TECHNICAL MANUAL



SYLVANIA RADIO TUBES

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EMPORIUM, PENNA.

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FOREWORD

Recent developments in Television and AM and FM radios have necessitated many new tube types. Present electronic equipment requires new tubes with new high quality standards to avoid noise, microphonism and electrical leakage. High frequency circuits have caused special emphasis to be placed on tubes with low lead inductances, low interelectrode capacitances and low dielectric losses. This edition of the Sylvania Technical Manual is designed to provide you with the most recent data on new electron tubes as well as furnish reference information on older types.

This manual has been prepared primarily for use by circuit design engineers and radio servicemen. To reduce the bulk of the book, only one set of curves are shown for similar tube types. Appropriate references are given to relate tubes to the proper tube data. Base connections and operating conditions are shown for all tube types listed in the manual.

Data on older tube types has been placed in the appendix. This has been done to make room for maximum information on television picture tubes and new receiving types.

The loose-leaf binder (explained in the appendix, page 84) readily permits insertion of new pages on additional tube types. These pages are mailed with the monthly paper "Sylvania News." If you do not already receive the News, it will be sent you without charge if you will write:

Sylvania Electric Products Inc.
Advertising Department
Emporium, Pennsylvania

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TYPE INDEX

There are only two places in this Manual where a tube type might be listed: in the main section, (MS), or in the appropriate table in the appendix, (App.). If it is a currently popular type, it is listed in proper numerical-alphabetical order in the main section. If seldom encountered, or perhaps obsolete, it will be found in a tabulated chart beginning on page 52 of the appendix for cathode ray tubes or page 55 for receiving tubes. Panel lamp data appears on page 81 and ballast tube data on page 82 of the appendix.

Type	Location
)A2	App. 55
)A4G	MS
)A5	MS
)B2	App. 55
)B3	MS
)C3	MS
)D3	MS
)Z3	App. 55
)Y4	App. 55
)Z4	MS
)1A	App. 55
1, KR1	App. 55
1A1	App. 82
1A3	App. 55
1A4	App. 55
1A4P	App. 55
1A4T	App. 55
1A5GT	MS
1A6	App. 55
1A7GT	MS
1AB5	App. 55
1AC5	MS
1AD5	MS
1B1	App. 82
1B3	MS
1B4/951	App. 55
1B4P	App. 55
1B5/25S	App. 55
1B7GT	App. 55
1C1	App. 82
1C5GT	MS
1C6	App. 55
1C7G	App. 55
1C8	MS
1D1	App. 82
1D5G	App. 55
1D5GP	App. 55
1D5GT	App. 55
1D7G	App. 55
1D8GT	MS
1D21	MS
1E1	App. 82
1E4G	MS
1E5GP	App. 55
1E5G, GT	App. 55
1E7GT	App. 55
1E8	MS
1F1	App. 82
1F4	App .55
1F5G	App. 55
1F6	App. 55
1F7G	App. 55
1F7GV	App. 55
1G1	App. 82
1G4GT	MS
1G5G	App. 55
1G6GT	MS
1H4G	App. 55
1H5GT	MS
1H6G	App. 55
1J1	App. 82
1J5G	App. 55
1J6G	App. 55
1K1	App. 82
1L4	MS
1LA4	MS
1LA6	MS
1LB4	MS
1LC5	MS
1LC6	MS
1LD5	MS
1LE3	MS
1LG5	MS
1LH4	MS
1LN5	MS
1N5GT	MS
1N6G	App. 55
1N34, etc.	MS
1P5GT	MS
1Q5GT	MS
1Q6	App. 55
1R1G	App. 82
1R4	App. 55
1R5	MS
1S4	MS
1S5	MS
1S6	MS
1SA6GT	App. 55
1SB6GT	App. 55
1T1G	App. 82
1T4	MS
1T5GT	MS
1T6	MS
1U4	MS
1U5	MS
1V	App. 55
1V5	MS
1W5	MS
1X1	App. 82
1Y1	App. 82
1Z1	App. 82
2	App. 82
2A3	App. 55
2A3H	App. 55
2A4G	App. 55
2A5	App. 55
2A6	App. 55
2A7, S	App. 55
2AP1, A	App. 52
2B7, S	App. 55
2E5	App. 55
2S/4S	App. 55
2V3G	App. 55
2W3GT	App. 55
2X2A	MS
2Z2/G84	App. 55
G2/2S	App. 55
3	App. 82
3A4	MS
3A5	App. 55
3A8GT	MS
3AP1-A	App. 52
3B5GT	App. 55
3B7	App. 55
3B8GT	App. 55
3BP1	App. 52
3D6	MS
3E6	MS
3JP12	App. 52
3LF4	MS
3Q4	MS
3Q5GT	MS
3S4	MS
3V4	MS
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4A1	App. 82
4A6G	App. 55
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5AZ4	MS
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5CP1	App. 52
5HP1	App. 52
5NP1	App. 52
5E1	App. 82
5FP7	App. 52
5T4	App. 55
5U4G	MS
5V4G	MS
5W4GT	MS
5X3	App. 55
5X4G	MS
5Y3GT	MS
5Y4G	MS
5Z3	MS
5Z4, GT	MS
KR5	App. 55
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6A4, LA	App. 55
6A5G	MS
6A6	App. 55
6A7	MS
6A7S	App. 55

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6A8, G, GT	MS
6AB5/6N5	App. 55
6AB6G	App. 55
6AB7	App. 55
6AC5GT	MS
6AC7	MS
6AD5, G, GT	App. 55
6AD6G	App. 55
6AD7G	App. 55
6AE5GT	App. 55
6AE6G	App. 55
6AE7GT	App. 55
6AF5G	App. 55
6AF6G	App. 55
6AG5	MS
6AG7	MS
6AH5G	App. 55
6AH6	MS
6AH7GT	App. 55
6AK5	MS
6AK6	MS
6AL5	MS
6AL6G	App. 55
6AL7G	MS
6AN6	App. 55
6AQ5	MS
6AQ6	MS
6AQ7	App. 55
6AR5	MS
6AS7G	MS
6AT6	MS
6AU6	MS
6AV6	MS
6B4G	MS
6B5	App. 55
6B6G	App. 55
6B7	App. 55
6B7S	App. 55
6B8, G, GT	App. 55
6BA6	MS
6BA7	MS
6BD6	MS
6BE6	MS
6BF6	MS
6BG6G	MS
6BH6	MS
6BJ6	MS
6C4	MS
6C5, GT	MS
6C6	App. 55
6C7	App. 55
6C8G	App. 55
6D4	MS
6D5G	App. 55
6D6	App. 55
6D7	App. 55
6D8G	App. 55
6E5	MS
6E6	App. 55
6E7	App. 55
6F5, GT	MS
6F6, G, GT	MS
6F7, S	App. 55
6F8G	App. 55
6G5	App. 55
6G6G	MS
6H4GT	App. 55
6H5	App. 55
6H6, GT	MS
6J4	App. 55
6J5, GT	MS
6J6	MS
6J7, GT	MS
6J8G	MS
6K4	MS
6K5G, GT	MS
6K6GT	MS
6K7, G, GT	MS
6K8, G, GT	MS
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6Q7, G, GT	MS
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6R7, GT	MS
6S7, G	MS
6S8GT	MS
6SA7GT	MS
6SB7Y	MS
6SC7, GT	MS
6SD7, GT	MS
6SE7GT	MS
6SF5, GT	MS
6SF7	MS
6SG7, GT	MS
6SH7, GT	MS
6SJ7, GT	MS
6SK7, GT	MS
6SL7GT	MS
6SN7GT	MS
6SQ7GT	MS
6SR7GT	MS
6SS7	MS
6ST7	MS
6SV7	App. 55
6T5	App. 55
6T7G	App. 55
6T8	MS
6U5/6G5	MS
6U6GT	MS
6U7G	MS
6V6, GT	MS
6V7G	MS
6W4GT	MS
6W5G	App. 55
6W6GT	MS
6W7G	MS
6X4	MS
6X5, GT	MS
6Y3G	App. 55
6Y5	App. 55
6Y6G	MS
6Y7G	MS
6Z3	App. 55
6Z4	App. 55
6Z4/84	App. 55
6Z5	App. 55
6Z7G	MS
6ZY5G	App. 55
7	App. 82
7A4	MS
7A5	MS
7A6	MS
7A7	MS
7A8	MS
7AB7	App. 55
7AD7	MS
7AF7	MS
7AG7	MS
7AH7	MS
7AJ7	MS
7AK7	MS
7B4	MS
7B5	MS
7B6	MS
7B7	MS
7B8	MS
7C4	App. 55
7C5	MS
7C6	MS
7C7	MS
7E5	MS
7E6	MS
7E7	MS
7F7	MS
7F8	MS
7G7	MS
7G8	MS
7GP1, 7GP4	App. 52
7H7	MS
7J7	MS
7JP1	App. 52
7JP4	MS
7K7	MS
7L7	MS
7N7	MS
7Q7	MS
7R7	MS
7S7	MS
7T7	App. 55
7V7	MS
7W7	MS
7X7	MS
7Y4	MS
7Z4	MS
8	App. 82
9	App. 82
10	App. 55
10BP4	MS
10HP4	MS
WD11	App. 55
WX12	App. 55
12A, 112A	App. 55
12A5	App. 55
12A6, GT	App. 55
12A7	App. 55
12A8GT	MS
12AH7GT	MS
12AL5	MS
12AT6	MS
12AT7	MS
12AU6	MS
12AU7	MS
12AV6	MS
12AW6	MS
12AX7	MS
12B7	App. 55
12B8GT	MS

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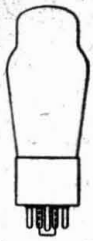
Type	Location
12BA6	MS
12BA7	MS
12BD6	MS
12BE6	MS
12C8	App. 55
12F5GT	MS
12H6	MS
12J5GT	MS
12J7GT	MS
12K7GT	MS
12K8GT	MS
12L8GT	App. 55
12LP4	MS
12Q7GT	MS
12S8GT	MS
12SA7GT	MS
12SC7	MS
12SF5GT	MS
12SF7	MS
12SG7	MS
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12SJ7, GT	MS
12SK7, GT	MS
12SL7GT	MS
12SN7GT	MS
12SQ7, GT	MS
12SR7	MS
12Z3	App. 55
12Z5	App. 55
13	App. 55
14A4	MS
14A5	MS
14A7	MS
14AF7	MS
14B6	MS
14B8	MS
14C5	MS
14C7	MS
14E6	MS
14E7	MS
14F7	MS
14F8	MS
14H7	MS
14J7	MS
14N7	MS
14Q7	MS
14R7	MS
14S7	MS
14W7	MS
14Y4	MS
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24A	App. 55
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25A7GT	App. 55
25AC5GT	App. 55
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25B6G	App. 55
25B8GT	MS
25C6G	MS
25D8GT	App. 55
25L6GT	MS
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25Y5	App. 55
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26	App. 55
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26D6	MS
27	App. 55
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28Z5	App. 55
KR28	App. 55
30	App. 55
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34	App. 55
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35A5	MS
35B5	MS
35C5	MS
35L6GT	MS
35W4	MS
35Y4	MS
35Z3	MS
35Z4GT	MS
35Z5GT	MS
35Z6G	App. 55
36	App. 55
36A	App. 55
37	App. 55
37A	App. 55
38	App. 55
38A	App. 55
39/44	App. 55
39A	App. 55
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42	App. 55
43	App. 55
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45	App. 55
45Z3	MS
46	App. 55
46A1	App. 82
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47	App. 55
48	App. 55
49	App. 55
50	App. 55
50A5	MS
50B5	MS
50C5	MS
50C6G	MS
50L6GT	MS
50X6	MS
50Y6GT	MS
50Y7GT	MS
50Z7G	MS
HZ50	App. 55
51	See Type 35/51
51S	App. 55
52	App. 55
53	App. 55
55	App. 55
55S	App. 55
56	App. 55
56AS	App. 55
56S	App. 55
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71B	App. 55
75	App. 55
75S	App. 55
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77	App. 55
78	App. 55
79	App. 55
80	MS
80M	App. 55
81	App. 55
81M	App. 55
82	MS
82V	App. 55
83	MS
83V	MS
84/6Z4	App. 55
G84/2Z2	App. 55
85	App. 55
85AS	App. 55
88	App. 55
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112A	App. 55
117L7/M7GT	MS
117N7GT	MS
117P7GT	App. 55
117Z3	MS
117Z4GT	App. 55
117Z6GT	MS
143D	App. 55
182B/482B	App. 55
183/483	App. 55
210T	App. 55
401	App. 55
482A	App. 55
482B	App. 55
483	App. 55
484	App. 55
485	App. 55
585	App. 55
586	App. 55
P861	App. 55

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Type	Location
864	App. 55
879	See 2X2A
884	MS
885	MS
950	App. 55
951	App. 55
1201	See Type 7E5
1203A	See Type 7C4
1204	See Type 7AB7
1206	See Type 7G8
1221	App. 55
1223	App. 55
1229	App. 55
1231	App. 55
1232	See Type 7G7
1247	MS
1265	App. 55
1266	App. 55
1267	App. 55
1273	MS
1275	App. 55
1276	App. 55
1280	MS
1291	See Type 3B7
1293	App. 55
1294	See Type 1R4
1299	See Type 3D6
1612	App. 55
1626	App. 55
1629	App. 55
2050	MS
2051	MS
5679	MS
5722	MS
9002	App. 55
9003	App. 55
AD	App. 55
AF	App. 55
AG	App. 55
AX	App. 55
B	App. 55
BA	App. 55
BH	App. 55
BR	App. 55
D½	App. 55
D1	App. 55
DE1	App. 55
E	App. 55
G	App. 55
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H2-10	App. 55
LA	App. 55
PZ	App. 55
PZH	App. 55
RE1	App. 55
RE2	App. 55
S02	App. 55
Wunderlich	App. 55
Wunderlich A	App. 55
Wunderlich B	App. 55
XXB	App. 55
XXD	App. 55
XXFM	App. 55
XXL	App. 55
X6030	App. 55



4V-0-0



Sylvania Type 0A4G

COLD CATHODE CONTROL TUBE

PHYSICAL SPECIFICATIONS

ıse	Small Octal 6-Pin
ulb	ST-12
aximum Overall Length	4 1/8"
aximum Seated Height	3 9/16"
ounting Position	Any

RATINGS

ın. Anode to Cathode Breakdown Voltage (Starter Anode Potential 0 Volts)	225 Volts	(A)
arter Anode to Cathode Breakdown Voltage—Min.	70 Volts	(B)
Max.	90 Volts	(B)
Max. Starter Anode Current for Anode Breakdown	100 μa.	(C)
ırter Anode to Cathode Voltage Drop (Approx.)	60 Volts	
node to Cathode Voltage Drop (Approx.)	70 Volts	
node Current—Continuous Max.	25 Ma.	
Instantaneous Max.	100 Ma.	

TYPICAL OPERATION

Anode Supply Voltage (RMS)	105 to 130 Volts
Starter Anode Voltage—Peak AC	70 Volts
Peak RF	55 Volts

Note; To assure stable operation, the 0A4G should be shielded from external ht sources.

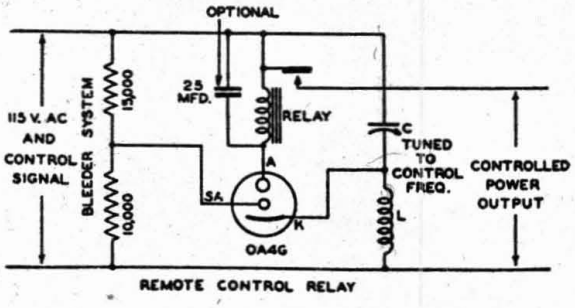
Notes; (A), (B), (C), refer to Application Notes.

APPLICATION

Type 0A4G is a gas filled, cold cathode type of tube for use in the remote control of line operated units. This is made possible by transmitting radio frequency impulses over the power line. The tube may also be used as a voltage regulator and as a relaxation oscillator.

The tube consists of a cathode, anode, and starter-anode. Its characteristics are such that with no voltage on the starter-anode a relatively large voltage (A) is required between the cathode and anode to cause the tube to start.

The application of a proper signal voltage (B) to the starter-anode will cause a cathode to starter-anode current (C) to flow. This will produce a glow discharge and reduce the voltage for breakdown between cathode and anode to the point where the tube will conduct at normal line voltage. Therefore, there need be no stand-by current flowing while the current is inoperative.



0A4G (Cont'd)

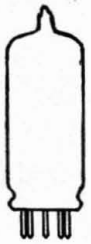
The accompanying circuit of a remote control relay is typical application of the Type 0A4G in a-c service. It will b noted in the circuit that full line voltage is applied between th anode and cathode and that a bleeder system is used to main tain a voltage on the starter-anode just below that required fo breakdown. The capacity and inductance, C and L, is a high-(tuned circuit for r-f signals. When an r-f signal is transmitte on the power line a resonant voltage appears across the induc ance and capacity. The voltage across condenser C increases th negative potential peaks on the cathode and increases th potentials between the cathode and starter-anode. A discharge between the cathode and starter-anode is started by these peaks. This discharge produces free ions which enable th discharge to transfer to the anode when sufficient starter-anod current flows. After this transfer occurs, current flows throu the relay.

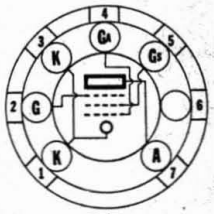
Precautions should be taken in the application of the Typ 0A4G so that at high line voltages the a-c voltage applied to the starter-anode will not be great enough to reach the breakdow point. Precautions should also be taken to insure that the carrier voltage will be large enough to make up for the lowes line voltage. Therefore, a minimum r-f starter-anode voltage o 55 volts should be provided.

The Type 0A4G may be operated from d-c power lines. How ever, after the tube has started to conduct through the applica tion of a signal it will continue to conduct even after the signal is removed, since the voltage supply on the anode circuit is continuous. Therefore, to reset the tube for a further operation to a nonconducting state, it will be necessary to remove the anode voltage or drop it below 60 volts, instantaneously, after the signal has been removed.

0A5 Sylvania Type

TRIGGERTUBE





OA5

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	1 5/8"
Maximum Seated Height	1 3/8"
Mounting Position	Any

RATINGS

Maximum Anode Operating Voltage DC	1000 Volts
Minimum Anode Operating Voltage DC (1)	500 Volts
Minimum Trigger Grid Firing Voltage (2)	+180 Volts
Minimum Hold-Off Voltage DC (3)	1500 Volts
Minimum Trigger Grid Pulse Voltage to Fire (2)	50 Volts
Maximum Trigger Grid Pulse Current (4)	40 ua.
Maximum Discharge Capacitance	0.5 ufd.
Maximum Power Input (5)	1.0 Watt
Maximum Repetition Rate	See Note 5
Minimum Peak Cathode Current to Produce Arc	10 Amperes
Ambient Temperature Range	−40 to +60° C.

(1) Operation at 250 volts is possible providing higher trigger pulse voltages are available.

(2) This is the sum of bias voltage and triggering pulse.

(3) Voltages above this limit may cause the tube to fire without application of pulse voltage. Measured in a typical circuit with a trigger grid bias of 90 volts and a keep-alive current of 50 ua.

(4) Measured in a typical circuit with 50 ua keep-alive current and 90 volts trigger grid bias.

(5) The maximum power input is given by $W = \frac{1}{2}CV^2f$ where C is the discharge capacitance in microfarads, V is the anode voltage in kilovolts and f is the number of flashes or pulses per second. This relation also determines the maximum repetition rate.

TYPICAL OPERATION

In an Electroflash Trigger Circuit

node Voltage DC	750 Volts
rigger Grid Voltage	+90 Volts
igger Grid Circuit Resistance	0.25 Megohm
rigger Pulse Voltage	85 Volts
eep-Alive Current	50 ua.
ischarge Condenser	0.25 ufd.

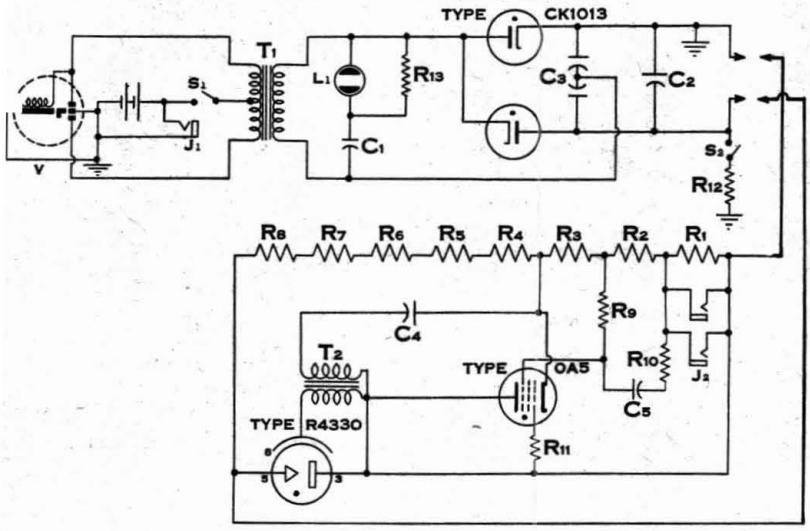
APPLICATION

Sylvania Type 0A5 is a miniature cold cathode gas discharge ube designed for use as a trigger tube for switching service requiring extremely high instantaneous peak currents (hundreds f amperes). It is sensitive enough and will carry high enough urrent to permit photocell operation of some devices without pecial amplifiers. The circuit below shows its use in a typical ortable Electroflash unit, where its use reduces the current arrying capacity requirement of the switch and also reduces ne shock hazard.

Note that for most applications the shield grid (Pin 5) is eft floating. This increases the sensitivity. Connection to the athode through a 10 meg. resistor increases the hold-off voltage considerably, but a higher trigger grid current will be required.

This type is licensed under the tube patents of Edgerton, Germeshausen, and Grier, but no license is implied under their ircuit patents.

BATTERY ELECTROFLASH CIRCUT DIAGRAM



PARTS LIST

Condenser	Capacity	Working Voltage
C1	.001 mfd.	2500
C2	32 mfd.	2500
C3	.05 – .05 mfd.	2000
C4	.25 mfd.	1000
C5	.01 mfd.	600

Resistor	Ohms	Watts
R1	.51 Meg.	½
R2	1.8 Meg.	½
R3	.47 Meg.	½
R4 to R8	1.6 Meg. each	1
R9	10 Meg.	½
R10	.27 Meg.	½
R11	10 Meg.	½
R12	5000	10
R13	47,000	½

MISCELLANEOUS

Battery	4 Volt Storage
J1	Battery charging connection
J2	Camera and Synchronizer connection
L1	Neon Indicator Lamp
S1	Off-On switch S.P.S.T.
S2	Safety switch
T1	Vibrator Transformer
T2	Trigger Transformer
V	Vibrator

0B3 Sylvania Type
0C3 Sylvania Type
0D3 Sylvania Type

VOLTAGE REGULATORS





4AJ-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 6 Pin
Bulb	ST-12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

RATINGS

	0B3	0C3	0D3
Minimum Starting Voltage Required	125	133	185 Volts
Operating Current—Minimum	5	5	5 Ma.
Operating Current—Maximum	30	40	40 Ma.
Maximum peak current for 10 Secs.	100	100	100 Ma.

TYPICAL OPERATION

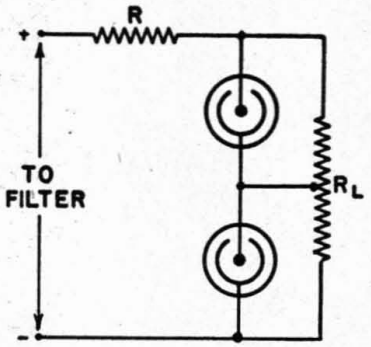
Heater Voltage	None Required		
Operating Voltage	90	105	150 Volts
Regulation (Max. Voltage change Min. to Max. Current)	6	4	5.5 Volts

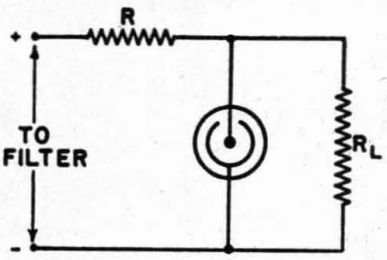
APPLICATION

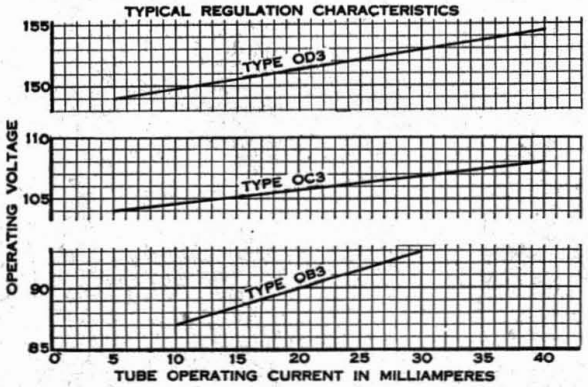
These 3 Sylvania tubes are gas filled cold cathode voltage regulators. They are characterized by a practically constant internal voltage drop across which a load requiring good regulation may be connected.

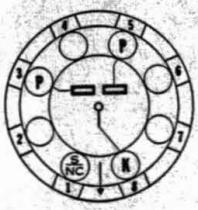
These types are mounted in the ST-12 bulb with a standard small 6-pin octal base. The outside, cylindrical electrode is the cathode, and is connected to base pin No. 2. The inner electrode is the anode and is connected to pin No. 5.

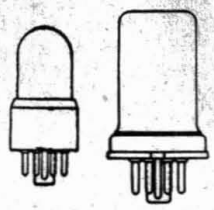
A current limiting resistor should always be used in series with the tube and the line. The amount of current drawn by the load will, of course, determine the size of this resistor, but it should be such as never to allow an operating current of more than the rated 30 or 40 ma to flow through the tube in case the load is disconnected.











Sylvania Type 0Z4
Sylvania Type 0Z4G

FULL WAVE GAS RECTIFIERS

4R-1-0 (0Z4)
4R-0-0 (0Z4G)

PHYSICAL SPECIFICATIONS

	0Z4	0Z4G
Base	Small Wafer Octal 6 Pin	Dwarf Octal 5 Pin
Bulb	Metal 8-3	T-7
Maximum Overall Length	2 5/8"	2 5/8"
Maximum Seated Height	2 1/16"	2 1/16"
Mounting Position	Any	Any

RATINGS

Heater Voltage	None Required
Peak Starting Plate Voltage	300 Min.
Peak Plate Current (Operating)	200 Ma.
Peak Plate to Plate Voltage	1000 Volts
DC Output Current	30 Ma. Min. 90 Ma. Max

TYPICAL OPERATION

Heater Voltage	None Required
AC Plate Voltage (RMS)	300 Volts
DC Output Current	90 Ma.

APPLICATION

Sylvania Types OZ4 and OZ4G are full wave gas filled rectifiers. No heater or filament supply is required since the cathodes are designed for ionic heating. This aids in keeping battery drain to a minimum in receivers such as auto radios where such a factor may be important.

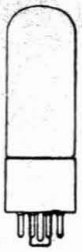
Types OZ4 and OZ4G will handle high peak currents in operation with a constant voltage drop of approximately 24 volts. The electrical characteristics of both types are identical. Shielding of type OZ4G may be required since gas rectifiers may radiate RF interference unless adequate shielding is provided.

Conventional filter circuits such as normally used with gas and vapor filled rectifiers are adequate for satisfactory performance.

1A5^{GT} Sylvania Type

POWER AMPLIFIER PENTODE

LOCK-IN EQUIVALENT 1LA4





6X-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7-Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Filament Voltage (Design Center for AC-DC Oper.)	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Total Zero Signal Cathode Current	6 Ma.

TYPICAL OPERATION AS A CLASS A_1 AMPLIFIER

Filament Voltage	1.4	1.4 Volts
Filament Current	.050	.050 Ampere
Plate Voltage	85	90 Volts
Screen Voltage	85	90 Volts
Grid Voltage*	-4.5	-4.5 Volts
Plate Current	3.5	4.0 Ma.
Screen Current	0.7	0.8 Ma.
Plate Resistance	0.3	0.3 Megohm
Mutual Conductance	800	850 μmhos
Load Resistance	25,000	25,000 Ohms
Power Output	100	115 Milliwatts
Total Harmonic Distortion	10	7 Percent

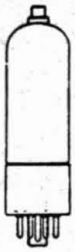
*Self bias is recommended for battery operation although it reduces the power output slightly. It makes a separate bias supply unnecessary and allows the bias to decrease in proportion with the decrease in B supply volts with age.

APPLICATION

The characteristics of this type have been duplicated in Lock-In Type 1LA4 to which reference should be made for curve data and circuit application notes.



7Z-1-0



Sylvania Type 1A7GT

HEPTODE CONVERTER

LOCK-IN EQUIVALENT 1LA6

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8-Pin Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Filament Voltage	1.4 Volts
Filament Current	0.05 Ampere
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	60 Volts
Maximum Screen Supply Voltage	110 Volts
Maximum Anode-Grid Voltage	110 Volts
Maximum Cathode Current	4.0 Ma.

TYPICAL OPERATION

Filament Voltage	1.4 Volts
Filament Current	0.05 Ampere
Plate Voltage	90 Volts
Screen Voltage**	45 Volts
Anode-Grid Voltage	90 Volts
Control-Grid Voltage (G)†	0 Volts
Oscillator Grid Resistor (Go)	200000 Ohms
Plate Resistance	0.6 Megohm
Plate Current	0.55 Ma.
Screen Current	0.6 Ma.
Anode-Grid Current	1.2 Ma.
Oscillator Grid Current	0.035 Ma.
Total Cathode Current	2.4 Ma.
Conversion Conductance;	
Control Grid Voltage at 0 Volts	250 μmhos
Control Grid Voltage at −2 Volts	50 μmhos
Control Grid Voltage at −3 Volts	5 μmhos

**Obtained preferably by using a properly by-passed 70,000 ohm resistor in series with a 90 volt supply.

†A resistance of at least 1 megohm should be in the grid return to negative filament pin.

APPLICATION

Sylvania Type 1A7GT is a pentagrid converter tube designed especially for service in low drain battery operated receivers.

The characteristics of this tube have been closely duplicated in lock-in type 1LA6 to which reference should be made for curve data and circuit application notes.

1AC5 Sylvania Type

OUTPUT PENTODE





8CP-0-0

PHYSICAL SPECIFICATIONS

Base	Subminiature Button 8 Pin
Bulb	T-3
Maximum Overall Length	1¾"
Maximum Seated Height	1½"
Mounting Position	Any

RATINGS

Filament Voltage DC	1.25 Volts
Maximum Plate Voltage	67.5 Volts
Maximum Screen Voltage	67.5 Volts
Maximum Cathode Current	4.0 Ma.

TYPICAL OPERATION

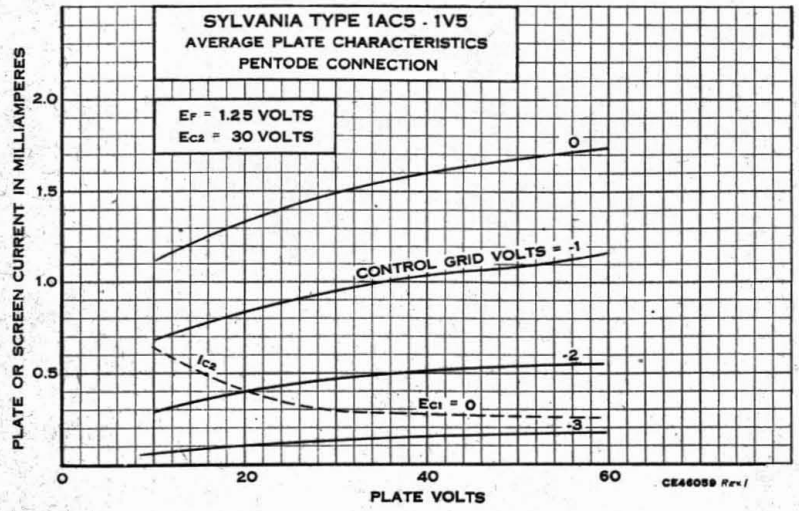
CLASS A AMPLIFIER

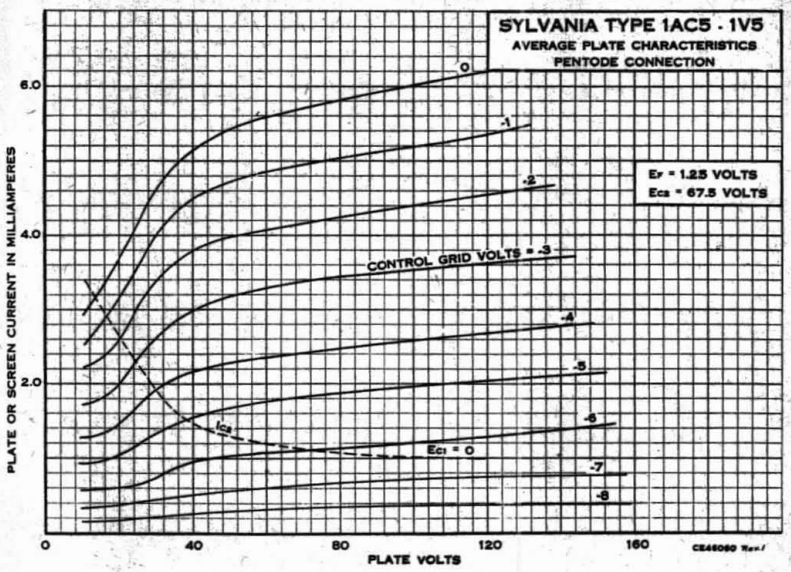
Filament Voltage DC	1.25	1.25	1.25 Volts
Filament Current	40	40	40 Ma.
Plate Voltage	30	45	67.5 Volts
Screen Voltage	30	45	67.5 Volts
Grid Voltage	−2.0	−3.0	−4.5 Volts
Plate Current	0.50	1.0	2.0 Ma.
Screen Current	0.10	0.2	0.4 Ma.
Plate Resistance (Approx.)	.200	.170	.150 Megohm
Mutual Conductance	450	600	750 μmhos
Load Resistance	50,000	40,000	*25,000 Ohms
Power Output	5	15	50
Total Harmonic Distortion	10	10	10%

APPLICATION

Sylvania Type 1AC5 is an Output Pentode suitable for use in very small radio sets or amplifiers. The other types required for a normal set complement and designed for such usage are Types 1E8 (Converter), 1T6 (Diode Pentode) and 1AD5 (RF Pentode).

This type corresponds in service and circuit requirements to Type 1LA4 except for the improved plate current economy.




SYLVANIA TYPE 1AC5 - 1V5
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Er = 1.25 VOLTS
Ec2 = 67.5 VOLTS
CONTROL GRID VOLTS = -3
0
-1
-2
-4
-5
-6
-7
-8
Ic2
Ec1 = 0
PLATE OR SCREEN CURRENT IN MILLIAMPERES
6.0
4.0
2.0
0
40
80
120
160
PLATE VOLTS
CE46060 Rev.1

1AD5 Sylvania Type

SHARP CUT-OFF RF PENTODE





8CP-0-0

PHYSICAL SPECIFICATIONS

Base	Subminiature Button 8 Pin
Bulb	T-3
Maximum Overall Length	1¾″
Maximum Seated Height	1½″
Mounting Position	Any

Direct Interelectrode Capacitances:*

	Unshielded	Shielded*
Grid to Plate	.01 Max.	.009 μμf. Max.
Input	1.8	1.9 μμf.
Output	2.8	3.0 μμf.

*With 0.405″ diameter shield connected to negative filament. Leads numbering 1, 3 and 6 must be grounded to obtain these values.

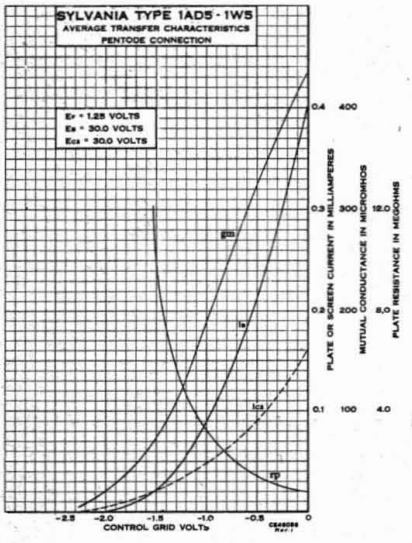
TYPICAL OPERATION

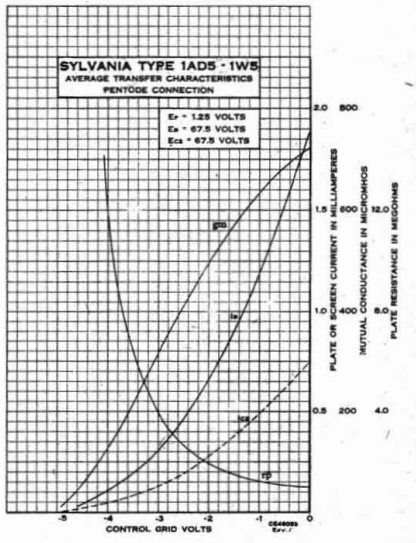
Filament Voltage DC	1.25	1.25	1.25 Volts
Filament Current	40	40	40 Ma.
Plate Voltage	30	45	67.5 Volts
Screen Voltage	30	45	67.5 Volts
Grid Voltage	0	0	0 Volts
Plate Current	0.45	0.9	1.85 Ma.
Screen Current	0.16	0.35	0.75 Ma.
Plate Resistance (Approx.)	0.7	0.7	0.7 Megohm
Mutual Conductance	430	580	735 μmhos
Control Grid Voltage for Ib=10 μa. (Approx.)	−3.0	−4.0	−6.0 Volts

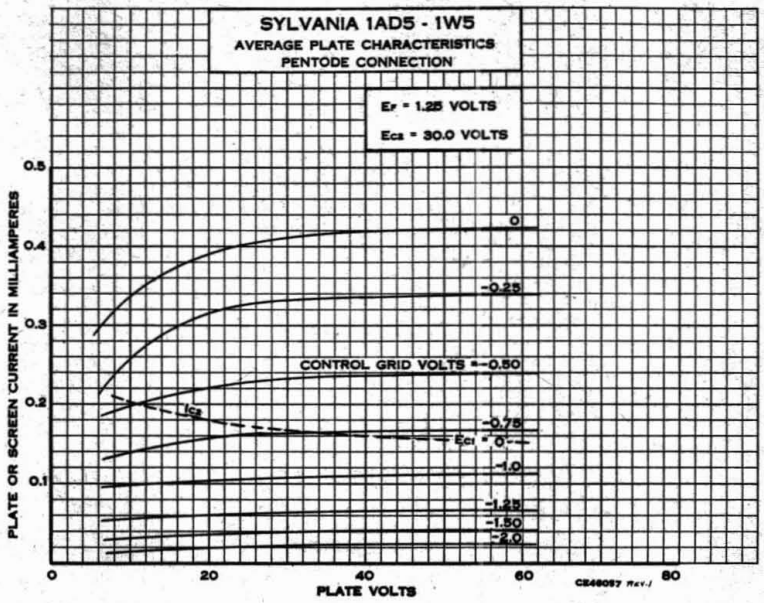
APPLICATION

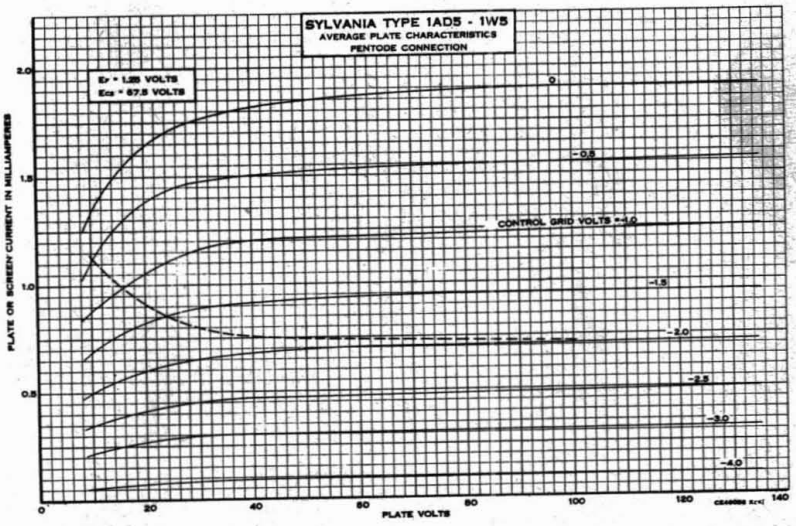
Sylvania Type 1AD5 is an RF Pentode tube suitable for use in very small radio sets or amplifiers. The other types required for a normal set complement and designed for such usage are Types 1E8 (Converter), 1T6 (Diode Pentode) and 1AC5 (Output Pentode).

This type corresponds in service and circuit design to Type 1LN5 and will operate satisfactorily with standard radio components.





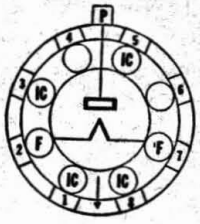

SYLVANIA 1AD5 - 1W5
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Ef = 1.25 VOLTS
Ec2 = 30.0 VOLTS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
0.5
0.4
0.3
0.2
0.1
0
-0.25
CONTROL GRID VOLTS =-0.50
Ic2
-0.75
Ec1 = 0
-1.0
-1.25
-1.50
-2.0
0
20
40
60
80
PLATE VOLTS


SYLVANIA TYPE 1AD5 - 1W5
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Ef = 1.25 VOLTS
Ec2 = 67.5 VOLTS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
2.0
1.5
1.0
0.5
0
-0.5
CONTROL GRID VOLTS =-1.0
-1.5
-2.0
-2.5
-3.0
-4.0
0
20
40
60
80
100
120
140
PLATE VOLTS

1B3GT Sylvania Type

HALF-WAVE RECTIFIER





3C-0-7

PHYSICAL SPECIFICATIONS

Base	Short Intermediate Shell Octal 6-Pin
Bulb	T-9
Cap	Small
Maximum Overall Length	4 1/16"
Maximum Seated Height	3 1/2"
Mounting Position	Any

RATINGS

Filament Voltage AC or DC	1.25 Volts
Filament Current	200 Ma.
Maximum Peak Inverse Plate Voltage	40,000 Volts
Maximum Peak Plate Current	17 Ma.
Maximum Average Plate Current	2 Ma.
Maximum Frequency of Supply Voltage	300 Kc.
Direct Interelectrode Capacitances*	
Plate to Filament (Approx.)	1.2 μμf.

* *Unshielded.*

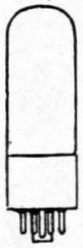
APPLICATION

Sylvania Type 1B3GT is a high-vacuum half-wave rectifier designed for high voltage service where low currents are required. Typical examples are for operation of cathode-ray tubes and electroflash units.

When the high voltage is supplied by an oscillator care should be taken to use large leads and long radius corners to avoid corona loss. When the filament is also supplied by the oscillator the adjustment for proper operating temperature should be made optically by comparison with a similar filament on a readily metered supply. Shielding is recommended not only on account of R. F. supply interference but from possible soft X-rays.

1C5GT Sylvania Type

POWER OUTPUT PENTODE





6X-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7-Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

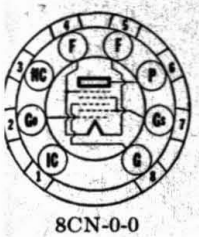
TYPICAL OPERATION

Filament Voltage	1.4	1.4 Volts
Filament Current	0.10	0.10 Ampere
Plate Voltage	83	90 Volts
Screen Voltage	83	90 Volts
Grid Voltage*	−7.0	−7.5 Volts
Plate Current	7.0	7.5 Ma.
Screen Current	1.6	1.6 Ma.
Plate Resistance	110000	115000 Ohms
Mutual Conductance	1500	1550 μmhos
Amplification Factor	165	180
Load Resistance	9000	8000 Ohms
Power Output	200	240 Mw.
Total Harmonic Distortion	10	10 Per Cent

*Negative filament return, Pin No. 7.

APPLICATION

This tube is now used only for replacement in sets designed for it, since improved performance can be obtained from types 1LB4, 3D6 or 3Q5GT.



8CN-0-0



Sylvania Type 1C8

PENTAGRID CONVERTER

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	1½"
Minimum Lead Length	1¼"
Mounting Position	Any

For additional data reference should be made to Type 1E8 which has the same operating conditions but differs in lead length.



8AJ-0-2



Sylvania Type 1D8GT

DIODE TRIODE

POWER AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Filament Voltage	
Dry Battery Operation Must Never Exceed	1.6 Volts
AC DC Operation Design Center	1.3 Volts
Maximum Plate Voltage (Pentode)	110 Volts
Maximum Screen Voltage (Pentode)	110 Volts
Maximum Plate Voltage (Triode)	110 Volts
Maximum Cathode Current (Pentode Zero Signal)	6 Ma.
Minimum Diode Current (10 Volts DC Applied)	0.5 Ma.

*The single diode plate is located at the negative end of the filament and is independent of the other sections except for the common filament.

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	100 Ma.

TRIODE UNIT CLASS A1 AMPLIFIER

Plate Voltage	45	67.5	90 Volts
Grid Voltage	0	0	0 Volt
Amplification Factor	25	25	25
Plate Resistance (Approximate)	77,000	55,500	43,500 Ohms
Mutual Conductance	325	450	575 μmhos
Plate Current	0.3	0.6	1.1 Ma.

PENTODE UNIT CLASS A1 AMPLIFIER

Plate Voltage	45	67.5	90 Volts
Screen Voltage	45	67.5	90 Volts
Grid Voltage	−4.5	−6.0	−9.0 Volts
Plate Resistance (Approximate)	0.3	0.2	0.2 Megohm
Mutual Conductance	650	875	925 μmhos
Plate Current	1.6	3.8	5.0 Ma.
Screen Current	0.3	0.8	1.0 Ma.
Load Resistance	20,000	16,000	12,000 Ohms
Power Output	35	100	200 Milliwatts
Total Harmonic Distortion	10	10	10 Percent

APPLICATION

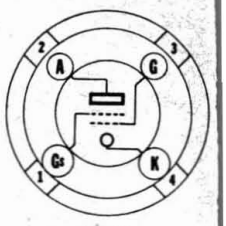
Sylvania Type 1D8GT is a 1.4 volt filament type tube containing in one bulb, a diode, medium mu triode, and a power amplifier pentode. This tube is suitable for use in dry battery operated portable receivers since the filament can be operated directly from a single dry cell without ballast resistors.

Because of the 100 ma. filament current requirement this tube is not suitable for use in series string arrangement with other 1.4 volt tubes.

1D21 Sylvania Type

STROBOTRON





1D21

PHYSICAL SPECIFICATIONS

Base	Small 4 Pin
Bulb	T-9
Maximum Overall Length	4 9/32"
Maximum Seated Height	3 5/8"
Mounting Position	Any

RATINGS

Maximum Anode Voltage DC*	300 Volts
Maximum Peak Inverse Anode Voltage	50 Volts
Minimum Peak Cathode Current	5 Amperes
Maximum Average Cathode Current	50 Ma.
Maximum Pulse Frequency	240 pps
Maximum Average Grid Current	15 Ma.
Maximum Control Grid Circuit Resistance	5 Megohms
Maximum Grid Current (Surge)	1 Ma.
Maximum Shield or Control Grid Voltage†	±50 Volts
Minimum Grid Pulse Voltage	175 Volts
Approx. Tube Voltage Drop—Glow Discharge	70 Volts
—Arc Discharge	20 Volts
Ambient Temperature Range	−55 to +90° Cent.

TYPICAL OPERATION

Anode Voltage*	300 Volts
Average Cathode Current	50 Ma.
Peak Cathode Current	10 to 200 Amperes
Control Grid Voltage†	0 Volts
Shield Grid Voltage†	+30 Volts
Pulse Voltage	175 Volts

*Measured from anode to shield grid.

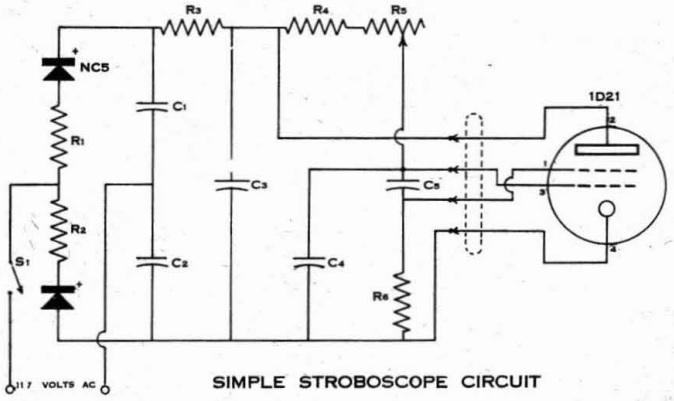
†Either grid may be used for control with proper bias on the other grid.

APPLICATION

Sylvania Strobotron Type 1D21 is a gas discharge tube which when used in a suitable circuit may be used for studying the motion of rotating or reciprocating parts up to 14,400 revolutions per minute.

A circuit for a simple stroboscope requiring a minimum of parts and capable of operating over the range from 600 to 6720 revolutions per minute is shown below.

Sylvania Strobotron tubes are licensed under the patents of Edgerton, Germeshausen, and Grier, but no license is implied under their circuit patents.

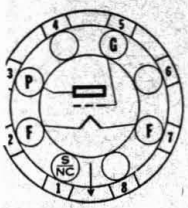


SIMPLE STROBOSCOPE CIRCUIT

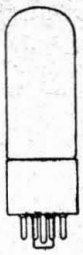
PARTS LIST

R1—10 ohm, 1 w. res.
R2—10 ohm, 1 w. res.
R3—3500 ohm, 10 w. wirewound res.
R4—50,000 ohm, 1 w. res.
R5—1 megohm pot.
R6—2 megohm, 1 w. res.

C1—20 ufd., 450 v. elec. cond.
C2—20 ufd., 450 v. elec. cond.
C3—1 ufd., 400 v. cond.
C4—.1 ufd., 400 v. cond.
C5—.01 ufd., mica cond.
S1—S.p.s.t. toggle sw.



5S-0-0



Sylvania Type 1E4G

MEDIUM-MU TRIODE

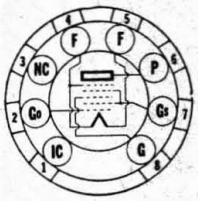
LOCK-IN EQUIVALENT 1LE3

PHYSICAL SPECIFICATIONS

ıse	Small Octal 7 Pin
ulb	T-9
axımum Overall Length	4"
axımum Seated Height	3 1/16"
ounting Position	Any

APPLICATION

Sylvania Type 1E4G is a general purpose triode designed for use in low drain battery operated receivers. Its characteristics have been duplicated in type 1LE3, to which reference should be made for additional data.



8CN-0-0



Sylvania Type 1E8

PENTAGRID CONVERTER

PHYSICAL SPECIFICATIONS

Base	Subminiature Button 8 Pin
Bulb	T-3
Maximum Overall Length	1¾"
Maximum Seated Height	1½"
Mounting Position	Any

Direct Interelectrode Capacitances:

	Unshielded
Control grid to all other electrodes	6.0 μμf.
Control grid to plate	0.4 μμf. Max.
Plate to all other electrodes	5.0 μμf.
Oscillator grid to control grid	0.2 μμf. Max.
Oscillator grid to all other electrodes	2.4 μμf.

TYPICAL OPERATION

Filament Voltage DC	1.25	1.25	1.25 Volts
Filament Current	40	40	40 Ma.
Plate Voltage	30	45	67.5 Volts
Screen Supply Voltage	30	45	67.5 Volts
Screen Grid Resistor	10,000	15,000	20,000 Ohms
Grid Voltage	0	0	0 Volts
Plate Current	0.30	0.6	1.0 Ma.
Screen Current	0.8	1.1	1.5 Ma.
Plate Resistance (Approx.)	0.3	0.4	0.4 Megohm
Conversion Transconductance	115	140	150 μmhos
Oscillator Grid Resistance	0.1	0.1	0.1 Megohm
Oscillator Grid Current	30	50	70 μa.
Control Grid Voltage for Gc=5 μmhos approx.	−7.0	−8.0	−9.0

Oscillator Characteristics*

Mutual Conductance	730 μmhos

*In a non-oscillating condition with plate and screen tied together at a voltage of 30 volts, and zero volts on the oscillator and control grids.

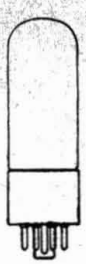
APPLICATION

Sylvania Type 1E8 is a converter tube for use in very small radio sets. The other types required for a normal set complement and designed for such usage are Types 1T6 (Diode Pentode), 1AC5 (Output Pentode) and 1AD5 (RF Pentode).

This type corresponds in service and circuit requirements to Type 1R5 except for optimization of the performance at low voltages.

1G4GT Sylvania Type

MEDIUM-MU TRIODE





5S-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts Max.
Grid Voltage*	-6.0 Volts
Plate Current	2.3 Ma.
Mutual Conductance	825 μmhos
Amplification Factor	8.8

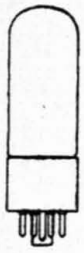
*Negative filament return, Pin No. 7.

APPLICATION

Sylvania Type 1G4G is a general purpose triode designed for use in low drain battery operated receivers. It is now used almost exclusively for replacement purposes.

1G6GT Sylvania Type

DUO TRIODE POWER AMPLIFIER





7AB-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	100 Ma.

CLASS A AMPLIFIER (Each Triode)

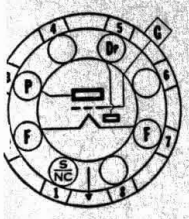
Plate Voltage	90 Volts
Grid Voltage	0 Volt
Plate Current	1.0 Ma.
Plate Resistance	40000 Ohms
Mutual Conductance	825 μmhos
Amplification Factor	33

CLASS B POWER AMPLIFIER

Plate Voltage	90 Volts Max.
Grid Voltage	0 Volt
Plate Current Per Plate (Zero Signal)	1.0 Ma.
Peak Plate Current Per Triode	20 Ma. Max.
Load Resistance (Plate to Plate)	12000 Ohms
Power Output*	675 Mw.
Distortion (Approx.)	3 Per Cent

APPLICATION

Sylvania 1G6G is a 1.4 volt battery type Class B power amplifier consisting of two triode units in a single bulb. It is now used almost exclusively for replacement purposes.



5Z-1-7



Sylvania Type 1H5GT

DIODE HIGH-MU TRIODE

LOCK-IN EQUIVALENT 1LH4

PHYSICAL SPECIFICATIONS

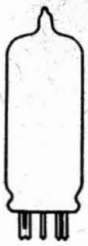
Base	Small Wafer 7 Pin Octal Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

APPLICATION

For other information on this type refer to corresponding Lock-In type 1LH4 which is identical in electrical characteristics.

1L4 Sylvania Type

SHARP CUT OFF RF PENTODE





6AR-0-1 & 5

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Filament Voltage	
Battery Operation—Must Never Exceed	1.6 Volts
AC DC Power Line Operation—Design Center	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	90 Volts
Maximum Total Cathode Current	6.5 Ma.
Minimum Grid Bias	0 Volt

Direct Interelectrode Capacitances:*

Grid to Plate	0.010 μμf Max.
Input	3.6 μμf
Output	7.5 μμf

*Measured without tube shield.

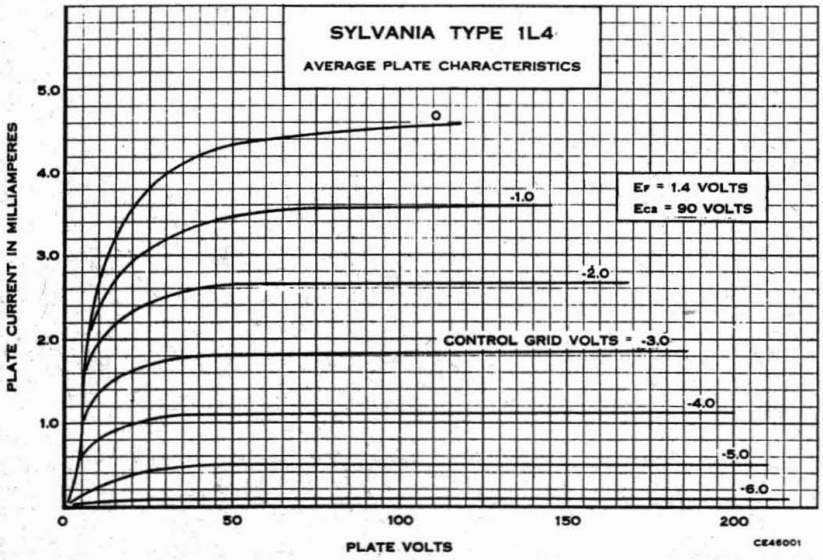
TYPICAL OPERATION

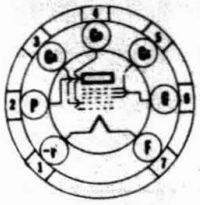
Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	90	90 Volts
Screen Voltage	67.5	90 Volts
Grid Voltage	0	0 Volts
Plate Resistance	0.6	0.35 Megohm
Mutual Conductance	925	1025 μmhos
Plate Current	2.9	4.5 Ma.
Screen Current	1.2	2.0 Ma.
Grid Bias for 10 μa. Plate Current	−6.0	−8.0 Volts

APPLICATION

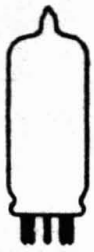
Sylvania Type 1L4 is a sharp cut off pentode of miniature construction. It is designed for RF and IF service in compact portable receivers. Low current requirements and its ability to operate at low plate and screen voltages along with its small size make it desirable for these applications. The internal shielding usually eliminates the need for a tube shield. Circuit requirements are similar to those of other 1.4 volt battery tubes.

For use in resistance coupled amplifiers see appendix.





7DC-0-0



Sylvania Type 1L6

PENTAGRID CONVERTER

PHYSICAL SPECIFICATIONS

Base	Small Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Maximum Plate Voltage	110 Volts
Maximum Screen Supply Voltage	110 Volts
Maximum Screen Voltage	65 Volts
Maximum Anode Grid Voltage	110 Volts
Maximum Cathode Current	4.0 Ma.
Minimum Signal Grid Circuit Resistance	1.0 Meg.

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Grid G to Plate	0.30	0.45 μμf Max.
Grid G to Grid Ga	0.24	0.24 μμf
Grid G to Grid Go	0.19	0.19 μμf
Grid Go to Grid Ga	0.80	0.80 μμf
Grid G to All (RF Input)	7.5	7.5 μμf
Grid Ga to All except Go (Oscillator Output)	2.6	2.6 μμf
Grid Go to All except Ga (Oscillator Input)	2.2	2.2 μμf
Plate to All (Mixer Output)	12.0	7.0 μμf
Grid Go to Plate	0.10	0.15 μμf Max.

*With ¾" diameter shield (RMA Std. 316) connected to Pin 1.

TYPICAL OPERATION

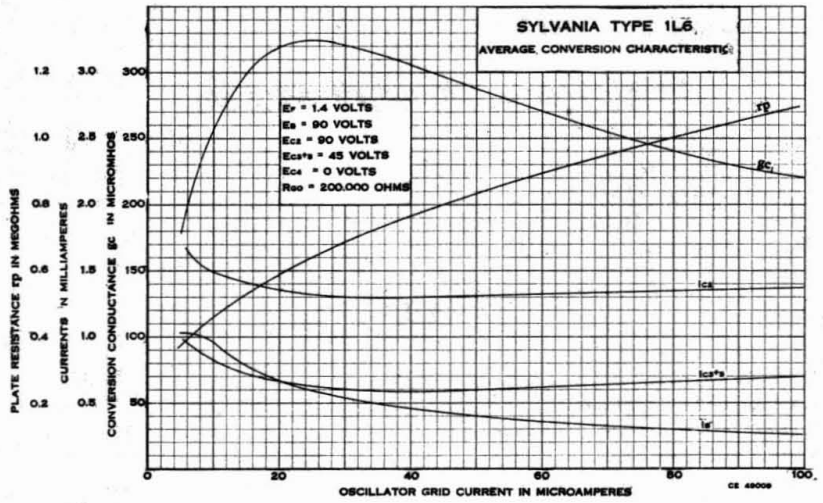
Filament Voltage	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage#	45 Volts
Anode Grid Voltage (Ega)	90 Volts
Control Grid Voltage	0 Volts
Control Grid Circuit Resistance	1.0 Meg.
Oscillator Grid Resistor (Rgo)	0.2 Meg.
Plate Resistance (Approx.)	0.65 Meg.
Plate Current	0.5 Ma.
Screen Current	0.6 Ma.
Anode Grid Current	1.2 Ma.
Oscillator Grid Current	0.035 Ma.
Total Cathode Current	2.35 Ma.
Conversion Transconductance	
Control Grid Voltage at 0 Volts	300 μmhos
Control Grid Voltage at −3.5 Volts (Approx.)	10 μmhos
Oscillator Mutual Conductance**	550 μmhos

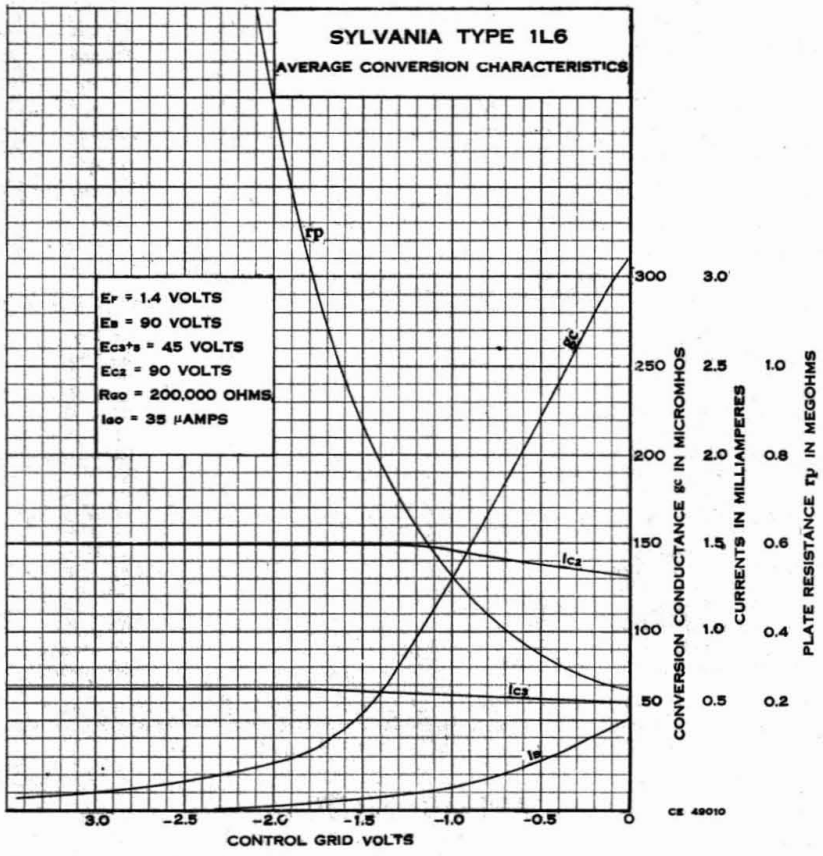
**Not oscillating, Eb = 90 V, Egs = 45 V, Ega = 90 V, Eg and Ego = 0 V.
#Obtained preferably by using a properly bypassed dropping resistor of from 45,000 ohms to 75,000 ohms in series with the B supply.

APPLICATION

Sylvania Type 1L6 is a miniature type pentagrid converter designed for use in low drain battery operated receivers. It is similar in construction and application to Types 1A7GT and 1LA6. The small size and low current requirements recommend it for use in small portable receivers.

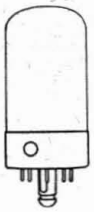
1L6 (Cont'd)


SYLVANIA TYPE 1L6
AVERAGE CONVERSION CHARACTERISTICS
Er = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 90 VOLTS
Ec3+s = 45 VOLTS
Ec4 = 0 VOLTS
Rgo = 200,000 OHMS
rp
gc
Ic2
Ic3+s
Ib
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE 49009


SYLVANIA TYPE 1L6
AVERAGE CONVERSION CHARACTERISTICS
Er = 1.4 VOLTS
Eb = 90 VOLTS
Ec3+s = 45 VOLTS
Ec2 = 90 VOLTS
Rgo = 200,000 OHMS
Igo = 35 μAMPS
rp
gc
Ic2
Ic3
Ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE 49010



5AD-L-0



Sylvania Type 1LA4

POWER OUTPUT PENTODE

GT EQUIVALENT 1A5GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Filament Voltage (Design Center for AC-DC Operation)	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Total Zero Signal Cathode Current	6 Ma.

TYPICAL OPERATION AS A CLASS A_1 AMPLIFIER

Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	85	90 Volts
Screen Voltage	85	90 Volts
Grid Volts*	−4.5	−4.5 Volts
Self-Bias Resistor*	1000	950 Ohms
Plate Current	3.5	4.0 Ma.
Screen Current	0.7	0.8 Ma.
Plate Resistance	0.3	0.3 Megohm
Mutual Conductance	800	850 μmhos
Load Resistance	25,000	25,000 Ohms
Power Output	100	115 Milliwatts
Total Harmonic Distortion	10	7 Per Cent

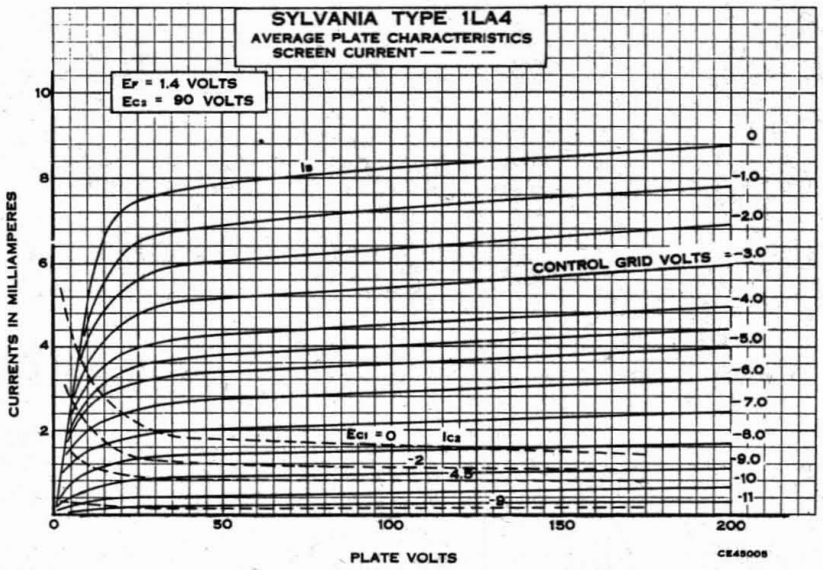
*Self bias is recommended for battery operation. Although it reduces the power output slightly it makes a separate bias supply unnecessary and allows the bias to decrease in proportion with the decrease in B supply volts with age.

APPLICATION

Sylvania Type 1LA4 is a power output pentode, designed especially for use in low drain battery operated receivers. This type is extremely economical to use because the A and B current drains are quite low for this power output.

Operation on 1.5 volt dry battery supply is permissible without the use of a resistor or ballast tube since the design provides satisfactory performance over the useful life of the battery. See appendix for general comments on use with other voltage supplies.

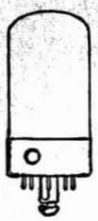
The following curve may be useful in estimating performance under other conditions.



1LA6 Sylvania Type

HEPTODE CONVERTER

GT EQUIVALENT 1A7GT





7AK-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Supply	110 Volts
Maximum Screen Voltage	65 Volts
Maximum Anode-Grid Voltage	110 Volts
Maximum Cathode Current	4.0 Ma.

Direct Interelectrode Capacitances:*

Grid G to Plate	0.4 μμf
Mixer Input	7.5 μμf
Mixer Output	8.0 μμf
Oscillator Input	2.8 μμf
Oscillator Output	3 2 μμf

*With $1\frac{5}{16}$" diameter tube shield (RMA Std. 308) connected to negative filament.

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage**	45 Volts
Anode-Grid Voltage	90 Volts
Control Grid Voltage (G)	0 Volt
Oscillator Grid Resistor (Go)	200000 Ohms
Plate Resistance	0.75 Megohm
Plate Current	0.55 Ma.
Screen Current	0.6 Ma.
Anode-Grid Current	1.2 Ma.
Oscillator Grid Current	0.035 Ma.
Conversion Conductance	250 μmhos
Control Grid Voltage at -3 Volts	10 μmhos

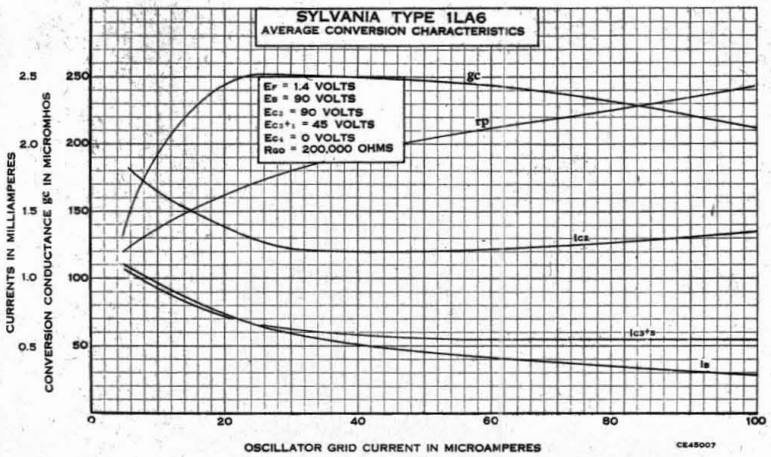
**Obtained preferably by using a properly by-passed voltage dropping resistor of 45,000 to 70,000 ohms in series with the "B" voltage supply.
A resistance of at least 1 megohm should be in the grid return to negative fil.

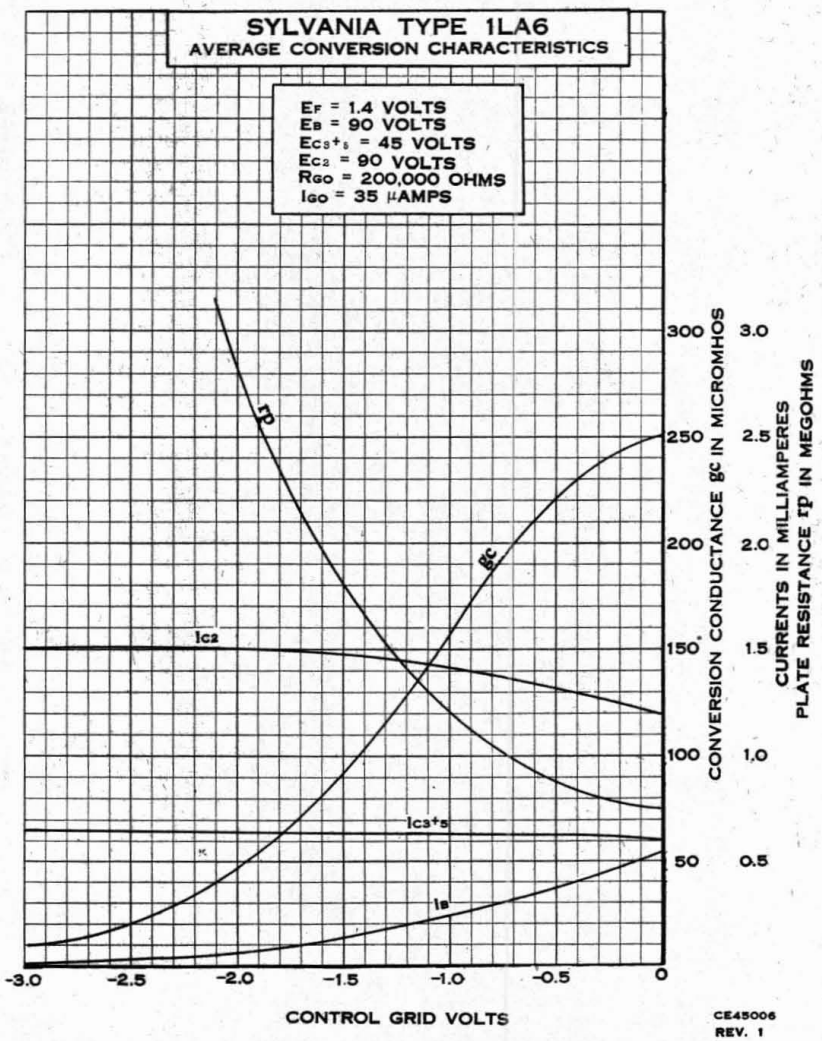
APPLICATION

Sylvania Type 1LA6 is a pentagrid converter tube designed especially for service in low drain battery operated receivers. Its applications are similar to other pentagrid converters, such as types 7A8 and 1A7G, but the differences in characteristics and operating conditions must be taken into account in designing the other components to secure optimum performance.

The filament is designed for operation directly from a suitable 1.5 volt dry battery without the use of a ballast tube and will give satisfactory performance over the useful life of the battery. See appendix for use on other voltage supplies.

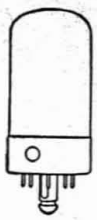
A 90 volt B battery is required for the plate and anode supply voltages. A 70,000 ohm dropping resistor from this supply is the preferred method of obtaining the screen voltage. Although no grid bias voltage is required the grid return should be made either to the A V C system or through a 1 megohm resistor suitably bypassed.

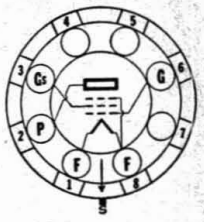

SYLVANIA TYPE 1LA6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
EB = 90 VOLTS
EC2 = 90 VOLTS
EC3+S = 45 VOLTS
EC4 = 0 VOLTS
RGO = 200,000 OHMS
gc
rp
Ic2
Ic3+s
Ia
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE45007


SYLVANIA TYPE 1LA6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
EB = 90 VOLTS
EC3+S = 45 VOLTS
EC2 = 90 VOLTS
RGO = 200,000 OHMS
IGO = 35 μAMPS
rp
gc
Ic2
Ic3+s
Ia
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45006
REV. 1

1LB4 Sylvania Type

POWER OUTPUT PENTODE





5AD-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Cathode Current	6.0 Ma.

TYPICAL OPERATION

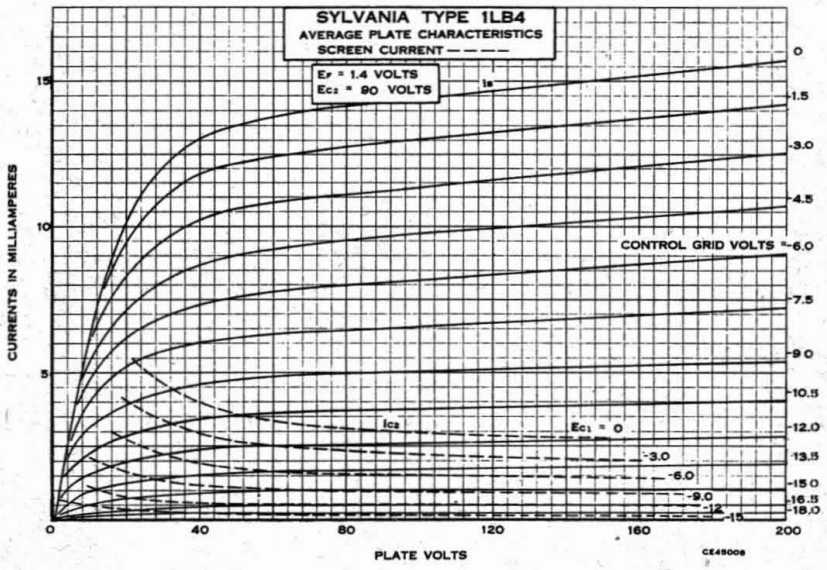
Filament Voltage DC	1.4	1.4	1.4	1.4 Volts
Filament Current	50	50	50	50 Ma.
Plate Voltage	45	62.5	67.5	90 Volts
Screen Voltage	45	62.5	67.5	90 Volts
Grid Voltage	-4.5	-5.0	-6.0	-9.0 Volts
Plate Current (Zero Signal)	1.6	3.8	3.8	5.0 Ma.
Screen Current (Zero Signal)	0.3	0.8	0.8	1.0 Ma.
Plate Resistance (Approx.)	0.4	0.3	0.3	0.25 Megohm
Mutual Conductance	650	875	875	925 μmhos
Load Resistance	20000	16000	16000	12000 Ohms
Power Output	35	90	100	200 Mw.
Total Harmonic Distortion	10	10	10	10 Per Cent

APPLICATION

Sylvania Type 1LB4 is a power output pentode of lock-in construction designed especially for service in low drain battery operated receivers. This type is extremely economical because the A and B current drains are unusually low. Type 1LB4 will deliver approximately 35 milliwatts when the plate and screen are operated at 45 volts. This means that considerable power output is available during the entire life of the B-batteries.

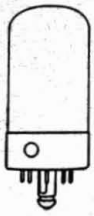
The filament is rated at a nominal voltage of 1.4 volts and 50 milliamperes. However, the tube may be operated directly from a suitable 1.5 volt dry battery without the use of a ballast tube since the design provides satisfactory performance over the useful life of the battery. Other forms of A-batteries are applicable if the proper circuit arrangements are provided; see appendix.

It is preferable to operate Type 1LB4 with self-bias since the grid voltage will be reduced in proportion as the B voltage drops with increasing battery life.





7AO-L-8



Sylvania Type 1LC5

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	45 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 $\mu\mu$f Max.
Input	3.2 $\mu\mu$f
Output	7.0 $\mu\mu$f

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to negative filament

TYPICAL OPERATION

Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	45	90 Volts
Screen Voltage	45	45 Volts
Grid Voltage*	0	0 Volt
Suppressor	Connected to Negative Filament at Socket	
Plate Current	1.1	1.15 Ma.
Screen Current	.35	.30 Ma.
Plate Resistance	0.7	1.5 Megohm Approx.
Mutual Conductance	750	775 μmhos
Grid Voltage for Ib=10 μa	−3.4	−3.4 Volts

*A resistance of at least 1 megohm should be in the grid return to negative filament Pin No. 8.

APPLICATION

Sylvania Type 1LC5 is an r-f amplifier pentode of "Lock-In" construction designed especially for service in low drain battery operated receivers and an r-f or i-f amplifier when small size and light weight are desired.

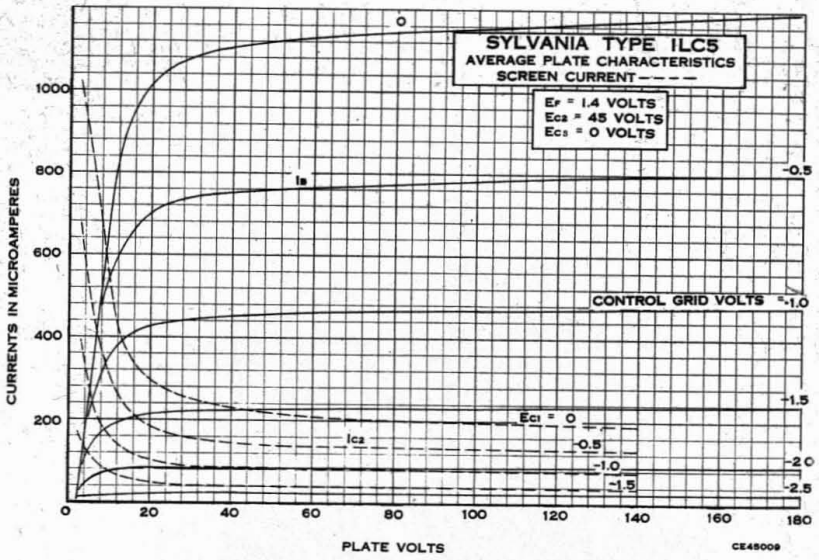
The outstanding feature of the Type 1LC5 is its ability to function at reduced "B" voltages. This tube can be used satisfactorily in a-v-c circuits since it has a medium cut-off characteristic. Type 1LC5 is a high impedance tube and should be worked into a high impedance if maximum r-f amplification is to be attained. The circuit applications are the same as for Sylvania Type 1LN5.

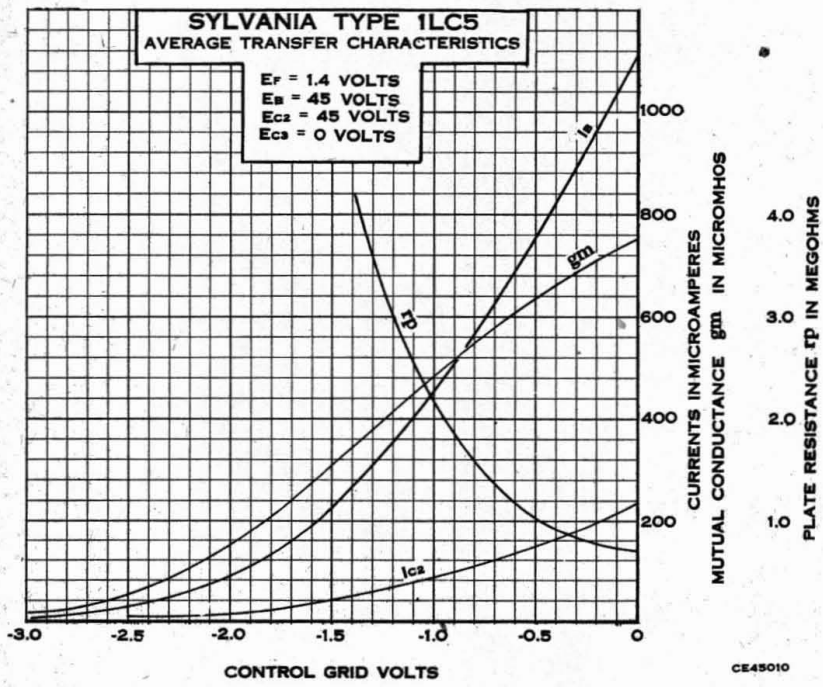
For maximum advantages the Type 1LC5 should be used in conjunction with the other types in the "Reduced Plate Voltage" tube complement, Types 1LC6, 1LD5, and 1LB4.

The filament is rated at a nominal voltage of 1.4 volts and 50 milliamperes. However, the tube may be operated directly from a suitable 1.5 volt dry battery without the use of a ballast tube since the design provides satisfactory performance over the useful voltage range normally encountered during the life of the battery. Other forms of "A" batteries are applicable if the proper circuit arrangements are provided.

For data on use as a resistance coupled amplifier see appendix.

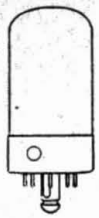
1LC5 (Cont.)


SYLVANIA TYPE 1LC5
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - -
EF = 1.4 VOLTS
Ec2 = 45 VOLTS
Ec3 = 0 VOLTS
CURRENTS IN MICROAMPERES
PLATE VOLTS
CONTROL GRID VOLTS
Ec1 = 0
-0.5
-1.0
-1.5
-2.0
-2.5
Ib
Ic2
CE45009


SYLVANIA TYPE 1LC5
AVERAGE TRANSFER CHARACTERISTICS
EF = 1.4 VOLTS
EB = 45 VOLTS
Ec2 = 45 VOLTS
Ec3 = 0 VOLTS
Ib
gm
rp
Ic2
CONTROL GRID VOLTS
CURRENTS IN MICROAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CE45010



7AK-L-0



Sylvania Type 1LC6

HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

ase	Lock-In 8 Pin
ılb	T-9
[aximum Overall Length	2 15/32"
ıximum Seated Height	2 1/4"
ɔunting Position	Any

RATINGS

aximum Filament Voltage	1.6 Volts
esign Center for AC-DC Operation	1.3 Volts
[aximum Plate Voltage	110 Volts
aximum Screen or Anode Grid Supply	110 Volts
[aximum Anode-Grid Voltage	50 Volts
[aximum Screen Grid Voltage	45 Volts
Iaximum Cathode Current	3.0 Ma.

Direct Interelectrode Capacitances:*

Grid G to Plate	0.28 μμf.
Mixer Input	9.00 μμf.
Mixer Output	5.50 μμf.
Oscillator Input	2.40 μμf.
Oscillator Output	4.80 μμf.

*With 1 5/16" dia. tube shield (RMA Std. M8-308) connected to negative filament.

TYPICAL OPERATION

ilament Voltage	1.4	1.4 Volts
ilament Current	0.050	0.050 Ampere
late Voltage	45	90 Volts
creen Voltage*	35	35 Volts
ıode-Grid Voltage	45	45 Volts
Control Grid Voltage	0	0 Volt
Oscillator Grid Resistor	200000	200000 Ohms
Plate Resistance	300000	650000 Ohms
Plate Current	0.7	0.75 Ma.
Screen Current	0.75	0.70 Ma.
Anode-Grid Current	1.4	1.4 Ma.
Oscillator Grid Current	0.035	0.035 Ma.
Total Cathode Current	2.9	2.9 Ma.
Conversion Conductance:		
At 0 Volts	250	275 μmhos
At -2 Volts	50	50 μmhos
At -3 Volts	5	5 μmhos approx.

*Obtained preferably by using a properly by-passed voltage dropping resistor in series with B voltage supply. In order to avoid oscillation difficulties the screen voltage must be at least 10 volts lower than the oscillator anode.

†A resistance of at least 1 megohm should be in the grid return to negative filament, Pin No. 8.

Note; The characteristics of the oscillator section (not oscillating) are; GM=550 μmhos (approx.), MU=14, and anode-grid current=2.7 ma.

Conditions; Ep=90 volts, Ega=45 volts, Egs=35 volts, and Ego and Eg=0 volts.

APPLICATION

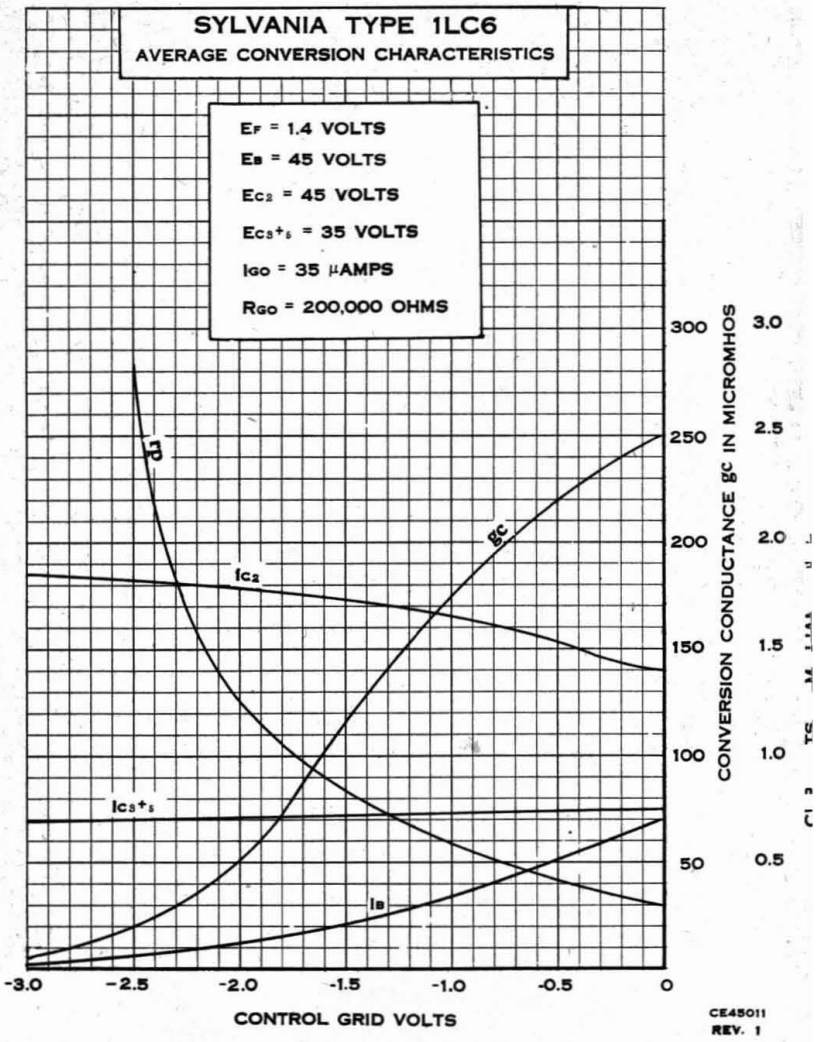
Sylvania Type 1LC6 is a pentagrid Converter of "Lock-In" construction, designed especially for service in low drain battery operated receivers when small size and light weight are desired.

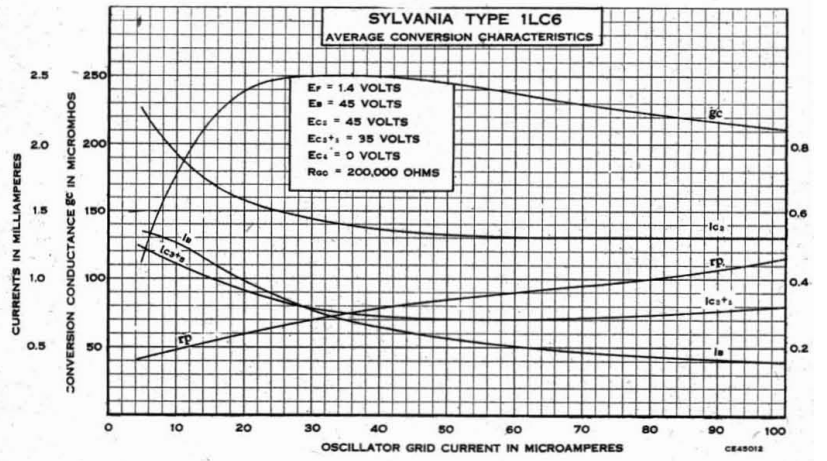
The outstanding feature of the Type 1LC6 is its ability to function at reduced "B" voltages.

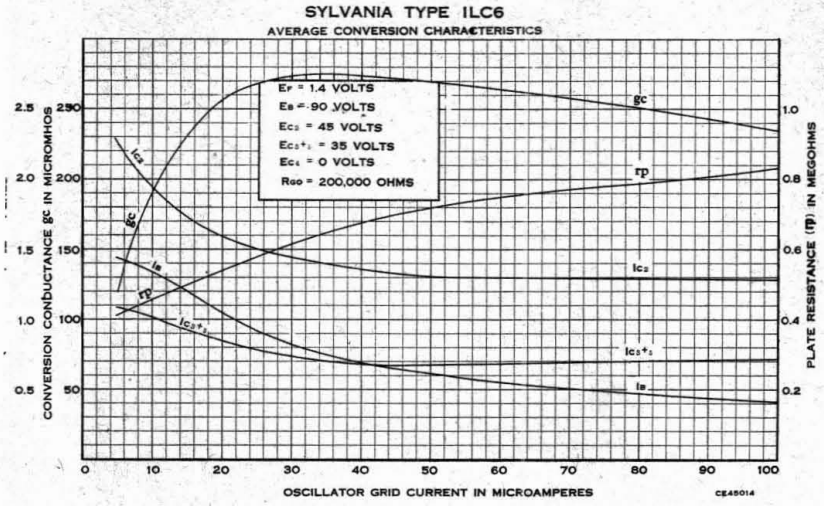
The circuit applications are the same as for Sylvania Type 1LA6, but the difference in characteristics and operating conditions must be taken into account to secure optimum performance.

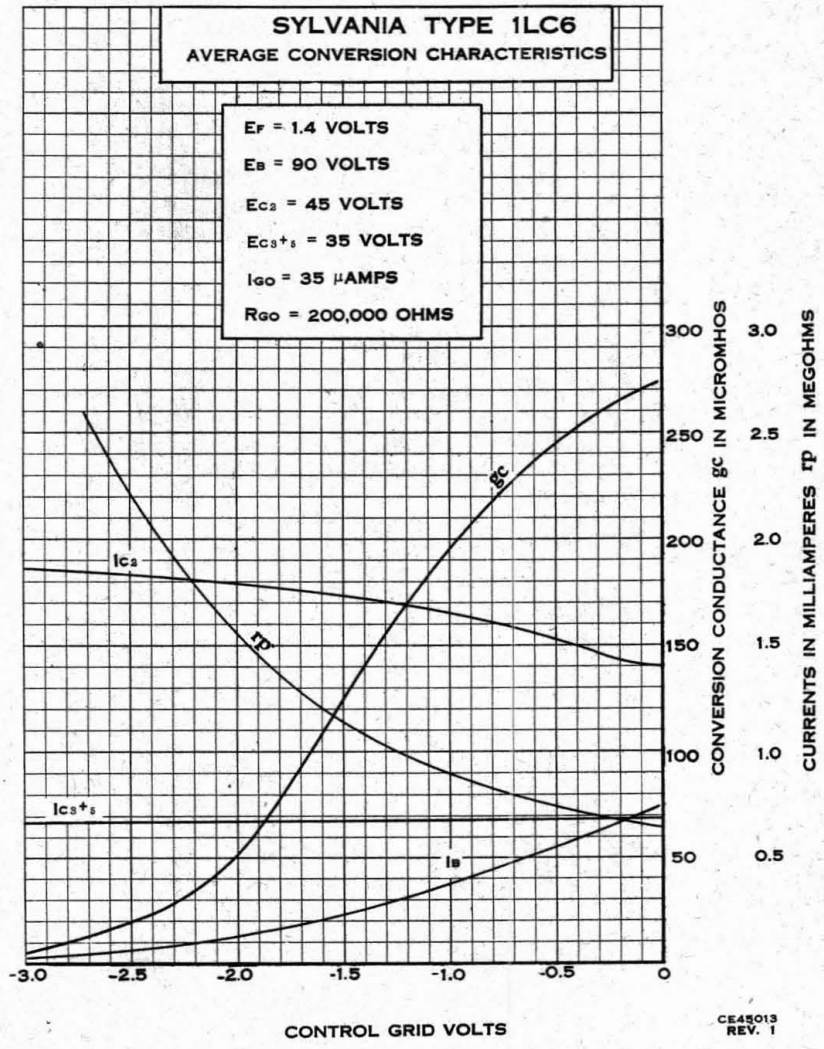
The filament is rated at a nominal voltage of 1.4 volts and 50 milliamperes. However, the tube may be operated directly from a suitable 1.5 dry battery without the use of a ballast tube, since the design provides satisfactory performance over the usual voltage range normally encountered during the life of the battery. Other forms of A batteries are applicable if the proper circuits arrangements are provided.

1LC6 (Cont.)


SYLVANIA TYPE 1LC6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
Eb = 45 VOLTS
Ec2 = 45 VOLTS
Ec3+s = 35 VOLTS
Ico = 35 μAMPS
Rgo = 200,000 OHMS
rp
gc
Ic2
Ic3+s
Ia
300
250
200
150
100
50
3.0
2.5
2.0
1.5
1.0
0.5
CONVERSION CONDUCTANCE gc IN MICROMHOS
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
CONTROL GRID VOLTS
CE45011
REV. 1

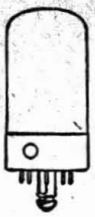

SYLVANIA TYPE 1LC6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
Eb = 45 VOLTS
Ec2 = 45 VOLTS
Ec3+s = 35 VOLTS
Ec4 = 0 VOLTS
Rgc = 200,000 OHMS
gc
Ic2
rp
Ic3+s
Ia
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
2.5
2.0
1.5
1.0
0.5
250
200
150
100
50
0.8
0.6
0.4
0.2
0
10
20
30
40
50
60
70
80
90
100
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE45012


SYLVANIA TYPE 1LC6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
EB = 90 VOLTS
EC2 = 45 VOLTS
EC3+5 = 35 VOLTS
EC1 = 0 VOLTS
RGO = 200,000 OHMS
gc
rp
IC2
IC3+5
IB
IC1
CONVERSION CONDUCTANCE gc IN MICROMHOS
PLATE RESISTANCE (rp) IN MEGOHMS
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE45014


SYLVANIA TYPE 1LC6
AVERAGE CONVERSION CHARACTERISTICS
EF = 1.4 VOLTS
EB = 90 VOLTS
EC2 = 45 VOLTS
EC3+5 = 35 VOLTS
IGO = 35 μAMPS
RGO = 200,000 OHMS
gc
IC2
rp
IC3+5
IB
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES rp IN MEGOHMS
CONTROL GRID VOLTS
CE45013
REV. 1

1LD5 Sylvania Type

DIODE PENTODE





6AX-L-8

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 23/32"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	50 Volts
Maximum Diode Drop for 0.5 Ma.	10 Volts

Diode plate located at negative end of filament.

Direct Interelectrode Capacitances:*

Grid to Plate	0.18 μμf.
Input	3.20 μμf.
Output	6.00 μμf.

*With 1 5/16" dia. shield (RMA Std. 308) connected to negative filament.

TYPICAL OPERATION

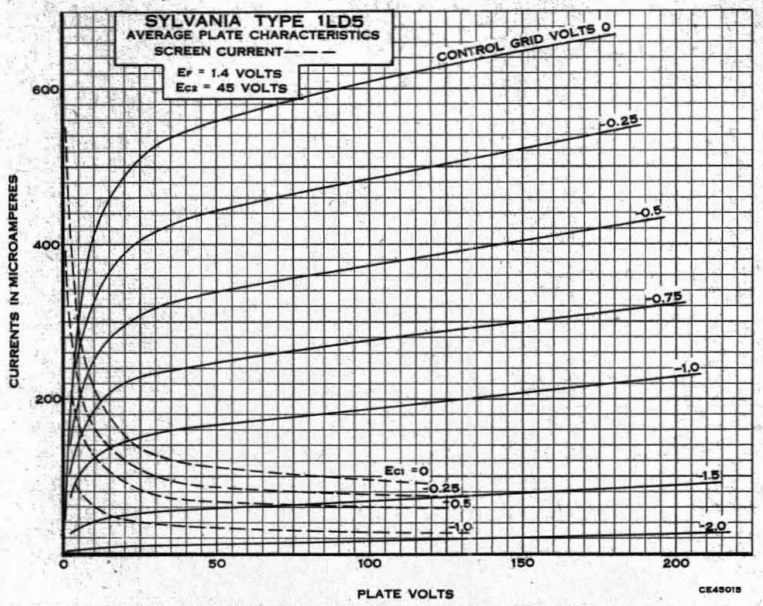
Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	45	90 Volts
Screen Voltage	45	45 Volts
Grid Voltage	0	0 Volt
Plate Current	0.55	0.6 Ma.
Screen Current	0.12	0.1 Ma.
Plate Resistance	900000	750000 Ohms
Mutual Conductance	550	575 μmhos

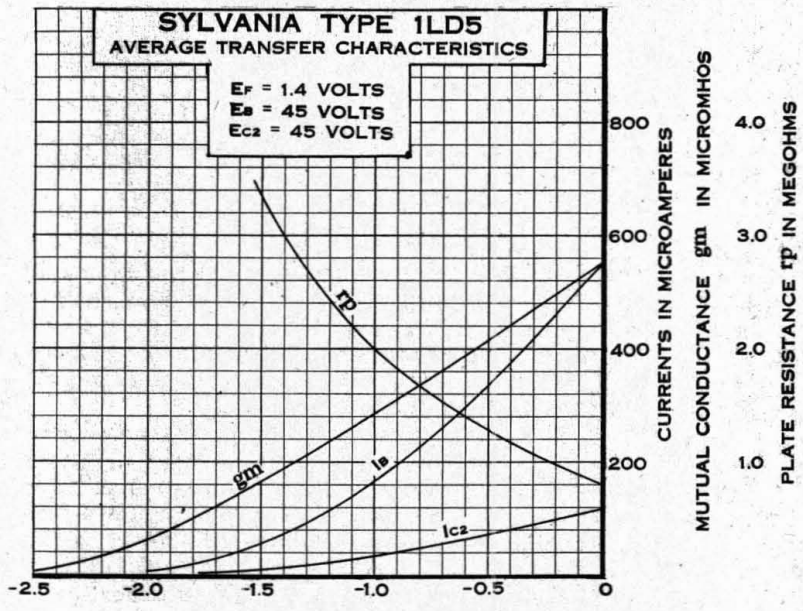
APPLICATION

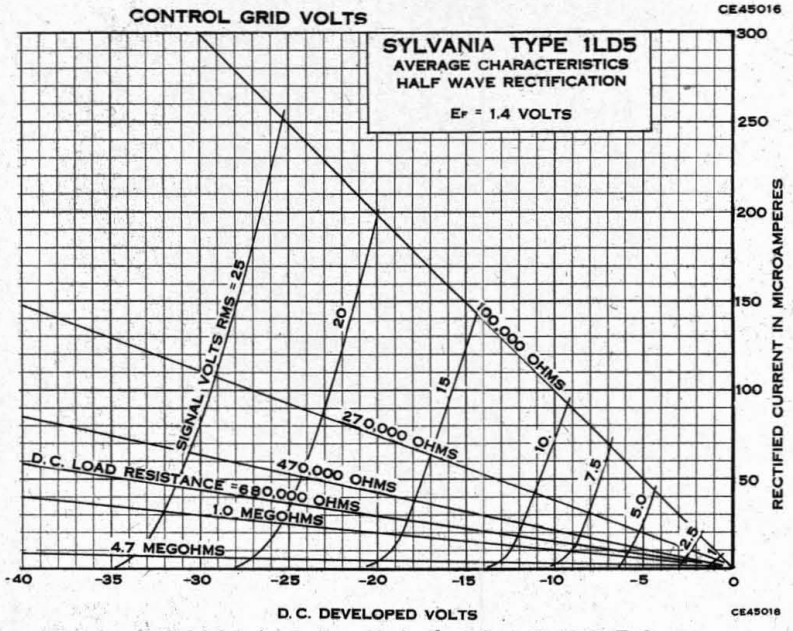
Sylvania Type 1LD5 is a diode-Audio pentode designed especially for service in low drain battery operated receivers as a combined diode detector and pentode audio amplifier, when small size and light weight are desired. The outstanding feature of type 1LD5 is its ability to function at reduced "B" voltages.

The circuit application is the same as that of the Sylvania Type 1LA4 except that the amplifier section is constructed as a pentode to take advantage of the higher gain at low plate voltage compared with that of a triode. For maximum advantages, the Type 1LD5 should be used in conjunction with the other types in the "Reduced Plate Voltage" tube complement, Types 1LC6, 1LC5, and 1LB4.

For resistance coupled information refer to table in appendix.


SYLVANIA TYPE 1LD5
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT— — —
Ef = 1.4 VOLTS
Ec2 = 45 VOLTS
CONTROL GRID VOLTS 0
-0.25
-0.5
-0.75
-1.0
-1.5
-2.0
Ec1 = 0
-0.25
-0.5
-1.0
CURRENTS IN MICROAMPERES
600
400
200
0
50
100
150
200
PLATE VOLTS
CE45015

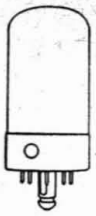

SYLVANIA TYPE 1LD5
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 45 VOLTS
Ec2 = 45 VOLTS
rp
gm
Ib
Ic2
800
600
400
200
CURRENTS IN MICROAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
4.0
3.0
2.0
1.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
CONTROL GRID VOLTS
CE45016

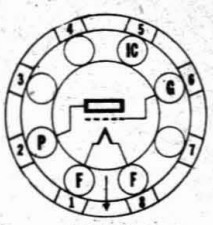

SYLVANIA TYPE 1LD5
AVERAGE CHARACTERISTICS
HALF WAVE RECTIFICATION
Ef = 1.4 VOLTS
SIGNAL VOLTS RMS = 25
20
15
100,000 OHMS
270,000 OHMS
470,000 OHMS
D.C. LOAD RESISTANCE = 680,000 OHMS
1.0 MEGOHMS
4.7 MEGOHMS
10
7.5
5.0
2.5
1.0
300
250
200
150
100
50
RECTIFIED CURRENT IN MICROAMPERES
-40
-35
-30
-25
-20
-15
-10
-5
0
D.C. DEVELOPED VOLTS
CE45018

1LE3 Sylvania Type

MEDIUM-MU TRIODE

GT EQUIVALENT 1E4G





4AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	1.7 $\mu\mu$f.
Input	1.7 $\mu\mu$f.
Output	3.0 $\mu\mu$f.

*With $1\frac{5}{16}$" diameter shield (RMA Standard 308) connected to negative filament.

TYPICAL OPERATION

Filament Voltage DC	1.4	1.4 Volts
Filament Current	0.050	0.050 Ampere
Plate Voltage	90	90 Volts
Grid Voltage*	0	−3 Volts
Plate Current	4.5	1.4 Ma.
Plate Resistance	11200	19000 Ohms
Mutual Conductance	1300	760 μmhos
Amplification Factor	14.5	14.5

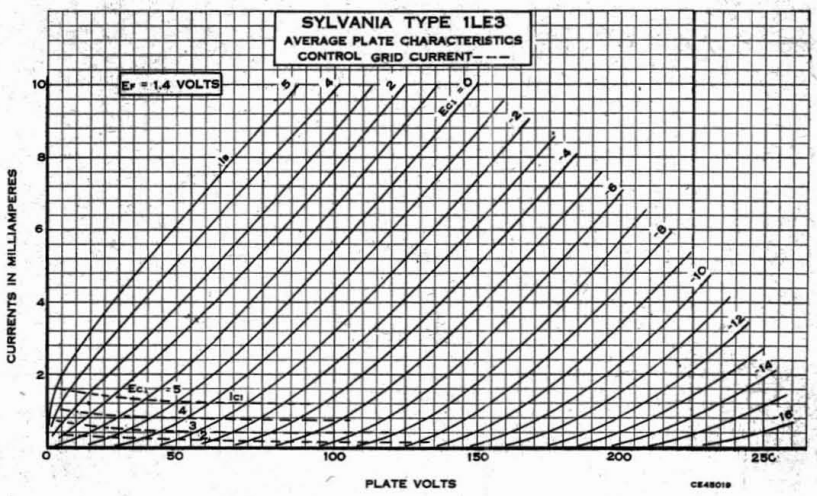
*Negative Filament return to Pin No. 8.

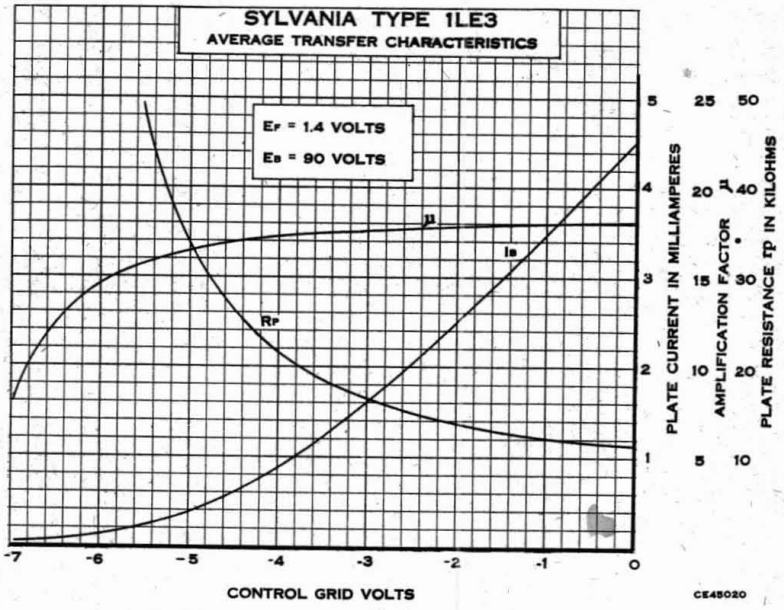
APPLICATION

Sylvania Type 1LE3 is a general purpose triode of "Lock-In" construction, designed especially for use in low drain battery operated receivers. The electrical characteristics make it especially desirable for use as an oscillator. When no C battery is used, the grid return should be made through a 1 megohm resistor to the negative filament terminal.

The filament is rated at a nominal voltage of 1.4 volts and 50 milliamperes. However, the tube may be operated directly from a suitable 1.5 volt dry battery without the use of a ballast tube since the design provides satisfactory performance over the useful voltage range normally encountered during the life of the battery. Other forms of A batteries are applicable if the proper circuit arrangements are provided as described on page 22.

For use in resistance coupled circuits, see appendix.

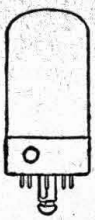

SYLVANIA TYPE 1LE3
AVERAGE PLATE CHARACTERISTICS
CONTROL GRID CURRENT- - -
Ef = 1.4 VOLTS
Ec1 = 0
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45019


SYLVANIA TYPE 1LE3
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 90 VOLTS
μ
Ib
Rp
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45020

1LG5 Sylvania Type

SEMI-REMOTE CUT-OFF

RF PENTODE





7AO-L-8

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage Must Never Exceed	1.6 Volts
AC-DC Power Line Design Center	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.007 μμf. Max
Input	3.2 μμf.
Output	7.0 μμf.

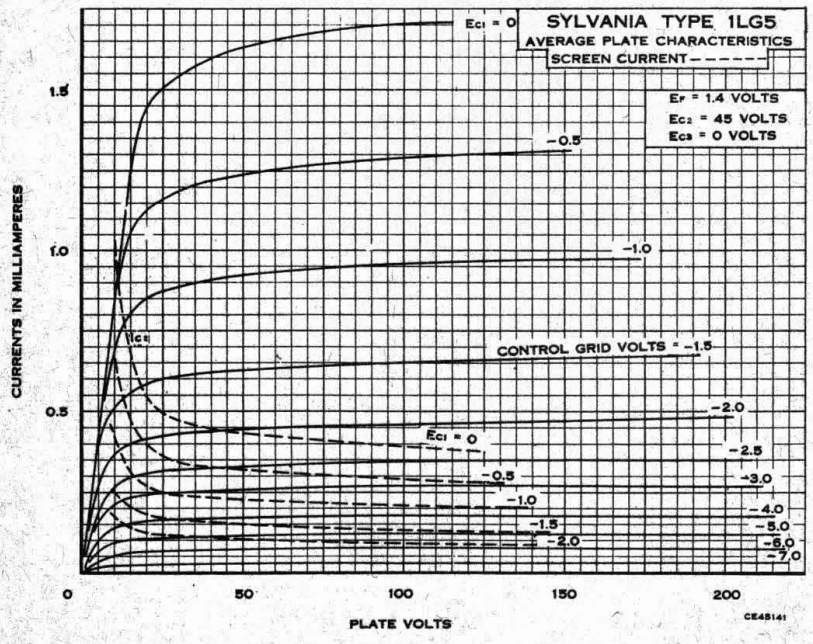
*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to negative filament.

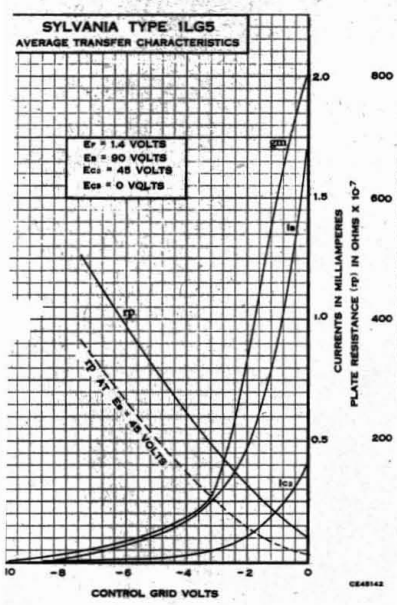
TYPICAL OPERATION

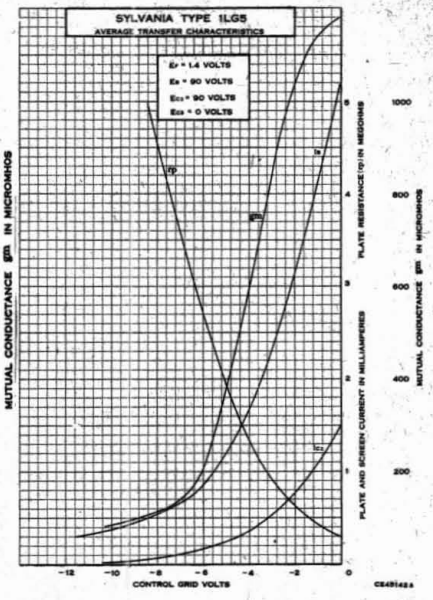
Filament Voltage DC	1.4	1.4	1.4 Volts
Filament Current	50	50	50 Ma.
Plate Voltage	45	90	90 Volts
Screen Voltage	45	45	90 Volts
Control Grid Voltage	0	0	−1.5 Volts
Control Grid Resistor	2.0	2.0	2.0 Megohm
Suppressor Grid	Connected to Negative Filament at Socket		
Plate Current	1.5	1.7	3.7 Ma.
Screen Current	0.45	0.4	0.9 Ma.
Mutual Conductance	800	800	1150 μmhos
Plate Resistance (Approx.)	0.35	>1.0	0.5 Megohm
Control Grid Voltage for Gm=10 μmhos (Approx.)	−9.0	−10.0	−19 Volts

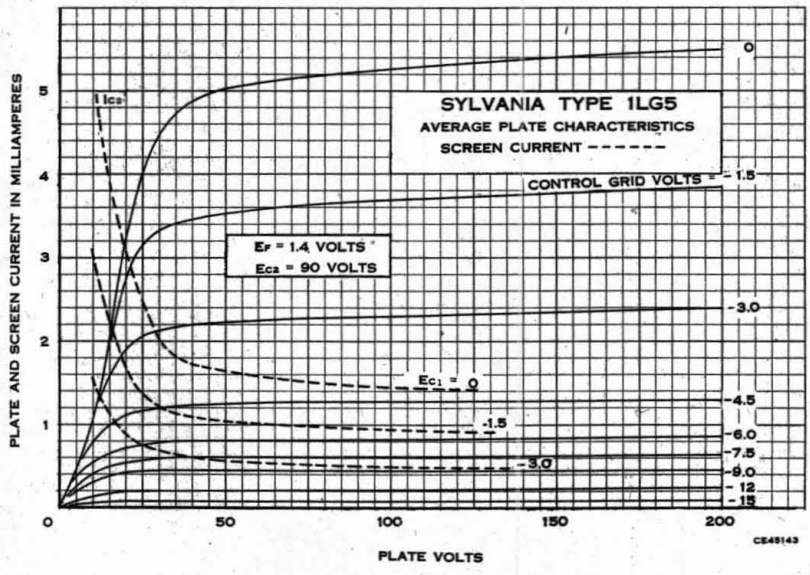
APPLICATION

Sylvania Type 1LG5 is a semi-remote cut-off pentode designed for battery operation. It is similar to Type 1LC5 except that it is more suitable for use with A-V-C circuits. Its characteristics have been optimized for 45-volt operation. It is recommended that Types 1LD5, 1LC6 and 1LB4 which have also been optimized for 45 volt service be used in circuits employing this tube. Minimum bias requirements are best satisfied by the use of the specified grid circuit resistor.




SYLVANIA TYPE 1LG5
AVERAGE TRANSFER CHARACTERISTICS
Er = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 45 VOLTS
Ec3 = 0 VOLTS
gm
Ib
rp
Ic2
Ec2 AT Eb = 45 VOLTS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE (rp) IN OHMS X 10-3
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
CE45142

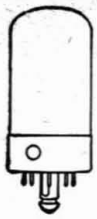

SYLVANIA TYPE 1LG5
AVERAGE TRANSFER CHARACTERISTICS
Er = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 90 VOLTS
Ec3 = 0 VOLTS
rp
gm
Ib
Ic2
PLATE RESISTANCE (rp) IN MEGOHMS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
CE45142A


SYLVANIA TYPE 1LG5
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - - - -
Er = 1.4 VOLTS
Ec2 = 90 VOLTS
I Ic2
CONTROL GRID VOLTS
0
-1.5
-3.0
-4.5
-6.0
-7.5
-9.0
-12
-15
Ec1 = 0
-1.5
-3.0
PLATE AND SCREEN CURRENT IN MILLIAMPERES
PLATE VOLTS
CE45143

1LH4 Sylvania Type

DIODE HIGH-MU TRIODE

GT EQUIVALENT 1H5GT





5AG-L-1

PHYSICAL SPECIFICATIONS

Base	Lock-In 8Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Diode Drop at 0.5 Ma.	10 Volts

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Grid Voltage*	0 Volt
Plate Current	0.15 Ma.
Plate Resistance	240000 Ohms
Mutual Conductance	275 μmhos
Amplification Factor	65

*A resistor of at least 1 megohm should be in the grid return so negative filament, pin No. 8.

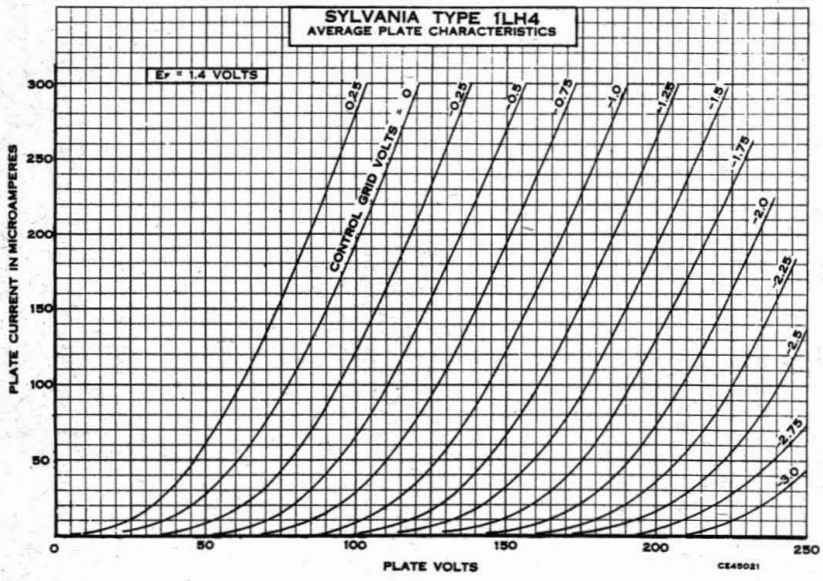
Note; Diode plate location at negative end of filament.

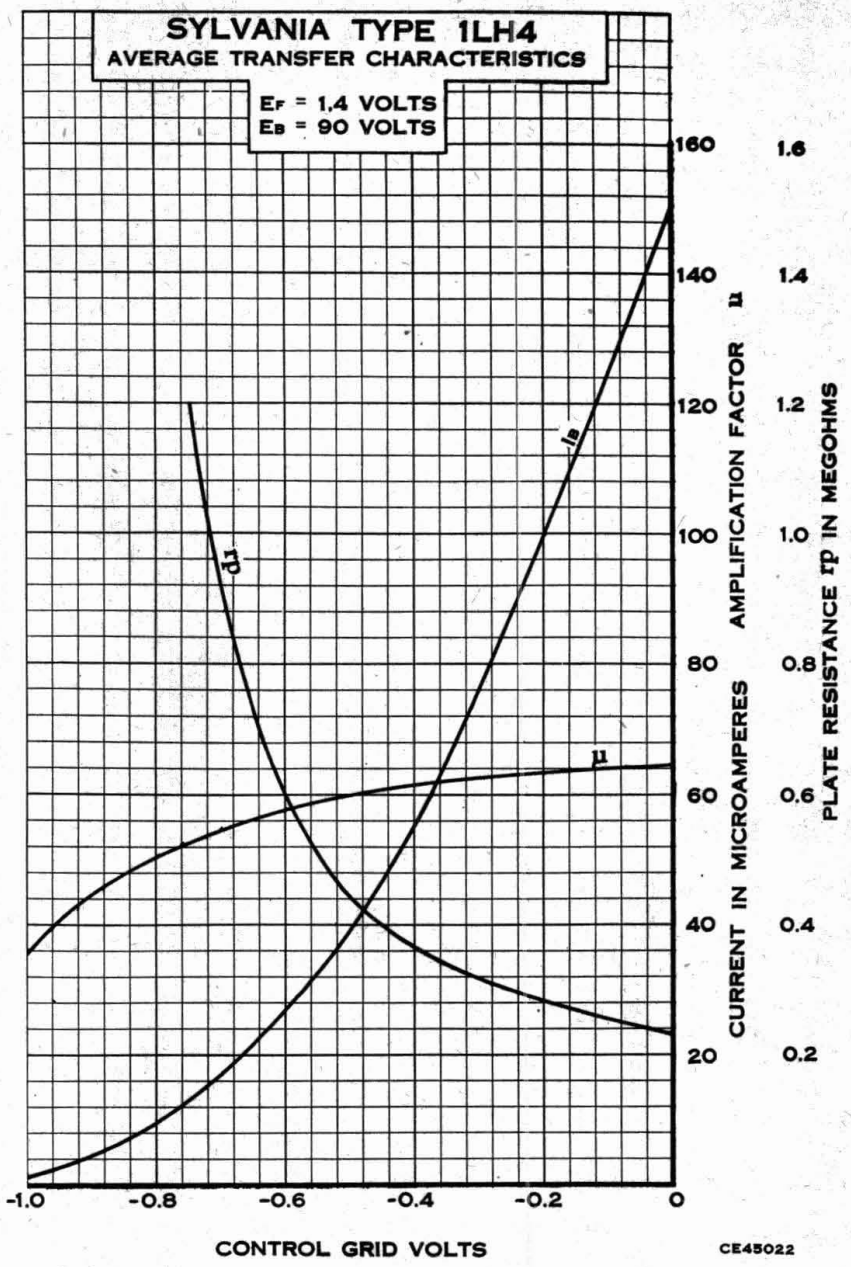
APPLICATION

Sylvania Type 1LH4 is a diode-triode designed especially for use in low drain battery operated receivers. It may be employed as a combined diode detector and triode audio amplifier and for securing the required voltage for automatic volume control. Its high amplification factor makes resistance coupling advisable. No bias battery is required since return to the negative filament terminal provides sufficient bias.

This tube may be operated directly from a suitable 1.5 volt dry battery without the use of a ballast tube since the design provides satisfactory performance over the useful life of the battery.

For use in resistance coupled circuits, see appendix.

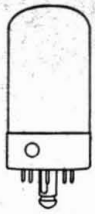



SYLVANIA TYPE 1LH4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 90 VOLTS
rp
Ib
μ
160
140
120
100
80
60
40
20
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
CURRENT IN MICROAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN MEGOHMS
-1.0
-0.8
-0.6
-0.4
-0.2
0
CONTROL GRID VOLTS
CE45022

1LN5 Sylvania Type

SHARP CUT OFF RF PENTODE

GT EQUIVALENT 1N5GT





7AO-L-8

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{15}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 $\mu\mu$f. Max.
Input	3.0 $\mu\mu$f.
Output	8.0 $\mu\mu$f.

*With $1\frac{5}{16}$" dia. (RMA Std. 308) shield connected to negative filament.

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage	90 Volts
Grid Voltage*	0 Volt
Plate Current	1.6 Ma.
Screen Current	0.35 Ma.
Plate Resistance	1.1 Megohms Approx.
Mutual Conductance	800 μmhos
Mutual Conductance at −4.5 Volts (Approx.)	10 μmhos

*Negative filament return, Pins No. 8 and 5.

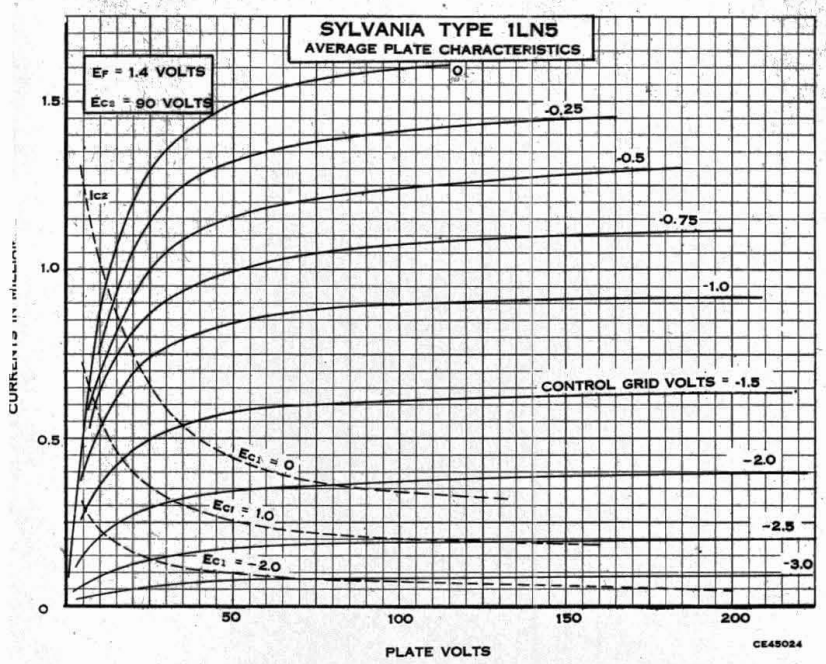
APPLICATION

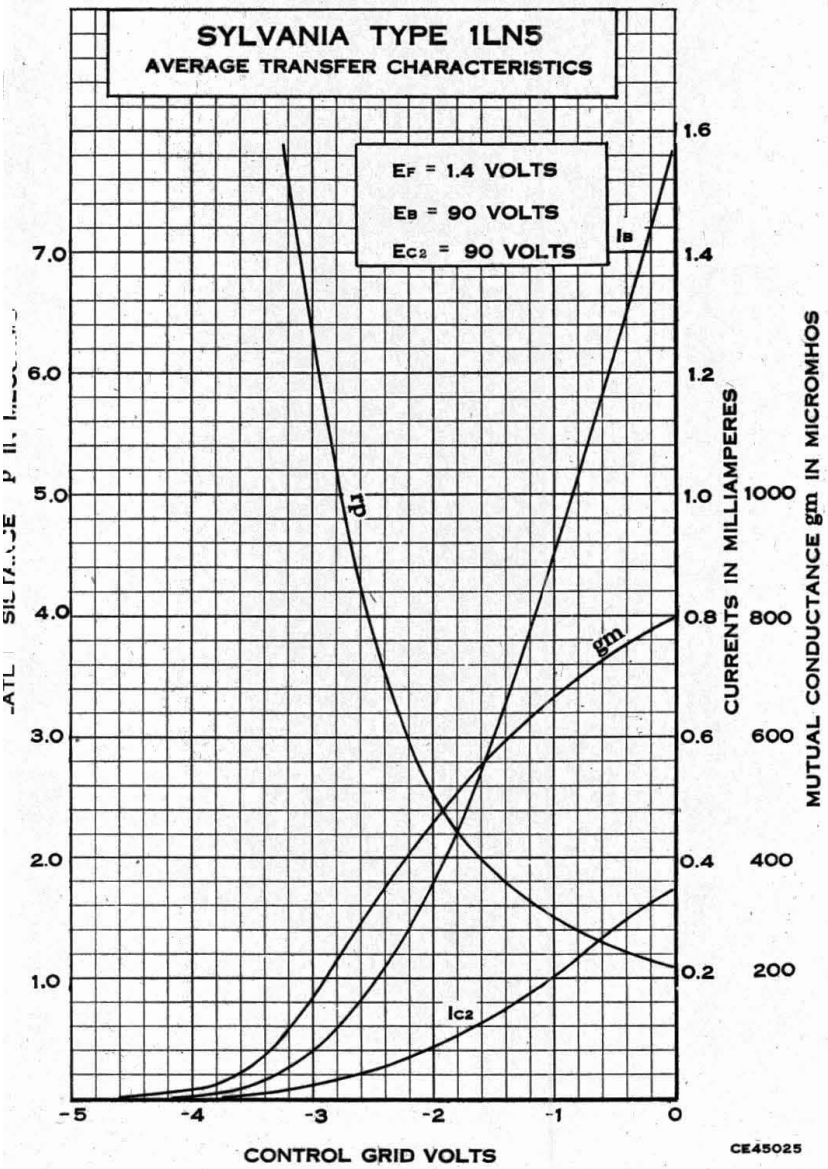
Sylvania Type 1LN5 is an r-f pentode designed especially for service in low drain battery operated receivers as an r-f, i-f or a-f amplifier. This tube can be used satisfactorily in a-v-c circuits since it has a medium cut-off characteristic. Type 1LN5 is a high impedance tube and should work into a high impedance load if maximum r-f amplification is to be attained.

The filament is designed for operation directly from a suitable 1.5 volt dry battery without the use of a ballast tube and will give satisfactory performance over the useful life of the battery. (See appendix for use on other voltage supplies.)

A 90 volt battery is required for the plate and screen supply voltages. No C battery is necessary since the grid return should be made either to the a-v-c system or through a 1 megohm resistor suitably bypassed.

For use in resistance coupled circuits, see appendix.

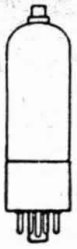

SYLVANIA TYPE 1LN5
AVERAGE PLATE CHARACTERISTICS
EF = 1.4 VOLTS
Ec2 = 90 VOLTS
Ic2
0
-0.25
-0.5
-0.75
-1.0
CONTROL GRID VOLTS = -1.5
-2.0
-2.5
-3.0
Ec1 = 0
Ec1 = 1.0
Ec1 = -2.0
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45024


SYLVANIA TYPE 1LN5
AVERAGE TRANSFER CHARACTERISTICS
EF = 1.4 VOLTS
EB = 90 VOLTS
Ec2 = 90 VOLTS
IB
rp
gm
Ic2
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
CE45025

1N5GT Sylvania Type

SHARP CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 1LN5





5Y-1-7

PHYSICAL SPECIFICATIONS

Base	Small Wafer 7-Pin Octal Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

Direct Interelectrode Capacitances:*

Grid to Plate	.007 μμf. Max.
Input	3.4 μμf.
Output	10.0 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to negative filament.

TYPICAL OPERATION

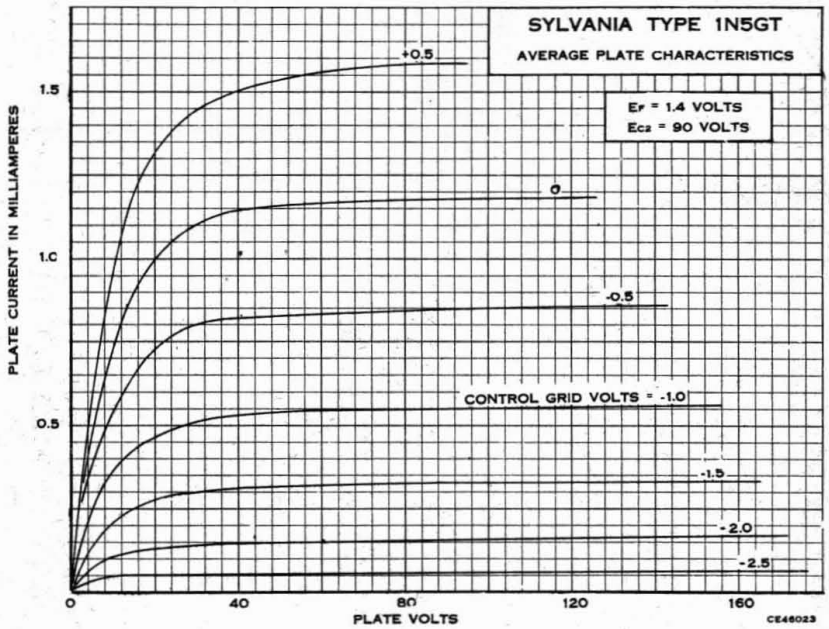
Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage	90 Volts
Grid Voltage*	0 Volt
Plate Current	1.2 Ma.
Screen Current	0.3 Ma.
Plate Resistance (Approx.)	1.5 Megohms
Mutual Conductance	750 μmhos
Mutual Conductance at -3.2 Volts (Approx.)	50 μmhos
Mutual Conductance at -4 Volts (Approx.)	5 μmhos

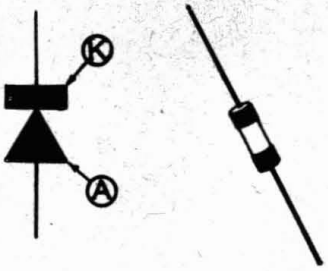
*Negative filament return, Pin No. 7.

APPLICATION

Sylvania Type 1N5G is an r-f pentode designed especially for service in low drain battery operated receivers as an r-f, i-f or a-f amplifier. This tube can be used satisfactorily in a-v-c circuits since it has a medium cut-off characteristic. Type 1N5G is a high impedance tube and should be worked into a high impedance if maximum r-f amplification is to be attained.

For Resistance Coupled Amplifier Data refer to type 1LN5 in appendix.





Sylvania Type 1N34, etc.

CRYSTAL DIODES

PHYSICAL SPECIFICATIONS

Style	See Outline
Connections	.025 Leads
Maximum Body Length	3/4"
Maximum Body Diameter	9/32"
Maximum Lead Length per Lead	1 5/8"
Mounting Position	Any
Temperature Range	-50 to +70° C.
Nominal Shunt Capacitance	1 μμf.

RATINGS

Type	Peak Inverse Working Voltage	Peak Current Ma.	Transient Surge Current Ma.	Average Current Ma.	Minimum Forward Current At 1 Volt Ma.	Maximum Reverse Current μa.
1N34	60	150	500	40	5.0	50 at −10 v; 800 at −50 v
1N35*	50	60	100	22.5	7.5	10 at −10 v
1N38	100	150	500	40	3.0	6 at −3 v; 625 at −100 v
1N39	200	150	500	40	3.0	200 at −100 v; 800 at −200 v
1N40◆	25	60	100	22.5	12.75†	50 at −10 v
1N41◆	25	60	100	22.5	12.75†	50 at −10 v
1N42◆	50	60	100	22.5	12.75†	6 at −3 v; 625 at −100 v
1N54	35	150	500	40	5.0	10 at −10 v
1N55	150	150	500	40	3.0	300 at −100 v; 800 at −150 v
1N56	40	200	1000	50	15.0	300 at −30 v
1N57	80	150	500	40	4.0	500 at −75 v
1N58	100	150	500	40	4.0	800 at −100 v

*Type 1N35 consists of two Type 1N34 units mounted in a fibre assembly. The units are matched within 10% for resistance in the forward direction at 1 volt.

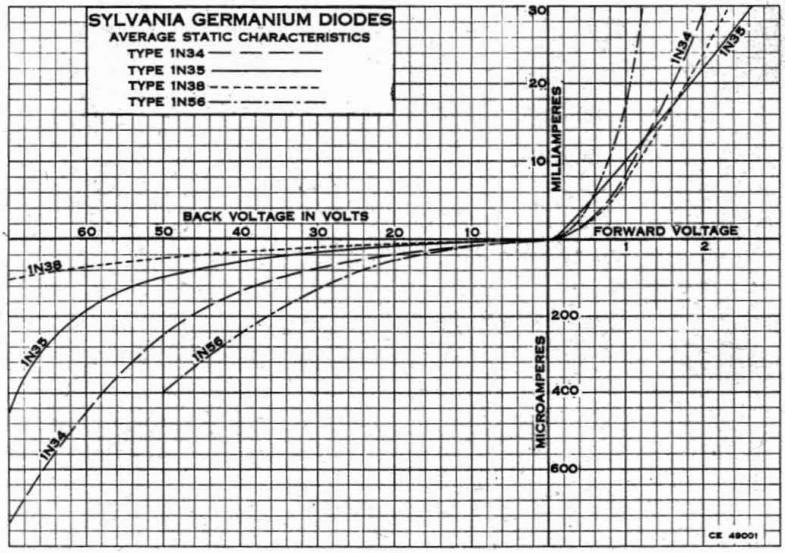
†At 1.5 volts.

◆Each unit contains 4 selected diodes matched within ±2.5% in the forward direction at 1.5 volts.

APPLICATION

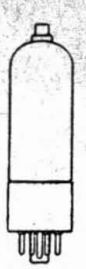
Sylvania Germanium diodes are ruggedly built semi-conductors which may be used whenever a diode of their voltage and current rating is required. Their advantages are size, no heater supply, low hum, low capacitance, no contact potential, and ruggedness.

A booklet describing their applications is available on request.



1P5GT Sylvania Type

REMOTE CUT-OFF RF PENTODE





5Y-1-7

PHYSICAL SPECIFICATIONS

Base	Small Wafer 7-Pin Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 μμf. Max.
Input	2.2 μμf.
Output	10.0 μμf.

*With 1 5/16" diameter shield (RMA 308) connected to negative filament.

TYPICAL OPERATION

Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage	90 Volts
Grid Voltage*	0 Volt
Plate Current	2.3 Ma.
Screen Current	0.7 Ma.
Plate Resistance (Approx.)	0.8 Megohm
Mutual Conductance	750 μmhos
Mutual Conductance at −12 Volts Bias	10 μmhos

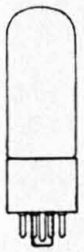
*Negative Filament return, Pin No. 7.

APPLICATION

Sylvania 1P5GT is a 1.4 volt battery type r-f pentode designed especially for use as an r-f, i-f, or a-f amplifier. This tube has a more remote cut-off characteristic than the Type 1N5GT. The basing arrangement is the same on both types. It is now used almost exclusively for replacement purposes.

1Q5GT Sylvania Type

BEAM POWER AMPLIFIER





6AF-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7-Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Filament Voltage DC	1.4 Volts
Filament Current	100 Ma.
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Cathode Current at Zero Signal	12 Ma.

TYPICAL OPERATION

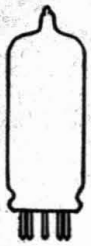
Filament Voltage DC	1.4	1.4 Volts
Filament Current	100	100 Ma.
Plate Voltage	85	90 Volts
Screen Voltage	85	90 Volts
Grid Voltage	−5.0	−4.5 Volts
Peak A-F Signal Voltage	5.0	4.5 Volts
Plate Current (Zero Signal)	7.0	9.5 Ma.
Screen Current (Zero Signal)	0.8	1.6 Ma.
Mutual Conductance	1950	2200 μmhos
Load Resistance	9000	8000 Ohms
Power Output	250	270 Mw.
Total Harmonic Distortion	5.5	6.0 Per Cent

APPLICATION

For other data on this tube, refer to corresponding Lock-In Type 3LF4 which is identical except for filament construction.



7AT-0-0



Sylvania Type 1R5

HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	90 Volts
Maximum Screen Voltage	67.5 Volts
Maximum Screen Supply	90 Volts
Maximum Cathode Current	5.5 Ma.
Direct Interelectrode Capacitances:*	
Grid Go to Plate	0.10 μμf.
Signal Input	7.0 μμf.
Mixer Output	7.5 μμf.
Oscillator Input	3.8 μμf.
Grid (G) to Plate	0.4 μμf. Max.
Grid (G) to Grid (Go)	0.2 μμf. Max.
Grid (Go) to Plate	0.1 μμf. Max.

*Without shield.

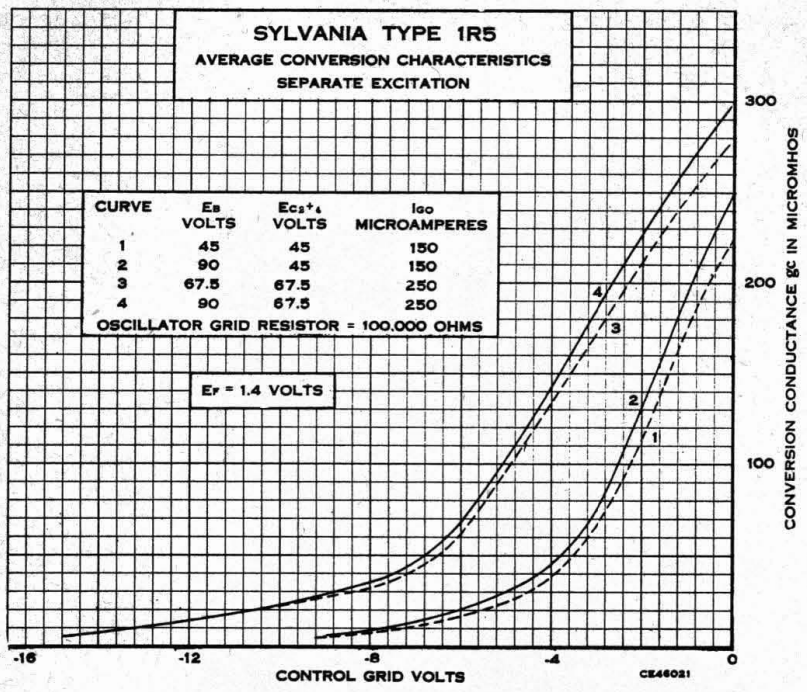
TYPICAL OPERATION

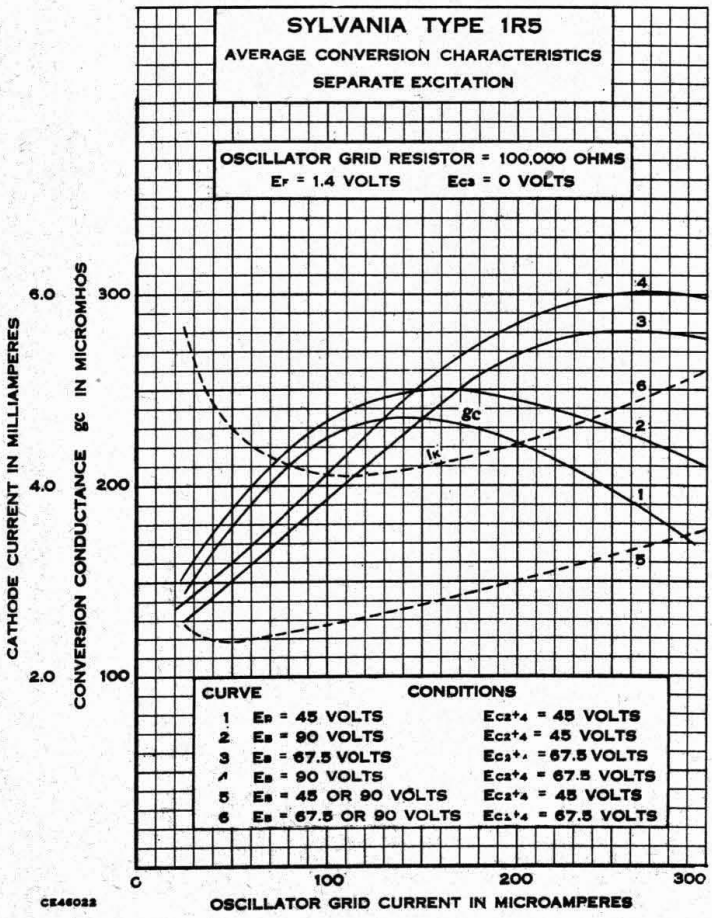
Filament Voltage	1.4	1.4	1.4	1.4 Volts
Filament Current	0.050	0.050	0.050	0.050 Ampere
Plate Voltage	45	67.5	90	90 Volts
Screen Voltage	45	67.5	45	67.5 Volts
Grid Voltage	0	0	0	0 Volt
Oscillator-Grid Resistor (Rgo)	0.1	0.1	0.1	0.1 Megohm
Plate Resistance (Approx.)	0.6	0.5	0.8	0.6 Megohm
Plate Current	0.7	1.4	0.8	1.6 Ma.
Screen Current	1.9	3.2	1.9	3.2 Ma.
Oscillator-Grid Current	0.15	0.25	0.15	0.25 Ma.
Total Cathode Current	2.75	5.0	2.75	5.0 Ma.
Conversion Conductance	235	280	250	300 μmhos
Grid Voltage (G) for Conversion Conductance of 5 μmhos	−9	−14	−9	−14 Volts

APPLICATION

Sylvania Type 1R5 is a pentagrid converter of the miniature line especially designed for mixer-oscillator service in compact, light weight, portable equipment. The operating efficiency allows the tube to be used with extremely low B. Supply voltages. The internal construction of the tube is similar to that of Sylvania Type 6SA7GT, with the exception of the filament. Circuit applications for Type 6SA7GT may be used for Sylvania type 1R5.

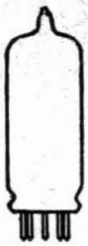
1R5 (Cont.)


SYLVANIA TYPE 1R5
AVERAGE CONVERSION CHARACTERISTICS
SEPARATE EXCITATION
CURVE | Eb VOLTS | Ec2+4 VOLTS | Ico MICROAMPERES
1 | 45 | 45 | 150
2 | 90 | 45 | 150
3 | 67.5 | 67.5 | 250
4 | 90 | 67.5 | 250
OSCILLATOR GRID RESISTOR = 100,000 OHMS
Ef = 1.4 VOLTS
CONVERSION CONDUCTANCE gc IN MICROMHOS
300
200
100
-16
-12
-8
-4
0
CONTROL GRID VOLTS
CE46021


SYLVANIA TYPE 1R5
AVERAGE CONVERSION CHARACTERISTICS
SEPARATE EXCITATION
OSCILLATOR GRID RESISTOR = 100,000 OHMS
Ef = 1.4 VOLTS Ec3 = 0 VOLTS
CATHODE CURRENT IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
6.0
4.0
2.0
300
200
100
gc
ik
CURVE | CONDITIONS
1 | Eb = 45 VOLTS | Ec2+4 = 45 VOLTS
2 | Eb = 90 VOLTS | Ec2+4 = 45 VOLTS
3 | Eb = 67.5 VOLTS | Ec2+4 = 67.5 VOLTS
4 | Eb = 90 VOLTS | Ec2+4 = 67.5 VOLTS
5 | Eb = 45 OR 90 VOLTS | Ec2+4 = 45 VOLTS
6 | Eb = 67.5 OR 90 VOLTS | Ec2+4 = 67.5 VOLTS
0
100
200
300
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE46022



7AV-0-0



Sylvania Type 1S4

POWER AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅝"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	90 Volts
Maximum Screen Voltage	67.5 Volts
Maximum Cathode Current Zero Signal	9.0 Ma.
Maximum Cathode Current Maximum Signal	11.0 Ma.

TYPICAL OPERATION

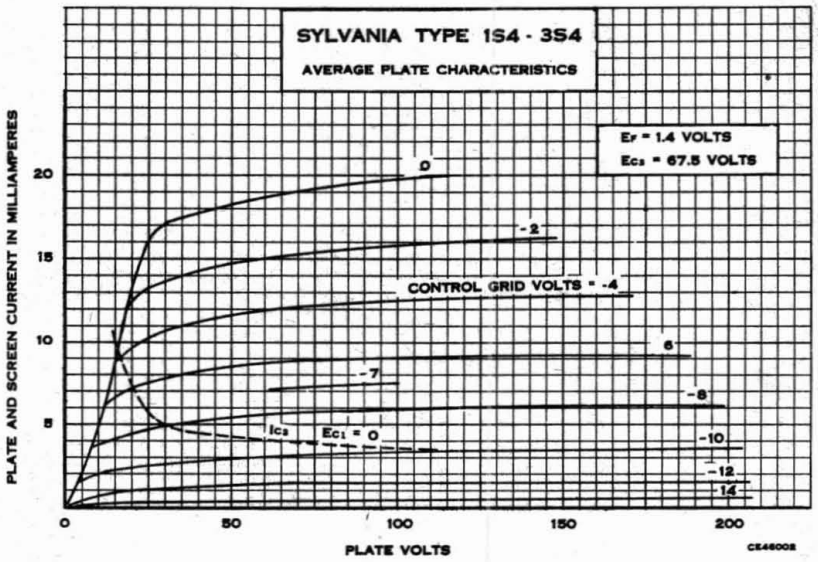
CLASS A AMPLIFIER

Filament Voltage DC	1.4	1.4	1.4 Volts
Filament Current	0.100	0.100	0.100 Ampere
Plate Voltage	45	67.5	90 Volts
Screen Voltage	45	67.5	67.5 Volts
Grid Voltage*	-4.5	-7	-7 Volts
Peak A-F Signal Voltage	4.5	7	7 Volts
Zero Signal Plate Current	3.8	7.2	7.4 Ma.
Zero Signal Screen Current	0.8	1.5	1.4 Ma.
Plate Resistance (Approx.)	0.1	0.1	0.1 Megohm
Mutual Conductance	1250	1550	1575 μmhos
Load Resistance	8000	5000	8000 ohms
Power Output	65	180	270 Milliwatts
Total Harmonic Distortion	12	10	12 Per Cent

*Negative Filament Return, Pin No. 1

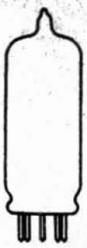
APPLICATION

Sylvania Type 1S4 is a power amplifier pentode of the Miniature construction, especially designed for output service in compact, light weight, portable equipment. The high operating efficiency allows the tube to be used with extremely low B. Supply voltages. The circuit applications are similar to those for Sylvania Type 1LB4.



1S5 Sylvania Type

DIODE PENTODE AMPLIFIER





6AU-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5 ½
Maximum Overall Length	2 ⅛"
Maximum Seated Height	1 ⅞"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	90 Volts
Maximum Screen Voltage	90 Volts
Maximum Signal Cathode Current	3.0 Ma.
Maximum Diode Current	0.25 Ma.

Direct Interelectrode Capacitances:*

Grid to Plate	0.2 μμf.
Input	2.2 μμf.
Output	2.4 μμf.

*With no external shielding.

TYPICAL OPERATION

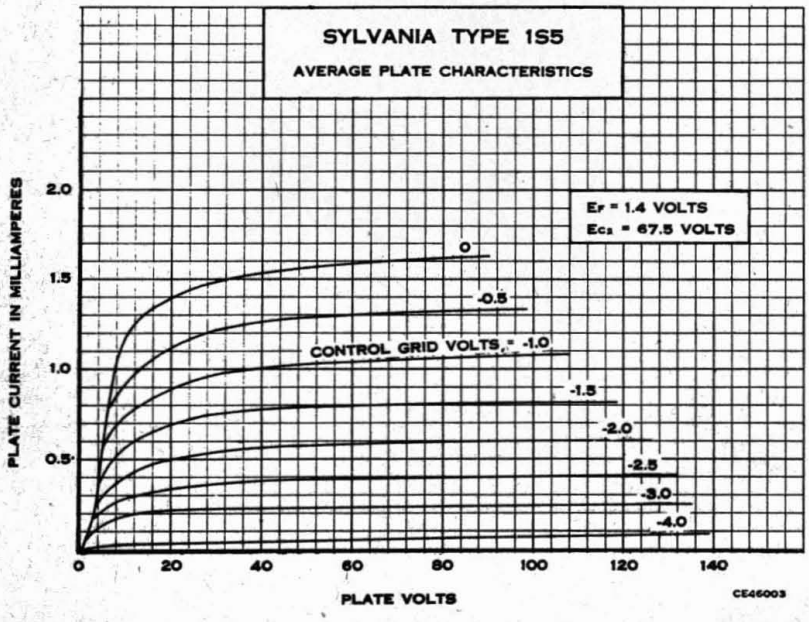
Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	67.5	90 Volts
Screen Voltage	67.5	90 Volts
Grid Voltage	0	0 Volt
Plate Current	1.6	2.7 Ma.
Screen Current	0.4	0.5 Ma.
Plate Resistance (Approx.)	0.6	0.5 Megohm
Mutual Conductance	625	720 μmhos

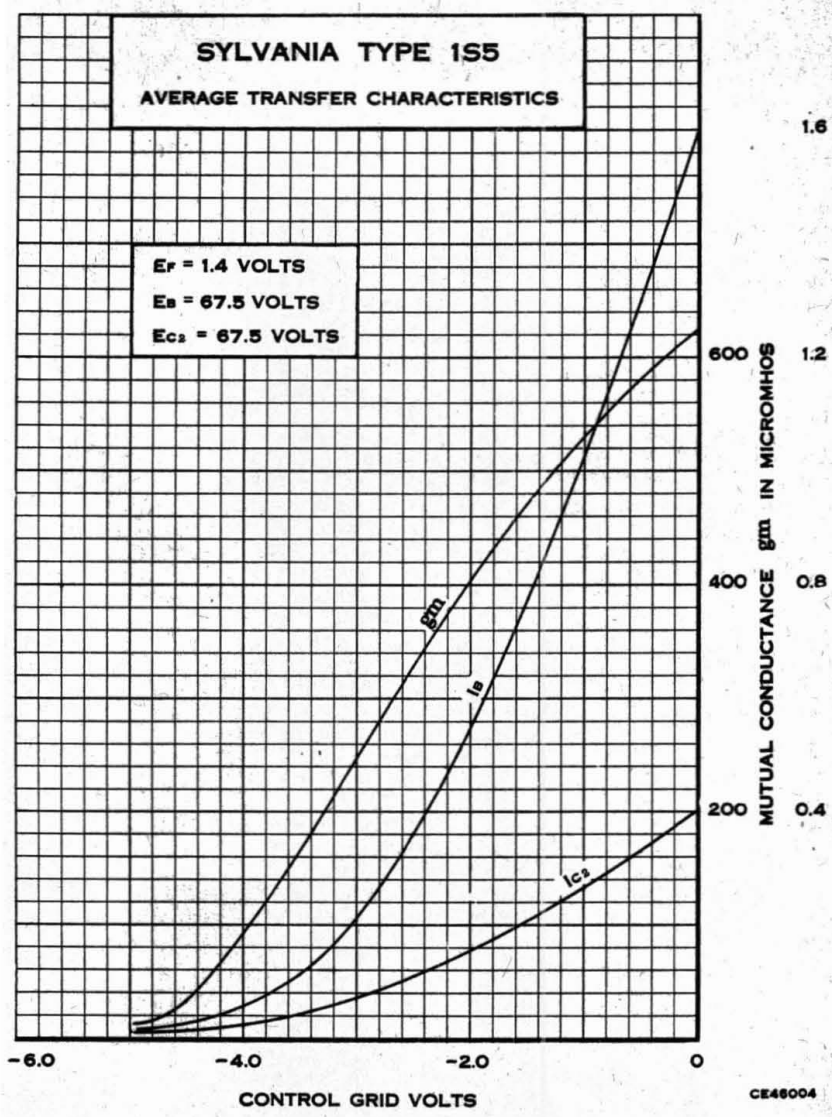
Note; Diode plate located at negative end of filament.

APPLICATION

Sylvania Type 1S5 is a diode pentode of the miniature construction, especially designed for detector-audio service in compact, light weight, portable equipment. The high operating efficiency allows the tube to be used with extremely low B supply voltages. The internal construction of Type 1S5 is similar to that of Sylvania Type 1LD5 and the corresponding circuit application notes may be used.

For use in resistance coupled circuits, see appendix.







8DA-0-0



Sylvania Type 1S6

DIODE PENTODE

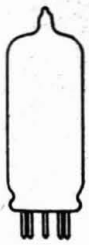
PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	1½"
Minimum Lead Length	1¼"
Mounting Position	Any

For additional data and curves, reference should be made to Type 1T6 which has the same operating conditions but differs in lead length.

1T4 Sylvania Type

REMOTE CUT-OFF RF PENTODE





6AR-0-1 & 5

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5½
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

Maximum Filament Voltage DC	1.6 Volts
Filament Voltage DC (design center of AC-DC Power Line Operation)	1.3 Volts
Maximum Plate Voltage	90 Volts
Maximum Screen Voltage	90 Volts
Maximum Total Cathode Current	5.5 Ma.
Minimum Grid Bias Voltage	0 Volt

Direct Interelectrode Capacitances:*

Grid to Plate	0.01 μμf. Max.
Grid to all Electrodes Except Plate	3.6 μμf.
Plate to All Electrodes Except Grid G	7.5 μμf.

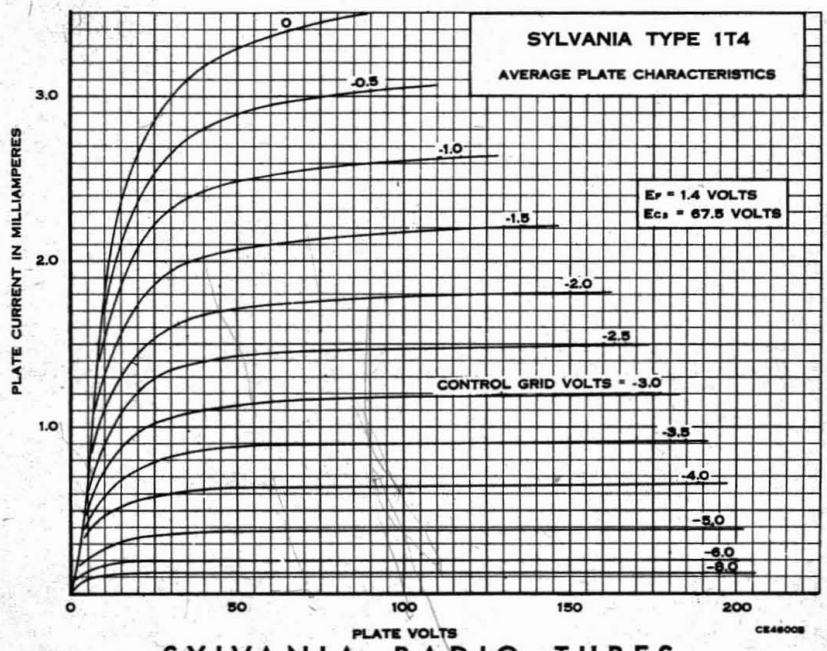
*With close-fitting tube shield connected to negative filament.

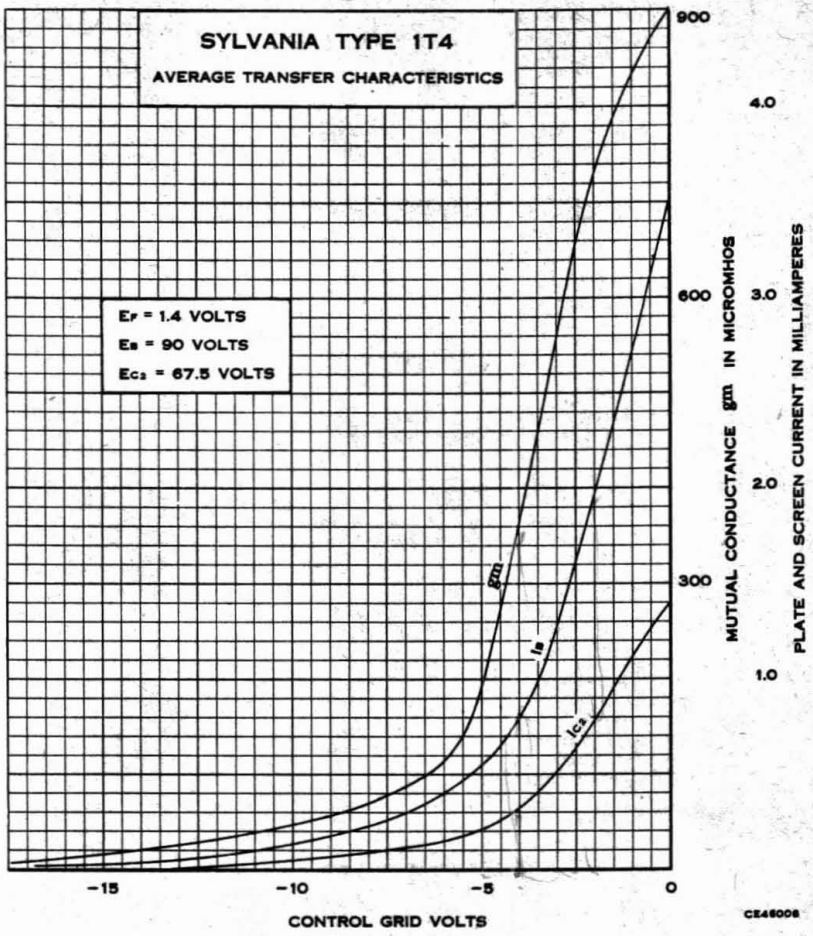
TYPICAL OPERATION

Filament Voltage DC	1.4	1.4	1.4	1.4 Volts
Filament Current	50	50	50	50 Ma.
Plate Voltage	45	67.5	90	90 Volts
Screen Voltage	45	67.5	45	67.5 Volts
Grid Voltage	0	0	0	0 Volt
Plate Current	1.7	3.4	1.8	3.5 Ma.
Screen Current	0.7	1.5	0.65	1.4 Ma.
Plate Resistance (Approx.)	0.35	0.25	0.8	0.5 Megohm
Mutual Conductance	700	875	750	900 μmhos
Grid Voltage for 10 μmhos	−10	−16	−10	−16 Volts

APPLICATION

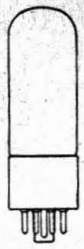
Sylvania Type 1T4 is a rf-if remote cut-off pentode of the miniature style of construction. It is especially designed for radio frequency amplifier service in compact, light weight, portable equipment. The high operating efficiency allows the tube to be used with extremely low B supply voltages. The construction incorporates internal shielding which is connected to minus filament, and eliminates the need for an external bulb shield. A shielded socket should be employed to obtain the minimum Grid-plate capacity. The circuit applications are the same as those for Sylvania Types 1LC5 and 1N5GT/G.




SYLVANIA TYPE 1T4
AVERAGE TRANSFER CHARACTERISTICS
Er = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 67.5 VOLTS
gm
Ib
Ic2
900
600
300
4.0
3.0
2.0
1.0
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
-15
-10
-5
0
CONTROL GRID VOLTS
CE46006

1T5GT Sylvania Type

PENTODE POWER AMPLIFIER





6X-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	
Dry Battery Operation—Must Never Exceed	1.6 Volts
AC-DC Power Line Operation—Design Center	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Cathode Current (Zero Signal)	7.3 Ma.

TYPICAL OPERATION

	Self Bias	Fixed Bias
Filament Voltage	1.4	1.4 Volts
Filament Current	0.05	0.05 Ampere
Plate Voltage	84.0	90 Volts
Screen Voltage	84.0	90 Volts
Control Grid Voltage	−6.0	−6.0 Volts
Plate Resistance (Approximate)	0.25	0.25 Megohms
Mutual Conductance	1050	1150 μmhos
Plate Current (Zero Signal)	5.4	6.5 Ma.
Plate Current (Maximum Signal)	5.5	6.5 Ma.
Screen Current (Zero Signal)	0.6	0.8 Ma.
Screen Current (Maximum Signal)	1.5	1.5 Ma.
Load Resistance	14000	14000 Ohms
Total Harmonic Distortion	7.5	7.5 Per Cent
Power Output	145	170 Milliwatts

APPLICATION

Sylvania Type 1T5GT is a filament type 1.4 volt beam power amplifier tube designed for service in dry battery portable receivers. It features high power output and low drain from battery circuits.



8DA-0-0



Sylvania Type 1T6

DIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Subminiature Button 8 Pin
Bulb	T-3
Maximum Overall Length	1¾"
Maximum Seated Height	1½"
Mounting Position	Any

RATINGS

Filament Voltage	1.25 Volts
Maximum Plate Voltage	67.5 Volts
Maximum Screen Voltage	67.5 Volts
Maximum Cathode Current (Pentode Section)	2.0 Ma.
Maximum Diode Current for continuous operation	0.25 Ma.

TYPICAL OPERATION

CLASS A OPERATION

Filament Voltage DC	1.25	1.25	1.25 Volts
Filament Current	40	40	40 Ma.
Plate Voltage	30	45	67.5 Volts
Screen Voltage	30	45	67.5 Volts
Grid Voltage	0	0	0 Volts
Plate Current	0.33	0.75	1.6 Ma.
Screen Current	0.10	0.21	0.4 Ma.
Plate Resistance (Approx.)	0.5	0.5	0.4 Megohm
Mutual Conductance	330	475	600 μmhos
Average Diode Current with 10 Volts DC	1.5	1.5	1.5 Ma.

AS A RESISTANCE COUPLED AMPLIFIER

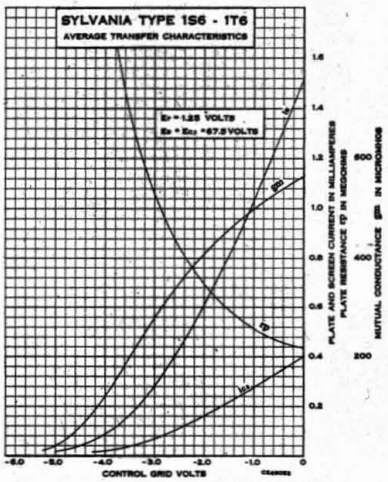
Plate Voltage	30	45	67.5 Volts
Screen Voltage	30	45	67.5 Volts
Voltage Gain (Approx.)	30 (1)	50 (2)	60 (2)

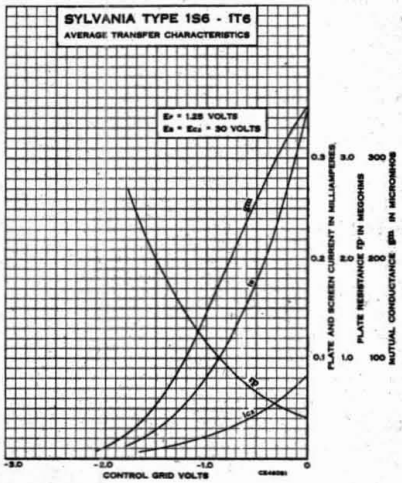
(1) With Rc2=2.2 megohms Rb=1.0 megohms Rcf=4.7 megohms
(2) With Rc2=3.9 megohms Rb=1.0 megohms Rcf=4.7 megohms

APPLICATION

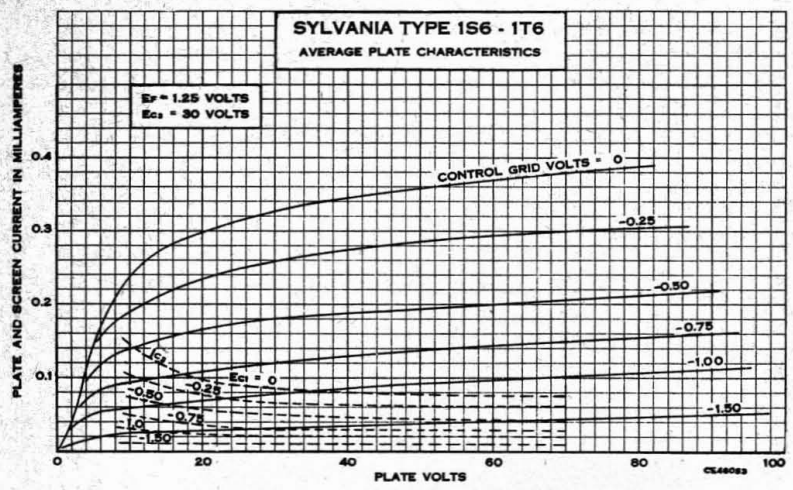
Sylvania Type 1T6 is a diode audio pentode tube suitable for use in very small radio sets or amplifiers. The other types required for a normal set complement and designed for such usage are Types 1E8 (Converter), 1AD5 (RF Pentode Amplifier) and 1AC5 (Output Pentode).

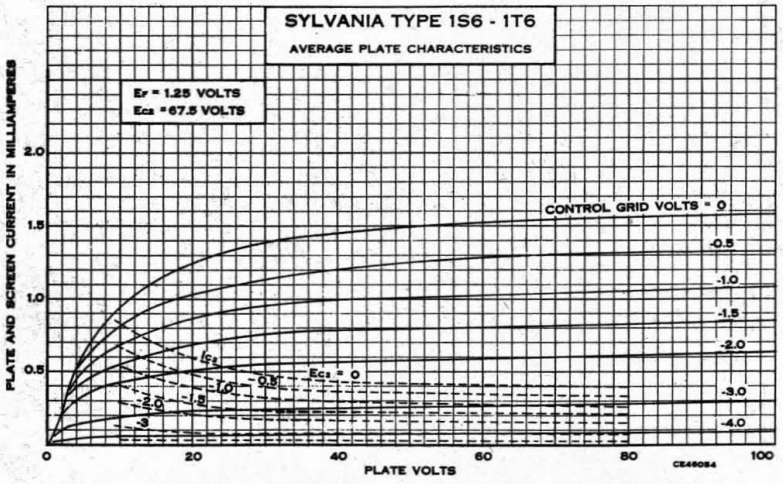
This type corresponds in service and circuit design to Types 1LD5 and 1S5 but is rated for use at lower voltages. The gains are comparable considering the reduced size and voltages. For a diode load curve, reference should be made to that given for Sylvania Type 1LD5.





1T6 (Cont.)


SYLVANIA TYPE 1S6 - 1T6
AVERAGE PLATE CHARACTERISTICS
Ef = 1.25 VOLTS
Ec2 = 30 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS = 0
-0.25
-0.50
-0.75
-1.00
-1.50
Ec1 = 0
PLATE VOLTS
CE46083


SYLVANIA TYPE 1S6 - 1T6
AVERAGE PLATE CHARACTERISTICS
Ef = 1.25 VOLTS
Ec2 = 67.5 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS = 0
-0.5
-1.0
-1.5
-2.0
-3.0
-4.0
Ec1 = 0
PLATE VOLTS
CE46084



6AR-0-1 & 5



Sylvania Type 1U4

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature 7-Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	1.6 Volts
Design Center for AC-DC Operation	1.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Voltage	110 Volts
Maximum Control Grid Voltage	–30 Volts
Minimum Control Grid Voltage	0 Volts
Maximum Total Cathode Current	6.5 Ma.
Direct Interelectrode Capacitances:*	
Grid to Plate	.008 μμf. Max.
Input	3.6 μμf.
Output	7.5 μμf.

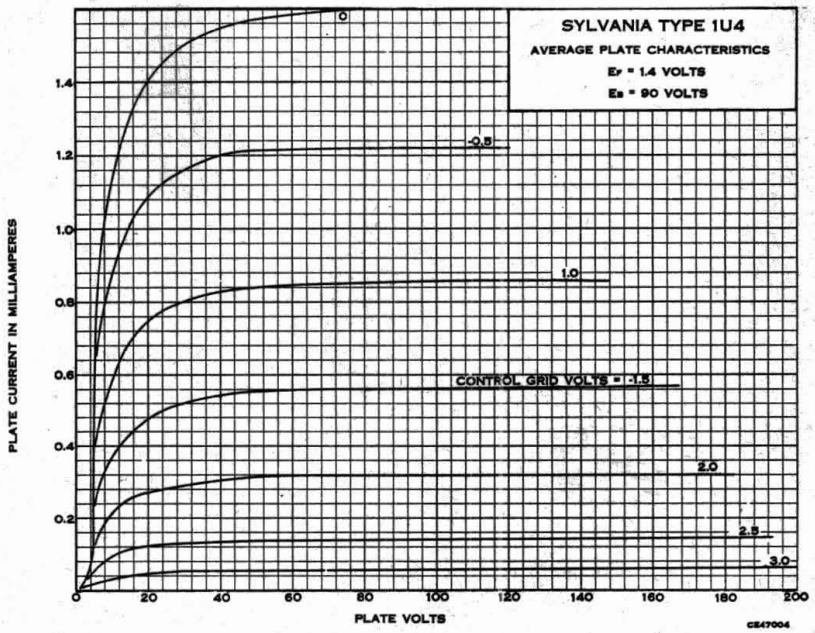
*With tight fitting external shield.

TYPICAL OPERATION

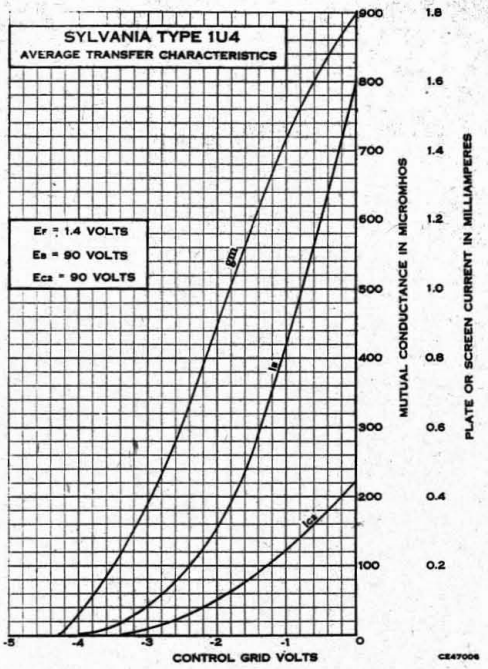
Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage	90 Volts
Control Grid Voltage	0 Volts
Plate Resistance (Approx.)	1.5 Megohms
Mutual Conductance	900 umhos
Plate Current	1.6 Ma.
Screen Current	0.45 Ma.
Grid Bias Voltage for Mutual Conductance of 10 umhos	–4.5 Volts

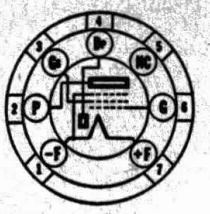
APPLICATION

Sylvania Type 1U4 is a sharp cut-off RF pentode very similar in application and characteristics to Type 1LN5. Data required for its use in resistance coupled amplifier circuits are shown in appendix.



1U4 (Cont.)


SYLVANIA TYPE 1U4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 90 VOLTS
gm
Ib
Ic2
900
800
700
600
500
400
300
200
100
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-5
-4
-3
-2
-1
0
CONTROL GRID VOLTS
MUTUAL CONDUCTANCE IN MICROMHOS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
CE47006



6BW-0-0



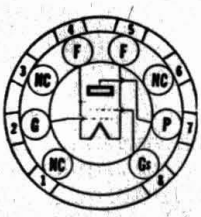
Sylvania Type 1U5

DIODE PENTODE AMPLIFIER

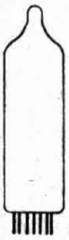
PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"

Note: With the exception of the base diagram given above, the characteristics of type 1U5 are identical, except for Capacitances, with those given for type 1S5 including curves, and Resistance Coupled Amplifier data given in appendix.



8CP-0-0



Sylvania Type 1V5

OUTPUT PENTODE

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	1½"
Minimum Lead Length	1¼"
Mounting Position	Any

For additional data and curves, reference should be made to Type 1AC5 which has the same operating conditions but differs in lead length.



8CP-0-0



Sylvania Type 1W5

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	1½"
Minimum Lead Length	1¼"
Mounting Position	Any

For additional data and curves, reference should be made to Type 1AD5 which has the same operating conditions but differs in lead length.

2X2A Sylvania Type

HIGH VOLTAGE HALF-WAVE RECTIFIER





4AB-0-0

PHYSICAL SPECIFICATIONS

Base	Small 4 Pin
Bulb	ST12
Cap	Small Metal
Maximum Overall Length	$4\frac{17}{32}$"
Maximum Seated Height	$3\frac{29}{32}$"
Mounting Position	Any

RATINGS AND OPERATION

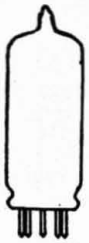
Heater Voltage	2.5 Volts
Heater Current	1.75 Amperes
Maximum RMS Plate Voltage	4500 Volts
Peak Inverse Plate Voltage	12,500 Volts
Peak Plate Current	100 Ma.
Minimum Effective Plate Supply Impedance	0 Ohms
DC Output Current (Maximum)	7.5 Ma.

APPLICATION

Sylvania Type 2X2/879 is a high voltage, high vacuum half wave rectifier. It is designed for use in applications requiring high DC voltages at low current loads such as for anode supplies for cathode ray tubes. Filter requirements for this type of service are easily met since a simple resistive, capactive filter is usually adequate. Care should be taken to provide adequate insulation as in any high voltage installation.

3A4 Sylvania Type

POWER AMPLIFIER PENTODE





7BB-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	$2\frac{1}{8}$"
Maximum Seated Height	$1\frac{7}{8}$"
Mounting Position	Any

TYPICAL OPERATION

Filament Voltage		1.4 or 2.8* Volts
Filament Current		200 or 100 Ma.
Plate Voltage	135	150 Volts
Screen Voltage	90	90 Volts
Grid Voltage	−7.5	−8.4 Volts
Plate Current	14.8	13.3 Ma.
Screen Current	2.6	2.2 Ma.
Mutual Conductance	1900	1900 μmhos
Load Resistance	8000	8000 Ohms
Power Output Maximum Signal	600	700 Mw.

*For operation at 2.8 volts (filaments in series) a shunting resistor must be connected between pins 1 and 5 to make the voltage at this point equal to that across pins 5 and 7.

APPLICATION

Sylvania Type 3A4 is a miniature power amplifier pentode. It is similar to types 3Q4 and 3S4, but has higher plate voltage and current ratings with greater power output.

Sylvania Type 1V2

HALF WAVE VACUUM RECTIFIER



9U-0-0



PHYSICAL SPECIFICATIONS

Base	Miniature-Button 9-pin
Bulb	T6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 15/16"
Mounting Position	Any

RATINGS

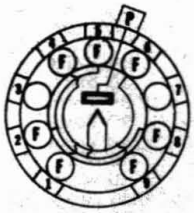
Heater Voltage (AC)	0.625 Volts
Heater Current	0.3 Amperes
Peak Inverse Plate Voltage (Max.)	7,500 Volts
Peak Plate Current (Max.)	10 Ma
Average Plate Current (Max.)	0.5 Ma
Direct Interelectrode Capacitance (Approx.) with no external shield Plate to Filament	0.8 μμf

APPLICATION

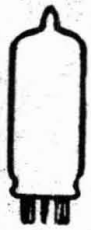
Sylvania Type 1V2 is a half-wave rectifier designed especially for use in television circuits using fly-backs or high frequency oscillator supplies.

Sylvania Type 1X2

HIGH VOLTAGE HALF-WAVE RECTIFIER



9Y-0-1,4,6 & 9



PHYSICAL SPECIFICATIONS

Base	Miniature Button 9-pin
Bulb	T6½
Cap	Skirted Miniature
Maximum Overall Length	2 11/16"
Mounting Position	Any

RATINGS AND OPERATION

Filament Voltage	1.25 Volts
Filament Current	200 Ma
Peak Inverse Plate Voltage (Max.)	15,000 Volts
Peak Plate Current (Max.)	10 Ma
DC Output Current (Max.)	1 Ma
Frequency of Supply Voltage (Max.)	300 kc

APPLICATION

Sylvania Type 1X2 is a high voltage, half-wave rectifier. It is designed for use in television circuits using either rf or fly-back type of power supply, as well as for use at power line frequency. See type 1B3GT for suggestions on reducing corona loss etc.

Issued as a supplement to the manual in Sylvania News for August 1950.

1W4 Sylvania Type

POWER AMPLIFIER PENTODE





5BZ-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Filament Voltage	1.4 Volts
Maximum Plate Voltage	110 Volts
Maximum Screen Grid Voltage	110 Volts
Maximum Cathode Current	6.0 Ma

TYPICAL OPERATION

Filament Voltage DC	1.4	1.4	1.4	1.4 Volts
Filament Current	50	50	50	50 Ma
Plate Voltage	45	62.5	67.5	90 Volts
Screen Voltage	45	62.5	67.5	90 Volts
Grid Voltage	−4.5	−5.0	−6.0	−9.0 Volts
Plate Current	1.6	3.8	3.8	5.0 Ma
Screen Current	0.3	0.8	0.8	1.0 Ma
Plate Resistance (approx.)	0.4	0.3	0.3	0.25 Megohms
Mutual Conductance	650	875	875	925 μmhos
Load Resistance	20,000	16,000	16,000	12,000 Ohms
Power Output	35	90	100	2,000 Milliwatts
Total Harmonic Distortion	10	10	10	10 %

APPLICATION

Sylvania Type 1W4 is a miniature filament type power output tube for use in low drain battery operated receivers. Electrical characteristics are identical with those for Type 1LB4, including design for maximum power output with low B supply voltage.



8AS-0-1



Sylvania Type 3A8GT

DIODE TRIODE
RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8-Pin
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 1/2"
Maximum Seated Height	2 15/16"
Mounting Position	Any

RATINGS

	Series	Parallel
Maximum Filament Voltage		
Dry Battery Operation Must Never Exceed	3.2	1.6 Volts
AC-DC Power Line Operation Design Center	2.6	1.3 Volts
Maximum Plate Voltage		
Pentode	110	110 Volts
Triode	110	110 Volts
Maximum Screen Voltage	110	110 Volts
Minimum Diode Current with 10 Volts DC applied*	0.5	0.5 Ma.
Maximum Diode Current Continuous Operation	0.25	0.25 Ma.

	Triode	Pentode
Direct Interelectrode Capacitances:*		
Grid to Plate	2.0	0.012 μμf. Max.
Input	2.6	3.0 μμf.
Output	4.2	10.0 μμf.

*The diode triode filament is connected to pins 1 and 7. The diode is located at the negative end of the filament.
**With 1 5/16" diameter shield (RMA Std. 308) Connected to Negative Filament.

TYPICAL OPERATION

	Series	Parallel
Filament Voltage DC	2.8	1.4 Volts
Filament Current	50	50 Ma.

	Triode	Pentode
Plate Voltage	90	90 Volts
Screen Voltage		90 Volts
Grid Voltage**	0	0 Volt
Plate Resistance (Approximate)	0.2	0.8 Megohm
Mutual Conductance	325	750 μmhos
Plate Current	0.2	1.5 Ma.
Screen Current	....	0.5 Ma.

**Grid bias voltage is measured from the negative filament terminal of each unit. With Series filament, pin number 7 is the negative for the diode triode section and pin number 1 for the pentode section. With parallel filaments pin number 7 becomes negative for both.

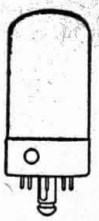
APPLICATION

Sylvania Type 3A8GT is a filament type diode, triode, pentode with the filament center tap connected to pin number 1, allowing this tube to be used for 1.4 volt dry battery operation or with series filament in a 50 ma. series string arrangement. Each unit is independent of the others except for the common filament.

Data for use in Resistance Coupled Amplifiers may be obtained by referring to types 1LN5 and 1LH4 in appendix.

3D6 Sylvania Type

BEAM POWER AMPLIFIER





6BA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

	Series	Parallel
Maximum Filament Voltage DC	3.5*	1.75* Volts
Minimum Filament Voltage DC	2.8	1.40 Volts
Filament Current	0.110	0.220 Ampere
Maximum Plate Voltage	180	180 Volts
Maximum Screen Voltage	135	135 Volts
Maximum Cathode Current§	30	30 Ma.
Maximum Plate Dissipation	4.5	4.5 Watts
Maximum Screen Dissipation	0.9	0.9 Watt

*For parallel operation, connect pins No. 1 and No. 8 to positive voltage supply, and pin No. 7 to negative voltage supply. For series operation, connect pin No. 1 to positive and pin No. 8 to negative.

§When series operated, a shunting resistor should be connected across the section of filament between pins No. 7 and No. 8 of sufficient value to by-pass any cathode current in excess of the maximum per section. If other tubes in a series filament arrangement contribute to the filament current of Type 3D6, an additional shunting resistor may be required between pins No. 1 and No. 8.

Direct Interelectrode Capacitances:*	Note 1	Note 2
Control Grid to Plate	0.30	0.30 $\mu\mu$f.
Input	7.5	7.5 $\mu\mu$f.
Output	5.5	6.5 $\mu\mu$f.

Note 1. With no external shield (Pin No. 5 connected to filament center tap).

Note 2. With $1\frac{5}{16}$" diameter shield (RMA Std. M8-308) connected to negative filament (Pin No. 5 connected to filament center tap).

TYPICAL OPERATION A-F POWER AMPLIFIER CLASS A_1

Filament Voltage	1.4	1.4	1.4 Volts
Filament Current	0.220	0.220	0.220 Ampere
Plate Voltage	90	135	150 Volts
Screen Voltage	90	90	90 Volts
Grid Voltage	−4.5	−4.5	−4.5 Volts
Peak A-F Signal Voltage	4.5	4.5	4.5 Volts
Plate Current Zero Signal	9.5	9.8	9.9 Ma.
Plate Current Maximum Signal	8.5	9.8	10.2 Ma.
Screen Current Zero Signal	1.6	1.2	1.0 Ma.
Screen Current Maximum Signal	3.2	2.0	1.8 Ma.
Mutual Conductance	2400	2400	2400 μmhos
Load Resistance	8000	12000	14000 Ohms
Total Distortion	5	5	5 Per Cent
Power Output	270	500	600 Mw.

R-F POWER AMPLIFIER CLASS C (50 Mc.)

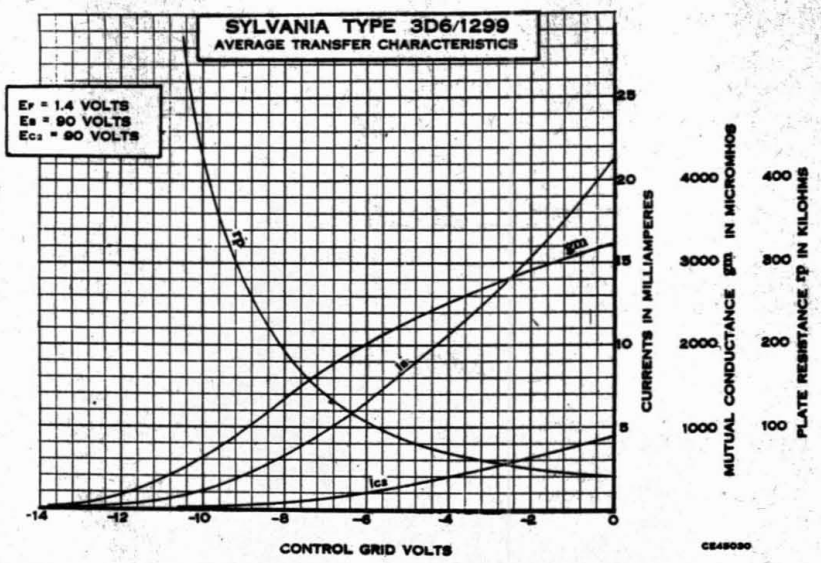
Filament Voltage DC	1.4 Volts
Plate Voltage	150 Volts
Screen Voltage	135 Volts
Grid Voltage (Approximately)§	−20 Volts
Plate Current	23.0 Ma.
Screen Current	6.0 Ma.
Grid Current	1.0 Ma.
Total DC Cathode Current	30 Ma. Max
Peak R-F Grid Voltage	55 Volts
R-F Power Input	0.25 Watt
R-F Power Output	1.4 Watts

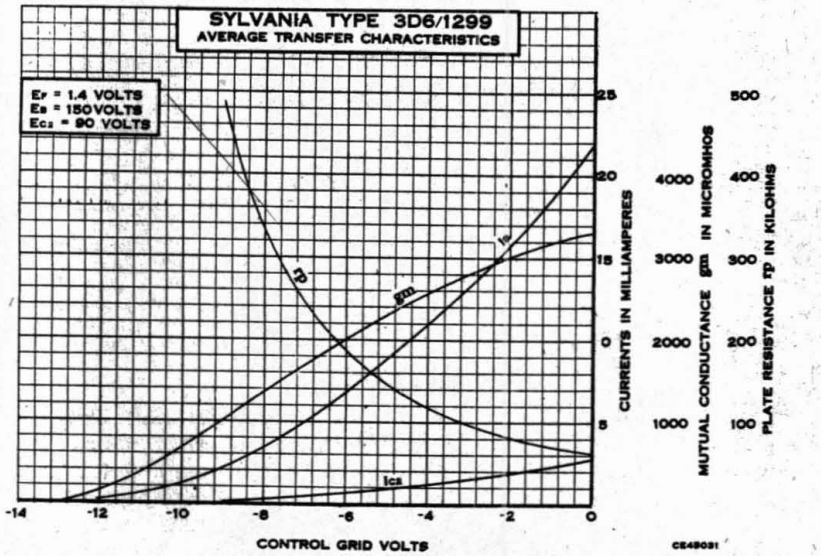
§May be obtained from a fixed source, or by use of a suitable grid resistor.

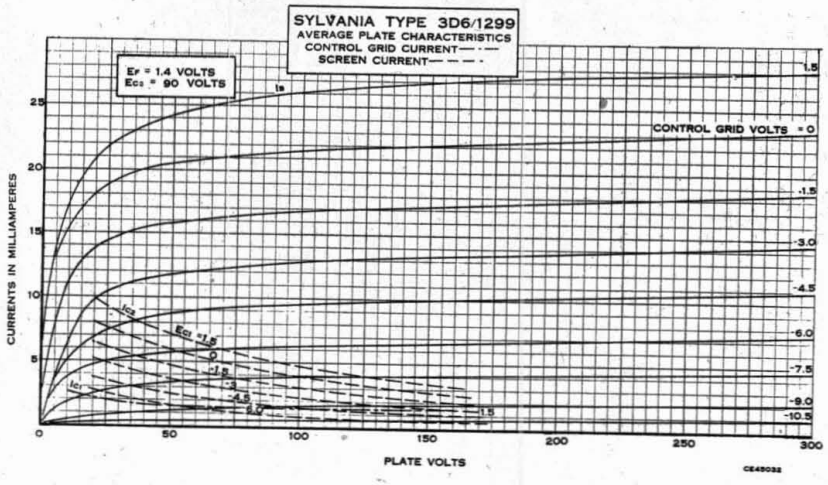
APPLICATION

Sylvania Type 3D6 is a filament type beam power amplifier of Lock-In construction employing the same type of filament as is used in the Sylvania Type 3B7, allowing it to be operated over a range of from 1.4 to 1.75 volts. The Class A audio characteristics are similar to those of Type 3Q5GT.

When employed as a Class C amplifier, Type 3D6 will provide power output ranging from 2 watts at 20 megacycles to approximately 0.5 watt at 200 megacycles, therefore, making it useful as an r-f amplifier or oscillator in low power portable transmitters. When the 3D6 is operated at high plate efficiences (Class C), the output is limited by maximum allowable plate current, but for Class A or for frequency multiplication plate and screen dissipation becomes the limiting factor. The characteristics of the 3D6 do not differ materially for either series or parallel filament operation.

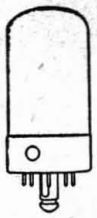

SYLVANIA TYPE 3D6/1299
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 90 VOLTS
Ec2 = 90 VOLTS
rp
gm
Ib
Ic2
-14
-12
-10
-8
-6
-4
-2
0
5
10
15
20
25
1000
2000
3000
4000
100
200
300
400
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CE45030


SYLVANIA TYPE 3D6/1299
AVERAGE TRANSFER CHARACTERISTICS
Ef = 1.4 VOLTS
Eb = 150VOLTS
Ec2 = 90 VOLTS
rp
gm
Ib
Ic2
-14
-12
-10
-8
-6
-4
-2
0
5
10
15
20
25
1000
2000
3000
4000
100
200
300
400
500
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CE45031


SYLVANIA TYPE 3D6/1299
AVERAGE PLATE CHARACTERISTICS
CONTROL GRID CURRENT — · — ·
SCREEN CURRENT — — —
Ef = 1.4 VOLTS
Ec2 = 90 VOLTS
Ib
Ic2
Ec2 =1.5
0
-1.5
-3
-4.5
-6.0
-7.5
-9.0
-10.5
CONTROL GRID VOLTS = 0
-1.5
-3.0
-4.5
-6.0
-7.5
-9.0
-10.5
0
5
10
15
20
25
50
100
150
200
250
300
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45032

3E6 Sylvania Type

SHARP CUT-OFF RF PENTODE





7CJ-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

	Parallel	Series
Maximum Filament Voltage	1.6	3.2 Volts
Design Center for AC, DC Operation	1.3	2.6 Volts
Maximum Plate Voltage	110	110 Volts
Maximum Screen Voltage	110	110 Volts
Maximum Cathode Current	12.0	6.0* Ma.

For parallel filament operation, connect pins 1 and 8 to positive supply and pin 5 to negative supply. For series operation, pin No. 1 is positive and pin No. 8 is negative.

*For each 1.4 volt section. A shunting resistor across the negative filament section is necessary to limit current to value given.

Direct Interelectrode Capacitances:**

Grid to Plate	0.007 μμf. Max.
Input	5.5 μμf.
Output	8.0 μμf.

**With $1\frac{5}{16}$" dia. shield (RMA Std. 308) connected to negative filament.

TYPICAL OPERATION

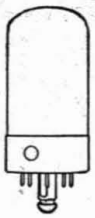
	Parallel	Series
Filament Voltage DC	1.4	2.8 Volts
Filament Current	100	50 Ma.
Plate Voltage	90	90 Volts
Screen Voltage	90	90 Volts
Grid Voltage	0	0 Volt
Grid Resistor	2.0	2.0 Megohms
Plate Current	4.2	2.9 Ma.
Screen Current	1.7	1.2 Ma.
Mutual Conductance	2000	1700 μmhos
Plate Resistance	0.25	0.325 Megohm
Grid Voltage for Ib=10 μa	−5.5	−4.0 Volts

APPLICATION

Sylvania Type 3E6 is a sharp cut-off pentode with Lock-In construction. The filament is center tapped so that it may be operated at 1.4 or 2.8 volts. This permits operation in parallel with other 1.4 volt tubes from a single dry cell source or in a series string arrangement with other 50 ma. filament tubes. Because of the additional emission provided by this filament arrangement, the mutual conductance is much higher than usually obtained in the 1-4 volt series of tubes giving greater gains per stage, especially under difficult operating conditions.



6BA-L-0



Sylvania Type 3LF4

BEAM POWER AMPLIFIER

GT EQUIVALENT—3Q5GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	Series*	Parallel†
Dry Battery Operation must never Exceed	3.2	1.6 Volts
AC-DC Power Line Operation—Design Center	2.6	1.3 Volts
Maximum Plate Voltage	110	110 Volts
Maximum Screen Voltage	110	110 Volts
Maximum Cathode Current	6*	12 Ma.

TYPICAL OPERATION

CLASS A AMPLIFIER

	Series*			Parallel†	
Filament Voltage	2.8	2.8	1.4	1.4	1.4 Volts
Filament Current	0.050	0.050	0.100	0.100	0.100 Ampere
Plate Voltage	90	110	85	90	110 Volts
Screen Voltage	90	110	85	90	110 Volts
Grid Voltage	−4.5	−6.6	−5.0	−4.5	−6.6 Volts
Peak A-F Signal Voltage	4.5	5.1δ	5.0	4.5	5.4δ Volts
Plate Current	8.0	8.5	7.0	9.5	10 Ma.
Screen Current	1.0	1.1	0.8	1.3	1.4 Ma.
Plate Resistance (App.)	80000	110000	70000	90000	100000 Ohms
Mutual Conductance	2000	2000	1950	2200	2200 μmhos
Load Resistance	8000	8000	9000	8000	8000 Ohms
Total Harmonic Distortion	8.5	8.5	5.5	6.0	6.0 Per Cent
Power Output	230	330	250	270	400 Mw.

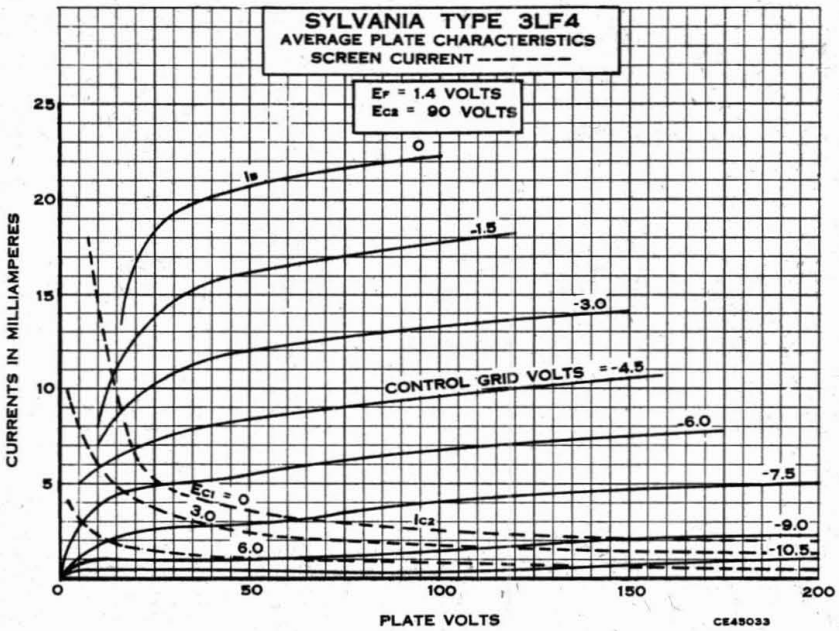
*A resistor of 270 ohms must be used in parallel with the negative section of the filament (Pins 7 and 8) in order to insure that the value of 6.0 Ma. total cathode current for each 1.4 volt section of the filament is not exceeded. When other tubes in series filament circuits contribute to the filament current of the 3LF4, an additional shunt resistor between pins 1 and 8 will be required.

†For parallel operation, connect pins 1 and 8 to the positive of the voltage supply and pin 7 to the negative.

δUse of a peak signal voltage equal to the bias voltage gives power output of 400 Mw. at 10% distortion and 500 Mw. at 10% distortion for the parallel connection.

APPLICATION

Sylvania Type 3LF4 is a Lock-In beam power amplifier tube having electrical characteristics identical to those of Type 3Q5GT. In series operation, note the use of the shunting resistor on the negative half of the filament to equalize the current in the two sections of the filament.



3Q4 Sylvania Type

BEAM POWER AMPLIFIER





7BA-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Filament Voltage	Parallel	Series
Dry Battery Operation Must Never Exceed	1.6	3.2 Volts
AC-DC Power Line Operation Design Center	1.3	2.6 Volts
Maximum Plate Voltage	90	90 Volts
Maximum Screen Voltage	90	90 Volts
Maximum Cathode Current (Zero Signal)*	12	6 Ma.

*When series filament connections are used a shunting resistor should be used across the negative filament section (pins 1 and 5) to limit cathode current to the value specified. If other tubes in a series filament string contribute to the filament current of the 3Q4, another resistor should be connected between pins 1 and 7 so chosen to carry any excess current over ratings.

TYPICAL OPERATION CLASS A_1 AMPLIFIER

	Parallel Filament	Series Filament	Series Filament
Filament Voltage DC	1.4	1.4	2.8 Volts
Filament Current	100	100	50 Ma.
Plate Voltage	85	90	90 Volts
Screen Voltage	85	90	90 Volts
Grid Voltage	−5.0	−4.5	−4.5 Volts
Peak Signal Voltage	5.0	4.5	4.5 Volts
Zero Signal Plate Current	6.9	9.5	7.7 Ma.
Zero Signal Screen Current	1.5	2.1	1.7 Ma.
Plate Resistance (Approximate)	0.12	0.10	0.12 Megohm
Mutual Conductance	1975	2150	2000 μmhos
Load Resistance	10000	10000	10000 Ohms
Total Harmonic Distortion	10	7	7 PerCent
Maximum Signal Power Output	0.25	0.27	0.24 Watt

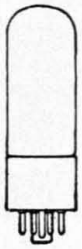
APPLICATION

Sylvania Type 3Q4 is a miniature type power output pentode having a 50 ma. center tapped filament. With series filament connection this tube may be used in a series filament arrangement with other tubes in the 50 ma. filament group. With parallel filament connections this tube may be run directly from a single cell dry battery filament supply with satisfactory service over the range of voltages encountered during the service life of such batteries.

3Q5GT Sylvania Type

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 3LF4





7AQ-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2¾"
Mounting Position	Any

RATINGS

Maximum Filament Voltage	Series	Parallel
Dry Battery Operation Must Never Exceed	3.2	1.6 Volts
AC-DC Power Line Operation Design Center	2.6	1.3 Volts

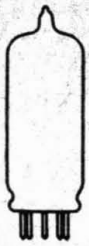
TYPICAL OPERATION

	Series Filament	Parallel Filament
Filament Voltage DC	2.8	1.4 Volts
Filament Current	50	100 Ma.

For other rating, operation and application data refer to Sylvania Lock-In type 3LF4.



7BA-0-0



Sylvania Type 3S4

PENTODE POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

	Parallel†	Series
Maximum Filament Voltage	1.6	3.2 Volts
Design Center for AC-DC Operation	1.3	2.6 Volts
Maximum Plate Voltage	90	90 Volts
Maximum Screen Voltage	67.5	67.5 Volts
Maximum Cathode Current	12.0	6.0* Ma.

†For parallel filament operation, tie pins 1 and 7. Negative end of filament connected to pin No. 5.

*A shunting resistor across negative filament section, pins 1 and 5, is necessary to limit cathode current to value given.

TYPICAL OPERATION

AMPLIFIER CLASS A_1

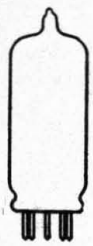
	Parallel Filament		Series Filament	
Filament Voltage DC	1.4	1.4	2.8	2.8 Volts
Filament Current	100	100	50	50 Ma.
Plate Voltage	67.5	90	67.5	90 Volts
Screen Voltage	67.5	67.5	67.5	67.5 Volts
Grid Voltage	−7	−7	−7	−7 Volts
Peak A-F Grid Voltage	7	7	7	7 Volts
Zero Signal Plate Current	7.2	7.4	6.0	6.1 Ma.
Zero Signal Screen Current	1.5	1.4	1.2	1.1 Ma.
Mutual Conductance	1550	1575	1400	1425 μmhos
Plate Resistance (Approx.)	0.1	0.1	0.1	0.1 Megohm
Load Resistance	5000	8000	5000	8000 Ohms
Total Harmonic Distortion	10	12	12	13 Per Cent
Maximum Signal Power Output	180	270	160	235 Milliwatts

APPLICATION

Sylvania Type 3S4 is a power amplifier pentode of miniature construction and is very similar to type 1S4 but designed for operation at either 1.4 volts or 2.8 volts. It is particularly suitable as an output tube in compact, light weight, portable equipment which may be operated on batteries or AC-DC power lines. The high operating efficiency allows the tube to be used with light weight low B supply voltages. Circuit applications are similar to those for Sylvania Types 1LB4 and 3Q5GT.



6BX-0-0



Sylvania Type 3V4

PENTODE POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

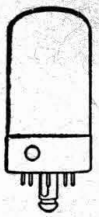
Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

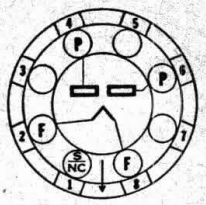
Note; With the exception of the base diagram given above the characteristics of type 3V4 are identical with those of type 3Q4 given on a previous page.

5AZ4 Sylvania Type

FULL-WAVE RECTIFIER

GT EQUIVALENT 5Y3GT





5T-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3½"
Maximum Seated Height	2⅝"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 6 and 8 are in vertical plane.

RATINGS

Filament Voltage AC	5.0 Volts
Filament Current	2.0 Amperes
Maximum Peak Inverse Voltage	1400 Volts
Maximum Steady State Peak Current Per Plate	400 Ma.
Maximum Transient Peak Current Per Plate	2.2 Amperes
Average Tube Voltage Drop at 125 Ma. Per Plate	60. Volts

The maximum values of plate supply voltage and output current are interrelated as well as dependent upon whether choke or condenser input is used. Intermediate values may be determined from the following table:

	Condenser Input			Choke Input	
AC Input Per Plate (RMS)	500	350	70	500	350 Volts
Output Current	85	125	150	125	150 Ma.

TYPICAL OPERATION

	Filter Circuit	
	Choke Input	Condenser Input
Filament Voltage AC	5.0	5.0 Volts
Filament Current	2.0	2.0 Amperes
AC Plate Voltage Per Plate (RMS)	500	350 Volts
DC Output Current	125	125 Ma.
Minimum Plate Supply Impedance Per Plate	...	50 Ohms
Input Choke	10	... Henrys

APPLICATION

Sylvania Type 5AZ4 is a lock-in full-wave filament type rectifier having the same ratings as Type 5Y3GT. Reference should be made to this type for the load curve under typical operating conditions.

250
58 000
225



5T-0-0



Sylvania Type 5U4G

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Medium Octal 5-Pin
Bulb	ST-16
Maximum Overall Length	5 5/16"
Maximum Seated Height	4 3/4"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 1 and 4 are in vertical plane.

RATINGS

Filament Voltage (AC)	5.0 Volts
Filament Current	3.0 Amperes
Peak Inverse Voltage	1550 Volts
Tube Drop at 225 Ma. per Plate	58 Volts
Peak Plate Current (Per Plate)	675 Ma.

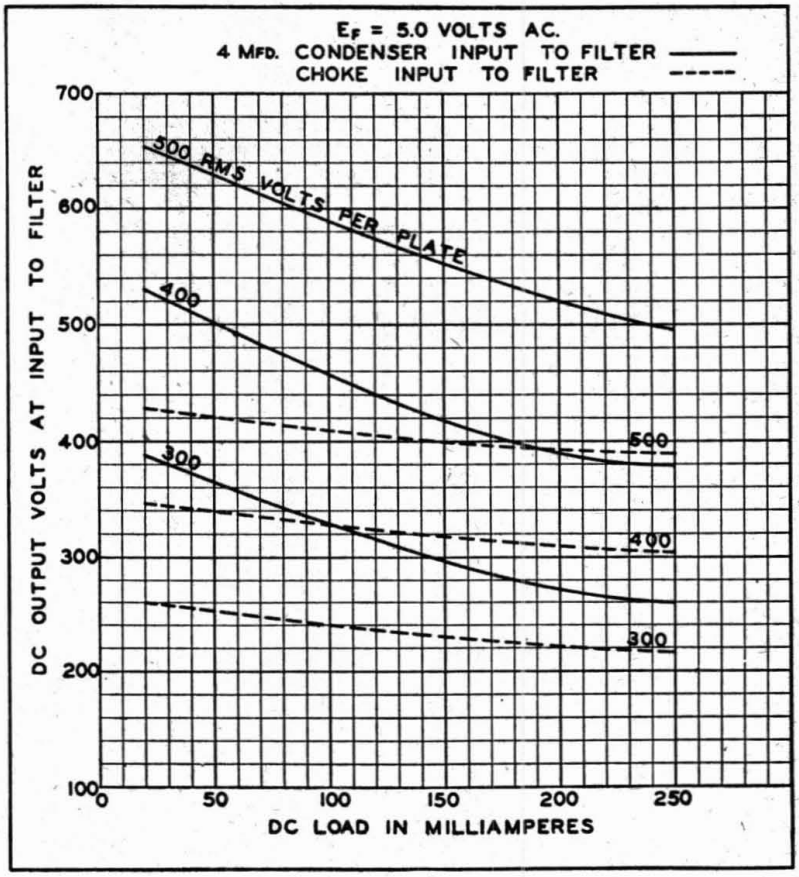
TYPICAL OPERATION

	Choke Input*	Condenser Input*
RMS Voltage Per Plate	550	450 Volts
DC Output Current (Maximum)	225	225 Ma.
Plate Supply Impedance (Minimum)	...	75 Ohms
Input Choke (Minimum)	3	... Henrys

*Filter Circuit.

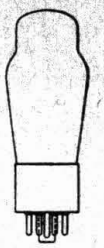
APPLICATION

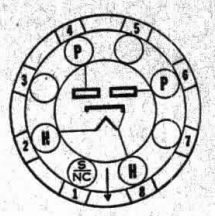
Sylvania Type 5U4G is a high vacuum full-wave rectifier tube designed for heavier duty service than Type 5Y3G. Choke input filter arrangements are preferred for use with this tube, although somewhat higher plate supply voltages will be required to obtain the same output voltage obtained with condenser input filter circuits, but peak currents are reduced and voltage regulation is greatly improved under variable loads. Type 5U4G is identical to the older Type 5Z3 except for basing.



5V4G Sylvania Type

FULL-WAVE RECTIFIER





5L-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 5-Pin
Bulb	ST-14
Maximum Overall Length	4 5/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

AC Heater Voltage	5.0 Volts
Heater Current	2.0 Amperes
Peak Inverse Voltage	1400 Volts
Tube Voltage Drop at 175 Ma. Per Plate	25 Volts
Peak Plate Current (Per Plate)	525 Ma.

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	375 Volts Max.
DC Output Current	175 Ma. Max.
Plate Supply Impedance per Plate	100 Ohms Min.

CHOKE INPUT TO FILTER

AC Voltage per Plate	500 Volts Max.
DC Output Current	175 Ma. Max.
Input Choke Value	4.0 Henrys Min.

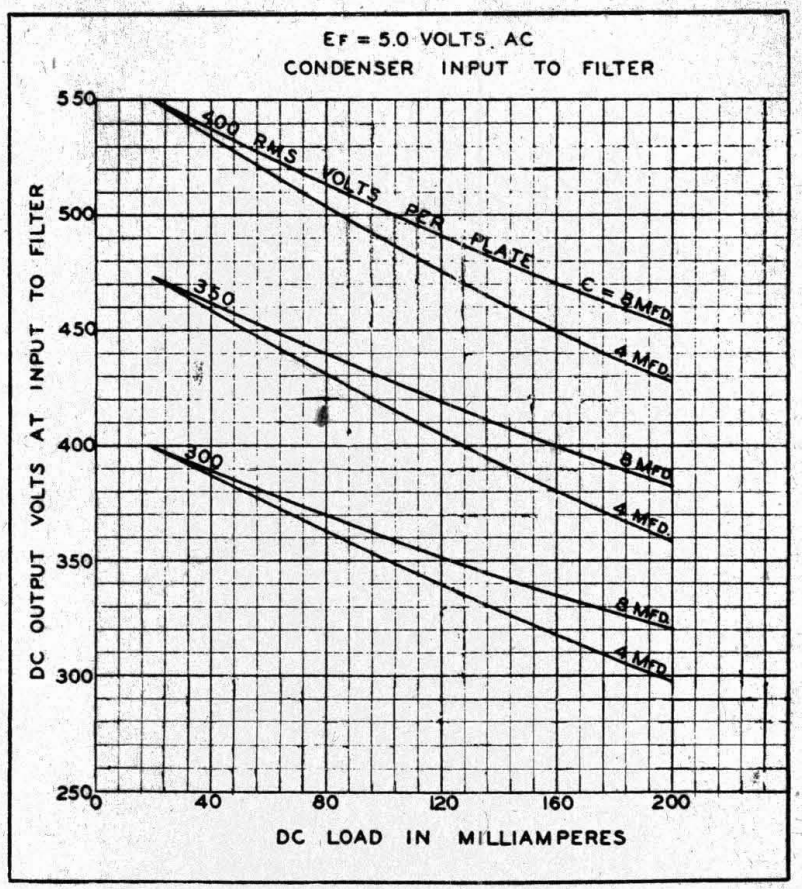
APPLICATION

Sylvania 5V4G is a cathode type high vacuum rectifier designed for full-wave applications. This glass tube is identical to Type 83V except that it is equipped with an octal base. It is important to note that the base of this rectifier may contain all eight pins, although only four of these are connected. Sockets designed for Type 5V4G must accommodate the eight pin base. The cathode is connected internally to the heater, similar to the 83V construction.

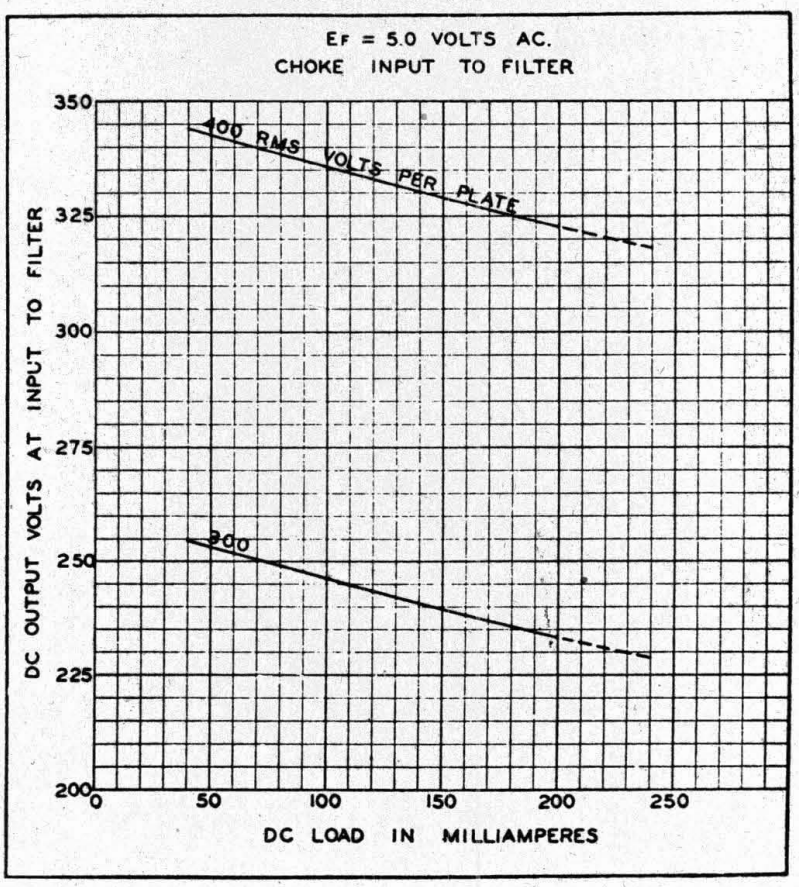
The filament voltage should be held close to its rated value of 5 volts. Since the filament current is rather high it is necessary to employ wire of the proper current carrying capacity.

The performance of the 5V4G is quite similar to that of any other high vacuum rectifier. Conventional filter circuits, either of the condenser-input or choke-input type, are applicable but care must be exercised so as not to exceed the recommended maximum values of plate voltage and output current. Choke-input filters will reduce the peak plate current and afford improved voltage regulation, although there will be a sacrifice in d-c output voltage.

TYPES 5V4G, 83V

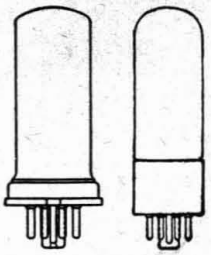


TYPES 5V4G, 83V



5W4GT Sylvania Type

FULL-WAVE RECTIFIER





5T-1-0 (5W4)
5T-0-0 (5W4GT)

PHYSICAL SPECIFICATIONS

	5W4	5W4GT
Base	Small Wafer Octal 5-Pin	Medium Octal 5-Pin
Bulb	Metal 8-6	T-9
Maximum Overall Length	3 1/4"	3 3/8"
Maximum Seated Height	2 11/16"	2 15/16"
Mounting Position	Any	Any

RATINGS

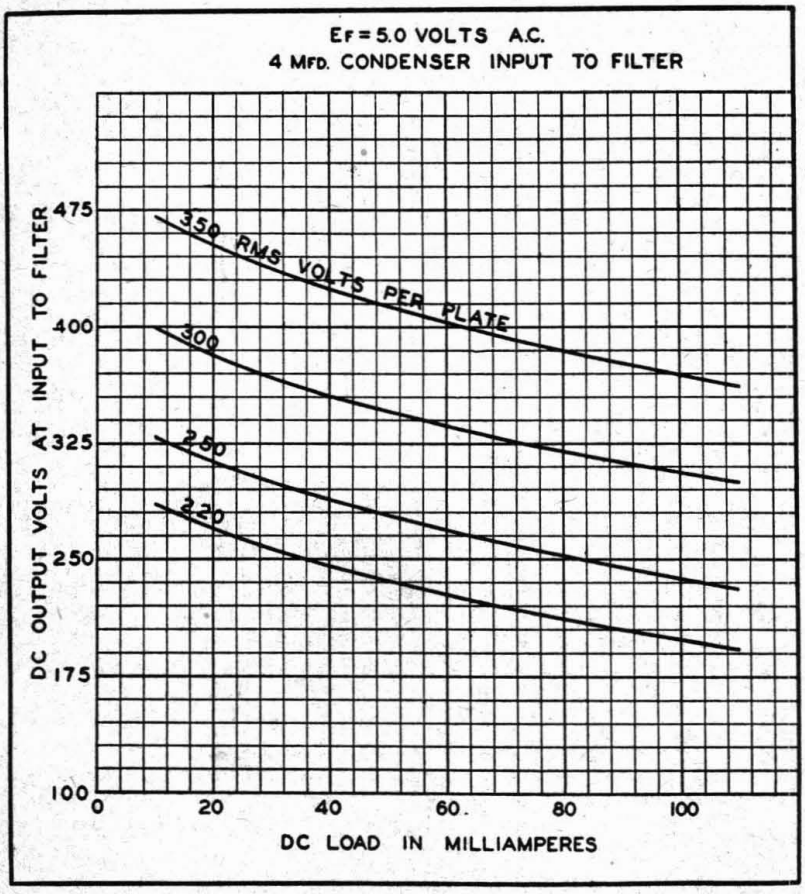
Filament Voltage AC	5.0 Volts
Filament Current	1.5 Amperes
Maximum Peak Inverse Voltage	1100 Volts
Tube Voltage Drop at 110 Ma. per Plate	50 Volts
Maximum Peak Plate Current (Per Plate)	300 Ma.

TYPICAL OPERATION

Filament Voltage AC	5.0 Volts
Filament Current	1.5 Amperes
RMS Voltage Per Plate	350 Volts
DC Output Current	100 Ma.
Minimum Plate Supply Impedance	50 Ohms

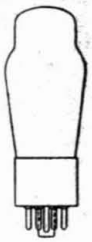
APPLICATION

Sylvania Types 5W4 and 5W4GT are full-wave high vacuum type rectifiers. Both types are similar to Type 5Y3 in application but have somewhat lower ratings. Type 5W4 is of metal construction and its GT equivalent uses the small tubular glass bulb type of construction. Each is interchangeable with the other and are chiefly used for replacement in existing equipment.





5Q-0-0



Sylvania Type 5X4G

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Medium Octal 8-Pin
Bulb	ST-16
Maximum Overall Length	5 5/16"
Maximum Seated Height	4 3/4"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 1 and 4 are in a vertical plane.

For operation data, and curves refer to corresponding Type 5U4G which is identical except for basing.



5Q-0-0
5Y4G



5T-0-0
5Y3GT

Sylvania Type 5Y3GT
Sylvania Type 5Y4G

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

	5Y3GT	5Y4G
Base	Intermediate Octal 5-Pin	Medium Octal 6-Pin
Bulb	T-9	ST-14
Maximum Overall Length	3 3/8"	4 5/8"
Maximum Seated Height	2 13/16"	4 1/16"
Mounting Position	Vertical*	Vertical†

*Horizontal operation permitted if Pins 2 and 4 are in a vertical plane.

†Horizontal operation permitted if Pins 1 and 4 are in a vertical plane.

RATINGS

Filament Voltage AC	5.0 Volts
Filament Current	2.0 Amperes
Maximum Peak Inverse Voltage	1400 Volts
Maximum Steady State Peak Current per Plate	400 Ma.
Maximum Transient Peak Current per Plate	2.2 Amperes
Average Tube Voltage Drop at 125 Ma. per Plate	60 Volts

The maximum values of plate supply voltage and output current are interrelated as well as dependent upon whether choke or condenser input is used. Intermediate values may be determined from the following table:

	Condenser Input			Choke Input	
AC Input per Plate (RMS)	500	350	70	500	350 Volts
Output Current	85	125	150	125	150 Ma.

TYPICAL OPERATION

	Filter Circuit	
	Choke Input	Condenser Input
Filament Voltage AC	5.0	5.0 Volts
Filament Current	2.0	2.0 Amperes
AC Plate Voltage per Plate (RMS)	500	350 Volts
DC Output Current	125	125 Ma.
Minimum Plate Supply Impedance per Plate	...	50 Ohms
Input Choke	10	... Henrys

APPLICATION

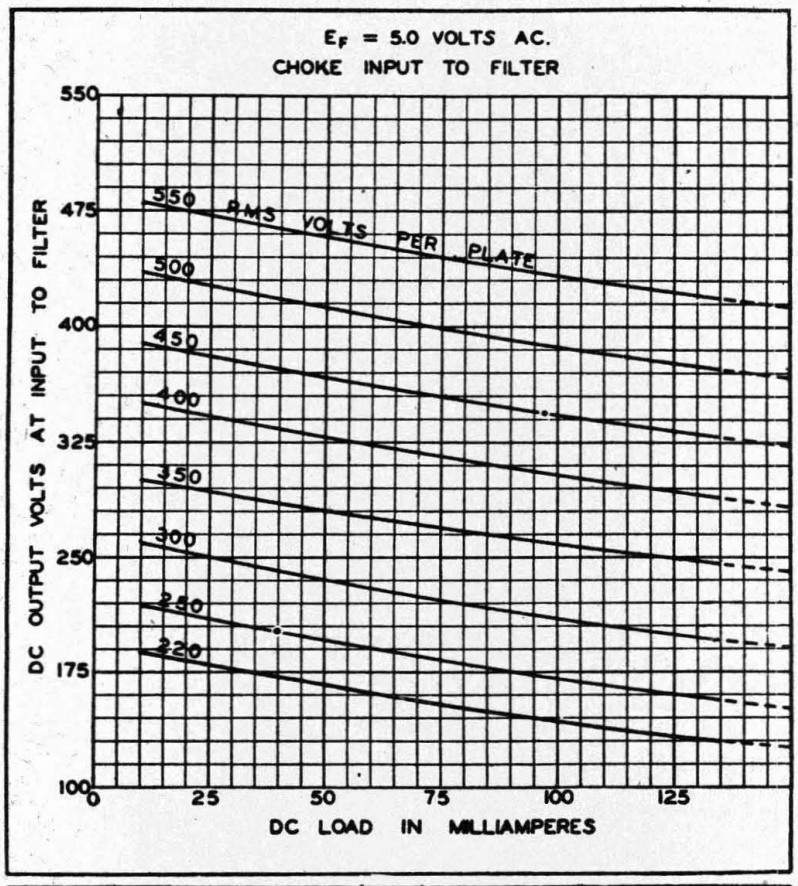
Sylvania Types 5Y3GT and 5Y4G are full-wave vacuum type rectifiers similar to Type 80 and are used for supplying direct current power from an a-c power supply line.

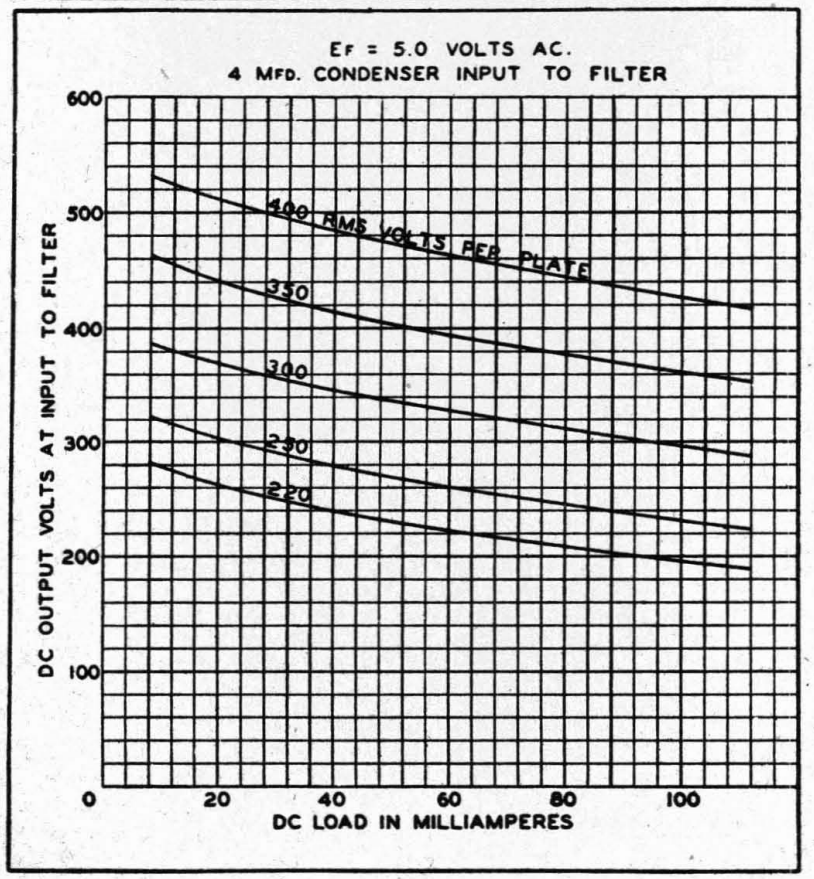
The filament employed in these types is of the oxide coated type. This filament is operated on alternating current from a five volt winding on the power transformer. The filament voltage should be held close to its rated value of 5 volts. Since the filament current is rather high (2.0 amperes) it is necessary to employ wire of the proper current carrying capacity. It is unnecessary to provide the filament winding with a center tap for most applications.

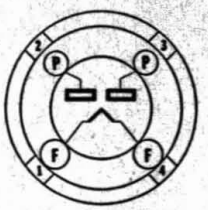
(Curves are shown on the following page).

5Y3GT (Cont.)
5Y4G (Cont.)

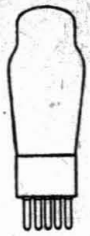
TYPES 5Y3G, 5Y4G, 80







4C-0-0



Sylvania Type 5Z3

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

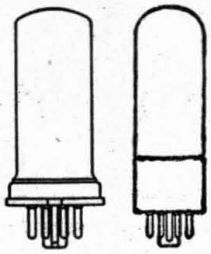
Base	Medium 4-Pin
Bulb	ST16
Maximum Overall Length	5 3/8"
Maximum Seated Height	4 3/4"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 1 and 2 are in a vertical plane.

For further data on this type, refer to corresponding Type 5U4G, which is identical except for basing.



5L-1-0 (5Z4)
5L-0-0 (5Z4GT)



Sylvania Type 5Z4GT

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

	5Z4	5Z4GT
Base	Small Wafer Octal 5 Pin	Intermediate Octal 5 Pin
Bulb	Metal 8-6	T9
Maximum Overall Length	3 1/4"	3 3/8"
Maximum Seated Height	2 11/16"	2 13/16"
Mounting Position	Any	Any

RATINGS

Heater Voltage	5.0 Volts
Heater Current	2.0 Ampere
Peak Inverse Voltage	1400 Volts
Peak Plate Current per Plate	375 Ma.
Tube Drop at 125 Ma. per Plate	20 Volts

TYPICAL OPERATION

	Choke Input	Condenser Input
Heater Voltage	5.0	5.0 Volts
Heater Current	2.0	2.0 Ampere
RMS Voltage Per Plate	500	350 Volts
DC Output Current	125	125 Ma.
Minimum Plate Supply Impedance Per Plate	...	50 Ohms
Minimum Input Choke	5.0	.... Henrys

APPLICATION

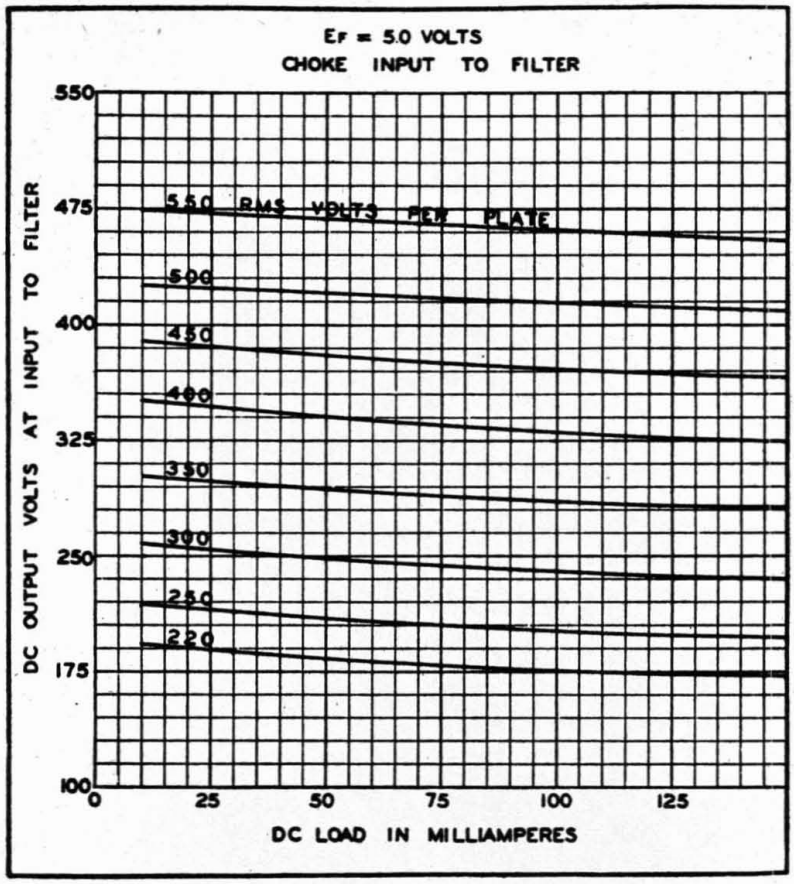
Sylvania 5Z4 is a heater-cathode type high vacuum rectifier designed for full-wave circuit applications. The cathode is connected internally to one side of the heater.

The performance of the 5Z4 is quite similar to that of any other high vacuum type rectifier. Conventional filter circuits, either of the condenser-input or choke-input type, are applicable but care must be exercised not to exceed the recommended maximum values of plate voltage and output current. Choke-input filters will reduce the peak plate current, and afford improved voltage regulation, although there will be a sacrifice in d-c output voltage.

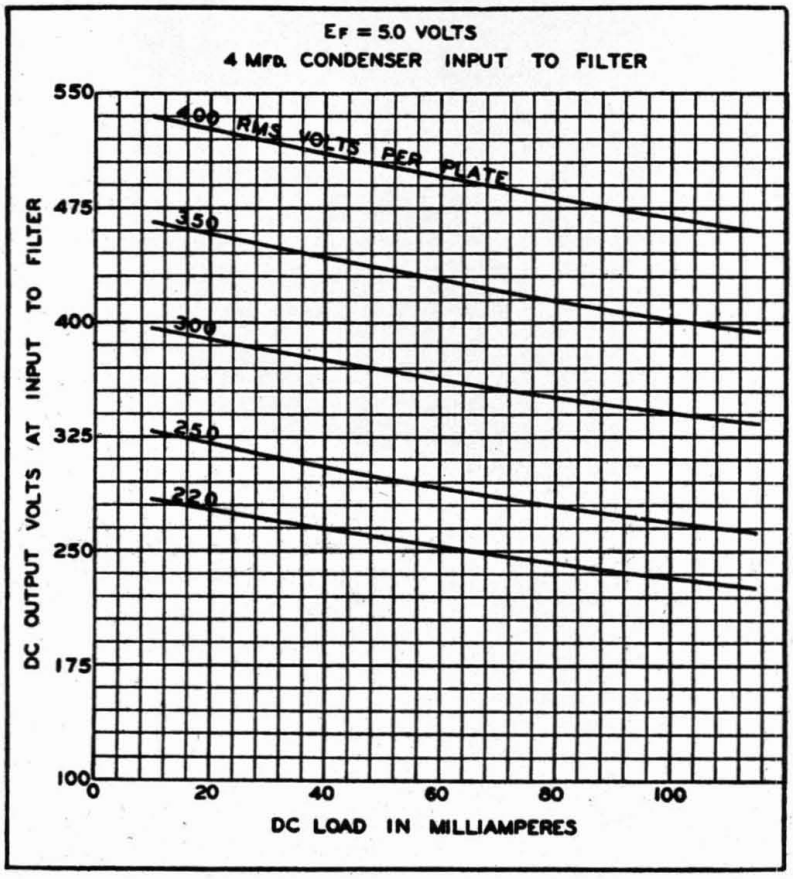
Proper fusing of radio receivers employing close-spaced rectifiers, such as Types 5Z4 and 83V, is recommended. The fuse should be placed in the primary circuit of the power transformer.

Note: For rectifier curve data see following page.

TYPE 5Z4



TYPE 5Z4





6T-0-0



Sylvania Type 6A5G

POWER AMPLIFIER TRIODE

PHYSICAL SPECIFICATIONS

Base	Medium Octal 8 Pin
Bulb	ST16
Maximum Overall Length	5⅜"
Maximum Seated Height	4¾"
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	1.25 Amperes
Maximum Plate Voltage	325 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	16 μμf.
Input	7 μμf.
Output	5 μμf.

*Unshielded.

TPYICAL OPERATION as Amplifier

	Class A One Tube	Push-Pull Class AB_1 Two Tubes Fixed Bias	Two Tubes Self Bias	
Heater Voltage	6.3	6.3	6.3	Volts
Heater Current	1.25	1.25	1.25	Amperes
Plate Voltage	250	325	325	Volts
Grid Voltage	−45	−68	....	Volts
Self-Bias Resistor	750	...	850	Ohms
Plate Current (Per Tube)	60	40	40	Ma.
Plate Resistance	800	....	....	Ohms
Mutual Conductance	5250	....	....	μmhos
Amplification Factor	4.2	....	....	
Load Resistance (Total)	2500	3000	5000	Ohms
Power Output	3.75	15.	10	Watts
Harmonic Distortion	5.0	2.5	5.0	Per Cent

APPLICATION

Type 6A5G is a heater type triode for use as a power output tube. Because of the heater-cathode design this tube is quite hum free, thus no potentiometer is required to balance out hum. Type 6A5G is identical in ratings and characteristics to Types 6A3 and 6B4G with the exception of the Class A power output rating which is 550 milliwatts higher.

In using this tube in new circuits, any of the conventional methods may be used for the input coupling, providing the resistance added in the grid return is not excessive. With self-bias the d-c resistance in this circuit should be less than 0.5 megohm and with fixed bias it should not be greater than 50,000 ohms.

When using Sylvania Type 6A5G in place of a 6B4G no change in connections is necessary unless the hum reduction characteristic is desired. In this case the bias resistors should be removed from the center tap of the filament transformer or potentiometer and connected to the cathode terminal pin.

It should be pointed out that since the heater and cathode are tied internally, this type cannot be used in circuits requiring a potential difference between heater and cathode and that on tube testers a short will be indicated between these terminals.

6A7 Sylvania Type

HEPTODE CONVERTER





7C-0-0

PHYSICAL SPECIFICATIONS

Base	Small 7 Pin
Bulb	ST12
Cap	Small Metal
Maximum Overall Length	$4\frac{17}{32}$"
Maximum Seated Height	$3\frac{29}{32}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply	300 Volts
Maximum Anode-Grid Supply	300 Volts
Maximum Anode-Grid Voltage	200 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	0.3 Watt
Maximum Anode-Grid Dissipation	0.75 Watt
Maximum Cathode Current	14 Ma.
Maximum Heater-Cathode Voltage	90 Volts

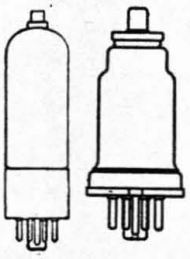
APPLICATION

For further operation data, refer to Types 6A8 and 6A8G. Circuit application notes will be found under Lock-In Type 7A8. Electrical characteristics are sufficiently close so that 7A8 curve data may be used.

6A8G/GT Sylvania Type

HEPTODE CONVERTERS

LOCK-IN EQUIVALENT 7B8





8A-1-0 (6A8, GT)
8A-0-0 (6A8G)

PHYSICAL SPECIFICATIONS

	6A8	6A8G	6A8GT
Base	Small Wafer Octal 8 Pin	Small Octal 8 Pin	Small Wafer Octal 8 Pin Metal Sleeve
Bulb	Metal 8-4	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	$3\frac{1}{8}$"	$4\frac{17}{32}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{9}{16}$"	$3\frac{29}{32}$"	$2\frac{3}{4}$"
Mounting Position	Any	Any	Any

TYPICAL OPERATION

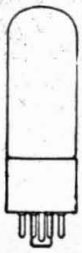
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Signal Grid Voltage	−1.5	−3.0 Volts
Screen Voltage	50	100 Volts
Anode-Grid Voltage	100	250* Volts
Oscillator Grid Resistance	50,000	50,000 Ohms
Plate Current	1.1	3.5 Ma.
Screen Current	1.3	2.7 Ma.
Anode-Grid Current	2.0	4.0 Ma.
Oscillator Grid Current	0.25	0.4 Ma.
Self-Bias Resistor	300	300 Ohms
Plate Resistance	0.5	0.3 Megohm
Conversion Conductance	360	550 μmhos
Conversion Conductance at		
Signal Grid Bias of −20 (Approx.)	3	..... μmhos
Signal Grid Bias of −35 (Approx.)	....	6 μmhos

*Through a 20,000 ohm resistor.

For ratings, refer to Type 6A7. Other data will be found under Lock-In Type 7B8 which is nearly identical in electrical characteristics.



6Q-0-0



Sylvania Type 6AC5GT

HIGH-MU POWER AMPLIFIER

TRIODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Maximum Plate Supply Voltage	250 Volts
Maximum Plate Dissipation	10 Watts
Maximum Heater-Cathode Voltage	90 Volts
Maximum Peak Plate Current per Tube	110 Ma.

TYPICAL OPERATION

CLASS A DYNAMIC-COUPLED POWER AMPLIFIER WITH TYPE 6P5GT AS DRIVER

Heater Voltage	6.3 Volts
Heater Current	0.4 Ampere
Plate Supply Voltage	250 Volts
Grid Voltage	*
Plate Current	32 Ma.
Plate Current of Driver	5.5 Ma.
Input Signal to Driver	16.5 Volts RMS
Load Resistance	7000 Ohms
Power Output**	3.7 Watts
Total Harmonic Distortion	10 Per Cent

*Bias voltage for both the 6AC5GT and the driver is developed automatically by the dynamic-coupled connection shown in the Circuit below.

**It is possible to obtain a power output of 4.3 watts if the driver is operated up to the point of grid current flow. Under these conditions the distortion is approximately 16 per cent.

TYPICAL OPERATION FOR TWO TUBES:

Heater Voltage	6.3 Volts
Heater Current	0.4 Ampere
Plate Voltage	250 Volts
Grid Voltage	0 Volt
Peak Input Signal (Grid to Grid)	70 Volts
DC Plate Current (Zero Signal)	5 Ma.
Load Resistance (Plate to Plate)	10000 Ohms
Power Output‡	8 Watts

‡With peak input of 950 milliwatts to grids.

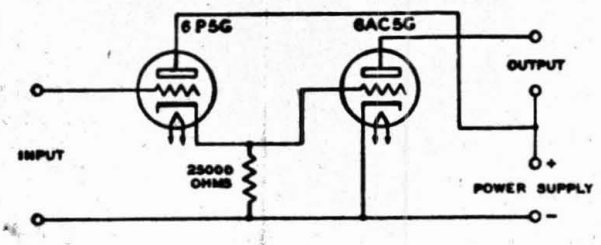
APPLICATION

Sylvania Type 6AC5GT is a Class A power amplifier triode which may be used for positive grid potential operation, and which may employ a tube of the 6P5GT type as a driver.

It is understood that the sale of the tube does not carry any implied license under patents covering special coupling circuits, and Sylvania Electric Products Inc. assumes no liability for use of this tube in unlicensed circuits.

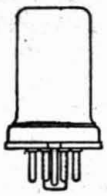
Although the positive grid characteristics of the tube make it applicable in Class B circuits the tube was designed to give optimum performance in a Class A dynamic-coupled circuit such as shown below.

The principal function of the 25,000 ohm resistor is to prevent a current surge while the 6AC5GT is warming up. The total resistance in the grid circuit of the Type 6P5GT should not exceed 1.0 megohm.



6AC7/1852 Sylvania Type

TELEVISION AMPLIFIER PENTODE





8N-1-1

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.450 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Plate Dissipation	3.02 Watts
Maximum Screen Dissipation	0.38 Watt
Maximum Grid Resistor*	
Self Bias Fixed Screen Voltage	0.25 Megohm
Self Bias Series Screen Resistor	0.50 Megohm
Self-Bias Resistor (Minimum)	160 Ohms
Maximum Heater-Cathode Voltage	90 Volts

*For maximum voltage conditions.

Direct Interelectrode Capacitances:†

Grid to Plate	0.015 μμf. Max.
Input	11 μμf.
Output	5 μμf.

†With shell connected to cathode.

TYPICAL OPERATION CLASS A_1

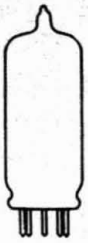
Heater Voltage	6.3	6.3 Volts
Heater Current	0.450	0.450 Ampere
Plate Voltage	300	300 Volts
Screen Supply Voltage	150	300 Volts
Screen Resistor	.....	60000 Ohms
Suppressor Grid Voltage	0	0 Volts
Self-Bias Resistor	160	160 Ohms
Plate Current	10	10 Ma.
Screen Current	2.5	2.5 Ma.
Mutual Conductance	9000	9000 μmhos
Plate Resistance (Approximate)	1.0	1.0 Megohm

APPLICATION

Sylvania Type 6AC7/1852 is high gain television amplifier pentode of single ended construction. It is suitable for use in wide band amplifiers and high frequency amplifiers where circuit losses tend to be excessive. Self bias operation is preferred to fixed bias and data is arranged accordingly. When screen voltage is obtained through a dropping resistor grid circuit resistance may be as high as 0.5 megohm, but if obtained from a fixed source, grid circuit resistance should be limited to 0.25 megohm. This tube is similar to Sylvania Lock-In types 7V7 and 7W7.



7BD-0-2 & 7



Sylvania Type 6AG5

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 1/16"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Plate Dissipation	2 Watts
Maximum Screen Dissipation	0.5 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:* (Without External Shield)

Grid to Plate	0.025 μμf. Max.
Input	6.5 μμf.
Output	1.8 μμf.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

PENTODE CONNECTION

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	125	250 Volts
Screen Voltage	100	125	150 Volts
Self-Bias Resistor	100	100	200 Ohms
Plate Current	5.5	7.2	7.0 Ma.
Screen Current	1.6	2.1	2.0 Ma.
Grid Bias for 10 μa Plate Current	-5.0	-6.0	-8.0 Volts
Plate Resistance (Approx.)	0.3	0.5	0.8 Megohm
Transconductance	4750	5100	5000 μmhos

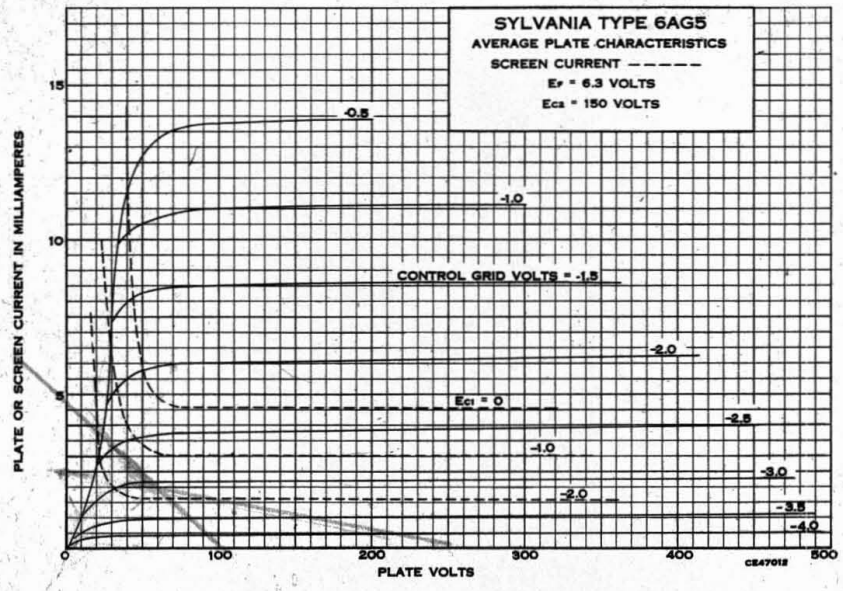
TRIODE CONNECTION

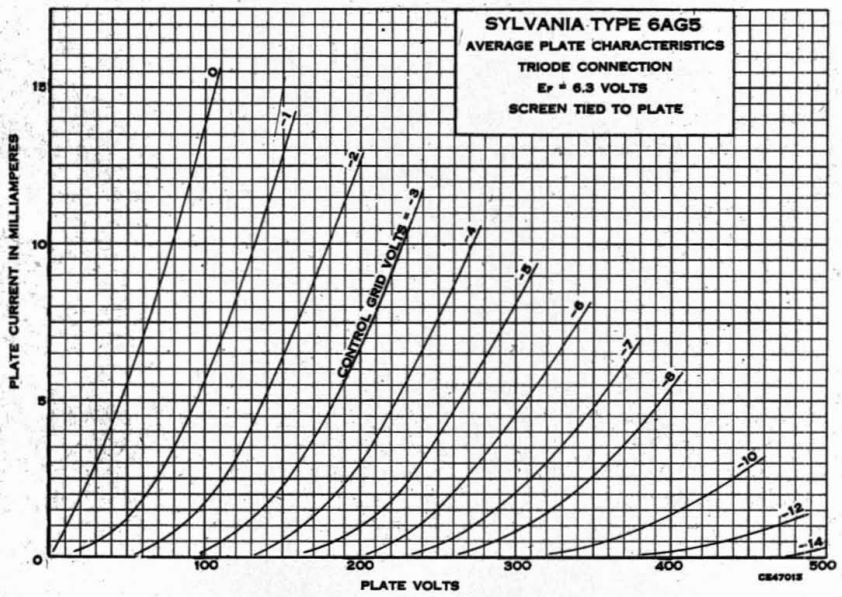
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	180	250 Volts
Self-Bias Resistor	350	825 Ohms
Plate Current	7.0	5.5 Ma.
Plate Resistance	7900	11,000 Ohms
Amplification Factor	45	42
Transconductance	5700	3800 μmhos

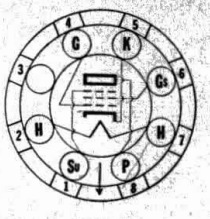
APPLICATION

Sylvania Type 6AG5 is a sharp cut-off pentode of miniature construction having high mutual conductance. It is useful as a RF amplifier for frequencies up to 400 megacycles. Input and output capacitances are low and the dual cathode leads aid in preventing degeneration, by providing the means for cathode return isolation.

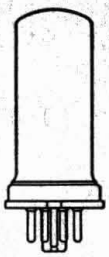
6AG5 (Cont.)


SYLVANIA TYPE 6AG5
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - - -
Ef = 6.3 VOLTS
Ec2 = 150 VOLTS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS = -1.5
Ec1 = 0
0
5
10
15
100
200
300
400
500
-0.5
-1.0
-2.0
-2.5
-3.0
-3.5
-4.0
CE47012


SYLVANIA TYPE 6AG5
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
Ef = 6.3 VOLTS
SCREEN TIED TO PLATE
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS = -3
0
5
10
15
100
200
300
400
500
0
-1
-2
-4
-5
-6
-7
-8
-10
-12
-14
CE47012



8Y-1-3



Sylvania Type 6AG7

TELEVISION AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-6
Maximum Overall Length	3¼"
Maximum Seated Height	2 11/16"
Mounting Position	Vertical§

§Horizontal if plane of pins number 2 and 7 is vertical.

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.650 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	300 Volts
Maximum Plate Dissipation	9.0 Watts
Maximum Screen Dissipation	1.5 Watts
Minimum External Control Grid Voltage	0 Volts
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances: Shell Connected to Cathode.	
Grid to Plate	0.060 μμf. Max.
Input	13.0 μμf.
Output	7.5 μμf.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.650 Ampere
Plate Voltage	300 Volts
Screen Voltage	150 Volts
Control Grid Voltage*	3.0 Volts
Self-Bias Resistor	81 Ohms
Peak AF Signal Voltage	3.0 Volts
Plate Resistance	0.13 Megohm
Mutual Conductance	11000 μmhos
Zero Signal Plate Current	30 Ma.
Maximum Signal Plate Current	30.5 Ma.
Zero Signal Screen Current	7.0 Ma.
Maximum Signal Screen Current	9.0 Ma.
Load Resistance	10000 Ohms
Power Output	3.0 Watts
Total Distortion	7.0 Per Cent

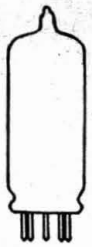
*Maximum grid circuit resistance should not exceed 0.25 megohm if fixed bias is used, or 1.0 megohm if self-bias is used.

APPLICATION

Sylvania Type 6AG7 is a power output pentode designed especially for video circuit application. It has high transconductance and large plate current making it suitable for supplying signals direct to the Picture Tube in such circuits.

6AH6 Sylvania Type

SHARP CUT-OFF RF PENTODE





7CC-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button Miniature 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Plate Dissipation	3.2 Watts
Maximum Screen Dissipation	0.4 Watts
Maximum Cathode Current	13.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.020 μμf. Max.
Input	10 μμf.
Output	3.6 μμf.

*With ¾" diameter shield (RMA No. 316) connected to cathode.

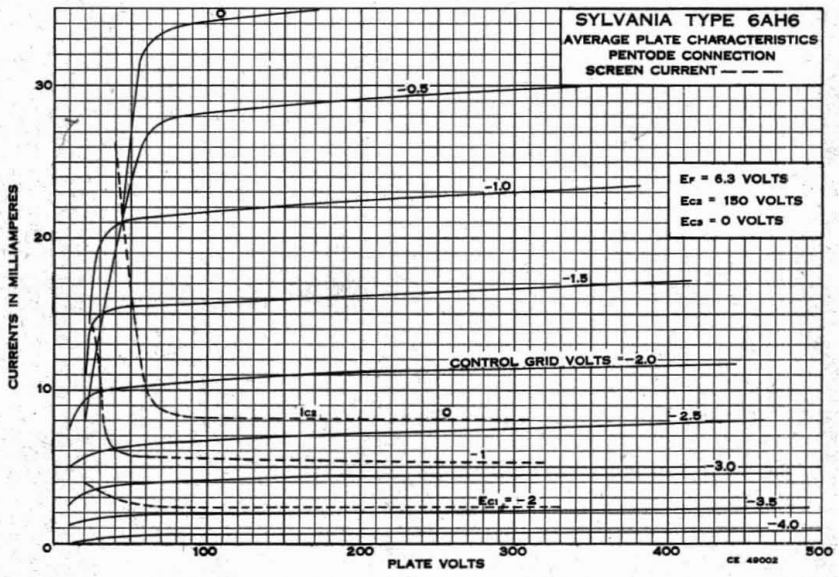
TYPICAL OPERATION

	Pentode Connection	Triode Connection
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	300	150
Screen Voltage	150	150
Suppressor Grid Voltage	tie to K	tie to P
Control Grid Voltage	Obtained by 160 Ohm Cathode Resistor	
Plate Resistance (Approx.)	500,000	3600 Ohms
Mutual Conductance	9,000	11,000 μmhos
Amplification Factor	...	40
Plate Current	10	12.5 Ma.
Screen Current	2.5	.... Ma.
Control Grid Voltage for Ib=10 μa (Approx.)	-7.0	-7.0 Volts

APPLICATION

Sylvania Type 6AH6 is a sharp cut-off pentode designed for use in television, video and I.F. circuits where wide band amplification or low impedance output is required. The triode rating is to permit its use in cathode follower circuits.

The suppressor grid is not designed to have a large enough control characteristic for practical use.





7BD-0-2 & 7



Sylvania Type 6AK5

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	1¾"
Maximum Seated Height	1½"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.175 Ampere
Maximum Plate Voltage	180 Volts
Maximum Screen Volts	140 Volts
Maximum Plate Dissipation	1.7 Watts
Maximum Screen Dissipation	0.5 Watt
Maximum DC Heater-Cathode Voltage	90 Volts
Maximum Cathode Current	18 Ma.
Direct Interelectrode Capacitances:*	
Grid to Plate	0.02 μμf. Max.
Input	4.0 μμf.
Output	2.8 μμf.

*With a close fitting shield connected to the cathode.

TYPICAL OPERATION CLASS A_1 AMPLIFIER

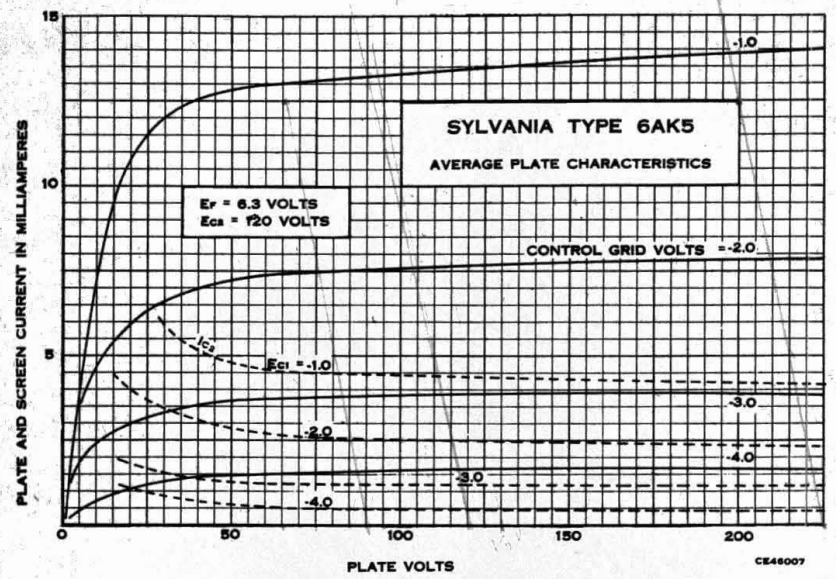
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.170	0.175	0.175 Ampere
Plate Voltage	125	150	180 Volts
Screen Voltage	120	140	120 Volts
Self-Bias Resistor**	200	330	200 Ohms
Plate Resistance (Approximate)	0.34	0.42	0.69 Megohm
Mutual Conductance	5000	4300	5100 μmhos
Plate Current	7.5	7.0	7.7 Ma.
Screen Current	2.5	2.2	2.4 Ma.

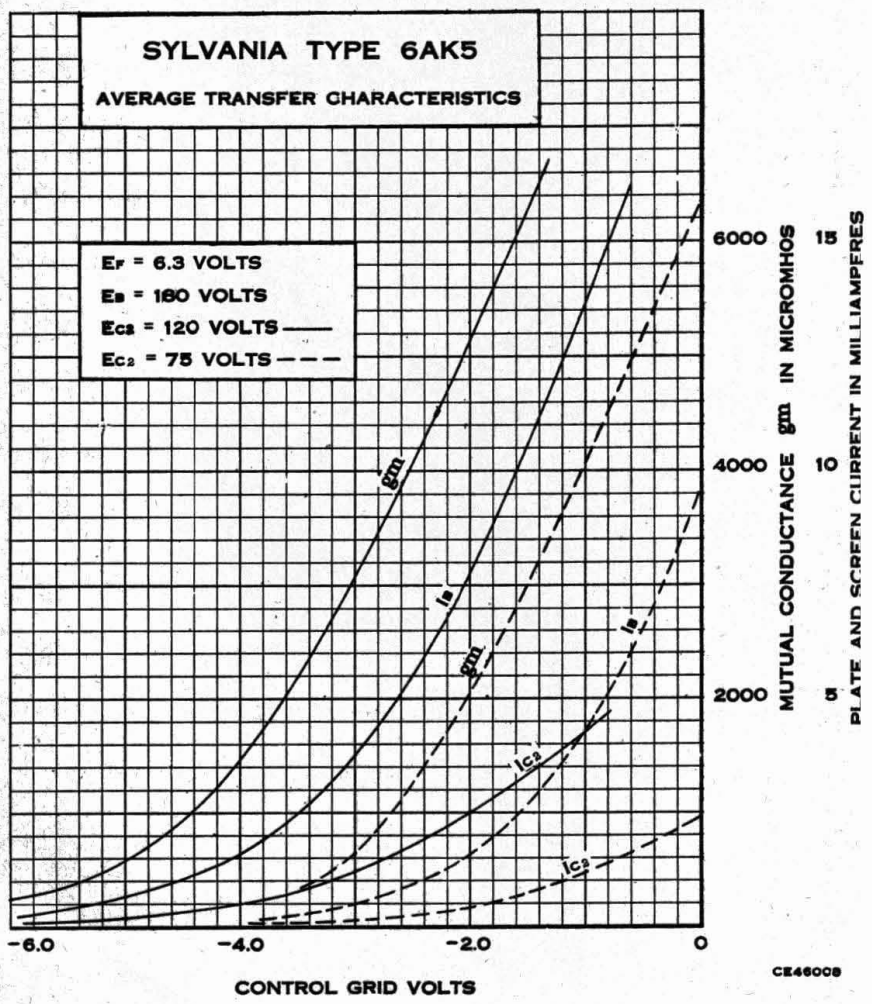
**Fixed Bias Operation is not recommended.

APPLICATION

Sylvania Type 6AK5 is a high-frequency, high mutual conductance pentode of miniature style of construction. It is intended for use at frequencies up to approximately 400 megacycles and the dual cathode leads, when properly used, help to isolate input and output circuits, thereby permitting greater gain per stage.

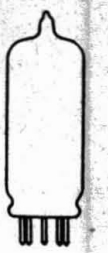
6AK5 (Cont.)


SYLVANIA TYPE 6AK5
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS
Ec2 = 120 VOLTS
CONTROL GRID VOLTS = -2.0
Ec1 = -1.0
-3.0
-4.0
-1.0
-2.0
-3.0
-4.0
Ic2
PLATE AND SCREEN CURRENT IN MILLIAMPERES
PLATE VOLTS
0
50
100
150
200
5
10
15
CE46007


SYLVANIA TYPE 6AK5
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 180 VOLTS
Ec2 = 120 VOLTS ——
Ec2 = 75 VOLTS — — —
gm
Ia
gm
Ia
Ic2
Ic2
-6.0
-4.0
-2.0
0
CONTROL GRID VOLTS
6000
4000
2000
MUTUAL CONDUCTANCE gm IN MICROMHOS
15
10
5
PLATE AND SCREEN CURRENT IN MILLIAMPERES
CE46008



7BK-0-0



Sylvania Type 6AK6

PENTODE POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	250 Volts
Maximum Plate Dissipation	2.75 Watts
Maximum Screen Dissipation	0.75 Watts
Maximum DC Heater-Cathode Voltage	100 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	0.12 μμf.
Input	3.6 μμf.
Output	4.2 μμf.

*Without external shield.

TYPICAL OPERATION

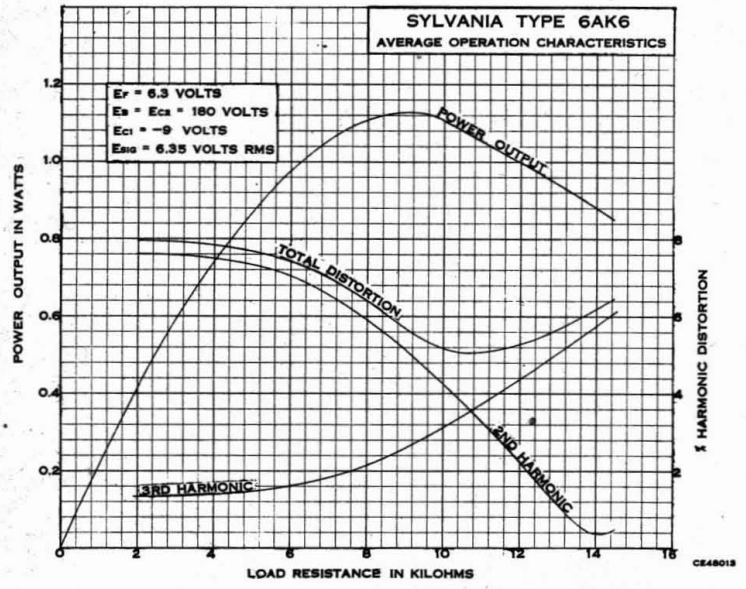
A.F. POWER AMPLIFIER

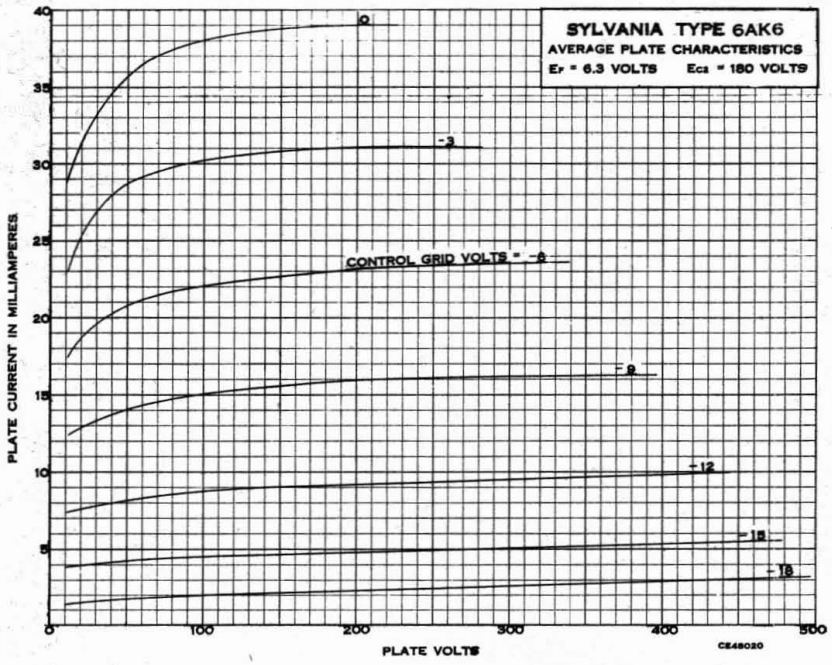
Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Plate Voltage	180 Volts
Suppressor	Connected to Cathode at Socket
Screen Voltage	180 Volts
Grid Voltage	−9 Volts
Peak AF Grid Voltage	9 Volts
Zero Signal Plate Current	15 Ma.
Zero Signal Screen Current	2.5 Ma.
Plate Resistance	0.2 Megohm
Transconductance	2300 μmhos
Load Resistance	10,000 Ohms
Total Harmonic Distortion	10 %
Maximum Signal Power Output	1.1 Watts

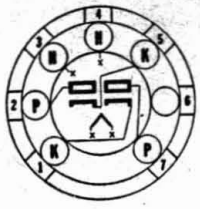
APPLICATION

Sylvania Type 6AK6 is a power amplifier pentode designed for use in compact light-weight radio equipment. It is similar in characteristics to Sylvania Type 6G6G.

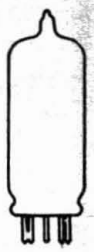
6AK6 (Cont.)


SYLVANIA TYPE 6AK6
AVERAGE OPERATION CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = Ec2 = 180 VOLTS
Ec1 = -9 VOLTS
Esig = 6.35 VOLTS RMS
POWER OUTPUT
TOTAL DISTORTION
2ND HARMONIC
3RD HARMONIC
POWER OUTPUT IN WATTS
% HARMONIC DISTORTION
LOAD RESISTANCE IN KILOHMS
CE48015


SYLVANIA TYPE 6AK6
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS Ec2 = 180 VOLTS
0
-3
CONTROL GRID VOLTS = -6
-9
-12
-15
-18
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTS
CE48020



6BT-0-6



Sylvania Type 6AL5

DUODIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	1¾"
Maximum Seated Height	1½"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere
Maximum Peak Inverse Plate Voltage	420 Volts
Maximum Peak Plate Current per Plate	54 Ma.
Maximum DC Output Current per Plate	9.0 Ma.
Maximum DC Heater-Cathode Voltage	330 Volts

Direct Interelectrode Capacitances:

	Unshielded	Shielded*
Plate Input each Unit	2.5	3.2 μμf.
Coupling Plate to Plate	.068	.026 μμf.
Cathode Input each Unit	3.4	3.6 μμf.

*With a ¾" diameter shield (RMA Std. 316) connected to internal shield.

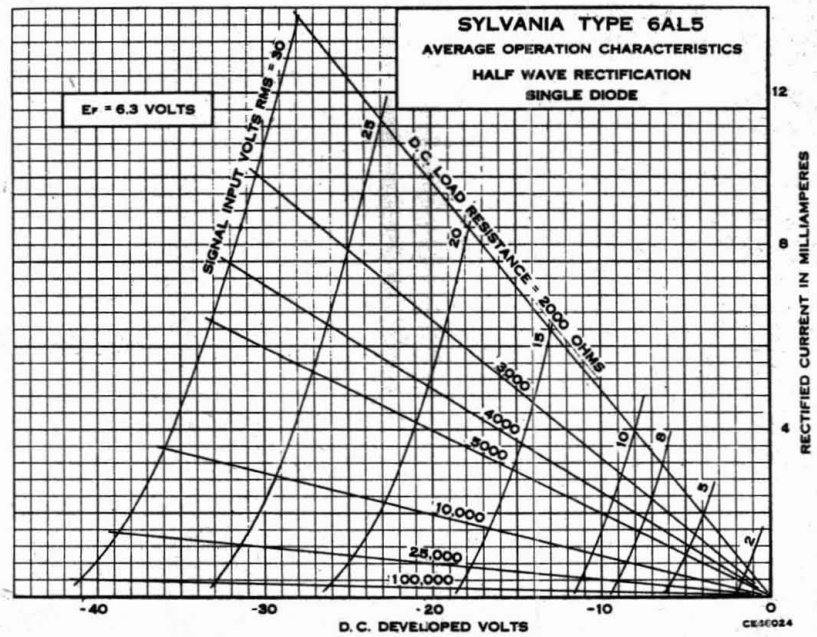
TYPICAL OPERATION
AS A HALF WAVE RECTIFIER

AC Voltage Per Plate (RMS)	150 Volts
Minimum Effective Plate Supply Impedance	300 Ohms
DC Output Current Per Plate	9.0 Ma.

APPLICATION

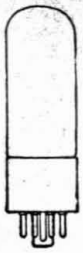
Sylvania Type 6AL5 is a double diode of miniature type of construction. It is designed especially for high-frequency operation having a resonant frequency per unit of approximately 700 megacycles. Each diode unit is completely separate from the other and isolated by means of an internal shield thus permitting independent operation of each diode.

In ratio detector service, use of a series resistor to operate the heater at a voltage of 5.3 volts is recommended. This provides considerably lower hum output without loss of performance.



6AL7GT Sylvania Type

TUNING INDICATOR





8CH-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Shell 8 Pin Octal
Bulb	T-9
Maximum Overall Length	3 1/16"
Maximum Seated Height	2 1/2"
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Maximum Target Voltage	365 Volts
Minimum Target Voltage	220 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

TUNING INDICATOR SERVICE

Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Target Voltage	315 Volts
Control Grid Voltage*	0 Volts
Deflection Electrode Voltages†	0 Volts
Deflection Sensitivity (Approx.)	1 mm per Volt
Control Grid Voltage for Fluorescent Cut-Off (Approx.)	-6.0 Volts
Cathode Bias Resistor (Approx.)	3300 Ohms

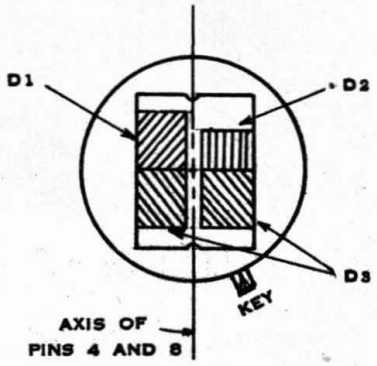
*When not used for fluorescent control the grid should be connected to the cathode.

†The illustration shows the fluorescent areas controlled by the deflection electrodes connected to D1, D2 and D3 respectively.

APPLICATION

Sylvania Type 6AL7GT is a tuning indicator tube using the principle of the cathode ray tube and designed for use with FM circuits. The fluorescent coating is applied to a mica screen and the relative values of the voltages applied to the deflection electrodes is indicated by the location and size of the illuminated area.

The diagrams below show the response under the various circuit and tuning conditions.



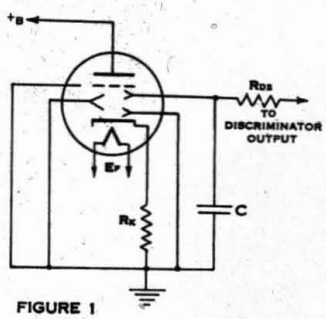


FIGURE 1

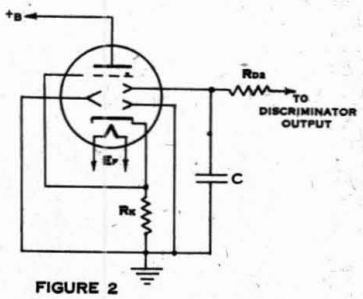


FIGURE 2

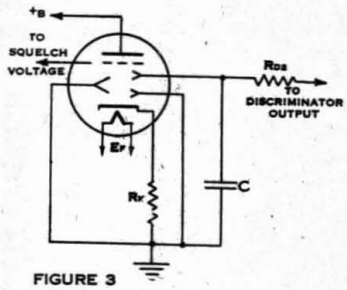


FIGURE 3

SQUELCH VOLTAGE

6 V. (APPROX.) = *OFF CHANNEL

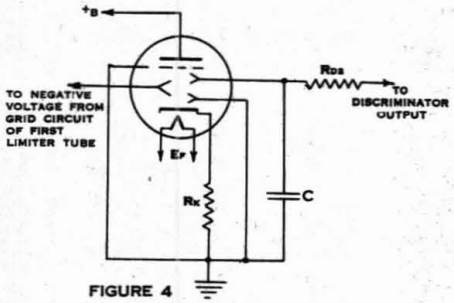


FIGURE 4

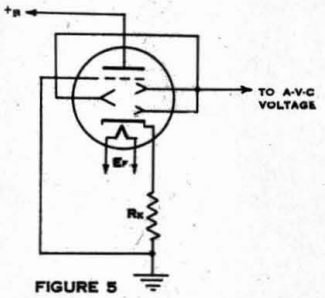
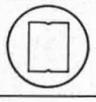
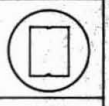
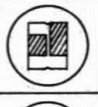
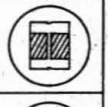
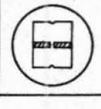
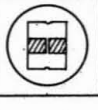
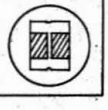


FIGURE 5

COMMON CONDITIONS FOR ALL CIRCUITS

E_f = 6.3 VOLTS
$+_B$ = 250 VOLTS D-C APPROXIMATE
R_K = 3300 OHMS
R_{DS} = 1.0 MEGOHM
C = 0.05 MICROFARAD

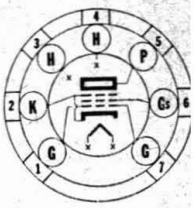
PATTERN RESPONSE IN VARIOUS CIRCUITS

CONTROL VOLTAGE SOURCE	SIGNAL	CIRCUIT (SEE FIGURE)	OFF CHANNEL (-)	ON CHANNEL OFF TUNE (-)	ON TUNE	ON CHANNEL OFF TUNE (+)	OFF CHANNEL (+)
DISCRIMINATOR	FM	1 AND 2					
DISCRIMINATOR AND SQUELCH	FM	3					
DISCRIMINATOR AND LIMITER	FM	4					
AVC	AM	5					

6AQ5 Sylvania Type

BEAM POWER AMPLIFIER





7BZ-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	450 Ma.
Maximum Plate Voltage	250 Volts
Maximum Screen Voltage	250 Volts
Maximum Plate Dissipation	12 Watts
Maximum Screen Dissipation	2 Watts
Maximum Peak Heater-Cathode Voltage	90 Volts
Maximum Grid-Circuit Resistance	
For Fixed Bias	0.1 Megohm
For Cathode Bias	0.5 Megohm

Direct Interelectrode Capacitances:

	Shielded†	Unshielded
Grid to Plate	0.17	0.35 μμf.
Input	8.0	7.6 μμf.
Output	11.0	6.0 μμf.

†With a ¾" diameter shield (RMA Std. 316) connected to Cathode.

TYPICAL OPERATION

AF POWER AMPLIFIER - CLASS A_1

Heater Voltage	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	180	250 Volts
Screen Voltage	180	250 Volts
Control Grid Voltage	−8.5	−12.5 Volts
Peak AF Grid Voltage	8.5	12.5 Volts
Zero Signal Plate Current	29	45 Ma.
Maximum Signal Plate Current	30	47 Ma.
Zero Signal Screen Current (Approx.)	3	4.5 Ma.
Maximum Signal Screen Current (Approx.)	4	7 Ma.
Plate Resistance (Approx.)	58,000	52,000 Ohms
Transconductance	3700	4100 μmhos
Load Resistance	5500	5000 Ohms
Total Harmonic Distortion	8	8 %
Maximum Signal Power Output	2.0	4.5 Watts

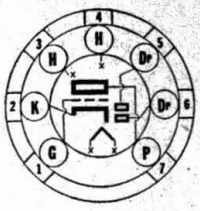
AF POWER AMPLIFIER - CLASS AB_1*

Plate Voltage	250 Volts
Screen Voltage	250 Volts
Control Grid Voltage	−15 Volts
Peak AF Grid to Grid Voltage	30 Volts
Zero Signal Plate Current	70 Ma.
Maximum Signal Plate Current	79 Ma.
Zero Signal Screen Current	5 Ma.
Maximum Signal Screen Current	13 Ma.
Plate Resistance (per tube)	60,000 Ohms
Transconductance (per tube)	3750 μmhos
Effective Load Resistance (plate to plate)	10,000 Ohms
Total Harmonic Distortion	5 %
Maximum Signal Power Output	10 Watts

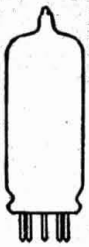
*Values are for two tubes.

APPLICATION

Sylvania Type 6AQ5 is a beam power amplifier in the miniature style designed for use in compact AC or auto sets. Since it is identical to Type 6V6GT except that the highest rating is not recommended, the same characteristic curves may be used.



7BT-0-0



Sylvania Type 6AQ6

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

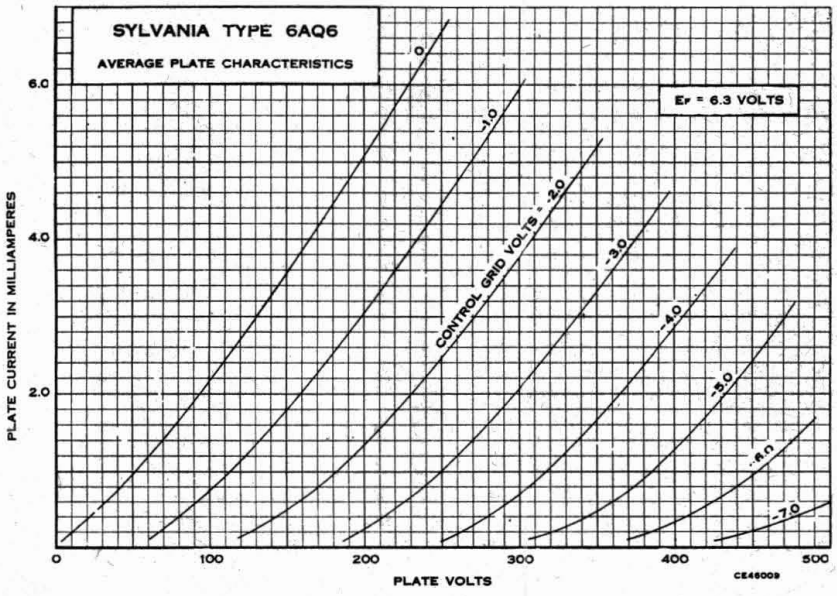
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−3.0 Volts
Amplification Factor	70	70
Plate Resistance	61000	58000 Ohms
Mutual Conductance	1150	1200 μmhos
Plate Current	0.8	1.0 Ma.

APPLICATION

Sylvania Type 6AQ6 is a double diode, high-mu triode of miniature construction. It is similar to type 6Q7 but has lower heater drain and lower internal capacitances. Its small size facilitates the design of small compact receivers.

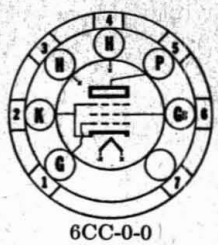
Data for use in Resistance Coupled Amplifier Circuits may be found in the appendix under type 6Q7GT.



6AR5 Sylvania Type

BEAM POWER AMPLIFIER





6CC-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 3/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	250 Volts
Maximum Screen Voltage	250 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	400	400 Ma.
Plate Voltage	250	250 Volts
Screen Voltage	250	250 Volts
Grid Voltage*	−16.5	−18 Volts
Self-Bias Resistor	420	500 Ohms
Peak Signal Voltage	16.5	18 Volts
Plate Current (Zero Signal)	34	32 Ma.
Plate Current (Maximum Signal)	35	33 Ma.
Screen Current (Zero Signal)	5.7	5.5 Ma.
Screen Current (Maximum Signal)	10	10 Ma.
Plate Resistance (Approx.)	65,000	68,000 Ohms
Mutual Conductance	2,400	2,300 μmhos
Load Resistance	7,000	7,600 Ohms
Power Output	3.2	3.4 Watts
Total Harmonic Distortion	7	11 %

*Maximum grid circuit resistance should not exceed 0.5 megohms for self-bias operation, or 0.1 megohm for fixed bias operation.

APPLICATION

Sylvania Type 6AR5 is a miniature tube for use in locations where the space requirements do not permit use of the Types 7B5 or 6K6G, and which do not require the 315 volt rating. For curve data, reference should be made to Type 7B5.



8BD-0-0



Sylvania Type 6AS7G

LOW MU DUOTRIODE

PHYSICAL SPECIFICATIONS

Base	Medium Shell Octal 8 Pin
Bulb	ST-16
Maximum Overall Length	5 5/16"
Maximum Seated Height	4 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	2.5 Amperes
Maximum Plate Voltage	250 Volts
Maximum Plate Dissipation per Plate	13 Watts
Maximum Peak Heater-Cathode Voltage	300 Volts
Maximum Peak Inverse Plate Voltage	1700 Volts
Maximum Plate Current	125 Ma.

TYPICAL OPERATION

AS A DIRECT COUPLED AMPLIFIER

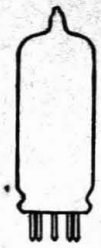
Plate Supply Voltage	135 Volts
Grid Voltage	Obtained by Self-Bias Resistor
Self-Bias Resistor	250 Ohms
Plate Current	125 Ma.
Plate Resistance	280 Ohms
Mutual Conductance	7000 μmhos
Amplification Factor	2.0

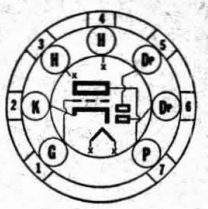
APPLICATION

Sylvania Type 6AS7G is a low mu duo triode power amplifier designed for television service as a booster scanner. Fixed bias operation is not recommended and the grid circuit resistance should not exceed 1 megohm.

6AT6 Sylvania Type

DUODIODE HIGH-MU TRIODE





7BT-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	2.1 μμf.
Input	2.3 μμf.
Output	1.1 μμf.
Diode No. 2 (Pin 5) to Grid	.025 μμf. Max.

*Without external shield.

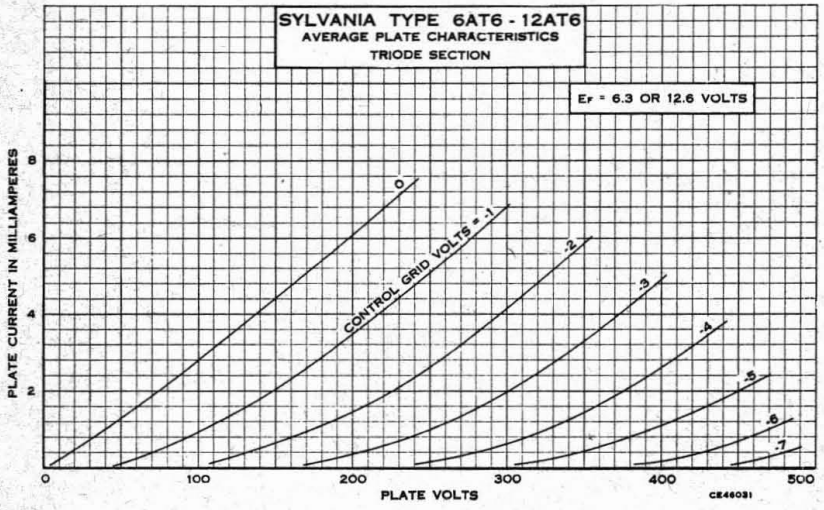
TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−3.0 Volts
Plate Current	0.8	1.0 Ma.
Amplification Factor	70	70
Plate Resistance	54000	58000 Ohms
Mutual Conductance	1300	1200 μmhos

APPLICATION

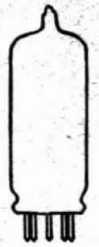
Sylvania Type 6AT6 is a duodiode high-mu triode of miniature type of construction. It is similar in application to Types 6Q7GT, 6SQ7GT and lock-in Type 7B6. The small size of this tube makes it particularly useful in the design of compact, light weight equipment.

Data for use in Resistance Coupled Amplifier Circuits may be found in the appendix under type 6Q7GT.





7BK-0-2



Sylvania Type 6AU6

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	3 Watts
Maximum Screen Dissipation	0.65 Watt
Minimum Control Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.0035 μμf. Max.
Input	5.5 μμf.
Output	5.0 μμf.

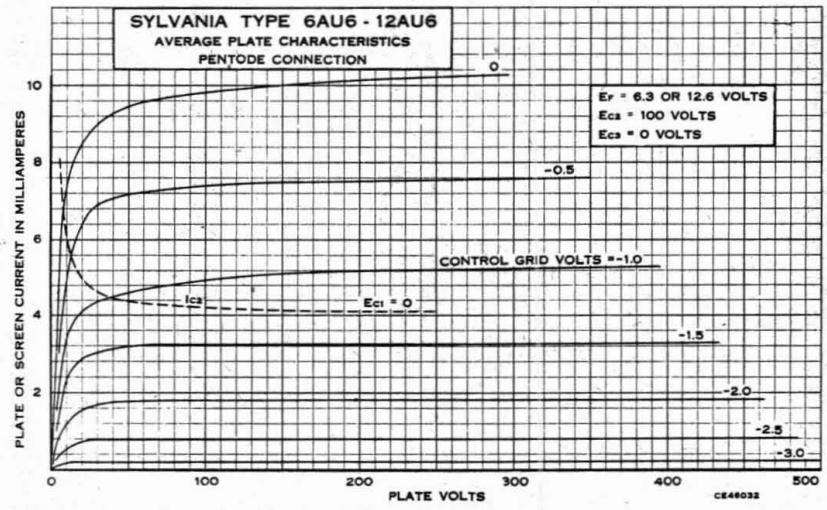
*Without external shield.

TYPICAL OPERATION

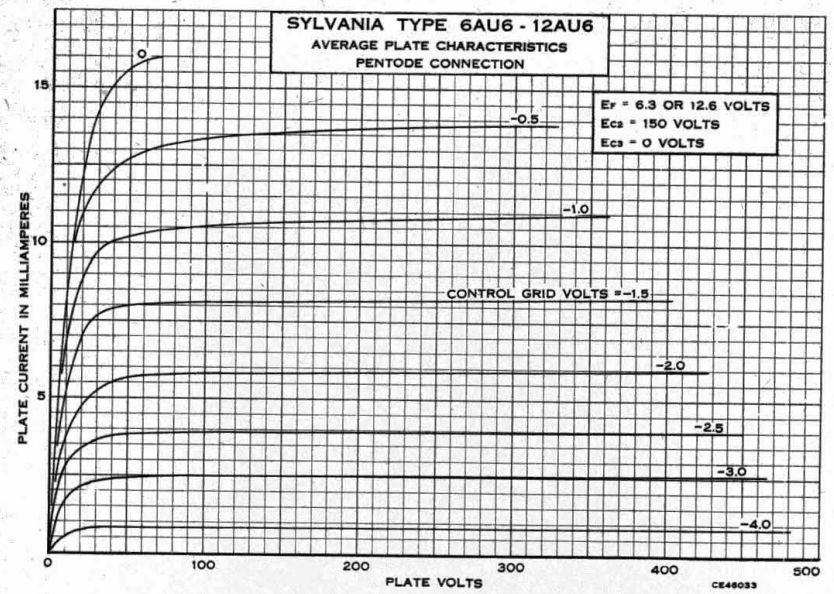
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	250	250 Volts
Suppressor Grid	Connect to Cathode at Socket		
Screen Voltage	100	125	150 Volts
Control Grid Voltage	−1.0	−1.0	−1.0 Volt
Cathode Resistor	150	100	68 Ohms
Plate Resistance (Approximate)	0.5	1.5	1.0 Megohm
Mutual Conductance	3900	4500	5200 μmhos
Control Grid Voltage at 10 μa. Plate	−4.2	−5.5	−6.5 Volts
Plate Current	5.0	7.6	10.6 Ma.
Screen Current	2.1	3.0	4.3 Ma.

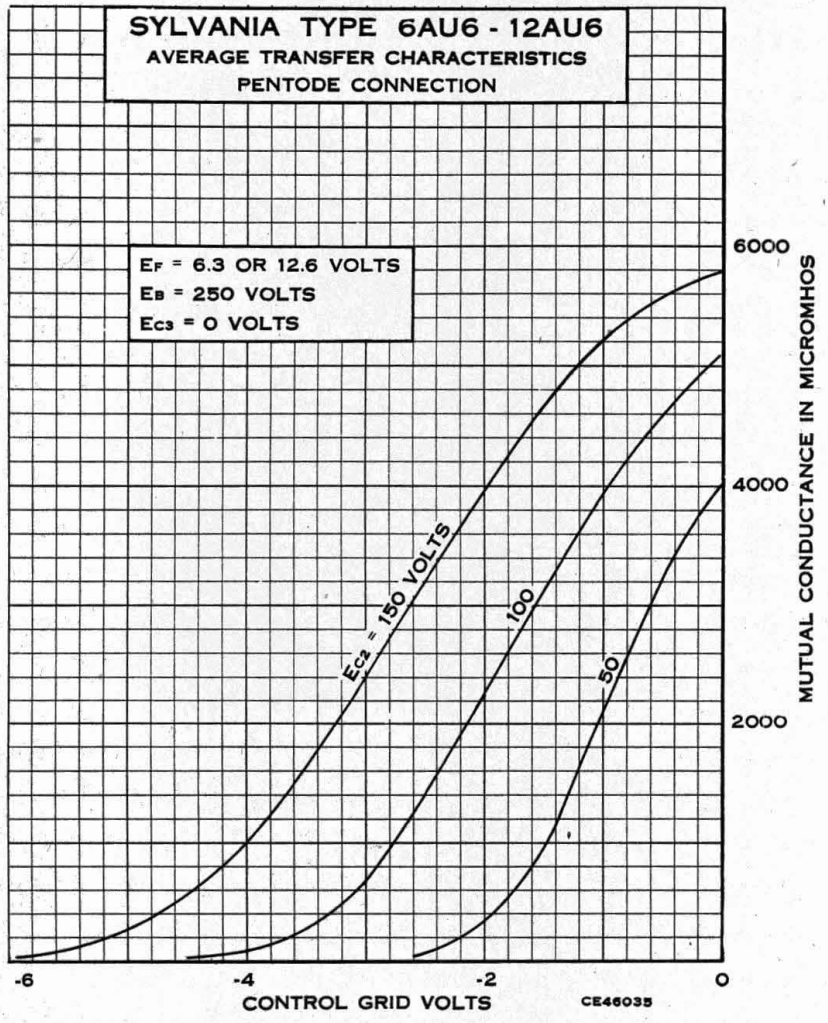
APPLICATION

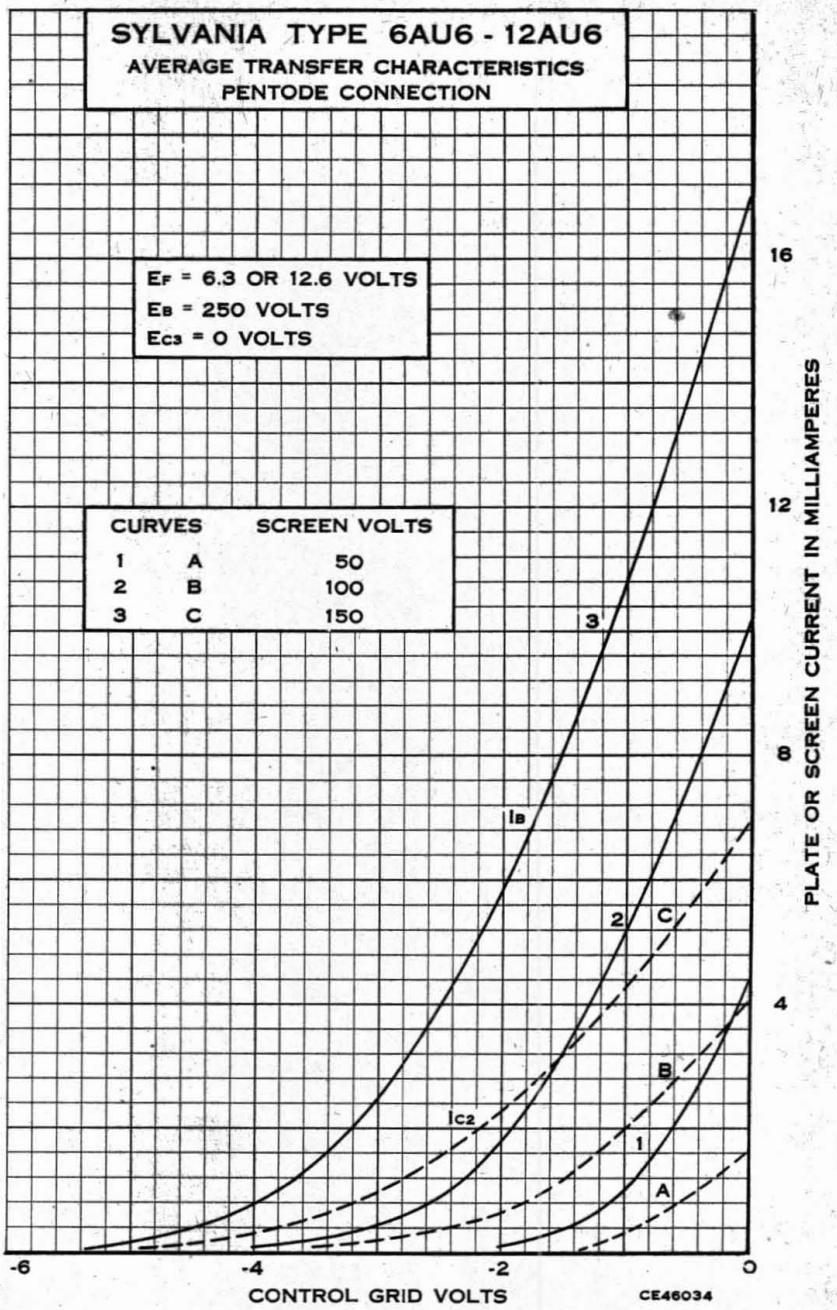
Sylvania Type 6AU6 is a sharp cut-off pentode of miniature construction. It has high mutual conductance and low interelectrode capacitances. These characteristics combined with high plate resistance make it suitable for many RF and IF applications. The miniature type of construction lends itself readily to applications in compact light-weight equipment.



6AU6 (Cont.)

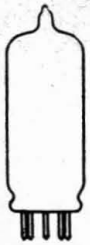

SYLVANIA TYPE 6AU6 - 12AU6
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
Ec2 = 150 VOLTS
Ec3 = 0 VOLTS
0
-0.5
-1.0
CONTROL GRID VOLTS =-1.5
-2.0
-2.5
-3.0
-4.0
PLATE CURRENT IN MILLIAMPERES
15
10
5
0
100
200
300
400
500
PLATE VOLTS
CE46033

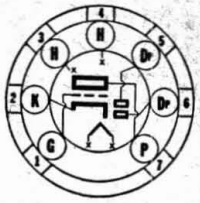

SYLVANIA TYPE 6AU6 - 12AU6
AVERAGE TRANSFER CHARACTERISTICS
PENTODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
Ec3 = 0 VOLTS
Ec2 = 150 VOLTS
100
50
6000
4000
2000
MUTUAL CONDUCTANCE IN MICROMHOS
-6
-4
-2
0
CONTROL GRID VOLTS
CE46035


SYLVANIA TYPE 6AU6 - 12AU6
AVERAGE TRANSFER CHARACTERISTICS
PENTODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
EC3 = 0 VOLTS
CURVES SCREEN VOLTS
1 A 50
2 B 100
3 C 150
IB
IC2
16
12
8
4
-6
-4
-2
0
CONTROL GRID VOLTS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
CE46034

6AV6 Sylvania Type

DUODIODE TRIODE





7BT-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button Miniature 7 I
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Vol
Heater Current	300 Ma.
Maximum Plate Voltage (Triode Unit)	300 Vol
Maximum Peak Heater-Cathode Voltage	90 Volts
Maximum Diode Plate Current per diode	1.0 Ma.

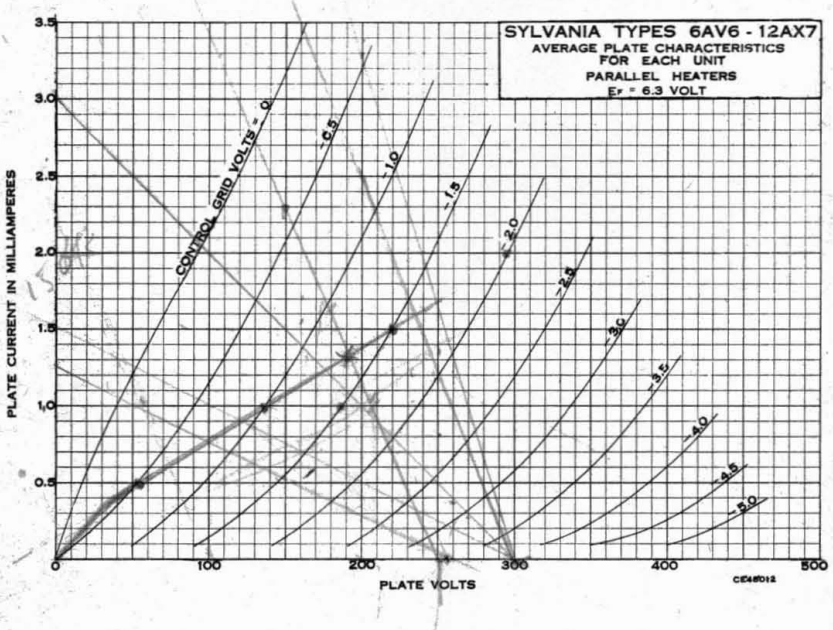
TYPICAL OPERATION

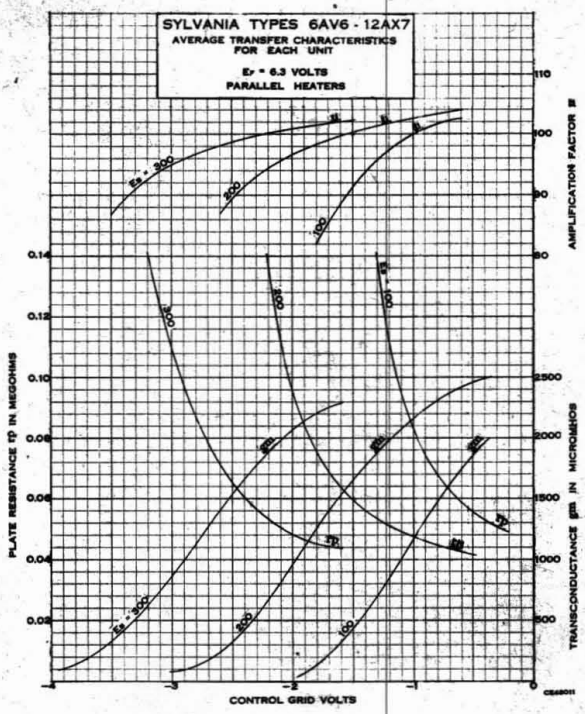
TRIODE UNIT - CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Amplification Factor	100	100
Plate Resistance	80,000	62,500 Ohms
Transconductance	1250	1600 μmhos
Plate Current	0.5	1.2 Ma.

APPLICATION

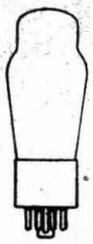
Sylvania Type 6AV6 is a high mu diode triode in the miniature style. It is very similar in characteristics to lock-in Type 7B4 and the resistance coupled data given in appendix will be substantially correct for this type also. Type 12AV6 is the 150 Ma. equivalent for use in AC-DC sets.




SYLVANIA TYPES 6AV6 - 12AX7
AVERAGE TRANSFER CHARACTERISTICS
FOR EACH UNIT
Ef = 6.3 VOLTS
PARALLEL HEATERS
PLATE RESISTANCE rp IN MEGOHMS
AMPLIFICATION FACTOR μ
TRANSCONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
Eb = 300
250
200
100
0.14
0.12
0.10
0.08
0.06
0.04
0.02
110
100
90
80
2500
2000
1500
1000
500
0
-4
-3
-2
-1
C54-8011

6B4G Sylvania Type

POWER AMPLIFIER TRIODE





5S-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 8 Pin
Bulb	ST16
Maximum Overall Length	5 5/16"
Maximum Seated Height	4 3/4"
Mounting Position	Any

RATINGS

Filament Voltage	6.3 Volts
Filament Current	1.0 Ampere
Maximum Plate Voltage	325 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	16 μμf.
Input	7 μμf.
Output	5 μμf.

*Without external shield.

TYPICAL OPERATION AS AMPLIFIER

	Class A One Tube	Push Pull Class AB Two Tubes Fixed Bias	Self Bias
Filament Voltage	6.3	6.3	6.3 Volts
Filament Current	1.0	1.0	1.0 Ampere
Plate Voltage	250	325	325 Volts
Grid Voltage*	−45	−68	..... Volts
Self-Bias Resistor	750	.....	850 Ohms
Plate Current (Per Tube)	60	40	40 Ma.
Plate Resistance	800	.....	..... Ohms
Mutual Conductance	5250	.....	..... μmhos
Amplification Factor	4.2	.....	.....
Total Load Resistance	2500	3000	5000 Ohms
Power Output	3.2	15	10 Watts
Harmonic Distortion	5.0	2.5	5.0 Per Cent

*Measured from filament center tap when operated on AC.

APPLICATION

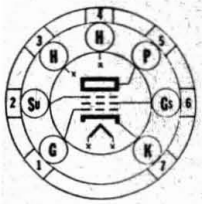
Sylvania 6B4G is a power amplifier triode, identical to Type 6A3 in electrical characteristics, and is used in the output stage of a-c operated receivers and public address systems. An outstanding feature is the ability of the tube to deliver very large amounts of power under Class A operating conditions. This is accomplished by proper design which provides a very high mutual conductance (5250 micromhos).

It should be noted that the plate current is comparatively high, the grid bias voltage large, the amplification factor relatively small, and the plate resistance exceptionally low in value. This is characteristic of power amplifiers of the triode type.

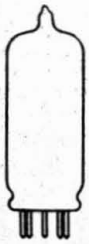
Any of the conventional methods may be used for the input coupling provided that the resistance added in the grid return is not excessive. The d-c resistance in this circuit should be less than 0.5 megohm for a self-bias arrangement; with fixed bias the limit is 50,000 ohms. If the above values are exceeded, the bias voltage may be reduced as a result of grid current. This condition will cause excessive plate current to flow which, in turn, may cause damage to the tube or output transformer.

A resistor of approximately 750 ohms will provide the appropriate bias voltage for the self-bias operation of a single Type 6B4G tube. This value should be increased to 850 ohms for two tubes in push-pull, since an over-biased voltage condition is recommended for this method of operation. If no degeneration is permissible this self-biasing resistor should be suitably bypassed.

In comparison with single stage service it will be noted that over-biased push-pull operation of power tubes provides greatly increased output. The operating conditions for such service are on the basis of no flow of grid current and cancellation of the second harmonic distortion.



7BK-0-2



Sylvania Type 6BA6

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.30 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	3 Watts
Maximum Screen Dissipation	0.6 Watt
Minimum Control Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.0035 μμf. Max.
Input	5.5 μμf.
Output	5.0 μμf.

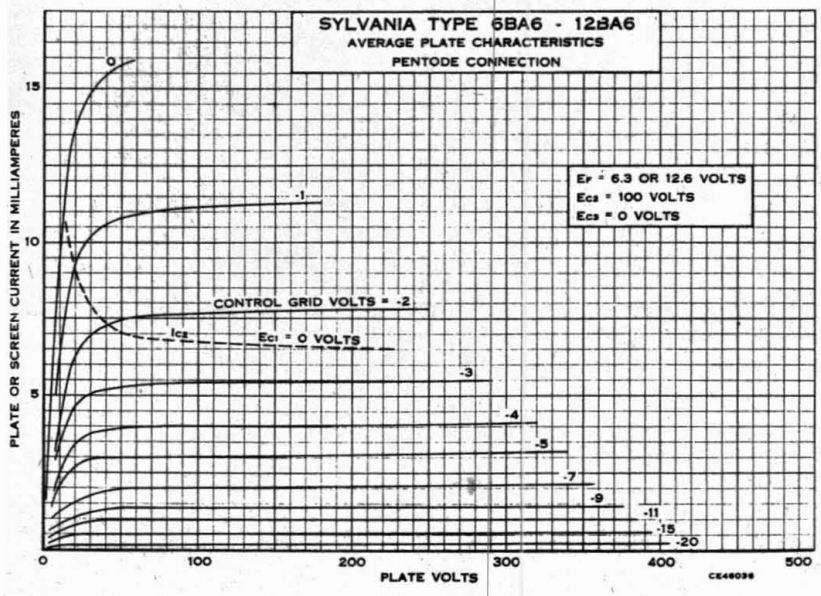
*Without external shield.

TYPICAL OPERATION

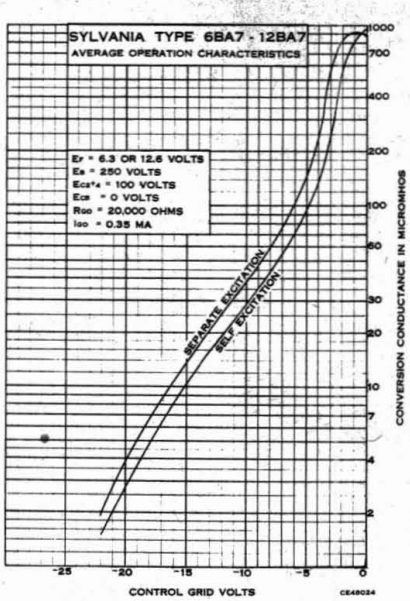
Heater Voltage	6.3	6.3 Volts
Heater Current	0.30	0.30 Ampere
Plate Voltage	100	250 Volts
Suppressor Grid	Connected to Cathode at Socket	
Screen Voltage	100	100 Volts
Self-Bias Resistor	68	68 Ohms
Plate Resistance (Approximate)	0.25	1.0 Megohms
Mutual Conductance	4300	4400 μmhos
Grid Voltage at Gm=40 μmhos	−20	−20 Volts
Plate Current	10.8	11 Ma.
Screen Current	4.4	4.2 Ma.

APPLICATION

Sylvania Type 6BA6 is a remote cut-off pentode of miniature construction. The remote cut-off characteristics allow smooth control of gain by changing grid bias voltage thus assuring satisfactory performance in a-v-c controlled circuits. Its small size and high mutual conductance together with low interelectrode capacitances make this tube suitable for compact, light weight equipment.



SYLVANIA RADIO TUBES





7BK-0-2



Sylvania Type 6BD6

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.4 Watts
Maximum Cathode Current	14 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

	Shielded	Unshielded
Grid to Plate	0.005	0.004 μμf. Max.
Input	4.3	4.3 μμf.
Output	5.0	5.0 μμf.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	−1	−3 Volts
Plate Current	13	9 Ma.
Screen Current	5	3.5 Ma.
Plate Resistance	0.12	0.7 Megohm
Transconductance	2350	2000 μmhos
Grid Voltage (approx.) for 10 μmhos	−35	−35 Volts

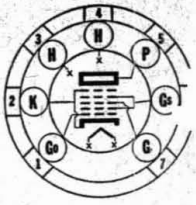
APPLICATION

Sylvania Type 6BD6 is a remote cut-off for RF or IF service in AC or DC receivers. Its ratings are very similar to those of the Lock-In Type 7A7, but the Type 6BD6 may be useful where compactness and light weight are desirable.

6BE6 Sylvania Type

HEPTODE CONVERTER





7CH-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pi
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

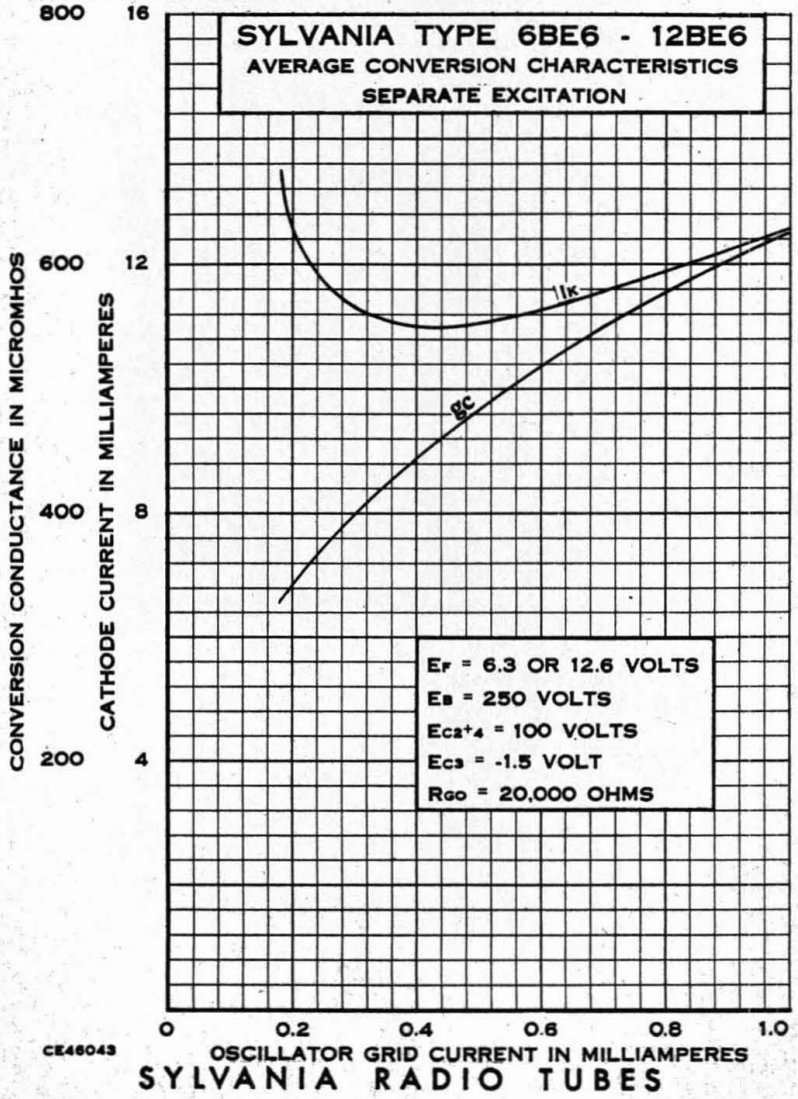
RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	1.0 Watt
Maximum Cathode Current	14.0 Ma.
Minimum Control Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid 3 to Plate	0.30 μμf. Max.
Mixer Input	7.0 μμf.
Mixer Output	8.0 μμf.
Oscillator Input	5.5 μμf.
Grid 1 to Grid 3	0.15 μμf. Max.
Grid 1 to Plate	0.05 μμf. Max.
Grid 1 to Cathode	3.0 μμf.
Cathode to all except Grid 1	15.0 μμf.

*Without external shield.



SYLVANIA RADIO TUBES

TYPICAL OPERATION

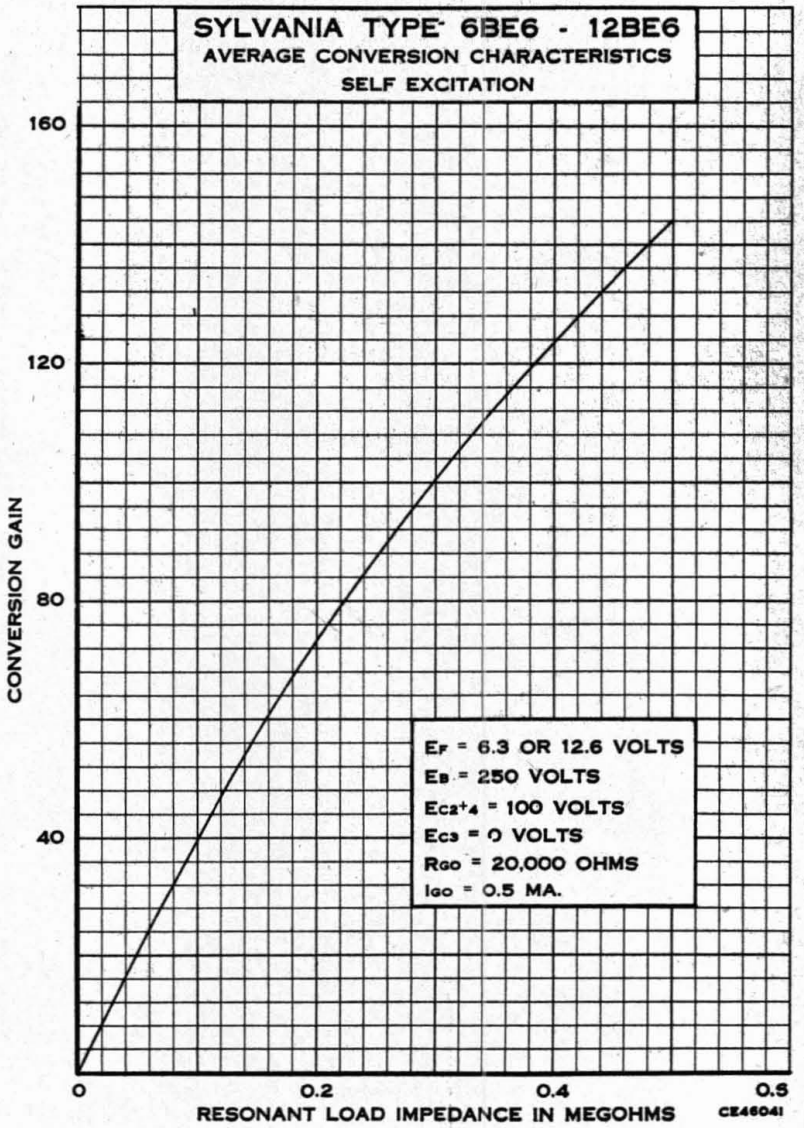
(SEPARATE EXCITATION)*

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	−1.5	−1.5 Volts
Plate Current	2.6	2.6 Ma.
Screen Current	7.5	7.5 Ma.
Oscillator Grid Current	0.5	0.5 Ma.
Total Cathode Current	10.6	10.6 Ma.
Oscillator Grid Resistor	20000	20000 Ohms
Plate Resistance (Approximate)	4	1.0 Megohms
Conversion Transconductance	455	475 μmhos
Conversion Transconductance, Eg3=—30 Volts	10 App.	10 App. μmhos

*Data for self excitation in a zero bias circuit corresponds very closely to that for separate excitation.

APPLICATION

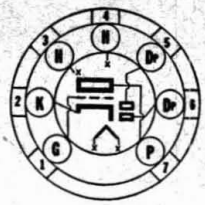
Sylvania Type 6BE6 is a miniature style heptode converter. It is similar in application to Type 6SA7GT and lock-in Type 7Q7. Operation data as given are for separate excitation but corresponds very closely to that obtained with self excitation. The small size of this tube lends itself readily to the design of light-weight compact equipment.



6BF6 Sylvania Type

DUODIODE TRIODE





7BT-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS—Triode Unit

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Peak Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:—Triode Unit

	Shielded	Unshielded
Grid to Plate	2.0	2.0 μμf.
Grid to Cathode	1.8	1.8 μμf.
Plate to Cathode	1.4	1.1 μμf.

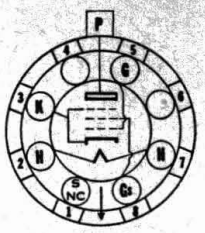
TYPICAL OPERATION

TRIODE UNIT - CLASS A_1 AMPLIFIER

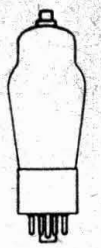
Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts
Grid Voltage	−9 Volts
Amplification Factor	16
Plate Resistance	8500 Ohms
Transconductance	1900 μmhos
Plate Current	9.5 Ma.
Load Resistance	10,000 Ohms
Total Harmonic Distortion	6.5 %
Power Output	300 Mw

APPLICATION

Sylvania Type 6BF6 is a duodiode triode in the miniature construction suitable for use in compact sets. The characteristics are identical to those of Type 7E6, to which reference should be made for curves and resistance coupled amplifier data.



5BT-0-0



Sylvania Type 6BG6-G

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Medium-Shell Octal 6 Pin
Bulb	ST-16
Cap	Miniature
Maximum Overall Length	5 1/16"
Maximum Seated Height	5 1/8"
Mounting Position	Vertical, Base Up or Down Horizontal, with Plane of Pins 2 and 7 Vertical

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.9 Ampere
Maximum Plate Voltage	500 Volts
Maximum Peak Positive Surge Plate Voltage*	6000 Volts
Maximum Screen Voltage**	350 Volts
Maximum Negative Control Grid Voltage	50 Volts
Maximum Peak Negative Surge Control Grid Voltage*	400 Volts
Maximum DC Plate Current	100 Ma.
Maximum Screen Input	3.2 Watts
Maximum Plate Dissipation	20 Watts
Maximum Heater-Cathode Voltage	135 Volts
Maximum Control Grid Circuit Resistance	1.0 Megohm

*The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle and its duration must be limited to 10 microseconds.

**Preferably obtained from plate voltage supply through a series dropping resistor of sufficient magnitude to limit the screen grid input to the rated maximum value for wide variation in screen current.

Direct Interelectrode Capacitances:*

Grid to Plate	.65 μμf. Max.
Input	11.0 μμf.
Output	6.5 μμf.

*With no external shield.

TYPICAL OPERATION

DEFLECTION AMPLIFIER

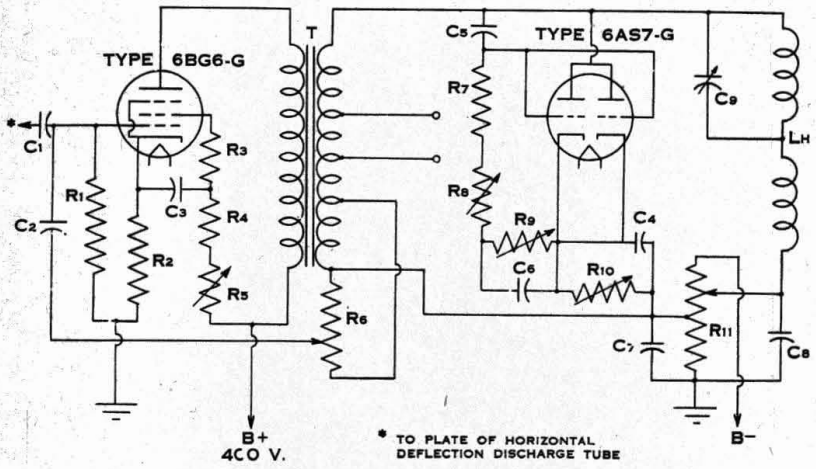
DC Supply Voltage, Plate and Screen	400 Volts
Peak Positive Surge Plate Voltage (Approx.)	4000 Volts
Peak Negative Surge Control Grid Voltage	−100 Volts
Plate Current	70 Ma.
Screen Current	6 Ma.
Control Grid Current	25 ua
Transconductance (approx.)	6000 μmhos

APPLICATION

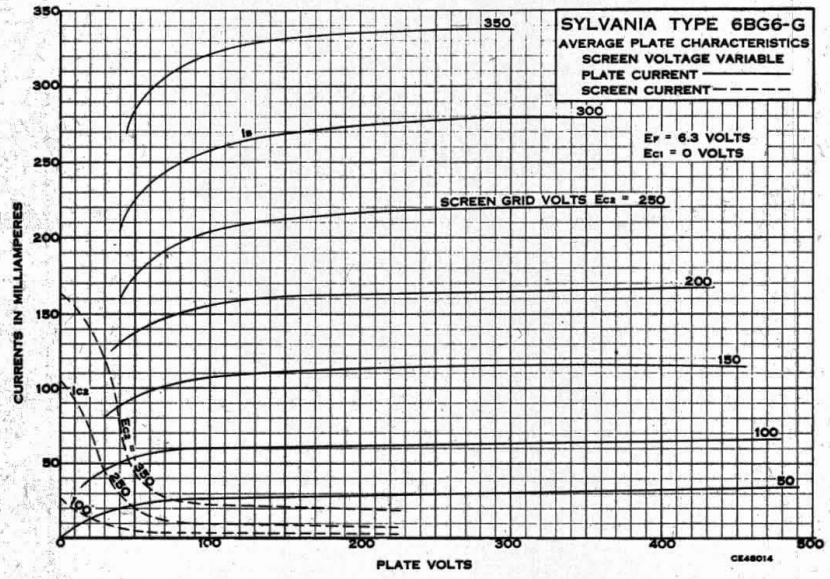
Sylvania Type 6BG6-G is a beam power amplifier designed for use as the driver tube in the horizontal deflection amplifier of television circuits using electro-magnetic deflection. A possible circuit is shown on the following page.

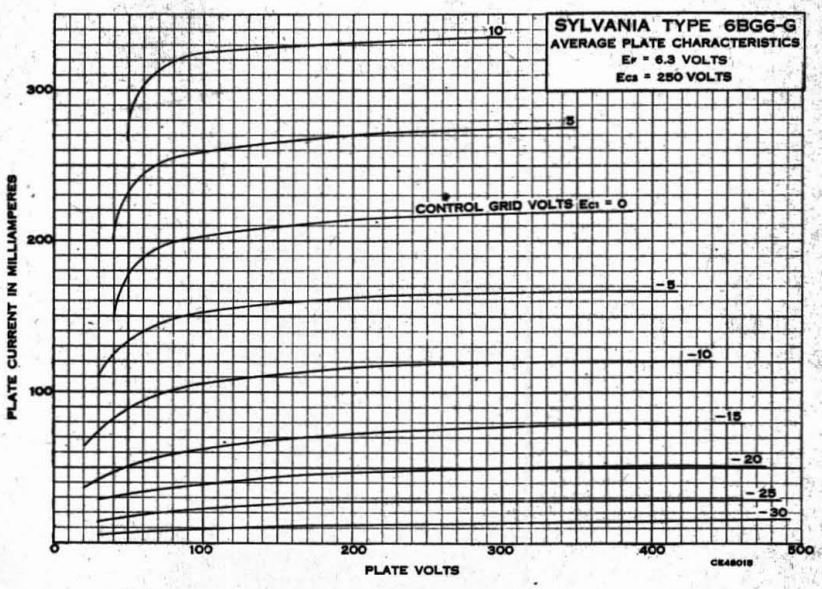
6BG6-G (Cont.)

HORIZONTAL DEFLECTION CIRCUIT



C1: 0.01 µf, 400 DC working volts
C2: 150 µµf, 400 DC working volts
C3 C4: 4 µf, 450 DC working volts (electrolytic)
C5: 30 µµf, 1500-volt surge
C6: 0.02 µf, 400 DC working volts
C7 C8: 100 µf, 10 DC working volts
C9: Balancing Capacitor, 25 to 75 µµf, 800-volt surge
LH: Horizontal Deflecting Yoke, Telectron Type No. DY-1S, or equivalent
R1: 500,000 ohms, 1/2 watt
R2: 100 ohms, 2 watts
R3: 100 ohms, 1/2 watt
R4: 8000 ohms, 4 watts
R5: Width Control, 50,000 ohms, 5 watts
R6: Peaking Amplitude and Linearity Control, 5000 ohms, wire wound, 2 watts
R7: 50,000 ohms, 1 watt
R8: Linearity Control, 25,000 ohms, 1 watt
R9: Linearity Control, 100,000 ohms, 1 watt
R10: Linearity Control, 1000 ohms, 5 watts
R11: Centering Control, 20 ohms, tapped at 10 ohms
T: Horizontal Deflection Transformer, Telectron Type No. YT-111H, or equivalent




SYLVANIA TYPE 6BG6-G
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS
Ec2 = 250 VOLTS
CONTROL GRID VOLTS Ec1 = 0
10
5
-5
-10
-15
-20
-25
-30
PLATE CURRENT IN MILLIAMPERES
300
200
100
0
100
200
300
400
500
PLATE VOLTS
CE48018

6BH6 Sylvania Type

SHARP CUT-OFF RF PENTODE





7CM-0-7

PHYSICAL SPECIFICATIONS

Base	Small-Button Miniature 7 Pin
Bulb	T-5½
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Control Grid Voltage	
Negative bias value	50 Volts
Positive bias value	0 Volts
Maximum Plate Dissipation	3.0 Watts
Maximum Screen Dissipation	0.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.0035 μμf. Max.
Input	5.4 μμf.
Output	4.4 μμf.

*With no external shield.

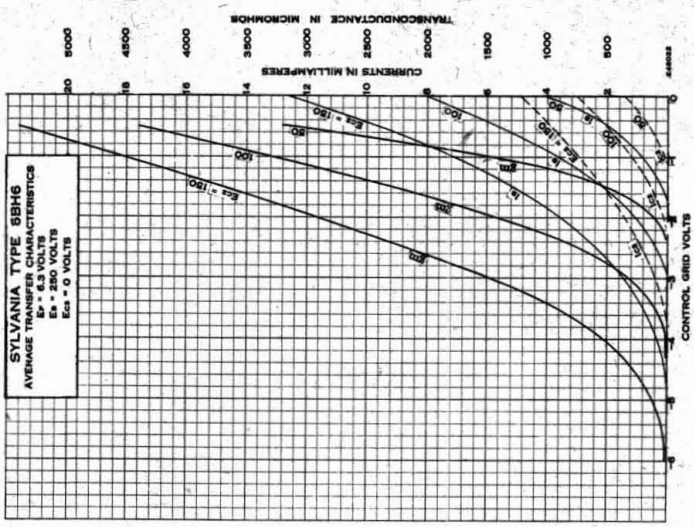
TYPICAL OPERATION

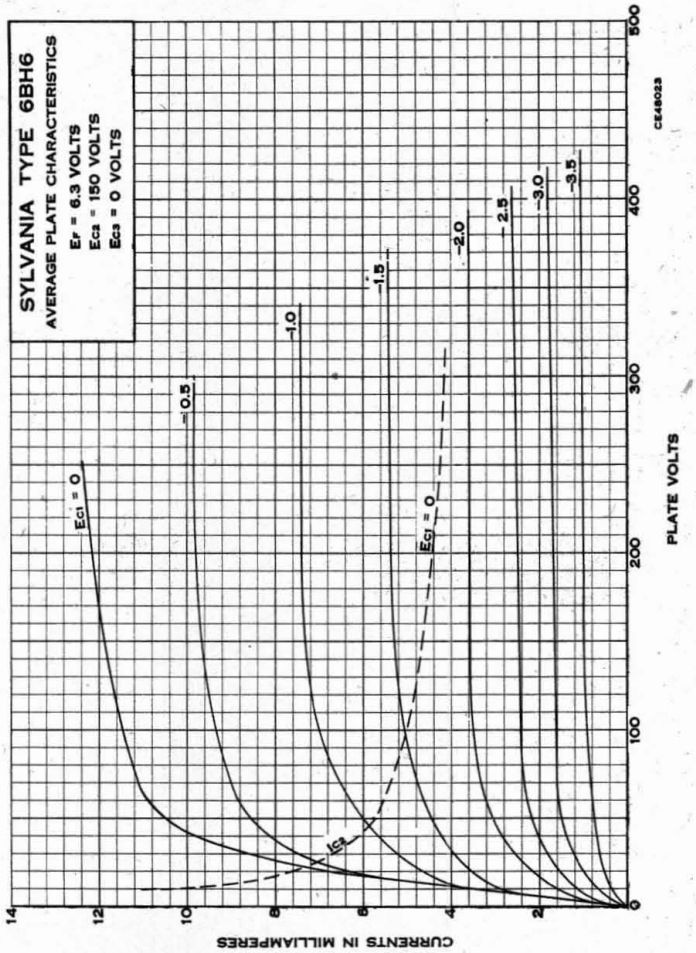
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Suppressor	Connected to cathode at socket	
Screen Voltage	100	150 Volts
Control Grid Voltage	−1	−1 Volt
Plate Current	3.6	7.4 Ma.
Screen Current	1.4	2.9 Ma.
Control Grid Bias (approx.) for 10 μa Plate Current	−5	−7.7 Volts
Plate Resistance	0.7	1.4 Megohms
Transconductance	3400	4600 μmhos

APPLICATION

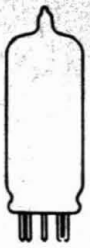
Sylvania Type 6BH6 is a sharp cut-off RF pentode of miniature construction. It has a 150 Ma. heater which makes it useful in AC/DC receivers, and in mobile equipment requiring low heater drain.


SYLVANIA TYPE 6BH6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec3 = 0 VOLTS
TRANSCONDUCTANCE IN MICROMHOS
CURRENTS IN MILLIAMPERES
CONTROL GRID VOLTS


SYLVANIA TYPE 6BH6
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS
Ec2 = 150 VOLTS
Ec3 = 0 VOLTS
Ec1 = 0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
Ec1 = 0
Ic2
CE48023
CURRENTS IN MILLIAMPERES
PLATE VOLTS

6BJ6 Sylvania Type

REMOTE CUT-OFF RF PENTODE





7CM-0-7

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	3.0 Watts
Maximum Screen Dissipation	0.6 Watts
Maximum Control Grid Voltage	
Negative bias	50 Volts
Positive bias	0 Volts
Maximum Peak Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.0035 μμf. Max.
Input	4.5 μμf.
Output	5.0 μμf.

*Without external shield.

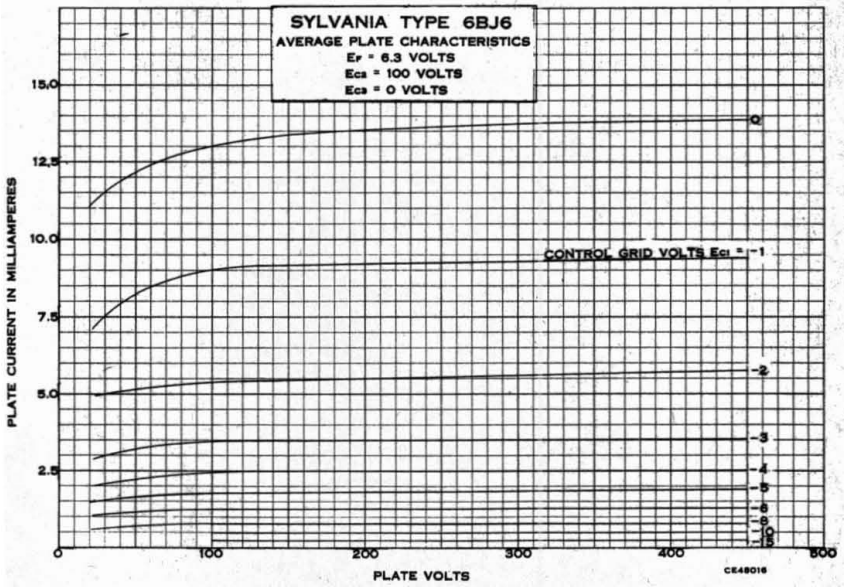
TYPICAL OPERATION

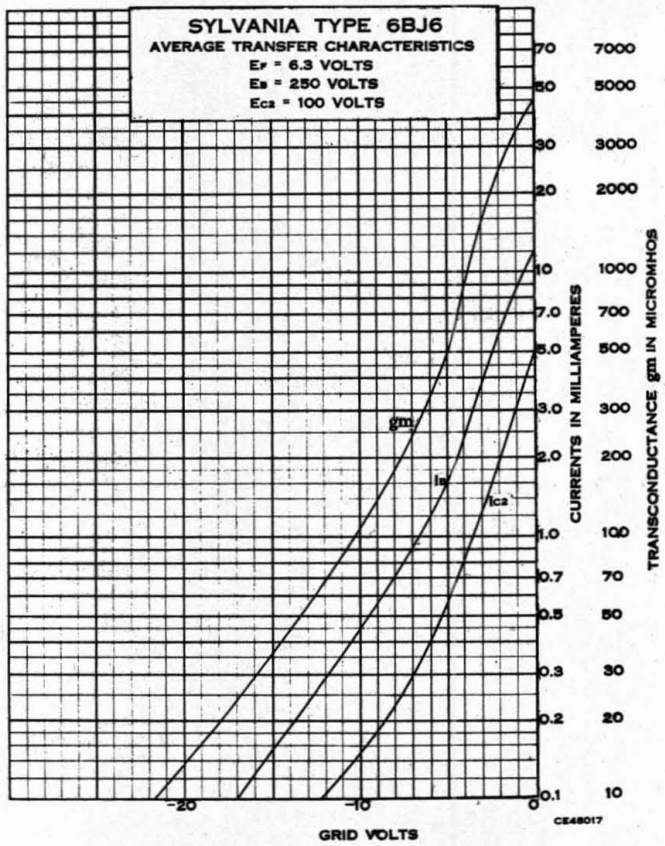
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	−1	−1 Volt
Suppressor	Connected to cathode at socket	
Control Grid Bias (Approx.) for 15 μmhos Transconductance	−20	−20 Volts
Plate Current	9.0	9.2 Ma.
Screen Current	3.5	3.3 Ma.
Transconductance	3650	3800 μmhos
Plate Resistance (Approx.)	0.25	1.3 Megohms

APPLICATION

Sylvania Type 6BJ6 is a remote cut-off pentode of miniature construction designed for use in sets requiring 150 Ma. heater current. It is similar in application to Sylvania Type 6BA6.

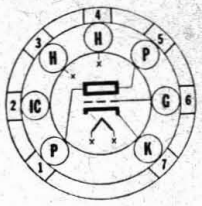

SYLVANIA TYPE 6BJ6
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS
Ec3 = 100 VOLTS
Ec3 = 0 VOLTS
PLATE CURRENT IN MILLIAMPERES
15.0
12.5
10.0
7.5
5.0
2.5
0
100
200
300
400
500
PLATE VOLTS
CONTROL GRID VOLTS Ec1 =
0
-1
-2
-3
-4
-5
-6
-8
-10
-15
CE48016


SYLVANIA TYPE 6BJ6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
CURRENTS IN MILLIAMPERES
70
50
30
20
10
7.0
5.0
3.0
2.0
1.0
0.7
0.5
0.3
0.2
0.1
TRANSCONDUCTANCE gm IN MICROMHOS
7000
5000
3000
2000
1000
700
500
300
200
100
70
50
30
20
10
gm
Ib
Ic2
-20
-10
0
GRID VOLTS
CE48017

6C4 Sylvania Type

HIGH FREQUENCY POWER TRIODE





6BG-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Plate Current	25 Ma.
Maximum Plate Dissipation	3.5 Watts
Maximum DC Grid Current	8.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	1.4 μμf.
Input	1.8 μμf.
Output	2.5 μμf.

*With close fitting shield connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	150 Ma.

CLASS A_1 AMPLIFIER

Plate Voltage	100	250 Volts
Grid Voltage**	0	−8.5 Volts
Self-Bias Resistor	.....	775 Ohms
Amplification Factor	19.5	17
Plate Resistance	6250	7700 Ohms
Mutual Conductance	3100	2200 μmhos
Plate Current	11.8	10.5 Ma.

CLASS C POWER AMPLIFIER AND OSCILLATOR***

Plate Voltage	300 Volts
Grid Voltage**	−27 Volts
DC Plate Current	25 Ma.
DC Grid Current (Approximate)	7.0 Ma.
Driving Power (Approximate)	0.35 Watt
Power Output (Approximate)	5.5 Watt

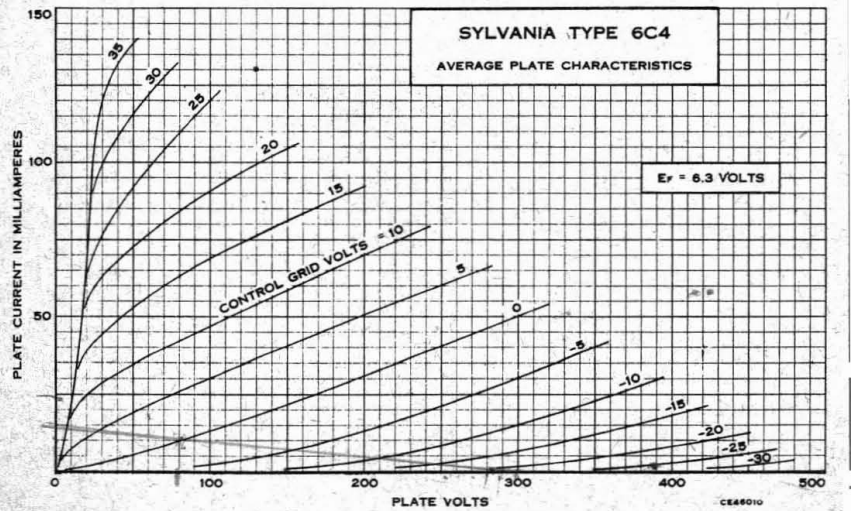
**Maximum grid circuit resistance should not exceed 0.25 megohm with fixed bias or 1.0 megohm with cathode resistor bias.

***Approximately 2.5 watts can be obtained at 150 megacycles as an oscillator with a grid resistor of 10,000 ohms and maximum rated input.

APPLICATION

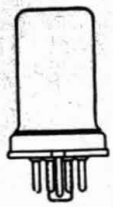
Sylvania Type 6C4 is a miniature type high-frequency triode. It is intended for use at high frequencies as an oscillator or power amplifier. Good power output, at reasonable efficiencies, is obtainable from this tube at frequencies in the order of 150 megacycles.

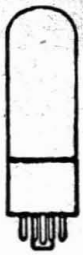
For use in resistance coupled circuits, see data in appendix.





6Q-1-1





Sylvania Type 6C5GT

MEDIUM-MU TRIODE

PHYSICAL SPECIFICATIONS

	6C5	6C5GT
Base	Small Wafer Octal 6 Pin	Small Wafer Octal 6 Pin Metal Sleeve
Bulb	Metal 8-3	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere
Maximum Plate Voltage	250 Volts
Minimum Grid Voltage	0 Volt
Maximum Plate Dissipation	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:	6C5**	6C5GT*
Grid to Plate	2.0	2.2 μμf.
Input	3.0	4.4 μμf.
Output	11	12 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.
**With metal shell connected to cathode.

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.3 Amperes
Plate Voltage	250 Volts
Grid Voltage**	−8 Volts
Plate Current	8 Ma.
Plate Resistance	10000 Ohms
Mutual Conductance	2000 μmhos
Amplification Factor	20

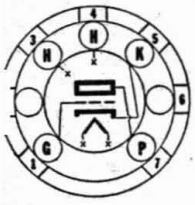
**The DC resistance in the grid circuit should not exceed 1.0 megohm.

APPLICATION

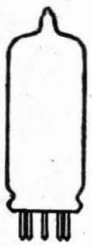
Sylvania 6C5 and 6C5GT are triodes which are quite similar to the Type 7A4. They are recommended for use as a detector, amplifier or oscillator.

It should be noted that Pin No. 1 on Type 6C5GT is connected to an internal cage for shielding purposes.

For use in resistance coupled circuits see data in appendix.



5AY-0-0



Sylvania Type 6D4

GAS TRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5 1/2
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	250 Ma.
Minimum Heating Time*	30 Seconds
Maximum Voltage Between Elements	450 Volts
Peak Cathode Current	100 Ma.
Average Cathode Current (30 seconds maximum)	25 Ma.
Tube Voltage Drop at 25 Ma. (Approximate)	16 Volts
Maximum Heater-Cathode Voltages	−100 Volts
	+25 Volts

*Heater voltage must be applied before application of anode voltage so that the cathode reaches operating temperature.

(continued on following page)

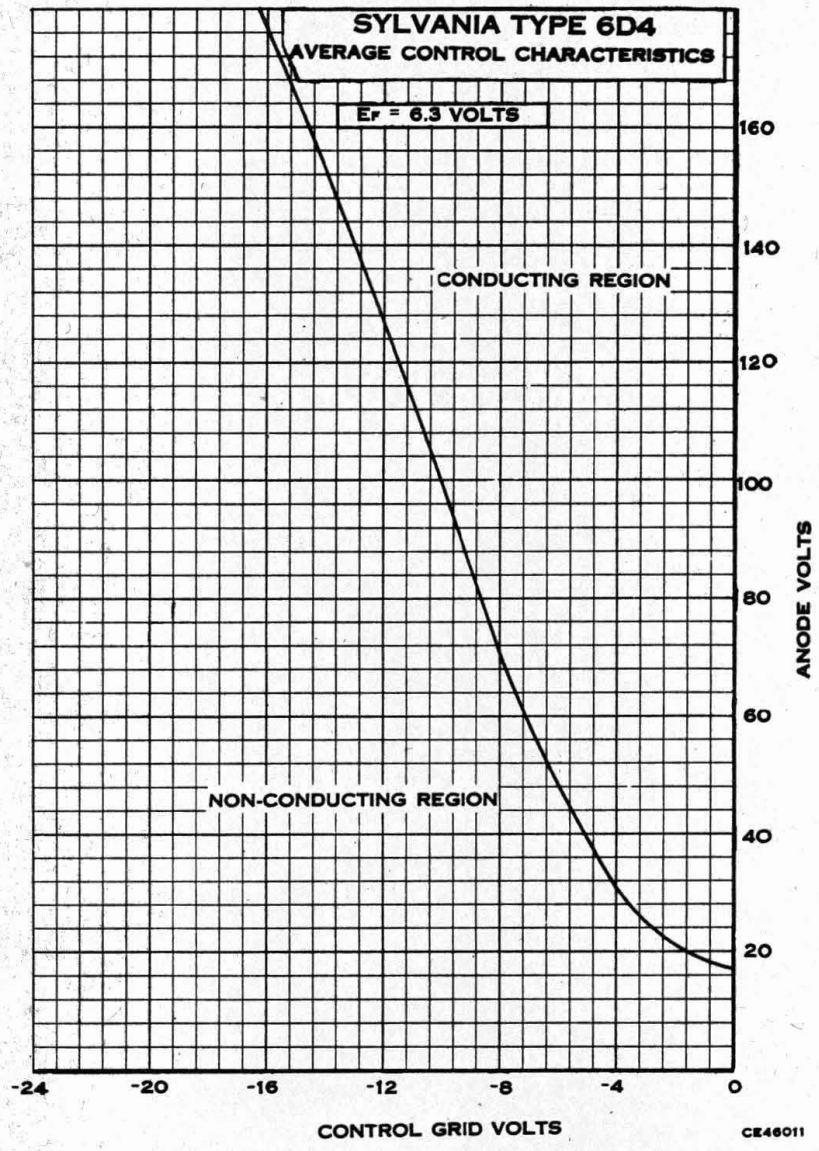
6D4 (Cont.)

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.25	250 Ma.
Anode Voltage	50	125 Volts
Approximate Grid Voltage to Start Conduction	−6.0	−12.0 Volts

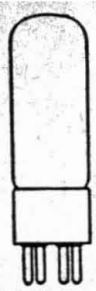
APPLICATION

Sylvania Type 6D4 is a gas triode of miniature construction. It may be used as a relay control tube or as a relaxation oscillator. The miniature construction lends itself readily to use in compact light weight equipment.





6R-0-0



Sylvania Type 6E5

ELECTRON RAY INDICATOR TUBE

PHYSICAL SPECIFICATIONS

Base	Small 6 Pin
Bulb	T9
Maximum Overall Length	4 3/16"
Maximum Seated Height	3 9/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere
Maximum Plate Supply Voltage	250 Volts
Maximum Target Voltage	250 Volts
Minimum Target Voltage	100 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	6.3	6.3	6.3 Volts
Plate Supply Voltage	100	200	250 Volts
Target Supply Voltage	100	200	250 Volts
Plate Current (Triode Unit)*	0.19	0.19	0.24 Ma.
Target Current (Approximate)*	1.0	3.0	4.0 Ma.
Grid Voltage (Triode Unit) † Approximate	0.0	0.0	0.0 Volt
Grid Voltage (Triode Unit) ‡ Approximate	-3.3	-6.5	-8.0 Volts
Triode Plate Resistor	0.5	1.0	1.0 Megohm

*With triode grid voltage of zero volts.
†For shadow angle of 90 degrees.
‡For shadow angle of zero degrees.

APPLICATION

Sylvania Type 6E5 consists of a triode, which functions as a d-c amplifier, and an electron ray device. This latter consists of a portion of the heated cathode as a source of the electrons which are attracted to the target by the positive potential on it. The shaded or unlighted sector is produced by the shadow of a control electrode which is attached to the plate of the triode.

This tube is designed primarily for use as a visible tuning indicator of the electron ray type. It contains a round conical plate or "Target" which fluoresces during operation, and is viewed through the top of the bulb. The visible indication is in the form of a fluorescent lighted sector covering about three-quarters of the area of the target when no voltage is applied to the control grid of the tube. When a negative voltage is applied to the control grid, the edges of the lighted portion close in over the previously unlighted or shaded 90° sector with a fan-like movement until the voltage is increased to a value such that the shaded portion is eliminated and the entire top surface of the target becomes uniformly illuminated.

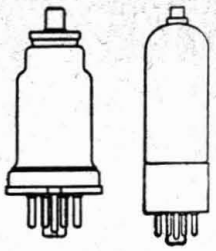
If the control grid is made negative, the plate and therefore the electron ray-control electrode become more positive with respect to the cathode due to decreasing the voltage drop in the resistor which is connected externally between the target and the plate. As this control element becomes more positive its shadow on the target is reduced and the edges of the lighted portion close in as mentioned above.

In actual circuit use the varying negative voltage for controlling the shadow may be obtained from some point in the a-v-c circuit, thus giving an indication of resonance when the unlighted portion of the target is at minimum.

The principal difference between Type 6E5 and Type 6U5/6G5 is in the plate current cut-off characteristics, which are —8 volts and —22 volts respectively. Where difficulty is experienced due to complete closing of the shadow of the 6E5 it is recommended that the 6U5/6G5 be used. If no difficulty exists due to closing of the shadow from only a portion of the a-v-c voltage being used, increased indications on weak signals may be obtained by using a Type 6U5/6G5 and applying the total a-v-c voltage. Type 6U5/6G5 may be used to replace the 6E5 in nearly all present applications, and in general no circuit changes will be necessary.

6F5GT Sylvania Type

HIGH-MU TRIODE
LOCK-IN EQUIVALENT 7B4





5M-1-0 (6F5)
5M-0-0 (6F5GT)

PHYSICAL SPECIFICATIONS

	6F5	6F5GT
Base	Small Wafer Octal 5 Pin	Intermediate Octal 5 Pin
Bulb	8-4	T-9
Cap	Miniature	Miniature
Maximum Overall Length	3 1/8"	3 5/16"
Maximum Seated Height	2 9/16"	2 3/4"
Mounting Position	Any	Any

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts Max.
Grid Voltage*	−1	−2 Volts
Plate Current*	0.4	0.9 Ma.
Plate Resistance	85000	66000 Ohms
Mutual Conductance	1150	1500 μmhos
Amplification Factor	100	100
Heater-Cathode Voltage	90	90 Volts Max.

*These are rating values only and not operating points with coupling resistor.

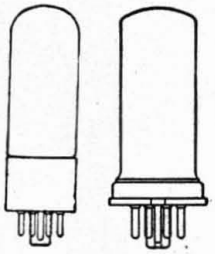
APPLICATION

Sylvania 6F5 and 6F5G are high-mu triode a-f amplifiers, quite similar to the triode section of the Type 75 but having improved characteristics. The tabulated ratings and characteristics show a lower plate impedance and a higher mutual conductance than for Type 75. All three types have the same amplification factor.

For resistance coupled circuits use data given for type 7B4.

6F6GT Sylvania Type

POWER AMPLIFIER PENTODES





7S-1-0 (6F6)
7S-0-0 (6F6GT)

PHYSICAL SPECIFICATIONS

	6F6	6F6G	6F6GT
Base	Small Wafer Octal 7 Pin	Medium Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	8-6	ST14	T9
Maximum Overall Length	3 1/4"	4 5/8"	3 5/16"
Maximum Seated Height	2 11/16"	4 1/16"	2 3/4"
Mounting Position	Any	Any	Any

TYPICAL OPERATION

SINGLE TUBE—CLASS A_1 AMPLIFIER

	Pentode		Triode*
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.7	0.7	0.7 Amperes
Plate Voltage	250	285	285 Volts
Screen Voltage	250	285	.... Volts
Grid Voltage	−16.5	−20	−20 Volts
Peak A-F Signal Voltage	16.5	20	20 Volts
Plate Current (Zero Signal)	34	38	31 Ma.
Plate Current (Maximum Signal)	36	40	34 Ma.
Screen Current (Zero Signal)	6.5	7	.... Ma.
Screen Current (Maximum Signal)	10.5	13	.... Ma.
Plate Resistance (Approximate)	80000	78000	2600 Ohms
Mutual Conductance	2500	2550	2600 μmhos
Amplification Factor	....	....	6.8
Load Resistance	7000	7000	4000 Ohms
Power Output	3.2	4.8	.85 Watts
Total Harmonic Distortion	8	9	6.5 Per Cent
Maximum Heater-Cathode Voltage	90	90	90 Volts

(Continued on following page)

PUSH-PULL AMPLIFIER

	Class A_1	Class AB_2	
	Pentode	Pentode	Triode*
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.7	0.7	0.7 Amperes
Plate Voltage	315	375	350 Volts
Screen Voltage	285	250	.... Volts
Grid Voltage	–24	–26	–38 Volts
Peak A-F Grid to Grid Voltage	48	82	123 Volts
Plate Current (Zero Signal)	62	34	48 Ma.
Plate Current (Maximum Signal)	80	82	92 Ma.
Screen Current (Zero Signal)	12	5	.... Ma.
Screen Current (Maximum Signal)	19.5	19.5	.... Ma.
Load Resistance (Plate to Plate)	10000	10000	6000 Ohms
Power Output	11	18.5	13 Watts
Total Harmonic Distortion	4	3.5	2 Per Cent
Maximum Heater-Cathode Voltage	90	90	90 Volts

*With screen grid tied to plate.

APPLICATION

Sylvania 6F6, 6F6G and 6F6GT are cathode type power output pentodes widely used in the output stages of radio receivers. The electrical characteristics of Type 6F6G are identical to those of Type 42 while those for the metal tube differ only very little from these types. The 6F6 and 6F6G may be employed either singly or in a push-pull arrangement. Although they are constructed as a pentode they may be operated as a triode by connecting the screen grid to the plate at the socket. As such they are very desirable driver tubes for a push-pull Class AB amplifier employing Type 6F6 or 6F6G tubes, furnishing approximately three-quarters of a watt driving power.

For single tube Class A amplifier service either transformer or impedance input-coupling devices are recommended. The 6F6 and 6F6G may also be resistance coupled from either the detector tube or the first audio stage if diode detection is used. If resistance coupling is employed the grid resistor must not exceed 500,000 ohms. This value can be utilized only when the output tube is operated entirely self-biased. When used with a fixed bias, or partially so, the resistor should not exceed 250,000 ohms.

Reference to the characteristics indicates that the mutual conductance, plate resistance and amplification factor make these tubes ideally suited for use in Class AB circuits utilizing one tube connected as a triode for the driver tube and two Type 6F6 or 6F6G tubes in the push-pull output stage.

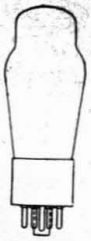
For either triode or pentode Class AB amplifier service, operated under the maximum voltage conditions as specified on the rating sheets, transformer or impedance input-coupling devices must be used.

The driver stage should be carefully designed in order to realize maximum output with minimum distortion. In each of the four arrangements listed the recommended driver tube is a single Type 6F6 or 6F6G, triode connected. It should be operated under the following conditions:

Plate Voltage	250 Volts
Grid Voltage	–20 Volts
Minimum Plate Load	10000 Ohms

6G6G Sylvania Type

POWER AMPLIFIER PENTODE





7S-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.150 Ampere
Maximum Plate Voltage	180 Volts
Maximum Screen Voltage	180 Volts
Maximum Plate Dissipation	2.75 Watts
Maximum Screen Dissipation	0.75 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

	Triode*	Pentode	
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.15	0.15	0.15 Ampere
Plate Voltage	180	135	180 Volts
Screen Voltage	....	135	180 Volts
Grid Voltage	−12	−6	−9 Volts
Peak A-F Signal Voltage	12	6	9 Volts
Plate Current (Zero Signal)	11	11.5	15.0 Ma.
Screen Current (Zero Signal)	....	2.0	2.5 Ma.
Plate Resistance	4750	170000	175000 Ohms
Mutual Conductance	2000	2100	2300 μmhos
Amplification Factor	9.5	360	400
Load Resistance	12000	12000	10000 Ohms
Power Output	0.25	0.6	1.1 Watts
Total Harmonic Distortion	5	7.5	10 Per Cent

*With screen grid tied to plate.

APPLICATION

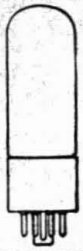
Sylvania Type 6G6G is a power amplifier pentode with a 150 milliampere heater. It is intended to be used in power output stages where maximum efficiency is desirable and high power output is not required. This type is not recommended for automotive service.

Transformer or impedance coupling methods are recommended. If resistance coupling is used, the d-c grid resistance should be limited to 0.5 megohm for both self-bias and fixed-bias operation under the 135 volt plate voltage condition. For the 180 volt plate voltage condition the d-c grid resistance should not be more than 0.5 megohm for self-biased operation and 0.1 megohm with fixed-bias.

The heater voltage should never exceed the rated value by more than 10 per cent, and the voltage between heater and cathode should be as low as possible if direct connection is not made.



7Q-1-1 (6H6)
7Q-0-1 (6H6GT)





Sylvania Type 6H6GT

DUODIODES

PHYSICAL SPECIFICATIONS

	6H6	6H6GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-5	T9
Maximum Overall Length	1¾"	3 5/16"
Maximum Seated Height	1 5/16"	2 5/16"
Mounting Position	Any	Any
Direct Interelectrode Capacitances:*		
Plate No. 1 to Cathode	3.0	3.1 μμf.
Plate No. 2 to Cathode	3.4	4.0 μμf.
Coupling—Plate No. 1 to Plate No. 2	0.1	0.1 μμf. Max.

*With close-fitting tube shield on Type 6H6GT or shell of 6H6 connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.30 Ampere
AC Voltage Per Plate (RMS)	150 Volts Max.
DC Output Current	8 Ma. Max.

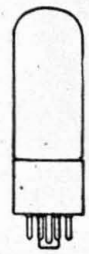
APPLICATION

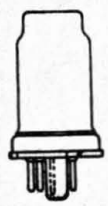
Sylvania 6H6 and 6H6G consist of two separate diode plates, each being associated with an individual cathode. The cathodes are brought out to separate base pins.

The characteristics of this tube have been practically duplicated by Sylvania type 7A6 having only .150 ampere heater current. Application notes and curve data found under type 7A6 should be used.



6Q-1-0





Sylvania Type 6J5GT

MEDIUM-MU TRIODES

LOCK-IN EQUIVALENT 7A4

PHYSICAL SPECIFICATIONS

	6J5	6J5GT
Base	Small Wafer Octal 6 Pin	Small Wafer Metal Sleeve Octal 6 Pin
Bulb	Metal 8-3	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2¾"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC		6.3 Volts
Heater Current		0.3 Ampere
Maximum Plate Voltage		300 Volts
Minimum Grid Voltage		0 Volt
Maximum Plate Dissipation		2.5 Watts
Maximum Heater Cathode Voltage		90 Volts.
Direct Interelectrode Capacitances:*	**6J5**	**6J5G**
Grid to Plate	3.4	4.0 μμf.
Input	3.4	4.2 μμf.
Output	3.6	5.0 μμf.

*With standard RMA tube shield for Type 6J5G or shell of 6J5 connected to cathode.

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3
Plate Voltage	90	250 Volts
Grid Voltage**	0	−8 Volts
Plate Current	10.0	9.0 Ma.
Plate Resistance (Approximate)	6700	7700 Ohms
Mutual Conductance (Approximate)	3000	2600 μmhos
Amplification Factor	20	20

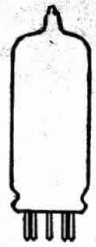
**The DC Resistance in the Grid Circuit should not exceed 1.0 Megohm.

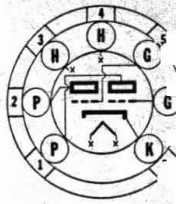
APPLICATION

In general the applications and operating conditions of these types will parallel those for Lock-In Type 7A4.

6J6 Sylvania Type

DUO TRIODE





7BF-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.45 Ampere
Maximum Plate Voltage	300 Volts
Maximum Grid Voltage	−40 Volts
Maximum Plate Current (Per Plate)	15 Ma.
Maximum Grid Current (Per Unit)	8.0 Ma.
Maximum Plate Dissipation (Per Unit)	1.5 Watts
Maximum Heater-Cathode Voltage	100 Volts
Direct Interelectrode Capacitances: Without Shield (Approx. each Unit)	
Grid to Plate	1.6 μμf.
Input	2.2 μμf
Output	0.4 μμf.

TYPICAL OPERATION CLASS A_1 AMPLIFIER

(Per Section except as noted)

Plate Voltage	100 Volts
Self-Bias Resistor*	50 Ohms
Amplification Factor	38
Plate Resistance	7100 Ohms
Mutual Conductance	5300 μmhos
Plate Current	8.5 Ma.

*Value is for both units operating as specified. Under rated maximum conditions total grid circuit resistance should not exceed 0.5 megohm. Fixed bias operation is not recommended.

CLASS C OSCILLATOR OR RF AMPLIFIER (Push-Pull)

Plate Voltage	150 Volts
Grid Voltage†	−10 Volts
Plate Current	30 Ma.
Grid Current (Approximate)	16 Ma.
Driving Power (Approximate)	0.35 Watt
Power Output (Approximate)	3.5 Watts

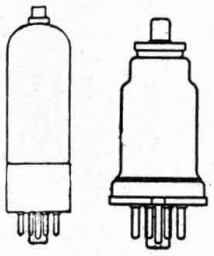
†Obtained by grid resistor of 625 ohms or cathode resistor of 220 ohms.

APPLICATION

Sylvania Type 6J6 is intended as a high frequency oscillator amplifier or mixer. Power outputs in the order of 3.5 watts ar obtainable as a class C amplifier at moderate frequencie. With grids in push-pull and plates in parallel this tube wi operate as a mixer at frequencies as high as 600 megacycle

6J7GT Sylvania Type

SHARP CUT-OFF RF PENTODES





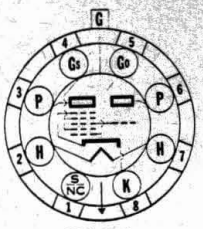
7R-1-1 (6J7, G
7R-0-1 (6J7G

TYPICAL OPERATION

	Triode		Pentode	
Heater Voltage	6.3	6.3	6.3	6.3 Volts
Heater Current	0.3	0.3	0.3	0.3 Volts
Plate Voltage	180	250	100	250 Volts
Grid Voltage**	-5.3	-8	-3	-3 Volts
Screen Voltage	Tie to Plate		100	100 Volts
Suppressor	Tie to Plate		Tie to Cathode	
Plate Current	5.3	6.5	2.0	2.0 Ma.
Screen Current	...	...	0.5	0.5 Ma.
Plate Resistance	0.011	0.01	1.0	>1.0 Megohms
Mutual Conductance	1800	1900	1185	1225 μmhos
Amplification Factor	20	20	...	...
Grid Voltage for Current Cut-Off	...	...	-7	-7 Volts

**The d-c resistance in grid circuit should not exceed 1.0 megohm.

See type 6K7 etc. for dimensions and use type 7C7 curve data.



8H-0-8



Sylvania Type 6J8G

TRIODE HEPTODE CONVERTER

LOCK-IN EQUIVALENT 7J7

PHYSICAL SPECIFICATIONS

Base	Small Octal 8 Pin
Bulb	ST12
Cap	Miniature
Maximum Overall Length	$4^{15}/_{32}$"
Maximum Seated Height	$3^{29}/_{32}$"
Mounting Position	Any

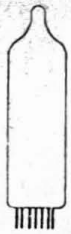
RATINGS

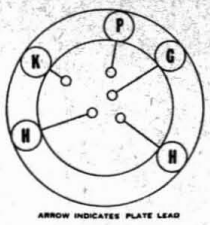
Heater Voltage	6.3 Volts
Heater Current	0.30 Ampere

The other characteristics of this tube have been substantially duplicated in Lock-In type 7J7 and further information and curve data may be obtained by reference to this type.

6K4 Sylvania Type

HIGH FREQUENCY TRIODE





6K4

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	1½"
Minimum Lead Length	1¼"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	250 Volts
Maximum Heater to Cathode Voltage	90 Volts
Maximum Plate Dissipation (open air)	3.0 Watts
Maximum Cathode Current	20.0 Ma.

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Grid to Plate	2.4	2.4 μμf.
Input	2.4	2.4 μμf.
Output	3.8	0.8 μμf.

*With a .405" diameter shield connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	200 Volts
Grid Voltage* Obtained from Self Bias Resistor of	150	680 Ohms
Plate Current	13.0	11.5 Ma.
Transconductance	5500	3450 μmhos
Amplification Factor	20	16
Plate Resistance	3640	4650 Ohms
Grid Voltage for Plate Current Cut-Off to 10 μa.	−14	−30 Volts

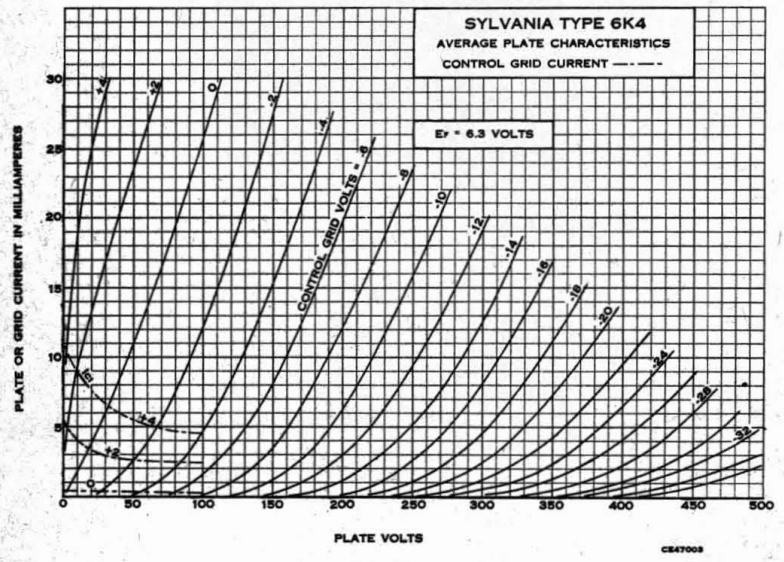
*Provides an operating bias of approximately 2.0 and 8.0 volts respectively. Maximum grid circuit resistance should not exceed ½ megohm. Fixed bias operation is not recommended.

APPLICATION

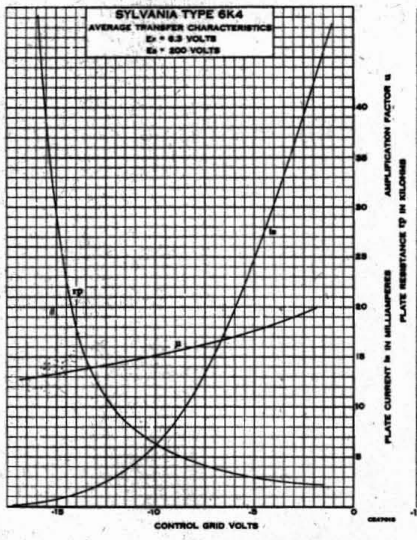
Sylvania Type 6K4 is designed for use in high frequency applications requiring a very small, light-weight tube, highly resistant to shock and vibration.

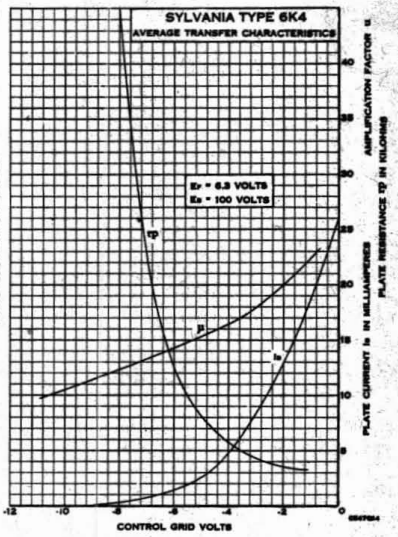
At frequencies of around 500 Mc., an output of approximately ¾ Watt may be obtained when used in a suitable circuit.

Data for use as a resistance coupled amplifier may be found in the appendix.



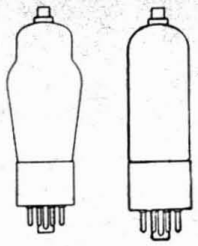
SYLVANIA RADIO TUBES


SYLVANIA TYPE 6K4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 200 VOLTS
CONTROL GRID VOLTS
PLATE CURRENT Ib IN MILLIAMPERES
AMPLIFICATION FACTOR u
PLATE RESISTANCE rp IN KILOHMS


SYLVANIA TYPE 6K4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
rp
u
Ib
CONTROL GRID VOLTS
PLATE CURRENT Ib IN MILLIAMPERES
AMPLIFICATION FACTOR u
PLATE RESISTANCE rp IN KILOHMS

6K5GT Sylvania Type

HIGH-MU TRIODE





5U-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	T9 or ST12
Cap	Miniature
Maximum Overall Length	$4\frac{15}{32}$"
Maximum Seated Height	$3\frac{29}{32}$"
Mounting Position	Any
Direct Interelectrode Capacitances:*	
Grid to Plate	2.0 μμf.
Input	2.4 μμf.
Output	3.6 μμf.

*No external shield.

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	100	250 Volts
Grid Voltage*	−1.5	−3 Volts
Plate Current*	0.35	1.1 Ma.
Plate Resistance (Approximate)	78000	50000 Ohms
Mutual Conductance (Approximate)	900	1400 μmhos
Amplification Factor	70	70
Maximum Heater-Cathode Voltage	90	90 Volts

*These are rating values only and not operating points with coupling resistor.

APPLICATION

Sylvania 6K5G is a high-mu triode glass tube equipped with an octal base. The characteristics of this amplifier are very similar to the triode section of Sylvania Type 6Q7G. The principal differences appear in the increased mutual conductance and corresponding reduction in plate impedance.

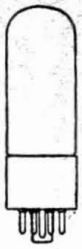
The amplification factor ($\mu = 70$) is somewhat lower than that of the Type 6F5 or the triode section of Type 75, but this lower value enables the use of a larger signal input both under 250-volt and 100-volt operating conditions before the grid swing reaches the grid current region. This feature also renders the value of grid bias less critical than with a tube having a higher amplification factor.

This tube when operated with a plate supply voltage of 250 volts and a plate load resistor of 100,000 to 250,000 ohms should have a negative grid bias of approximately 2.5 volts. When the triode is operated on a plate supply of 100 volts with a plate load resistor of 50,000 to 100,000 ohms, the negative grid bias should be of the order of 1.4 volts. For special application these values may be varied to suit the conditions.

Data for use in Resistance Coupled Amplifier Circuits may be found in the appendix under Type 6Q7GT.



7S-0-0



Sylvania Type 6K6GT

POWER OUTPUT PENTODE

LOCK-IN EQUIVALENT 7B5

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.4 Ampere
Maximum Plate Voltage	315 Volts
Maximum Screen Voltage	285 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	2.8 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.4	0.4	0.4 Ampere
Plate Voltage	100	250	315 Volts
Grid Voltage	−7	−18	−21 Volts
Screen Voltage	100	250	250 Volts
Plate Current (Zero Signal)	9.0	32.0	25.5 Ma.
Plate Current (Maximum Signal)	9.5	33.0	28.0 Ma.
Screen Current (Zero Signal)	1.6	5.5	4.0 Ma.
Screen Current (Maximum Signal)	3.0	10.0	9.0 Ma.
Plate Resistance	104000	68000	75000 Ohms
Mutual Conductance	1500	2300	2100 μmhos
Peak Signal Voltage (a-f)	7	18	21 Volts
Load Resistance	12000	7600	9000 Ohms
Power Output	0.35	3.4	4.5 Watts
Total Harmonic Distortion	11	11	15 Percent

APPLICATION

Sylvania 6K6GT is an efficient power amplifier pentode of the indirectly heated cathode type. This tube is the "G" type equivalent of Type 41. It has a 6.3 volt heater and is adaptable to a-c, and automobile service.

Type 6K6GT may be used either singly or in push-pull combination. If a single tube is employed in the output stage, using self-bias, the self-biasing resistor should be properly bypassed. For the push-pull arrangement the value of this resistor is one-half that required for a single tube.

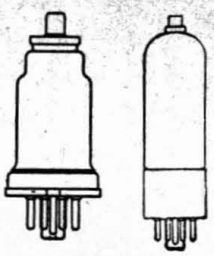
Transformer or impedance coupling devices are to be recommended. If it is desired to use resistance coupling, the grid resistor (with self-bias) should be limited to 1.0 megohm provided the heater voltage never exceeds about 7 volts. With fixed bias the maximum allowable resistance for the grid resistor is 0.1 megohm.

The recommended load resistance should be used if possible in order to keep the second harmonic at a minimum. If, however, two tubes are used in push-pull Class A, somewhat lower third harmonic in the output may be obtained by employing a lower load for both tubes than normal since the second harmonics will cancel with the push-pull arrangement.

For curve data reference should be made to type 7B5.

6K7GT Sylvania Type

REMOTE CUT-OFF RF PENTODES





7R-1-0 (6K7)
7R-0-8 (6K7G)
7R-1-8 (6K7GT)

PHYSICAL SPECIFICATIONS

	6K7	6K7G	6K7GT
Base	Small Wafer Octal 7 Pin	Small Octal 7 Pin	Small Wafer Metal Sleeve Octal 7 Pin
Bulb	Metal 8-4	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"	3 5/16"
Maximum Seated Height	2 5/16"	3 29/32"	2 3/4"
Mounting Position	Any	Any	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	2.75 Watts
Maximum Screen Dissipation	.35 Watts
Minimum External Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.005	.007	.005 μμf. Max.
Input G1 to (F+K+G2+G3)	7	5	4.6 μμf.
Output P to (F+K+G2+G3)	12	12	12 μμf.

*With standard RMA tube shield on Type 6K7G and 6K7GT or shell of 6K7 connected to cathode.

TYPICAL OPERATION

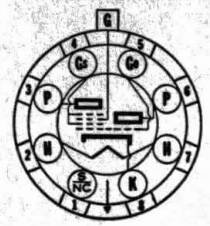
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	250	250 Volts
Screen Voltage	100	100	125 Volts
Grid Voltage	−1.0	−3	−3 Volts
Suppressor		Tie to Cathode	
Plate Current	9.5	7.0	10.5 Ma.
Screen Current	2.7	1.7	2.6 Ma.
Plate Resistance (Approx.)	.15	0.8	0.6 Megohm
Mutual Conductance	1650	1450	1650 μmhos
Grid Bias for Mutual Conductance= 2 μmhos	−38.5	−42.5	−52.5 Volts

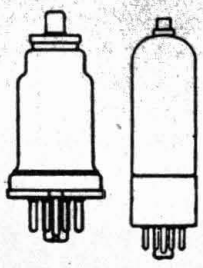
APPLICATION

Sylvania 6K7, 6K7G and 6K7GT are triple-grid remote cut-off amplifiers designed to fulfill the many requirements imposed on a tube for service in the r-f and i-f stages of radio receivers.

The uses for Sylvania Types 6K7, 6K7G and 6K7GT parallel those which have been outlined under the Circuit Application Notes for Type 7A7.



8K-1-0 (6K8)
8K-0-8 (6K8G)
8K-1-8 (6K8GT)



Sylvania Type 6K8GT

TRIODE HEXODE CONVERTERS

PHYSICAL SPECIFICATIONS

	6K8	6K8G	6K8GT
Base	Small Wafer Octal 8 Pin	Small Octal 8 Pin	Small Wafer Metal Sleeve Octal 8 Pin
Bulb	Metal 8-2	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"	3 1/16"
Maximum Seated Height	2 9/16"	3 29/32"	3"
Mounting Position	Any	Any	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.3 Ampere
Maximum Hexode Plate Voltage	300 Volts
Maximum Hexode Screen Supply Voltage	300 Volts
Maximum Hexode Screen Voltage	150 Volts
Maximum Hexode Plate Dissipation	.75 Watt
Maximum Hexode Screen Dissipation	.7 Watt
Maximum Oscillator Anode Voltage	125 Volts
Maximum Oscillator Anode Dissipation	0.75 Watt
Maximum Total Cathode Current	16 Ma.
Minimum External Signal Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

	6K8	6K8G, 6K8GT
Grid G to Hexode Plate (P)	0.03	0.08 μμf. Max.
Grid G to Oscillator Plate	0.02	0.05 μμf. Max.
Grid G to Oscillator Grid (Go)	0.2	0.2 μμf. Max.
Oscillator Grid (Go) to Oscillator Plate	1.1	1.8 μμf.
Oscillator Grid (Go) to Mixer Plate	0.1	0.15 μμf. Max.
Signal Input (G to all other Electrodes)	6.6	4.6 μμf.
Oscillator Input (Go to all other Electrodes except Oscillator Plate)	6.0	6.5 μμf.
Oscillator Output (P to all other Electrodes except Grid Go)	3.2	3.4 μμf.
Mixer Output (P to all other Electrodes)	3.5	4.8 μμf.

†With standard RMA tube shield on Type 6K8G, GT or shell of 6K8 connected to cathode.

TYPICAL OPERATION
AS A CONVERTER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.30	0.30 Ampere
Hexode Plate Voltage	100	250 Volts
Hexode Screen Voltage	100	100 Volts
Hexode Control-Grid Voltage	−3	−3 Volts
Oscillator Anode Voltage	100	100 Volts
Oscillator Grid Resistor	50000	50000 Ohms
Hexode Plate Current	2.3	2.5 Ma.
Hexode Screen Current	6.2	6.0 Ma.
Oscillator Plate Current	3.8	3.8 Ma.
Oscillator Grid and Hexode No. 1 Grid Current	0.15	0.15 Ma.
Cathode Current	12.5	12.5 Ma.
Hexode Plate Resistance (Approximate)	0.4	0.6 Megohm
Conversion Conductance	325	350 μmhos
Hexode Control-Grid Voltage at −6 Volts	125	140 μmhos
Hexode Control-Grid Voltage at −10 Volts	43	45 μmhos
Hexode Contol-Grid Voltage at −30 Volts (Approximate)	2	2 μmhos

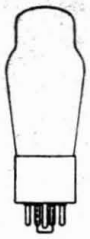
APPLICATION

Sylvania Types 6K8, 6K8G and 6K8GT are intended primarily for converter service. They contain both a triode oscillator unit and a hexode mixer unit in the same structure.

In conventional installations, these types tend to have less frequency drift than the pentagrid converter tubes such as Type 6A8. Design economies are possible in AC-DC receivers because the hexode plate, hexode screen grid, and triode plate may be operated at the same voltage.

6L5G Sylvania Type

MEDIUM-MU TRIODES





6Q-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 6 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any
Direct Interelectrode Capacitances:*	
Grid to Plate	2.8 μμf.
Input	2.8 μμf.
Output	5.0 μμf.

*With standard RMA tube shield.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts Max.
Grid Voltage	−3	−9 Volts
Plate Current	4.0	8.0 Ma.
Plate Resistance	10000	9000 Ohms
Mutual Conductance	1500	1900 μmhos
Amplification Factor	15	17
Heater-Cathode Voltage	90	90 Volts Max.

APPLICATION

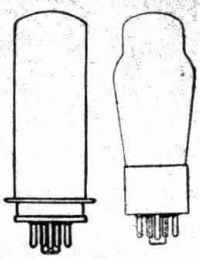
Sylvania Type 6L5G is a triode amplifier with characteristics quite similar to Types 6C5 and 6C5G. This octal based tube has a heater rating of only 0.150 ampere.

Type 6L5G is recommended for use as an amplifier, oscillator or detector. The applications will parallel those for the 6C5G and 76 and reference may be made to circuit application notes for Type 7A4.

For use in resistance coupled circuits, see data in appendix.



7AC-1-0 (6L6)
7AC-0-0 (6L6G, GA)



Sylvania Type 6L6
Sylvania Type 6L6G
Sylvania Type 6L6GA

BEAM POWER AMPLIFIERS

PHYSICAL SPECIFICATIONS

	6L6	6L6G	6L6GA
Base	Small Wafer Octal 7 Pin	Medium Octal 7 Pin	Medium Octal 7 Pin
Bulb	Metal 10-1	ST16	ST14
Maximum Overall Length	4 5/16"	5 5/16"	4 5/8"
Maximum Seated Height	3 3/4"	4 3/4"	4 1/16"
Mounting Position	Any	Any	Any

RATINGS

	Triode	Single Tube	Push-Pull
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.9	0.9	0.9 Ampere
Maximum Plate Voltage	300	350	360 Volts
Maximum Screen Voltage	Tie to Plate	250	270 Volts
Maximum Plate Dissipation	12	18.5	19.0 Watts
Maximum Screen Dissipation	....	2.7	2.5 Watts
Maximum Heater-Cathode Voltage	90	90	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER SINGLE TUBE

Heater Voltage	6.3	6.3	6.3 Volts
Plate Voltage	250	300	350 Volts
Screen Voltage	250	200	250 Volts
Grid Voltage	−14	−12.5	−18 Volts
Peak A-F Signal Voltage	14	12.5	18 Volts
Plate Current (Zero Signal)	72	48	54 Ma.
Plate Current (Maximum Signal)	79	55	66 Ma.
Screen Current (Zero Signal)	5	2.5	2.5 Ma.
Screen Current (Maximum Signal)	7.3	4.7	7.0 Ma.
Mutual Conductance	6000	5300	5200 μmhos
Plate Resistance	22500	35000	33000 Ohms
Load Resistance	2500	4500	4200 Ohms
Power Output	6.5	6.5	10.8 Watts
Total Harmonic Distortion	10	11	15 Per Cent

PUSH-PULL AMPLIFIER, PENTODE CONNECTION

	Class A_1		Class AB_1		Class AB_2	
Heater Voltage	6.3	6.3	6.3	6.3	6.3	6.3 Volts
Plate Voltage	250	270	360	360	360	360 Volts
Screen Voltage	250	270	270	270	225	270 Volts
Grid Voltage	−16	−17.5	−22.5	−22.5	−18	−22.5 Volts
Peak A-F Grid to Grid Voltage	32	35	45	45	52	72 Volts
Plate Current*	120	134	88	88	78	88 Ma.
Plate Current**	140	155	132	140	142	205 Ma.
Screen Current*	10	11	5	5	3.5	5 Ma.
Screen Current**	16	17	15	11	11	16 Ma.
Mutual Conductance	5500	5700	.....	.....	...	..... μmhos
Plate Resistance	24500	23500	.....	.....	.....	..... Ohms
Load Resistance	5000	5000	6600	3800	6000	3800 Ohms
Power Output	14.5	17.5	26.5	18	31	47 Watts
Total Harmonic Distortion	2	2	2	2	2	2 Percent

*Zero Signal.
**Maximum Signal.

TRIODE OPERATION
CLASS A_1 AMPLIFIER Single Tube

Heater Voltage	6.3	6.3 Volts
Plate Voltage	300	250 Volts
Screen Voltage	Tie to Plate	
Grid Voltage	−27	−20 Volts
Peak A-F Signal Voltage	27	20 Volts
Plate Current (Zero Signal)	41	40 Ma.
Plate Current (Maximum Signal)	48	44 Ma.
Plate Resistance	1700	1700 Ohms
Mutual Conductance	4700	4700 μmhos
Amplification Factor	8	8
Load Resistance	5000	5000 Ohms
Power Output	2.4	1.4 Watts
Total Harmonic Distortion	5.6	5.0 Per Cent

APPLICATION

Sylvania Types 6L6 and 6L6G are power amplifier tubes designed for use in the output stage of radio receivers, particularly in those designed to have a reserve of power capability.

(Continued on next page)

6L6
6L6G
6L6GA (Cont'd)

The tubes provide high power output, power sensitivity and efficiency.

The design principles, responsible for the above features, involve the use of directed electron beams. These effects are produced by arranging the tube elements in such a manner that potential fields are set up which confine the electrons into beams of high density. Efficient suppressor action is produced by the space-charge effects formed between the screen and plate. Very little power is taken by the screen.

The second harmonic distortion is intentionally high in order to reduce the third and higher order harmonics to a minimum. Elimination of the second harmonic distortion can be obtained by using these tubes in a push-pull arrangement. If only one tube is used in a resistance coupled circuit, second harmonics can be reduced by generating out-of-phase second harmonics in preceding audio stages or by degeneration.

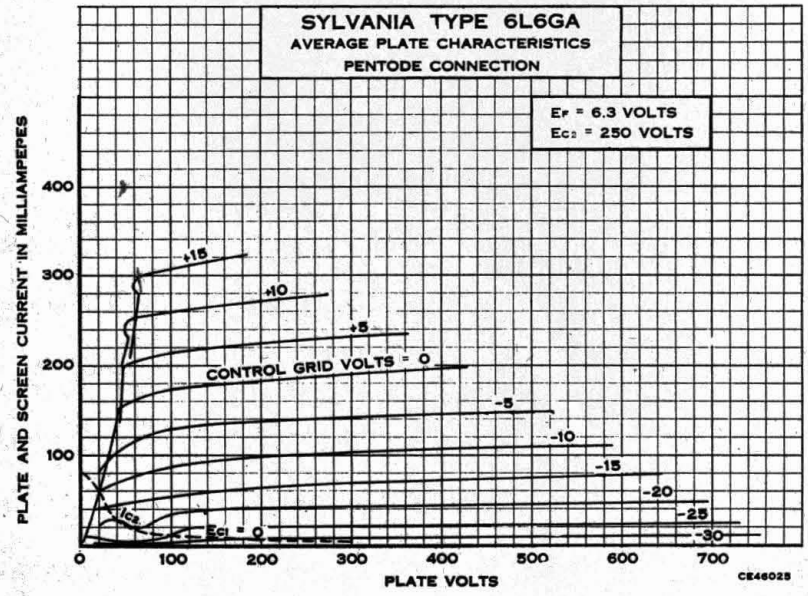
The Number "1" used in conjunction with the terms Class A and Class AB indicates that no grid current flows during any part of the input cycle. Likewise, the Number "2" indicates that grid current does flow during some part of the input cycle.

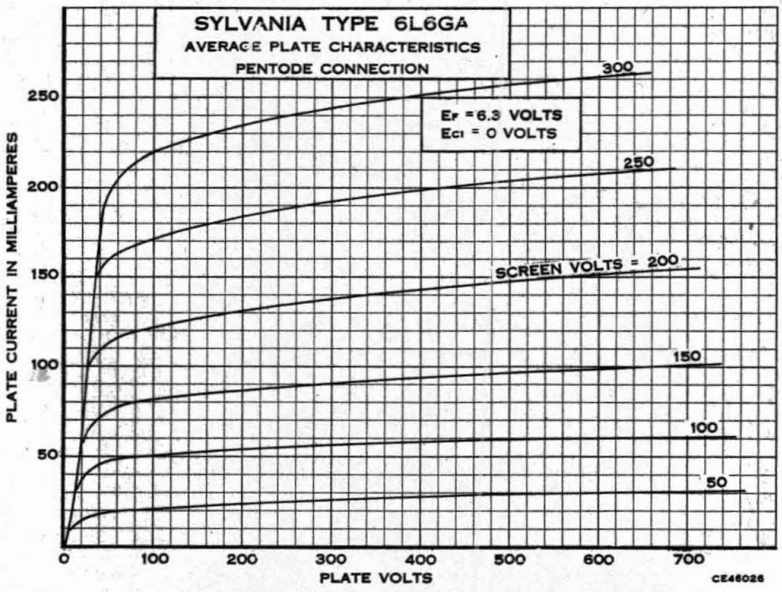
The heater voltage rating for Types 6L6 and 6L6G is 6.3 volts. Precautions should be taken to prevent the heater voltage from exceeding a maximum value of 7.0 volts during line voltage fluctuations. A minimum potential difference between heater and cathode should be maintained.

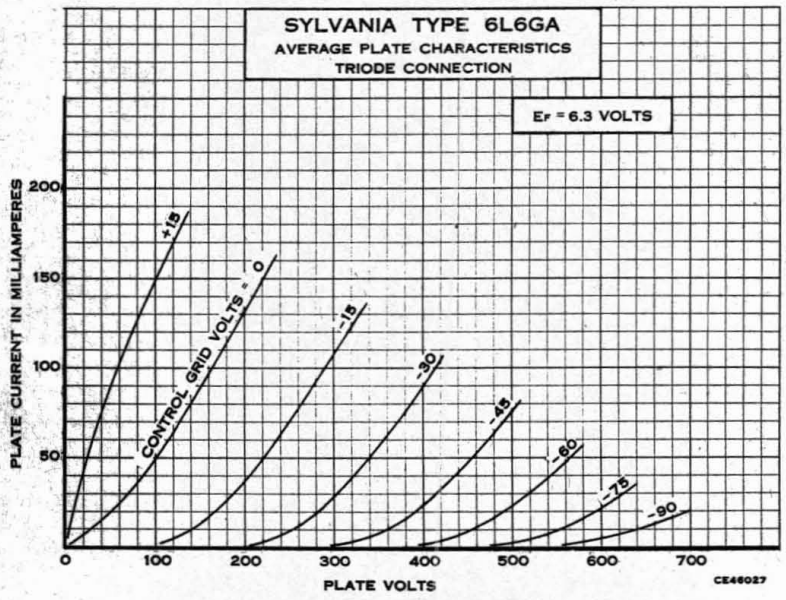
The maximum plate and screen dissipation must not be exceeded. Provision should be made for line voltage changes, especially when fixed-bias operation is employed.

Transformer or impedance coupling devices are recommended and the resistance introduced in the grid circuit should be kept as low as possible. For fixed bias this resistance should not exceed 0.1 megohm. The maximum grid circuit resistance when self-bias is employed may be 0.25 megohm if the heater voltage does not exceed 7.0 volts. See first note above.

For Class AB operation the driver stage should be designed so as to be capable of supplying the required peak power with low distortion to the grids of the output stage.

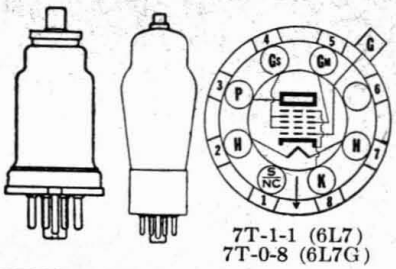



SYLVANIA TYPE 6L6GA
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Ef = 6.3 VOLTS
Ec1 = 0 VOLTS
300
250
SCREEN VOLTS = 200
150
100
50
PLATE CURRENT IN MILLIAMPERES
250
200
150
100
50
0
100
200
300
400
500
600
700
PLATE VOLTS
CE46026


SYLVANIA TYPE 6L6GA
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
Ef = 6.3 VOLTS
+15
CONTROL GRID VOLTS = 0
-15
-30
-45
-60
-75
-90
PLATE CURRENT IN MILLIAMPERES
200
150
100
50
0
100
200
300
400
500
600
700
PLATE VOLTS
CE46027

6L7, G Sylvania Type

HEPTODE CONVERTER, AMPLIFIER



7T-1-1 (6L7)
7T-0-8 (6L7G)

PHYSICAL SPECIFICATIONS

	6L7	6L7G
Base	Small Wafer Octal 7 Pin	Small Octal 7 Pin
Bulb	Metal 8-4	ST12
Cap	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"
Maximum Seated Height	2 9/16"	3 29/32"
Mounting Position	Any	Any

RATINGS

	Mixer	Amplifier
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Maximum Plate Voltage	300	300 Volts
Maximum Screen Voltage	150	100 Volts
Maximum Plate Dissipation	1.0	1.5 Watts
Maximum Screen Dissipation	1.5	1.0 Watts
Maximum Heater-Cathode Voltage	90	90 Volts

TYPICAL OPERATION—MIXER

Heater Voltage	6.3	6.3 Volts
Plate Voltage	250	250 Volts
Screen Voltage (Gs)	100	150 Volts
Control Grid Voltage (G)	−3	−6 Volts
Modulator Grid Voltage (Gm)	−10	−15 Volts
Peak Oscillator Voltage applied to Grid Gm (Min.)	12	18 Volts
Plate Current	2.4	3.3 Ma.
Screen Current	7.1	9.2 Ma.
Plate Resistance	Greater than 1 Megohm	
Conversion Conductance	375	350 μmhos
Control Grid Voltage for Conversion Conductance of 5 Micromhos	−30	−45 Volts

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts.
Plate Voltage	250 Volts
Screen Voltage (Gs)	100 Volts
Control Grid Voltage (G)	−3 Volts
Control Grid Voltage (Gm)	−3 Volts
Plate Current	5.3 Ma.
Screen Current	6.5 Ma.
Plate Resistance (Approximate)	0.6 Megohm
Amplification Factor	670
Mutual Conductance	1100 μmhos
At −6 Volts Bias on Grids G and Gm	475 μmhos
At −10 Volts Bias on Grids G and Gm	75 μmhos
At −15 Volts Bias on Grids G and Gm (Approximate)	5 μmhos

APPLICATION

Sylvania Types 6L7 and 6L7G pentagrid mixer amplifiers differ considerably in internal construction and connections from other pentagrid tubes such as Types 6A7, 6A8 and 6A8G.

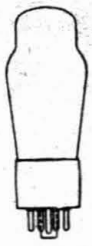
Starting from the cathode and proceeding outward the first grid (G) is connected to the top cap. The incoming signal circuit is connected to this grid and the return circuit may be connected to the a-v-c circuit. The second grid serves as a shield between G and Gm and is tied internally to the fourth grid. Thus the second and fourth grids together become the screen grid (Gs). The third grid (Gm) is the one to which the oscillator voltage is applied. The fifth grid is the suppressor grid and is connected internally to the cathode.

True electron coupling is provided since the oscillator voltage is applied to grid Gm. The capacity between Gm and ground is quite high and this fact must be taken into account in designing the oscillator circuit so as to adequately cover the desired range.

In addition to its principal use as a mixer tube, the 6L7 or 6L7G may be employed as an amplifier. By applying adjustable bias to both control grids, G and Gm, cut-off may be reached much more rapidly and less applied a-v-c voltage will be required to obtain control. The amplifier characteristics do not compare favorably with the 78 or 6K7 because the transconductance is lower.



7AU-0-0



Sylvania Type 6N6G

DIRECT COUPLED POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Medium Octal 7 Pin
Bulb	ST14
Maximum Overall Length	4 5/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.8 Ampere
Maximum Output Plate Voltage	300 Volts
Maximum Input Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.8 Ampere
Plate Voltage (Output)	300 Volts
Plate Voltage (Input)	300 Volts
Grid Voltage (Input)	0 Volt
Plate Current (Output)	42 Ma.
Plate Current (Input)	9 Ma.
Plate Resistance	24000 Ohms
Mutual Conductance†	2400 μmhos
Amplification Factor	58
Load Resistance	7000 Ohms
Power Output*	4.0 Watts
Power Output**	6.5 Watts

†Input grid—output plate Mutual Conductance.
*15 volts (r-m-s) signal; total distortion 5%.
**Input grid begins to draw grid current; total distortion 10%.

APPLICATION

Sylvania 6N6G is a heater type output tube comprising two triode units mounted in an ST-14 bulb. The smaller or input section acts as a driver tube for the larger output unit and is directly coupled to it. The input cathode and output grid are connected internally.

Type 6N6G may be employed in the output stage of a-c operated receivers to deliver large amounts of power with low percentage distortion. Two tubes may be used in a push-pull circuit if additional power is desired.

In general, the circuits designed for the Type 6N6G will be somewhat simplified since the number of component parts required will be less than with other power amplifier tubes. The tube operates without bias so that there is no need for a cathode resistor and its associated by-pass condenser. The output cathode is connected directly to minus B. Nevertheless, the input grid does not draw any current since a grid bias is automatically developed within the tube. The tube may therefore be fed by resistance coupling.

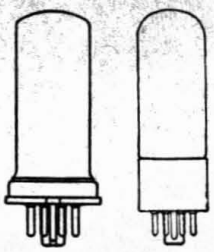
The optimum load resistance for single tube operation is 7000 ohms. When two Type 6N6G tubes are operated in push-pull the plate to plate load resistance should be 10,000 ohms.

The characteristics are shown for 300 volt operation. However, it is permissible to operate Type 6N6G with a plate voltage of 325 volts and a grid bias of −4.5 volts. Under these conditions the current values will be substantially the same as those shown above.

Type 6N6G is the "G" equivalent of Type 6B5.

6N7GT Sylvania Type

DUO TRIODE POWER AMPLIFIERS





8B-1-0 (6N7)
8B-0-0 (6N7GT)

PHYSICAL SPECIFICATIONS

	6N7	6N7GT
Base	Small Wafer Octal 8 Pin	Intermediate Octal 8 Pin
Bulb	Metal 8-6	T9
Maximum Overall Length	3 1/4"	3 5/16"
Maximum Seated Height	2 11/16"	2 3/4"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.8 Ampere
Maximum Plate Voltage	300 Volts
Maximum Dynamic Peak Plate Current (per Plate)	125 Ma.
Maximum Average Plate Dissipation (per Plate)	5.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS AB_2 POWER AMPLIFIER

(Values are for both sections unless otherwise specified)

	Ideal	Typical
Heater Voltage	6.3	6.3 Volts
Heater current	0.8	0.8 Ampere
Grid Impedance at 400 Cycles	0	516‡ Ohms
Plate Supply Impedance	0	1000 Ohms
Plate Voltage (Zero Signal)	300	300 Volts
Grid Voltage (DC)	0	0 Volt
Peak Signal Voltage (per Grid)	29	41 Volts
Plate Current (per Plate Zero Signal)	17.5	17.5 Ma.
Plate Current (per Plate Maximum Signal)	35	35 Ma.
Peak Grid Current (per Grid Maximum Signal)	20	22 Ma.
Load Resistance (Plate to Plate)	8000	8000 Ohms
Power Output	10	10 Watts
Total Harmonic Distortion	4	8 Per Cent

‡The 516 ohms impedance shown consists of 500 ohms resistance and 50 mh. inductance.

CLASS A DRIVER

(Both grids and both plates connected together at the socket)

Heater Voltage	6.3	6.3 Volts
Heater Current	0.8	0.8 Ampere
Plate Voltage	250	294 Volts
Grid Voltage	−5	−6 Volts
Plate Current	6	7 Ma.
Plate Resistance	11300	11000 Ohms
Mutual Conductance	3100	3200 μmhos
Amplification Factor	35	35

APPLICATION

Sylvania Types 6N7 and 6N7G are the metal and "G" type equivalents of Type 6A6. They are heater type Class B output tubes, consisting of two triode units in a single bulb.

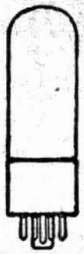
Types 6N7 and 6N7G are used primarily as Class B output tubes in a-c operated receivers, and will also find application in automobile receivers properly designed for their characteristics.

By connecting the triode elements in parallel, either type may be employed as a Class A tube, supplying sufficient power to drive another 6N7 or 6N7G in a Class B output stage. The driver plate load should be two to four times the plate resistance, the value depending upon the design of the Class B stage. The maximum d-c resistance in the grid circuit should not exceed 0.5 megohm, when the tube is self-biased. With fixed bias the value should be limited to 0.1 megohm.

For use in resistance coupled circuits see data in appendix.



6Q-0-0



Sylvania Type 6P5GT

MEDIUM-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−5	−13.5 Volts
Plate Current	2.5	5 Ma.
Plate Resistance	12000	9500 Ohms
Mutual Conductance	1150	1450 μmhos
Amplification Factor	13.8	13.8
Heater-Cathode Voltage	90	90 Volts Max.

BIASED DETECTOR

Heater Voltage	6.3	6.3 Volts
Plate Voltage	100	250 Volts Max.
Grid Voltage (Approximate)	−8	−20 Volts

Plate Current—Adjust to 0.2 ma. with no a-c input signal.

GRID LEAK DETECTOR

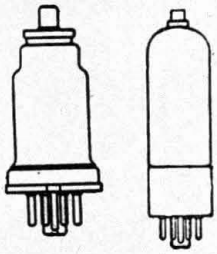
Heater Voltage	6.3 Volts
Plate Voltage	45 Volts
Grid Leak	1 to 5 Megohms
Grid Condenser	0.00025 μf.

APPLICATION

Sylvania Type 6P5G is a triode with electrical characteristics identical to those of Type 76, but having an octal base.



7V-1-8 (6Q7)
7V-0-8 (6Q7G)
7V-1-8 (6Q7GT)



Sylvania Type 6Q7GT

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

	6Q7	6Q7G	6Q7GT
Base	Small Wafer Octal 7 Pin	Small Octal 7 Pin	Small Wafer Metal Sleeve Octal 7 Pin
Bulb	Metal 8-4	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"	3 5/16"
Maximum Seated Height	2 9/16"	3 29/32"	2 3/4"
Mounting Position	Any	Any	Any

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage*	−1.0	−3 Volts
Plate Current*	0.8	1.0 Ma.
Plate Resistance	58000	58000 Ohms
Mutual Conductance	1200	1200 μmhos
Amplification Factor	70	70
Heater-Cathode Voltage	90	90 Volts Max.

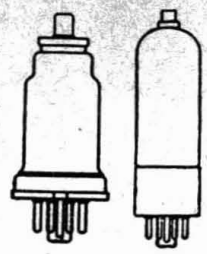
*These are rating values only and not operating points with coupling resistor.

APPLICATION

These Sylvania types are now used almost entirely for replacement purposes since single ended types 6SQ7GT and 7C6 give similar performance. For resistance coupled circuit data see the appendix.

6R7GT Sylvania Type

DUODIODE MEDIUM-MU TRIODE





7V-1-1 (6R7)
7V-0-8 (6R7GT)

PHYSICAL SPECIFICATIONS

	6R7	6R7GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-4	T9
Cap	Miniature	Miniature
Maximum Overall Length	3 1/8"	3 5/16"
Maximum Seated Height	2 9/16"	2 3/4"
Mounting Position	Any	Any

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.30 Ampere
Plate Voltage	250 Volts
Grid Voltage	−9 Volts
Plate Current	9.5 Ma.
Plate Resistance	8500 Ohms
Mutual Conductance	1900 μmhos
Amplification Factor	16
Undistorted Power Output	285 Mw.
Maximum Heater-Cathode Voltage	90 Volts

APPLICATION

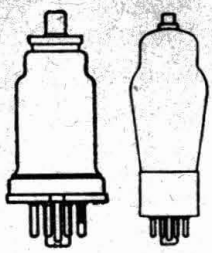
Sylvania 6R7 and 6R7GT are heater type tubes designed for a-c, d-c or storage battery operation. These tubes consist of two diodes and a triode in a single bulb and may be used as a combined diode detector, triode amplifier, and for securing the requisite voltage for automatic volume control.

The diodes in the 6R7 and 6R7GT are substantially the same as those used in Type 7B6 and can therefore be used in similar circuit applications. The diodes are well shielded from the triode section, insuring freedom from inter-action between the respective circuits.

For further details reference may be made to the Circuit Application notes on Type 7E6.



7R-1-1 (6S7)
7R-0-8 (6S7G)



Sylvania Type 6S7, G

REMOTE CUT-OFF RF PENTODES

PHYSICAL SPECIFICATIONS

	6S7	6S7G
Base	Small Wafer Octal 7 Pin	Small Octal 7 Pin
Bulb	Metal 8-4	ST12
Cap	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"
Maximum Seated Height	2 9/16"	3 29/32"
Mounting Position	Any	Any

TYPICAL OPERATION

AMPLIFIER (CLASS A)

Heater Voltage	6.3	6.3 Volts
Heater Current	0.150	0.150 Ampere
Plate Voltage	135	250 Volts Max.
Grid Voltage	−3	−3 Volts Min.
Screen Voltage	67.5	100 Volts Max.
Suppressor	Tie to Cathode	
Plate Current	3.7	8.5 Ma.
Screen Current	0.9	2.0 Ma.
Plate Resistance (Approximate)	1.0	1.0 Megohm
Mutual Conductance	1250	1750 μmhos
Grid Voltage for 10 μmhos	−25	−38.5 Volts
Heater-Cathode Voltage	90	90 Volts Max.

APPLICATION

Sylvania 6S7G is an r-f pentode in which the heater current rating is only 0.150 ampere. The tube has a remote plate current cut-off and is suitable for operation as an r-f or i-f amplifier or first detector in a-c, ac-dc, d-c and automobile radio receivers. The characteristics are quite similar to those for Type 6D6.

The uses for this tube parallel those for Type 6D6 and reference may be made to the Circuit Application notes for this type.

6S8GT Sylvania Type

TRIPLE DIODE-TRIODE





8CB-O-2

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/8"
Maximum Seated Height	3 1/16"
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	0.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

Triode grid to any diode plate	005 μμf. Max
Diode input (approx. each)	1 μμf.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−2.0 Volts
Plate Current	0.4	0.9 Ma.
Mutual Conductance	900	1100 μmhos
Plate Resistance	110,000	91,000 Ohms
Amplification Factor	100	100

APPLICATION

Sylvania Type 6S8GT is a triple diode high-mu triode in which one diode and cathode unit is separate from the duodiode triode unit. This arrangement permits use as a combined AM and FM detector and first audio amplifier. For this service the diodes connected to pins 3 and 1 should be used for FM and the diode connected to pin 4 should be used for AM.

Reference should be made to Type 7B6 for curves and resistance coupled data.



8AD-1-6
6SA7GT



8R-1-0
6SA7

Sylvania Type 6SA7GT

HEPTODE CONVERTER

LOCK-IN EQUIVALENT 7Q7

PHYSICAL SPECIFICATIONS

	6SA7	6SA7GT
Base	Small Wafer Octal 8 Pin	Intermediate Octal 8 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

Direct Interelectrode Capacitances:*

	6SA7*	6SA7GT**
Grid G to all other Electrodes (Signal Input)	9.5 μμf.	11.0 μμf.
Plate to all other Electrodes (Mixer Output)	12 μμf.	11.0 μμf.
Grid Go to all other Electrodes	7 μμf.	8.0 μμf.
Grid G to Plate	0.13 μμf. Max.	0.5 μμf.
Grid Go to Grid G	0.15 μμf. Max.	0.4 μμf.
Grid Go to Plate	0.06 μμf. Max.	0.2 μμf.
Grid Go to all other Electrodes except K	4.4 μμf.	5.0 μμf.
Grid Go to K	2.6 μμf.	3.0 μμf.
K to all other Electrodes except Grid Go	5 μμf.	14.0 μμf.

*With shell connected to cathode.
**With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

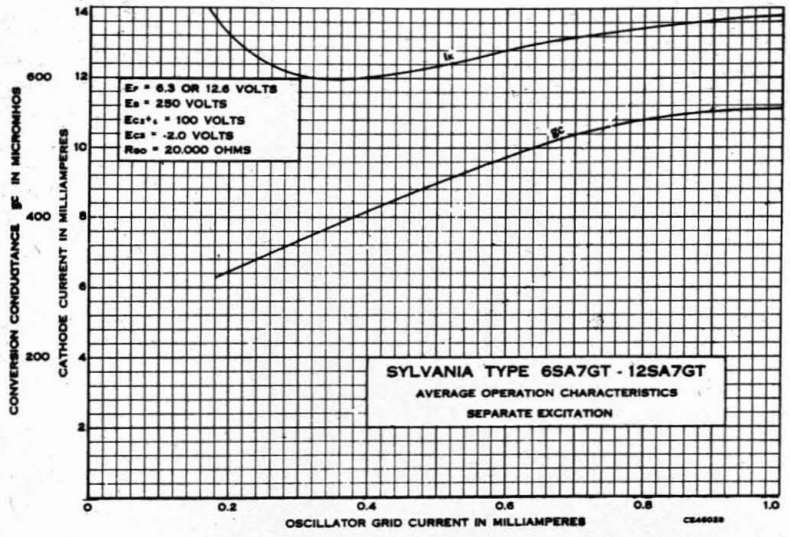
	Self-Excitation†		Separate Excitation		
Heater Voltage	6.3	6.3	6.3	6.3	Volts
Heater Current	300	300	300	300	Ma.
Plate Voltage	100	250	100	250	Volts
Control Grid Voltage (Grid G)	0	0	−2	−2	Volts
Screen Voltage (Grid Gs)	100	100	100	100	Volts
Grid No. 5 and Shell Voltage	0	0	0	0	Volt
Oscillator Grid Resistor (Grid Go)	20000	20000	20000	20000	Ohms
Plate Current	3.2	3.4	3.2	3.4	Ma.
Screen Grid Current	8	8	8	8	Ma.
Oscillator Grid Current	0.5	0.5	0.5	0.5	Ma.
Plate Resistance (Approx.)	0.5	0.8	0.5	0.8	Megohms
Conversion Conductance	425	450	425	450	μmhos
Control Grid Voltage (5 μmhos Conv. Cond.)	−35	−35	−35	−35	Volts
Max. Heater Cathode Voltage	90	90	90	90	Volts

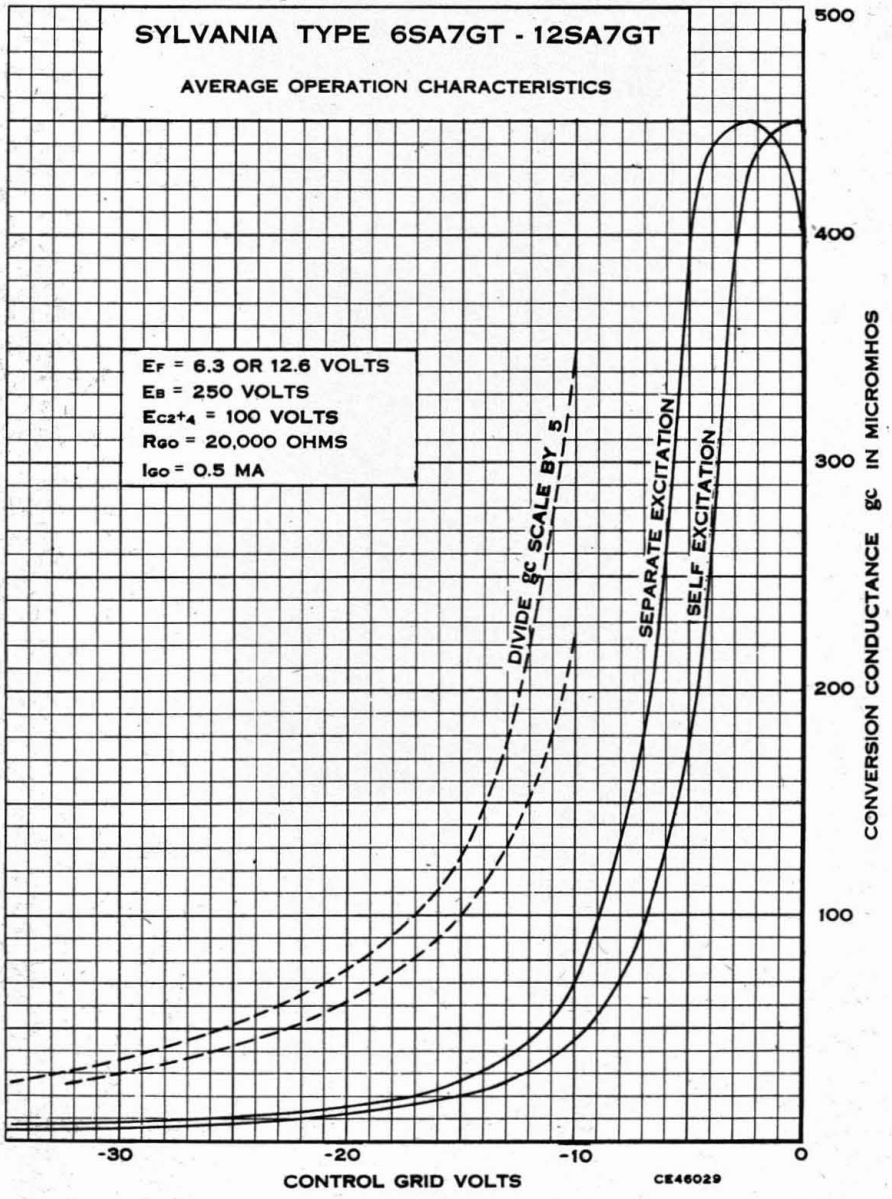
†Values shown are approximate and are for a Hartley circuit with a feedback of approximately 2 volts peak in the cathode circuit.

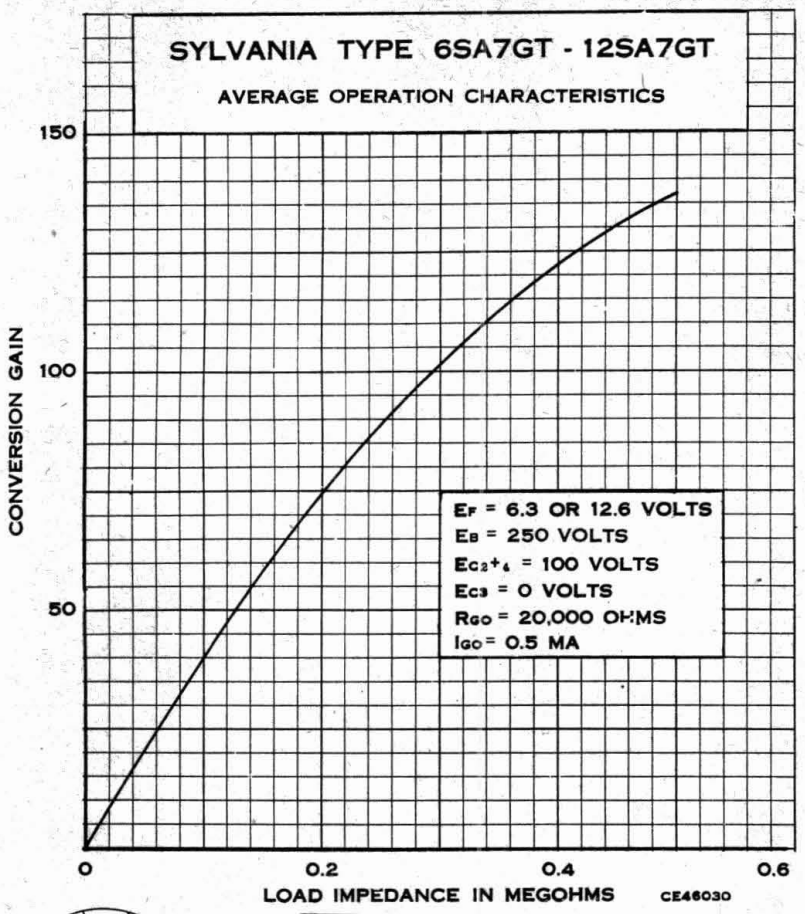
APPLICATION

Sylvania Types 6SA7, GT are single-ended pentagrid converters for service similar to other pentragrid converter types. The oscillator section is designed to operate in a Hartley circuit with the cathode connected to a tap on the oscillator coil. The mutual conductance between grid Go and grid Gs tied to the plate (not oscillating) is approximately 4500 umhos when grids Go, G and the shell are at zero volts, with grid Gs and plate at 100 volts. Characteristics for self-excitation in a Hartley circuit are shown above. Other application notes may be obtained by referring to Type 7Q7.

6SA7GT (Cont.)

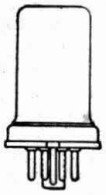

Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2+4 = 100 VOLTS
Ec3 = -2.0 VOLTS
Rgo = 20,000 OHMS
SYLVANIA TYPE 6SA7GT - 12SA7GT
AVERAGE OPERATION CHARACTERISTICS
SEPARATE EXCITATION
CONVERSION CONDUCTANCE gc IN MICROMHOS
CATHODE CURRENT IN MILLIAMPERES
OSCILLATOR GRID CURRENT IN MILLIAMPERES
CE46028


SYLVANIA TYPE 6SA7GT - 12SA7GT
AVERAGE OPERATION CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
Ec2+4 = 100 VOLTS
RGO = 20,000 OHMS
IGO = 0.5 MA
DIVIDE gc SCALE BY 5
SEPARATE EXCITATION
SELF EXCITATION
CONVERSION CONDUCTANCE gc IN MICROMHOS
CONTROL GRID VOLTS
CE46029





8S-1-0



Sylvania Type 6SC7

HIGH-MU DUO TRIODE

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

TYPICAL OPERATION

CLASS A AMPLIFIER (ONE TRIODE)

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts Max.
Grid Voltage	-2.0 Volts
Plate Current	2.0 Ma.
Plate Resistance	53000 Ohms
Mutual Conductance	1325 μmhos
Amplification Factor	70
Heater-Cathode Voltage	90 Volts Max.

TYPICAL OPERATION AS PHASE INVERTER

Plate Supply Voltage	90	300 Volts
Plate Current per Section	0.15	0.65 Ma.
Plate Load Resistor (per Plate)	0.25	0.25 Megohm
Self-Bias Resistor	3750	1675 Ohms
Grid Resistor for Following Tubes	0.5	0.5 Megohm
Voltage Amplification (At 5 volts RMS Output)	30	42
Peak Output Voltage (RMS)*	18	110 Volts

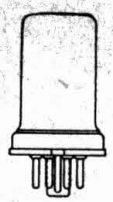
*At start of grid current.

APPLICATION

Sylvania Type 6SC7 is a double triode amplifier in the single-ended construction. It is so designed that it is specially adaptable for phase inverter service. For resistance coupling data reference should be made to Type 7F7.

6SB7Y Sylvania Type

HEPTODE CONVERTER





8R-1-0

PHYSICAL SPECIFICATIONS

Base	Micanol Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	1.5 Watts
Maximum Total Cathode Current	22 Ma.
Maximum Control Grid Voltage Range	−100 to +0 Volts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

Grid G to all other electrodes (signal input)*	9.6 μμf.
Plate to all other electrodes (Mixer output)*	9.2 μμf.
Grid Go to all other electrodes (oscillator input)*	7.3 μμf.
Grid G to plate*	0.13 μμf. Max.
Grid G to Grid Go*	0.16 μμf. Max.
Grid Go to plate*	0.06 μμf. Max.
Grid Go too all except cathode	3.8 μμf.
Grid Go to cathode	3.4 μμf.
Cathode to all ecxept Go	4.5 μμf.

*With shell connected to cathode.

TYPICAL OPERATION

	Separate Excitation*		Self Excitation for 88-108 Mc.	
Heater Voltage	6.3	6.3		6.3 Volts
Heater Current	300	300		300 Ma.
Plate Voltage	100	250		250 Volts
Screen Voltage	100	100		... Volts
Screen Supply Voltage	...	...		250 Volts
Screen Dropping Resistor	...	...		12,000 Ohms
Control Grid Voltage	−1.0	−1.0		0 Volts
Oscillator Grid Resistor	20,000	20,000		22,000 Ohms
Plate Resistance	0.5	1.0		... Megohm
Conversion Transconductance†	900	950		..... μmhos
Conversion Transconductance† at Eg=−20	3.5	3.5		..... μmhos
Signal Frequency	...	...	88	108 Mc.
Oscillation Frequency	...	...	98.7	118.7 Mc.
Plate Current	3.6	3.8	6.8	6.5 Ma.
Screen Current	10.2	10.0	12.6	12.5 Ma.
Oscillator Grid Current	0.35	0.35	0.13	0.14 Ma.

*Substantially the same characteristics may be obtained as a self excited oscillator by reducing the grid voltage to 0 volts.

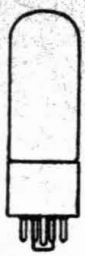
†The oscillator mutual conductance is approximately 8000 micromhos with Ego = 0, Egs = Ep = 100 volts, Eg = 0.

APPLICATION

Sylvania Type 6SB7Y is very similar to Type 6SA7GT except for increased oscillator strength and conversion conductance which provide improved performance at high frequencies.



8N-1-5



Sylvania Type 6SD7GT

SEMI-REMOTE CUT-OFF

RF AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin, Metal Sleeve
Bulb	T9
Maximum Overall Length	3 1/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.300 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	4 Watts
Maximum Screen Dissipation	0.4 Watt
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	0.0035 μμf. Max.
Input	9.0 μμf.
Output	7.5 μμf.

*Shell and internal shield connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

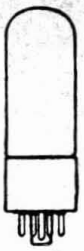
Heater Voltage	6.3	6.3 Volts
Heater Current	0.300	0.300 Ampere
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	−2	−2 Volts
Self-Bias Resistor	260	255 Ohms
Suppressor Voltage	0	0 Volt
Plate Resistance (Approximate)	0.25	1.0 Megohm
Mutual Conductance	3350	3600 μmhos
Control Grid Voltage for 20 μmhos	−11	−11 Volts
Plate Current	5.7	6.0 Ma.
Screen Current	2.0	1.9 Ma.

APPLICATION

Sylvania Type 6SD7GT is a semi-remote cut-off RF pentode having high mutual conductance making it useful when circuit conditions will not permit adequate gain with similar tubes having usual ratings. It is similar to Sylvania Lock-In type 7H7 in electrical characteristics.

6SE7GT Sylvania Type

SHARP CUT-OFF RF PENTODE





8N-1-5

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin Metal Sleeve
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.300 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Supply	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.4 Watt
Minimum External Control Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.005 μμf. Max.
Input	8.0 μμf.
Output	7.5 μμf.

*With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.300	0.300 Ampere
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1	−1.5 Volts
Plate Resistance (Approximate)	0.1	1.0 Megohm
Mutual Conductance	3000	3100 μmhos
Control Grid Voltage for Cut Off	−5	−5 Volts
Plate Current	5.5	4.5 Ma.
Screen Current	2.4	1.5 Ma.
Self-Bias Resistor	125	250 Ohms

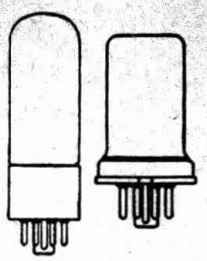
Suppressor Connected to Cathode.

APPLICATION

Sylvania Type 6SE7GT is a sharp cut-off pentode of single-ended construction. It has somewhat higher mutual conductance than type 6SJ7 permitting better gain under difficult circuit conditions. It is quite similar to Sylvania Lock-In type 7L7, which has lower interelectrode capacities.



6AB-1-0 (6SF5)
6AB-0-0 (6SF5GT)



Sylvania Type 6SF5GT

HIGH-MU TRIODE

LOCK-IN EQUIVALENT 7B4

PHYSICAL SPECIFICATIONS

	6SF5	6SF5GT
Base	Small Wafer Octal 6 Pin	Intermediate Octal 6 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

Direct Interelectrode Capacitances:*

	6SF5*	6SF5GT**
Grid to Plate	2.4	2.6 μμf.
Input	4.0	4.2 μμf.
Output	3.6	3.8 μμf.

*With shell connected to cathode.
**With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

TYPICAL OPERATION

CLASS A AMPLIFIER

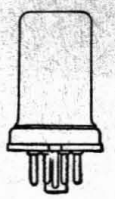
Heater Voltage	6.3 Volts
Heater Current	0.3 Amperes
Plate Voltage	250 Volts Max.
Grid Voltage	−2 Volts
Plate Current	0.9 Ma.
Plate Resistance	66000 Ohms
Mutual Conductance	1500 μmhos
Amplification Factor	100
Heater-Cathode Voltage	90 Volts Max.

APPLICATION

Sylvania Type 6SF5 is a metal single-ended high-mu triode. The characteristics are the same as those for the Sylvania Lock-In Type 7B4 except for capacitances. For additional application notes and curve data refer to Type 7B4.

6SF7 Sylvania Type

DIODE RF PENTODE





7AZ-1-1

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Plate Dissipation	3.5 Watts
Maximum Screen Dissipation	0.5 Watt
Minimum Control Grid Bias	0 Volt
Minimum Diode Current at 10 Volts DC	0.8 Ma.
Maximum Continuous Diode Current	1.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.004 μμf. Max.
Input	5.5 μμf.
Output	6.0 μμf.
Pentode Grid to Diode Plate	0.002 μμf. Max.
Pentode Plate to Diode Plate	1.3 μμf.

*With shell connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

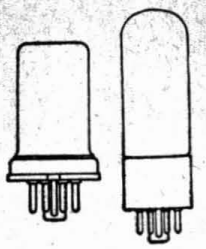
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1	−1 Volts
Self-Bias Resistor	65	65 Ohms
Plate Resistance (Approximate)	0.2	0.7 Megohm
Mutual Conductance	1975	2050 μmhos
Control Grid Voltage for 10 μmhos	−35	−35 Volts
Plate Current	12.0	12.4 Ma.
Screen Current	3.4	3.3 Ma.

APPLICATION

Sylvania Type 6SF7 is a single diode remote cut-off RF pentode. It is similar to Sylvania Lock-In Type 7E7 except that it has only one diode. Refer to data on Type 7B6 for diode characteristics.



8BK-1-1



Sylvania Type 6SG7GT

SEMI-REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

	6SG7 Small Wafer	6SG7GT Small Wafer Octal
Base	Octal 8 Pin	8 Pin Metal Sleeve
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Supply	300 Volts
Maximum Screen Voltage	200 Volts
Maximum Plate Dissipation	3 Watts
Maximum Screen Dissipation	0.6 Watt
Minimum External Control Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

	6SG7*	6SG7GT**
Grid to Plate	0.003	.0035 μμf. Max.
Input	8.5	8.5 μμf.
Output	7.0	7.0 μμf.

*Shell connected to cathode.

**With 1 1/16" diameter tube shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	250	250 Volts
Screen Voltage	100	125	150 Volts
Control Grid Voltage	−1	−1	−2.5 Volts
Self-Bias Resistor	90	60	190 Ohms
Plate Resistance (Approximate)	0.25	0.9	>1.0 Megohm
Mutual Conductance	4100	4700	4000 μmhos
Plate Current	8.2	11.8	9.2 Ma.
Screen Current	3.2	4.4	3.4 Ma.
Control Grid Voltage for 40 μmhos	−11.5	-14.0	−17.5 Volts

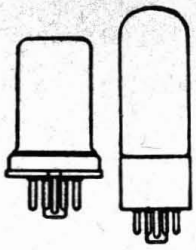
APPLICATION

Sylvania Types 6SG7 - 6SG7GT are high mutual conductance pentodes having semi-remote cut-off characteristics. The electrical characteristics are designed to give better gains at the higher frequencies and in wide band amplifiers. The double cathode leads allow better isolation between input and output circuits reducing losses due to cathode degeneration.

6SH7GT Sylvania Type

SHARP CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 7T7





8BK-1-1

PHYSICAL SPECIFICATIONS

	6SH7	6SH7GT
Base	Small Wafer Octal 8 Pin	Small Wafer Octal 8 Pin Metal Sleeve
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.300 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Supply	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Plate Dissipation	3.0 Watts
Maximum Screen Dissipation	0.7 Watt
Minimum External Control Grid Bias	0 Volt
Maximum Heater Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

	6SH7*	6SH7GT**
Grid to Plate	0.003	0.004 μμf. Max.
Input	8.5	8.5 μμf.
Output	7.0	7.0 μμf.

*With shell connected to cathode.

**With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

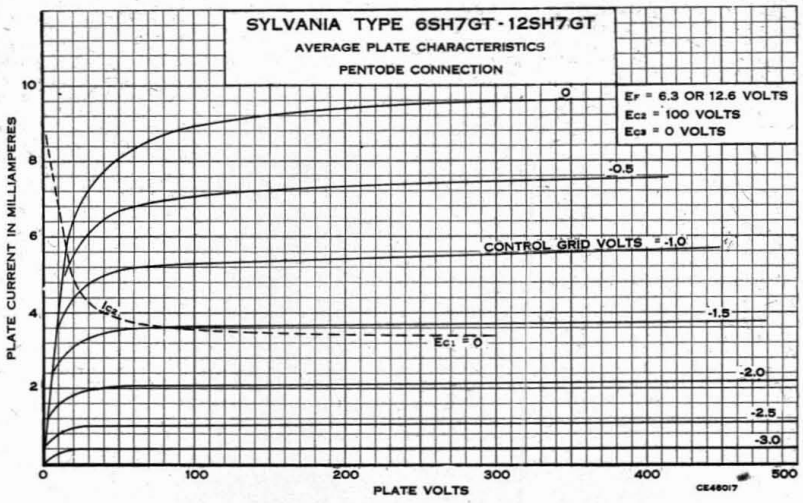
TYPICAL OPERATION

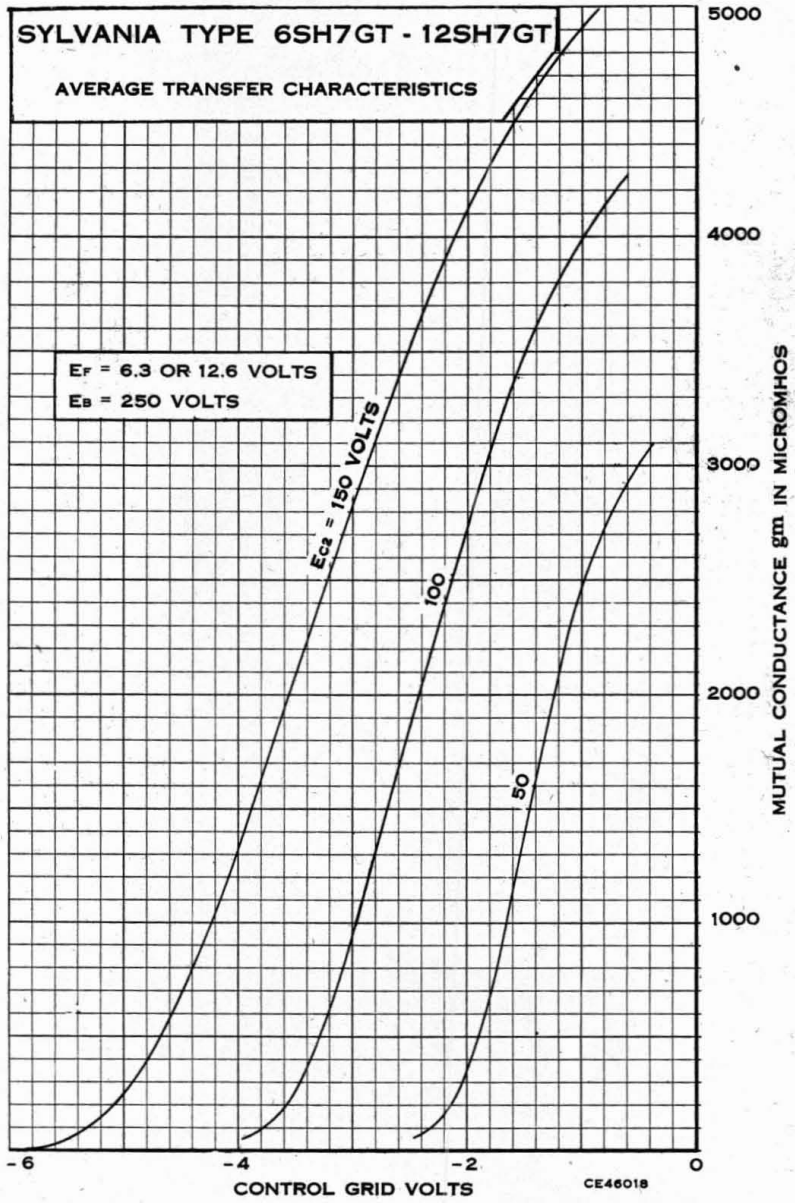
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.300	0.300 Ampere
Plate Voltage	100	250 Volts
Screen Voltage	100	150 Volts
Control Grid Voltage	−1	−1 Volts
Self-Bias Resistor	135	65 Ohms
Plate Resistance (Approximate)	0.35	0.9 Megohm
Mutual Conductance	4000	4900 μmhos
Grid Bias for 10 μa. Plate Current	-4.0	-5.5 Volts
Plate Current	5.3	10.8 Ma.
Screen Current	2.1	4.1 Ma.

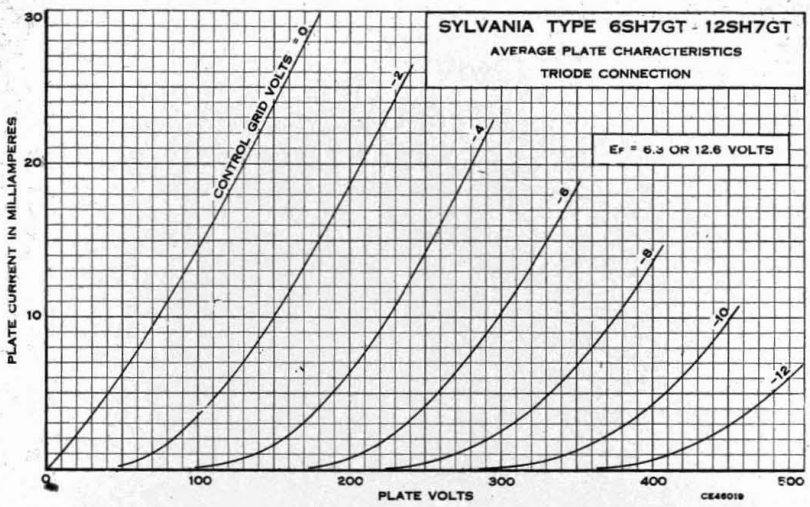
APPLICATION

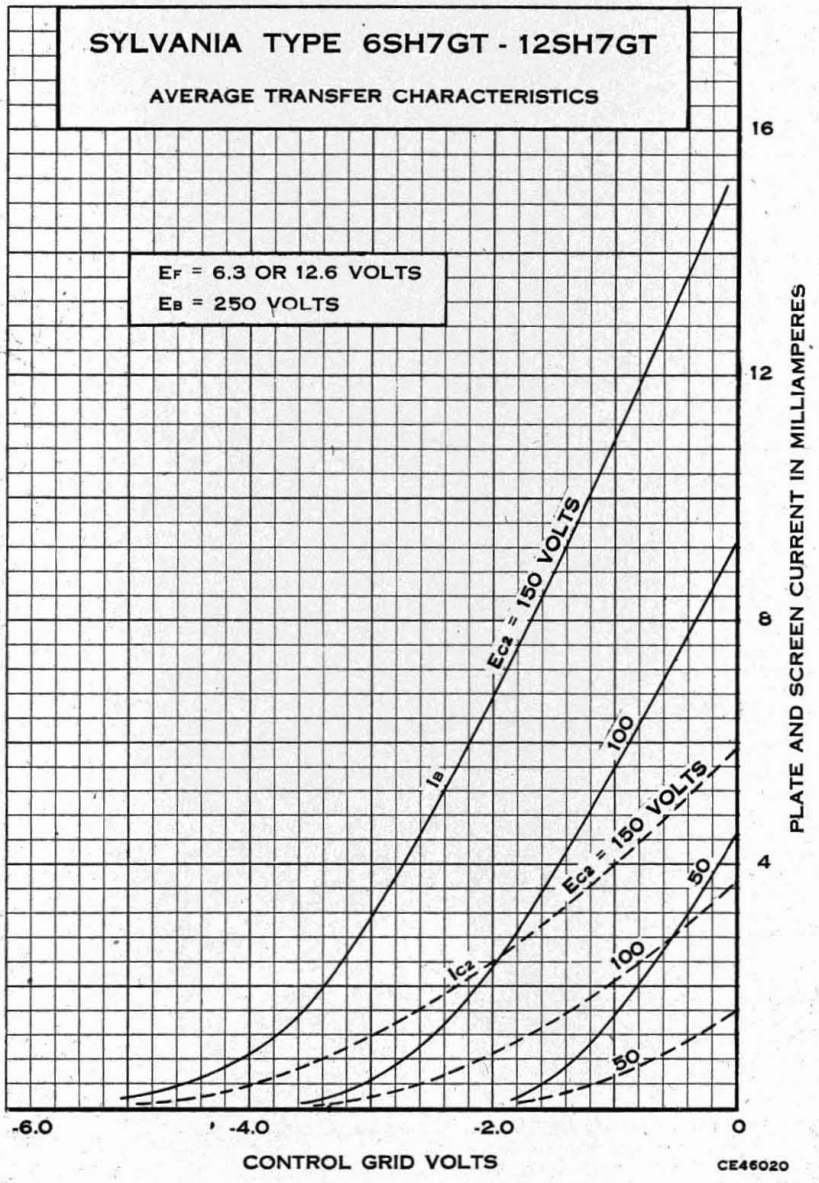
Sylvania Types 6SH7 - 6SH7GT and 6SH7A are high mutual conductance, sharp cut-off pentodes suitable for wide-band and high-frequency operation. Two cathode leads are brought out so that cathode degeneration can be effectively reduced. The 6SH7A features an especially rugged type of construction allowing its use under extremely difficult mechanical conditions. These types are similar, except for cut-off characteristics, to Sylvania Lock-In Type 7H7.


SYLVANIA TYPE 6SH7GT-12SH7GT
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Ef = 6.3 OR 12.6 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS = -1.0
-0.5
-1.5
-2.0
-2.5
-3.0
Ec1 = 0
Ic2
CE46017


SYLVANIA TYPE 6SH7GT - 12SH7GT
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 150 VOLTS
100
50
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
CE46018

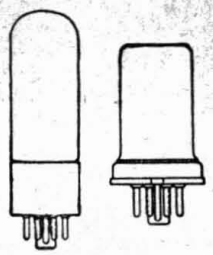
6SH7GT (Cont.)


SYLVANIA TYPE 6SH7GT - 12SH7GT
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
CONTROL GRID VOLTS = 0
-2
-4
-6
-8
-10
-12
PLATE CURRENT IN MILLIAMPERES
30
20
10
0
100
200
300
400
500
PLATE VOLTS
CE46019


SYLVANIA TYPE 6SH7GT - 12SH7GT
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
Eca = 150 VOLTS
Ib
100
Eca = 150 VOLTS
50
Ic2
100
50
16
12
8
4
PLATE AND SCREEN CURRENT IN MILLIAMPERES
-6.0
-4.0
-2.0
0
CONTROL GRID VOLTS
CE46020



8N-1-1 (6SJ7)
8N-1-5 (6SJ7GT)



Sylvania Type 6SJ7GT

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

	6SJ7	6SJ7GT
Base	Small Wafer Octal 8 Pin	Small Wafer Metal Sleeve Octal 8 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	2⅝"	3 5/16"
Maximum Seated Height	2 1/16"	2¾"
Mounting Position	Any	Any

Direct Interelectrode Capacitances:*

	6SJ7*	6SJ7GT**
Grid to Plate	0.005	0.005 μμf. Max.
Input	6.0	6.3 μμf.
Output	7.0	7.5 μμf.

*Shell connected to cathode.
**With 1 5/16" diameter shield (RMA std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

PENTODE CONNECTION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	100	250 Volts Max.
Grid Voltage	−3	−3 Volts
Screen Voltage	100	100 Volts Max.
Suppressor	Tie to Cathode	
Plate Current	2.9	3.0 Ma.
Screen Current	0.9	0.8 Ma.
Plate Resistance (Approximate)	0.7	1.5 Megohms
Mutual Conductance	1575	1650 μmhos
Amplification Factor	1100	2500 (Approx.)
Heater-Cathode Voltage	90	90 Volts Max.

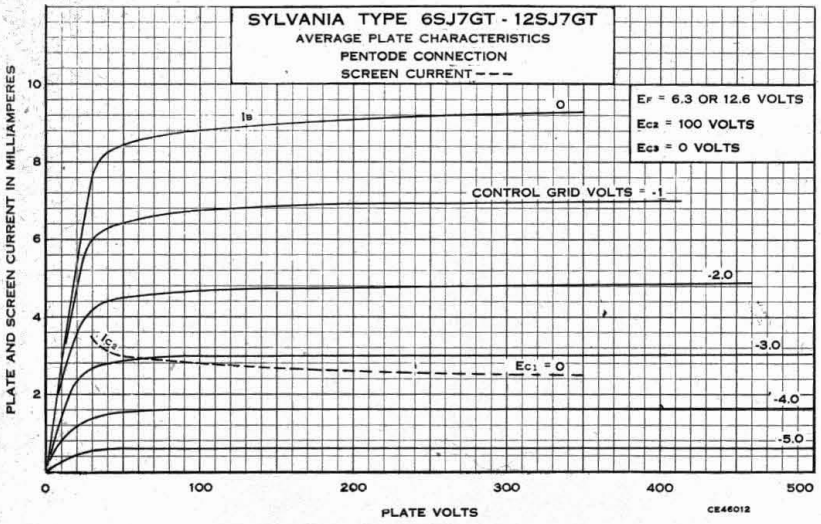
TRIODE CONNECTION

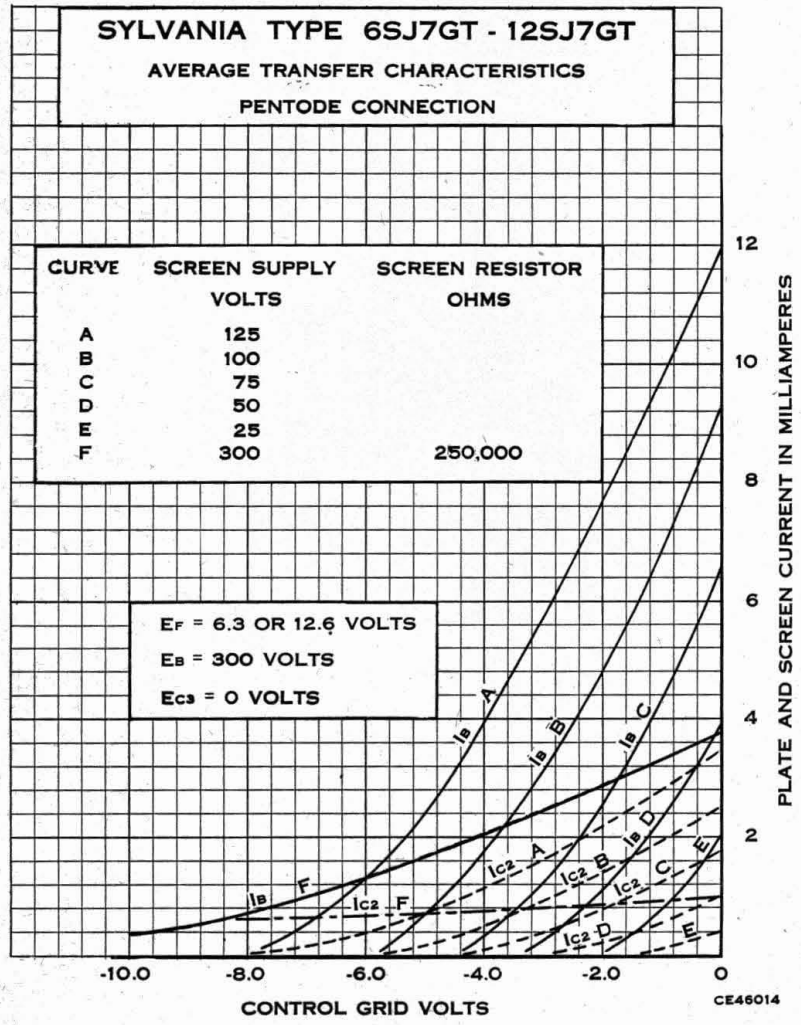
Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	180	250 Volts Max.
Grid Voltage	−6.0	−8.5 Volts
Amplification Factor	19	19
Plate Resistance	8250	7600 Ohms
Mutual Conductance	2300	2500 μmhos
Plate Current	6.0	9.2 Ma.

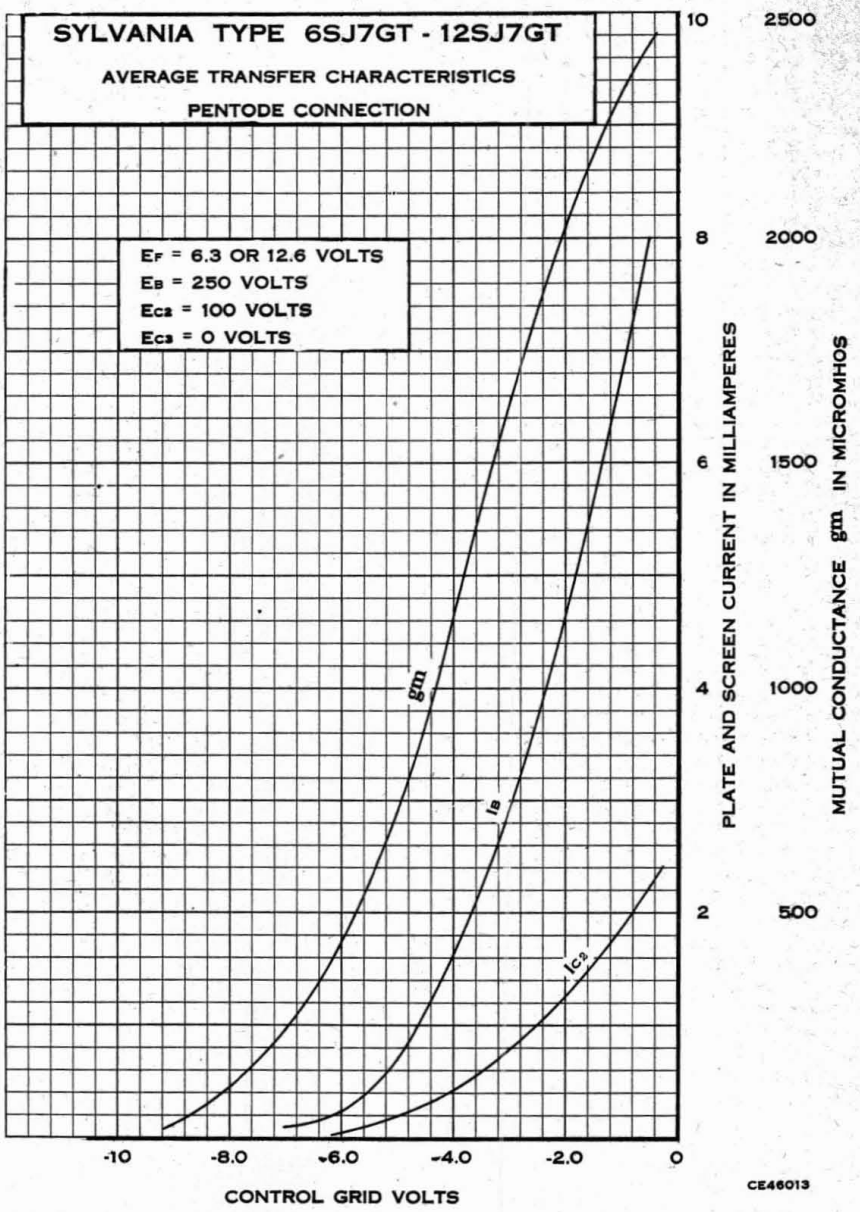
APPLICATION

Sylvania Types 6SJ7, GT are single-ended r-f pentode tubes having a sharp cut-off characteristic and designed for applications similar to those for Sylvania Type 6J7. Characteristics for this tube are also very similar to Type 7C7, but are not identical. For additional information on circuit application refer to Type 7C7. Resistance coupled circuit data may be found in the appendix.

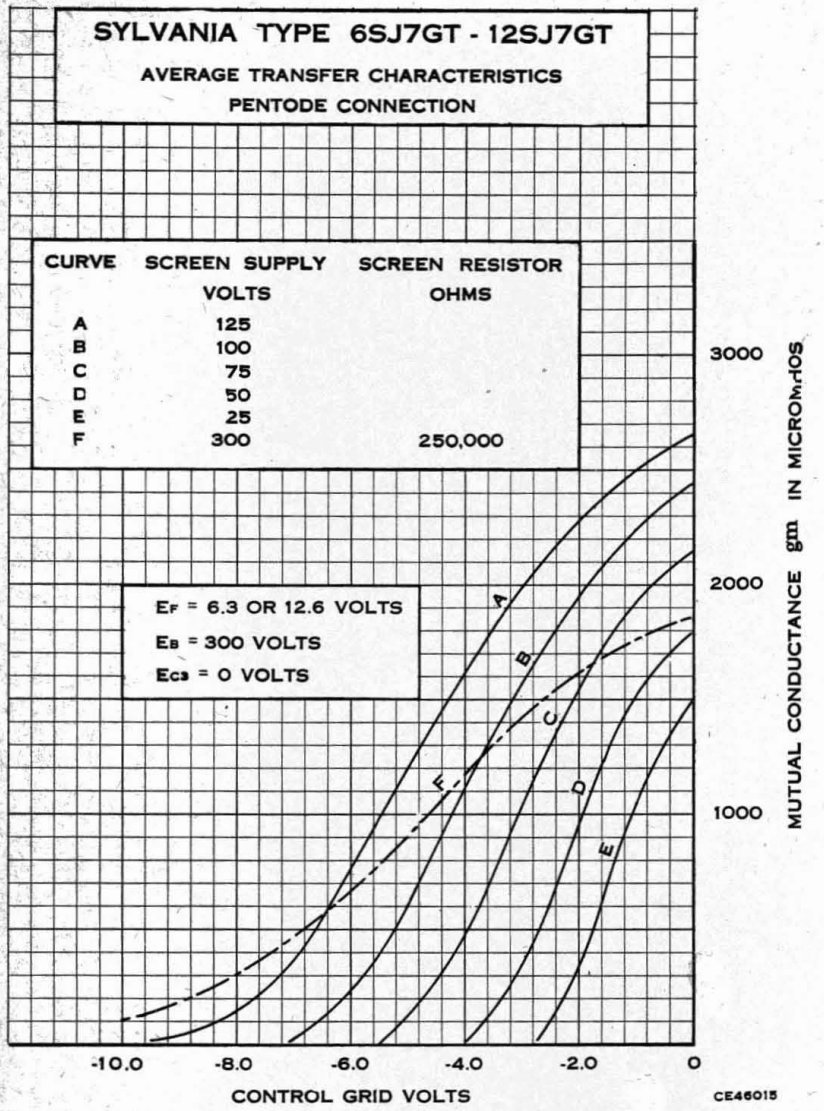
6SJ7GT (Cont.)

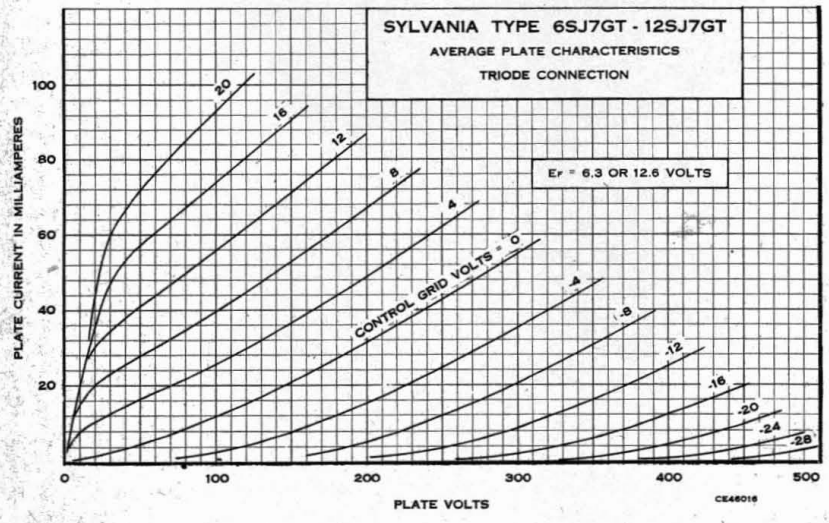

SYLVANIA TYPE 6SJ7GT - 12SJ7GT
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
SCREEN CURRENT - - -
EF = 6.3 OR 12.6 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS = -1
-2.0
-3.0
-4.0
-5.0
Ec1 = 0
CE46012


SYLVANIA TYPE 6SJ7GT - 12SJ7GT
AVERAGE TRANSFER CHARACTERISTICS
PENTODE CONNECTION
CURVE | SCREEN SUPPLY VOLTS | SCREEN RESISTOR OHMS
A 125
B 100
C 75
D 50
E 25
F 300 250,000
EF = 6.3 OR 12.6 VOLTS
EB = 300 VOLTS
Ec3 = 0 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
CE46014


SYLVANIA TYPE 6SJ7GT - 12SJ7GT
AVERAGE TRANSFER CHARACTERISTICS
PENTODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
gm
Ib
Ic2
10
8
6
4
2
2500
2000
1500
1000
500
PLATE AND SCREEN CURRENT IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
-10
-8.0
-6.0
-4.0
-2.0
0
CONTROL GRID VOLTS
CE46013

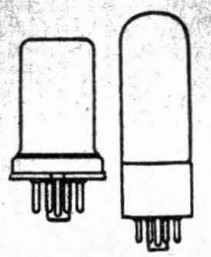
6SJ7GT (Cont.)


SYLVANIA TYPE 6SJ7GT - 12SJ7GT
AVERAGE TRANSFER CHARACTERISTICS
PENTODE CONNECTION
CURVE | SCREEN SUPPLY VOLTS | SCREEN RESISTOR OHMS
A | 125
B | 100
C | 75
D | 50
E | 25
F | 300 | 250,000
EF = 6.3 OR 12.6 VOLTS
EB = 300 VOLTS
EC3 = 0 VOLTS
A
B
C
D
E
F
3000
2000
1000
MUTUAL CONDUCTANCE gm IN MICROMHOS
-10.0
-8.0
-6.0
-4.0
-2.0
0
CONTROL GRID VOLTS
CE46015


SYLVANIA TYPE 6SJ7GT - 12SJ7GT
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
EF = 6.3 OR 12.6 VOLTS
20
16
12
8
4
CONTROL GRID VOLTS = 0
-4
-8
-12
-16
-20
-24
-28
100
80
60
40
20
PLATE CURRENT IN MILLIAMPERES
0
100
200
300
400
500
PLATE VOLTS
CE46016



8N-1-1 (6SK7)
8N-1-5 (6SK7GT)



Sylvania Type 6SK7GT

REMOTE CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 7A7

PHYSICAL SPECIFICATIONS

	6SK7	6SK7GT
Base	Small Wafer Octal 8 Pin	Small Wafer Metal Sleeve Octal 8 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

Direct Interelectrode Capacitances:*

	6SK7*	6SK7GT**
Grid to Plate	0.005 μμf. Max.	0.005 μμf. Max.
Input	6.0 μμf.	6.5 μμf.
Output	7.0 μμf.	7.5 μμf.

*With shell connected to cathode.
**With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

TYPICAL OPERATION

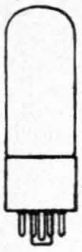
Heater Voltage	6.3	6.3 Volts
Heater Current	0.30	0.30 Ampere
Plate Voltage	100	250 Volts Max.
Grid Voltage	-1.0	-3 Volts Min.
Screen Voltage	100	100 Volts Max.
Suppressor	Tie to Cathode	
Plate Current	13.0	9.2 Ma.
Screen Current	4.0	2.6 Ma.
Plate Resistance (Approximate)	0.12	0.8 Megohm
Mutual Conductance	2350	2000 μmhos
Amplification Factor	475	1600 Approx.
Grid Voltage (10 μmhos Mutual Cond.)	-35	-35 Volts
Heater-Cathode Voltage	90	90 Volts Max.

APPLICATION

Sylvania Types 6SK7, GT are triple grid single-ended r-f pentodes with remote cut-off characteristics. Electrical characteristics are equivalent to Sylvania Lock-In Type 7A7. Additional application information for this tube may be obtained by referring to Type 7A7.



8BD-0-0



Sylvania Type 6SL7GT

HIGH-MU DUO TRIODE

LOCK-IN EQUIVALENT 7F7

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION*

Heater Voltage	6.3 Volts
Heater Current	0.300 Ampere
Plate Voltage	250 Volts
Grid Voltage	-2.0 Volts
Self-Bias Resistor	870 Ohms
Plate Current	2.3 Ma.
Plate Resistance	44000 Ohms
Mutual Conductance	1600 μmhos
Amplification Factor	70
Maximum Heater-Cathode Voltage	90 Volts

*Values are for one section except for heater.

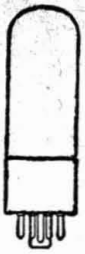
APPLICATION

Sylvania Type 6SL7GT is a high-mu double triode. It is identical, electrically, to Sylvania Lock-In Type 7F7.

6SN7GT Sylvania Type

MEDIUM-MU DUO TRIODE

LOCK-IN EQUIVALENT 7N7





8BD-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.60 Ampere

Direct Interelectrode Capacitances:*

	Triode 1§	Triode 2§
Grid to Plate	3.8	4.0 μμf.
Input	2.8	3.0 μμf.
Output	0.8	1.2 μμf.

*Without shield.

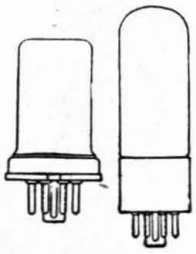
§Triode No. 1 connects to pins 4, 5 and 6. Triode No. 2 is connected to pins 1, 2 and 3.

For additional data on this type refer to corresponding Lock-In type 7N7 which is identical electrically.

6SQ7GT Sylvania Type

DUODIODE HIGH-MU TRIODE

LOCK-IN EQUIVALENT 7B6





8Q-1-1 (6SQ7)
8Q-1-3 (6SQ7GT)

PHYSICAL SPECIFICATIONS

	6SQ7	6SQ7GT
Base	Small Wafer Octal 8 Pin	Small Wafer Metal Sleeve Octal 8 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

Direct Interelectrode Capacitances:*

Grid to Plate	1.6	1.8 μμf.
Input	3.2	4.2 μμf.
Output	3.0	3.4 μμf.

*With shell connected to cathode for type 6SQ7G. Without shield for type 6SQ7GT.

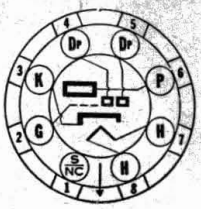
TYPICAL OPERATION

CLASS A AMPLIFIER (TRIODE UNIT)

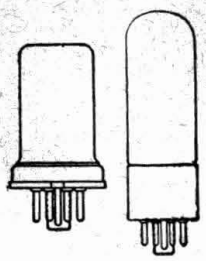
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Plate Current	0.5	1.1 Ma.
Plate Resistance	110,000	85,000 Ohms
Mutual Conductance	925	1175 μmhos
Amplification Factor	100	100
Maximum Heater-Cathode Voltage	90	90 Volts

APPLICATION

Sylvania Type 6SQ7 is a duodiode high-mu triode designed for the same type of service as the Sylvania Type 6Q7. This tube is of the single-ended construction with all elements brought out to a standard 8-pin base. Except for capacitances the electrical characteristics and circuit applications are the same as those for Sylvania Type 7B6 and reference can be made to that type for any necessary information.



8Q-1-1 (6SR7)
8Q-1-3 (6SR7GT



Sylvania Type 6SR7GT

DUODIODE MEDIUM-MU TRIODE

LOCK-IN EQUIVALENT 7E6

PHYSICAL SPECIFICATIONS

	6SR7	6SR7GT
Base	Small Wafer Octal 8 Pin	Small Wafer 8 Pin Metal Shell
Bulb	Metal 8-1	T9
Maximum Overall Length	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
Mounting Position	Any	Any

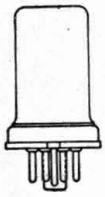
RATINGS AND OPERATION

Heater Voltages AC or DC	6.3 Volts
Heater Current	0.300 Ampere

For other ratings, operation and application data, refer to Sylvania Lock-In Type 7E6. Electrical characteristics, except for lower capacities in the 7E6, are identical.



8N-1-0



Sylvania Type 6SS7

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Minimum Grid Voltage	0 Volt
Maximum Plate Dissipation	2.25 Watts
Maximum Screen Dissipation	0.35 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

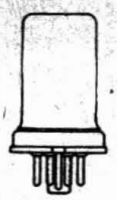
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1.0	−3.0 Volts
Suppressor	Connected to Cathode	
Plate Resistance (Approximate)	0.12	1.0 Megohm
Mutual Conductance	1930	1850 μmhos
Grid Voltage for 10 μmhos	−35	−35 μmhos
Plate Current	12.2	9.0 Ma.
Screen Current	3.1	2.0 Ma.

APPLICATION

Sylvania Type 6SS7 is a remote cut-off pentode of metal construction having a 150 Ma. heater. It is similar to Sylvania Lock-In Type 7B7. The 150 Ma. heater rating allows it to be used in series string heater arrangements with other tubes in the same group, or elsewhere where power economy is important.

6ST7 Sylvania Type

DUODIODE TRIODE





8Q-1-0

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.15 Ampere
Maximum Plate Voltage	250 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

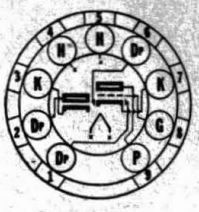
TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.15 Ampere
Plate Voltage	250 Volts
Grid Voltage	-9.0 Volts
Self-Bias Resistor	950 Ohms
Amplification Factor	16
Plate Resistance	8500 Ohms
Mutual Conductance	1900 μmhos
Plate Current	9.5 Ma.

APPLICATION

Sylvania Type 6ST7 is a single-ended metal double diode-triode. Except for heater rating, it is identical to Lock-In Type 7E6. Reference should be made to Type 7E6 for further data. For diode information, refer to Lock-In Type 7B6.



9E-0-3 & 7



Sylvania Type 6T8

TRIPLE DIODE TRIODE

PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T-6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 15/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	450 Ma.
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts
Maximum Diode Current per Plate	5.0 Ma.

Direct Interelectrode Capacitances:*

Grid to each diode plate	0.035 μμf. Max.
Diode input (pins 1 or 6)	3.8 μμf.
Diode input (pin 2)	4.5 μμf.

*With no external shield.

TYPICAL OPERATION

Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−3.0 Volts
Plate Current	0.8	1.0 Ma.
Amplification Factor	70	70
Mutual Conductance	1300	1200 μmhos
Plate Resistance	54,000	58,000 Ohms

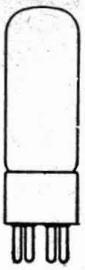
APPLICATION

Sylvania Type 6T8 is a triple diode triode designed for use in FM-AM sets. When used as a ratio detector it is recommended that pins 1 and 2 be used as the diodes.

For curve data reference should be made to Type 6AQ6, and resistance coupled data may be found in the appendix under Type 6Q7GT.

6U5 Sylvania Type

ELECTRON RAY INDICATOR TUBE





6R-0-0

PHYSICAL SPECIFICATIONS

Base	Small 6 Pin
Bulb	T9
Maximum Overall Length	$4\frac{3}{16}$"
Maximum Seated Height	$3\frac{9}{16}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Supply Voltage	285 Volts
Maximum Target Voltage	285 Volts
Minimum Recommended Target Voltage	125 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Supply Voltage	100	200	250 Volts
Target Supply Voltage	100	200	250 Volts
Plate Current (Triode Unit)*	0.19	0.19	0.24 Ma. Max.
Target Current (Approximate)*	1.0	3.0	4.0 Ma.
Grid Voltage (Triode Unit)† (Approx.)	0.0	0.0	0.0 Volt
Grid Voltage (Triode Unit)†† (Approx.)	−8.0	−18.5	−22.0 Volts
Triode Plate Resistor	0.5	1.0	1.0 Megohm

*With triode grid voltage of zero volts.
†For shadow angle of 90 degrees.
††For shadow angle of zero degrees.

APPLICATION

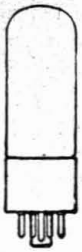
Sylvania Type 6U5 is a high-vacuum tuning indicator tube having characteristics identical with those for the original Types 6U5 and 6G5, except for bulb size. The 6U5 was enclosed in a T-9 bulb and the 6G5 in an ST-12 bulb. The 6U5 is enclosed in a T-9 bulb and may be used as a direct replacement for either of the original types without making any changes.

The target current is limited by a grid in the target section, the grid being connected to the cathode within the tube. In actual circuit use the varying negative voltage for controlling the shadow may be obtained from some point in the a-v-c circuit, thus giving an indication of resonance when the unlighted portion of the target is at a minimum.

The discontinued Type 6T5 had characteristics identical with the 6U5, but the visual indication was annular instead of fan-shaped. The 6U5 should be used as the replacement tube for Type 6T5, Type 6H5 and Type 6G5.



7AC-0-0



Sylvania Type 6U6GT

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	0.75	0.75 Ampere
Plate Voltage	110	200 Volts
Screen Voltage	110	135 Volts
Grid Voltage	−10.0	−14.0 Volts
Plate Current	44.0	55.0 Ma.
Screen Current	4.0	3.0 Ma.
Mutual Conductance	5600	6200 μmhos
Load Resistance	2000	3000 Ohms
Power Output	2.0	5.5 Watts
Maximum Heater-Cathode Voltage	90	90 Volts

APPLICATION

Sylvania Type 6U6GT is a beam power output tube somewhat similar to type 25L6GT. It is designed to give large power outputs at low plate supply voltages.



7R-0-8



Sylvania Type 6U7G

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	ST-12 Long
Cap	Miniature
Maximum Overall Length	4 7/8"
Maximum Seated Height	4 5/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Grid Bias Voltage (Minimum External)	0 Volt
Maximum Plate Dissipation	2.25 Watts
Maximum Screen Dissipation	25 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	0.30	0.30 Ampere
Plate Voltage	100	250 Volts
Grid Voltage	−3	−3 Volts
Screen Voltage	100	100 Volts
Suppressor	Tie to Cathode	
Plate Current	8.0	8.2 Ma.
Screen Current	2.2	2.0 Ma.
Plate Resistance (Approximate)	0.25	0.8 Megohm
Mutual Conductance	1500	1600 μmhos
Grid Bias for Mutual Conductance=2 μmhos	−50	−50 Volts

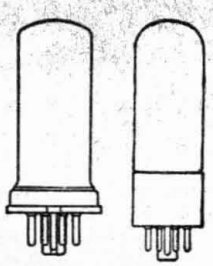
APPLICATION

Sylvania Type 6U7G is a remote cut-off pentode designed for RF and IF service. It is now used chiefly in replacement service.

6V6GT Sylvania Type

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 7C5





7AC-1-0 (6V6)
7AC-0-0 (6V6GT)

PHYSICAL SPECIFICATIONS

	6V6	6V6GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-6	T9
Maximum Overall Length	3 1/4"	3 5/16"
Maximum Seated Height	2 11/16"	2 3/4"
Mounting Position	Any	Any

RATINGS

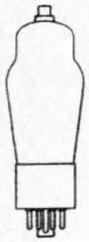
	One Tube
Heater Voltage AC or DC	6.3 Volts
Heater Current	0.45 Ampere
Maximum Plate Voltage	315 Volts
Maximum Screen Voltage	285 Volts
Maximum Plate Dissipation	12 Watts
Maximum Screen Dissipation	2 Watts
Maximum Heater-Cathode Voltage	90 Volts

APPLICATION

For further data, curves, etc., reference should be made to corresponding Lock-In type 7C5 which is identical in electrical characteristics.

6V7G Sylvania Type

DUODIODE TRIODE





7V-0-8

PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	ST12
Cap	Miniature
Maximum Overall Length	4 15/32"
Maximum Seated Height	3 29/32"
Mounting Position	Any

TYPICAL OPERATION

CLASS A AMPLIFIER (TRIODE UNIT)

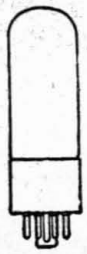
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.3	0.3	0.3 Ampere
Plate Voltage	135	180	250 Volts
Grid Voltage	-10.5	-13.5	-20.5 Volts
Plate Current	3.7	6.0	8.0 Ma.
Plate Resistance	11000	8500	7500 Ohms
Mutual Conductance	750	975	1100 μmhos
Amplification Factor	8.3	8.3	8.3
Load Resistance	25000	20000	20000 Ohms
Power Output	75	160	350 Mw.
Maximum Heater-Cathode Voltage	90	90	90 Volts

APPLICATION

Sylvania Type 6V7G is a low-mu duodiode triode. The diode section of this tube is quite similar to that of the 7B6 and the data given under this type may be used. The triode section is identical to that of type 85.



4CG-0-0



Sylvania Type 6W4GT

HALF-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	6 Pin Octal
Bulb	T-9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	1.2 Amperes
Tube Drop at 250 Ma. DC	21 Volts
Maximum Peak Inverse Plate Voltage	
For Television Damper Service*	2000 Volts
For Conventional Rectifier Service	1250 Volts
Maximum Peak Plate Current	600 Ma.
Hot Switching Plate Current for Duration of 0.2 Second Max.	3.5 Amperes
Maximum DC Plate Current	125 Ma.
Maximum Peak Heater-Cathode Voltage	
Heater Negative with respect to Cathode	450 Volts
Heater Positive with respect to Cathode	100 Volts

*This rating is applicable where the duty cycle of the voltage pulse does not exceed 15% of one television scanning cycle and its duration is limited to 10 micro-seconds.

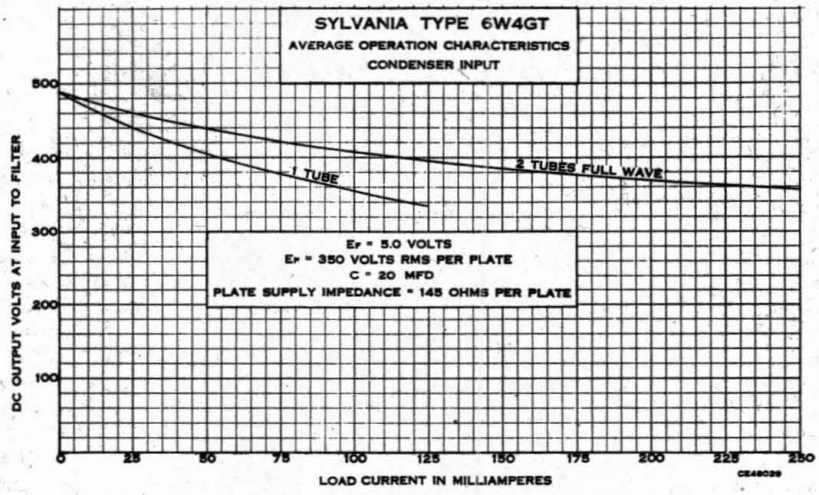
TYPICAL OPERATION

	Half-Wave	Full-Wave 2 Tubes
Heater Voltage	6.3	6.3 Volts
Heater Current	1.2	2.4 Amperes
RMS Plate Voltage Per Plate	350	350 Volts
Filter Input Capacitance	20	20 μf.
Total Minimum Effective Plate Supply Impedance	145	145 Ohms
DC Output Current	125	250 Ma.
Voltage Regulation (Half Load to Full Load) approx.	55	40 Volts

APPLICATION

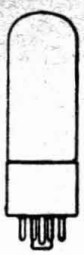
Sylvania Type 6W4GT is a high-vacuum half-wave rectifier, with low voltage drop. It is designed specially for use as a damper diode in television circuits.

When used for rectifier service the output voltage at any load within the tube rating may be obtained from the curve given below.



6W6GT Sylvania Type

BEAM POWER AMPLIFIER





7AC-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
Mounting Position	Any

TYPICAL OPERATION

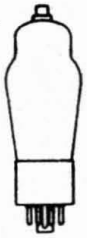
Heater Voltage	6.3 Volts
Heater Current	1.25 Ampere
Plate Voltage	135 Volts
Screen Voltage	135 Volts
Grid Voltage	-9.0 Volts
Self-Bias Resistor	150 Ohms
Plate Current	58.0 Ma.
Screen Current	2.8 Ma.
Mutual Conductance	9000 μmhos
Load Resistance	2000 Ohms
Power Output	3.3 Watts
Maximum Heater-Cathode Voltage	90 Volts

APPLICATION

Sylvania Type 6W6GT is a beam power amplifier capable of delivering large power output at relatively low plate supply voltages.

6W7G Sylvania Type

SHARP CUT-OFF R.F. PENTODE
LOCK-IN EQUIVALENT 7C7





7R-0-8

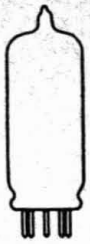
PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	ST12
Cap	Miniature
Maximum Overall Length	$4\frac{15}{32}$"
Maximum Seated Height	$3\frac{29}{32}$"
Mounting Position	Any

Sylvania Type 6W7G is a sharp cut-off pentode similar to type 6J7G but having a 150 ma. heater rating. For data concerning operation, reference should be made to Lock-In type 7C7.



5BS-0-0



Sylvania Type 6X4

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.6 Ampere
Maximum Peak Inverse Voltage	1250 Volts
Maximum Peak Plate Current	210 Ma.
Maximum DC Output Current	70 Ma.
Maximum Peak Heater-Cathode Voltage	450 Volts

TYPICAL OPERATION

	Condenser to Filter	Choke Input to Filter
AC Plate-to-Plate Supply Voltage RMS	650	900 Volts
Filter Input Condenser	4	... ufd.
Total Effective Plate-Supply Impedance per Plate	150	... Ohms
Minimum Filter Input Choke	...	8 Henries
DC Output Current	70	70 Ma.

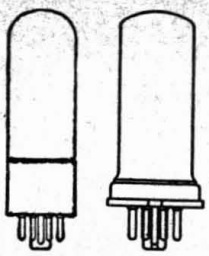
APPLICATION

Sylvania Type 6X4 is a miniature cathode type full-wave rectifier designed for use in compact sets requiring a rectifier of this rating. Characteristics are the same as for Sylvania Type 6X5GT, to which reference would be made for curve data.

6X5GT Sylvania Type

FULL-WAVE RECTIFIER

LOCK-IN EQUIVALENT 7Y4





6S-1-0 (6X5)
6S-0-0 (6X5GT)

PHYSICAL SPECIFICATIONS

	6X5	6X5GT
Base	Small Wafer Octal 6 Pin	Intermediate Octal 6 Pin
Bulb	Metal 8-6	T9
Maximum Overall Length	3 1/4"	3 5/16"
Maximum Seated Height	2 11/16"	2 3/4"
Mounting Position	Vertical	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.6 Ampere
Maximum Peak Inverse Voltage	1250 Volts
Maximum DC Heater-Cathode Voltage	450 Volts
Tube Voltage Drop (70 Ma. per Plate)	22 Volts
Maximum Peak Plate Current	210 Ma.

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	325 Volts Max.
DC Output Current	70 Ma. Max.
Plate Supply Impedance (per Plate)*	150 Ohms Min.

*Additional Impedance may be required when a filter of more than 40 Mfd. is used.

CHOKE INPUT TO FILTER

AC Voltage per Plate	450 Volts Max.
DC Output Current	70 Ma. Max.
Input Choke Value	10 Henrys Min.

Note: For rectifier curve data see next page.

APPLICATION

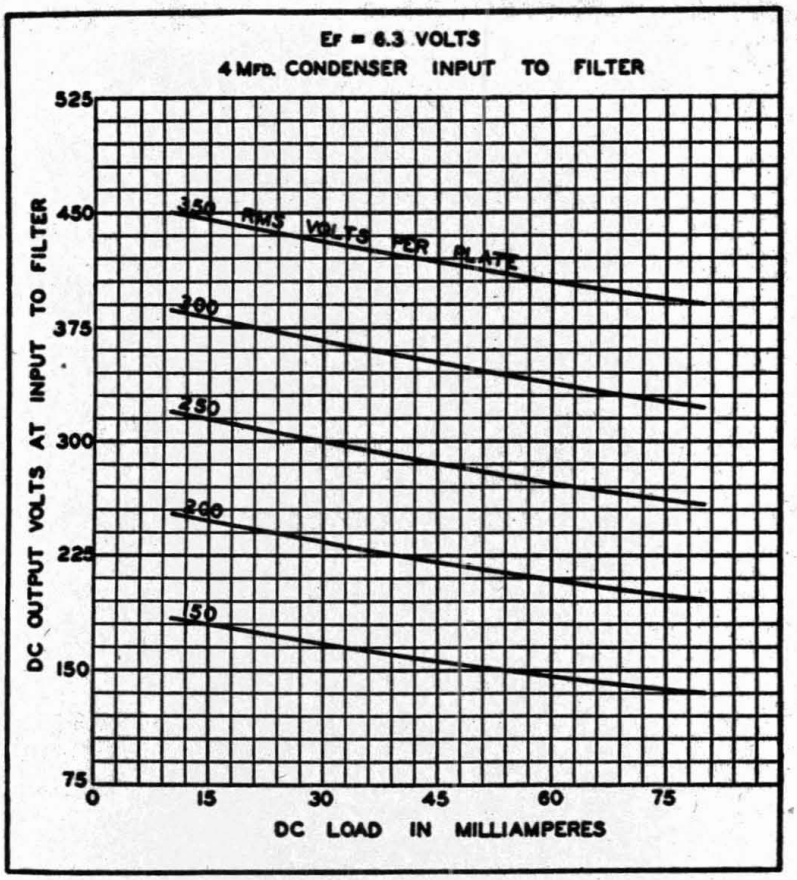
Sylvania Type 6X5 and 6X5GT are designed for use as rectifiers for auto-radio receivers or for a-c operated receivers where the demand for rectified current is low. They are similar to the Type 7Y4 except for heater current rating and therefore usable in similar applications.

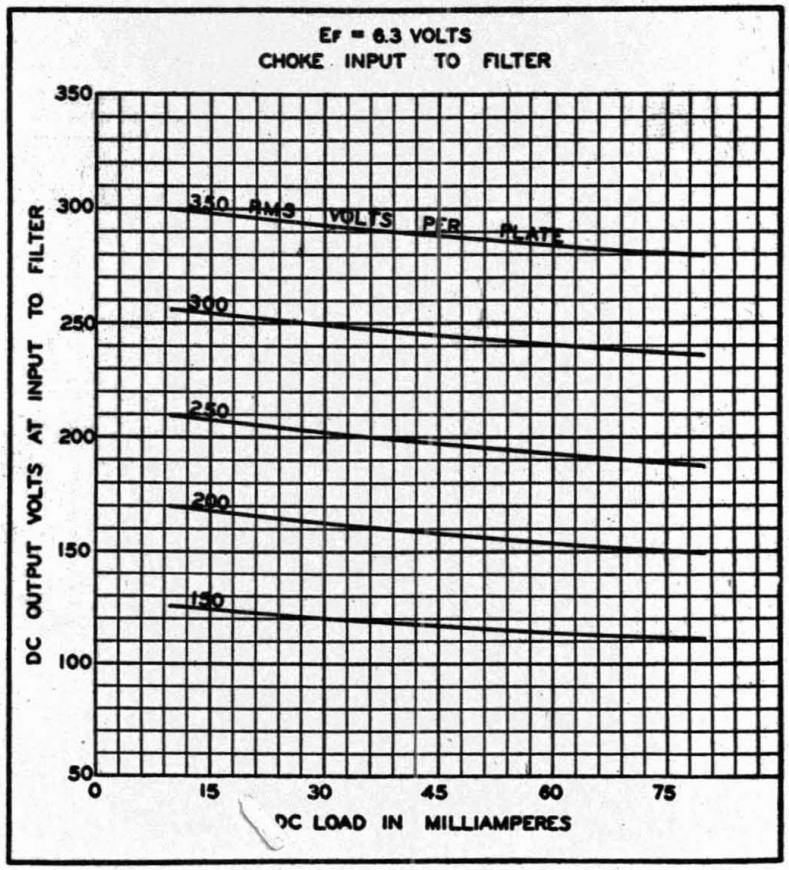
In order to obtain satisfactory output and regulation, careful consideration should be given to proper filtering. Filter circuits of the condenser-input or the choke-input type are applicable.

The d-c output will be considerably greater with a condenser-input filter than when the other type is used. Also, it will be true that higher peak plate currents will be encountered. The first condenser in the filter circuit, therefore, should not be too large in capacitance. It is not likely that the a-c input voltage will be a pure sine wave form so that the instantaneous peak values may be considerably greater than 1.4 times the r-m-s value. The voltage ratings of the condensers must be such as to handle the maximum peak values encountered.

When used with a vibrator and transformer combination as a source of a.c., considerable care must be taken in the transformer design, as well as the filter design, to avoid exceeding any of the maximum ratings.

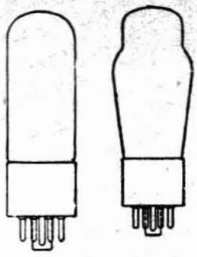
TYPE 6X5, 6X5G, 84/6Z4





6Y6GT Sylvania Type

BEAM POWER AMPLIFIER





7AC-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 7 Pin
Bulb	T9 or ST14
Maximum Overall Length	4 5/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	1.25 Ampere
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	135 Volts
Maximum Plate Dissipation	12.5 Watts
Maximum Screen Dissipation	1.75 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	1.25	1.25 Ampere
Plate Voltage	135	200 Volts
Screen Voltage	135	135 Volts
Grid Voltage	−13.5	−14.0 Volts
Peak Signal Voltage (A-F)	13.5	14.0 Volts
Plate Current (Zero Signal)	58	61 Ma.
Plate Current (Maximum Signal)	60	66 Ma.
Screen Current (Zero Signal)	3.5	2.2 Ma.
Screen Current (Maximum Signal)	11.5	9.0 Ma.
Plate Resistance	9300	18300 Ohms
Mutual Conductance	7000	7100 μmhos
Load Resistance	2000	2600 Ohms
Power Output	3.6	6.0 Watts
Total Harmonic Distortion	10	10 Per Cent

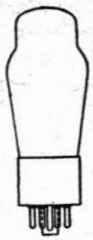
APPLICATION

Sylvania Type 6Y6GT embodies the same general principles of design as those incorporated in tubes like the 6L6G and 6V6G. It is intended primarily for use in a-c operated receivers where economy in B supply design is essential.

If the tube is to be operated with other plate and screen voltages which are below the maximum values, the operating conditions must be such that the maximum plate and screen dissipations are not exceeded. Failure to do so may result in grid emission difficulties and short life.



8B-0-0



Sylvania Type 6Y7G

DUO TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Small Octal 8 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.60	0.60 Ampere
Plate Voltage	180	250 Volts
Grid Voltage	0	0 Volt
Plate Current (No Signal)	7.5	10.5 Ma.
Load Resistance (Plate to Plate)	7000	14000 Ohms
Power Output*	5.5	8.0 Watts
Maximum Heater-Cathode Voltage	90	90 Volts

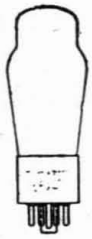
All characteristics shown are for two triodes operating in "Class B" service.
All plate currents are sum of currents flowing to each plate.
*Average Power Input—380 mw. grid to grid.

APPLICATION

Sylvania Type 6Y7G is a duo triode designed for use as a zero bias class B amplifier. It is identical to the older type 79 in electrical characteristics.



8B-0-0



Sylvania Type 6Z7G

DUO TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Small Octal 8 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	135	180 Volts Max.
Grid Voltage	0.0	0.0 Volt
Zero Signal Plate Current per Plate	3	4.2 Ma.
Maximum Peak Plate Current per Plate	60	60 Ma.
Maximum Average Plate Dissipation	8	8 Watts
Load Resistance (Plate to Plate)	15000	20000 Ohms
Power Output*	1.5	2.2 Watts
Load Resistance (Plate to Plate)	9000	12000 Ohms
Power Output**	2.5	4.2 Watts
Maximum Heater-Cathode Voltage	90	90 Volts

*With average power input of 80 mw. grid to grid.
**With average power input of 320 mw. grid to grid.

APPLICATION

Sylvania Type 6Z7G is a complete Class B output tube consisting of two triode units in a single bulb. This tube is designed primarily for use in battery operated receivers utilizing low heater current tubes.

Type 6Z7G is not recommended for operation in series with other 0.3 ampere tubes directly from power lines because of the danger of heater burn-outs resulting from excessive surge voltages to which the heater may be subjected.

The general circuit applications are conventional with other Class B tubes, such as Types 6Y7G and 79, but in the circuit design defferences in the 6Z7G characteristics should not be overlooked since Type 6Z7G is not directly interchangeable with any other tube type.

6ZY5G Sylvania Type

FULL-WAVE RECTIFIER





6S-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 6 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 5/8"
Mounting Position	Any

TYPICAL OPERATION

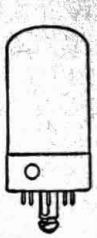
	Choke Input	Condenser Input
Heater Voltage	6.3	6.3 Volts
Heater Current	0.300	0.300 Ampere
AC Plate Supply Voltage (RMS Per Plate)	450	325 Volts
Maximum DC Output Current	40	40 Ma.
Maximum DC Heater-Cathode Voltage	450	450 Volts
Plate Supply Impedance Per Plate	.....	250 Ohms Min.
Input Choke	(Min.) 13.5 Henrys	....

APPLICATION

Sylvania Type 6ZY5G is a full-wave high-vacuum rectifier. It is similar to Type 6X5G and is used for light duty in similar applications.



5AC-L-0



Sylvania Type 7A4

MEDIUM-MU TRIODE

GT EQUIVALENT 6J5GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Minimum External Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	4.0 $\mu\mu$f.
Grid to Cathode	3.4 $\mu\mu$f.
Plate to Cathode	3.0 $\mu\mu$f.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

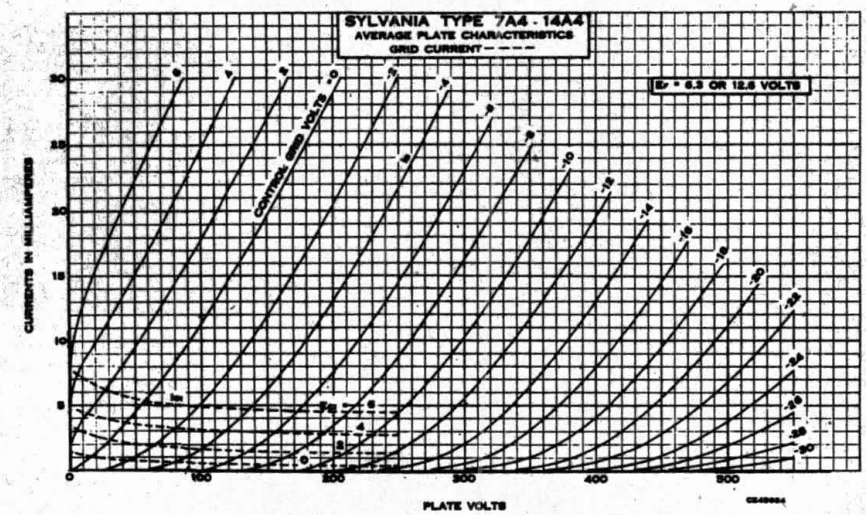
CLASS A AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	90	250 Volts
Grid Voltage	0	−8 Volts
Self-Bias Resistor	0	900 Ohms
Plate Current	10	9 Ma.
Plate Resistance (Approximate)	6700	7700 Ohms
Mutual Conductance	3000	2600 μmhos
Amplification Factor	20	20

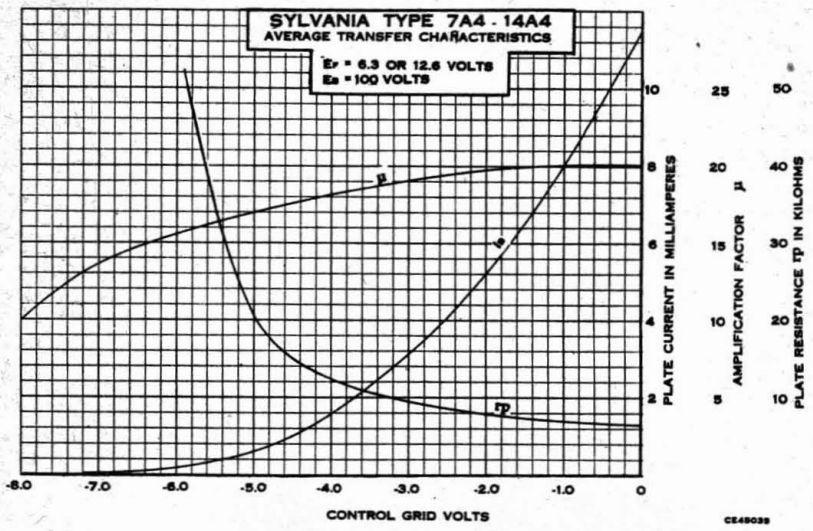
APPLICATION

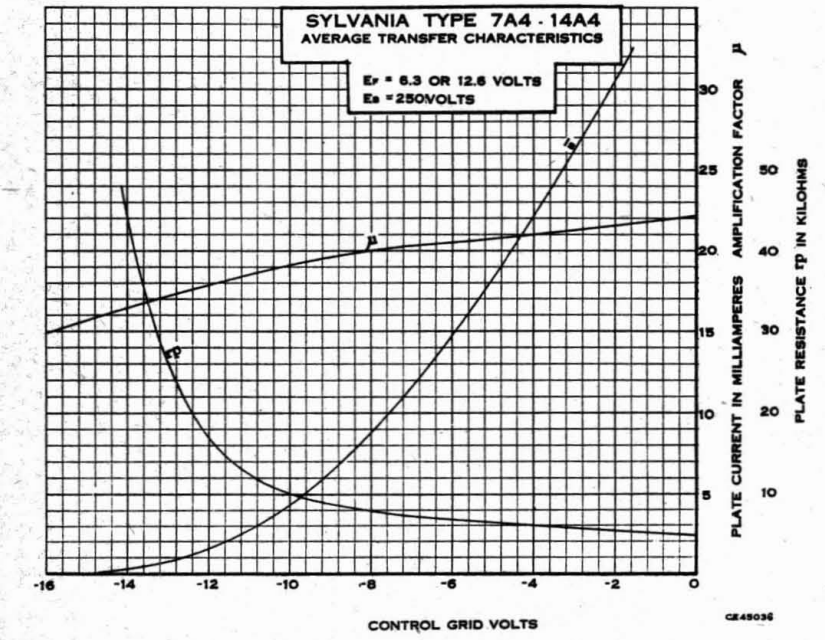
Sylvania Type 7A4 is a medium-mu triode designed for use as an oscillator, detector or amplifier. It is quite similar to types 6J5GT but gives improved performance especially at the higher frequencies, due to the lock-in type of construction. This construction results in shorter leads, lower capacitances, and lower base losses. This tube may be used successfully to about 225 mc. as an oscillator. For higher frequencies, types 7E5/1201 or 7F8 should be considered.

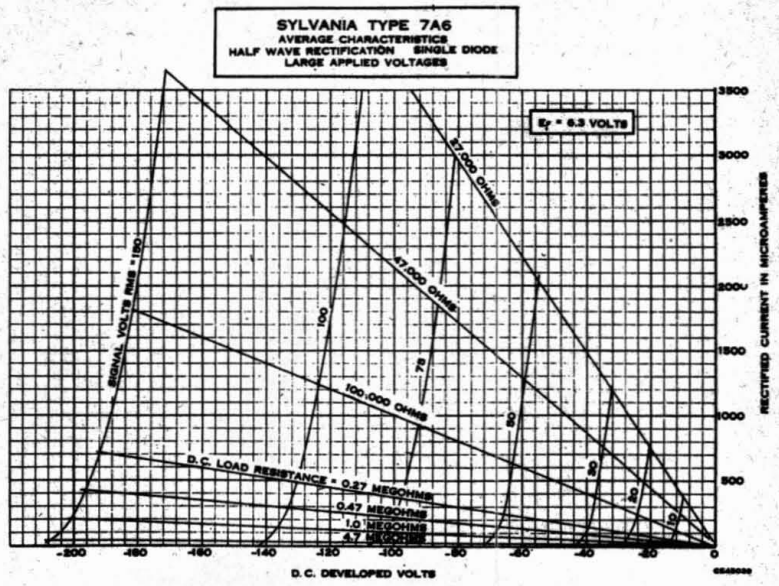
Tabulated data for resistance coupled operation will be found in the appendix.



7A4 (Cont.)


SYLVANIA TYPE 7A4 - 14A4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
μ
gm
rp
-8.0
-7.0
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0
CONTROL GRID VOLTS
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CE45035

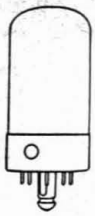

SYLVANIA TYPE 7A4 - 14A4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250VOLTS
μ
gm
rp
-16
-14
-12
-10
-8
-6
-4
-2
0
CONTROL GRID VOLTS
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CE45036


SYLVANIA TYPE 7A6
AVERAGE CHARACTERISTICS
HALF WAVE RECTIFICATION SINGLE DIODE
LARGE APPLIED VOLTAGES
Ef = 6.3 VOLTS
SIGNAL VOLTS RMS = 130
100
78
50
30
20
10
87,000 OHMS
47,000 OHMS
100,000 OHMS
D.C. LOAD RESISTANCE = 0.27 MEGOHMS
0.47 MEGOHMS
1.0 MEGOHMS
4.7 MEGOHMS
-200
-180
-160
-140
-120
-100
-80
-60
-40
-20
0
D.C. DEVELOPED VOLTS
3500
3000
2500
2000
1500
1000
500
RECTIFIED CURRENT IN MICROAMPERES

7A7 Sylvania Type

REMOTE CUT-OFF RF PENTODE

GT EQUIVALENT 6SK7GT





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.4 Watt
Minimum External Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.005 μμf. Max.
Input; Grid to (F+K+G_2+G_3)	5.5 μμf.
Output; Plate to (F+K+G_2+G_3)	7.0 μμf.

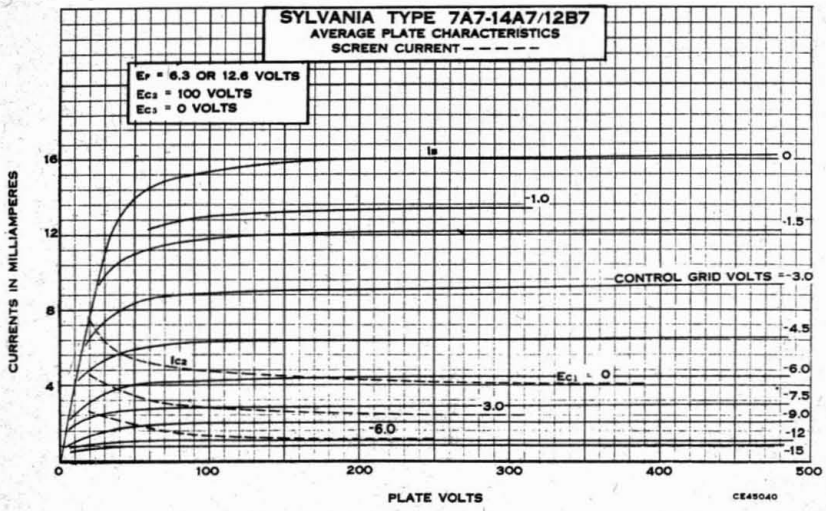
*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to Cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1.0	−3 Volts
Self-Bias Resistor	60	260 Ohms
Suppressor	Connect to Cathode	
Plate Current	13.0	9.2 Ma.
Screen Current	4.0	2.6 Ma.
Plate Resistance	0.12	0.8 Megohm
Mutual Conductance	2350	2000 μmhos
Grid Voltage for Mutual Conductance of 10 μmhos	−35	−35 Volts

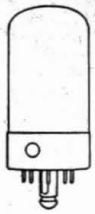
APPLICATION

Sylvania Type 7A7 is a single-ended remote cut-off pentode designed for RF or IF service in AC or DC receivers. For AC-DC service, Types 14A7 or 7B7 may be more suitable because of lower heater current ratings. Electrical characteristics are similar to the older Types 6K7GT and 6SK7GT. In most applications the internal shield connected to pin No. 5 should provide adequate shielding, although an external shield may be required if extremely high gain circuits are used.





6AA-L-0



Sylvania Type 7A5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	125 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Dissipation	1.2 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

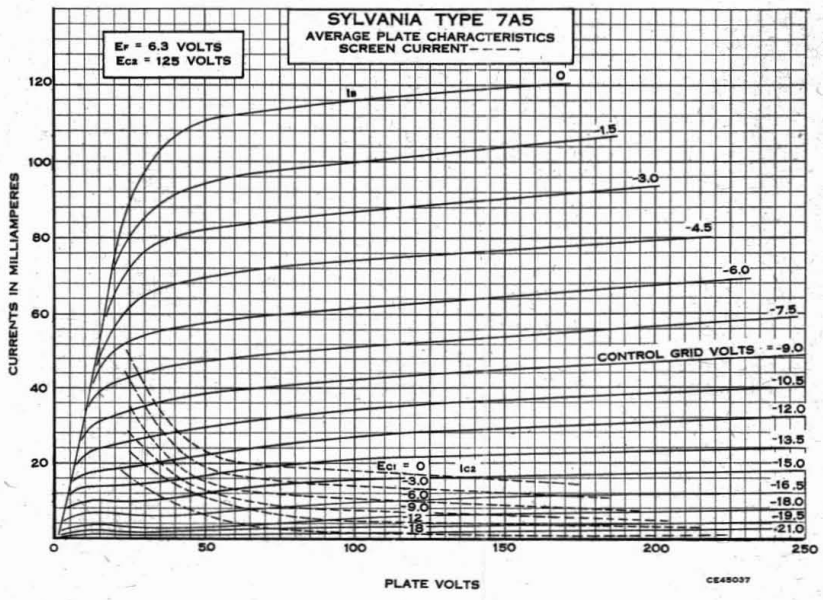
Heater Voltage	6.3	6.3 Volts
Heater Current	0.75	0.75 Ampere
Plate Voltage	110	125 Volts
Screen Voltage	110	125 Volts
Grid Voltage	−7.5	Volts**
Self-Bias Resistor	175	190 Ohms
Plate Current (Zero Signal)	40.0	44.0 Ma.
Plate Current (Maximum Signal)	41.0	45.0 Ma.
Screen Current (Zero Signal)	3.0	3.3 Ma.
Screen Current (Maximum Signal)	7.0	9.5 Ma.
Mutual Conductance	5800	6000 μmhos
Plate Resistance	16000	17000 Ohms
Load Resistance	2500	2700 Ohms
Power Output	1.5	2.2 Watt
Total Harmonic Distortion	10	10 Per Cent

**Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

APPLICATION

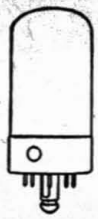
Sylvania Type 7A5 is a Lock-In type beam power amplifier designed to operate at plate voltages of about 110 volts. Except for heater ratings, it is similar to type 35A5. The curve data given for type 35A5 is applicable for the 110 volt condition.

Grid circuit resistance should not exceed 0.1 megohm for fixed bias operation or 0.5 megohm for self-bias operation.



7A6 Sylvania Type

DUODIODE





7AJ-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum RMS Plate Voltage	150 Volts
Maximum Heater-Cathode Voltage	330 Volts
Maximum Peak Current Per Plate	45 Ma.
Maximum DC Output Current Per Plate	8.0 Ma.
Average Voltage Drop Per Plate at 16 Ma.	11.0 Volts

Direct Interelectrode Capacitances:*

Plate 1 to Cathode 1 (pins 6 and 7)	2.0 μμf.
Plate 2 to Cathode 2 (pins 2 and 3)	2.6 μμf.
Plate 1 to Plate 2 (pins 3 and 6)	0.1 μμf. Max.

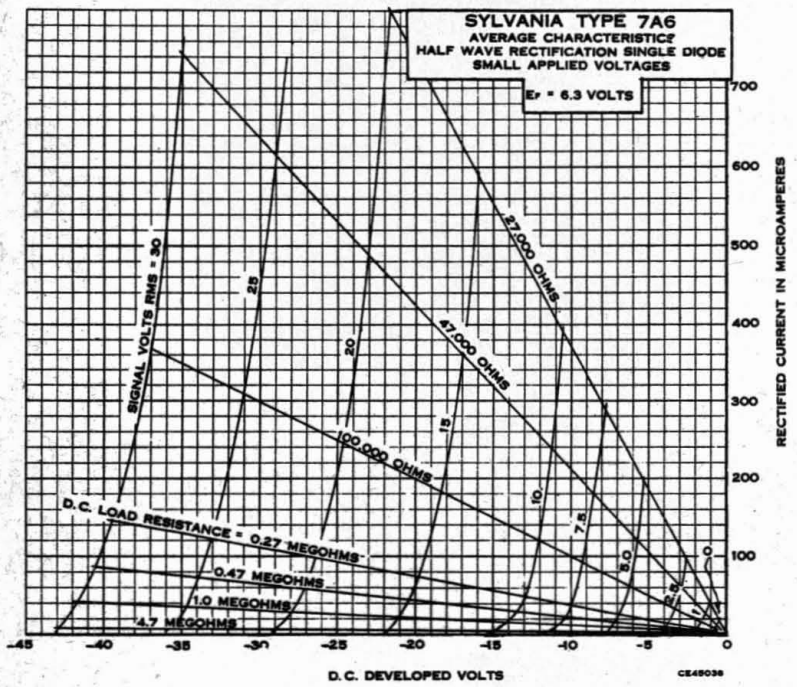
*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode

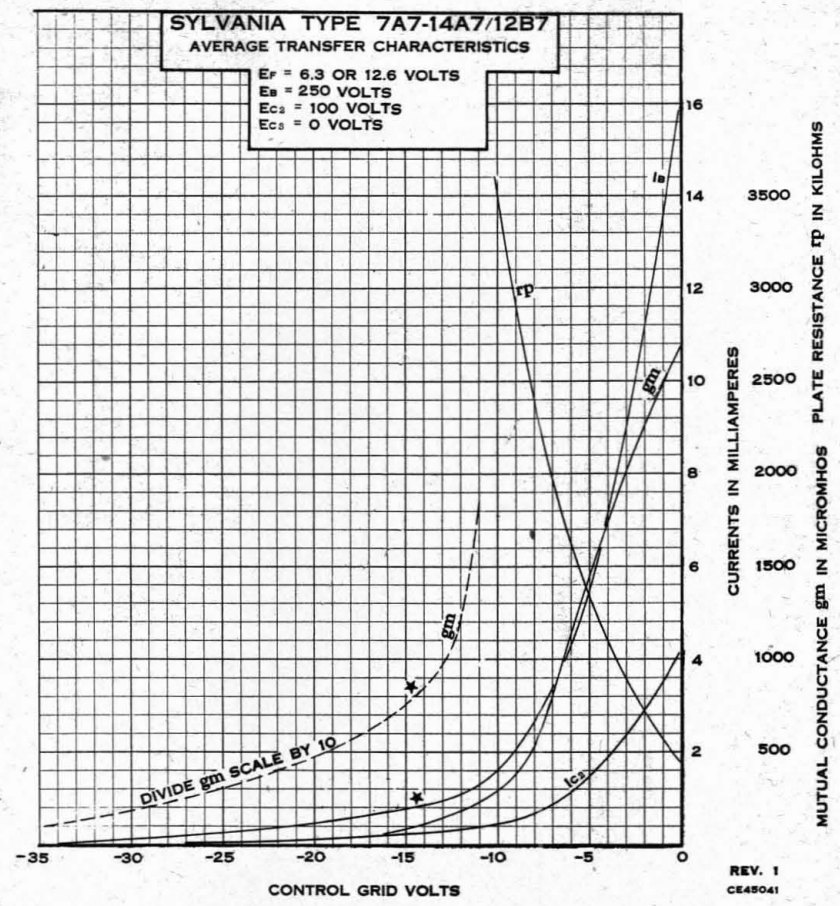
TYPICAL OPERATION

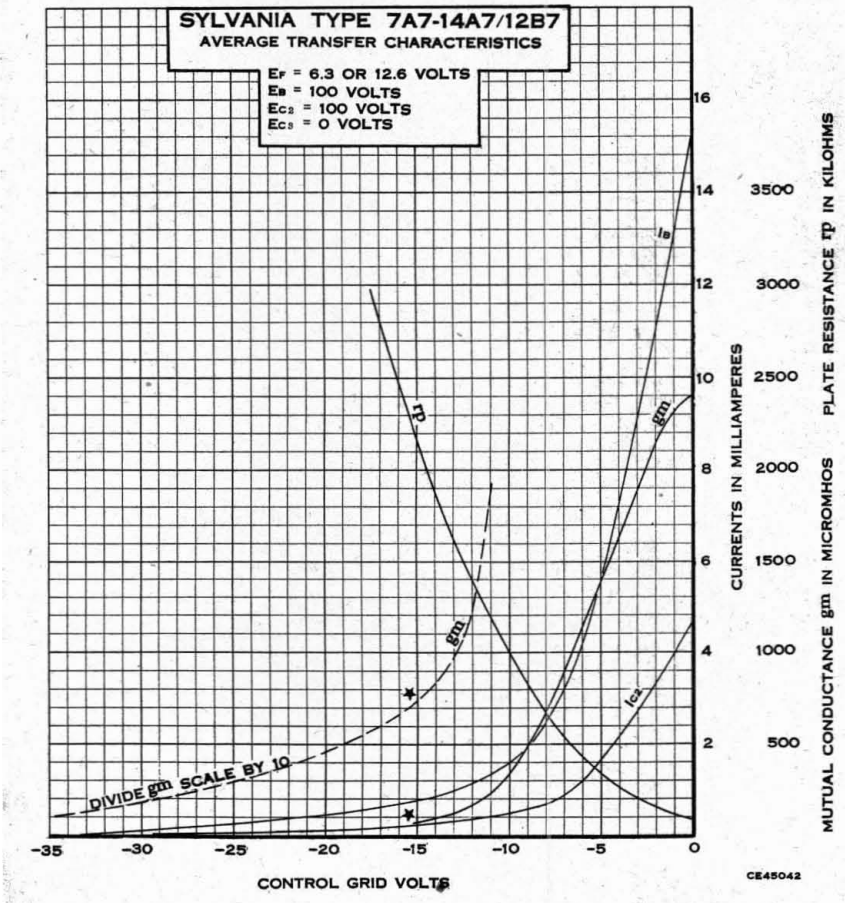
Heater Voltage	6.3 Volts
Heater Current	150 Ma.
AC Voltage per Plate (RMS)	150 Volts
DC Output Current	8.0 Ma.

APPLICATION

Sylvania Type 7A6 is a Lock-In type duodiode. It has separate cathodes and is similar to Type 6H6GT. The shielding between diode units permits each section to be used independently of the other and the lock-in construction gives good high-frequency characteristics. Type 7C4, however, should be considered for extremely high-frequency applications.



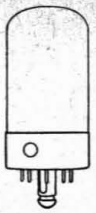

SYLVANIA TYPE 7A7-14A7/12B7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
rp
ib
gm
DIVIDE gm SCALE BY 10
ic2
-35 -30 -25 -20 -15 -10 -5 0
CONTROL GRID VOLTS
2 4 6 8 10 12 14 16
500 1000 1500 2000 2500 3000 3500
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
REV. 1
CE45041


SYLVANIA TYPE 7A7-14A7/12B7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
rp
ib
gm
DIVIDE gm SCALE BY 10
ic2
-35 -30 -25 -20 -15 -10 -5 0
CONTROL GRID VOLTS
2 4 6 8 10 12 14 16
500 1000 1500 2000 2500 3000 3500
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CE45042

7A8 Sylvania Type

OCTODE CONVERTER

G EQUIVALENT 6D8G





8U-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Oscillator Anode Supply	300 Volts
Maximum Oscillator Anode Voltage	200 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	0.3 Watt
Maximum Oscillator Anode Dissipation	0.75 Watt
Maximum Cathode Current	13.0 Ma.
Minimum Signal Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid G to Plate	0.15 μμf. Max.
Grid G to Grid Ga	0.3 μμf. Max.
Grid G to Grid Go	0.15 μμf. Max.
Grid Go to Grid Ga	0.60 μμf.
Grid G to all Electrodes (r-f Input)	7.5 μμf.
Grid Ga to all Electrodes except Go (Osc. Output)	3.4 μμf.
Grid Go to all Electrodes except Ga (Osc. Input)	3.8 μμf.
Plate to all Electrodes (Mixer Output)	9.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Control Grid (G) Voltage	−3.0	−3.0 Volts
Screen (Gs) Voltage	75	100 Volts
Anode Grid (Ga) Voltage	100	250 Volts**
Oscillator Grid Resistor (Go)	50000	50000 Ohms
Plate Current	1.8	3.0 Ma.
Screen Grid Current	2.7	3.2 Ma.
Anode Grid Current	2.8	4.2 Ma.
Oscillator Grid Current	0.2	0.4 Ma.
Self-Bias Resistor	400	280 Ohms
Plate Resistance	650000	700000 Ohms
Conversion Conductance	375	550 μmhos
Control Grid Voltage for 2 μmhos Conv. Cond.	−22.5	−30 Volts

**Applied through 20,000 ohm dropping resistor.

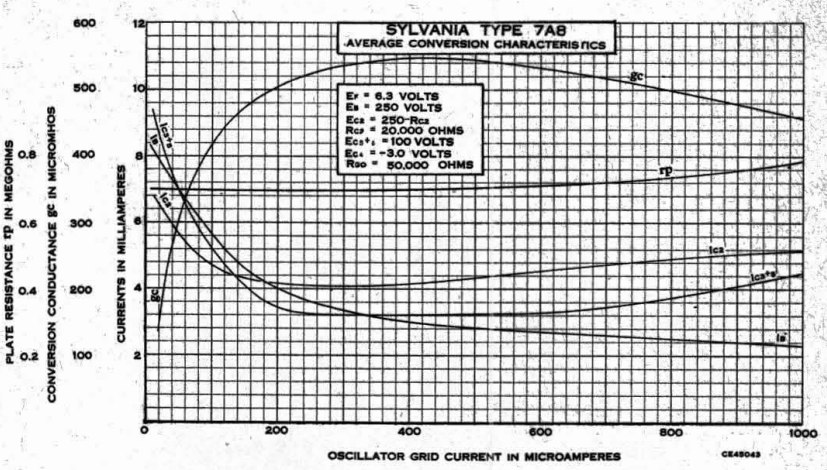
OSCILLATOR CHARACTERISTICS
NON-OSCILLATING CONDITION

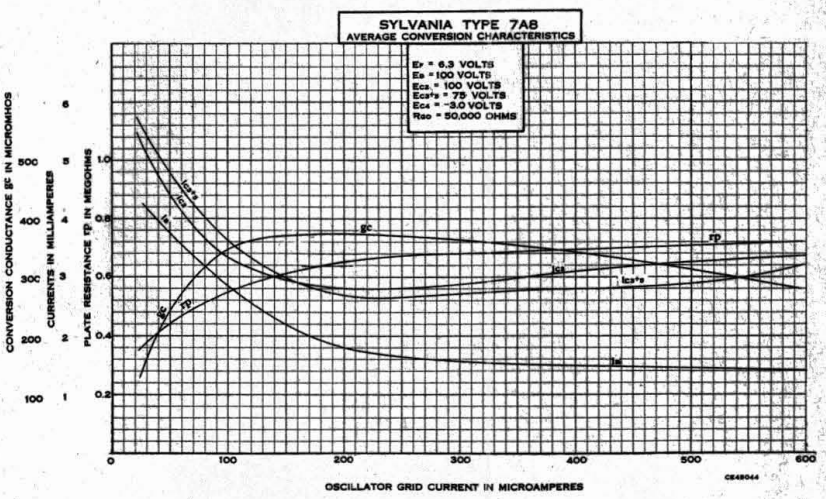
Anode Grid Current (Ga)	10 Ma.
Mutual Conductance (Ga to Go)	1600 μmhos
Amplification Factor (Ga to Go)	65

Measurements taken with a plate voltage of 250 volts, anode grid voltage of 180 volts, screen voltage of 100 volts, with oscillator grid at 0.0 volt.

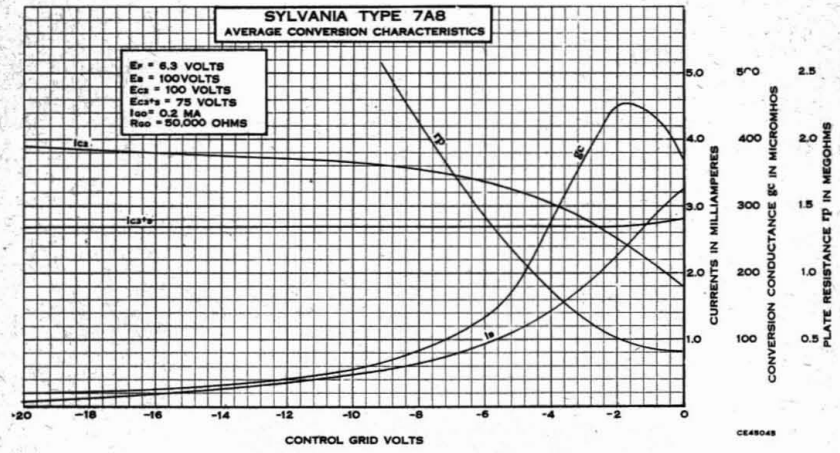
APPLICATION

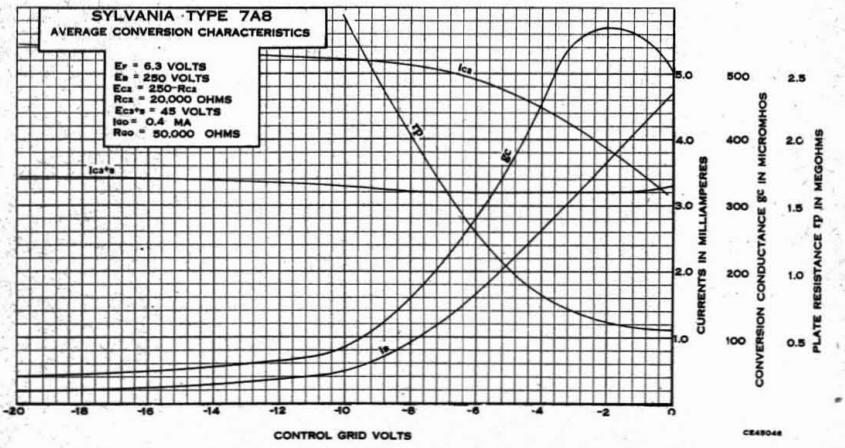
Sylvania Type 7A8 is a single-ended oscillator-mixer tube of lock-in design for service in AC, AC-DC and auto receivers. Compact size, short leads and good shielding are some of the features of this tube. Application and operation are similar to the older types of oscillator-mixer tubes. The addition of a suppressor grid in Type 7A8 serves to increase the plate resistance for improved performance, particularly when operated at low plate supply voltages.


SYLVANIA TYPE 7A8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 250-Rc2
Rc2 = 20,000 OHMS
Ec3*1 = 100 VOLTS
Ec4 = -3.0 VOLTS
Rg0 = 50,000 OHMS
gc
rp
ic2
ic3*2
ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE48043


SYLVANIA TYPE 7A8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
Ec3 = 100 VOLTS
Ec3*2 = 75 VOLTS
Ec4 = -3.0 VOLTS
Rg0 = 50,000 OHMS
gc
rp
ic2
ic3*2
ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE48044

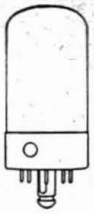
7A8 (Cont.)


SYLVANIA TYPE 7A8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100VOLTS
Ec1 = 100 VOLTS
Ec2*3 = 75 VOLTS
Ico = 0.2 MA
Rgo = 50,000 OHMS
Ic2
Ic2*3
Ib
gc
rp
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45045


SYLVANIA TYPE 7A8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec1 = 250-Rc1
Rc1 = 20,000 OHMS
Ec2*3 = 45 VOLTS
Ico = 0.4 MA
Rgo = 50,000 OHMS
Ic2
Ic2*3
Ib
gc
rp
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45046



8V-L-5



Sylvania Type 7AD7

TELEVISION AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal)	7.0 Volts
Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	300 Volts
Maximum Grid Voltage	0 Volts
Maximum Plate Dissipation	10 Watts
Maximum Screen Dissipation	1.2 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.030 μμf. Max.
Input	11.5 μμf.
Output	7.5 μμf.

*With 1 1/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.600 Ampere
Plate Voltage	300 Volts
Screen Voltage	150 Volts
Grid Voltage*	−3 Volts
Self Bias Resistor	68 Ohms
Suppressor	Connected to cathode
Plate Current (Zero Signal)	28 Ma.
Screen Current (Zero Signal)	7.0 Ma.
Plate Resistance	300,000 Ohms
Mutual Conductance	9500 μmhos

*Obtained preferably by self bias resistor. Maximum grid circuit resistance should not exceed 1.0 megohm for self bias condition; 0.25 megohm for fixed bias condition.

CLASS A_1 TELEVISION AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.600 Ampere
Plate Supply Voltage	300 Volts
Screen Voltage	125 Volts
Grid Voltage	−3.0 Volts
Self Bias Resistor	68 Ohms
Signal Voltage (Peak to Peak)	4.0 Volts
Suppressor	Connected to cathode
Plate Current (Zero Signal)	25.0 Ma.
Screen Current (Zero Signal)	6.0 Ma.
Maximum Signal Voltage Output (Peak to Peak)	135 Volts

APPLICATION

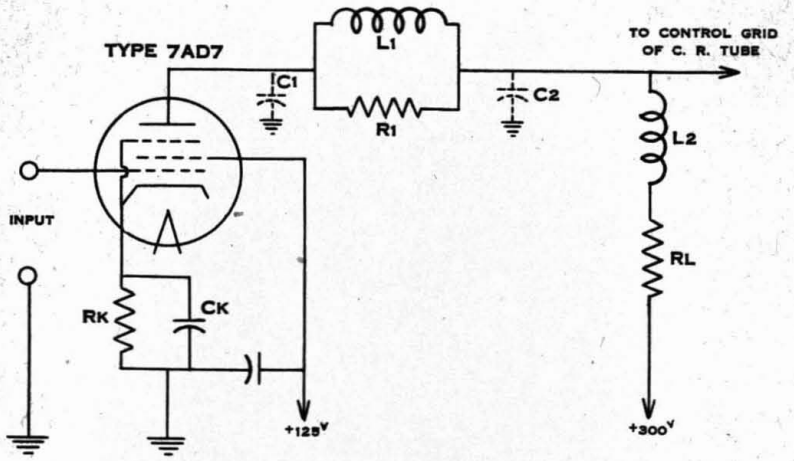
Sylvania Type 7AD7 is a high transconductance pentode amplifier designed for voltage amplification of a broad band of frequencies such as required for television service.

This is the first Lock-In tube having characteristics suitable for this purpose. It is, however, very similar to Type 6AG7 which, although having slightly higher theoretical gain, does not have the ruggedness, low capacitance, and high production advantages of the Lock-In construction.

7AD7 (Cont.)

TYPICAL TELEVISION AMPLIFIER

WITH 4 MC BANDWIDTH



C_1 = 17 $\mu\mu$f.
Type 7AD7 Output Capacitance plus Socket, Coil and Wiring Capacitance.

C_2 = 34 $\mu\mu$f.
Cathode Ray Tube Grid Capacitance plus Socket, Coil and Wiring Capacitance.

L_1 = 300 μH Series Reactor.

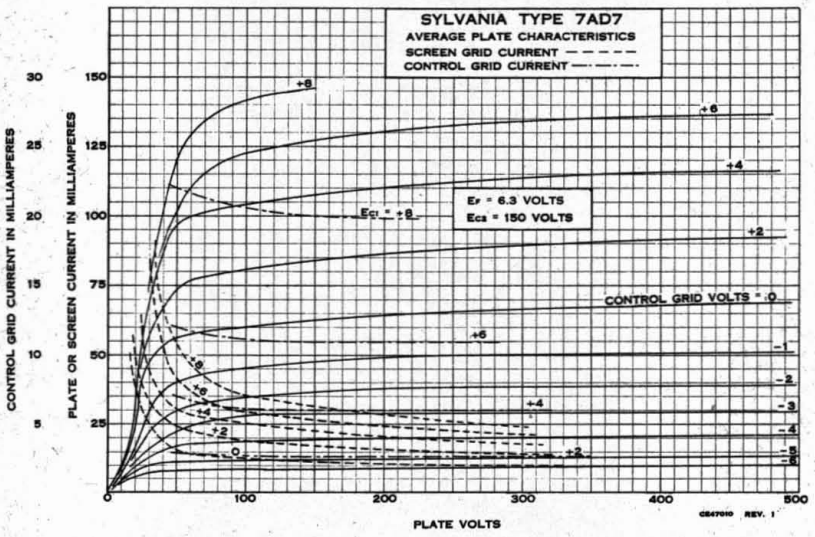
L_2 = 150 μH High Frequency Booster Reactor.

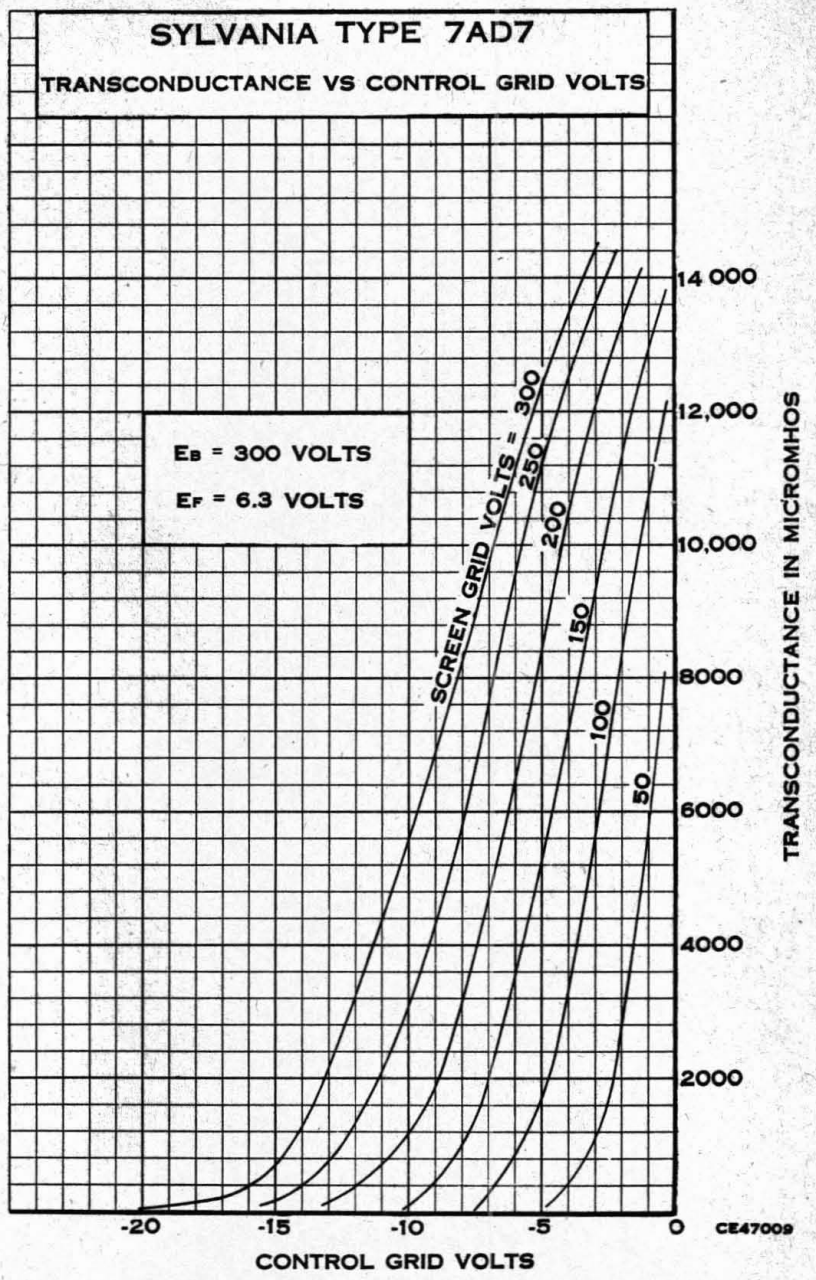
R_L = 20,000 Ohms.

R_1 = 3500 Ohm 10 Watt Load Resistor.

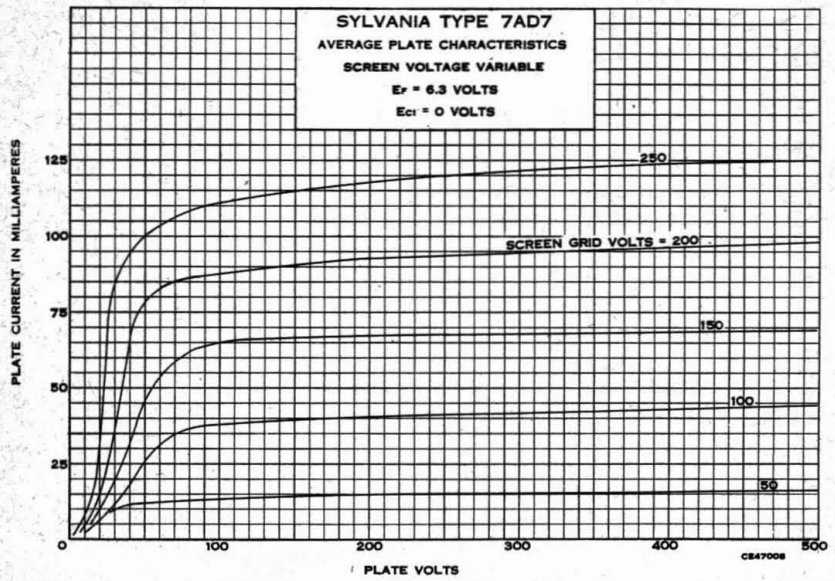
R_K = 68 Ohms.

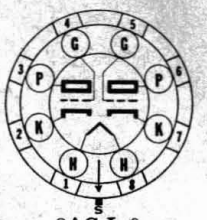
C_K = 500 μf.



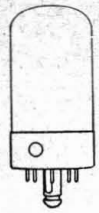

SYLVANIA TYPE 7AD7
TRANSCONDUCTANCE VS CONTROL GRID VOLTS
EB = 300 VOLTS
EF = 6.3 VOLTS
SCREEN GRID VOLTS = 300
250
200
150
100
50
14 000
12,000
10,000
8000
6000
4000
2000
TRANSCONDUCTANCE IN MICROMHOS
-20
-15
-10
-5
0
CE47009
CONTROL GRID VOLTS

7AD7 (Cont.)


SYLVANIA TYPE 7AD7
AVERAGE PLATE CHARACTERISTICS
SCREEN VOLTAGE VARIABLE
Ef = 6.3 VOLTS
Ec1 = 0 VOLTS
PLATE CURRENT IN MILLIAMPERES
125
100
75
50
25
0
100
200
300
400
500
PLATE VOLTS
250
SCREEN GRID VOLTS = 200
150
100
50
CS47008



8AC-L-0



Sylvania Type 7AF7

DOUBLE TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation (Per Plate)	2.5 Watts
Minimum External Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate (Per Section)	2.3 μμf.
Input (Per Section)	2.2 μμf.
Output (Per Section)	1.6 μμf.
Grid 1 to Grid 2	0.20 μμf. Max.
Plate 1 to Plate 2	0.60 μμf. Max.
Grid 1 to Plate 2	0.06 μμf. Max.
Grid 2 to Plate 1	0.10 μμf. Max.

*Measured without shield.

TYPICAL OPERATION

CLASS A_1

PER SECTION EXCEPT HEATER

Heater Voltage (AC or DC)	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	100	250 Volts
Grid Voltage	0	−3	−10 Volts
Self-Bias Resistor	.....	600	1100
Plate Current	10.8	5.0	9.0 Ma.
Mutual Conductance	2600	1900	2100 μmhos
Amplification Factor	17	16	16
Plate Resistance	6500	8400	7600 Ohms

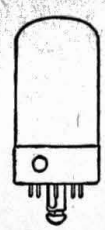
APPLICATION

Sylvania Type 7AF7 is a single-ended duo triode designed for use either as a phase inverter or as a voltage amplifier. The plate, grid, and cathode connections of each triode are brought out separately to permit use in special circuits.

The characteristics of Sylvania Type 7AF7 are very similar to those of Type 7N7. It has somewhat lower interelectrode capacities which may be desirable for some applications that do not require the higher mutual conductance of Type 7N7.

7AG7 Sylvania Type

SHARP CUT-OFF RF PENTODE





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.75 Watt
Minimum Control Grid Voltage	−1.0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.005 μμf. Max.
Input	7.0 μμf.
Output	6.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

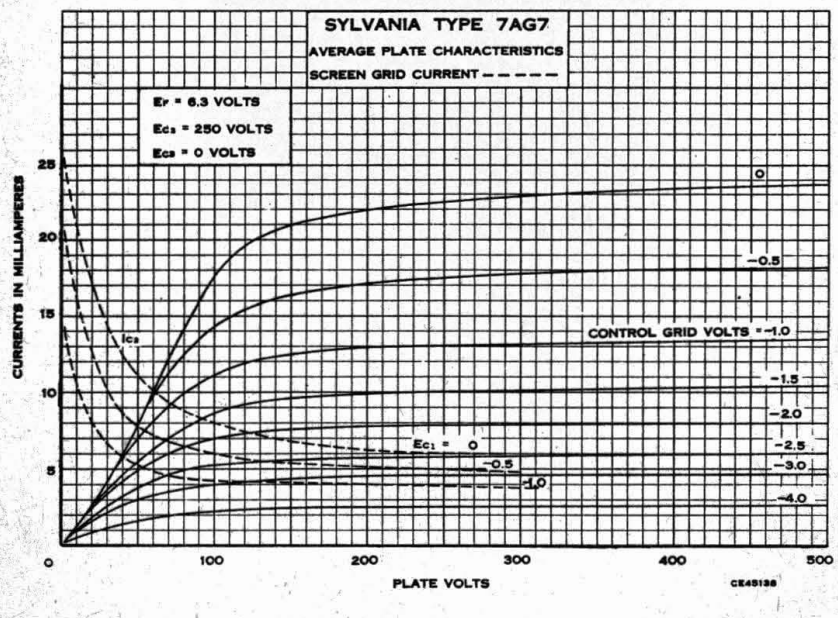
TYPICAL OPERATION

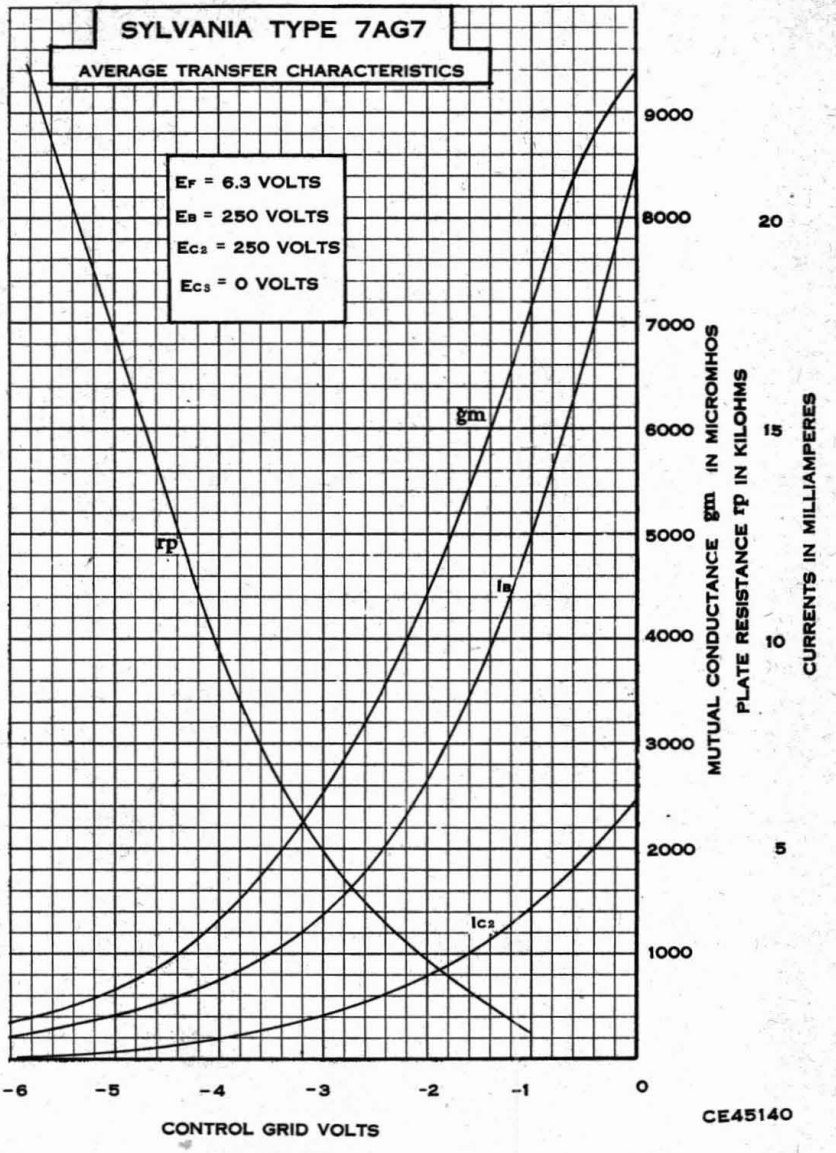
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	250 Volts
Suppressor	Connected to cathode at socket	
Control Grid Bias	−1.0	* Volts
Self-Bias Resistor	480	250 Ohms
Plate Current	1.6	6.0 Ma.
Screen Current	0.5	2.0 Ma.
Mutual Conductance	2600	4200 μmhos
Plate Resistance	.710	>1.0 Megohm
Control Grid Voltage for 10 μa. Plate Current	−3.5	−10.0 Volts

*Bias voltage developed is approximately 2.0 volts. Fixed bias operation is not recommended.

APPLICATION

Sylvania Type 7AG7 is a high efficiency, sharp cut-off pentode designed for either AC or AC-DC service. The high screen voltage rating permits a design which has high input impedance. For this reason, higher gains may be obtained in the television and frequency modulation bands than with other tubes having somewhat higher mutual conductance.

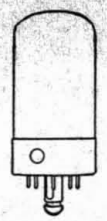



SYLVANIA TYPE 7AG7
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 VOLTS
EB = 250 VOLTS
EC2 = 250 VOLTS
EC3 = 0 VOLTS
gm
rp
Ib
Ic2
9000
8000
7000
6000
5000
4000
3000
2000
1000
20
15
10
5
-6
-5
-4
-3
-2
-1
0
CONTROL GRID VOLTS
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CURRENTS IN MILLIAMPERES
CE45140

7AH7 Sylvania Type

SEMI-REMOTE CUT-OFF

RF PENTODE AMPLIFIER





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.7 Watt
Minimum External Negative Control Grid Voltage	1.0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.005 μμf.
Input	7.0 μμf.
Output	6.5 μμf.

*With $1^{5}/_{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Plate Voltage	250 Volts
Screen Voltage	250 Volts
Suppressor	Connected to Cathode at Socket
Grid Voltage**	Obtained by 250 ohms self-bias resistor
Plate Current	6.8 Ma.
Screen Current	1.9 Ma.
Mutual Conductance	3300 μmhos
Plate Resistance	1.0 Megohm
Grid Voltage for Mutual Conductance of 35 μmhos	-20 Volts (Approx.)

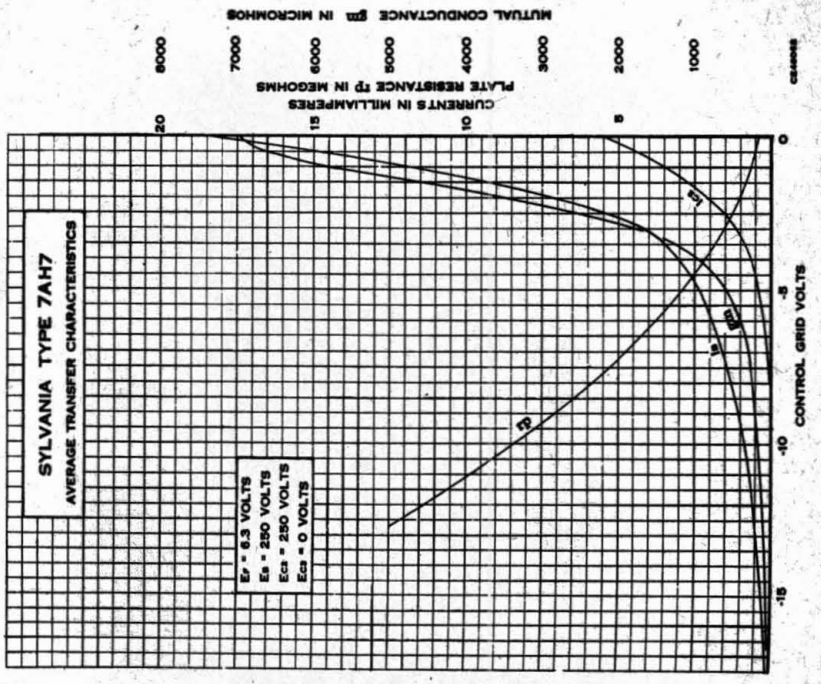
**Bias voltage is approximately 2.0 volts but fixed bias is not recommended.

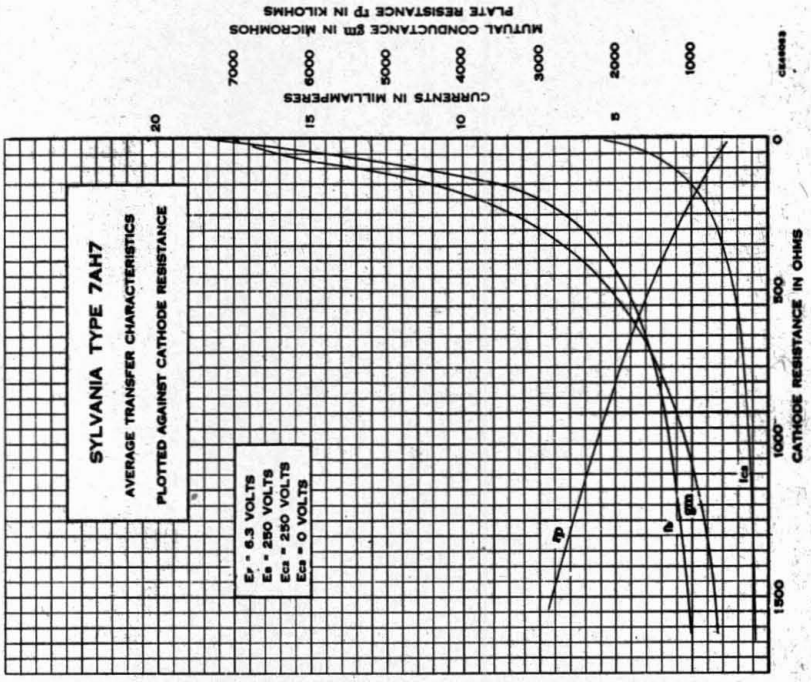
APPLICATION

Sylvania Type 7AH7 is a high efficiency semi-remote cut-off pentode designed for use in 6.3 volt, or AC-DC series service.

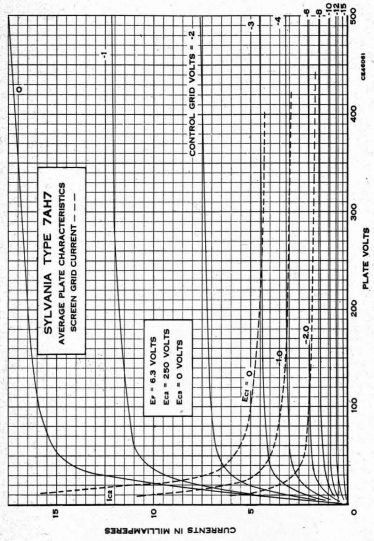
The use of the full plate supply voltage on the screen makes possible a tube design having high input resistance due to the reduction of transit time losses. For use in the Television and Frequency Modulation bands, higher gain may be obtained than with types having higher mutual conductance, because of this increased input resistance.

The use of the same voltage on the screen as on the plate may permit the omission of the screen filter resistor and by-pass condenser.


SYLVANIA TYPE 7AH7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 250 VOLTS
Ec3 = 0 VOLTS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
rp
gm
Ib
Ic2
CS-44008

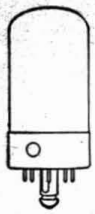

SYLVANIA TYPE 7AH7
AVERAGE TRANSFER CHARACTERISTICS
PLOTTED AGAINST CATHODE RESISTANCE
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 250 VOLTS
Ec3 = 0 VOLTS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN KILOHMS
MUTUAL CONDUCTANCE gm IN MICROMHOS
CATHODE RESISTANCE IN OHMS
rp
gm
Ib
Ic2
CS-44009

7AH7 (Cont.)


SYLVANIA TYPE 7AH7
AVERAGE PLATE CHARACTERISTICS
SCREEN GRID CURRENT — — —
Ef = 6.3 VOLTS
Ec2 = 250 VOLTS
Ec1 = 0 VOLTS
CONTROL GRID VOLTS = -2
PLATE VOLTS
CURRENTS IN MILLIAMPERES



8V-L-5



Sylvania Type 7AJ7

SHARP CUT-OFF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	0.1 Watt
Minimum External Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.007 μμf. Max.
Input	6.0 μμf.
Output	6.5 μμf.

*With $1^{5}/_{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

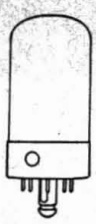
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	−1.0	−3.0 Volts
Self Bias Resistor	130	1000 Ohms
Suppressor Grid and Pin No. 5	Connected to Cathode	
Plate Current	5.7	2.2 Ma.
Screen Current	1.8	0.7 Ma.
Plate Resistance (Approx.)	.400	1.0 Megohm
Mutual Conductance	2275	1575 μmhos
Grid Bias for Plate Current Cut-Off	−8.5	−8.5 Volts

APPLICATION

Sylvania Type 7AJ7 is a triple grid amplifier designed especially for use in AC receivers and in the first stages of high gain amplifiers. The electrical characteristics are almost identical to those of Type 6SJ7 and are identical with those of Sylvania Type 14C7, except for heater rating. Reference should be made to the Type 14C7 data for curves and to the Type 7C7 for resistance coupled amplifier data.

7AK7 Sylvania Type

PENTODE WITH SUPPRESSOR CONTROL





8V-L-O

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{32}$"
Maximum Seated Height	$2\frac{5}{8}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	100 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Control Grid to Plate	0.7 μμf.
Control Grid Input	12.0 μμf.
Output	9.5 μμf.
Suppressor Grid to Plate	4.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode

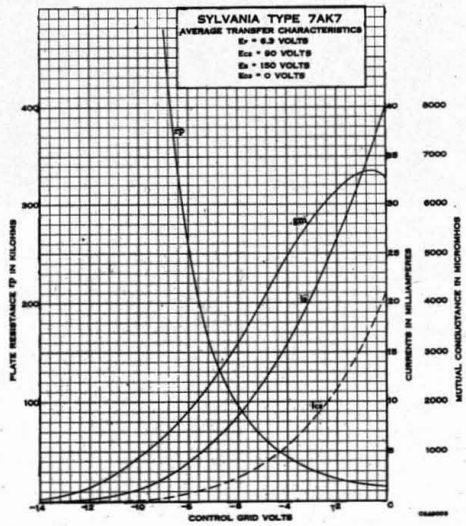
TYPICAL OPERATION

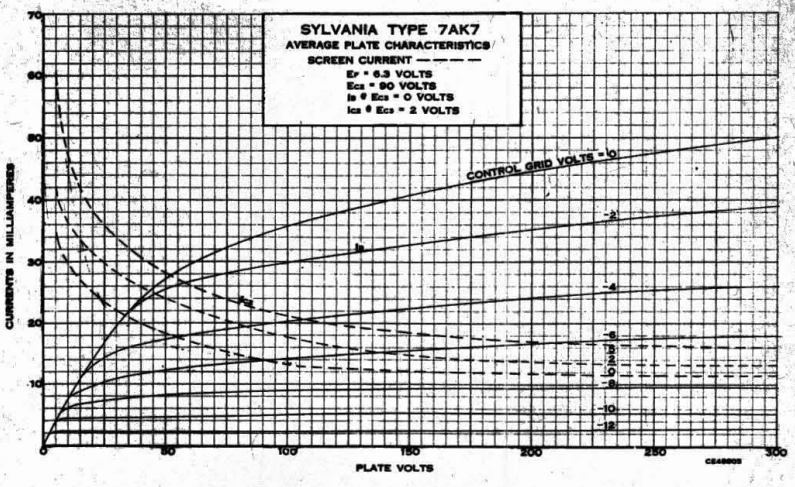
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	0.8	0.8	0.8 Ampere
Plate Voltage	150	150	150 Volts
Screen Voltage	90	90	90 Volts
Control Grid Voltage	0	—11	0 Volts
Suppressor Grid Voltage	0	0	—9.5 Volts
Transconductance	6500	....	..... μmhos
Plate Resistance (Approx.)	11,500	....	..... Ohms
Plate Current	40	2.0 Max.	2.0 Max. Ma.
Screen Current	21	0.45	43 Max. Ma.

APPLICATION

Sylvania Type 7AK7 is a sharp cut-off amplifier pentode of lock-in construction designed and rated for use with an additional control voltage on the suppressor. For use as a "gating" tube the watts dissipation rating of the screen may approximate 4.0 watts momentarily, providing the dissipation averaged over any one second interval does not exceed the rating.

Since normal use of this tube will require fixed bias operation, the maximum grid circuit resistance should not exceed .1 megohm.

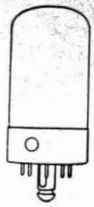



SYLVANIA TYPE 7AK7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT ———
Ef = 6.3 VOLTS
Ecc = 90 VOLTS
Ib & Ecs = 0 VOLTS
Ics & Ecs = 2 VOLTS
CONTROL GRID VOLTS = 0
-2
-4
-6
-8
-10
-12
Ib
Ics
CURRENTS IN MILLIAMPERES
PLATE VOLTS
0
50
100
150
200
250
300
70
60
50
40
30
20
10
CS40008

7B4 Sylvania Type

HIGH-MU TRIODE

GT EQUIVALENT 6SF5GT





5AC-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{15}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

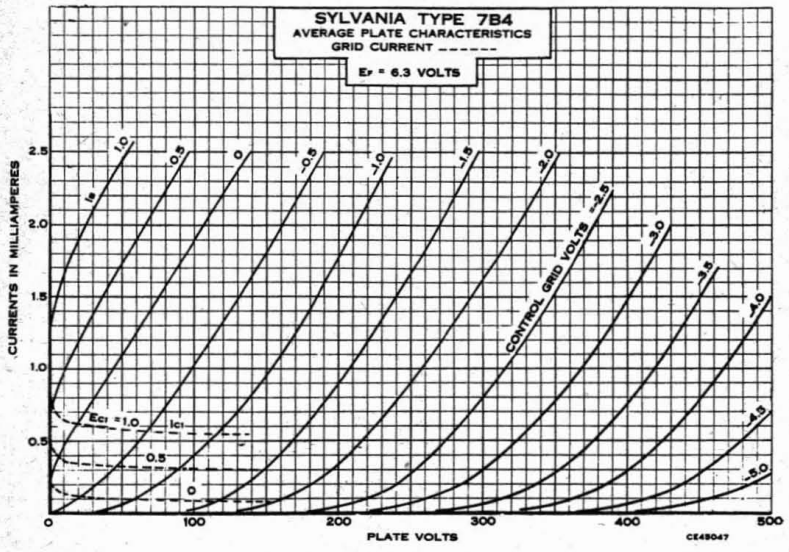
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Plate Current	0.4	0.9 Ma.
Plate Resistance (Approximate)	85000	66000 Ohms
Mutual Conductance (Approximate)	1150	1500 μmhos
Amplification Factor	100	100

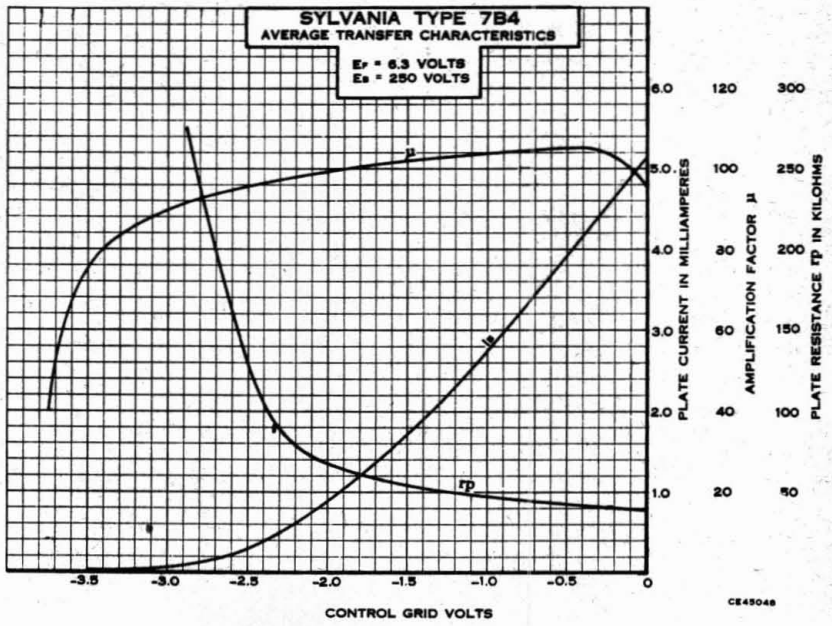
APPLICATION

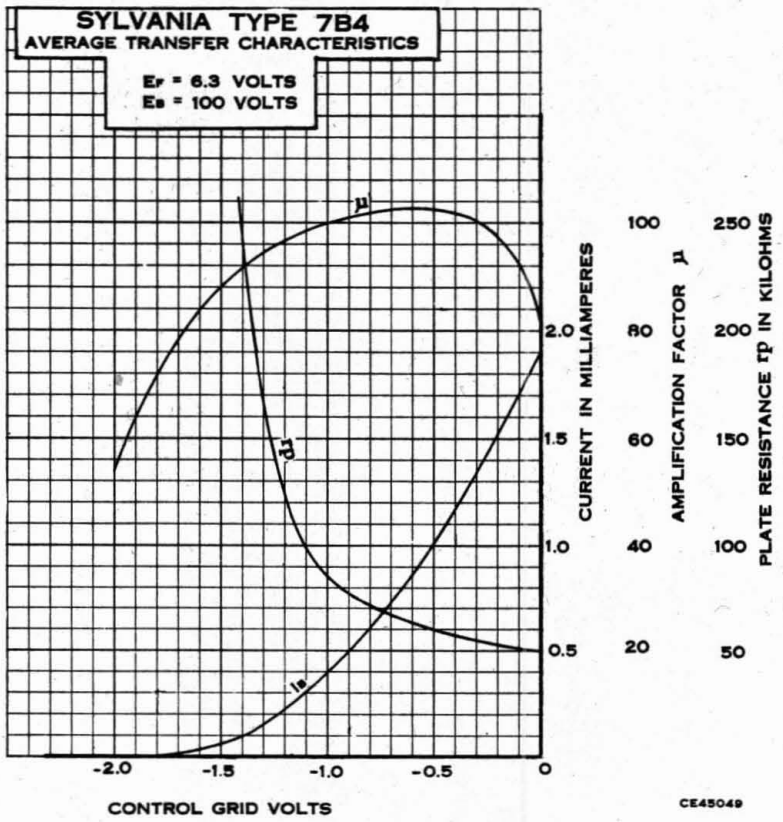
Sylvania Type 7B4 is a single-ended high-mu triode having electrical characteristics and applications similar to those for Type 6F5G.

The lock-in construction employed in Type 7B4 provides compactness, suitable shielding, and the lock-in feature. For a-c service the 7-volt heater rating corresponds to a 130-volt line condition. It is also the nominal voltage for automotive receiver service. For household receivers, ratings marked Max. are design centers for a line voltage of 117 volts. For automotive service the design centers are 90% of the values indicated using a battery terminal voltage of 6.6 volts.

For data on resistance coupling circuits, refer to table in appendix.



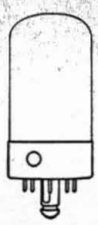

SYLVANIA TYPE 7B4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
μ
Ib
rp
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
6.0
5.0
4.0
3.0
2.0
1.0
120
100
80
60
40
20
300
250
200
150
100
50
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45048

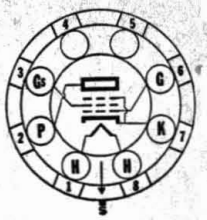

SYLVANIA TYPE 7B4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
μ
rp
Ib
-2.0
-1.5
-1.0
-0.5
0
2.0
1.5
1.0
0.5
100
80
60
40
20
250
200
150
100
50
CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45049

7B5 Sylvania Type

POWER OUTPUT PENTODE

GT EQUIVALENT 6K6GT





6AE-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	315 Volts
Maximum Screen Voltage	285 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	2.8 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.8 μμf.
Input	7.4 μμf.
Output	8.0 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

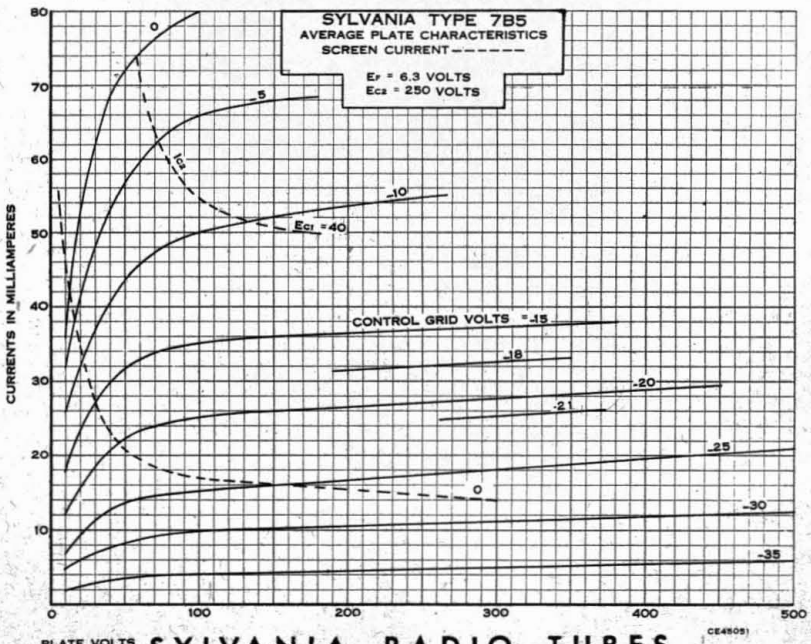
SINGLE-TUBE CLASS A_1 AMPLIFIER

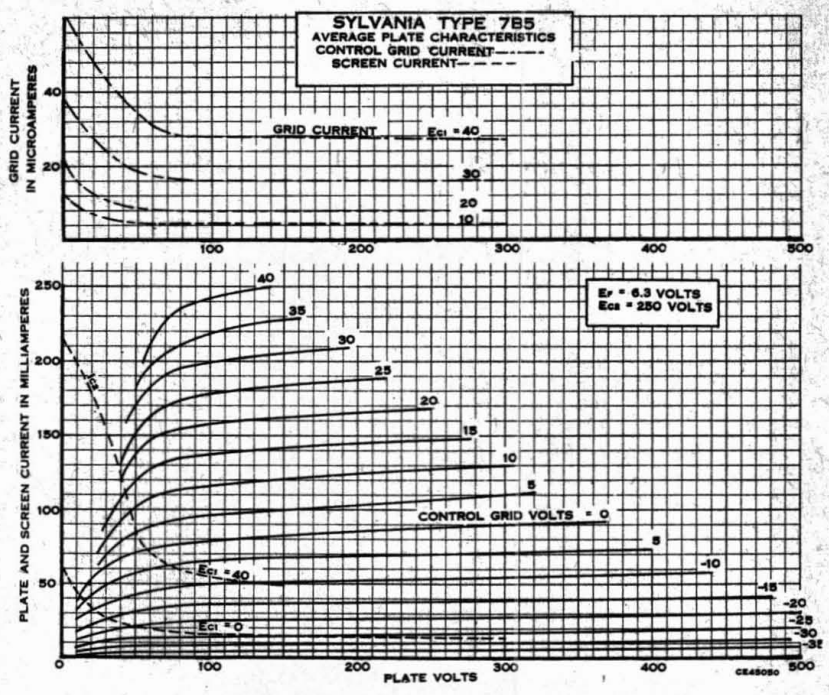
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	400	400	400 Ma.
Plate Voltage	100	250	315 Volts
Screen Voltage	100	250	250 Volts
Grid Voltage§	−7.0	−18	−21 Volts
Self-Bias Resistor	650	500	700 Ohms
Peak Signal Voltage	7.0	18	21 Volts
Plate Current (Zero Signal)	9.0	32.0	25.5 Ma.
Plate Current (Maximum Signal)	9.0	33.0	28.0 Ma.
Screen Current (Zero Signal)	1.6	5.5	4.0 Ma.
Screen Current (Maximum Signal)	3.0	10.0	9.0 Ma.
Plate Resistance (Approximate)	104000	68000	75000 Ohms
Mutual Conductance	1500	2300	2100 μmhos
Load Resistance	12000	7600	9000 Ohms
Power Output	0.35	3.4	4.5 Watts
Total Harmonic Distortion	11	11	15 Per Cent

§The DC resistance in the grid circuit should not exceed 0.5 Meg.

APPLICATION

Sylvania Type 7B5 is a power output pentode of lock-in design. It is suitable for use in automobile and A-C operated receivers with the lock-in design providing ruggedness and compact size.

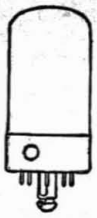


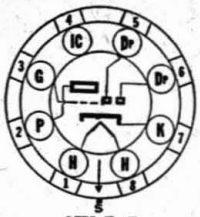

SYLVANIA TYPE 7B5
AVERAGE PLATE CHARACTERISTICS
CONTROL GRID CURRENT
SCREEN CURRENT
GRID CURRENT IN MICROAMPERES
GRID CURRENT
Ec1 = 40
30
20
10
PLATE AND SCREEN CURRENT IN MILLIAMPERES
Ef = 6.3 VOLTS
Ec2 = 250 VOLTS
CONTROL GRID VOLTS = 0
Ec1 = 40
Ec1 = 0
PLATE VOLTS
CR45050

7B6 Sylvania Type

DUODIODE HIGH-MU TRIODE

GT EQUIVALENT 6SQ7GT





8W-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts
Maximum Diode Drop at 0.8 Ma.	10 Volts
Maximum Diode Current per Plate (Continuous)	1.0 Ma.

Direct Interelectrode Capacitances:*

Grid to Plate	1.6 μμf.
Input	3.0 μμf.
Output	2.4 μμf.
Grid to Diode 1	0.01 μμf.
Grid to Diode 2	0.04 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

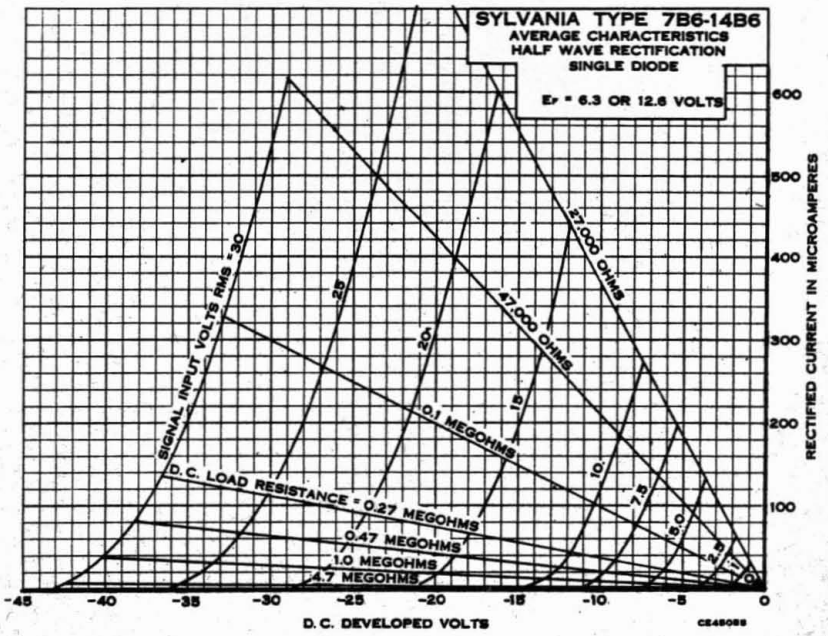
Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Plate Current	0.4	0.9 Ma.
Plate Resistance	110000	91000 Ohms
Mutual Conductance	900	1100 μmhos
Amplification Factor	100	100

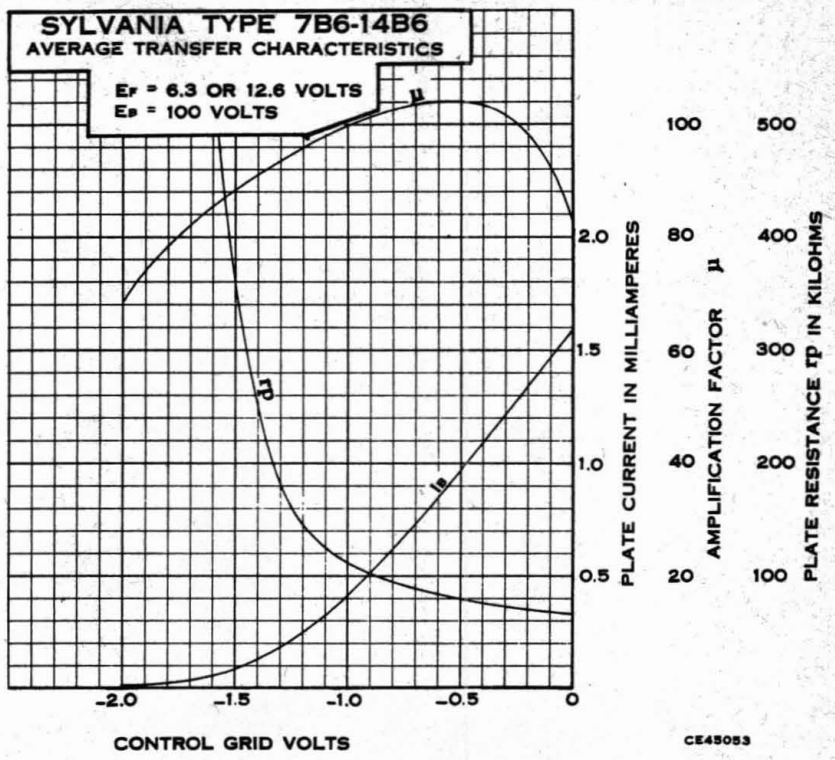
APPLICATION

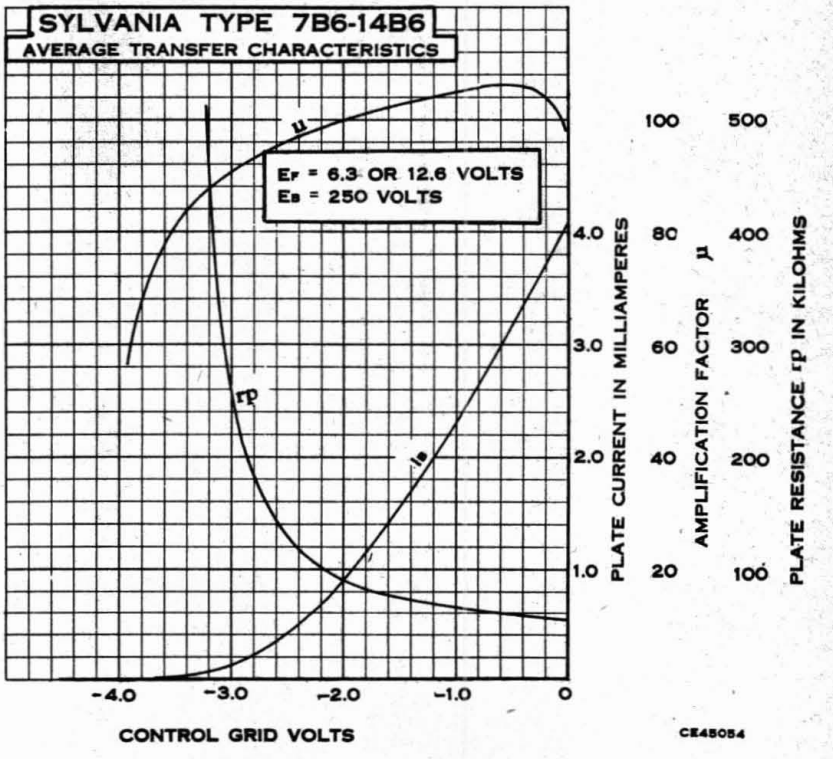
Sylvania Type 7B6 is a duodiode high-mu triode suitable for detector audio amplifier service in AC or auto receivers. For AC-DC receivers, the Types 7C6 or 14B6, having lower heater current ratings, should prove more satisfactory.

The diodes are independent of each other and of the triode unit except that the cathode structure is common to all. Type 7K7 or 7X7 should be considered if it is necessary to have more complete separation between the various sections.

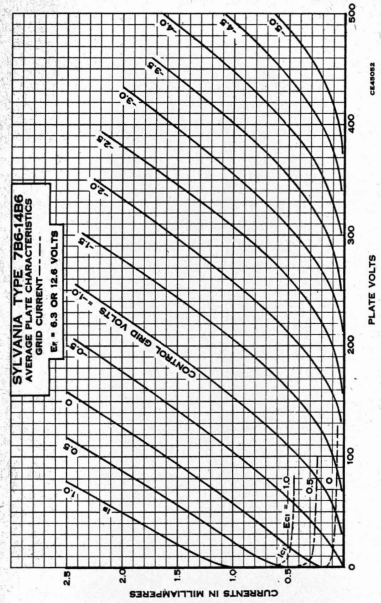
Resistance coupled amplifier data will be found in the table in the appendix.




SYLVANIA TYPE 7B6-14B6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
μ
rp
Ib
2.0
1.5
1.0
0.5
100
80
60
40
20
500
400
300
200
100
-2.0
-1.5
-1.0
-0.5
0
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45053

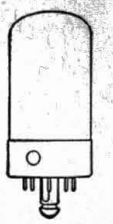

SYLVANIA TYPE 7B6-14B6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
μ
rp
Ib
4.0
3.0
2.0
1.0
100
80
60
40
20
500
400
300
200
100
-4.0
-3.0
-2.0
-1.0
0
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45054

7B6 (Cont.)


SYLVANIA TYPE 7B6-14B6
AVERAGE PLATE CHARACTERISTICS
GRID CURRENT
Ef = 6.3 OR 12.6 VOLTS
CONTROL GRID VOLTS
PLATE VOLTS
CURRENTS IN MILLIAMPERES
CS-45053



8V-L-5



Sylvania Type 7B7

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Plate Dissipation	2.25 Watts
Maximum Screen Dissipation	0.25 Watt
Minimum External Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	0.007 μμf. Max.
Input; Grid to (F+K+Gs+Su)	5.0 μμf.
Output; Plate to (F+K+Gs+Su)	6.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−3	−3 Volts
Self-Bias Resistor	300	300 Ohms
Suppressor	Connect to Cathode	
Plate Current	8.2	8.5 Ma.
Screen Current	1.8	1.7 Ma.
Plate Resistance	0.3	0.75 Megohm
Mutual Conductance	1675	1750 μmhos
Grid Voltage for Mutual Conductance of 10 μmhos	−40	−40 Volts

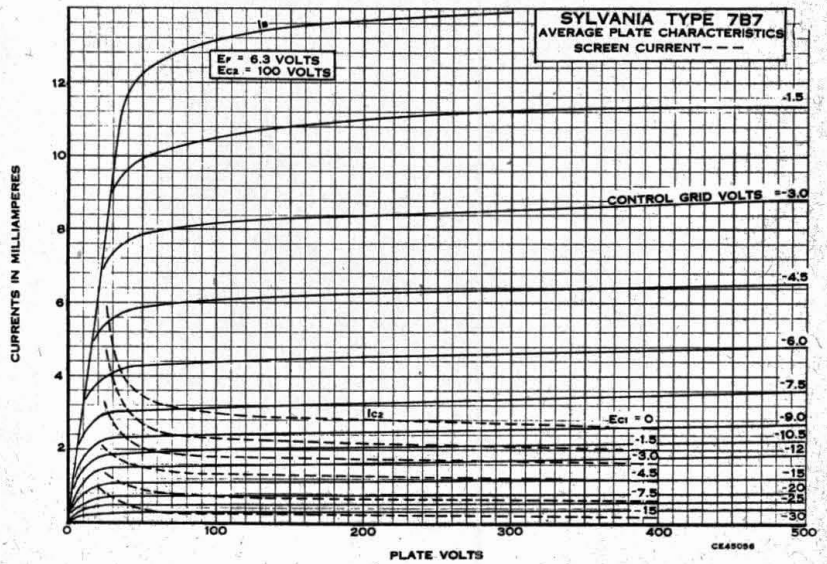
APPLICATION

Sylvania Type 7B7 is a single-ended triple grid remote cut-off amplifier of lock-in design suitable for r-f or i-f service in a-c, ac-dc and auto receivers.

All of the grids terminate a base pins, thus providing an r-f amplifier tube without a top cap. An internal cage-like shield connected to pin Number 5 is used to obtain a small grid to plate capacity.

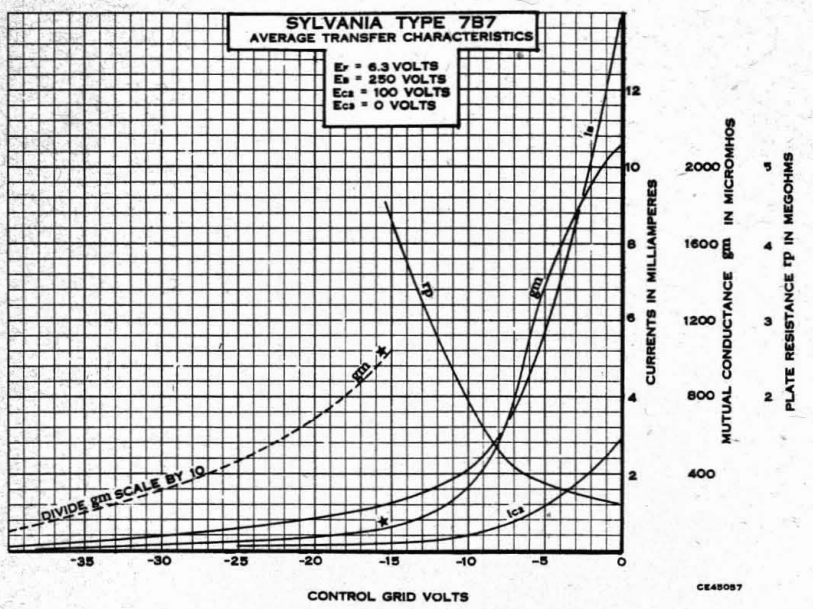
The electrical characteristics and applications of Type 7B7 are very similar to those for Type 7A7. Reference may be made to this type for application notes.

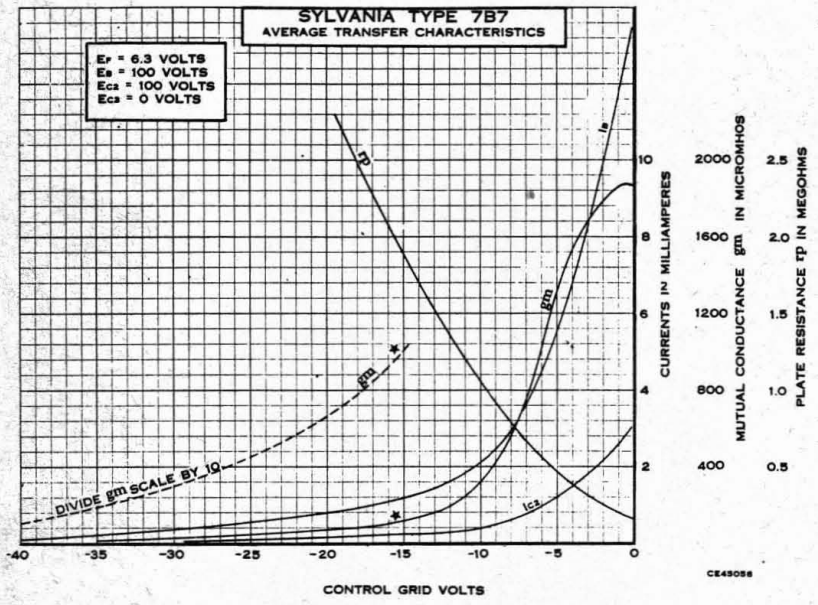
For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.

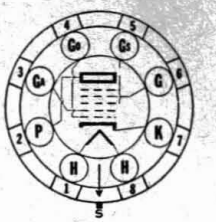


SYLVANIA RADIO TUBES

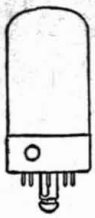
7B7 (Cont.)


SYLVANIA TYPE 7B7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
rp
gm
Ia
Ic2
DIVIDE gm SCALE BY 10
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45057


SYLVANIA TYPE 7B7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
rp
gm
Ia
Ic2
DIVIDE gm SCALE BY 10
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45058



8X-L-0



Sylvania Type 7B8

HEPTODE CONVERTER

GT EQUIVALENT 6A8GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply	300 Volts
Maximum Anode Grid Voltage	200 Volts
Maximum Anode Grid Supply	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	0.3 Watt
Maximum Anode Grid Dissipation	0.75 Watt
Maximum Cathode Current	14 Ma.
Minimum Signal Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid G to Plate	0.2 μμf. Max.
Grid G to Grid Ga	0.3 μμf. Max.
Grid G to Grid Go	0.2 μμf. Max.
Grid Go to Grid Ga	0.9 μμf.
Grid G to all Electrodes (R-F Input)	10.0 μμf.
Grid Ga to all Electrodes except Go (Osc. Output)	3.4 μμf.
Grid Go to all Electrodes except Ga (Osc. Input)	5.0 μμf.
Plate to all Electrodes (Mixer Output)	9.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	50	100 Volts
Anode Grid Voltage	100	250** Volts
Control Grid (G) Voltage	−1.5	−3.0 Volts
Oscillator Grid (Go) Resistor	50000	50000 Ohms
Plate Current	1.1	3.5 Ma.
Screen Grid Current	1.3	2.7 Ma.
Anode Grid Current	2.0	4.0 Ma.
Oscillator Grid Current	0 25	0.4 Ma.
Self-Bias Resistor	360	300 Ohms
Plate Resistance	0.6	0.36 Megohm
Conversion Conductance	360	550 μmhos
Control Grid Voltage (Approximate)		
For 6 μmhos Conversion Conductance	.....	−35 Volts
For 3 μmhos Conversion Conductance	−20	..... Volts

**Applied through 20,000 ohm dropping resistor.

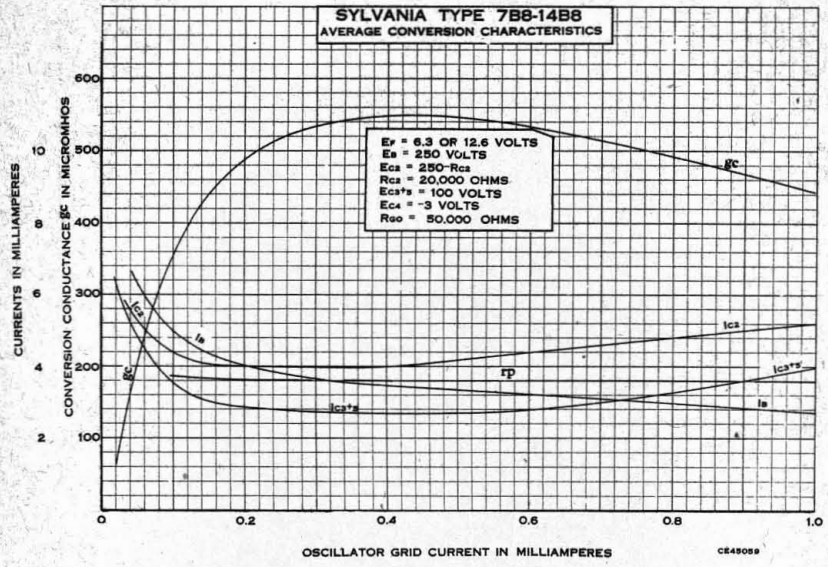
The oscillator section, not oscillating, has a Gm of 1150 μmhos, a mu of 75 at an anode grid current of 4.0 ma. when Ep = 250 Volts; Ega = 100 Volts; Egs = 55 Volts; Eg = 2.0 Volts and Ego = −1.0 Volt.

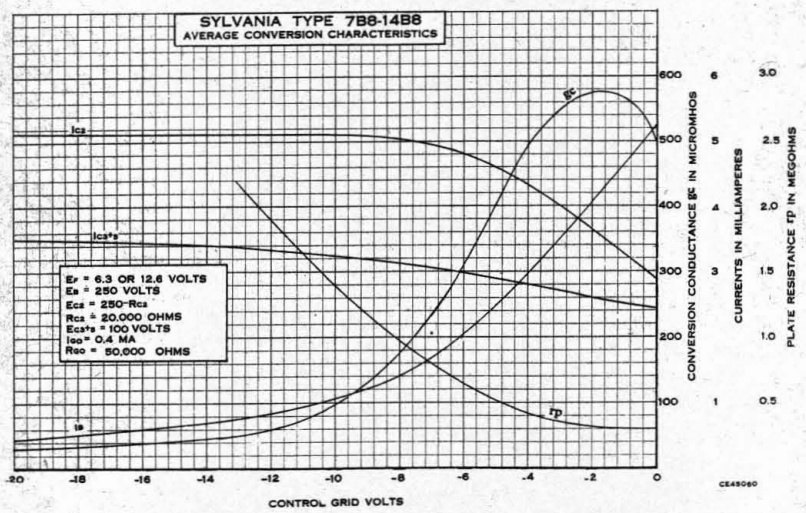
APPLICATION

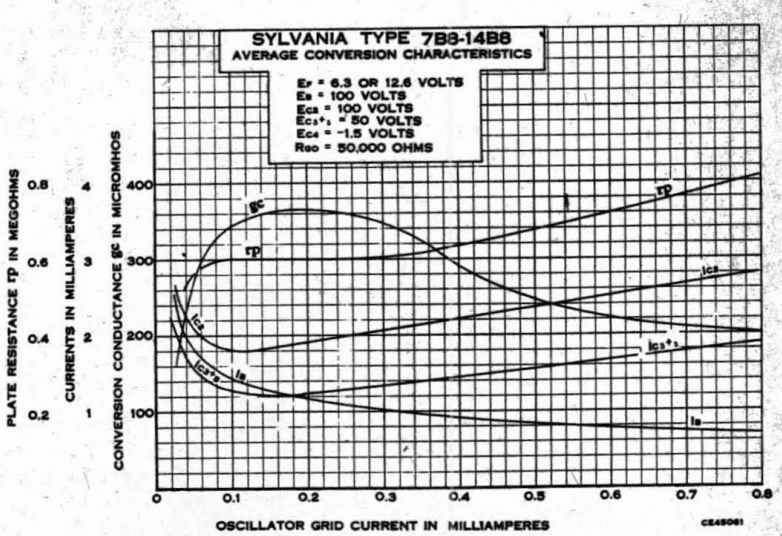
Sylvania Type 7B8 is a lock-in converter tube designed for use in AC or auto receivers. For AC-DC service, Type 14B8 with lower heater current rating will usually prove more satisfactory.

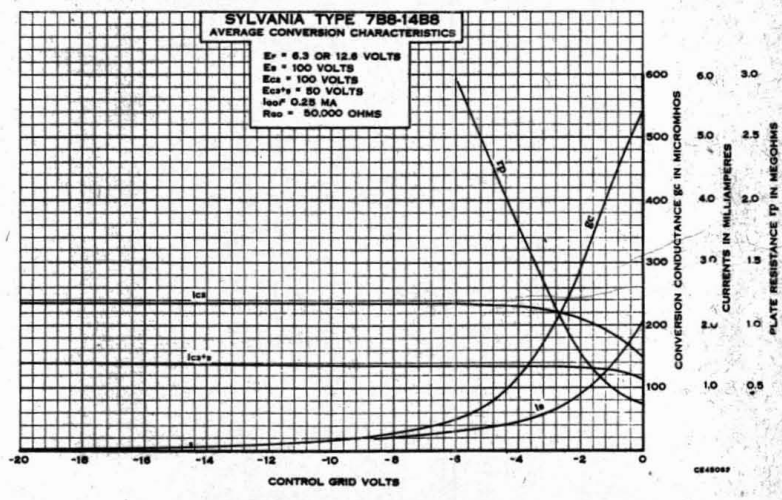
Electrically, Type 7B8 is similar to the older oscillator mixer tubes. Conventional circuits and design are readily adaptable for use with this compact rugged tube. As is usual with converter tubes, it is well to ascertain that the maximum cathode current does not exceed the rated limit under any encountered operating condition.

7B8 (Cont.)


SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Er = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 250-Rc2
Rc2 = 20,000 OHMS
Ec3+5 = 100 VOLTS
Ec4 = -3 VOLTS
Rgo = 50,000 OHMS
gc
ic2
ib
rp
ic2+3+5
ib
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MILLIAMPERES
CE45089


SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Er = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 250-Rc2
Rc2 = 20,000 OHMS
Ec3+5 = 100 VOLTS
Ico = 0.4 MA
Rgo = 50,000 OHMS
gc
ic2
ic2+3+5
ib
rp
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45060

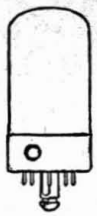

SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec3*1 = 50 VOLTS
Ec4 = -1.5 VOLTS
Rgo = 50,000 OHMS
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MILLIAMPERES
gc
rp
ic2
ic3*1
ic2*3
ib
CE45061


SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec3*2 = 50 VOLTS
Ioo* 0.25 MA
Rgo = 50,000 OHMS
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
rp
gc
ic2
ic3*2
ib
CE45062

7C5 Sylvania Type

BEAM POWER AMPLIFIER

GT EQUIVALENT 6V6GT





6AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$3\frac{5}{32}$"
Maximum Seated Height	$2\frac{5}{8}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	315 Volts
Maximum Screen Voltage	285 Volts
Maximum Plate Dissipation	12 Watts
Maximum Screen Dissipation	2 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.4 μμf.
Input	9.5 μμf.
Output	9.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER (ONE TUBE)

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	450	450	450 Ma.
Plate Voltage	180	250	315 Volts
Screen Voltage	180	250	225 Volts
Grid Voltage	−8.5	−12.5	−13.0 Volts
Self-Bias Resistor	260	250	360 Ohms
Peak Input Signal	8.5	12.5	13.0 Volts
Plate Current (Zero Signal)	29	45	34 Ma.
Plate Current (Maximum Signal)	30	47	35 Ma.
Screen Current (Zero Signal)	3.0	4.5	2.2 Ma.
Screen Current (Maximum Signal)	4.0	7.0	6.0 Ma.
Plate Resistance	58000	52000	77000 Ohms
Mutual Conductance	3700	4100	3750 μmhos
Load Resistance	5500	5000	8500 Ohms
Power Output	2.0	4.5	5.5 Watts
Total Harmonic Distortion	8	8	12 Per Cent

CLASS AB_1 AMPLIFIER (PUSH-PULL)

(Values are for two tubes)

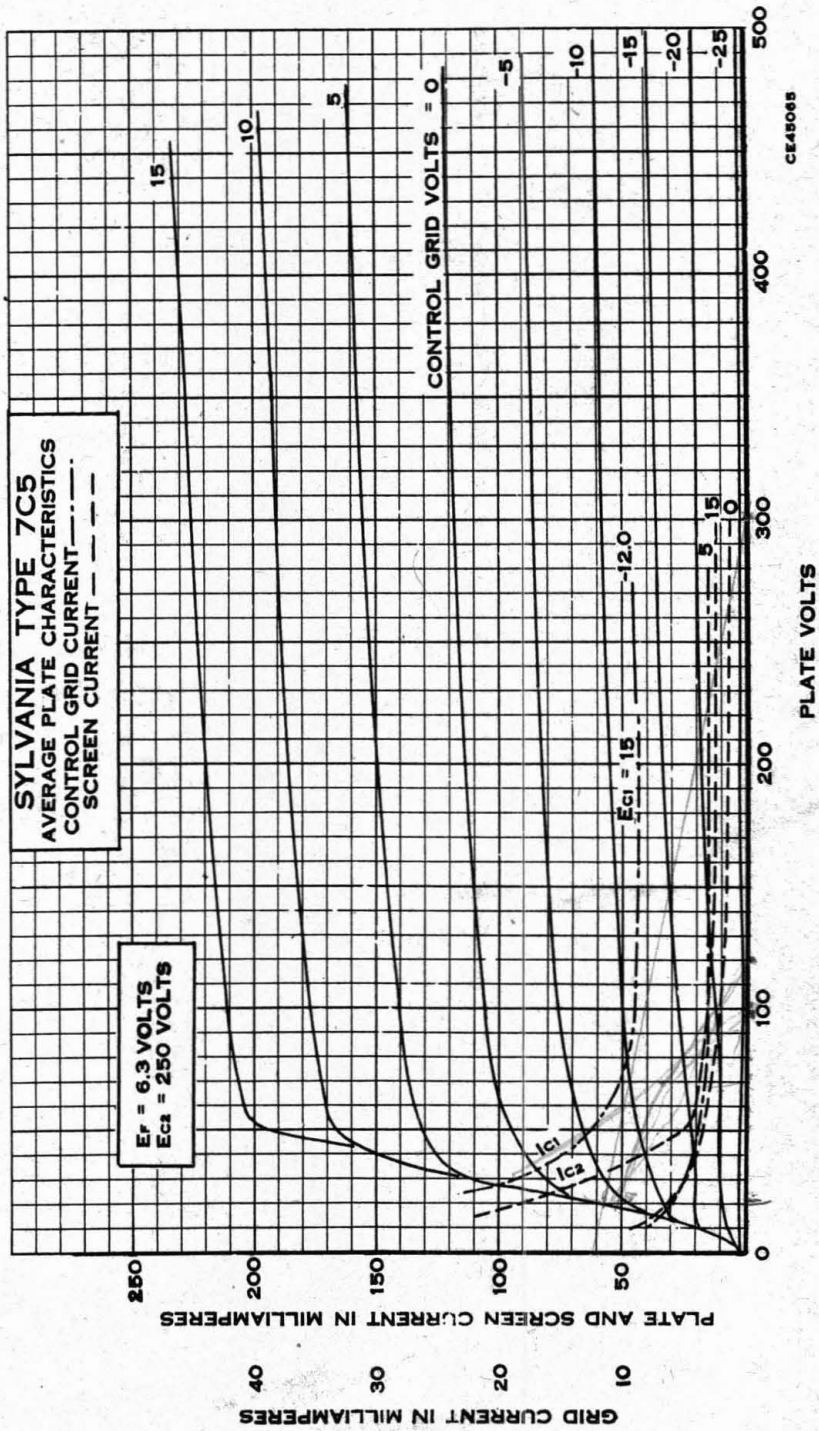
Heater Voltage	6.3	6.3 Volts
Heater Current	.90	.90 Ampere
Plate Voltage	250	285 Volts
Screen Voltage	250	285 Volts
Grid Voltage	−15	−19 Volts
Self-Bias Resistor	200	260 Ohms
Peak Input Signal (Grid to Grid)	30	38 Volts
Plate Current (Zero Signal)	70	70 Ma.
Plate Current (Maximum Signal)	79	92 Ma.
Screen Current (Zero Signal)	5	4 Ma.
Screen Current (Maximum Signal)	13	13.5 Ma.
Plate Resistance	60000	65000 Ohms
Mutual Conductance	3750	3600 μmhos
Load Resistance (Plate to Plate)	10000	8000 Ohms
Power Output	10.0	14.0 Watts
Total Harmonic Distortion	5	3.5 Per Cent

APPLICATION

Sylvania Type 7C5 is a beam power amplifier which provides high power output, power sensitivity, and efficiency with a low percentage of third and higher order harmonics. The electrical characteristics and applications are identical with those for Types 6V6 and 6V6G. The Type 7C5 should prove very desirable in applications where heater and plate current drain must be maintained at a minimum.

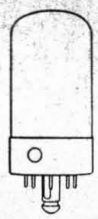
The lock-in construction provides compactness, suitable shielding and the special lock-in feature. For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.

When fixed bias is employed the resistance in the grid circuit should not be greater than 0.05 megohm. With cathode bias the grid circuit resistance must not exceed 0.5 megohm.


SYLVANIA TYPE 7C5
AVERAGE PLATE CHARACTERISTICS
CONTROL GRID CURRENT —·—·—
SCREEN CURRENT — — — —
Ef = 6.3 VOLTS
Eca = 250 VOLTS
CONTROL GRID VOLTS = 0
15
10
5
-5
-10
-15
-20
-25
-12.0
Ec1 = 15
Ic1
Ic2
CE45065
PLATE VOLTS
0
100
200
300
400
500
PLATE AND SCREEN CURRENT IN MILLIAMPERES
0
50
100
150
200
250
GRID CURRENT IN MILLIAMPERES
10
20
30
40

7C6 Sylvania Type

DUODIODE HIGH-MU TRIODE





8W-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Diode Drop at .8 Ma.	10 Volts
Maximum Diode Current per Plate (Continuous)	1.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Grid Voltage*	0.0	−1.0 Volt
Plate Current*	1.0	1.3 Ma.
Plate Resistance*	0.1	0.1 Megohm
Mutual Conductance*	850	1000 μmhos
Amplification Factor*	85	100

*These are rating values only and not operating points with coupling resistor. Refer to tabulated data on page 49 for this information.

APPLICATION

Sylvania Type 7C6 is a single-ended duodiode high-mu triode having electrical characteristics quite similar to those for Type 75, except for the heater ratings.

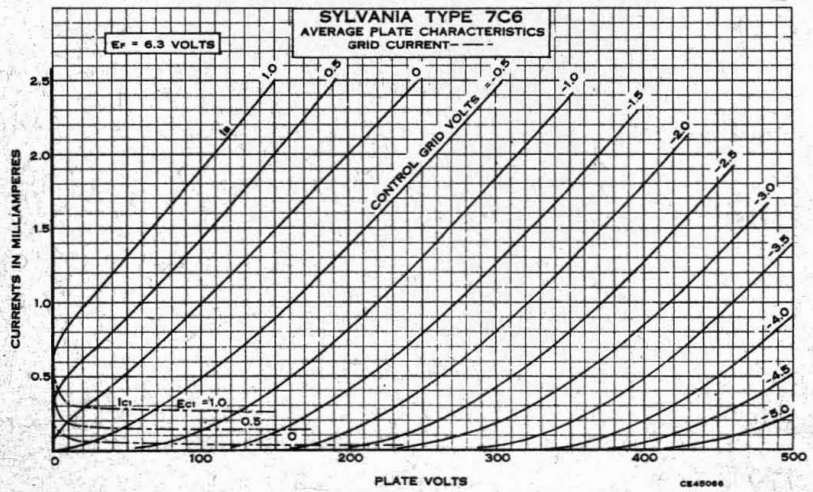
The diodes are substantially the same as those employed in other Sylvania duodiode high-mu triode types and therefore are suitable for conventional circuit applications. Diode curves are given under Type 7B6.

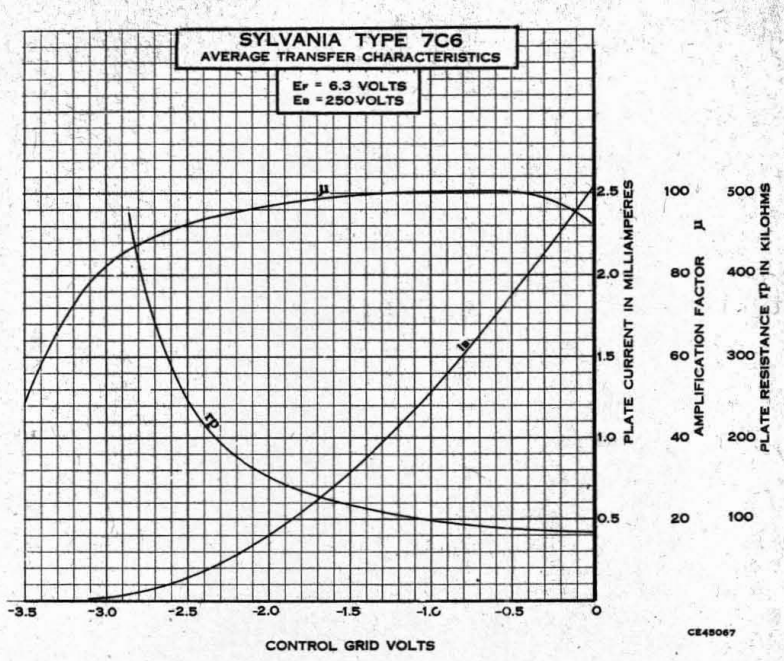
The triode section should not be employed with fixed bias. A high value of grid resistor is required and the triode operated essentially under zero bias conditions. With a plate supply voltage of 250 volts, the plate load resistor should be approximately 0.25 megohm. For special applications this value may be varied to suit the conditions.

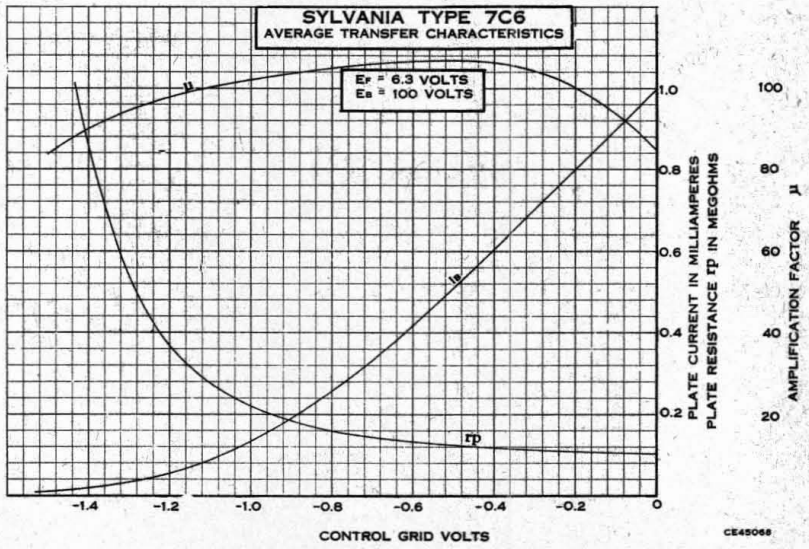
Resistance coupled data is given in the appendix.

It will be noted from the base diagram that the cathode is connected to two contact pins, Numbers 4 and 7. Pin Number 4 is used as a mount support for the cathode, therefore, the potential of Pins 4 and 7 is the same.

The lock-in construction provides compactness, suitable shielding and the special lock-in feature. For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.



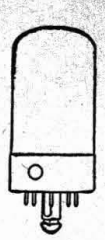

SYLVANIA TYPE 7C6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
μ
ip
rp
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
2.5
2.0
1.5
1.0
0.5
100
80
60
40
20
500
400
300
200
100
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45067

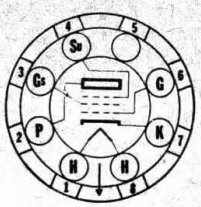

SYLVANIA TYPE 7C6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
μ
ip
rp
-1.4
-1.2
-1.0
-0.8
-0.6
-0.4
-0.2
0
1.0
0.8
0.6
0.4
0.2
100
80
60
40
20
PLATE CURRENT IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
AMPLIFICATION FACTOR μ
CONTROL GRID VOLTS
CE45068

7C7 Sylvania Type

SHARP CUT-OFF RF PENTODE

GT EQUIVALENT 6W7G





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	0.1 Watt
Minimum Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate (G1 to P)	0.007 $\mu\mu$f. Max.
Input; G1 to (F+K+Gs+Su+Shield)	5.5 $\mu\mu$f.
Output; P to (F+K+Gs+Su+Shield)	6.5 $\mu\mu$f.

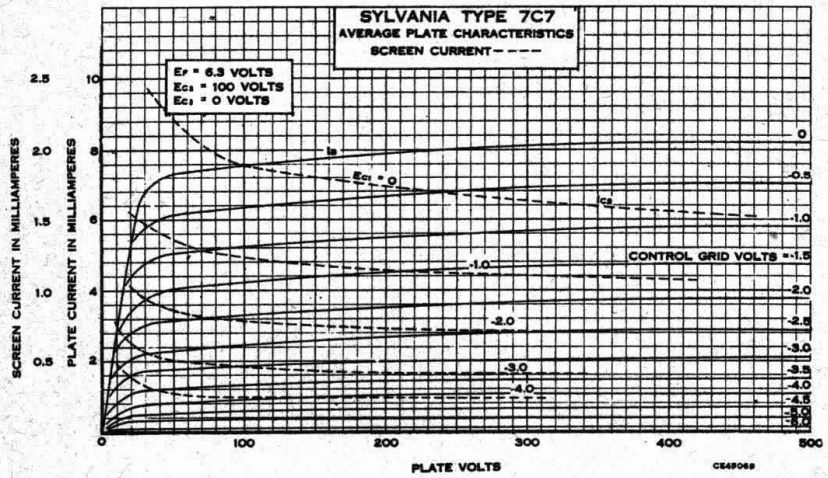
*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

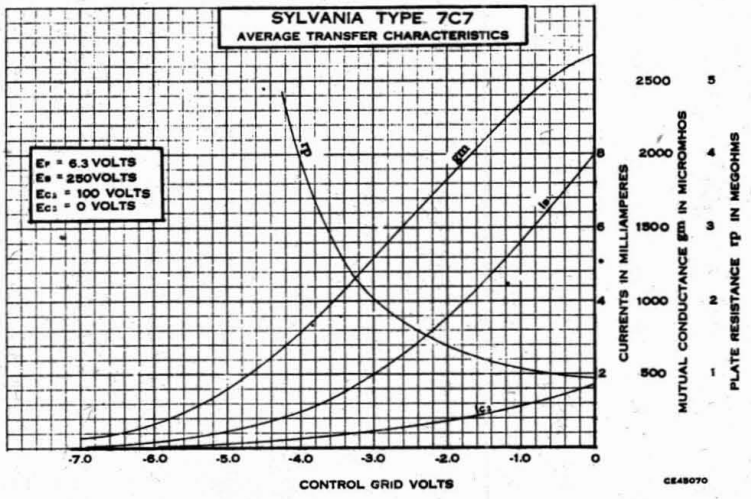
TYPICAL OPERATION

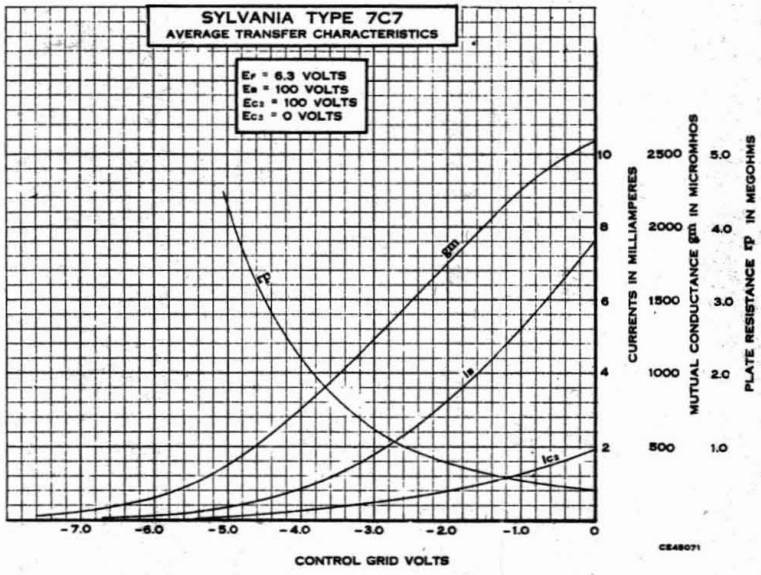
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts Max.
Screen Voltage	100	100 Volts Max.
Grid Voltage	−3	−3 Volts Min.
Self-Bias Resistor	1350	1200 Ohms
Suppressor Grid	Connect to Cathode	
Plate Current	1.8	2.0 Ma.
Screen Current	0.4	0.5 Ma.
Plate Resistance (Approximate)	1.2	2 Megohms
Mutual Conductance	1225	1300 μmhos

APPLICATION

Sylvania Type 7C7 is a sharp cut-off pentode with a low heater current rating. In other respects it is similar to the older Type 6J7GT. Design data for use in resistance coupled circuits appears in the appendix.

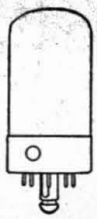


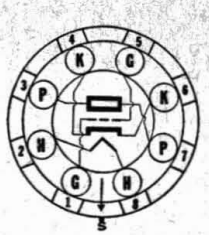

SYLVANIA TYPE 7C7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
rp
gm
Ib
Ic2
-7.0
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0
2
4
6
8
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
2500
2000
1500
1000
500
1
2
3
4
5
CE45070


SYLVANIA TYPE 7C7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
rp
gm
Ib
Ic2
-7.0
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0
2
4
6
8
10
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
2500
2000
1500
1000
500
1.0
2.0
3.0
4.0
5.0
CE45071

7E5 Sylvania Type

HIGH-FREQUENCY TRIODE





8BN-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	2 25/32"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	250 Volts
Maximum Plate Current	16 Ma.
Maximum Grid Current	6 Ma.
Maximum Plate Dissipation	4 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	1.5 μμf.
Input	3.6 μμf.
Output	2.8 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.150 Ampere
Plate Voltage	180 Volts
Grid Voltage	−3.0 Volts
Plate Current	5.5 Ma.
Mutual Conductance	3000 μmhos
Plate Resistance	120000 Ohms
Amplification Factor	36

UHF OSCILLATOR—750 Mc.♦

Heater Voltage	6.3	6.3 Volts
Plate Voltage	200	250 Volts
Plate Current	11	13 Ma.
Grid Resistor	10000	20000 Ohms
Developed Bias	2.5	3.5 Volts

♦Half-wave four-line oscillator in which line shortening, due to the tube, is approximately 45% of a half-wave length.

UHF OSCILLATOR OR POWER AMPLIFIER—300 Mc.♣

Heater Voltage	6.3 Volts
Plate Supply Voltage§	150 Volts
Plate Current	16 Ma.
Grid Current	6.0 Ma.
Grid Resistor (Approximate)	1700 Ohms
Power Output	0.20 Watt

§Supplied through 3000 ohm dropping resistor.

LOCAL OSCILLATOR FOR 300 Mc. MIXER DRIVING♣

Heater Voltage	6.3 Volts
Plate Supply Voltage§	90 Volts
Plate Current	7.8 Ma.
Grid Voltage	−7.0 Volts
Grid Resistor	3000 Ohms
Mixer Developed Bias‡	−5.3 Volts

§Supplied through 3000 ohm dropping resistor.

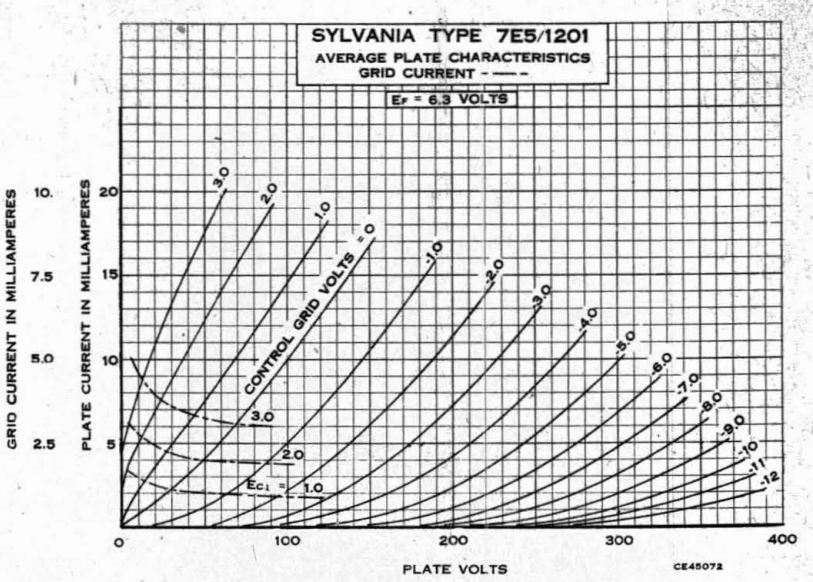
♣Quarter wave four-line oscillator in which the line shortening is approximately 30% of a quarter wave length.

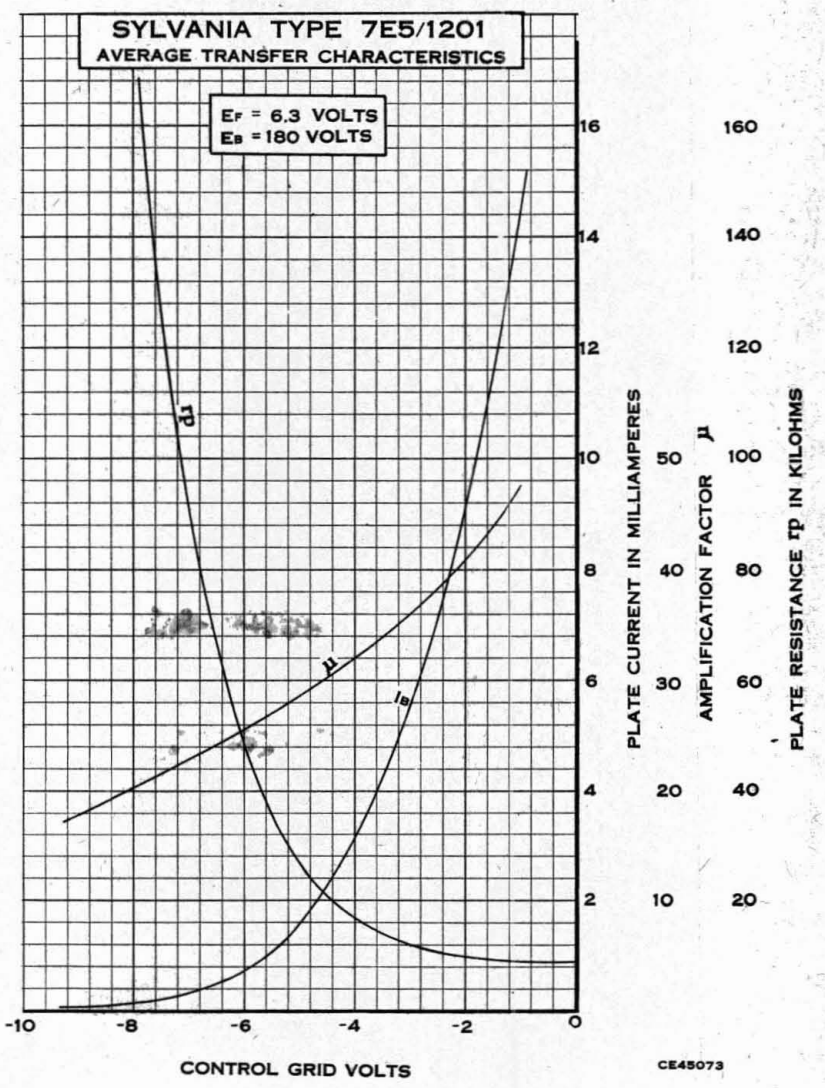
‡Developed bias across 35,000 ohm grid leak of UHF triode mixer tuned to 324 megacycles.

APPLICATION

Sylvania Type 7E5 is a cathode type triode of Lock-In construction designed for ultra-high frequqency applications. This tube can be used as a signal source or local oscillator to frequencies of 750 megacycles when used in a double ended transmission line circuit. This type of operation is facilitated by a symmetrical arrangement of double grid and plate leads. These connections are brought out to the Lock-In single ended base from opposite ends of their respective element structures. Useful power output can be obtained at frequencies of 400 megacycles and lower, but below approximately 200 megacycles the use of other types, such as Sylvania Type 7A4, are recommended.

For use in resistance coupled circuits, see data in appendix.

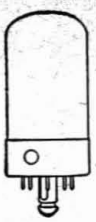

SYLVANIA TYPE 7E5/1201
AVERAGE PLATE CHARACTERISTICS
GRID CURRENT - - —
EF = 6.3 VOLTS
GRID CURRENT IN MILLIAMPERES
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS = 0
3.0
2.0
1.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
-10
-11
-12
EC1 =
PLATE VOLTS
CE45072

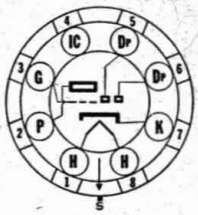

SYLVANIA TYPE 7E5/1201
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 VOLTS
EB = 180 VOLTS
rp
μ
Ib
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45073

7E6 Sylvania Type

DUODIODE MEDIUM-MU TRIODE

GT EQUIVALENT 6SR7GT





8W-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Diode Drop at .8 Ma.	10 Volts
Maximum Continuous Diode Current per Plate	1.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	1.5 μμf.
Input	3.0 μμf.
Output	2.4 μμf.
Grid to Diode 1	0.01 μμf. Max.
Grid to Diode 2	0.04 μμf. Max.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

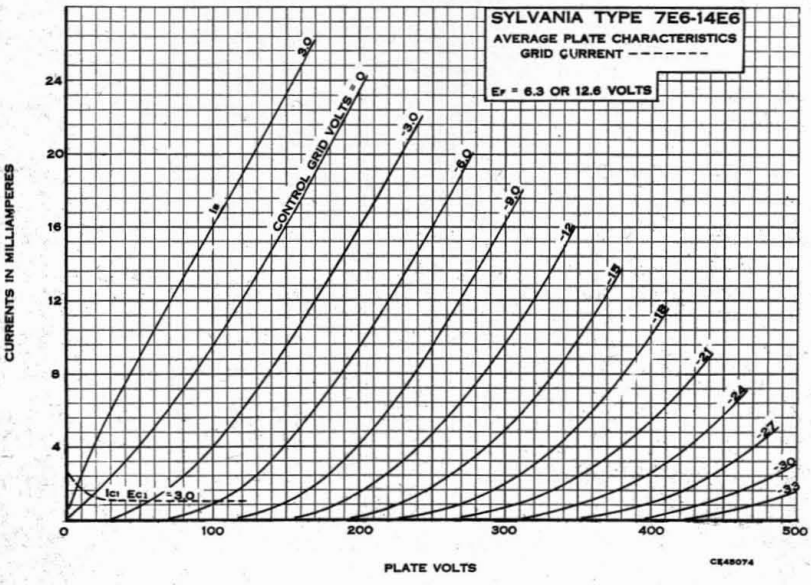
TYPICAL OPERATION

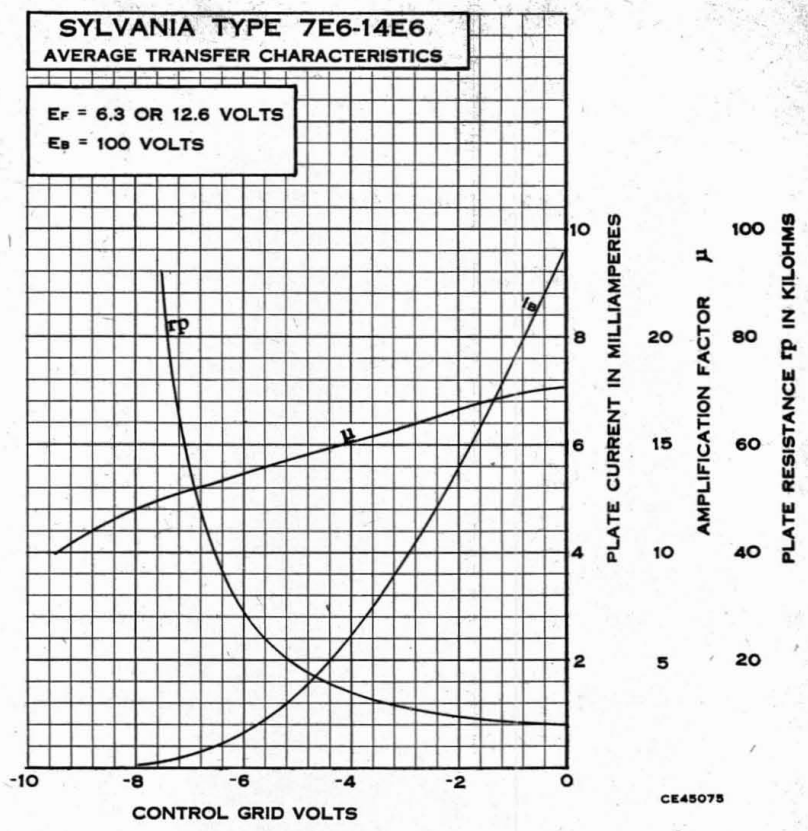
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage§	−3	−9 Volts
Self-Bias Resistor	770	950 Ohms
Plate Current	3.9	9.5 Ma.
Plate Resistance	11000	8500 Ohms
Mutual Conductance	1500	1900 μmhos
Amplification Factor	16.5	16

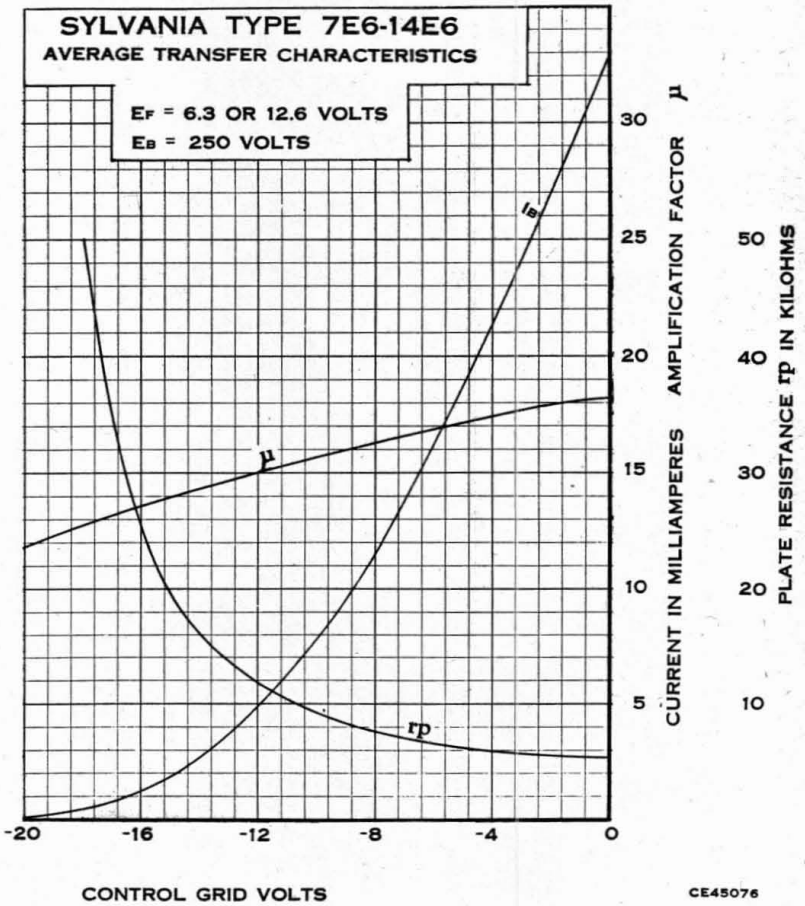
§DC resistance in the grid circuit should not exceed 1.0 megohm under maximum rated conditions.

APPLICATION

Sylvania Type 7E6 is a Lock-In duodiode triode having medium-mu characteristics. It is intended for use in conjunction with transformer coupled circuits although resistance coupling data are given in appendix. The diode section is the same as that in Type 7B6 and reference should be made to that type for curves.

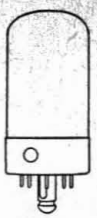



SYLVANIA TYPE 7E6-14E6
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 100 VOLTS
rp
μ
ib
-10
-8
-6
-4
-2
0
CONTROL GRID VOLTS
2
4
6
8
10
PLATE CURRENT IN MILLIAMPERES
5
10
15
20
AMPLIFICATION FACTOR μ
20
40
60
80
100
PLATE RESISTANCE rp IN KILOHMS
CE45075


SYLVANIA TYPE 7E6-14E6
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 250 VOLTS
rp
μ
ib
-20
-16
-12
-8
-4
0
CONTROL GRID VOLTS
5
10
15
20
25
30
CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
10
20
30
40
50
PLATE RESISTANCE rp IN KILOHMS
CE45076

7E7 Sylvania Type

DUODIODE RF PENTODE





8AE-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{35}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.3 Watt
Minimum Grid Bias	0 Volts
Maximum Diode Drop at 0.8 Ma.	10 Volts
Maximum Continuous Diode Current per Plate	1.0 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.005 μμf. Max.
Input	4.6 μμf.
Output	5.5 μμf.
Grid to Diode 1	.013 μμf. Max.
Grid to Diode 2	.003 μμf. Max.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

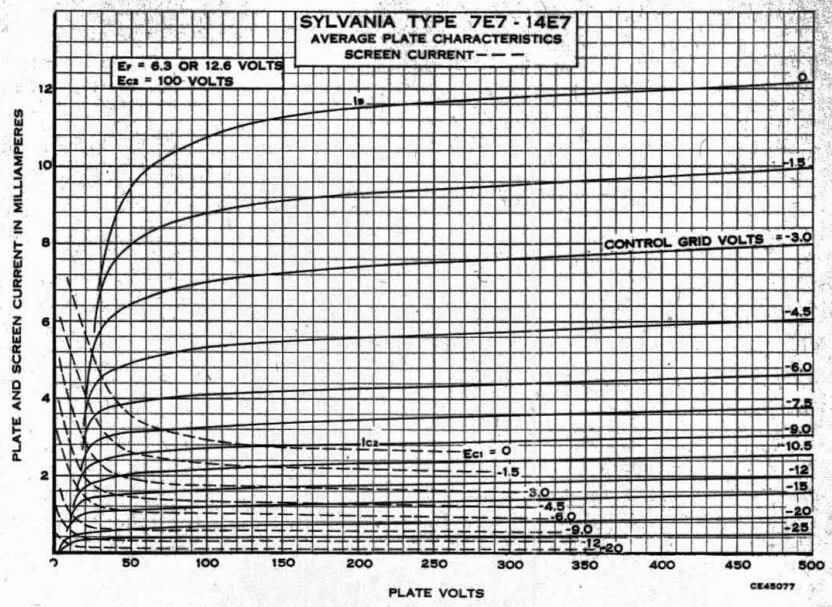
TYPICAL OPERATION

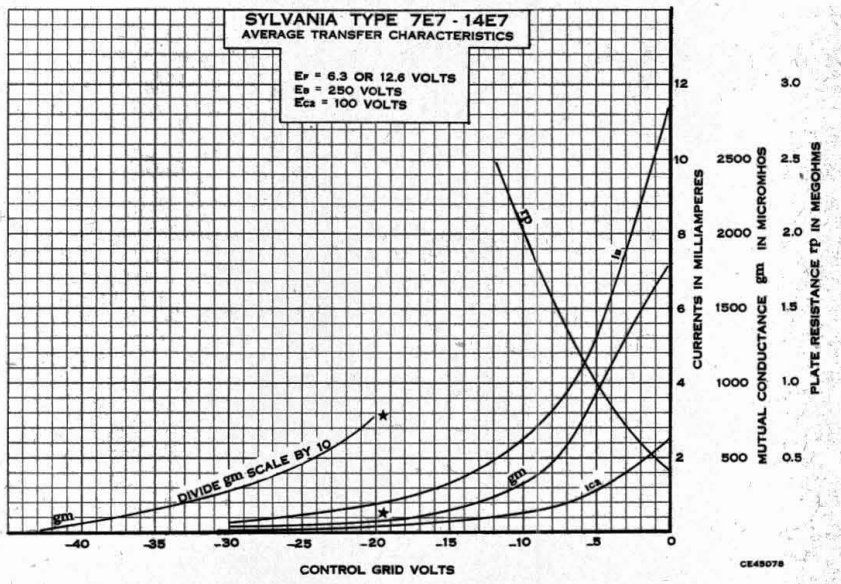
RF OR IF AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1.0	−3.0 Volts
Self-Bias Resistor	80	330 Ohms
Plate Current	10.0	7.5 Ma.
Screen Current	2.7	1.6 Ma.
Plate Resistance (Approximate)	0.15	0.7 Megohm
Mutual Conductance	1600	1300 μmhos
Grid Voltage for 2 μmhos Mutual Conductance	−36	−42.5 Volts

APPLICATION

Sylvania Type 7E7 is a duodiode, remote cut-off pentode suitable as an RF or IF amplifier and detector in conventional circuits. It is similar to the older Type 6B8G but has improved characteristics. The pentode section may also be used as an audio amplifier but Type 7R7 may give lower distortion in this type of service.

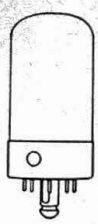

SYLVANIA TYPE 7E7 - 14E7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - -
Ef = 6.3 OR 12.6 VOLTS
Eca = 100 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPERES
PLATE VOLTS
Ib
Ica
Ec1 = 0
-1.5
-3.0
-4.5
-6.0
-9.0
-12
-20
CONTROL GRID VOLTS = 0
-1.5
-3.0
-4.5
-6.0
-7.5
-9.0
-10.5
-12
-15
-20
-25
CE45077


SYLVANIA TYPE 7E7 - 14E7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Eca = 100 VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
Ib
gm
Ica
rp
DIVIDE gm SCALE BY 10
CONTROL GRID VOLTS
CE45078

7F7 Sylvania Type

HIGH-MU DUO TRIODE

GT EQUIVALENT 6SL7GT





8AC-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation per Plate	1.0 Watt
Minimum Grid Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	1.6 $\mu\mu$f.
Input	2.4 $\mu\mu$f.
Output	2.0 $\mu\mu$f.
Grid 1 to Grid 2	0.2 $\mu\mu$f. Max.
Plate to Plate	1.0 $\mu\mu$f. Max.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

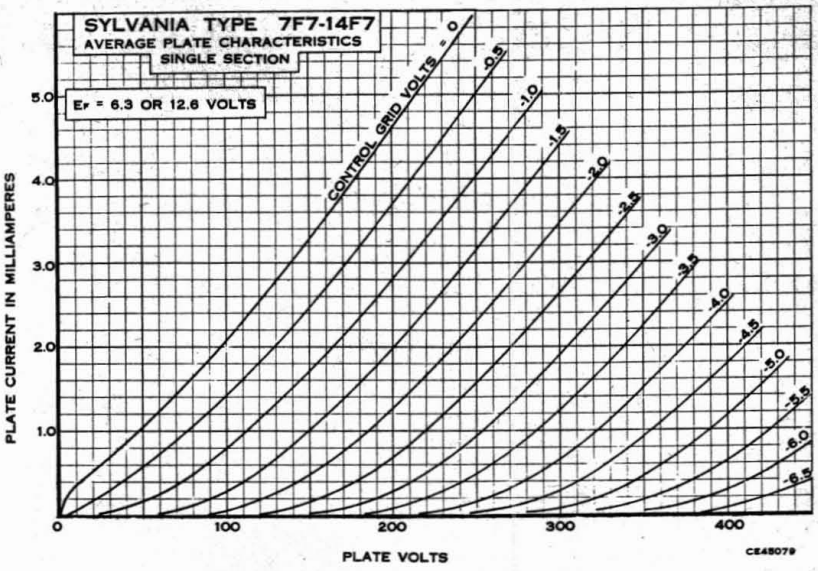
TYPICAL OPERATION

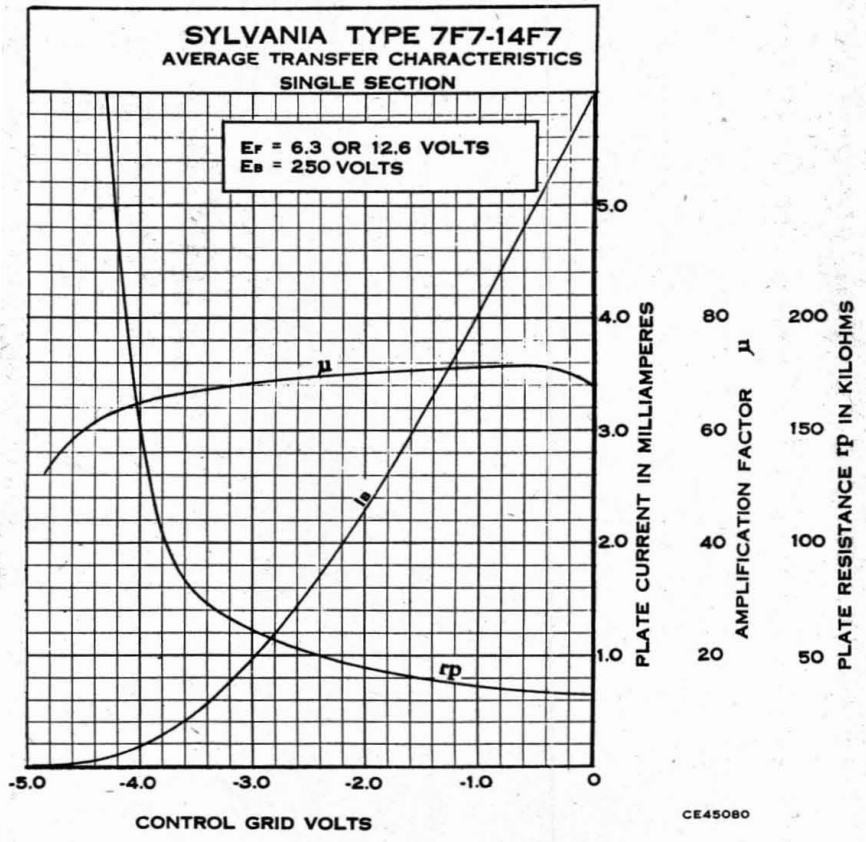
CLASS A AMPLIFIER PER SECTION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−2.0 Volts
Plate Current	.65	2.3 Ma.
Plate Resistance	62000	44000 Ohms
Mutual Conductance	1125	1600 μmhos
Amplification Factor	70	70

APPLICATION

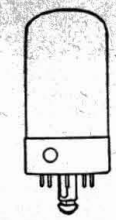
Sylvania Type 7F7 is a double triode high-mu amplifier tube of Lock-In construction. It is designed for use as a resistance coupled amplifier or phase inverter. All elements except the common heater are brought out separately allowing each triode section to operate independently of the other. Resistance coupling data are given in the appendix.

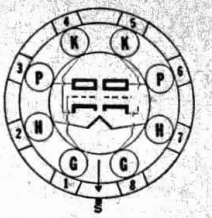

SYLVANIA TYPE 7F7-14F7
AVERAGE PLATE CHARACTERISTICS
SINGLE SECTION
Ef = 6.3 OR 12.6 VOLTS
CONTROL GRID VOLTS = 0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-5.5
-6.0
-6.5
PLATE CURRENT IN MILLIAMPERES
5.0
4.0
3.0
2.0
1.0
0
100
200
300
400
PLATE VOLTS
CE45079


SYLVANIA TYPE 7F7-14F7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
μ
Ib
rp
5.0
4.0
3.0
2.0
1.0
PLATE CURRENT IN MILLIAMPERES
80
60
40
20
AMPLIFICATION FACTOR μ
200
150
100
50
PLATE RESISTANCE rp IN KILOHMS
-5.0
-4.0
-3.0
-2.0
-1.0
0
CONTROL GRID VOLTS
CE45080

7F8 Sylvania Type

DOUBLE TRIODE





8BW-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	2 9/32"
Maximum Seated Height	1 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation (Total both sections)	3.5 Watts
Minimum External Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	1.2 μμf.
Input	2.8 μμf.
Output	1.4 μμf.
Grid to Grid	0.1 μμf. Max.
Plate to Plate	0.5 μμf. Max.
Heater to Cathode (External shield connected to ground)	2.8 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

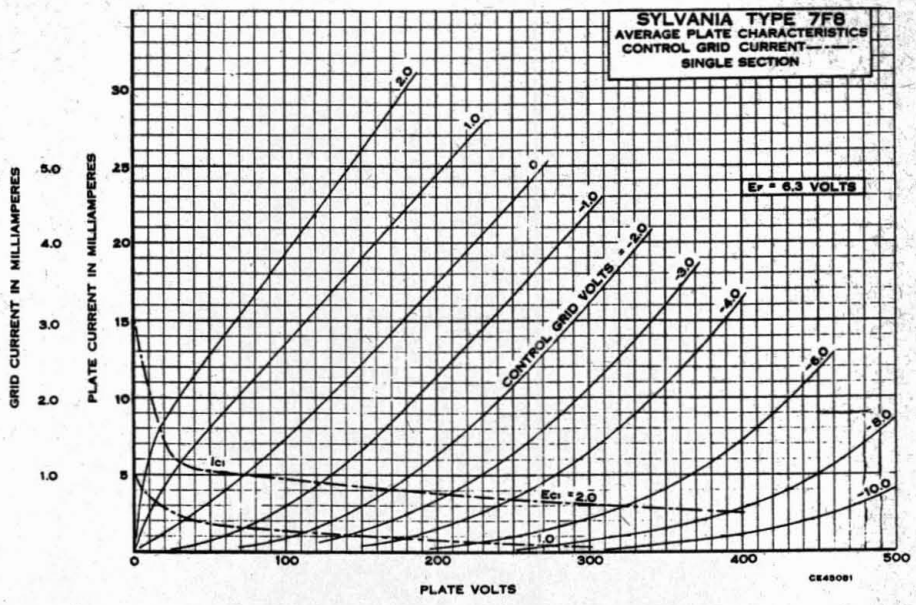
Per Section except Heater

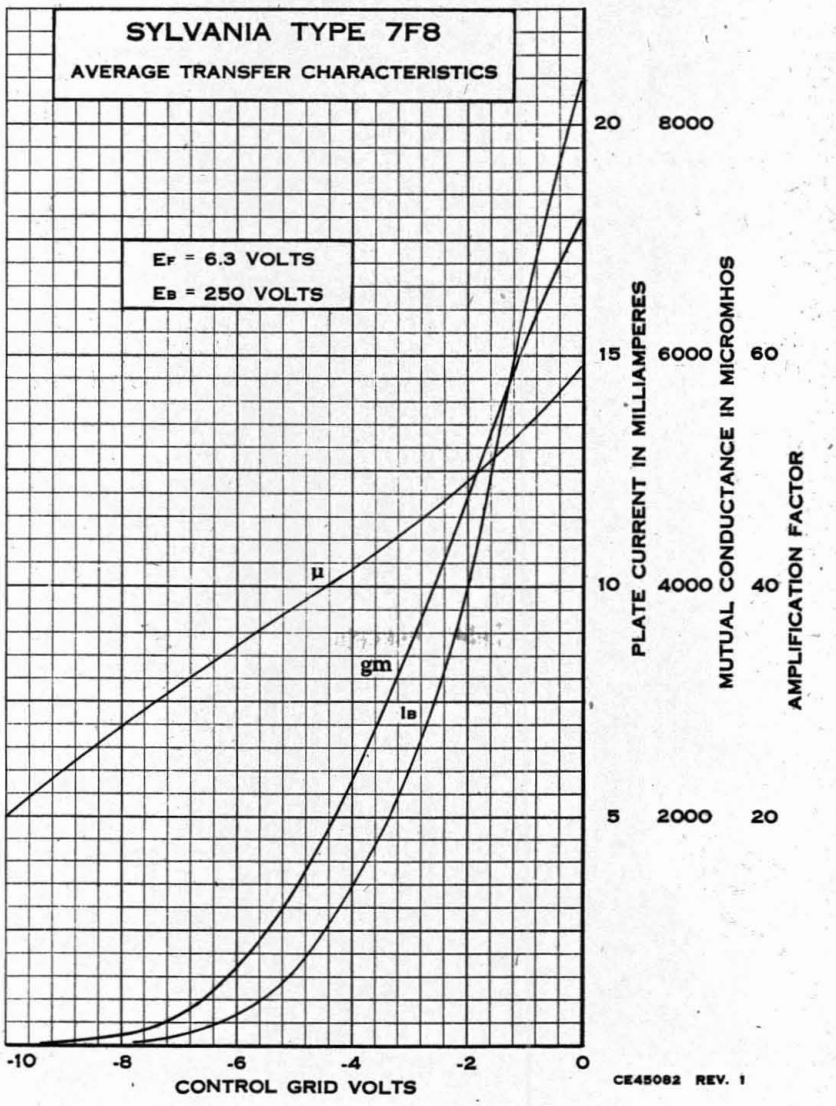
Heater Voltage (AC or DC)	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts
Self-Bias Resistor	500 Ohms
Plate Current	6.0 Ma.
Mutual Conductance	3300 μmhos
Amplification Factor	48
Grid Voltage for 10 μa. DC Plate Current (Approx.)	-11.0 Volts
Maximum Grid Circuit Resistance	0.5 Megohm

APPLICATION

Sylvania Type 7F8 is a high mutual conductance double triode designed for use at frequencies up to 300 or 400 megacycles. With proper care each section may be used separately to effect tube and space savings since all elements except heater are separate.

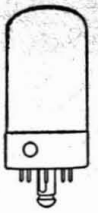
Design data for use in resistance coupled circuits may be found in the appendix.


SYLVANIA TYPE 7F8
AVERAGE PLATE CHARACTERISTICS
CONTROL GRID CURRENT ——·——·——
SINGLE SECTION
Ef = 6.3 VOLTS
GRID CURRENT IN MILLIAMPERES
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
2.0
1.0
0
-1.0
-2.0
-3.0
-4.0
-6.0
-8.0
-10.0
Ic1
Ec1 = 2.0
1.0
PLATE VOLTS
CE45081


SYLVANIA TYPE 7F8
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
μ
gm
Ib
PLATE CURRENT IN MILLIAMPERES
MUTUAL CONDUCTANCE IN MICROMHOS
AMPLIFICATION FACTOR
CONTROL GRID VOLTS
CE45082 REV. 1

7G7 Sylvania Type

SHARP CUT-OFF RF PENTODE





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\,1/4$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	1.5 Watts
Maximum Screen Dissipation	0.3 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 μμf. Max.
Input: G to (F+K+Gs+Su+Internal Shield)	9.0 μμf.
Output: P to (F+K+Gs+Su+Internal Shield)	7.0 μμf.

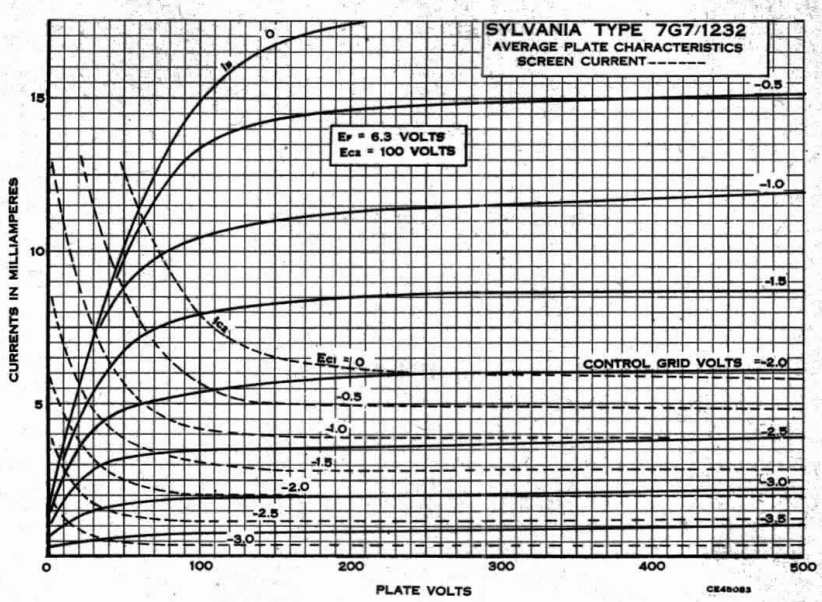
*With $1\,5/16$" diameter shield (RMA Std. 308) connected to cathode.

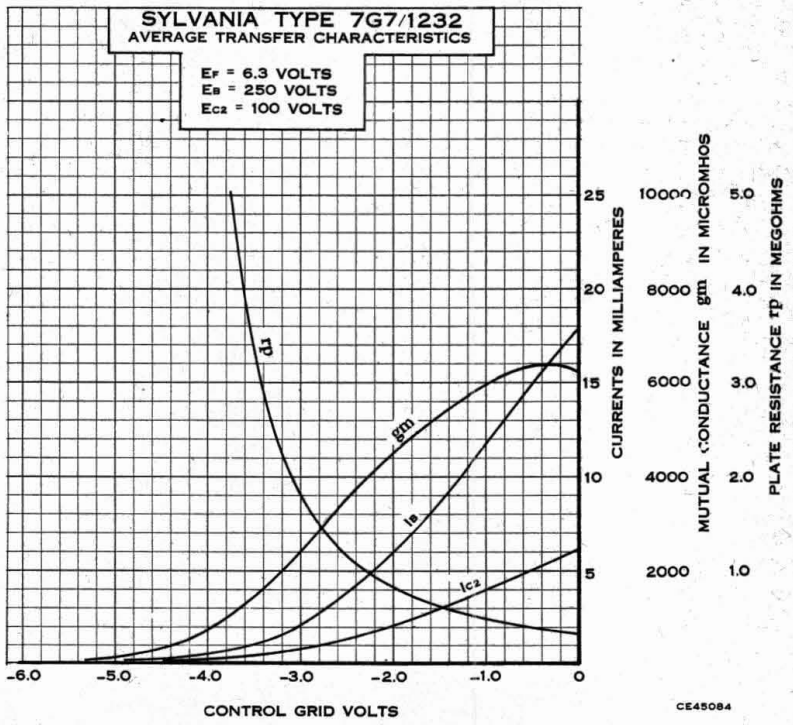
TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	450 Ma.
Plate Voltage	250 Volts
Suppressor Voltage	Tie to Cathode
Screen Voltage	100 Volts
Grid Voltage	−2 Volts
Self-Bias Resistor	250 Ohms
Plate Current	6.0 Ma.
Screen Current	2.0 Ma.
Plate Resistance (Approximate)	0.8 Megohm
Mutual Conductance	4500 μmhos
Grid Voltage for Cathode Current Cut-off (Approx.)	−7 Volts

APPLICATION

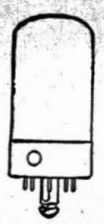
Sylvania Type 7G7 is a sharp cut-off, high mutual conductance pentode with Lock-In construction. It is designed to give reasonable gain in high-freqquency and broad-band amplifier circuits where loss of gain in low impedance circuits may be partially compensated for by a tube having high mutual conductance. As with other high mutual conductance tubes, the use of fixed-bias circuits is not recommended.


SYLVANIA TYPE 7G7/1232
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT------
Ef = 6.3 VOLTS
Ec2 = 100 VOLTS
CONTROL GRID VOLTS
0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
Ib
Ic2
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45083


SYLVANIA TYPE 7G7/1232
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
rp
gm
Ib
Ic2
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45084

7G8 Sylvania Type

SHARP CUT-OFF DOUBLE TETRODE





8BV-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	2 9/32"
Maximum Seated Height	1 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Supply	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Plate Dissipation (Per Section)	1.5 Watts
Maximum Screen Dissipation (Per Section)	0.1 Watt
Minimum Control Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.15 μμf. Max.
Input	3.40 μμf.
Output	2.60 μμf.

*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode. Measurements made on each section.

TYPICAL OPERATION

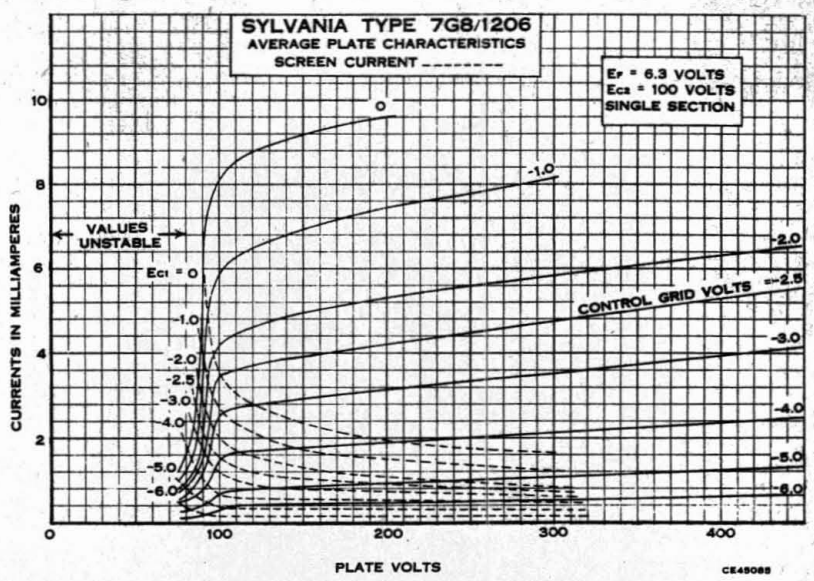
CLASS A_1 AMPLIFIER (Per Section except Heater)§

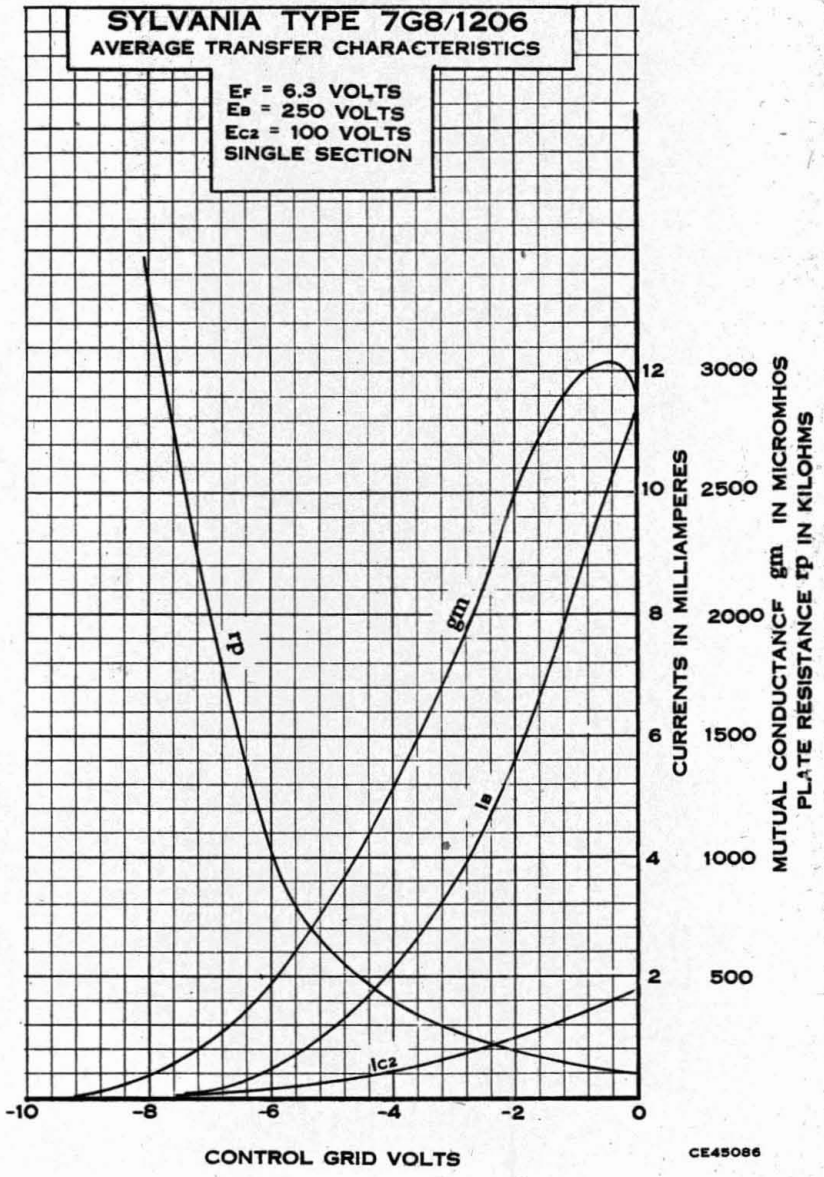
Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts
Screen Voltage	100 Volts
Grid Voltage	−2.5 Volts
Self-Bias Resistor	470 Ohms
Plate Current	4.5 Ma.
Screen Current	0.8 Ma.
Mutual Conductance	2100 μmhos
Plate Resistance	225000 Ohms
Grid Voltage for 10 μa. Plate Current	−11 Volts

§To assure operation of one section only, at least 40 volts negative must be applied to the grid of the section not operating.

APPLICATION

Sylvania Type 7G8 is a double tetrode with a common cathode and screen. As an RF amplifier to frequencies of 400 Mc. the push-pull connection using this tube results in improved performance. Any RF currents in the cathode and screen leads are out of phase and effectively cancel with respect to external circuits. At the same time, effective input and output capacities are very nearly halved.


SYLVANIA TYPE 7G8/1206
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - - - - - -
Ef = 6.3 VOLTS
Ec2 = 100 VOLTS
SINGLE SECTION
CURRENTS IN MILLIAMPERES
VALUES UNSTABLE
Ec1 = 0
-1.0
-2.0
-2.5
-3.0
-4.0
-5.0
-6.0
CONTROL GRID VOLTS
PLATE VOLTS
CE45085

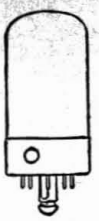

SYLVANIA TYPE 7G8/1206
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
SINGLE SECTION
rp
gm
Ia
Ic2
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45086

7H7 Sylvania Type

SEMI-REMOTE CUT-OFF RF

PENTODE

GT EQUIVALENT 6SH7GT





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\,1/4$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Screen Dissipation	0.5 Watt
Minimum External Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 $\mu\mu$f. Max.
Input	8.0 $\mu\mu$f.
Output	7.0 $\mu\mu$f.

*With $1\,5/16$" diameter shield (RMA Std. 308) connected to cathode

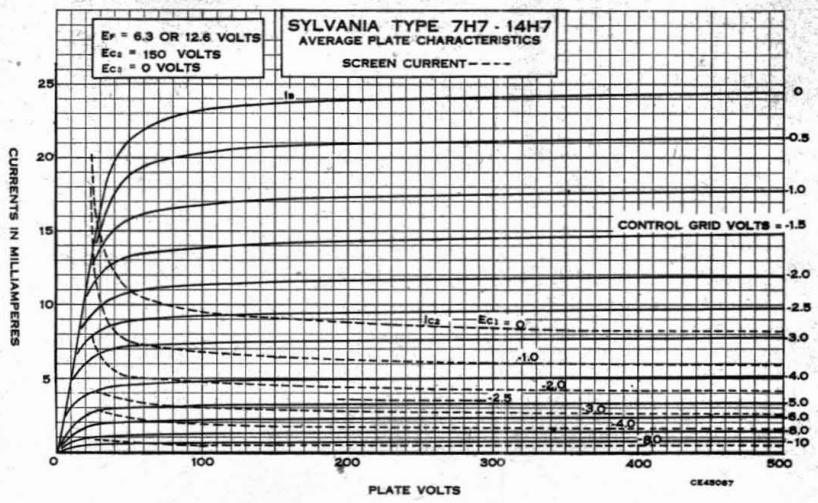
TYPICAL OPERATION

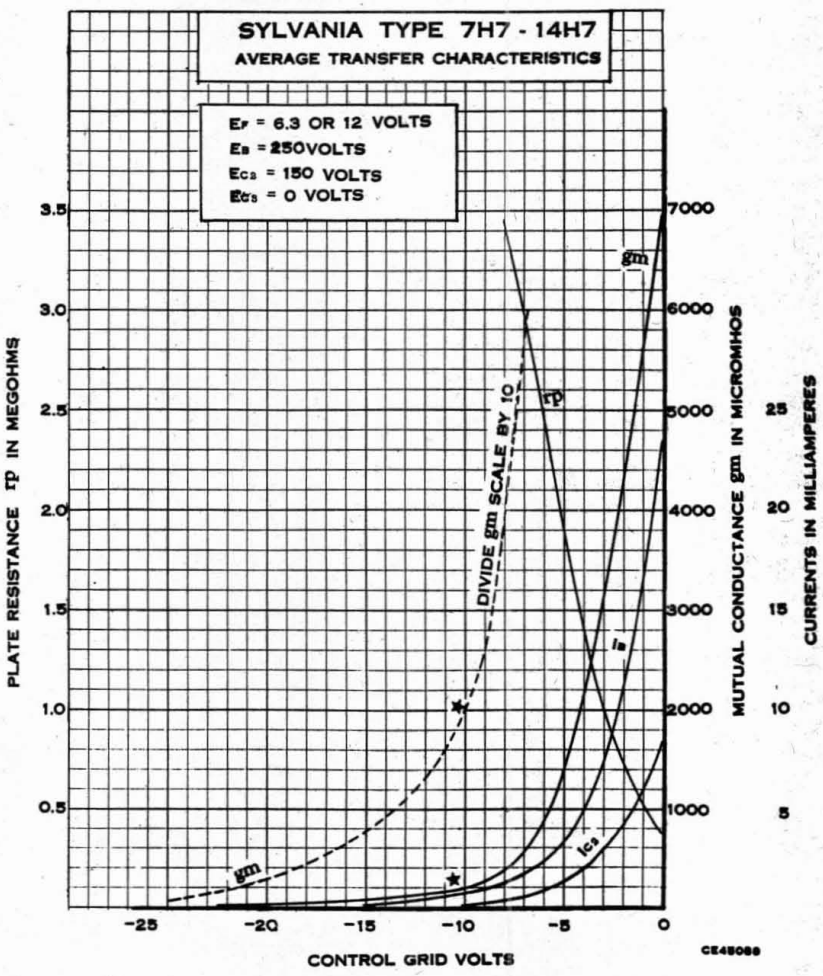
CLASS A_1 AMPLIFIER

Heater Voltage (AC or DC)	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	150 Volts
Grid Voltage	−1.5	..... Volts
Self-Bias Resistor	150	180 Ohms
Suppressor and Internal Shield	Connect to Cathode	
Plate Current	7.5	10.0 Ma.
Screen Current	2.6	3.2 Ma.
Plate Resistance	0.35	0.8 Megohm
Mutual Conductance	4000	4000 μmhos
Grid Voltage for Mutual Conductance of 35 μmhos (Approximate)	−12	−19 Volts

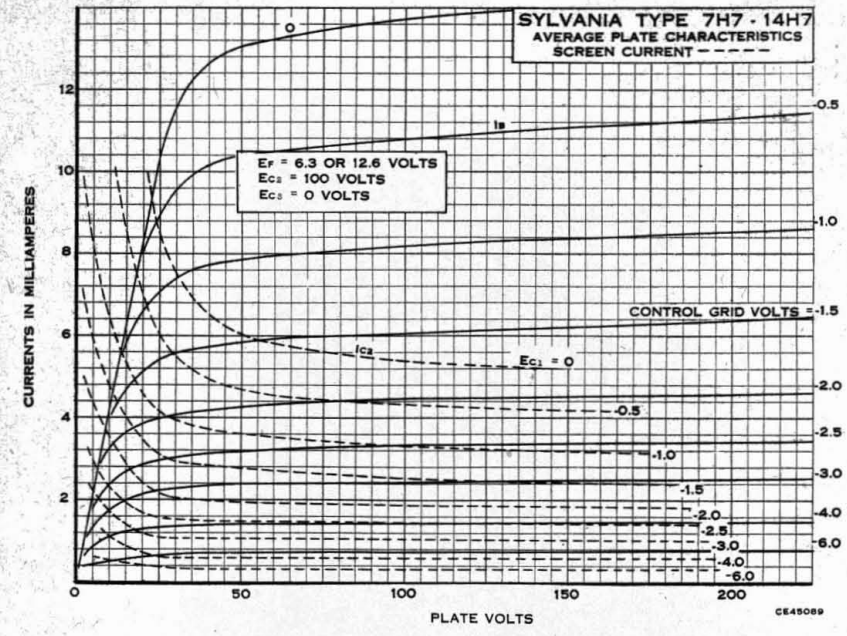
APPLICATION

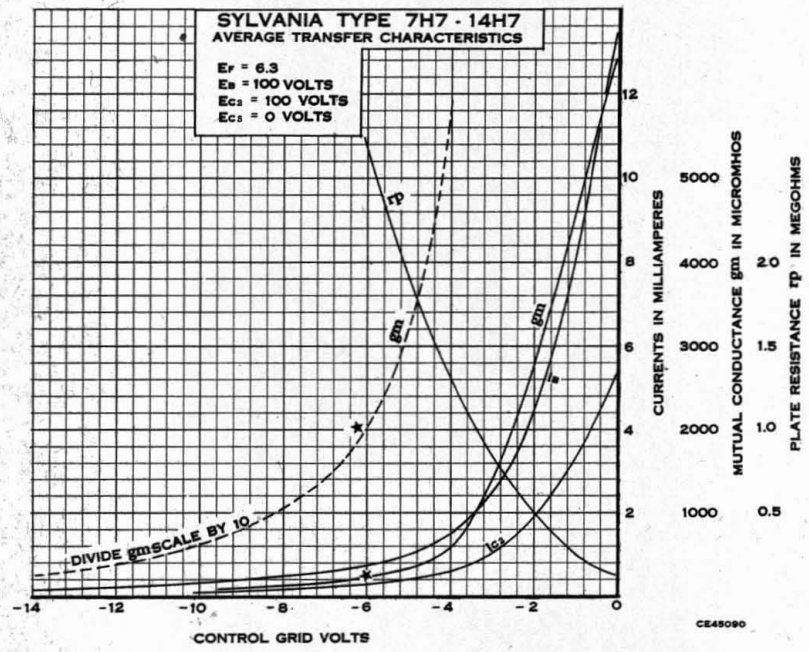
Sylvania Type 7H7 is a semi-remote cut-off pentode suitable for RF or television service. It is similar to Type 6AB7 except for lower heater current and slightly lower mutual conductance. The Lock-In construction provides ruggedness, suitable shielding and short leads so necessary in high-frequency circuits. The high mutual conductance helps to compensate for the low gain associated with high-frequency and wide-band amplifier designs.

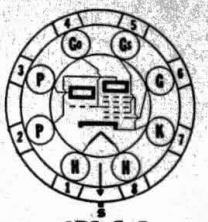

SYLVANIA TYPE 7H7 - 14H7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - -
Ef = 6.3 OR 12.6 VOLTS
Ec2 = 150 VOLTS
Ec3 = 0 VOLTS
CONTROL GRID VOLTS = -1.5
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45087


SYLVANIA TYPE 7H7 - 14H7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12 VOLTS
Eb = 250VOLTS
Ec2 = 150 VOLTS
Ec3 = 0 VOLTS
PLATE RESISTANCE rp IN MEGOHMS
MUTUAL CONDUCTANCE gm IN MICROMHOS
CURRENTS IN MILLIAMPERES
DIVIDE gm SCALE BY 10
CONTROL GRID VOLTS
CE45088

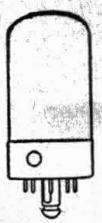
7H7 (Cont.)


SYLVANIA TYPE 7H7 - 14H7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - - -
EF = 6.3 OR 12.6 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS
Ec1 = 0
Ia
Ic2
CE45089


SYLVANIA TYPE 7H7 - 14H7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec3 = 0 VOLTS
rp
gm
Ia
Ic2
DIVIDE gm SCALE BY 10
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CE45090



8BL-L-7



Sylvania Type 7J7

TRIODE HEPTODE CONVERTER

G EQUIVALENT 6J8G

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 35/64"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Heptode Plate Voltage	300 Volts
Maximum Heptode Screen Voltage	100 Volts
Maximum Heptode Screen Supply Voltage	300 Volts
Minimum Heptode Control Grid (G) Voltage	0 Volt
Maximum Triode Plate Voltage	150 Volts
Maximum Triode Plate Supply Voltage	300 Volts
Maximum Triode Plate Dissipation	1.25 Watts
Maximum Total Cathode Current	14 Ma.
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances:*	
Grid G to Heptode Plate	0.03 μμf. Max.
Grid G to Oscillator Plate	0.1 μμf. Max.
Grid G to Grid Go	0.3 μμf. Max.
Grid Go to Oscillator Plate	0.9 μμf.
Grid G to All Other Electrodes (r-f input)	4.6 μμf.
Oscillator Plate to All Electrodes Except Grid Go (Oscillator Output)	3.2 μμf.
Oscillator Grid to All Electrodes Except Oscillator Plate (Oscillator Input)	7.5 μμf.
Heptode Plate to All Electrodes (Mixer Output)	7.5 μμf.

*With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage (Heptode)	100	250 Volts
Oscillator Plate Voltage (Triode)	100	250** Volts
Screen Voltage (Heptode)	100	100 Volts
Control Grid Voltage (Heptode Grid G)	−3	−3 Volts
Oscillator Grid Resistor (Triode)	50000	50000 Ohms
Plate Current (Heptode)	1.5	1.4 Ma.
Screen Current (Heptode)	2.6	2.8 Ma.
Oscillator Plate Current (Triode)	3.2	5.0 Ma.
Oscillator Grid Current (Triode)	0.3	0.4 Ma.
Plate Resistance (Heptode)	0.5	1.5 Megohms
Conversion Conductance	280	290 μmhos
Conversion Conductance ($Ec_1 = -20$)	2	2 μmhos
Total Cathode Current	7.7	9.6 Ma.

**Applied through 20000 ohms series resistance properly by-passed.

TRIODE CHARACTERISTICS

Heater Voltage	6.3 Volts
Plate Voltage	150 Volts
Grid Voltage	−3 Volts
Plate Current	6.6 Ma.
Plate Resistance	10700 Ohms
Mutual Conductance (Approximate)	1400 μmhos
Amplification Factor (Approximate)	15

APPLICATION

Sylvania Type 7J7 is a Lock-In converter tube consisting of a triode unit and heptode unit in a single bulb. The cathode is common to both units. This tube is essentially the combination of the well known triode-oscillator and separate detector, and is similar to Type 6J8G.

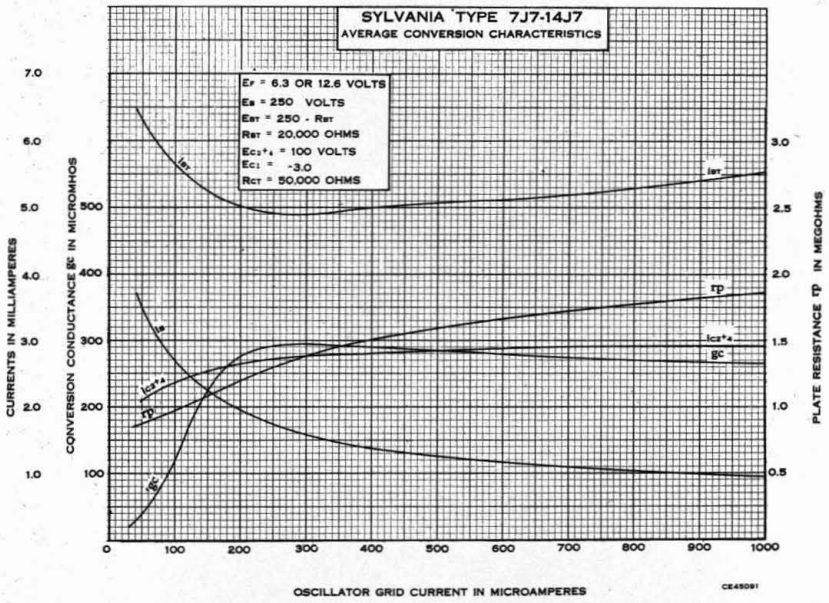
Type 7J7 provides true electron coupling since the grid of the triode section is connected to an injector grid in the mixer section. The high plate resistance of this tube results in very low plate loading, making it possible to use highly efficient i-f transformers to advantage. Compared to most other existing types of converter tubes, 7J7 has lower frequency drift which is an attractive feature. Because of this high frequency stability it should be possible to reduce the filtering in the oscillator plate and not encounter the "fluttering" found in most other converters.

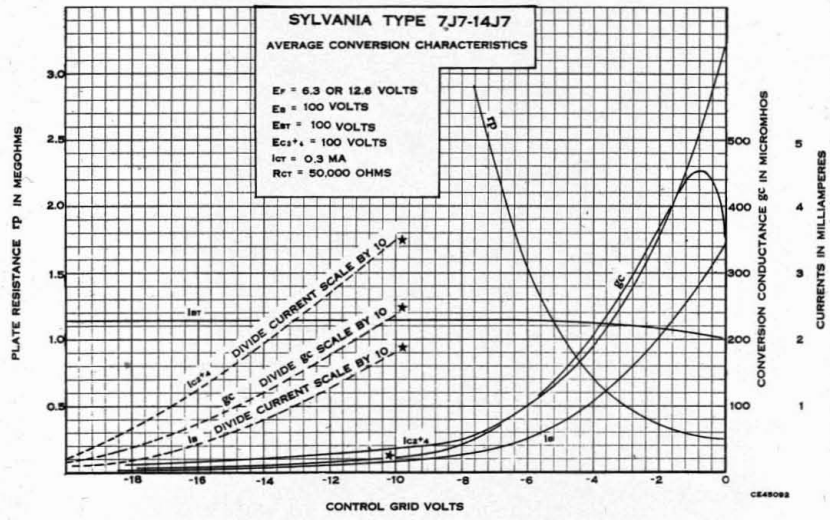
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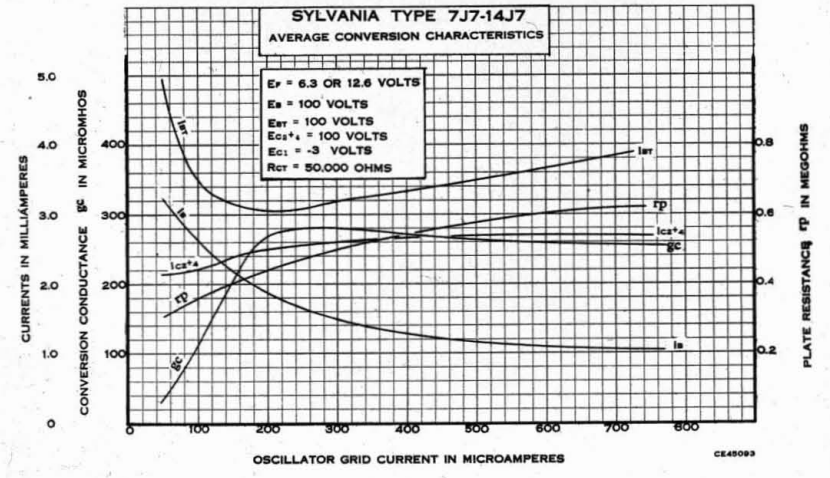
7J7 (Cont.)

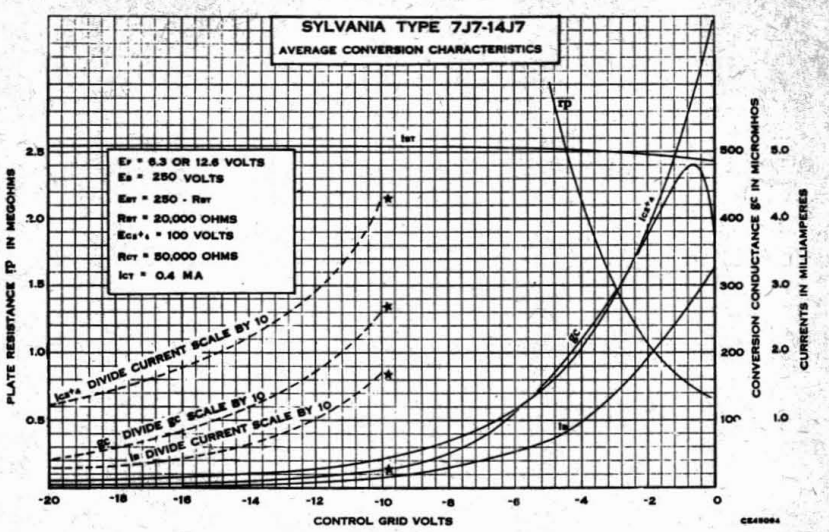
It will be noted that the two plates and the heptode screen-grids are operated at the same d-c potential when using 100 volts. Thus, the screen-grid dropping resistor required with previous converters may be eliminated.

For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.



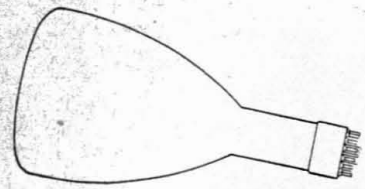


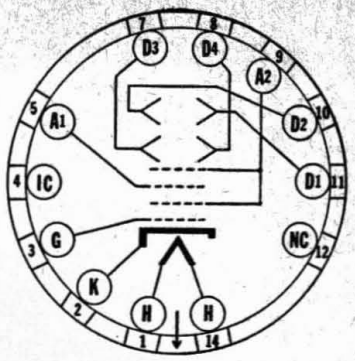



SYLVANIA TYPE 7J7-14J7
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec1 = 250 - Ec1
Rc1 = 20,000 OHMS
Ec2 = 100 VOLTS
Rc2 = 50,000 OHMS
Ic2 = 0.4 MA
rp
Ic1
Ic2
gc
Ib
Ic2 DIVIDE CURRENT SCALE BY 10
gc DIVIDE gc SCALE BY 10
Ib DIVIDE CURRENT SCALE BY 10
PLATE RESISTANCE rp IN MEGOHMS
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
CONTROL GRID VOLTS
2.5
2.0
1.5
1.0
0.5
500
400
300
200
100
5.0
4.0
3.0
2.0
1.0
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
CS49084

7JP4 Sylvania Type

PICTURE TUBE





14-G

PHYSICAL SPECIFICATIONS

Base	Medium Shell Diheptal 12 Pin
Maximum Overall Length	14⅞″
Maximum Overall Diameter	7⅛″
Picture Size	4 x 5½″
Deflection Method	Electrostatic
Focusing Method	Electrostatic
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Maximum Anode No. 2 Voltage	6000 Volts
Maximum Focusing Anode Voltage	2800 Volts
Control Grid Voltage Range†	−200 to 0 Volts
Peak Voltage between Anode No. 2 and any Deflecting Electrode	750 Volts
Peak Heater to Cathode Voltage*	125 Volts
Maximum Grid Circuit Resistance	1.5 Megohms
Maximum Deflection Electrode Circuit Resistance	5.0 Megohms

†Signal voltages which drive the grid more than 2 volts positive are not recommended.

*During a warming-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.6	0.6 Amperes
Anode #2 Voltage	4000	6000 Volts
Anode #1 Voltage	1080 to 1600	1620 to 2400 Volts
Anode #1 Current (For any operating condition)		−15 to 10 μa.
Control Grid Voltage for Visual Cut-Off	−48 to −112	−72 to −168 Volts
Deflection Factors		
Deflecting Electrodes D_1 D_2	124 to 164	186 to 246 Volts DC/in.
Deflecting Electrodes D_3 D_4	100 to 136	150 to 204 Volts DC/in.

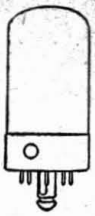
APPLICATION

Sylvania Type 7JP4 is a direct viewing Television Picture Tube employing electrostatic deflection and focusing.

Type 7JP4 may be used as a direct replacement for Type 7GP4 providing no connections are made to the socket connections for Pins 4 and 12.



8BF-L-7



Sylvania Type 7K7

DUODIODE HIGH-MU TRIODE

(Separate Diode Cathode)

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Diode Drop for 1.5 Ma. (Per Diode)	10 Volts
Maximum Heater-Cathode Voltage	90 Volts
Maximum Plate Dissipation	1 Watt
Minimum External Grid Bias	0 Volt

Direct Interelectrode Capacitances:*

Grid to Plate	1.7 μμf.
Input	2.4 μμf.
Output	2.0 μμf.
Diode 1 to Grid 1	0.25 μμf. Max.
Diode 2 to Grid 1	0.25 μμf. Max.
Diode Cathode to Diode 1	2.0 μμf. Max.
Diode Cathode to Diode 2	2.0 μμf. Max.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION AS AMPLIFIER—CLASS A

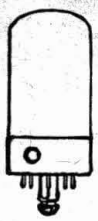
Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts
Grid Voltage	−2.0 Volts
Amplification Factor	70
Plate Resistance (Approximate)	44000 Ohms
Mutual Conductance	1600 μmhos
Plate Current	2.3 Ma.

APPLICATION

Sylvania Type 7K7 is a duodiode high-mu triode which differs from the usual diode triode by having separate cathodes for the diode and triode sections. This permits greater flexibility in circuit design. The characteristics of the triode section are identical to those of one section of Type 7F7. Reference should be made to that type for curves, and resistance coupled amplifier data appears under Type 7F7 in the appendix.

7L7 Sylvania Type

SHARP CUT-OFF RF PENTODE





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{35}{64}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	125 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	4.0 Watt
Maximum Screen Dissipation	0.4 Watt
Minimum Grid Bias Voltage	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.01 $\mu\mu$f. Max.
Input: G to (F+K+Gs+Su+Internal Shield)	8.0 $\mu\mu$f.
Output: P to (F+K+Gs+Su+Internal Shield)	6.5 $\mu\mu$f.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode and base shell.

TYPICAL OPERATION

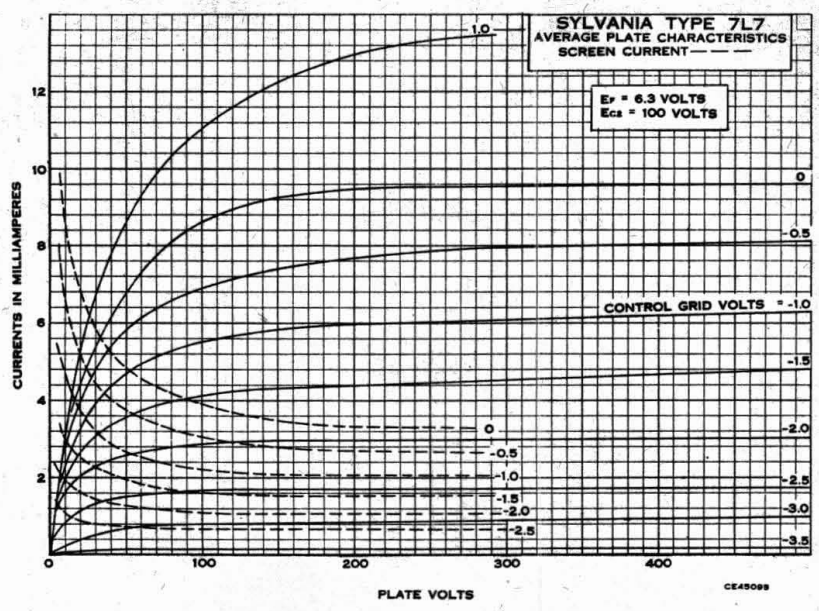
CLASS A_1 AMPLIFIER

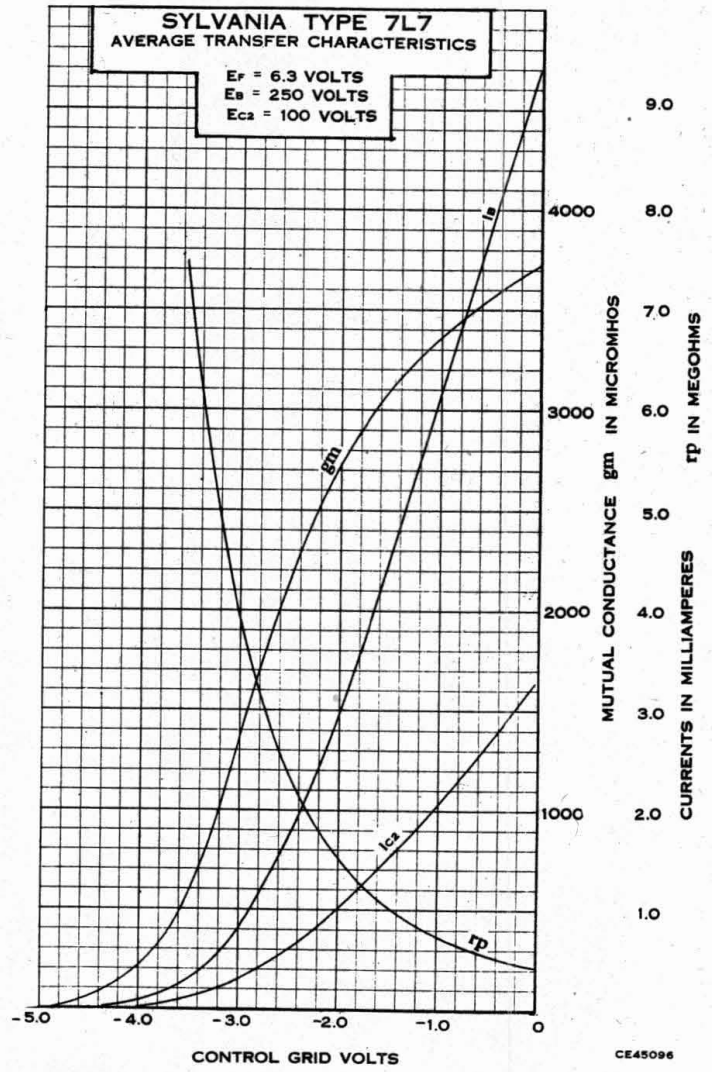
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Grid Voltage	−1	−1.5 Volt
Suppressor	Tied to Cathode	
Self-Bias Resistor	125	250 Ohms
Plate Current	5.5	4.5 Ma.
Screen Current	2.4	1.5 Ma.
Plate Resistance (Approximate)	0.1	1.0 Megohm
Mutual Conductance	3000	3100 μmhos
Grid Voltage for Cathode Current Cut-off	−6	−6 Volts Approx.

APPLICATION

Sylvania Type 7L7 is a single-ended triple grid amplifier of Lock-In construction somewhat similar to Type 7G7/1232 except that the heater current has been reduced and spacings increased, making it more suitable for general use than Type 7G7/1232 which was designed for application where a higher value of mutual conductance was desirable.

Due to low operating bias required, it is recommended that same be obtained automatically by the use of suitable cathode biasing resistors, values of which are shown above.

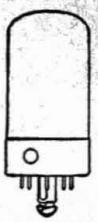

SYLVANIA TYPE 7L7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT — — —
Ef = 6.3 VOLTS
Ec2 = 100 VOLTS
CONTROL GRID VOLTS = -1.0
1.0
0
-0.5
-1.5
-2.0
-2.5
-3.0
-3.5
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45095


SYLVANIA TYPE 7L7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
Ib
gm
Ic2
rp
MUTUAL CONDUCTANCE gm IN MICROMHOS
rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONTROL GRID VOLTS
CE45096

7N7 Sylvania Type

MEDIUM-MU DUOTRIODE

GT EQUIVALENT 6SN7GT





8AC-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{32}$"
Maximum Seated Height	$2\frac{5}{8}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation per Section	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts
Minimum Grid Voltage	0 Volt

Direct Interelectrode Capacitances:*

	T1†		T2†
Grid to Plate	3.0	....	3.0 μμf.
Input	3.4	....	2.9 μμf.
Output	2.0	....	2.4 μμf.
Plate 1 to Plate 2	....	0.34	μμf.
Grid 1 to Grid 2	....	0.40	μμf.
Grid 1 to Plate 2	....	0.08	μμf.
Grid 2 to Plate 1	....	0.06	μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.
†Triode No. 1 connected to pins 5, 6 and 7; Triode No. 2 to pins 2, 3 and 4.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

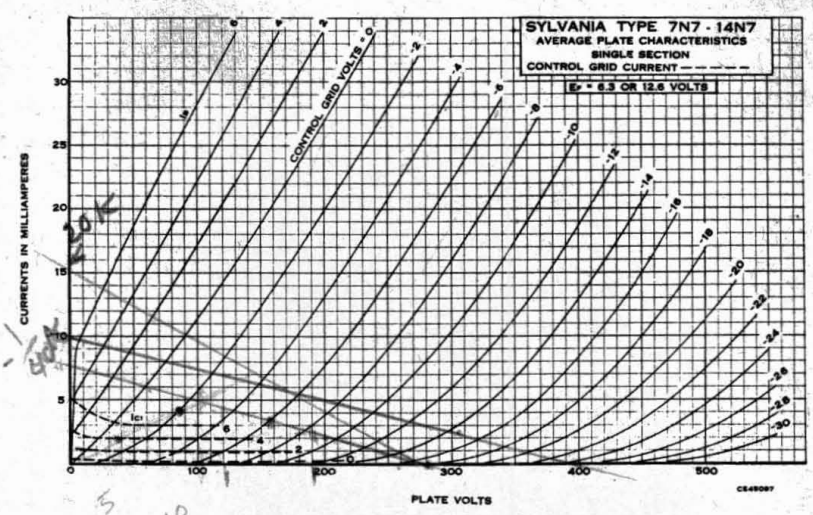
Heater Voltage (AC or DC)	6.3	6.3 Volts
Heater Current	0.600	0.600 Ampere
Plate Voltage	90	250 Volts
Grid Voltage	0	−8 Volts
Self-Bias Resistor	0	900 Ohms
Plate Current	10.0	9.0 Ma.
Plate Resistance	6700	7700 Ohms
Mutual Conductance	3000	2600 μmhos
Amplification Factor	20	20

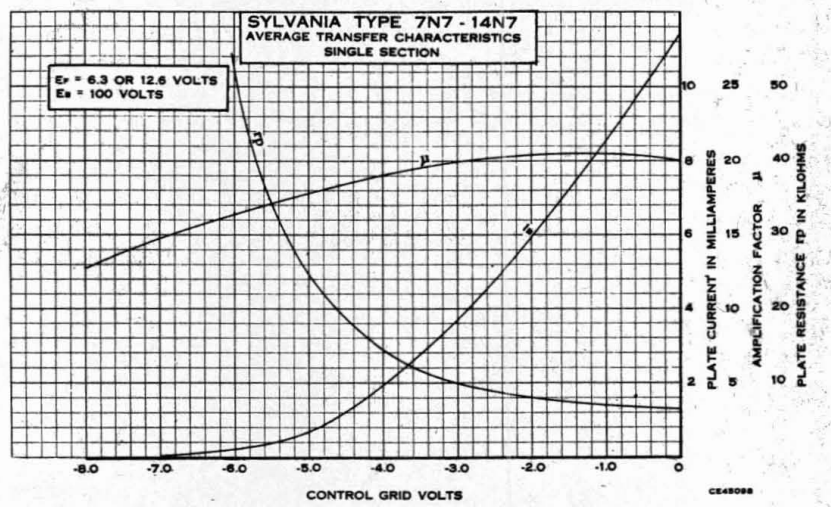
PHASE INVERTER

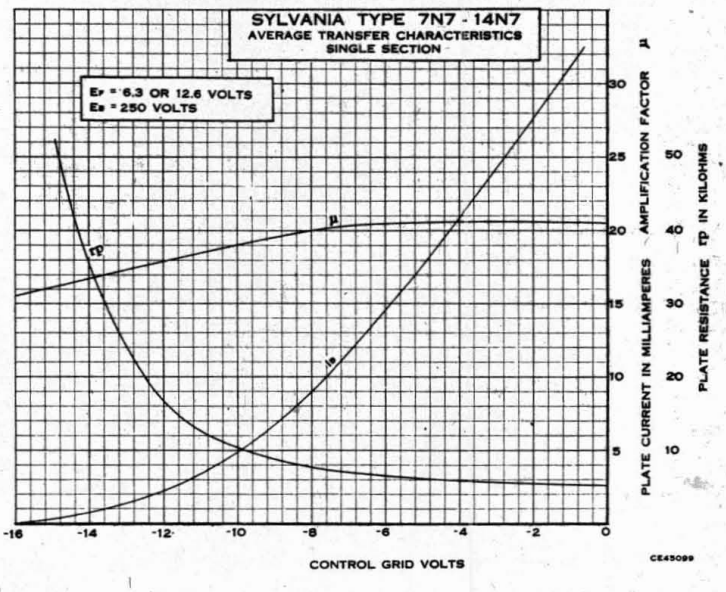
Plate Supply Voltage	100	250 Volts
Grid Voltage	−2.25	−5.5 Volts
Plate Current per Section	1.5	2.4 Ma.
Plate Resistor	30000	50000 Ohms
Self-Bias Resistor	750	1150 Ohms
Maximum Output Voltage (RMS)	20	65 Volts

APPLICATION

Sylvania Type 7N7 is a single-ended double triode with separate cathodes for each section. It is designed for use as a phase inverter or voltage amplifier. The 7N7 is identical to two Type 7A4 tubes and reference is made to that type for curves, and to the appendix for resistance coupled data. Type 6SN7GT is the octal based equivalent.


SYLVANIA TYPE 7N7 - 14N7
AVERAGE PLATE CHARACTERISTICS
SINGLE SECTION
CONTROL GRID CURRENT
Ef = 6.3 OR 12.6 VOLTS
CONTROL GRID VOLTS = 0
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45097

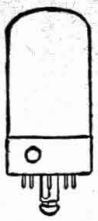

SYLVANIA TYPE 7N7 - 14N7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45098


SYLVANIA TYPE 7N7 - 14N7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45099

7Q7 Sylvania Type

HEPTODE CONVERTER

GT EQUIVALENT 6SA7GT





8AL-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	1.0 Watt
Maximum Total Cathode Current	14 Ma.
Minimum Signal-Grid External Bias Voltage (with self-excited oscillator)	0 Volt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid G to Plate	0.20 μμf. Max.
Grid G to Go	0.20 μμf. Max.
Grid Go to Plate	0.15 μμf. Max.
Signal Input	9.0 μμf.
Oscillator Input	7.0 μμf.
Mixer Output	9.0 μμf.
Grid Go to All Except Cathode	5.0 μμf.
Grid Go to Cathode	2.2 μμf.
Cathode to all Except Go	6.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CONVERTER (SEPARATELY EXCITED)

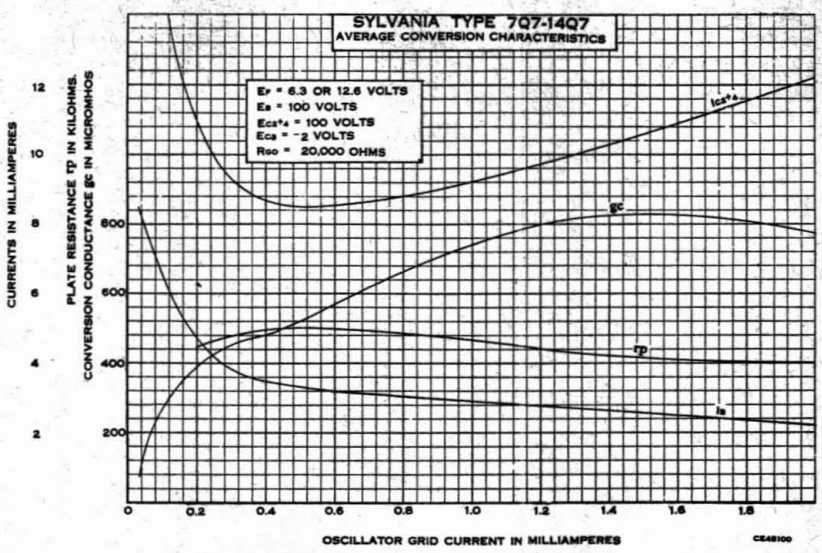
Heater-Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage** (G)	−2	−2 Volts
Self-Bias Resistor	160	160 Ohms
Suppressor Grid and Shield Voltage	0	0 Volt
Oscillator Grid Resistor (Go)	20000	20000 Ohms
Plate Resistance (Approximate)	0.5	1.0 Megohm
Oscillator Grid Current	0.5	0.5 Ma.
Plate Current	3.3	3.5 Ma.
Screen Current (Gs)	8.5	8.5 Ma.
Total Cathode Current	12.3	12.5 Ma.
Conversion Conductance at Ec3= −2	525	550 μmhos
Conversion Conductance at Ec3= −6	275	300 μmhos
Conversion Conductance at Ec3= −10	65	70 μmhos
Conversion Conductance at Ec3= −35 (Approx.)	2	2 μmhos

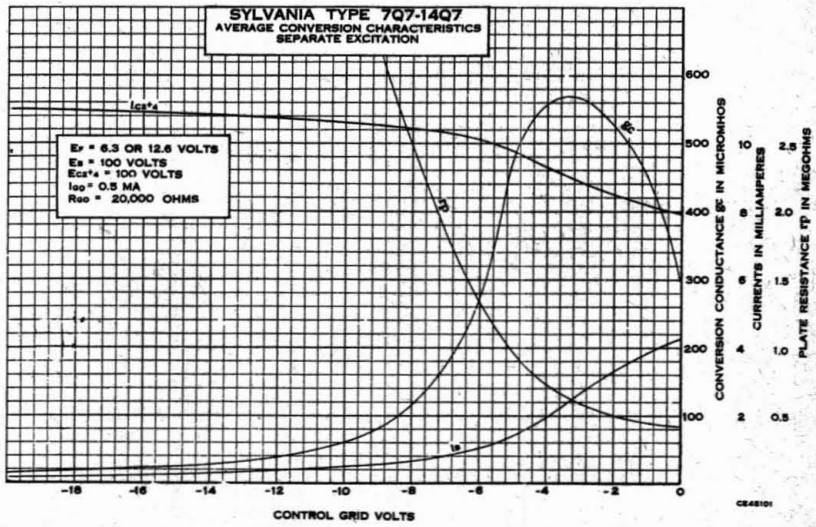
**Characteristics for self excitation are similar to those given for separate excitation except the control grid (Grid G bias voltage is 0 volt).

Note: With Grid Gs connected to plate (100 volts) and signal applied to Grid Go (0 volt bias). the Mutual Conductance is 4500 μmhos, plate current 27 Ma. amplification factor 13. Grid G is connected to ground during this test.

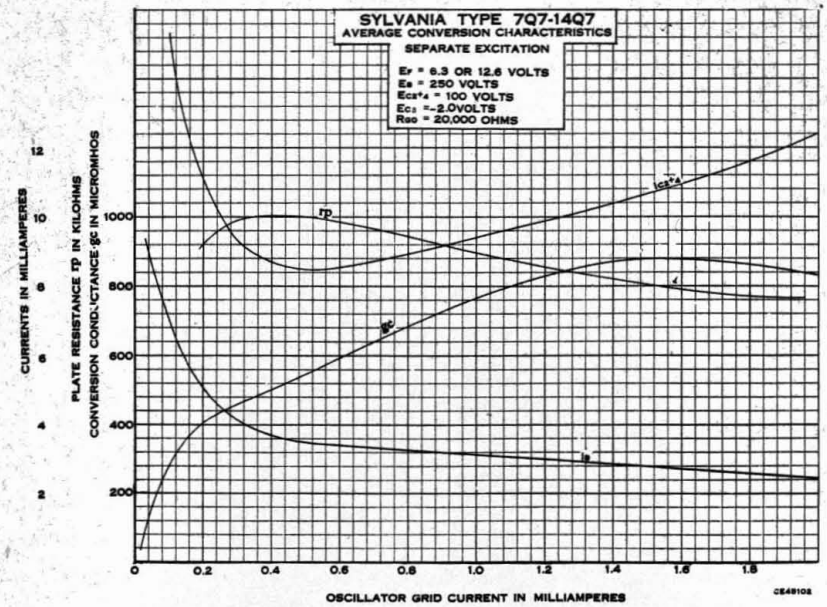
APPLICATION

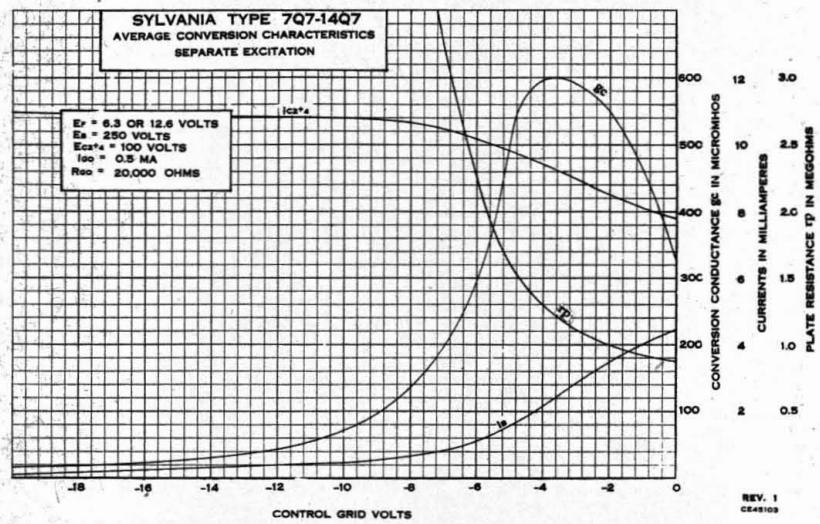
Sylvania Type 7Q7 is a pentagrid converter having electrical characteristics quite similar to those for Type 6SA7. The Lock-In construction embodied in this type provides compactness, suitable shielding and the lock-in feature. For a-c service the 7-volt heater rating corresponds to a 130-volt line condition. It is also the nominal voltage for automotive receiver service. Ratings marked Max. and Min. are design centers for a line voltage of 117 volts. For automotive service the design centers are 90% of the values indicated, using a battery terminal voltage of 6.6 volts.

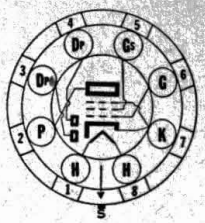

SYLVANIA TYPE 7Q7-14Q7
AVERAGE CONVERSION CHARACTERISTICS
Er = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ecs'+4 = 100 VOLTS
Ecs = -2 VOLTS
Rgo = 20,000 OHMS
Ics'+4
gc
rp
Ib
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN KILOHMS
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MILLIAMPERES
CE48100


SYLVANIA TYPE 7Q7-14Q7
AVERAGE CONVERSION CHARACTERISTICS
SEPARATE EXCITATION
Er = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ecs'+4 = 100 VOLTS
Ig0 = 0.5 MA
Rgo = 20,000 OHMS
Ics'+4
gc
rp
Ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE48101

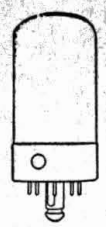
7Q7 (Cont.)


SYLVANIA TYPE 7Q7-14Q7
AVERAGE CONVERSION CHARACTERISTICS
SEPARATE EXCITATION
Er = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2*4 = 100 VOLTS
Ec1 =-2.0VOLTS
Rgo = 20,000 OHMS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN KILOHMS
CONVERSION CONDUCTANCE gc IN MICROMHOS
rp
gc
Ic2*4
Ib
OSCILLATOR GRID CURRENT IN MILLIAMPERES
CE48102


SYLVANIA TYPE 7Q7-14Q7
AVERAGE CONVERSION CHARACTERISTICS
SEPARATE EXCITATION
Er = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2*4 = 100 VOLTS
Igo = 0.5 MA
Rgo = 20,000 OHMS
Ic2*4
gc
rp
Ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
REV. 1
CE48103



8AE-L-7



Sylvania Type 7R7

DUODIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\,1/4$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.25 Watt
Minimum External Grid Bias	0 Volt
Maximum Heater-Cathode Voltage	90 Volts
Maximum Diode Drop for .8 Ma.	10 Volts
Maximum Diode Current per Plate (continuous)	1.0 Ma.

Direct Interelectrode Capacitances:*

Grid to Plate	0.004 μμf. Max.
Input	5.6 μμf.
Output	5.3 μμf.
Diode 1 to Grid 1	.005 μμf. Max.
Diode 2 to Grid 1	.002 μμf. Max.

*With $1\,5/16$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

Heater Voltage AC or DC	6.3	6.3	6.3	6.3 Volts
Heater Current	300	300	300	300 Ma.
Plate Voltage	100	100	250	250 Volts
Screen Voltage	100	100	100	100 Volts
Grid Voltage	−2.0	−1.0	−2.0	−1.0 Volts
Self-Bias Resistor	450	130	450	130 Ohms
Plate Current	3.4	5.5	3.5	6.2 Ma.
Screen Current	1.0	2.2	1.0	1.6 Ma.
Plate Resistance (Approx.)	0.5	0.35	1.8	1.0 Megohm
Mutual Conductance	2100	3000	2200	3200 μmhos
Grid Bias for 10 μmhos	−20	−20	−20	−20 Volts

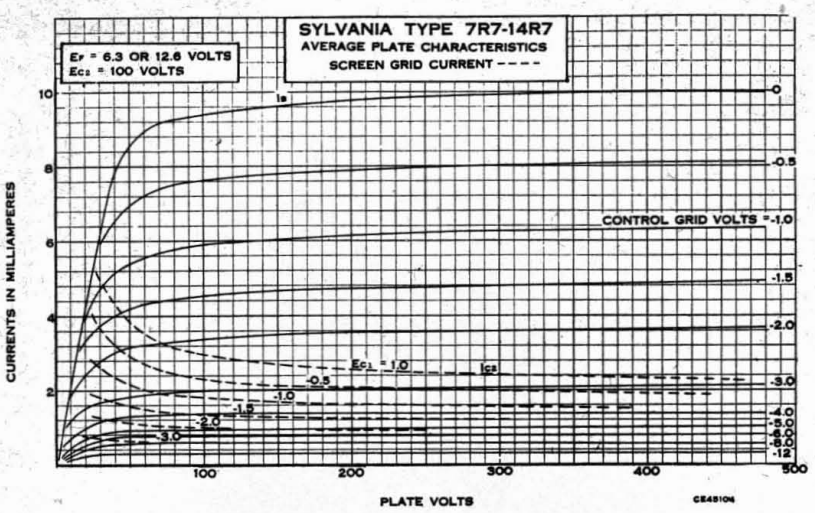
APPLICATION

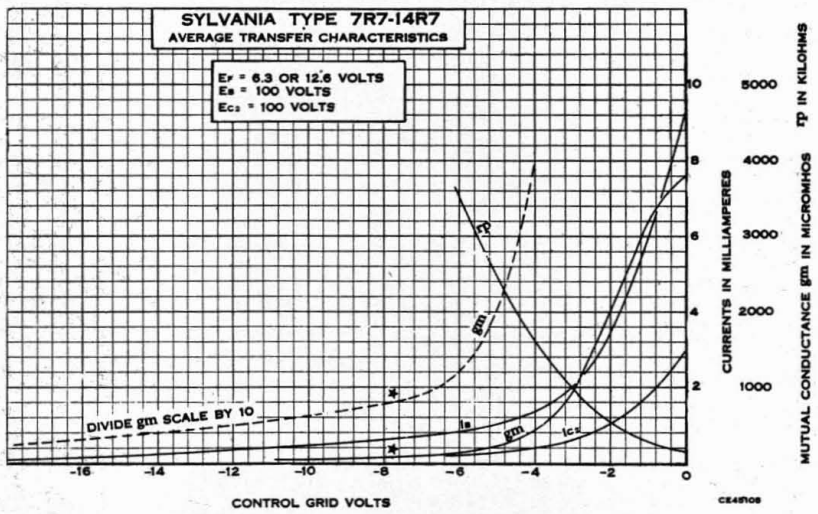
Sylvania Type 7R7 is a duodiode pentode of Lock-In construction. It is similar to Types 7E7 and 6B8G but has higher mutual conductance, lower plate current and interelectrode capacitance, and semi-remote cut-off. It is intended for use in AC and auto radio services. For AC-DC use the corresponding type, 14R7, should be more suitable.

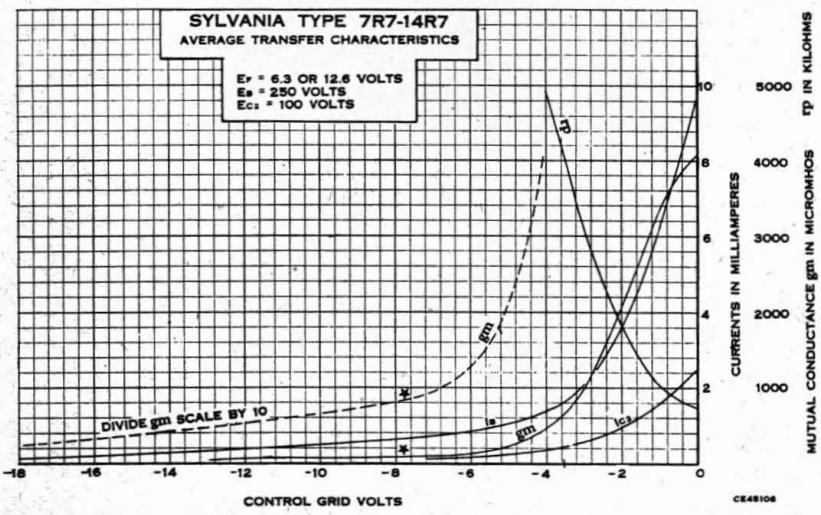
Applications of this tube will be similar to those of other high gain pentodes. The lower capacitance together with shielding and high mutual conductance make this tube suitable for many RF and wide band amplifier services. For diode characteristics, refer to curves for Type 7B6.

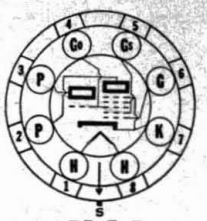
Data for use in resistance coupled circuits can be found in the appendix.

7R7 (Cont.)

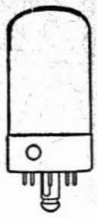

SYLVANIA TYPE 7R7-14R7
AVERAGE PLATE CHARACTERISTICS
SCREEN GRID CURRENT - - - -
Ef = 6.3 OR 12.6 VOLTS
Ec2 = 100 VOLTS
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45104


SYLVANIA TYPE 7R7-14R7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
DIVIDE gm SCALE BY 10
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
rp IN KILOHMS
CE45105


SYLVANIA TYPE 7R7-14R7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
DIVIDE gm SCALE BY 10
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
rp IN KILOHMS
CE45106



8BL-L-7



Sylvania Type 7S7

TRIODE HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Heptode Plate Voltage	300 Volts
Maximum Heptode Screen Voltage	100 Volts
Maximum Heptode Screen Supply	300 Volts
Minimum Heptode Control Grid Voltage	0 Volt
Maximum Heptode Plate Dissipation	0.6 Watt
Maximum Heptode Screen Dissipation	0.4 Watt
Maximum Triode Plate Voltage	175 Volts
Maximum Triode Plate Supply Voltage	300 Volts
Maximum Triode Plate Dissipation	1.0 Watt
Maximum Total Cathode Current	14 Ma.
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Heptode Grid G to Plate	0.03 μμf. Max.
Heptode Grid G to Triode Plate	0.10 μμf. Max.
Heptode Grid G to Grid Go	0.35 μμf. Max.
Triode Grid Go to Triode Plate	1.0 μμf.
Input (Signal)	5.0 μμf.
Output (Mixer)	8.0 μμf.
Input (Oscillator)	7.0 μμf.
Output (Oscillator)	3.5 μμf.

*With $1^{5}/_{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Heptode Plate Voltage	100	250 Volts
Heptode Screen Voltage	100	100 Volts
Oscillator Plate Voltage (Triode)	100	250† Volts
Heptode Control Grid Voltage	−2	−2 Volts
Self-Bias Resistor	240	195 Ohms
Oscillator Grid Resistor	50000	50000 Ohms
Heptode Plate Current	1.9	1.8 Ma.
Heptode Screen Current	3.0	3.0 Ma.
Oscillator Plate Current (Triode)	3.0	5.0 Ma.
Oscillator Grid Current (Triode)	0.3	0.4 Ma.
Heptode Plate Resistance	0.5	1.25 Megohms
Conversion Conductance	500	525 μmhos
Conversion Conductance (Heptode Grid −21 Volts)	2	2 μmhos
Total Cathode Current	8.2	10.2 Ma.

†Applied through a 20,000 ohm dropping resistor properly by-passed.

TRIODE CHARACTERISTICS

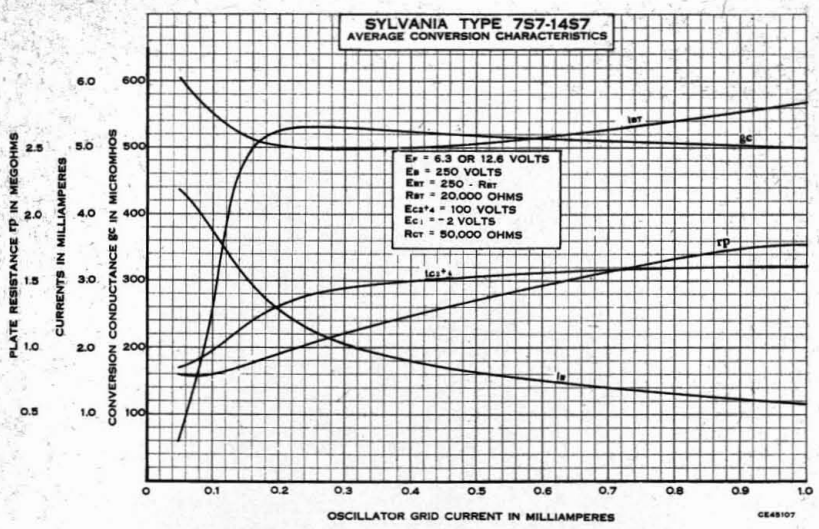
Heater Voltage	6.3 Volts
Plate Voltage	100 Volts
Grid Voltage	0 Volts
Plate Current	6.5 Ma.
Plate Resistance	11000 Ohms
Mutual Conductance	1650 μmhos
Amplification Factor	18

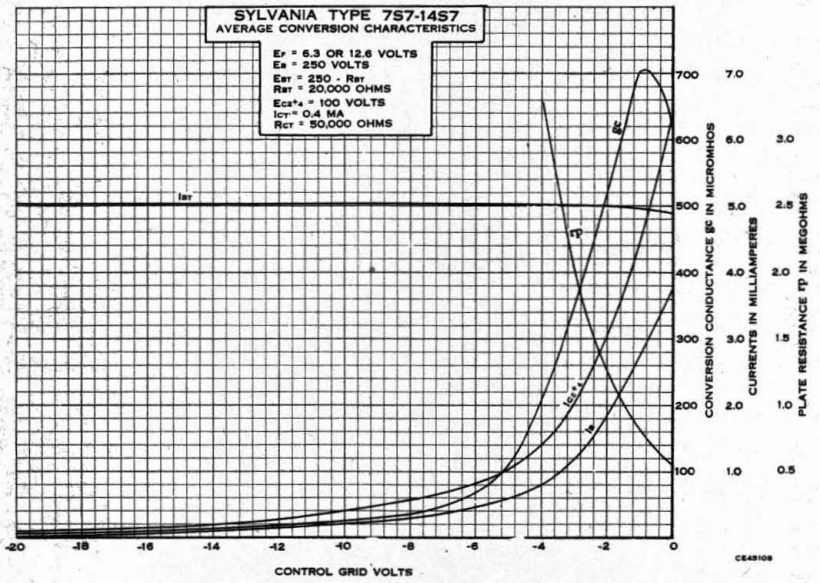
APPLICATION

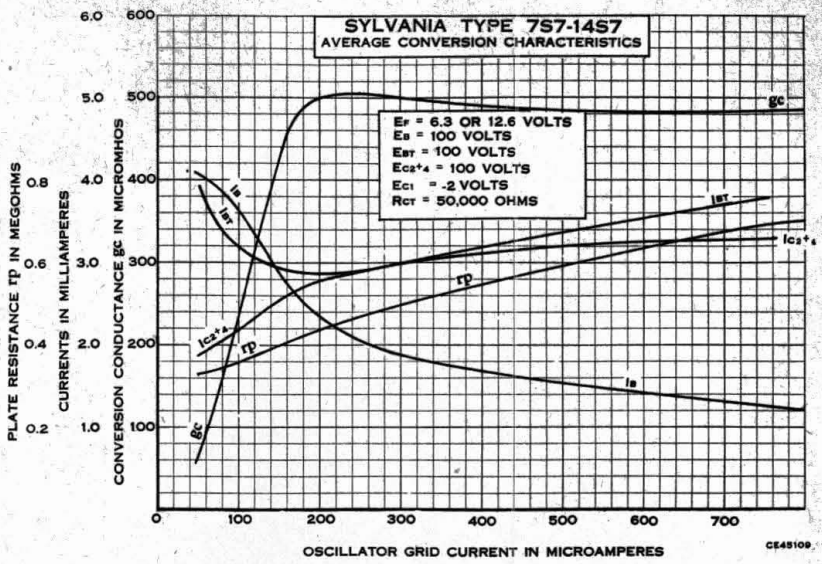
Sylvania Type 7S7 is a triode heptode tube designed for converter service. The triode section serves as the oscillator and is internally coupled to the heptode which serves as the mixer. This construction provides minimum frequency drift compared to other conversion methods. Type 7S7 is similar to Type 7J7 except for improved triode characteristics and higher conversion conductance.

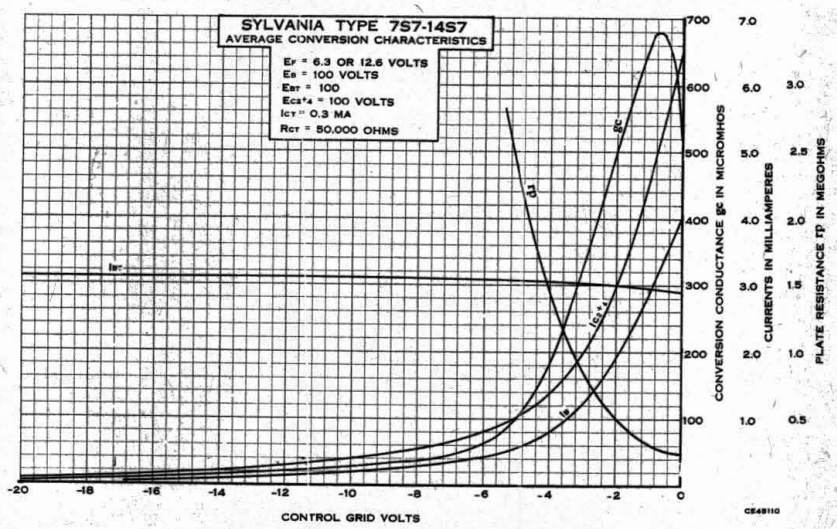
Adequate shielding, ruggedness, etc., is provided by the Lock-In construction.

7S7 (Cont.)


SYLVANIA TYPE 7S7-14S7
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ebb = 250 - Rbb
Rbb = 20,000 OHMS
Ec2+4 = 100 VOLTS
Ec1 = -2 VOLTS
Rct = 50,000 OHMS
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MILLIAMPERES
CE45107

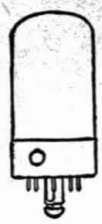

SYLVANIA TYPE 7S7-14S7
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ebb = 250 - Rbb
Rbb = 20,000 OHMS
Ec2+4 = 100 VOLTS
Ict = 0.4 MA
Rct = 50,000 OHMS
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45108


SYLVANIA TYPE 7S7-14S7
AVERAGE CONVERSION CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 100 VOLTS
EBT = 100 VOLTS
EC2+4 = 100 VOLTS
EC1 = -2 VOLTS
RCT = 50,000 OHMS
gc
Ib
IbT
IC2+4
rp
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
OSCILLATOR GRID CURRENT IN MICROAMPERES
CE45109


SYLVANIA TYPE 7S7-14S7
AVERAGE CONVERSION CHARACTERISTICS
EF = 6.3 OR 12.6 VOLTS
EB = 100 VOLTS
EBT = 100
EC2+4 = 100 VOLTS
ICT = 0.3 MA
RCT = 50,000 OHMS
gc
rp
IbT
IC2+4
Ib
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45110

7V7 Sylvania Type

SHARP CUT-OFF RF PENTODE





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage§	150 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.8 Watt
Minimum Self-Bias Resistor	160 Ohms
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	.004 μμf. Max.
Input	9.5 μμf.
Output	6.5 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

	§Condition 1	§Condition 2
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	300	300 Volts
Screen Supply Voltage	150	300 Volts
Screen Series Resistor	....	40000 Ohms
Suppressor (Grid 4) and Pin 5	0	0 Volt
Self-Bias Resistor	160	160 Ohms
Plate Current	10	10 Ma.
Screen Current	3.9	3.9 Ma.
Plate Resistance	0.3	0.3 Megohms
Mutual Conductance	5800	5800 μmhos
Grid Voltage for 10 μa. Plate Current	−8.0	−16 Volts

§Conditions 1 and 2 represent operation with fixed screen supply and with series resistor, respectively. Condition 2 gives an extended cut-off characteristic. When a screen supply in excess of 150 volts is used a series dropping resistor must be used to limit screen voltage to 150 volts when the plate current is at its rated value of 10 milliamperes.

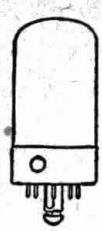
APPLICATION

Sylvania Type 7V7 is a cathode type pentode having low grid-plate capacity and high mutual conductance. It is identical to type 7W7 except for minor changes which make type 7W7 superior at high frequencies. The same curve data may be used for either type.

Due to the low bias requirement, self-bias should be used and grid circuit resistances should be limited to 0.25 megohm for fixed screen supply while series drop screen supplies permit a maximum grid circuit resistance of 0.5 megohm.



8BJ-L-5



Sylvania Type 7W7

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage§	150 Volts
Maximum Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.8 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.0025 μμf. Max.
Input	9.5 μμf.
Output	7.0 μμf.

*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

	§Condition 1	§Condition 2
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	300	300 Volts
Screen Supply	150	300 Volts
Screen Series Resistor	....	40000 Ohms
Suppressor	Connected to Cathode	
Self-Bias Resistor	160	160 Ohms
Plate Current	10.0	10.0 Ma.
Screen Current	3.9	3.9 Ma.
Plate Resistance	0.3	0.3 Megohm
Mutual Conductance	5800	5800 μmhos
Grid Voltage for 10 μa. Plate Current Approx.	−8.0	−16 Volts

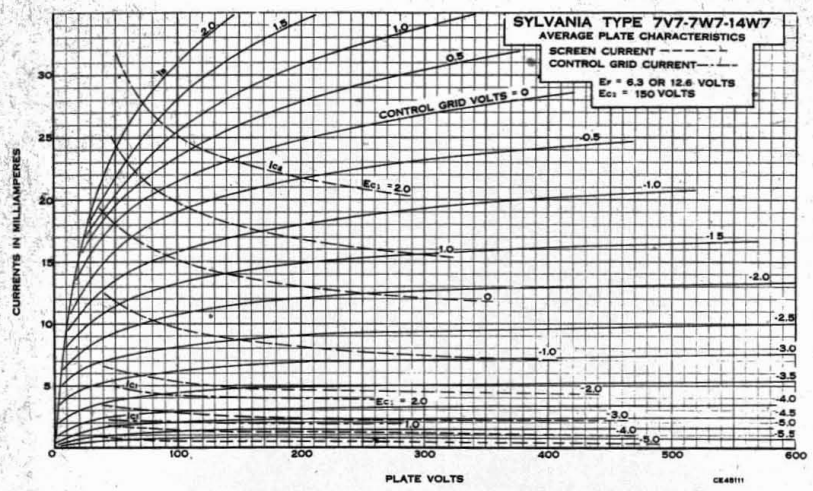
§Conditions 1 and 2 represent operation with fixed screen supply and with series screen dropping resistor respectively. Note that condition 2 gives an extended cut-off characteristic giving better control of gain when bias gain control is used. When a screen supply voltage in excess of 150 volts is used, a series screen dropping resistor must be employed to limit screen voltage to 150 volts with plate current at rated value of 10 ma.

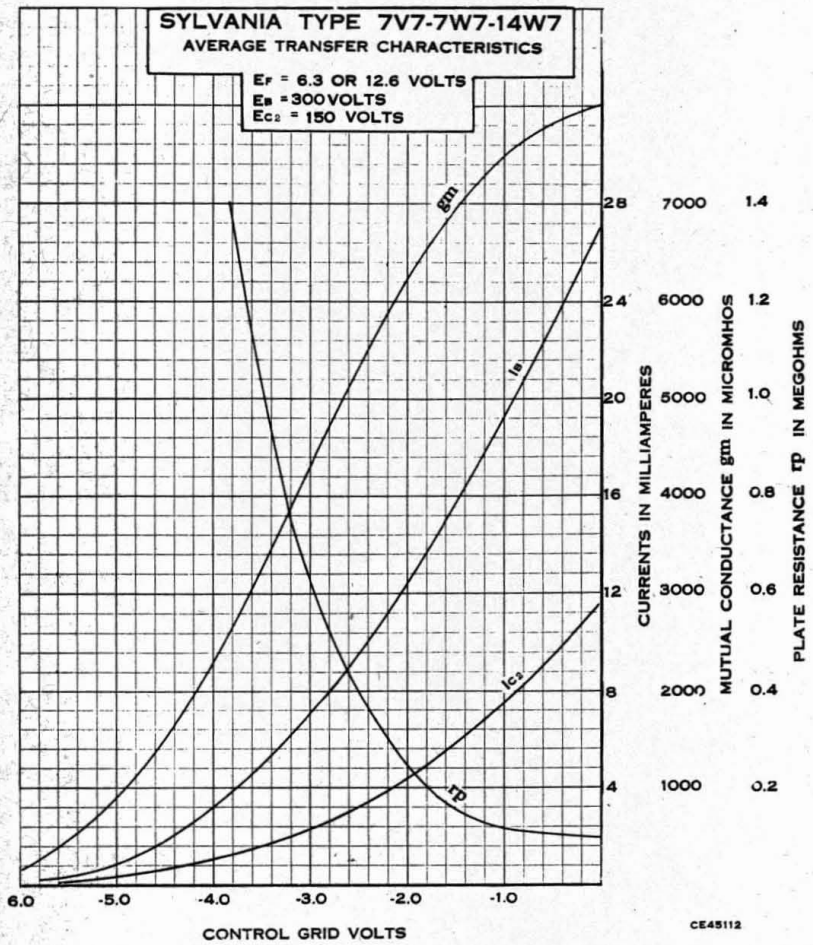
APPLICATION

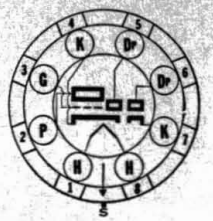
Sylvania Type 7W7 is a cathode type RF pentode of Lock-In construction having high mutual conductance with exceptionally low grid-plate capacity. These characteristics make this tube especially well suited for use in broad-band amplifiers, and in high-frequency applications.

Degeneration due to common coupling in the cathode circuit can be reduced with this tube by proper use of the two cathode leads. It has been found that as an RF amplifier at 75 megacycles or higher, optimum input and output resistance can be obtained by returning input circuits to pin No. 4, and output circuits, including heater and screen, to pin No. 7.

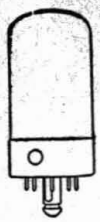
7W7 (Cont.)


SYLVANIA TYPE 7V7-7W7-14W7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT
CONTROL GRID CURRENT
Ef = 6.3 OR 12.6 VOLTS
Ec2 = 150 VOLTS
CONTROL GRID VOLTS = 0
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45111


SYLVANIA TYPE 7V7-7W7-14W7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 300 VOLTS
Ec2 = 150 VOLTS
gm
Ib
Ic2
rp
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE45112



8BZ-L-4



Sylvania Type 7X7

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts
Diode Current at 10 Volts (Minimum)	1.5 Ma.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	0	−1.0 Volt
Amplification Factor	85	100
Mutual Conductance	1000	1500 μmhos
Plate Resistance	85000	85000 Ohms
Plate Current	1.2	1.9 Ma.

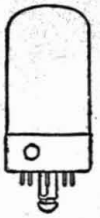
APPLICATION

Sylvania Type 7X7 is a double diode high-mu triode. It differs from other duodiode triodes by having diode No. 2 a completely separate unit except for the common heater. This difference allows this tube to be used in applications which require complete separation of the diode units.

7Y4 Sylvania Type

FULL WAVE RECTIFIER

GT EQUIVALENT 6X5GT





5AB-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum RMS Plate Voltage Condenser Input	325 Volts
Maximum RMS Plate Voltage Choke Input	450 Volts
Maximum Peak Inverse Voltage	1250 Volts
Maximum DC Heater-Cathode Voltage	450 Volts
Maximum Peak Plate Current	210 Ma.
Maximum DC Output Current	70 Ma.
DC Voltage Drop at 70 Ma. Per Plate	22 Volts

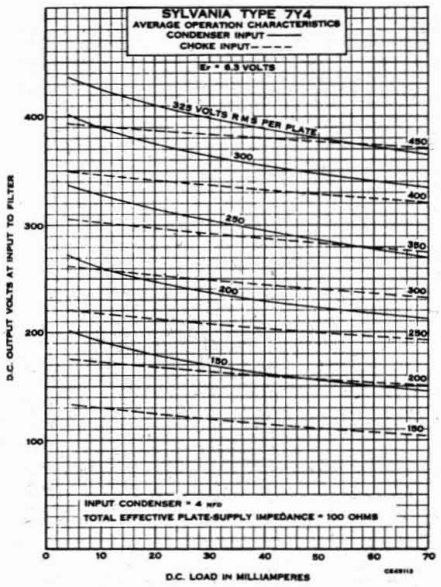
TYPICAL OPERATION

	Condenser Input	Choke Input
Heater Voltage	6.3	6.3 Volts
Heater Current	500	500 Ma.
RMS Plate Voltage	325	450 Volts
DC Output Current	70	70 Ma.
Plate Supply Impedance* (Minimum per Plate)	150	.... Ohms
Minimum Input Choke Value	....	10 Henrys

*When greater than 40 μfd input filter condenser is used it may be necessary to increase minimum plate supply impedance.

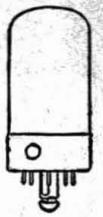
APPLICATION

Sylvania Type 7Y4 is a full-wave cathode heater type rectifier tube of Lock-In construction. It is designed for service in small auto and AC receivers. It is similar to the older 6X5GT and 84 but is smaller physically and is considerably more rugged due to the Lock-In construction. Conventional circuits such as used with the older types, are entirely suitable for use with this tube.





5AB-L-0



Sylvania Type 7Z4

DUODIODE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	7.0 Volts
Maximum AC Plate Voltage (RMS Per Plate) Condenser Input	325 Volts
Maximum AC Plate Voltage (RMS Per Plate) Choke Input	450 Volts
Maximum Peak Inverse Voltage	1250 Volts
Maximum DC Heater-Cathode Voltage	450 Volts
Maximum Steady State Peak Plate Current Per Plate	300 Ma.
DC Voltage Drop at 100 Ma. Per Plate	40 Volts
Maximum DC Output Current	100 Ma.

TYPICAL OPERATION

Condenser Input to Filter	
Heater Voltage AC or DC	6.3 Volts
Heater Current	0.900 Ampere
AC Plate Voltage (RMS per Plate)	325 Volts
DC Output Current	100 Ma.
Plate Supply Impedance (Per Plate) §	75 Ohms
Choke Input to Filter	
Heater Voltage	6.3 Volts
Heater Current	0.900 Ampere
AC Plate Voltage (RMS Per Plate)	450 Volts
DC Output Current	100 Ma.
Minimum Value of Input Choke	6 Henrys

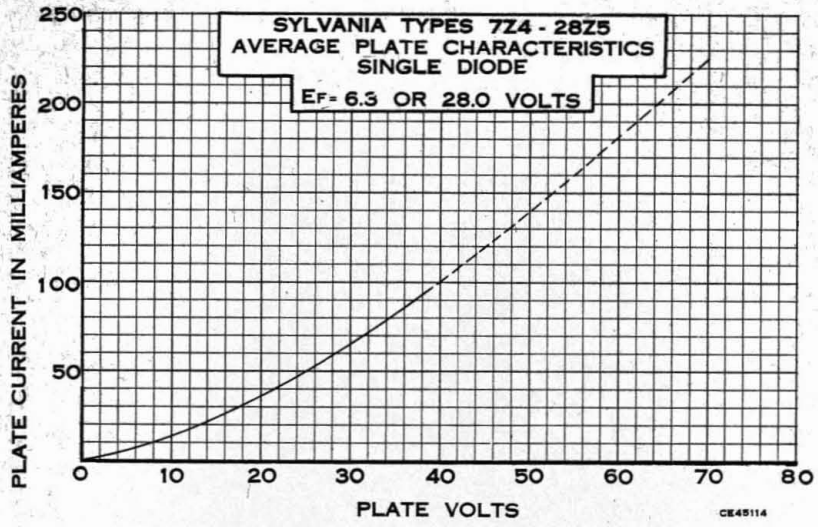
§When a filter condenser larger than 40 mfds. is used, additional plate supply impedance may be required.

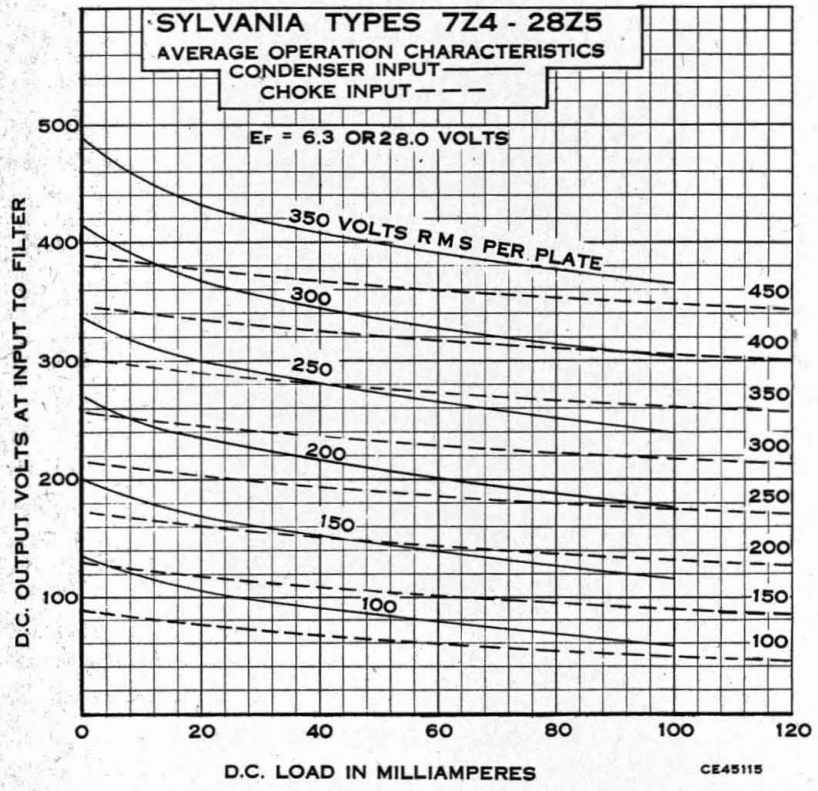
APPLICATION

Sylvania Type 7Z4 is a full-wave cathode type rectifier of Lock-In construction providing a rugged, compact tube. This tube is designed for rectifier service in AC or auto receivers which require a greater load current than can be supplied by type 7Y4. The increased tube drop gives an additional safety factor with power supplies of low impedance. Conventional circuits may be used.

Curves are on following page

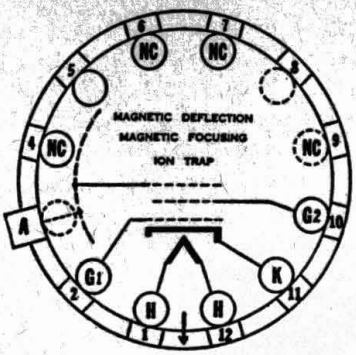
7Z4 (Cont.)


SYLVANIA TYPES 7Z4 - 28Z5
AVERAGE PLATE CHARACTERISTICS
SINGLE DIODE
EF = 6.3 OR 28.0 VOLTS
PLATE CURRENT IN MILLIAMPERES
250
200
150
100
50
0
10
20
30
40
50
60
70
80
PLATE VOLTS
CE45114

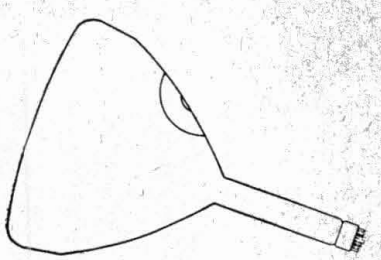

SYLVANIA TYPES 7Z4 - 28Z5
AVERAGE OPERATION CHARACTERISTICS
CONDENSER INPUT
CHOKE INPUT - - -
EF = 6.3 OR 28.0 VOLTS
350 VOLTS RMS PER PLATE
300
250
200
150
100
450
400
350
300
250
200
150
100
D.C. OUTPUT VOLTS AT INPUT TO FILTER
500
400
300
200
100
0
20
40
60
80
100
120
D.C. LOAD IN MILLIAMPERES
CE45115

Sylvania Type 10BP4

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 7 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	18″
Maximum Overall Diameter	10⅝″
Picture Size	6 x 8″
Deflection Method	Electromagnetic
Focusing Method	Electromagnetic
Ion Trap Type	Tilted Lens
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Maximum Anode Voltage	10,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range†	−125 to 0 Volts
Peak Heater to Cathode Voltage*	125 Volts
Maximum Grid Circuit Resistance	1.5 Megohms

†Signal voltages which drive the grid more than 2 volts positive are not recommended.

*During a warming-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	9000 Volts
Accelerating Grid Voltage (Approx.)	250 Volts
Control Grid Voltage for Visual Cut-Off	−27 to −63 Volts
Ion Trap Magnet	Sylvania Part No. H2-531 or equivalent permanent magnet type
Focus Coil Current with Typical Coil	100 Ma.

APPLICATION

Sylvania Type 10BP4 is a direct viewing Television Picture Tube employing electromagnetic deflection and focusing as well as the tilted lens type of ion trap. This last feature prevents the formation of a dark ion spot in the center of the screen.

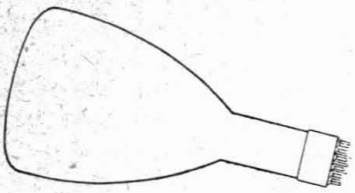
The deflection coil is placed first, close to the large part of the tube, after this the focusing coil is placed with its center approximately 3¼ inches from intersection of the bulb cone with the neck. The ion trap magnet is placed last with its strongest poles toward the base and in line with the internal pole pieces which are in the plane of Pins 6 and 12. Final adjustment of the ion trap magnet and the two coils while observing a test pattern gives the best results.

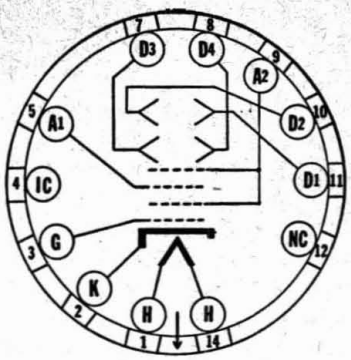
The coating on the outside of the bulb should be grounded to provide a filter capacitance of 500 to 2500 $\mu\mu$f.

CAUTION: The precautions suggested for handling television tubes are given in the appendix.

10HP4 Sylvania Type

PICTURE TUBE





14-G

PHYSICAL SPECIFICATIONS

Base	Medium Shell Diheptal 12 Pin
Maximum Overall Length	19 5/8"
Maximum Overall Diameter	10 1/8"
Picture Size	6 x 8"
Deflection Method	Electrostatic
Focusing Method	Electrostatic
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Maximum Anode #2 Voltage	5000 Volts
Maximum Focusing Anode Voltage	2000 Volts
Control Grid Voltage Range†	-200 to 0 Volts
Peak Voltage Between Anode #2 and any Deflecting Electrode	600 Volts
Peak Heater to Cathode Voltage*	125 Volts
Maximum Grid Circuit Resistance	1.5 Megohms
Maximum Deflection Electrode Circuit Resistance	5.0 Megohms

†Signal voltages which drive the grid more than 2 volts positive are not recommended.

*During a warming-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

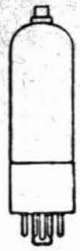
Heater Voltage	6.3	6.3 Volts
Heater Current	0.6	0.6 Amperes
High Voltage Anode Supply	4000	5000 Volts
Focusing Anode Voltage	960 to 1440	1200 to 1800 Volts
Focusing Anode Current		Not over 10 μa.
Control Grid Bias for Visual Cut-Off	-48 to -112	-60 to -140 Volts
Deflection Factors		
Deflecting Electrodes D_1 D_2	104	130 Volts DC/in.
Deflecting Electrodes D_3 D_4	80	100 Volts DC/in.

APPLICATION

Sylvania Type 10HP4 is an electrostatic type Television Picture Tube recommended for replacement use in sets designed for it.



8A-1-0



Sylvania Type 12A8GT

PENTAGRID CONVERTER

LOCK-IN EQUIVALENT 14B8

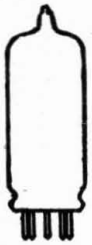
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other ratings, operation and application data, refer to corresponding Type 6A8GT which is identical except for heater ratings.



6BT-0-6



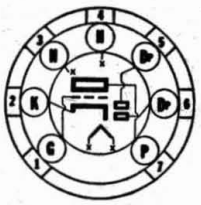
Sylvania Type 12AL5

DUODIODE

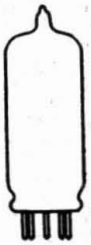
RATINGS AND OPERATION

Heater Voltage	12.6 Volts
Heater Current	150 Ma.

For other rating, operation, and application data, refer to corresponding Type 6AL5.



7BT-0-0



Sylvania Type 12AT6

DUODIODE HIGH-MU TRIODE

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating operation and application data, refer to corresponding Type 6AT6.

12AT7 Sylvania Type

DUOTRIODE





9A-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T-6½
Maximum Overall Length	$2\frac{3}{16}$"
Maximum Seated Height	$1\frac{15}{16}$"
Mounting Position	Any

RATINGS

EACH TRIODE UNIT

	Series	Parallel
Heater Voltage	12.6	6.3 Volts
Heater Current	150	300 Ma.
Maximum Heater-Cathode Voltage	90	90 Volts
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation	2.5	2.5 Watts

Direct Interelectrode Capacitances:*

	Triode No. 1†	Triode No. 2†
Grounded Cathode Operation		
Grid to Plate	1.5	1.5 μμf.
Input	2.2	2.2 μμf.
Output	0.5	0.4 μμf.
Grid to Grid	.005	μμf. Max.
Plate to Plate	0.4	μμf. Max.
Heater to Cathode	2.4	2.4 μμf.
Grounded Grid Operation		
Plate to Cathode	0.2	0.2 μμf.
Input	4.6	4.6 μμf.
Output	1.8	1.8 μμf.

†Triode 1 has the plate connected to Pin No. 6.

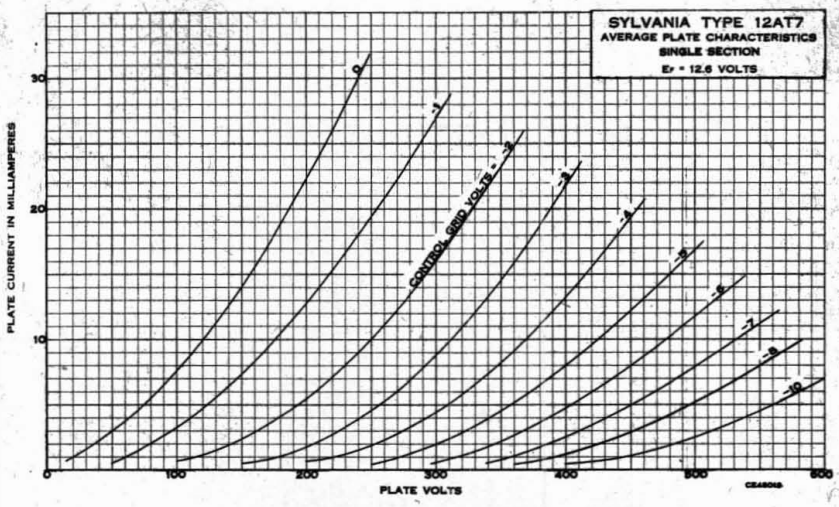
TYPICAL OPERATION

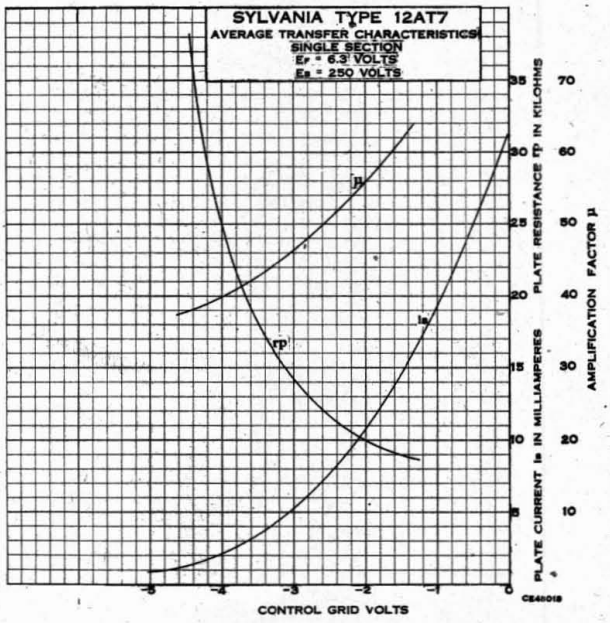
CLASS A_1 AMPLIFIER - EACH TRIODE UNIT

Heater Voltage	12.6 or	6.3	Volts
Heater Current	150 or	300	Ma.
Plate Voltage	100	180	250 Volts
Grid Voltage	−1	−1	−2 Volts
Cathode Bias Resistor	270	90	200 Ohms
Plate Resistance (Approx.)	15,000	9,400	10,900 Ohms
Mutual Conductance	4000	6600	5500 Ohms
Amplification Factor	60	62	60
Plate Current	3.7	11.0	10.0 Ma.
Grid Voltage for Ib = 10 μa (Approx.)	−5	−8	−12 Volts

APPLICATION

Sylvania Type 12AT7 is a miniature duotriode designed for use in compact equipment requiring a grounded-grid R.F. amplifier at frequencies up to 300 mc. The center tapped heater permits use on either 6.3 volt or series type heater circuits.


SYLVANIA TYPE 12AT7
AVERAGE PLATE CHARACTERISTICS
SINGLE SECTION
Ef = 12.6 VOLTS
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
PLATE VOLTS
CS-45048


SYLVANIA TYPE 12AT7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 6.3 VOLTS
Eb = 250 VOLTS
μ
rp
Ib
PLATE RESISTANCE rp IN KILOHMS
PLATE CURRENT Ib IN MILLIAMPERES
AMPLIFICATION FACTOR μ
CONTROL GRID VOLTS
CS-45018

12AU6 Sylvania Type

SHARP CUT-OFF RF PENTODE





7BK-0-2

RATINGS AND OPERATION

Heater Voltage	12.6 Volts
Heater Current	150 Ma.

For other rating, operation, and application data, refer to corresponding Type 6AU6.

12AU7 Sylvania Type

DUOTRIODE





9A-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T-6½
Maximum Overall Length	$2\frac{3}{16}$"
Maximum Seated Height	$1\frac{15}{16}$"
Mounting Position	Any

RATINGS (Each Triode)

	Series	Parallel
Heater Voltage AC or DC	12.6	6.3 Volts
Heater Current	150	300 Ma.
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation	2.75	2.75 Watts
Maximum Cathode Current	20	20 Ma.
Maximum Peak Heater-Cathode Voltage	180	180 Volts
Maximum Grid-Circuit Resistance		
For Cathode Bias	1.0	1.0 Megohm
For Fixed Bias	0.25	0.25 Megohm

Direct Interelectrode Capacitances:*

	Triode No. 1	Triode No. 2
Grid to Plate	1.5	1.5 μμf.
Grid to Cathode	1.6	1.6 μμf.
Plate to Cathode	0.50	0.35 μμf.

*Without external shield.

Note:—Triode No. 1 has the plate connected to pin No. 6.

TYPICAL OPERATION

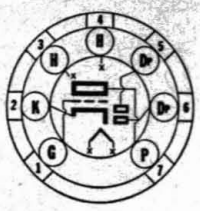
CLASS A_1 AMPLIFIER

Heater Voltage		
Series	12.6	12.6 Volts
Parallel	6.3	6.3 Volts
Heater Current		
Series	150	150 Ma.
Parallel	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	0	−8.5 Volts
Amplification Factor	19.5	17
Plate Resistance	6250	7700 Ohms
Transconductance	3100	2200 μmhos
Plate Current	11.8	10.5 Ma.

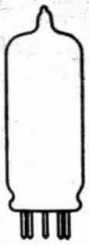
APPLICATION

Sylvania Type 12AU7 is a double triode in the T6½ miniature construction providing enough terminals to permit the center tap of the heater being brought out. This makes possible the parallel connection for use in AC sets or a series connection for use in 150 Ma. AC-DC service.

For curve and resistor coupled amplifier data reference should be made to Type 6C4.



7BT-0-0



Sylvania Type 12AV6

DUODIODE TRIODE

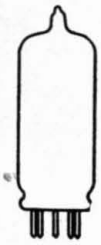
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 6AV6, which is identical except for heater ratings.



7CM-0-7



Sylvania Type 12AW6

SHARP CUT-OFF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5½"
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

	Triode*	Pentode
Heater Voltage	12.6	12.6 Volts
Heater Current	150	150 Ma.
Maximum Plate Voltage	300	300 Volts
Maximum Screen Voltage	...	150 Volts
Maximum Screen Supply Voltage	...	300 Volts
Maximum Control Grid Voltage		
Negative	50	50 Volts
Positive	0	0 Volts
Maximum Plate Dissipation	2.5	2 Watts
Maximum Screen Dissipation	...	0.5 Watt
Maximum Peak Heater-Cathode Voltage	90	90 Volts

*Screen grid tied to plate and suppressor grid tied to cathode.

Direct Interelectrode Capacitances:*

Grid to Plate	0.025 μμf.
Input	6.5 μμf.
Output	1.5 μμf.

**With no external shielding.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

	PENTODE CONNECTION		
Heater Voltage	12.6	12.6	12.6 Volts
Heater Current	150	150	150 Ma.
Plate Voltage	100	125	250 Volts
Suppressor Voltage		Connected to cathode at socket.	
Screen Voltage	100	125	150 Volts
Cathode Bias Resistor	100	100	200 Ohms
Plate Resistance (Approx.)	0.3	0.5	0.8 Megohm
Transconductance	4750	5100	5000 μmhos
Grid Voltage for Plate Current of 10 μa	−5	−6	−8 Volts
Plate Current	5.5	7.2	7 Ma.
Screen Current	1.6	2.1	2 Ma.

	TRIODE CONNECTION	
Heater Voltage	12.6	12.6 Volts
Heater Current	150	150 Ma.
Plate Voltage	180	250 Volts
Cathode Bias Resistor	350	825 Ohms
Plate Resistance	7900	11,000 Ohms
Amplification Factor	45	42
Transconductance	5700	3800 μmhos
Plate Current	7.0	5.5 Ma.

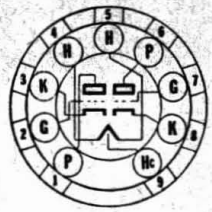
APPLICATION

Sylvania Type 12AW6 is a miniature sharp cut-off pentode designed for use in compact AC-DC sets. This type is the same as Type 6AG5 except for the heater voltage and the separation of the suppressor and cathode leads. For curve data reference should be made to Type 6AG5.

12AX7 Sylvania Type

HIGH MU DUOTRIODE





9A-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T-6½"
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 15/16"
Mounting Position	Any

RATINGS**

	Series	Parallel
Heater Voltage AC or DC	12.6	6.3 Volts
Heater Current	150	300 Ma.
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation	1	1 Watt
Maximum Grid Voltage		
Negative Bias Value	50	50 Volts
Positive Bias Value	0	0 Volts
Maximum Peak Heater-Cathode Voltage		
Heater negative with respect to cathode	180	180 Volts
Heater positive with respect to cathode	180	180 Volts

Direct Interelectrode Capacitances:*

	Triode No. 1†	Triode No. 2†
Grid to Plate	1.7	1.7 μμf.
Grid to Cathode	1.6	1.6 μμf.
Plate to Cathode	0.46	0.34 μμf.

†Triode No. 1 and Triode No. 2 have their plates connected to pins 6 and 1 respectively.

*Without external shield.

TYPICAL OPERATION**

CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Amplification Factor	100	100
Plate Resistance	80,000	62,500 Ohms
Transconductance	1250	1600 μmhos
Plate Current	0.5	1.2 Ma.

**Values are for each unit.

APPLICATION

Sylvania Type 12AX7 is a high mu duotriode for use as a voltage amplifier or phase inverter in portable or compact radio equipment. The use of the 9 pin base allows connection to be made to the center tap of the heater permitting operation in parallel on 6 volt supplies or in series for AC-DC service. For typical curves reference should be made to Type 6AV6 and to type 7B4 for resistance coupled amplifier data.



7BK-0-0



Sylvania Type 12BA6

REMOTE CUT-OFF RF PENTODE

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to corresponding Type 6BA6.



8CT-0-6 & 8



Sylvania Type 12BA7

HEPTODE CONVERTER

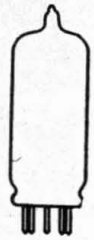
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6BA7, which is identical except for heater ratings.



7CH-0-0



Sylvania Type 12BE6

HEPTODE CONVERTER

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to corresponding Type 6BE6.



7BK-0-2



Sylvania Type 12BD6

REMOTE CUT-OFF RF PENTODE

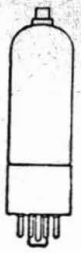
RATINGS AND OPERATION

Heater Voltage	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6BD6 which is identical except for heater ratings.

12F5GT Sylvania Type

HIGH-MU TRIODE





5M-0-0

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6F5 or 6F5GT which is identical, except for heater ratings.

12H6 Sylvania Type

TWIN DIODE





7Q-1-1

RATINGS AND OPERATION

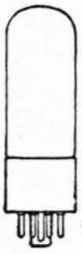
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6H6 which is identical except for heater ratings.

12J5GT Sylvania Type

MEDIUM-MU TRIODE

LOCK-IN EQUIVALENT 14A4





6Q-0-0

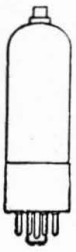
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6J5GT which is identical except for heater ratings.

12J7GT Sylvania Type

SHARP CUT-OFF RF PENTODE





7R-1-1

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6J7GT which is identical except for heater ratings.



7R-1-8



Sylvania Type 12K7GT

REMOTE CUT-OFF RF PENTODE

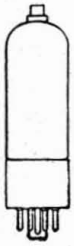
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6K7GT which is identical except for heater ratings.



8K-1-8



Sylvania Type 12K8GT

TRIODE HEXODE CONVERTER

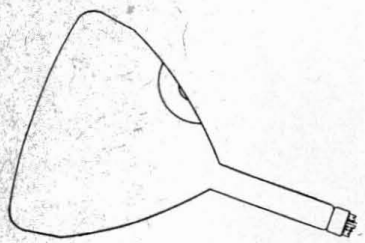
RATINGS AND OPERATION

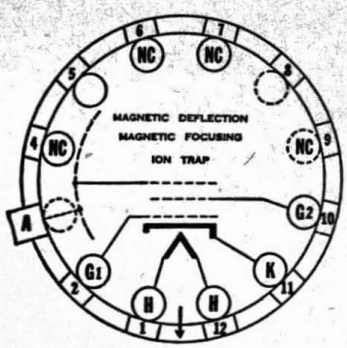
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding type 6K8GT which is identical except for heater ratings.

12LP4 Sylvania Type

PICTURE TUBE





12-D

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 7 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19⅛"
Maximum Overall Diameter	12½"
Picture Size	7½ x 10"
Deflection Method	Electromagnetic
Focusing Method	Electromagnetic
Ion Trap Type	Tilted Lens
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	12,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range†	−125 to 0 Volts
Peak Heater to Cathode Voltage*	125 Volts
Maximum Grid Circuit Resistance	1.5 Megohms

†Signal voltages which drive the grid more than 2 volts positive are not recommended.

*During a warming-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Anode Voltage	11,000 Volts
Accelerating Grid Voltage	250 Volts
Control Grid Voltage for Visual Cut-Off	−27 to −63 Volts
Ion Trap Magnet	Sylvania Part No. H2-531 or equivalent permanent magnet type
Focus Coil Current with Typical Coil	100 Ma.

APPLICATION

Sylvania Type 12LP4 is a direct view Television Picture Tube employing electromagnetic deflection and focusing as well as the tilted lens type of ion trap. This last feature prevents the formation of a dark ion spot in the center of the screen.

The deflection coil is placed first, close to the large part of the tube, after this the focusing coil is placed with its center approximately 3¼ inches from intersection of the bulb cone with the neck. The ion trap magnet is placed last with its strongest poles toward the base and in line with the internal pole pieces which are in the plane of Pins 6 and 12.

Final adjustment of the ion trap magnet and the two coils while observing a test pattern gives the best results.

The coating on the outside of the bulb should be grounded to provide a filter capacitance of 500 to 2500 $\mu\mu$f.

CAUTION: The precautions suggested for handling television tubes are given on page 16 of the appendix.



7V-1-8



Sylvania Type 12Q7GT

DUODIODE HIGH-MU TRIODE

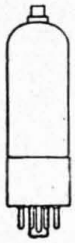
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6Q7GT which is identical except for heater ratings.



8CB-0-2



Sylvania Type 12S8GT

TRIPLE DIODE TRIODE

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 6S8GT which is identical except for heater ratings.

12SA7GT Sylvania Type

PENTRAGRID CONVERTER

LOCK-IN EQUIVALENT 14Q7



8AD-1-6
12SA7GT



8R-1-0
12SA7

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SA7GT which is identical except for heater ratings.

12SC7 Sylvania Type

DOUBLE TRIODE AMPLIFIER





8S-1-0

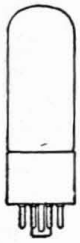
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SC7 which is identical except for heater ratings.

12SF5GT Sylvania Type

HIGH-MU TRIODE





6AB-0-0

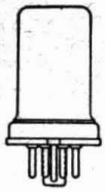
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SF5GT which is identical except for heater ratings.



7AZ-1-0



Sylvania Type 12SF7

DIODE REMOTE CUT-OFF RF PENTODE

RATINGS AND OPERATION

Heater Voltage AC or DC..... 12.6 Volts
Heater Current..... 150 Ma.

For other data, refer to corresponding Type 6SF7 which is identical except for heater ratings.



8BK-1-1



Sylvania Type 12SG7

SEMI-REMOTE CUT-OFF RF PENTODE

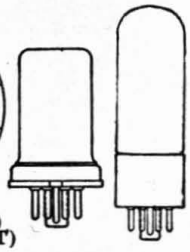
RATINGS AND OPERATION

Heater Voltage AC or DC..... 12.6 Volts
Heater Current..... 150 Ma.

For other data, refer to corresponding Type 6SG7 which is identical except for heater ratings.



8BK-1-0 (12SH7)
8BK-1-1 (12SH7GT)



Sylvania Type 12SH7GT

SHARP CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 14H7

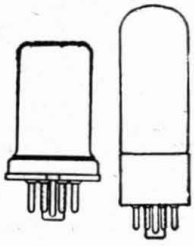
RATINGS AND OPERATION

Heater Voltage AC or DC..... 12.6 Volts
Heater Current..... 150 Ma.

For other data, refer to corresponding Type 6SH7GT, which is identical except for heater ratings.



8N-1-1 (12SJ7)
8N-1-5 (12SJ7GT)



Sylvania Type 12SJ7GT

SHARP CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 14C7

RATINGS AND OPERATION

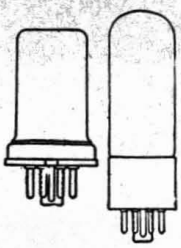
Heater Voltage AC or DC..... 12.6 Volts
Heater Current..... 150 Ma.

For other data, refer to corresponding Type 6SJ7GT, which is identical except for heater ratings.

12SK7GT Sylvania Type

REMOTE CUT-OFF RF PENTODE

LOCK-IN EQUIVALENT 14A7





8N-1-1 (12SK7)
8N-1-5 (12SK7GT)

RATINGS AND OPERATION

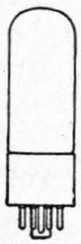
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SK7GT which is identical except for heater ratings.

12SL7GT Sylvania Type

DOUBLE TRIODE AMPLIFIER

LOCK-IN EQUIVALENT 14F7





8BD-0-0

RATINGS AND OPERATION

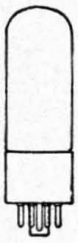
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SL7GT which is identical except for heater ratings.

12SN7GT Sylvania Type

DOUBLE TRIODE AMPLIFIER

LOCK-IN EQUIVALENT 14N7





8BD-0-0

RATINGS AND OPERATION

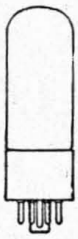
Heater Voltage AC or DC	12.6 Volts
Heater Current	300 Ma.

For other data, refer to corresponding Type 6SN7GT which is identical except for heater ratings.

12SQ7GT Sylvania Type

DUODIODE HIGH-MU TRIODE

LOCK-IN EQUIVALENT 14B6





8Q-1-3

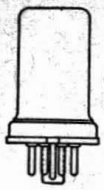
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SQ7GT which is identical except for heater ratings.



8Q-1-1



Sylvania Type 12SR7

DUODIODE MEDIUM-MU TRIODE

LOCK-IN EQUIVALENT 14E6

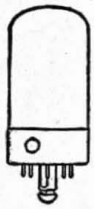
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SR7 which is identical except for heater ratings.



5AC-L-0



Sylvania Type 14A4

MEDIUM-MU TRIODE

GT EQUIVALENT 12J5GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

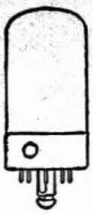
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7A4.

14A5 Sylvania Type

BEAM POWER AMPLIFIER





6AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	300 Volts
Maximum Plate Dissipation	7.5 Watts
Maximum Screen Dissipation	1.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.4 μμf.
Input	6.8 μμf.
Output	7.0 μμf.

*With $1^{5}/_{16}$" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.
Plate Voltage	250 Volts
Screen Voltage	250 Volts
Grid Voltage§	−12.5 Volts
Self-Bias Resistor	370 Ohms
Peak AF Signal Voltage	12.5 Volts
Plate Current Zero Signal	30 Ma.
Plate Current Maximum Signal	32 Ma.
Screen Current Zero Signal	3.5 Ma.
Screen Current Maximum Signal	5.5 Ma.
Plate Resistance	70000 Ohms
Mutual Conductance	3000 μmhos
Load Resistance	7500 Ohms
Power Output	2.8 Watts
Total Harmonic Distortion	7 Per Cent

§The DC resistance in the grid circuit under rated maximum condition should never exceed 0.5 megohm for self bias, and 0.1 megohm for fixed bias operation.

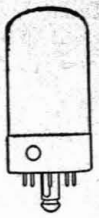
APPLICATION

Sylvania Type 14A5 is a beam power amplifier of Lock-In construction similar to Type 14C5 except for lower power output because of lower heater power. It should be noted that type 14A5 is an exception to the rule that corresponding types in the 7 and 14 volt series are the same except for heater ratings.

Low resistance grid coupling methods are to be preferred but when resistance coupling methods are used, circuit resistances should not exceed the maximum values given above.



8V-L-5



Sylvania Type 14A7

REMOTE CUT-OFF RF PENTODE

GT EQUIVALENT 12SK7GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

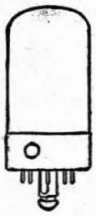
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7A7.



8AC-L-0



Sylvania Type 14AF7

TWIN TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

OPERATION

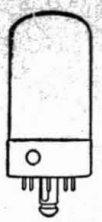
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

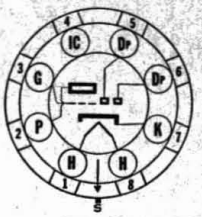
For other rating, operation and application data, refer to Sylvania Lock-In Type 7AF7.

14B6 Sylvania Type

DUODIODE HIGH-MU TRIODE

GT EQUIVALENT 12SQ7GT





8W-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

OPERATION

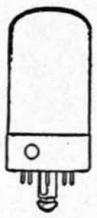
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7B6.

14B8 Sylvania Type

PENTAGRID CONVERTER

GT EQUIVALENT 12A8GT





8X-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

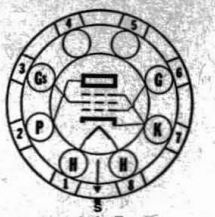
RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

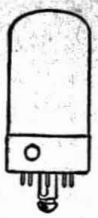
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7B8.



6AA-L-0



Sylvania Type 14C5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

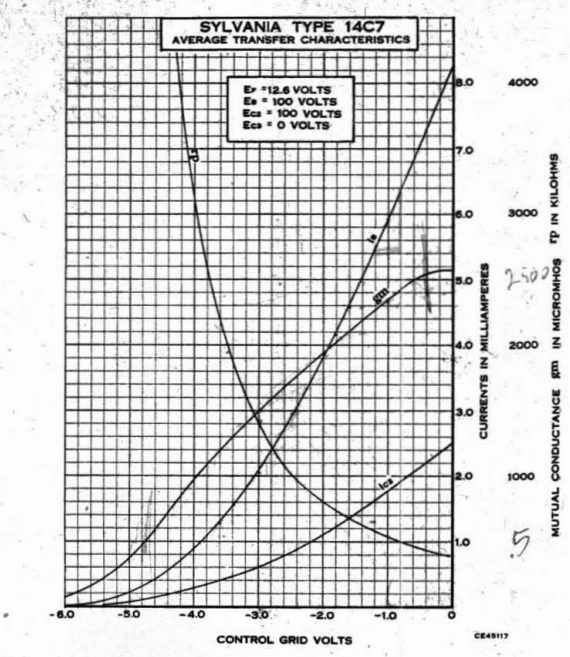
RATINGS

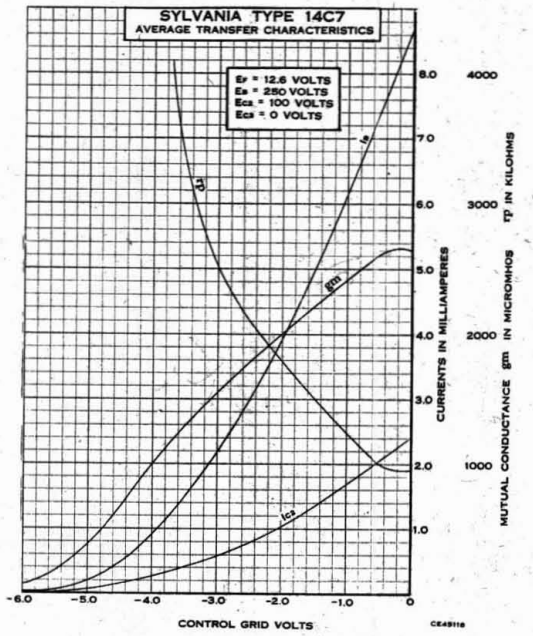
Heater Voltage AC or DC (Nominal)	14.0 Volts

OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	225 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7C5.

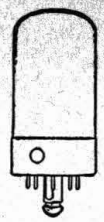

SYLVANIA TYPE 14C7
AVERAGE TRANSFER CHARACTERISTICS
Er = 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
Ip
Ib
gm
Ic2
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
4000
3000
2000
1000
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
rp IN KILOHMS
CE49117

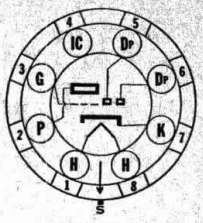

SYLVANIA TYPE 14C7
AVERAGE TRANSFER CHARACTERISTICS
Er = 12.6 VOLTS
Eb = 250 VOLTS
Ec2 = 100 VOLTS
Ec1 = 0 VOLTS
Ip
Ib
gm
Ic2
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
4000
3000
2000
1000
-6.0
-5.0
-4.0
-3.0
-2.0
-1.0
0
CONTROL GRID VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
rp IN KILOHMS
CE49118

14E6 Sylvania Type

DUODIODE MEDIUM-MU TRIODE

METAL EQUIVALENT 12SR7





8W-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

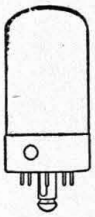
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7E6. For diode load curve data, refer to that for Type 7B6.

14E7 Sylvania Type

DUODIODE PENTODE





8AE-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2\frac{25}{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

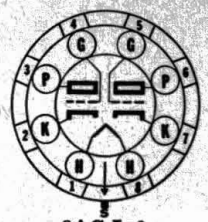
RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

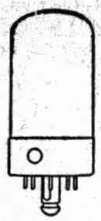
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7E7.



8AC-L-0



Sylvania Type 14F7

HIGH-MU DUO TRIODE

GT EQUIVALENT 12SL7GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

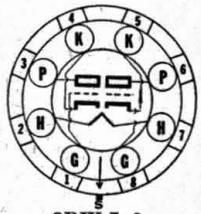
RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

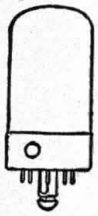
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Type 7F7.



8BW-L-0



Sylvania Type 14F8

DOUBLE TRIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	$2^{9}/_{32}$"
Maximum Seated Height	$1\frac{3}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

TYPICAL OPERATION

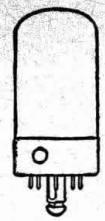
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

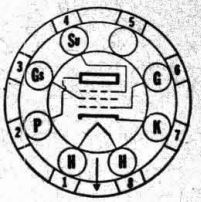
For other rating, operation and application data, refer to Sylvania Type 7F8.

14H7 Sylvania Type

SEMI-REMOTE CUT-OFF RF PENTODE

GT EQUIVALENT 12SH7GT





8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

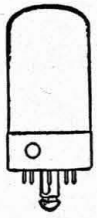
OPERATION

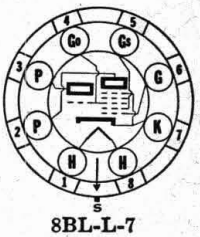
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7H7.

14J7 Sylvania Type

TRIODE HEPTODE CONVERTER





8BL-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

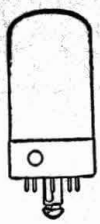
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7J7.



8AC-L-0



14N7 Sylvania Type

MEDIUM-MU DUO TRIODE

GT EQUIVALENT 12SN7GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\,^{5}/_{8}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

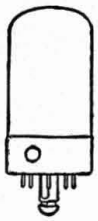
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	300 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7N7.



8AL-L-0



Sylvania Type 14Q7

PENTAGRID CONVERTER

GT EQUIVALENT 12SA7GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\,^{1}/_{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

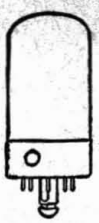
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7Q7.

14R7 Sylvania Type

DUODIODE PENTODE





8AE-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{15}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

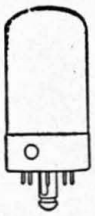
OPERATION

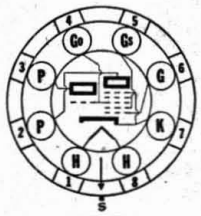
Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Lock-In Type 7R7. For diode load current data, see Type 7B6.

14S7 Sylvania Type

TRIODE HEPTODE CONVERTER





8BL-L-7

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{15}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

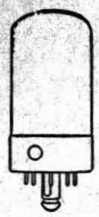
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7S7.



8BJ-L-5



Sylvania Type 14W7

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	2¼"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

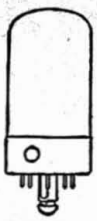
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	225 Ma.

For other rating, operation and application data, refer to Sylvania Lock-In Type 7W7.

14Y4 Sylvania Type

DUODIODE RECTIFIER





5AB-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts
Maximum AC Plate Voltage (RMS per Plate, Condenser Input)	325 Volts
Maximum AC Plate Voltage (RMS, Choke Input)	450 Volts
Maximum Peak Inverse Voltage	1250 Volts
Maximum DC Heater-Cathode Voltage	450 Volts
Maximum Steady State Peak Plate Current Per Plate	210 Ma.
Tube Voltage Drop at 70 Ma. DC Per Plate	22 Volts
Maximum Output Current	70 Ma.

TYPICAL OPERATION FULL WAVE RECTIFIER

CONDENSER INPUT TO FILTER

Heater Voltage AC or DC	12.6 Volts
Heater Current	0.300 Ampere
AC RMS Voltage per Plate	325 Volts
DC Output Current	70 Ma.
Plate Supply Impedance per Plate§	150 Ohms Min.

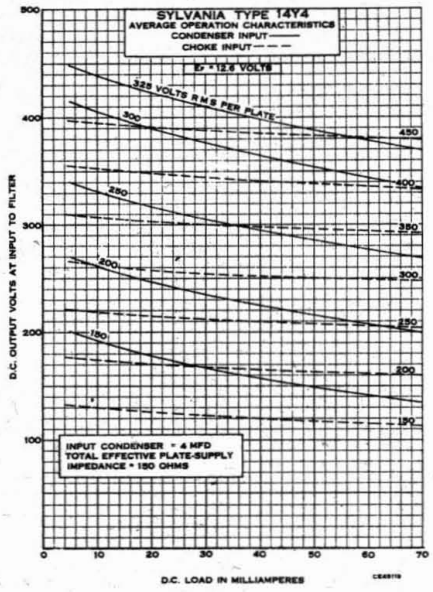
CHOKE INPUT TO FILTER

Heater Voltage	12.6 Volts
Heater Current	0.300 Amperes
AC Voltage Per Plate	450 Volts
DC Output Current	70 Ma.
Minimum Value of Input Choke	8 Henrys

§When filter condensers larger than 40 μfd are used it may be necessary to increase the specified plate supply impedance.

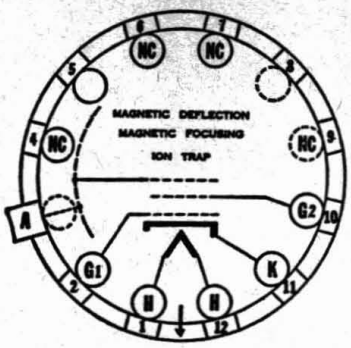
APPLICATION

Sylvania Type 14Y4 is a full-wave cathode type rectifier of Lock-In construction, giving it desirable mechanical features. This tube is designed for service in aircraft or compact AC receivers. Operating conditions and characteristics are similar to those of Type 7Y4 except for heater rating. Conventional full or half-wave circuits may be used.

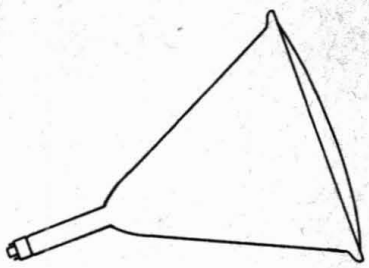


Sylvania Type 16AP4

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 7 Pin
Bulb Contact	Metal-Cone Lip
Maximum Overall Length	22 5/8"
Maximum Overall Diameter	16"
Minimum Useful Screen Diameter	14 3/8"
Deflection Method	Electromagnetic
Focusing Method	Electromagnetic
Ion Trap Type	Tilted Lens
Phosphor Color	White
Phosphor Persistance	Medium
Mounting Position	Any
Deflection Angle (Approx.)	53°

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	14,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range†	−125 to 0 Volts
Peak Heater to Cathode Voltage*	150 Volts
Maximum Grid Circuit Resistance	1.5 Megohms

†Signal voltages which drive the grid more than 2 volts positive are not recommended.

*During a warming-up period not exceeding 5 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	0.6	0.6 Ampere
Anode Voltage	9000	12,000 Volts
Accelerator Grid Voltage	300	300 Volts
Control Grid Voltage for visual cut-off	−33 to −77	−33 to −77 Volts
Ion Trap Magnet	Sylvania Part No. H2-531 or equivalent permanent magnet type.	
Focus Coil Current with Typical Coil	55-92	67-112 Ma.

APPLICATION

Sylvania Type 16AP4 is a magnetic deflection direct view picture tube for television use. This type combines the features of the tilted lens ion trap and a light-weight metal cone envelope.

Since the anode voltage is applied to the metal shell, this type should be operated within an enclosure adequate to prevent accidental contact, and insulation for the maximum voltage should be provided in the tube mounting. Connection to the metal cone should be made through a clip or metal piece on which the polished lip rests when in use.

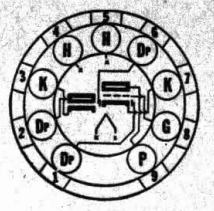
Good regulation of the H.V. power supplies is not required, and is, in fact, a disadvantage in case of internal arcs. Some resistance should be added in the power supply circuits when short circuit currents could exceed 1 ampere. This additional resistance should provide 16,000 minimum ohms in the anode, 470 minimum ohms in the accelerator grid, and 150 minimum ohms in the control grid circuits.

CAUTION: The precautions suggested for handling television tubes are given on page 16 of the appendix.

19T8 Sylvania Type

TRIPLE DIODE TRIODE





9E-0-3 & 7

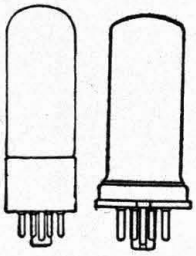
RATINGS AND OPERATION

Heater Voltage AC or DC	18.9 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 6T8 which is identical except for heater ratings.

25A6GT Sylvania Type

POWER AMPLIFIER PENTODE





7S-1-0 (25A6)
7S-0-0 (25A6GT)

PHYSICAL SPECIFICATIONS

	25A6	25A6GT
Base	Small Wafer 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-6	T-9
Maximum Overall Length	3¼"	3 5/16"
Maximum Seated Height	2 11/16"	2¾"
Mounting Position	Any	Any

RATINGS

Heater Voltage AC or DC	25.0 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	160 Volts
Maximum Screen Voltage	135 Volts
Maximum Plate Dissipation	5.3 Watts
Maximum Screen Dissipation	1.9 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

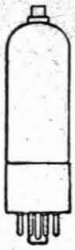
Heater Voltage AC or DC	25.0	25.0	25.0 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	95	135	160 Volts
Screen Voltage	95	135	120 Volts
Grid Voltage	−15	−20	−18 Volts
Self-Bias Resistor	625	450	450 Ohms
Peak A-F Signal Voltage	15	20	18 Volts
Plate Current (Zero Signal)	20	37	33 Ma.
Plate Current (Maximum Signal)	22	39	36 Ma.
Screen Current (Zero Signal)	4	8	6.5 Ma.
Screen Current (Maximum Signal)	8	14	12 Ma.
Plate Resistance	45000	35000	42000 Ohms
Mutual Conductance	2000	2450	2375 μmhos
Load Resistance	4500	4000	5000 Ohms
Power Output	0.9	2	2.2 Watts
Total Harmonic Distortion	11	9	10 Per Cent

APPLICATION

The Sylvania Types 25A6 and 25A6G are the equivalents of the Type 43.



8T-0-1



Sylvania Type 25B8GT

TRIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	25.0 Volts
Heater Current	0.150 Ampere

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

	Triode	Pentode
Heater Voltage	25	25 Volts
Heater Current	0.150	0.150 Ampere
Plate Voltage	100	100 Volts
Screen Voltage	....	100 Volts
Grid Voltage	−1.0	−3.0 Volts
Self-Bias Resistor	....	315 Ohms
Amplification Factor	112	....
Plate Resistance	75000	185000 Ohms
Mutual Conductance	1500	2000 μmhos
Plate Current	0.6	7.6 Ma.
Screen Current	....	2.0 Ma.
Grid Voltage (Approximate for Cut-Off)	−2.5	.... Volts
(For 2 μmhos)	....	−41 Volts

APPLICATION

Sylvania Type 25B8GT is a high-mu triode and a remote cut-off pentode as separate units. It is similar to Type 12B8GT except for heater rating. The .150 Ma. heater rating allows its use in series heater arrangements with other 150 Ma. heater tubes.

25C6G Sylvania Type

BEAM POWER AMPLIFIER





7AC-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 7 Pin
Bulb	ST14
Maximum Overall Length	4 5/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

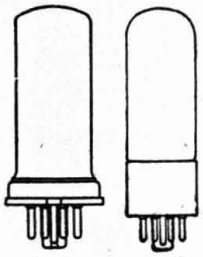
RATINGS

Heater Voltage AC or DC	25.0 Volts
Heater Current	300 Ma.

For other data on this type refer to type 6Y6 which is identical except for heater ratings.

25L6GT Sylvania Type

BEAM POWER AMPLIFIER





7AC-1-0 (25L6)
7AC-0-0 (25L6GT).

PHYSICAL SPECIFICATIONS

	25L6	25L6GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-6	T-9
Maximum Overall Length	3 1/4"	3 5/16"
Maximum Seated Height	2 11/16"	2 3/4"
Mounting Position	Any	Any

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	25.0	25.0 Volts
Heater Current	300	300 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage*	-7.5	** Volts
Peak AF Signal Voltage	7.5	8.5 Volts
Cathode Bias Resistor	140	180 Ohms
Plate Current, Zero Signal	49	46 Ma.
Plate Current, Maximum Signal	50	47 Ma.
Screen Current, Zero Signal	4	2.2 Ma.
Screen Current, Maximum Signal	10	8.5 Ma.
Plate Resistance	13,000	28,000 Ohms
Mutual Conductance	8000	8000 μmhos
Load Resistance	2000	4000 Ohms
Total Harmonic Distortion	10	10 %
Power Output	2.1	3.8 Watts

*For fixed bias circuits the grid circuit resistance should not exceed 0.1 megohm; for self-bias operation 0.5 megohm should be the maximum.

**Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

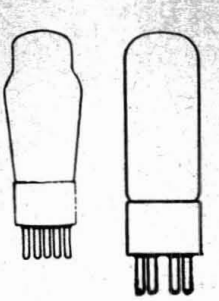
APPLICATION

Sylvania 25L6 and 25L6G are power amplifiers intended especially for operation in the output stage of ac-dc and d-c receivers. These tubes provide high power output at the comparatively low plate and screen voltages which are available in such receivers.

The design features, which are similar to those employed in Type 6L6, involve the use of directed electron beams. These effects are produced by careful arrangement of the tube elements, so placed as to set up potential fields which confine the electrons into beams of high density. High power output is obtained with good power sensitivity and high efficiency.



6E-0-0



Sylvania Type 25Z5

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Small 6 Pin
Bulb	T9 or ST12
Maximum Overall Length	4 3/16"
Maximum Seated Height	3 9/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	25.0 Volts
Heater Current	300 Ma.
Maximum DC Heater-Cathode Voltage	350 Volts
Maximum Peak Inverse Voltage	700 Volts
Tube Voltage Drop (150 Ma. Per Plate)	22 Volts
Steady State Peak Plate Current Per Plate	450 Ma.

TYPICAL OPERATION

VOLTAGE DOUBLER

Heater Voltage	25.0 Volts
AC Plate Voltage Per Plate (RMS)	117 Volts Max.
DC Output Current	75 Ma. Max.
Maximum Steady State Peak Plate Current Per Plate	450 Ma. Max.
Plate Supply Impedance (Minimum)	* Ohms

*Sufficient to limit the maximum steady-state peak plate current to value shown. Additional impedance may be required when a filter of more than 40 mfd. is used.

HALF-WAVE RECTIFIER

Heater Voltage	25.0	25.0	25.0 Volts
A-C Plate Voltage per Plate (RMS)	117	150	235¶ Volts
D-C Output Current per Plate	75¶	75¶	75¶ Ma.
Plate Supply Impedance	15	40	100 Ohms

¶Maximum.

Note: For rectifier curve data see next page.

APPLICATION

Sylvania Type 25Z5 is a heater type, high-vacuum rectifier especially suited for providing d-c power directly from ordinary a-c line supplies. The design makes it applicable in half-wave circuits or as a voltage doubling device and hence particularly adapted for service in transformerless receivers.

Half-Wave Circuit Operation:

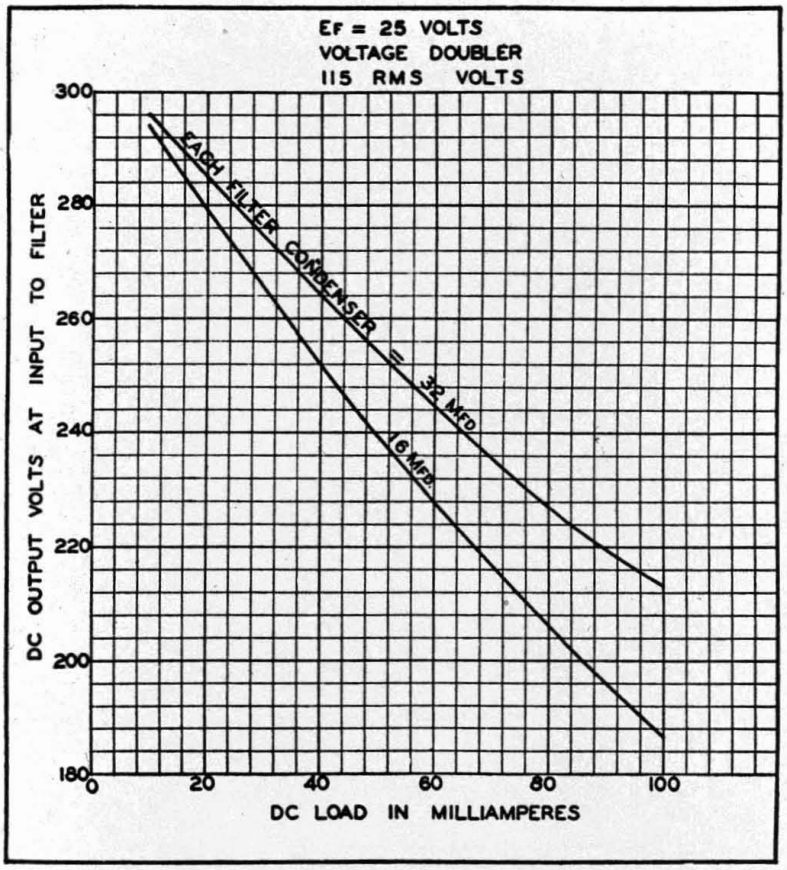
For this type of service it is necessary to connect the two plates together at the socket and, likewise, to tie the two cathodes so as to form a single element. A condenser-input filter is essential in order to obtain satisfactory d-c output voltages; the recommended capacitance is 16 mfd.

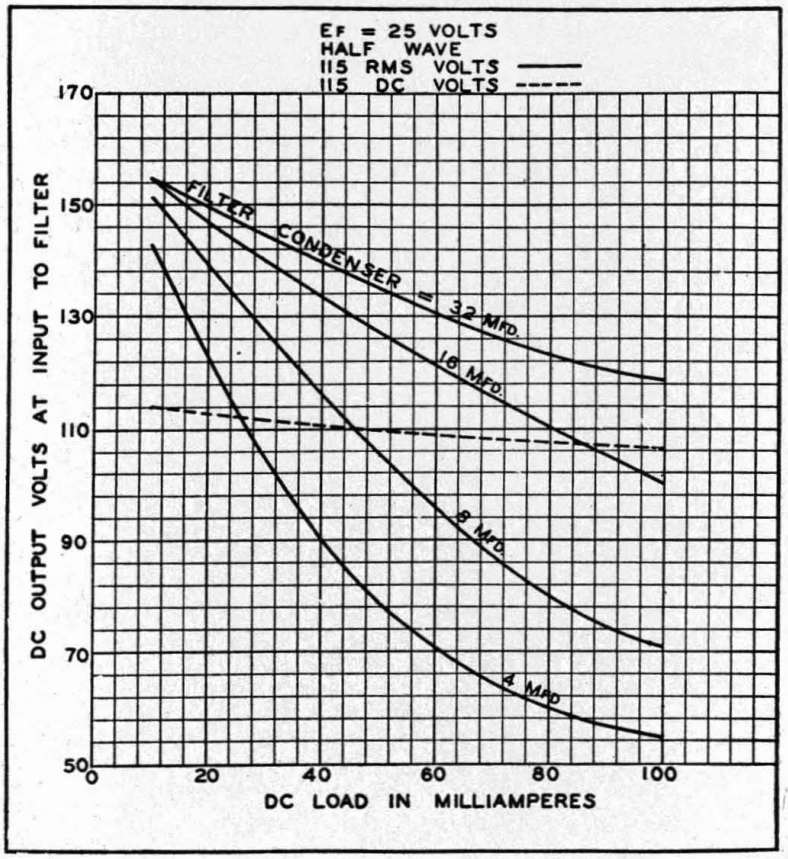
Voltage Doubler Operation:

Transformerless receivers of the a-c operated type incorporate the voltage doubling feature of these rectifiers. In this type of service the two diode units of the tube are arranged in series, one being reversed with respect to the other by means of suitable connections to two condensers connected in series across diode plate No. 1 and the cathode of diode No. 2. One side of the a-c line is applied to diode plate No. 2 and cathode No. 1, while the other side of the line goes to the common tap of the condensers. This scheme provides full-wave rectification and permits the condenser which is across one diode to discharge through the load and conducting diode during the period that the other diode is rectifying. The voltage across the load is the sum of the d-c output of the conducting half and the condenser discharge voltage, furnishing approximately twice the d-c voltage which a half-wave circuit would supply. More economical filtering is possible due to the doubled frequency of the output resulting from the rectification of each half of the a-c supply. Unlike the ordinary full-wave circuit, however, only two a-c connections are necessary so that the tube may be operated without a transformer.

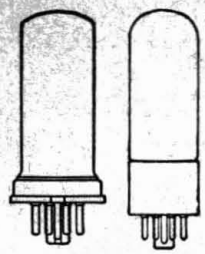
25Z5 (Cont.)

TYPES 25Z5, 25Z6, 25Z6G









7Q-1-0 (25Z6)
7Q-0-0 (25Z6GT)

Sylvania Type 25Z6GT

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

	25Z6	25Z6GT
ase	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
ulb	Metal 8-6	T-9
laximum Overall Length	3 1/4"	3 5/16"
laximum Seated Height	2 11/16"	2 3/4"
ounting Position	Any	Any

RATINGS

leater Voltage AC or DC	25.0 Volts
leater Current	300 Ma.
laximum DC Heater-Cathode Voltage	350 Volts
aximum Peak Inverse Voltage	700 Volts
ube Voltage Drop (150 Ma. Per Plate)	22 Volts
laximum Steady State Peak Current Per Plate	450 Ma.

TYPICAL OPERATION

VOLTAGE DOUBLER

leater Voltage	25.0 Volts
C Plate Voltage Per Plate (RMS)	117 Volts Max.
C Output Current	75 Ma. Max.
eak Plate Current*	450 Ma. Max.
late Supply Impedance (Minimum)	* Ohms

*Sufficient to limit the maximum steady-state peak plate current to value shown. Additional impedance may be required when a filter of more than 40 mfd. is used.

HALF-WAVE RECTIFIER

Heater Voltage	25.0	25.0	25.0 Volts
AC Plate Voltage Per Plate (RMS)	117	150	235¶ Volts
DC Output Current Per Plate	75¶	75¶	75¶ Ma.
Plate Supply Impedance	15	40	100 Ohms

¶Maximum.

Note: For rectifier curve data see preceeding page.

APPLICATION

Sylvania 25Z6 and 25Z6G are the metal and octal equivalents respectively of Sylvania Type 25Z5. Their design makes the tubes applicable in half-wave circuits or as a voltage doubling device and hence they are particularly adapted for service in transformerless receivers.

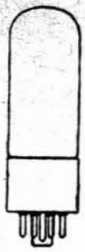
When used in a "universal" type receiver the heater is connected in series with the heaters of the other tubes in the set. The 25 volt rating is an economical feature since it reduces the amount of heat to be dissipated in the fixed series resistor of the heater circuit.

For half-wave circuit operation, it is necessary to connect the two plates together at the socket and, likewise, to tie the two cathodes so as to form a single element. A condenser-input filter is essential in order to obtain satisfactory d-c output voltages. The recommended capacitance is 16 microfarads.

Reference may be made to the curve data on Type 25Z5 which are applicable to the 25Z6 and 25Z6G. A discussion covering the operation as a voltage doubling device is given under Type 25Z5.

26A7GT Sylvania Type

DUO BEAM POWER AMPLIFIER





8BU-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

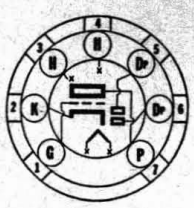
TYPICAL OPERATION (Each Section)

Heater Voltage	26.5 Volts
Heater Current	0.600 Ampere
Plate Voltage	26.5 Volts
Screen Voltage	26.5 Volts
Grid Voltage*	−4.5 Volts
Self-Bias Resistor	100 Ohms
Plate Current	20 Ma.
Screen Current	2.0 Ma.
Load Resistance	1500 Ohms
Power Output	200 Milliwatts
Maximum Heater-Cathode Voltage	90 Volts

*Under maximum rated conditions, grid circuit resistance should not exceed .5 megohm for self bias, or .1 megohm for fixed bias.

APPLICATION

Sylvania Type 26A7GT is a double beam power amplifier tube capable of delivering relatively large power outputs at reasonable distortion levels at very low plate voltages. It is similar to Lock-In type 28D7 in application.



7BT-0-2



Sylvania Type 26C6

DUODIODE TRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	26.5 Volts
Heater Current	70 Ma.
Maximum Plate Voltage	250 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Heater Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage AC or DC	26.5	26.5 Volts
Heater Current	70	70 Ma.
Plate Voltage	26.5	250 Volts
Grid Voltage	*	−9 Volts
Amplification Factor	17	16
Plate Current	1.1	9.5 Ma.
Plate Resistance	15,500	8500 Ohms
Mutual Conductance	1100	1900 μmhos

*Obtained by use of a 2 megohm grid resistor.

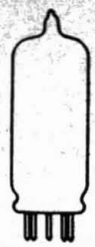
APPLICATION

Sylvania Type 26C6 is a miniature duodiode triode designed for airplane and similar applications where the 12 cell storage battery provides both plate and heater voltage.

For curve and resistance coupled amplifier data, reference should be made to Type 7E6.

26D6 Sylvania Type

HEPTODE CONVERTER





7CH-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
Mounting Position	Any

RATINGS

Heater Voltage	26.5 Volts
Heater Current	70 Ma.
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Dissipation	1.0 Watt
Maximum Total Cathode Current	14.0 Ma.
Maximum Control Grid Voltage Range	+0 to −50 Volts

TYPICAL OPERATION

SEPARATELY EXCITED CONVERTER*

Heater Voltage AC or DC	26.5	26.5	26.5 Volts
Heater Current	70	70	70 Ma.
Plate Voltage	26.5	100	250 Volts
Screen Voltage	26.5	100	100 Volts
Control Grid Voltage	−0.5	−1.5	−1.5 Volts
Oscillator Grid Resistor	20,000	20,000	20,000 Ohms
Plate Resistance (Approx.)	....	0.5	1.0 Megohm
Conversion Transconductance†	270	455	475 μmhos
Conversion Transconductance @ Eg = −30 Volts	....	4	4 μmhos
Conversion Transconductance @ Eg = −6 Volts	8	...	... μmhos
Plate Current	0.45	2.8	3.0 Ma.
Screen Current	1.6	8.0	7.8 Ma.
Oscillator Grid Current	0.1	0.5	0.5 Ma.
Total Cathode Current	2.15	11.3	11.3 Ma.

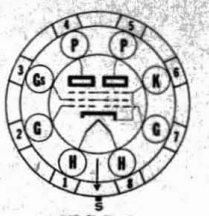
*Substantially the same characteristics may be obtained as a self excited oscillator by reducing the grid voltage to 0 volts.

†The oscillator mutual conductance is approximately 4500 μmhos with Ep = Egs = 26.5 volts and Eg = Ego = 0.

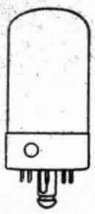
APPLICATION

Sylvania Type 26D6 is a miniature converter designed for airplane and similar applications where the 12 cell storage battery provides both plate and heater voltages.

For curve data reference should be made to Type 6BE6 to which it is similar except for heater and 26.5 volt ratings.



8BS-L-0



Sylvania Type 28D7

DOUBLE BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage	28 Volts
Heater Current	0 400 Ampere
Maximum Plate Voltage	100 Volts
Maximum Screen Voltage	67.5 Volts
Maximum Plate Dissipation (Per Section)	3.0 Watts
Maximum Screen Dissipation (Per Section)	0.5 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

RESISTANCE COUPLED AMPLIFIER CLASS A_2

	Self Bias	Fixed Bias
Heater Voltage	28.0	28.0 Volts
Heater Current	0.400	0.400 Ampere
Plate Voltage§	28.0	28.0 Volts
Screen Voltage	28.0	28.0 Volts
Grid Voltage	....	−3.5 Volts
Self-Bias Resistor	390	.... Ohms
Zero Signal Plate Current	9.0	12.5 Ma.
Maximum Signal Plate Current	6.5	8.1 Ma.
Zero Signal Screen Current	0.7	1.0 Ma.
Maximum Signal Screen Current	1.6	1.9 Ma.
Plate Resistance	....	4200 Ohms
Mutual Conductance	....	3400 μmhos
Peak AF Signal Voltage	4.9	4.9 Volts
Control Grid Resistor Per Section	0.5	0.2 Megohm
Load Resistance	4000	4000 Ohms
Power Output	80	100 Milliwatts
Total Harmonic Distortion	10	10 Per Cent

PUSH-PULL RESISTANCE COUPLED CLASS A_2

	Self Bias	Fixed Bias
Heater Voltage	28.0	28.0 Volts
Plate Voltage§	28.0	28.0 Volts
Screen Voltage	28.0	28.0 Volts
Grid Voltage	....	−3.5 Volts
Self-Bias Resistor	180	.... Ohms
Zero Signal Plate Current	18.5	25.0 Ma.
Maximum Signal Plate Current	14.5	19.0 Ma.
Zero Signal Screen Current	1.2	2.0 Ma.
Maximum Signal Screen Current	2.5	3.0 Ma.
Peak AF Signal Voltage (G to G)	9.8	9.8 Volts
Control Grid Resistor (Per Section)	0.5	0.2 Ohms
Load Resistance	6000	6000 Ohms
Total Harmonic Distortion	2.5	2.0 Per Cent
Power Output	175	225 Milliwatts

PARALLEL RESISTANCE COUPLED CLASS A_2

	Self Bias	Fixed Bias
Heater Voltage	28.0	28.0 Volts
Plate Voltage§	28.0	28.0 Volts
Screen Voltage	28.0	28.0 Volts
Grid Voltage	....	−3.5 Volts
Self-Bias Resistor	180	.... Ohms
Zero Signal Plate Current	18.5	25.0 Ma.
Maximum Signal Plate Current	13.1	16.0 Ma.
Zero Signal Screen Current	1.3	2.0 Ma.
Maximum Signal Screen Current	2.8	3.5 Ma.
Peak AF Signal Voltage	4.9	4.9 Volts
Control Grid Resistor (Both Sections)	0.2	0.1 Megohm
Load Resistance	2000	2000 Ohms
Total Harmonic Distortion	9.5	8.0 Per Cent
Power Output	160	200 Milliwatts

28D7 (Cont.)

TRANSFORMER COUPLED CLASS A_2

Heater Voltage	28.0 Volts
Plate Voltage§	28.0 Volts
Screen Voltage	28 0 Volts
Grid Voltage	0 Volt
Self-Bias Resistor	0 Ohms
Zero Signal Plate Current	64.0 Ma.
Maximum Signal Plate Current	58.0 Ma.
Zero Signal Screen Current	4.0 Ma.
Maximum Signal Screen Current	17.0 Ma.
Peak AF Signal Voltage (G to G)	17.8 Volts
Load Resistance (Plate to Plate)	1500 Ohms
Total Harmonic Distortion	11.0 Per Cent
Power Output	600 Milliwatts

§The above characteristics may be realized provided the DC plate circuit resistance does not exceed 50 ohms per section.

APPLICATION

Sylvania Type 28D7 is a double beam power output tube of Lock-In construction designed for low voltage operation. Comparatively large power outputs are obtainable with very low applied plate voltages. Power outputs of 150 milliwatts or more are readily obtainable using this type of tube in a push-pull circuit employing self-bias. However, each section may be used as desired, separately, parallel or push-pull. Whenever a source of separate bias can be provided, the useful plate voltage will be increased by the amount of the bias. In low voltage operation slight increases in plate voltage are important in giving improved performance. In some cases this bias can be obtained from an oscillator, making a separate battery for bias unnecessary. Plate circuit resistances, including output transformer windings, should be as low as practicable to minimize power losses.

The precautions usually recommended for satisfactory performance of output stages are especially important with Type 28D7. Grid resistors should not exceed values specified so as to minimize the effects of grid currents. A low-mu driver tube (20 or less) is more satisfactory than high-mu tubes for maintaining high output with low distortion. Greatest power output is provided by using another 28D7 with sections paralleled coupled to the output stage by means of a coupling transformer of 5.75:1 impedance ratio (primary to ½ secondary). Power outputs in the order of 600 milliwatts at 11% distortion are obtainable in this manner at plate voltages of 28 volts with Class A2 operating conditions. At 600 mw., driver power output of 80 mw. at 12.8 volts is required.

For resistance coupled circuits, there are a number of low-mu triodes suitable for low voltage driver service at rated output such as types 14N7, 14E6 and 14A4. Pentodes similar to type 14R7 are also adaptable for this application. It should be noted that the load shunting the driver output also includes the following grid resistor and the grid-cathode resistance of the 28D7 paralleled. The latter consideration is important as the grid is driven to grid current at higher signal levels.

It is important to know power supply variations to determine 28D7 performance. The supply may vary from a high of 32 volts to as low as 22 volts. Data on the effect of this variation follows:

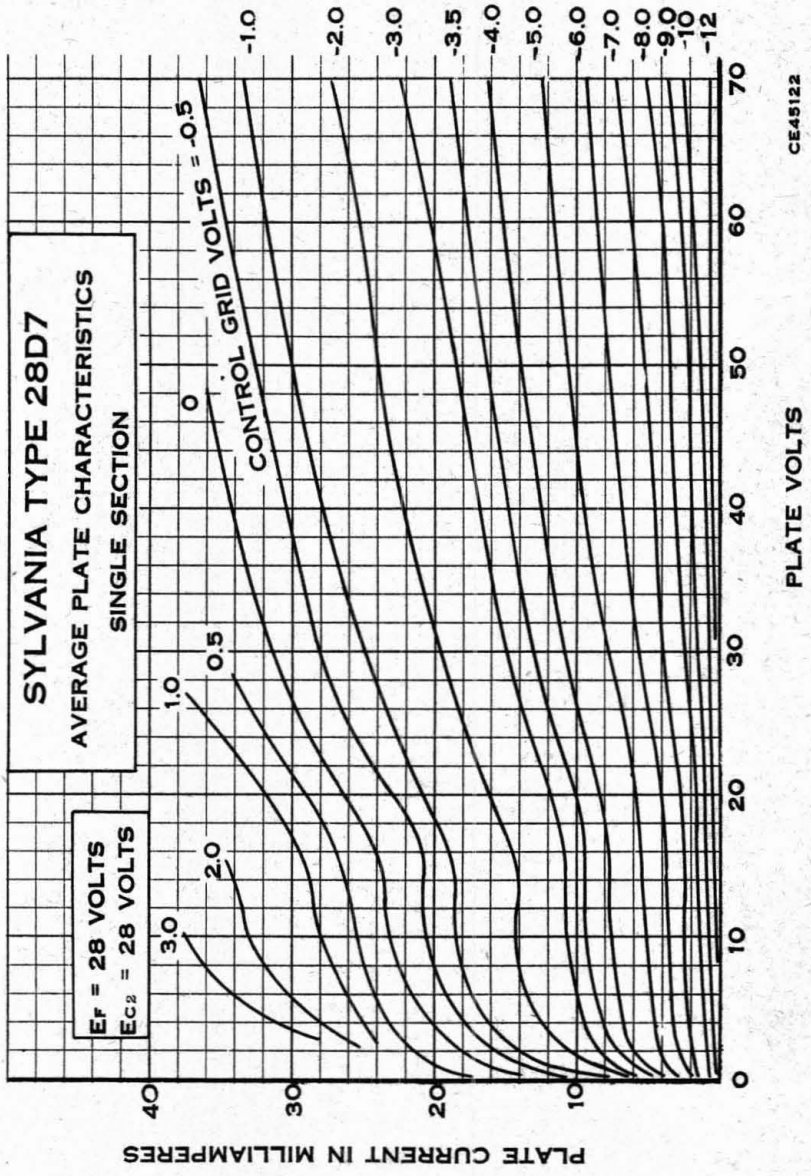
RL 2000 ohms Fixed Bias Rg=100,000 ohms: Ec=3.5 Volts			Esig 3.5 volts RMS Self Bias Rg=200,000 ohms: Rk=180 ohms: Ck=10 μf		
Eh=Eb=Ec2	Po	% Distortion	Eh=Eb=Ec2	Po	% Distortion
22	112 Mw.	15	22	90 Mw.	16
24	135	12	24	109	14
26	170	10	26	130	12
28	200	8	28	160	10
30	235	8	30	175	9

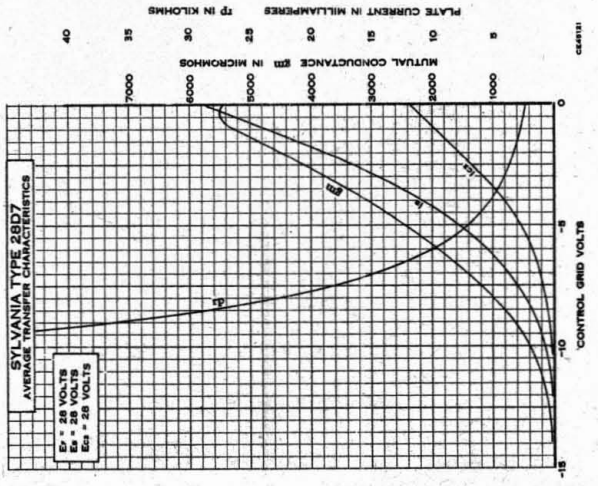
If Type 28D7 is to be required to operate for extended periods at heater voltage in excess of 28 volts a dropping resistor should be used to obtain a maximum heater voltage of 28 volts.

The operating temperature of type 28D7 is quite high. This fact should be carefully considered in planning design layouts, choice of sockets and other parts.

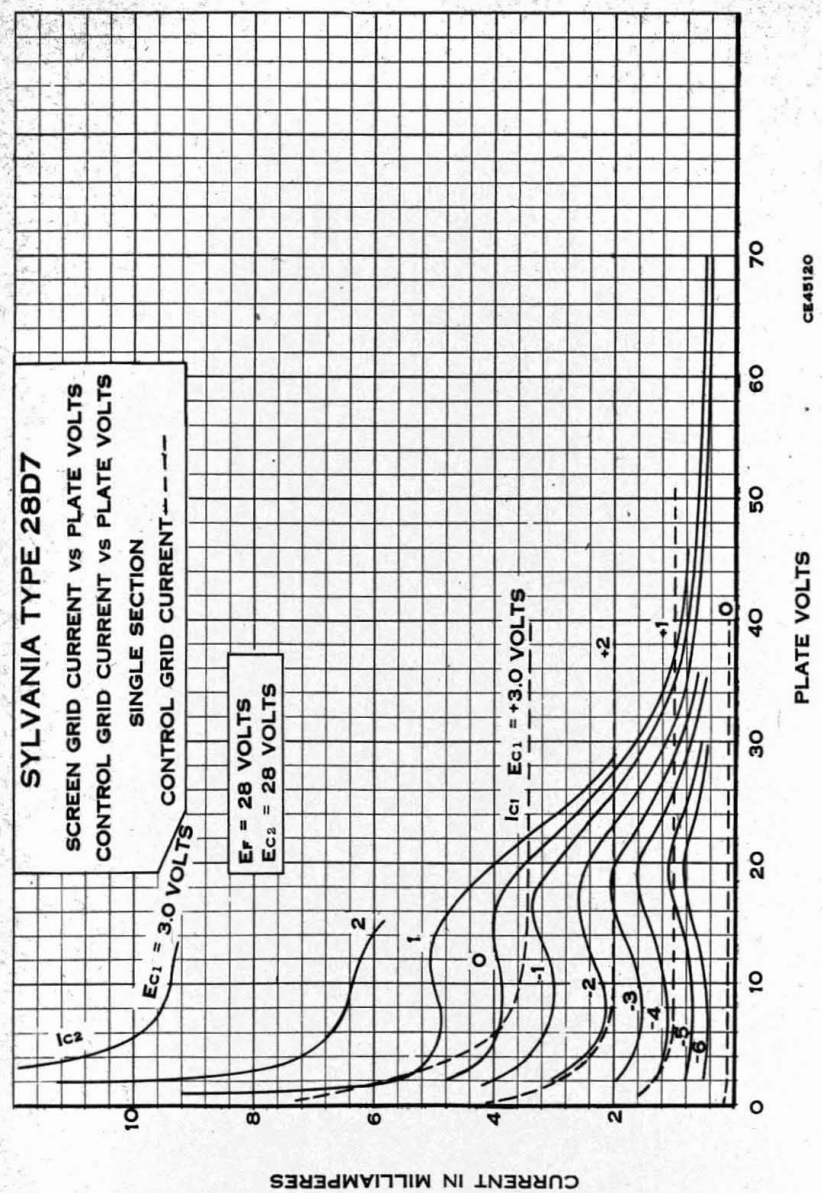
Power outputs up to 725 milliwatts at medium voltages of 50 to 250 volts and higher voltages of 500 to 600 volts for lower

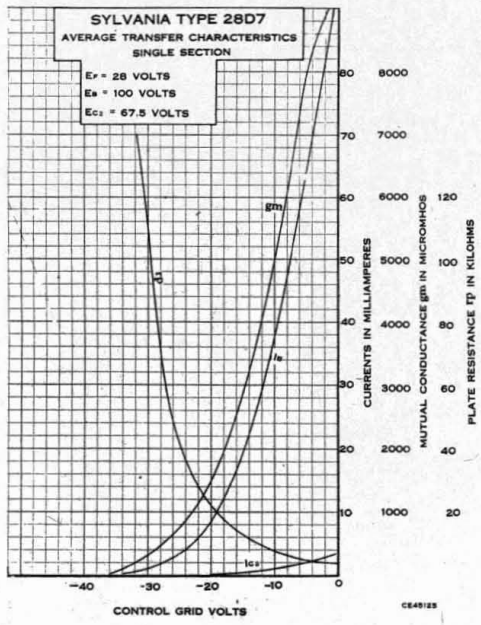
power requirements can readily be obtained by operating type 28D7 as an oscillator and rectifying and filtering the oscillator rf output voltage. Thus small quantities of higher voltage DC may be obtained for special purposes without cumbersome equipment from low voltage DC sources. Additional data for this service can be supplied upon request.

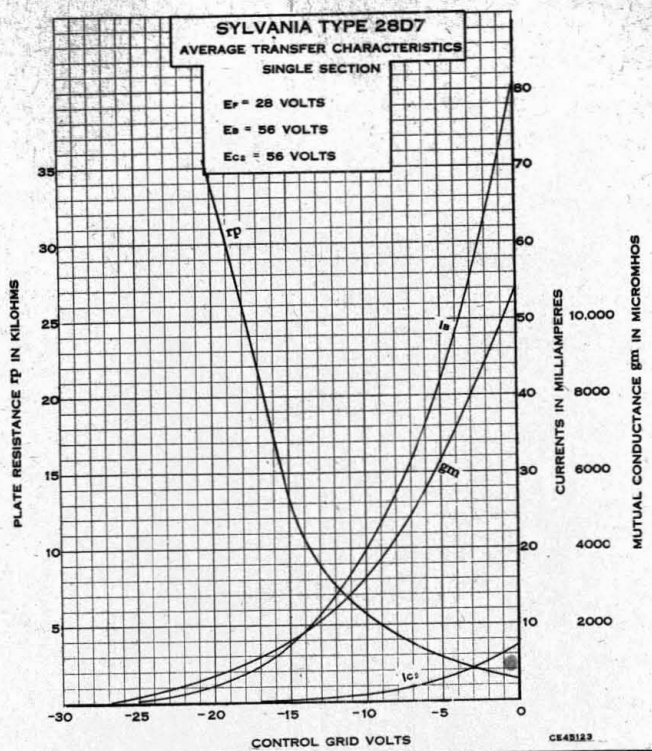


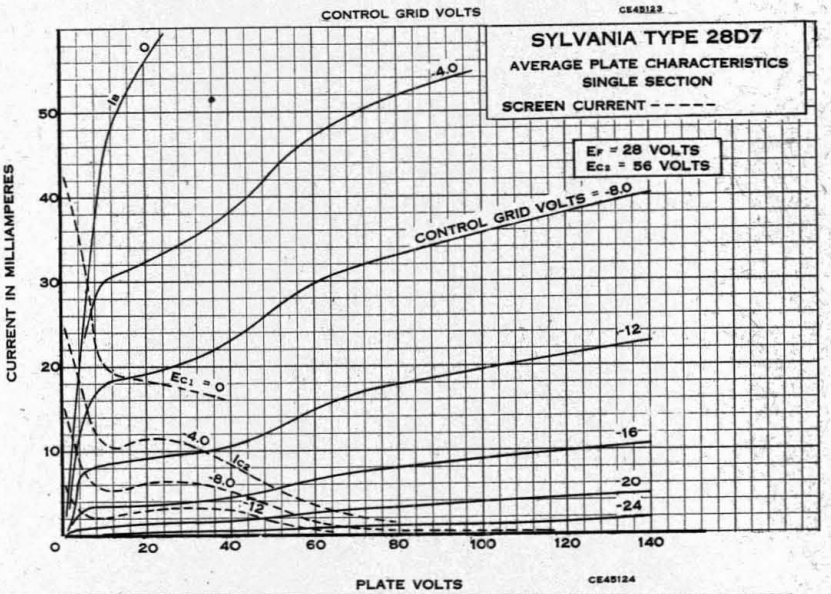


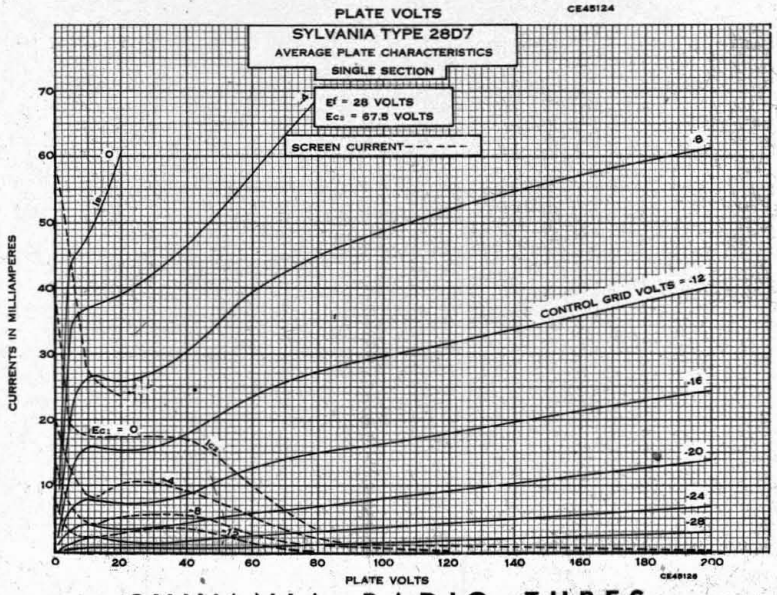
28D7 (Cont.)


SYLVANIA TYPE 28D7
SCREEN GRID CURRENT vs PLATE VOLTS
CONTROL GRID CURRENT vs PLATE VOLTS
SINGLE SECTION
CONTROL GRID CURRENT
Ef = 28 VOLTS
Ec2 = 28 VOLTS
Ic1 Ec1 = +3.0 VOLTS
Ec1 = 3.0 VOLTS
Ic2
CE45120
PLATE VOLTS
CURRENT IN MILLIAMPERES


SYLVANIA TYPE 28D7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 28 VOLTS
Eb = 100 VOLTS
Ec2 = 67.5 VOLTS
gm
Ip
Ic2
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN KILOHMS
CONTROL GRID VOLTS
CE45125


SYLVANIA TYPE 28D7
AVERAGE TRANSFER CHARACTERISTICS
SINGLE SECTION
Ef = 28 VOLTS
Eb = 56 VOLTS
Ec2 = 56 VOLTS
rp
Ia
gm
Ic2
PLATE RESISTANCE rp IN KILOHMS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
CONTROL GRID VOLTS
CE45123

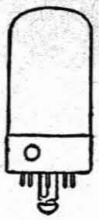

SYLVANIA TYPE 28D7
AVERAGE PLATE CHARACTERISTICS
SINGLE SECTION
SCREEN CURRENT - - - - -
Ef = 28 VOLTS
Ec2 = 56 VOLTS
CONTROL GRID VOLTS = -8.0
Ia
Ic2
Ec1 = 0
-4.0
-12
-16
-20
-24
CURRENT IN MILLIAMPERES
PLATE VOLTS
CE45124


SYLVANIA TYPE 28D7
AVERAGE PLATE CHARACTERISTICS
SINGLE SECTION
Ef = 28 VOLTS
Ec2 = 67.5 VOLTS
SCREEN CURRENT- - - - - -
CONTROL GRID VOLTS = -12
Ia
Ic2
Ec1 = 0
-8
-16
-20
-24
-28
CURRENTS IN MILLIAMPERES
PLATE VOLTS
CE45125

35A5 Sylvania Type

BEAM POWER AMPLIFIER

GT EQUIVALENT 35L6GT





6AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35.0 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

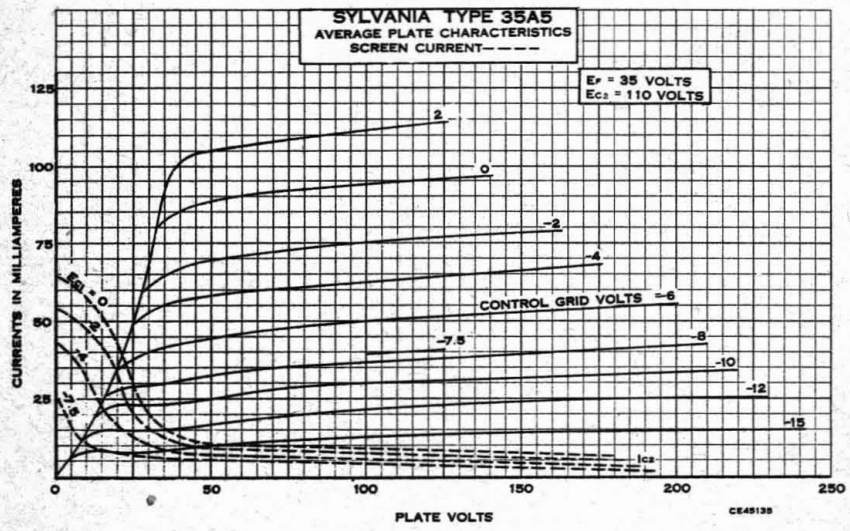
Heater Voltage AC or DC	35.0	35.0 Volts
Heater Current	150	150 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage*	-7.5	*** Volts
Peak Signal Voltage	7.5	8.0 Volts
Self-Bias Resistor	175	180 Ohms
Zero Signal Plate Current	40	43 Ma.
Maximum Signal Plate Current	41	43 Ma.
Zero Signal Screen Current	3.0	2.0 Ma.
Maximum Signal Screen Current	7.0	5.5 Ma.
Plate Resistance	14000	34000 Ohms
Mutual Conductance	5800	6100 μmhos
Load Resistance	2500	5000 Ohms
Power Output	1.5	3.0 Watts
Total Harmonic Distortion	10	10 %

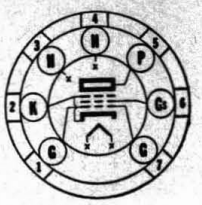
*The maximum grid circuit resistance under fixed bias conditions should not exceed 0.1 megohm and for self-bias 0.5 megohm.

***Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

APPLICATION

Sylvania Type 35A5 is a beam power amplifier of Lock-In construction and is designed especially for use in the output stage of AC-DC and DC receivers. The heater ratings make this tube suitable for use with 150 Ma. tubes in receivers using series heater circuits. Electrically, this type is equivalent to Type 35L6GT.





7BZ-0-0



Sylvania Type 35B5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 3/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35.0 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	117 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	4.5 Watts
Maximum Screen Dissipation	1.0 Watts
Maximum Peak Heater-Cathode Voltage	150 Volts

Direct Interelectrode Capacitances:*

Control Grid to Plate	0.4 μμf.
Input	11.0 μμf.
Output	6.5 μμf.

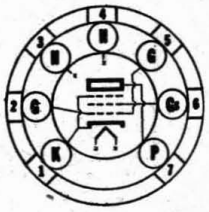
*With no external shield.

TYPICAL OPERATION

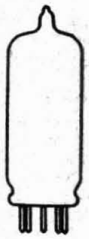
Heater Voltage	35.0 Volts
Heater Current	150 Ma.
Plate Voltage	110 Volts
Screen Voltage	110 Volts
Control Grid Voltage	–7.5 Volts
Peak Signal Voltage	7.5 Volts
Self-Bias Resistor	175 Ohms
Zero Signal Plate Current	40 Ma.
Maximum Signal Plate Current	41. Ma.
Zero Signal Screen Current	3.0 Ma.
Maximum Signal Screen Current	7.0 Ma.
Plate Resistance	14,000 Ohms
Mutual Conductance	5800 μmhos
Load Resistance	2500 Ohms
Power Output	1.5 Watts
Total Harmonic Distortion	10 %

APPLICATION

Sylvania Type 35B5 is a miniature output tube having the same characteristics as Sylvania Type 35A5 but for operation under the 110 volt condition only. For curve data reference should be made to Type 35A5.



7CV-0-0



Sylvania Type 35C5

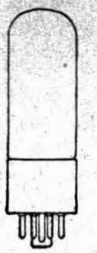
BEAM POWER AMPLIFIER

NOTE: With the exception of the base diagram given above the characteristics of Type 35C5 are identical with those given for Type 35B5 on this page.

35L6GT Sylvania Type

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 35A5





7AC-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35.0 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	125 Volts
Maximum Plate Dissipation	8.5 Watts
Maximum Screen Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

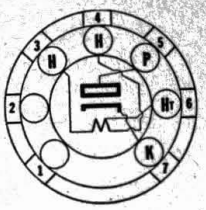
Heater Voltage	35.0	35.0 Volts
Heater Current	150	150 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage *	−7.5	** Volts
Cathode Bias Resistor	175	180 Ohms
Peak Signal Voltage	7.5	8.0 Volts
Plate Current	40	43 Ma.
Maximum Signal Plate Current	41	43 Ma.
Screen Current (Approx.)	3.0	2.0 Ma.
Maximum Signal Screen Current	7.0	5.5 Ma.
Plate Resistance (Approx.)	14,000	34,000 Ohms
Mutual Conductance	5800	6100 μmhos
Load Resistance	2500	5000 Ohms
Power Output	1.5	3.0 Watts
Total Harmonic Distortion	10.0	10.0 %

*For fixed bias circuits the grid circuit resistance should not exceed 0.1 megohm; for self-bias operation 0.5 megohm should be the maximum.

**Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

APPLICATION

Sylvania Type 35L6GT is a beam power amplifier tube designed for use as an output tube in AC-DC receivers. It is similar to type 25L6GT in application and equivalent to Lock-In types 35A5. Type 35L6GT is capable of delivering large power outputs at reasonable distortion levels with relatively low applied voltages. For curve data, refer to Lock-in Type 35A5.



5BQ-0-0



Sylvania Type 35W4

HALF-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35.0 Volts
Heater Current	150 Ma.
Maximum Peak Inverse Plate Voltage	330 Volts
Maximum Peak Plate Current	600 Ma.
Maximum DC Output Current	
With Panel Lamp (No shunting resistor)	60 Ma.
(With shunting resistor)	90 Ma.
Without Panel Lamp	100 Ma.
Maximum Voltage Panel Lamp Section (Panel Lamp Open)	15 Volts
Maximum Peak Heater-Cathode Voltage	330 Volts

TYPICAL OPERATION

With No. 40 or No. 47 Panel Lamps and 40 μf. Condenser Input Filter

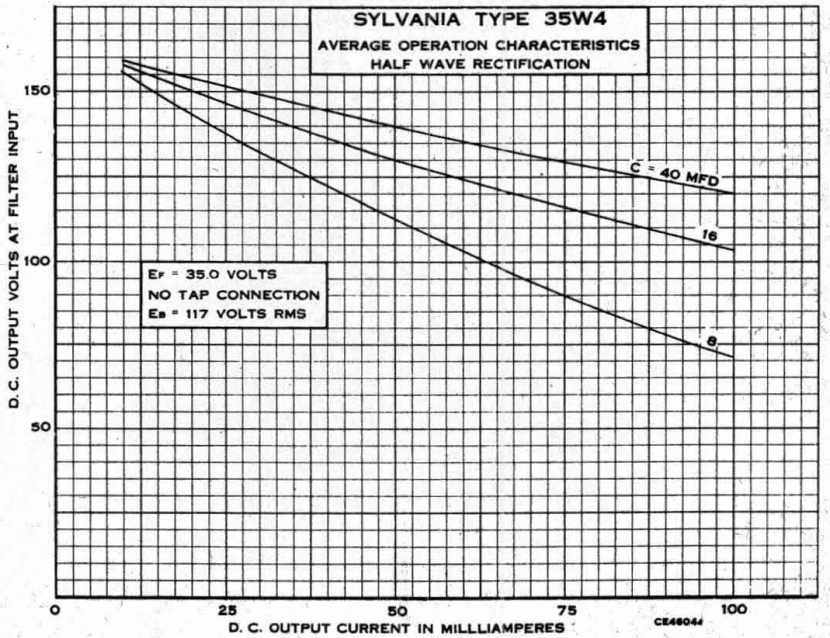
Heater Voltage	32.0	32.0	32.0	32.0 Volts
Heater Current	150	150	150	150 Ma.
RMS Plate Supply	117	117	117	117 Volts
Min. Effective Plate Supply Impedance	15	15	15	15 Ohms
Panel Lamp Shunting Resistor	....	300	150	100 Ohms
DC Output Current	60	70	80	90 Ma.

With 40 μf. Input Condenser and No Panel Lamp

Heater Voltage	35.0 Volts
Heater Current	150 Ma.
RMS Supply Voltage	117 Volts
Minimum Effective Plate Supply Impedance	15 Ohms
DC Output Current	100 Ma.
Maximum Value of Panel Lamp Shunting Resistor	
70 Ma. Output	800 Ohms
80 Ma. Output	400 Ohms
90 Ma. Output	250 Ohms

APPLICATION

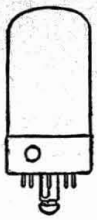
Sylvania Type 35W4 is a miniature style half-wave rectifier with tapped heater for panel lamp operation. It is similar in application to Type 35Z5GT and Lock-In Type 35Y4. Care should be taken in designing equipment for use with this tube to assure adequate ventilation as this tube, in common with other rectifiers, runs at quite high temperatures.

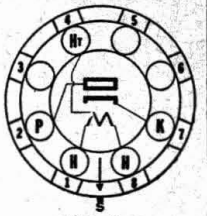


35Y4 Sylvania Type

HALF-WAVE RECTIFIER

GT EQUIVALENT 35Z5GT





5AL-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 1/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35.0 Volts
Heater Current	150 Ma.
Maximum AC Plate Voltage (RMS)	235 Volts
Maximum Peak Inverse Voltage	700 Volts
Maximum Steady State Peak Plate Current	600 Ma.
Maximum Peak Heater-Cathode Voltage	350 Volts
Maximum DC Output Current	
Without Panel Lamp	100 Ma.
With Panel Lamp and Shunting Resistor	90 Ma.
With Panel Lamp and No Shunting Resistor	60 Ma.
Maximum Value of Panel Lamp Shunting Resistor	
For 70 Ma. DC Output Current	800 Ohms
For 80 Ma. DC Output Current	400 Ohms
For 90 Ma. DC Output Current	250 Ohms
Tapped Section Voltage (Between Pins 1 and 4)	
With 0.150 Ampere flowing between Pins 1 and 8	7.5 Volts
Maximum Voltage Across Tapped Section when Panel Lamp Fails (RMS)	15.0 Volts
Tube Voltage Drop at 200 Ma. DC Plate Current	20.0 Volts

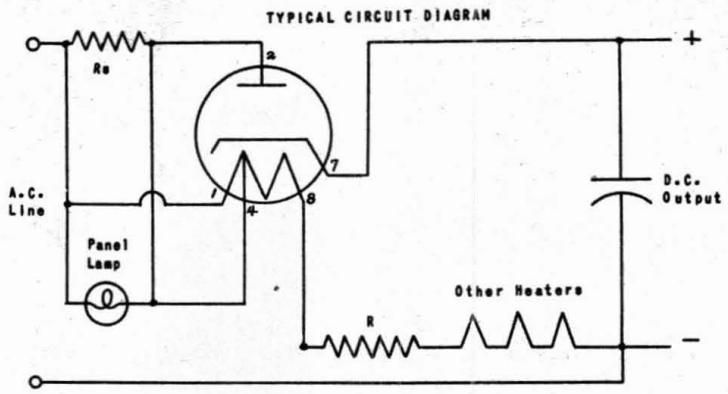
TYPICAL OPERATION

With 40 Mfd. Input Condenser and No. 40 or 47 Panel Lamp

Heater Voltage (Pins 1 and 8)	32.0	32.0	32.0	32.0	32.0 Volts
Heater Current (Pins 4 and 8)	150	150	150	150	150 Ma.
Voltage Across Tapped Section of Heater (Pins 1 and 4)	5.5	5.5	5.5	5.5	5.5 Volts
AC Plate Voltage	117	117	117	117	235 Volts
DC Output Current	60	70	80	90	60 Ma.
Minimum Effective Plate Supply Impedance	15	15	15	15	100 Ohms
Panel Lamp Shunt Resistor	....	300	150	100	.... Ohms

With 40 Mfd. Input Condenser and No Panel Lamp

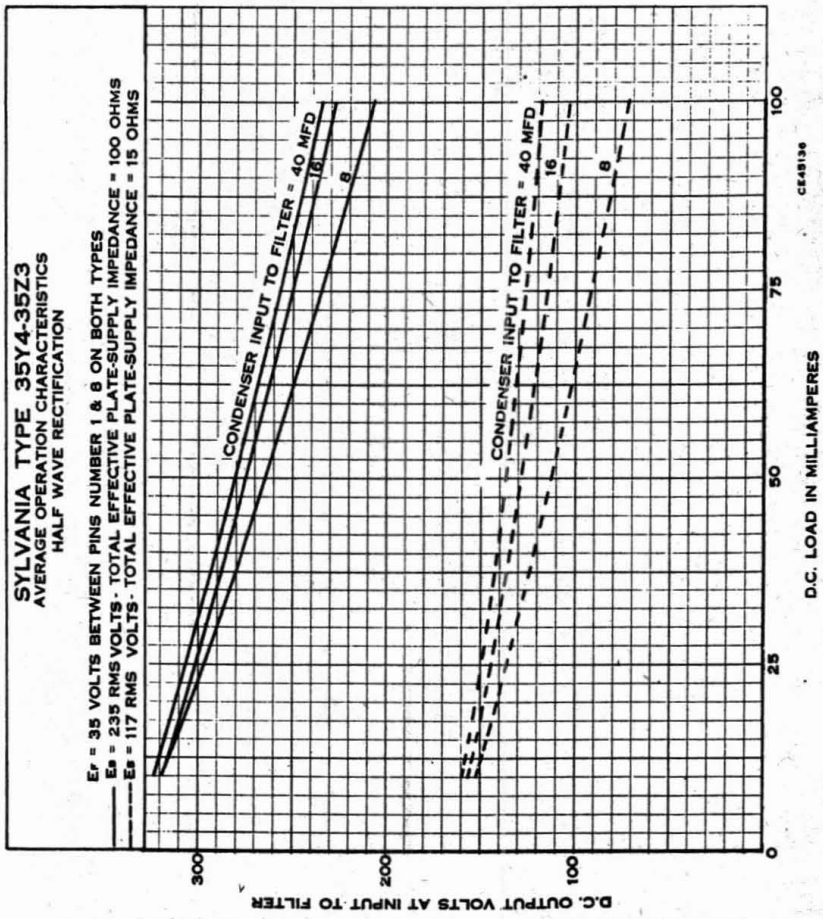
Heater Voltage (Pins 1 and 8)	35.0	35.0 Volts
Heater Current (Pins 4 and 8)	150	150 Ma.
Voltage Across Tapped Section of Heater (Pins 1 and 4)	7.5	7.5 Volts
AC Plate Voltage (RMS)	117	235 Volts
DC Output Current	100	100 Ma.
Minimum Effective Plate Supply Impedance	15	100 Ohms



Rs Pilot Lamp Shunt Resistor
R Ballast Resistor

APPLICATION

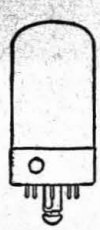
Sylvania Type 35Y4 is a high-vacuum type rectifier tube of Lock-In construction designed for use in AC-DC receivers. Its heater ratings enable it to be used in series with other tubes in the 150-Ma. heater group. A heater tap has been brought out to pin No. 4 to provide for panel lamp operation. When so used, the rectifier plate should be connected to this tap so that rectifier plate current will also pass through the lamp. At higher dc load conditions, a shunt resistor on the panel lamp is essential.

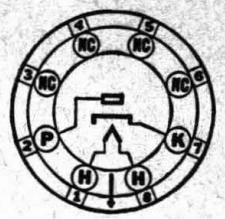


35Z3 Sylvania Type

HALF-WAVE RECTIFIER

GT. EQUIVALENT 35Z4GT





4Z-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	35 0 Volts
Heater Current	150 Ma.
Maximum AC (RMS) Plate Voltage	235 Volts
Maximum Peak Heater-Cathode Voltage	350 Volts
Maximum Peak Inverse Voltage	700 Volts
Maximum Steady State Peak Plate Current	600 Ma.
Tube Voltage Drop at 200 Ma. DC Plate Current	20 Volts
Maximum DC Output Current	100 Ma.

TYPICAL OPERATION

HALF-WAVE RECTIFIER

Heater Voltage (AC or DC)	35.0	35.0	35.0 Volts
Heater Current	150	150	150 Ma.
AC Plate Voltage RMS	117	150	235 Volts
Minimum Total Effective Plate Supply Impedance	15	40	100 Ohms
DC Output Current	100	100	100 Ma.

APPLICATION

Sylvania Type 35Z3 is a high-vacuum half-wave rectifier of Lock-In construction, especially designed for use in compact AC-DC receivers. Characteristics are the same as those of 35Z4GT and 35Y4 except that the latter makes provision for the use of a pilot lamp.

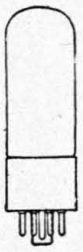
When used in connection with type 35A5 power output tube, the high voltage, low current rating permit compact receiver design with the minimum amount of heat dissipation.

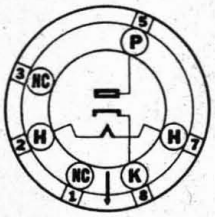
The load curve may be found by referring to type 35Y4.

35Z4GT Sylvania Type

HALF-WAVE RECTIFIER

LOCK-IN EQUIVALENT 35Z3





5AA-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

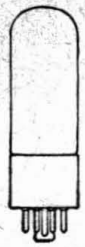
Heater Voltage	35.0	35.0 Volts
Heater Current	150	150 Ma.
AC Plate Supply Voltage (RMS)	117	235 Volts
Minimum Plate Supply Impedance	15	100 Ohms
DC Output Current	100	100 Ma.

APPLICATION

Sylvania Type 35Z4GT is a half-wave high-vacuum rectifier tube designed for AC-DC receiver service. It is similar to type 35Z5GT and to Lock-In type 35Y4 except that it does not have the heater tap for use with a pilot light.



6AD-0-0



Sylvania Type 35Z5GT

HALF-WAVE RECTIFIER

LOCK-IN EQUIVALENT 35Y4

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

TYPICAL OPERATION

CONDENSER INPUT

Heater Voltage	35.0 Volts
Heater Current	150 Ma.
AC Plate Voltage (RMS)	125 Volts Max.
DC Output Current*	60 Ma. Max.
DC Output Current**	100 Ma. Max.
Maximum Peak Inverse Voltage	700 Volts
Maximum Peak Plate Current	600 Ma.
Series Plate Resistor	25 Ohms Min.
Tube Voltage Drop at 200 Ma.**	21 Volts
Maximum Peak Heater-Cathode Voltage	350 Volts

*With rectified plate current through the panel lamp section of the heater shunted by a 6.3 volt, 0.150 ampere panel lamp, (Sylvania Panel Lamp S40 or S47).

**Panel lamp not connected.

APPLICATION

Sylvania Type 35Z5G is a half-wave high-vacuum rectifier designed for use in ac-dc and dc line operated receivers. The 35-volt heater is tapped to permit operation of a Sylvania S40 or S47 panel lamp across Pins 2 and 3. Conventional half-wave rectifier circuits are applicable.

A peak limiting resistor of at least 25 ohms must be used in series with the plate and a surge limiting resistor should be placed in series with the heaters of the other tubes in the heater circuit.

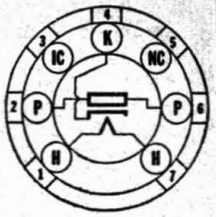
Reference should be made to the Lock-In equivalent Type 35Y4 for further data.

45Z3 Sylvania Type

HALF-WAVE HIGH-VACUUM

RECTIFIER





5AM-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5 ½
Maximum Overall Length	2 ⅛"
Maximum Seated Height	1 ⅞"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	45 Volts
Heater Current	75 Ma.
Maximum Peak Inverse Voltage	350 Volts
Maximum Peak Plate Current	390 Ma.
Maximum Peak Heater-Cathode Voltage	330 Volts

TYPICAL OPERATION

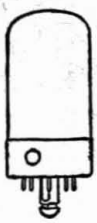
Heater Voltage	45 Volts
Heater Current	75 Ma.
RMS Plate Voltage	117 Volts
Minimum Effective Plate Supply Impedance	15 Ohms
Output Current DC*	65 Ma.

*Condenser input filter.

APPLICATION

Sylvania Type 45Z3 is a half-wave miniature type rectifier tube. It is intended for power supply service for AC-DC battery operated portable receivers. In such service it will supply power for plate and filament operation of the battery type tubes used in such receivers. Its small size is helpful in reducing the size of such equipment and the low drain requirements assist in heat dissipation problems.





Sylvania Type 50A5

BEAM POWER AMPLIFIER

GT EQUIVALENT 50L6GT

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{32}$"
Maximum Seated Height	$2\frac{5}{8}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	50.0 Volts
Heater Current	0.150 Ampere
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	10 Watts
Maximum Screen Dissipation	1.25 Watts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

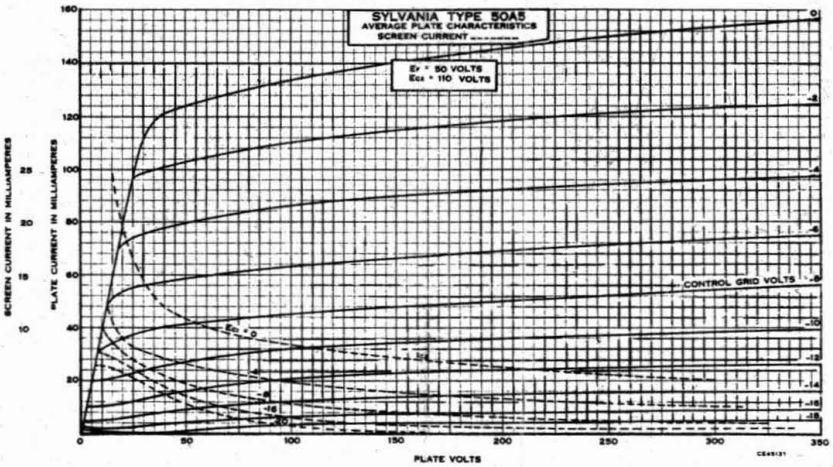
Heater Voltage AC or DC	50.0	50.0 Volts
Heater Current	0.150	0.150 Ampere
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage*	−7.5	** Volts
Peak Signal Voltage	7.5	8.0 Volts
Self-Bias Resistor	175	180 Ohms
Zero Signal Plate Current	49	46 Ma.
Maximum Signal Plate Current	50	47 Ma.
Zero Signal Screen Current	4.0	2.2 Ma.
Maximum Signal Screen Current	10.0	8.5 Ma.
Plate Resistance	13,000	28,000 Ohms
Mutual Conductance	8000	8000 μmhos
Load Resistance	2000	4000 Ohms
Power Output	2.1	3.8 Watts
Total Harmonic Distortion	10	10 Percent

*The maximum grid circuit resistance under fixed bias conditions should not exceed 0.1 megohm and for self-bias 0.5 megohm.

**Obtained by self-bias resistor; fixed bias operation not recommended.

APPLICATION

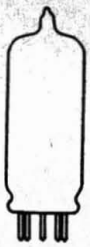
Sylvania Type 50A5 is a beam power amplifier of Lock-In construction designed especially for use as an output tube in AC-DC receivers using other 150 ma. heater tubes operating in series heater circuits. The beam power construction gives high power output and good power sensitivity, at reasonable distortion levels. Transformer or impedance coupling is to be preferred for input circuits but resistance coupling methods are satisfactory provided the grid circuit resistance does not exceed 0.1 megohm with fixed bias or 0.5 megohms with self bias.



50B5 Sylvania Type

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 50A5





7BZ-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2¾"
Mounting Position	Any

RATINGS

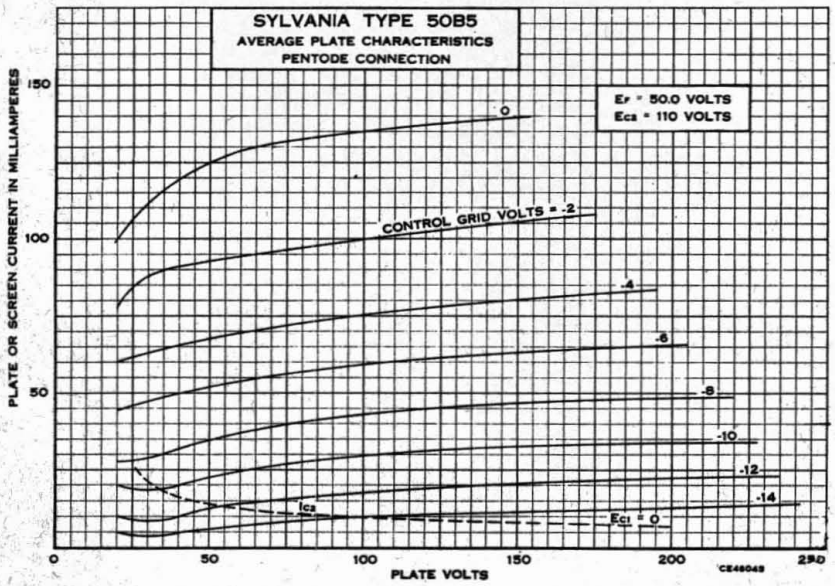
Heater Voltage AC or DC	50 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	135 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Dissipation	1.25 Watts
Maximum Heater-Cathode Voltage	180 Volts

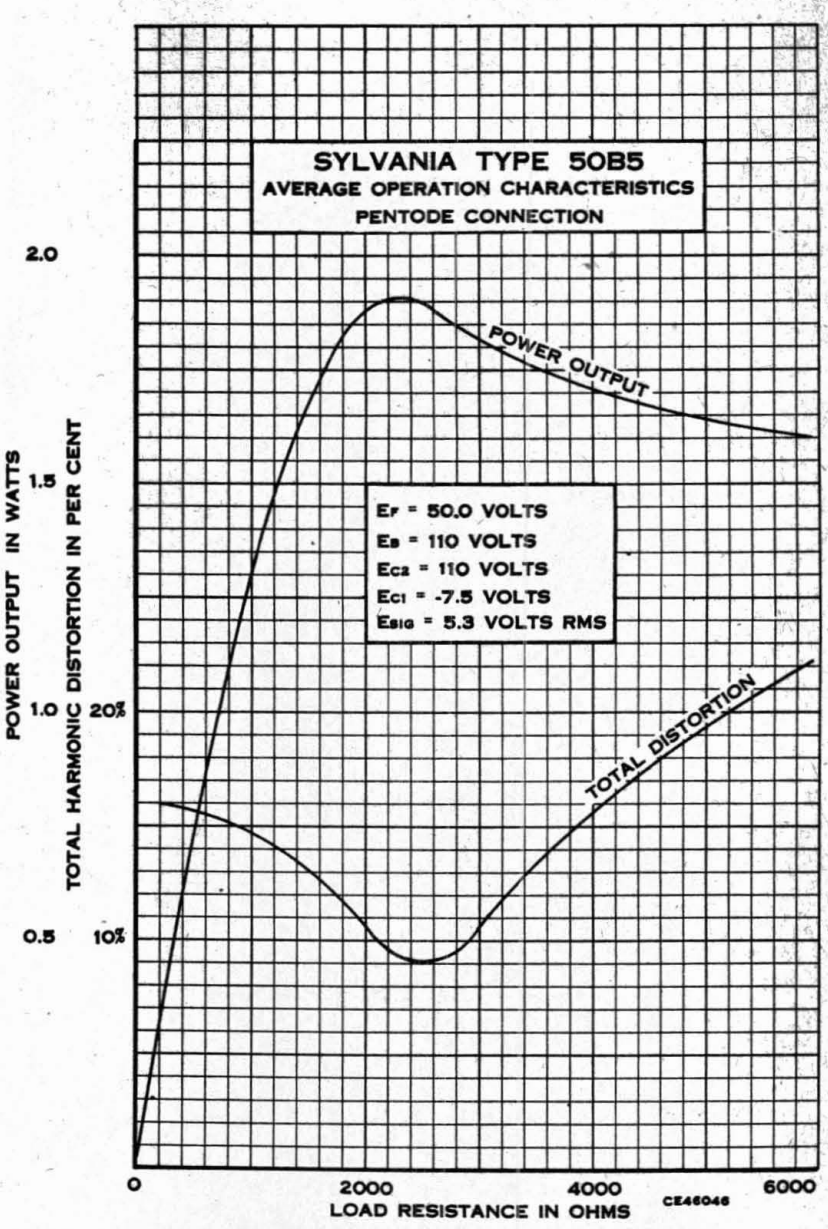
TYPICAL OPERATION

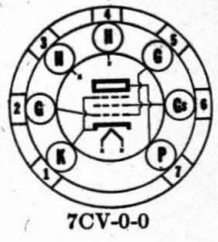
Heater Voltage	50 Volts
Heater Current	150 Ma.
Plate Voltage	110 Volts
Screen Voltage	110 Volts
Control Grid Voltage	−7.5 Volts
Peak Signal Voltage	7.5 Volts
Zero Signal Plate Current	49 Ma.
Maximum Signal Plate Current	50 Ma.
Zero Signal Screen Current	4.0 Ma.
Maximum Signal Screen Current	8.5 Ma.
Plate Resistance (Approximate)	10000 Ohms
Mutual Conductance	7500 μmhos
Load Reisstance	2500 Ohms
Total Harmonic Distortion	9.0 Percent
Maximum Signal Power Output	1.9 Watts

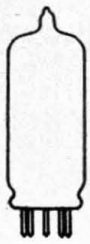
APPLICATION

Sylvania Type 50B5 is a beam power output amplifier tube of miniature style of construction. It is similar in application to Type 35L6GT, 50L6GT and Lock-In Types 35A5 and 50A5. Grid circuit resistances should not exceed 0.5 megohm for self bias or 0.1 megohm for fixed bias. Due to the high temperature at which these tubes operate, adequate ventilation should be assured in equipment designed for their use.









Sylvania Type 50C5

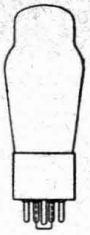
BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 50A5

NOTE: With the exception of the base diagram given above the characteristics of Type 50C5 are identical with those given for Type 50B5 on the previous page.

50C6G Sylvania Type

BEAM POWER AMPLIFIER





RATINGS AND OPERATION

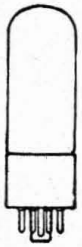
Heater Voltage AC or DC	50.0 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 6Y6G which i identical except for heater ratings.

50L6GT Sylvania Type

BEAM POWER AMPLIFIER

LOCK-IN EQUIVALENT 50A5





PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	50 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	10 Watts
Maximum Screen Dissipation	1.25 Watts
Maximum Heater Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	50	50 Volts
Heater Current	150	150 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage*	-7.5	** Volts
Self-Bias Resistor	140	180 Ohms
Peak AF Grid Signal	7.5	8.3 Volts
Plate Resistance (Aprox.)	13,000	28,000 Ohms
Mutual Conductance	8000	8000 μmhos
Zero Signal Plate Current	49	46 Ma.
Maximum Signal Plate Current	50	47 Ma.
Zero Signal Screen Current (Appprox.)	4.0	2.2 Ma.
Maximum Signal Screen Current (Approx.)	10.0	8.5 Ma.
Load Resistance	2000	4000 Ohms
Power Output	2.1	3.8 Watts
Total Harmonic Distortion	10	10 Percent

*Under rated maximum conditions, grid circuit resistance should not exceed 0.5 megohm for self-bias operation, and 0.1 megohm for fixed bias operation.

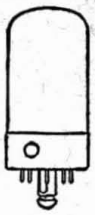
**Obtained by self-bias resistor. Fixed bias operation not recommended.

APPLICATION

Sylvania Type 50L6GT is a beam power output tube designed for use in series heater circuits with other tubes in the 150 Ma. heater group. It is very similar in characteristics to Sylvania Lock-In Type 50A5 and reference should also be made to that type for further application information.



7AJ-L-O



Sylvania Type 50X6

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 5/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC 10%	50.0 Volts
Heater Current	150 Ma.
Maximum Inverse Plate Voltage	700 Volts
Maximum Steady State Peak Current Per Plate	450 Ma.
Maximum DC Output Current Per Plate	75 Ma.
Maximum Heater to Cathode Voltage	350 Volts
Tube Voltage Drop at 150 Ma. Per Plate	22 Volts

TYPICAL OPERATION

VOLTAGE DOUBLER

	Half Wave	Full Wave
Heater Voltage AC or DC	50	50 Volts
Heater Current	150	150 Ma.
AC Plate Voltage Per Plate RMS	117	117 Volts
Filter Input Condenser	16	16 Mfd.
Minimum Total Effective Plate Supply Impedance	30	15 Ohms
DC Output Current	75	75 Ma.

HALF-WAVE RECTIFIER

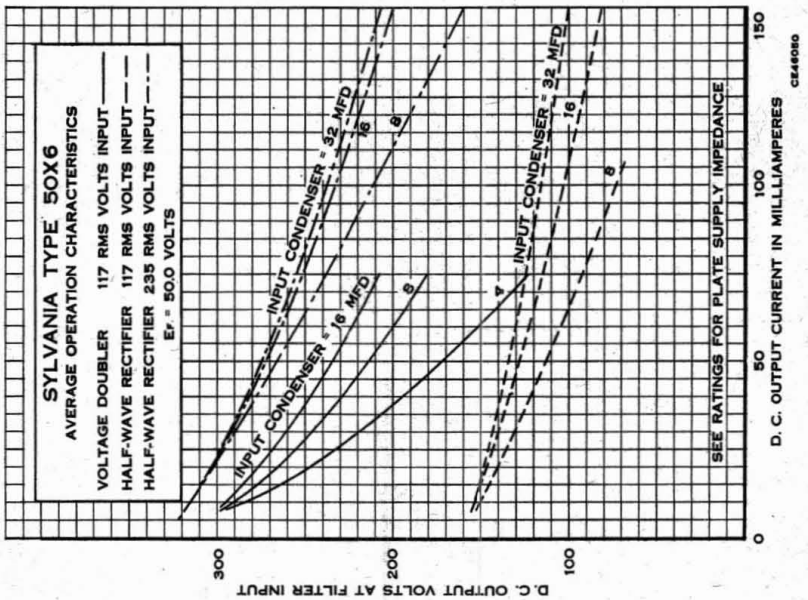
Single Section — Condenser Input Filter

Heater Voltage AC or DC	50	50	50 Volts
Heater Current	150	150	150 Ma.
Plate Supply Voltage AC (RMS)	117	150	235 Volts
Filter Input Condenser	16	16	16 Mfd.
Minimum Total Effective Plate Supply Impedance	15	40	100 Ohms
DC Output Current	75	75	75 Ma.

APPLICATION

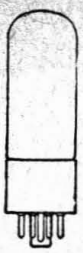
Sylvania Type 50X6 is a Lock-In voltage doubler rectifier designed for use in AC-DC receivers. Additional application notes for this service will be found under Type 25Z5.

The load curve is given below.



50Y6GT Sylvania Type

HIGH-VACUUM RECTIFIER





7Q-0-0

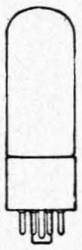
RATINGS AND OPERATION

Heater Voltage AC or DC	50 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 25Z6GT which is identical except for heater ratings.

50Y7GT Sylvania Type

HIGH-VACUUM RECTIFIER DOUBLER





8AN-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Shell 8 Pin Octal
Bulb	T-9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	50 Votls
Heater Current	150 Ma.
Maximum Peak Inverse Plate Voltage	700 Volts
Maximum AC Plate Voltage per Plate (RMS)	
Voltage Doubler Service	117 Volts
Half-Wave Rectifier	235 Volts
Maximum Steady State Peak Current per Plate	450 Ma.
Maximum Peak Heater-Cathode Voltage	350 Volts
Tapped Section Voltage (Pins 6 & 7)	7.5 Volts
Tube Voltage Drop at 150 Ma. per Plate	22 Volts
Maximum DC Output Current per Plate	75 Ma.
Maximum DC Output Current per Plate with Panel Lamp	60 Ma.
with Shunt Resistor	65 Ma.

TYPICAL OPERATION

FULL-WAVE VOLTAGE DOUBLER

	No Panel Lamp	With No. 40 or No. 47 Panel Lamp
Heater Voltage	50	46 Volts
Plate Supply Voltage AC (RMS)	117	117 Volts
DC Output Current	75	65 Ma.
Minimum Total Effective Plate Supply Resistance per Plate	15	15 Ohms
Panel Lamp Shunting Resistor	..	250 Ohms
Panel Lamp Voltage	..	5.5 Volts

Half-Wave Rectifier per Section—No Panel Lamp

Heater Voltage	50	50	50 Volts
Heater Current	150	150	150 Ma.
Plate Supply Voltage AC (RMS)	117	150	235 Volts
Filter Input Capacitance	16	16	16 μf.
Minimum Total Effective Plate Supply Impedance	15	40	100 Ohms
DC Output Current	75	75	75 Ma.

Half-Wave Rectifier per Section—With Panel Lamp

Heater Voltage	46	46	46 Volts
Heater Current (Pins 2 & 6)	150	150	150 Ma.
Plate Supply Voltage AC (RMS)	117	150	235 Volts
Filter Input Capacitance	16	16	16 μf.
Minimum Total Effective Plate Supply Impedance	15	40	100 Ohms
DC Output Current	65	65	65 Ma.
Panel Lamp Voltage	5.5	5.5	5.5 Volts
Panel Lamp Shunting Resistor	250	250	250 Ohms

APPLICATION

Sylvania Type 50Y7GT is a high-vacuum rectifier designed for voltage doubler or half-wave service in sets requiring a panel lamp.



8AN-0-0



Sylvania Type 50Z7G

HIGH-VACUUM RECTIFIER DOUBLER

PHYSICAL SPECIFICATIONS

ıse	Small Octal 8 Pin
ılb	ST12
aximum Overall Length	4 1/8"
aximum Seated Height	3 5/16"
ounting Position	Any

TYPICAL OPERATION

VOLTAGE DOUBLER

eater Voltage (Entire heater)	50.0 Volts
eater Current (Entire heater)	0.150 Ampere
C Plate Voltage per Plate (RMS)	117 Volts Max.
C Output Current*	65 Ma. Max.
eak Plate Current	400 Ma. Max.
late Supply Impedance per Plate (Minimum)	25† Ohms Min.

†Sufficient to limit the maximum steady-state peak plate current to value shown. dditional impedance may be required when a filter of more than 40 mfd. is used.

HALF-WAVE RECTIFIER

Condenser Input

leater Voltage	50.0 Volts
leater Current (Entire heater)	0.150 Ampere
C Plate Voltage	117 Volts Max.
C Output Current per Plate*	65 Ma. Max.
eak Plate Current per Plate	400 Ma. Max.
mpedance per Plate	25 Ohms Min.

*With rectified plate current through the panel lamp section of the heater shunted y a 2.9 volt, 0.170 ampere panel lamp, (Sylvania Panel Lamp S292 or S292A).

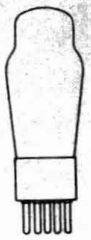
APPLICATION

Sylvania Type 50Z7G is a high vacuum rectifier designed for operation as a voltage doubler or as a half-wave rectifier in ac-dc or dc receivers. The 50-volt heater is tapped to provide suitable voltage between pins 6 and 7 to operate a Sylvania S292 or S292A panel lamp. The heater current rating for the entire heater is 150 milliamperes.

It is recommended that a surge limiting resistor be used in series with the heaters of the other tubes in the heater circuit.



4C-0-0



Sylvania Type 80

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Medium 4 Pin
Bulb	ST14
Maximum Overall Length	4 11/16"
Maximum Seated Height	4 1/8"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 1 & 4 are in a vertical plane.

RATINGS

Filament Voltage AC	5.0 Volts
Filament Current	2.0 Amperes
Peak Inverse Voltage	1400 Volts Max.
Tube Voltage Drop (125 Ma. per Plate)	60 Volts

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	350 Volts Max.
DC Output Current	125 Ma. Max.
Plate Supply Impedance per Plate	50 Ohms Min.

CHOKE INPUT TO FILTER

AC Voltage per Plate (RMS)	500 Volts Max.
DC Output Current	125 Ma. Max.
Input Choke Value (Minimum)	5.0 Henrys

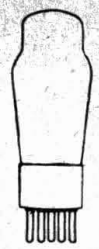
APPLICATION

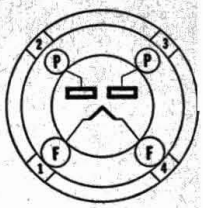
Sylvania Type 80 is a full-wave high-vacuum type rectifier tube designed to supply plate voltages at moderate current loads. It is equivalent to types 5Y3GT and 5Y4G and curve data for these types may be used for further reference.

82, 83 Sylvania Type

FULL-WAVE MERCURY VAPOR

RECTIFIERS





4C-0-0

PHYSICAL SPECIFICATIONS

	TYPE 82	TYPE 83
Base	Medium 4 Pin	Medium 4 Pin
Bulb	ST14	ST16
Maximum Overall Length	4 11/16"	5 5/16"
Maximum Seated Height	4 1/16"	4 3/4"
Mounting Position	Vertical—Base Down	Vertical—Base Down

RATINGS

Filament Voltage AC	2.5	5.0 Volts
Filament Current	3.0	3.0 Amperes
Maximum Peak Inverse Voltage	1550	1550 Volts
Tube Voltage Drop (Approximate)	15	15 Volts

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	450	450 Volts Max.
DC Output Current	115	225 Ma. Max.
Peak Plate Current	0.5	1.0 Ampere Max.
Plate Supply Impedance per Plate	50	50 Ohms Min.
Condensed Mercury Temperature Operating Range	24° to 60°	20° to 60° Centigrade

CHOKE INPUT TO FILTER

AC Voltage per Plate (RMS)	550	550 Volts Max.
DC Output Current	115	225 Ma. Max.
Peak Plate Current	0.5	1.0 Ampere Max.
Input Choke Value (Minimum)	6	3 Henrys
Condensed Mercury Temperature Operating Range	24 ° to 60°	20° to 60° Centigrade

APPLICATION

Sylvania Type 82 and 83 are full-wave rectifier tubes designed for the same general class of service as types 80 and 5Z3, but with improved performance for certain applications. The 82 and 83 contain a small quantity of mercury vapor which gives them a practically constant tube drop regardless of load. This improves the voltage regulation characteristics of power supply circuits employing these tubes. Care should be taken to maintain rated filament voltages and to avoid overloads to prevent tube damage.



4AD-0-0



Sylvania Type 83V

FULL-WAVE HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Medium 4 Pin
Bulb	ST14
Maximum Overall Length	4 11/16"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC	5.0 Volts
Heater Current	2.0 Amperes
Tube Voltage Drop (175 Ma. per Plate)	1400 Volts
Tube Voltage Drop (175 Ma. per Plate)	25 Volts

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	375 Volts Max.
DC Output Current	175 Ma. Max.
Plate Supply Impedance per Plate	100 Ohms Min.

CHOKE INPUT TO FILTER

AC Voltage per Plate	500 Volts Max.
DC Output Current	175 Ma. Max.
Input Choke Value (Minimum)	4.0 Henrys

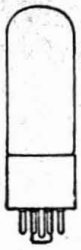
APPLICATION

Sylvania Type 83V is a heater-cathode type of high-vacuum rectifier. The heater-cathode type of construction allows much closer spacing of electrodes than with the filament type of construction. This close spacing reduces the inherent tube drop and improves the voltage regulation. High-vacuum type rectifiers are usually preferred in receivers because of the radio frequency hash noises usually generated by mercury vapor tubes. The use of shielding and filters to suppress this noise is unnecessary with high-vacuum rectifiers. Curves for type 83V will be found under equivalent type 5V4G.

117L7 M7GT Sylvania Type

RECTIFIER

BEAM POWER AMPLIFIER





8AO-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Maximum Overall Length	3 7/16"
Maximum Seated Height	2 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	117 Volts
Heater Current	90 Ma.
Maximum Peak Inverse Voltage Rectifier Section	350 Volts
Maximum Peak Plate Current	450 Ma.
Maximum Peak Heater-Cathode Voltage	330 Volts

AMPLIFIER SECTION

Maximum Plate Voltage	117 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	6.0 Watts
Maximum Screen Dissipation	1.0 Watt

TYPICAL OPERATION

Heater Voltage AC or DC	117 Volts
Heater Current	90 Ma.

RECTIFIER SECTION CONDENSER INPUT FILTER

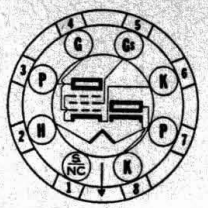
RMS Plate Voltage	117 Volts
DC Output Current	75 Ma.
Effective Plate Supply Impedance	15 Ohms

AMPLIFIER SECTION

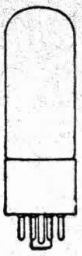
Plate Voltage	105 Volts
Screen Voltage	105 Volts
Grid Voltage	−5.2 Volts
Self-Bias Resistor	110 Ohms
Peak Signal Voltage	5.2 Volts
Zero Signal Plate Current	43 Ma.
Maximum Signal Plate Current	43 Ma.
Zero Signal Screen Current	4.0 Ma.
Maximum Signal Screen Current	5.5 Ma.
Plate Resistance (Approximate)	17000 Ohms
Mutual Conductance	5300 μmhos
Load Resistance	4000 Ohms
Total Harmonic Distortion	5 Percent
Maximum Signal Power Output	0.85 Watt

APPLICATION

Sylvania Type 117L7/M7GT is a combination rectifier and beam power output tube. It is designed for use in AC, DC, battery portable receivers supplying plate and filament power for the preceding tubes and the amplifier section serving as the output tube. When used in this manner, the battery tube filaments serve as the self-bias resistor to the amplifier section and should be adequately by-passed to prevent the amplifier cathode current variation from changing the filament voltage of the battery type tubes at the audio signal frequency and thus producing distortion. It is recommended that heater pin No. 2 be connected to the side of the power supply line opposite that connected to the rectifier plate pin No. 6 in order to keep amplifier heater-cathode voltage as low as possible.



8AV-0-0



Sylvania Type 117N7GT

RECTIFIER

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Maximum Overall Length	3 7/16"
Maximum Seated Height	2 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	117 Volts
Heater Current	90 Ma.

RECTIFIER SECTION

Maximum Peak Inverse Voltage	350 Volts
Maximum Peak Plate Current	450 Ma.
Maximum Peak Heater-Cathode Voltage	330 Volts

AMPLIFIER SECTION

Maximum Plate Voltage	117 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

Heater Voltage	117 Volts
Heater Current	90 Ma.

RECTIFIER SECTION, CONDENSER INPUT FILTER

RMS Plate Voltage	117 Volts
DC Output Current	75 Ma.
Effective Plate Supply Impedance*	15 Ohms

AMPLIFIER SECTION

Plate Voltage	100 Volts
Screen Voltage	100 Volts
Grid Voltage§	−6.0 Volts
Self-Bias Resistor	105 Ohms
Peak Signal Voltage	6.0 Volts
Zero Signal Plate Current	51 Ma.
Zero Signal Screen Current	5.0 Ma.
Plate Resistance	16000 Ohms
Load Resistance	3000 Ohms
Mutual Conductance	7000 μmhos
Total Harmonic Distortion	6 Percent
Maximum Signal Power Output	1.2 Watts

*When more than a 40 mf. filter condenser is used at the filter input more plate supply impedance than the minimum shown may be required.

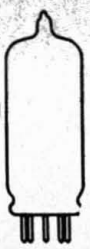
§Grid circuit resistance should not exceed 0.25 megohm with fixed bias or 1.0 megohm with self bias.

APPLICATION

Sylvania Type 117N7GT is a combination rectifier and beam power output tube designed as an output tube and power supply for AC DC battery portables. It is similar to Type 117L7/M7GT except for basing and higher power output and circuit notes for that type may be consulted for additional information.

117Z3 Sylvania Type

HALF-WAVE RECTIFIER





4CB-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 5/8"
Maximum Seated Height	2 3/8"
Mounting Position	Any

RATINGS

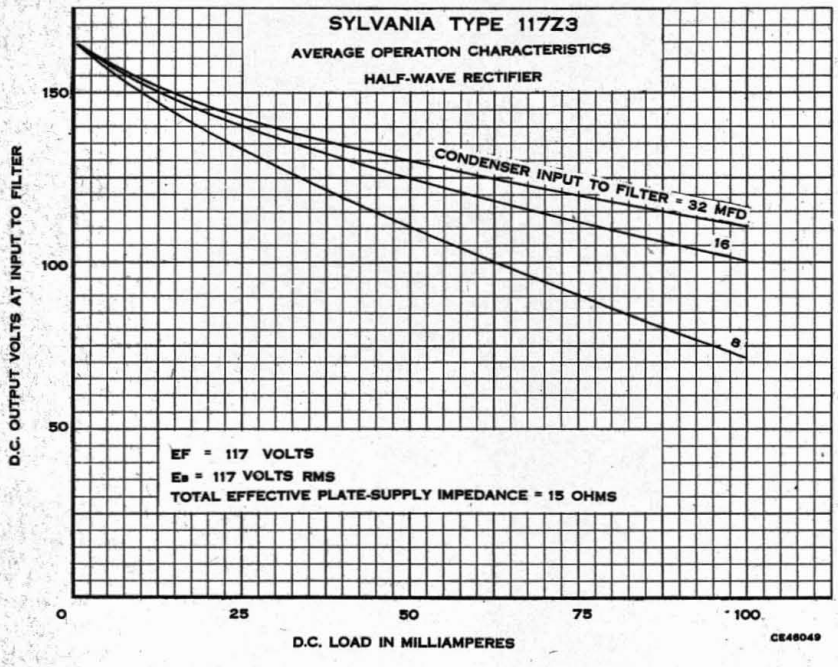
Heater Voltage (AC or DC)	117 Volts
Heater Current	40 Ma.
Maximum AC Plate Voltage (RMS)	117 Volts
Maximum Peak Heater to Cathode Voltage	
Cathode Positive	330 Volts
Cathode Negative	165 Volts
Maximum Peak Inverse Voltage	330 Volts
Maximum Steady State Peak Plate Current	540 Ma.
Tube Voltage Drop at 180 Ma. DC Plate Current	22.5 Volts
Maximum DC Output Current	90 Ma.
Maximum Plate Current Surge	1800 Ma.

TYPICAL OPERATION

Heater Voltage (AC or DC)	117 Volts
Heater Current	40 Ma.
AC Plate Voltage (RMS)	117 Volts
Output Current	90 Ma.
Minimum Total Effective Plate Supply Impedance	15 Ohms

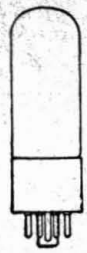
APPLICATION

Sylvania Type 117Z3 is a miniature half-wave rectifier designed for use in portable and AC-DC receivers. The output is sufficient for operation of combination battery portables with the high efficiency 50 Ma tubes in series.





7Q-0-0



Sylvania Type 117Z6GT

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Maximum Peak Inverse Plate Voltage	700 Volts
Maximum Peak Plate Current Per Plate	360 Ma.
Maximum DC Output Current Per Plate	60 Ma.
Maximum Peak Heater-Cathode Voltage	350 Volts
Average Tube Drop at 120 Ma. Output Current	15 Volts

TYPICAL OPERATION

HALF-WAVE RECTIFIER WITH CONDENSER INPUT FILTER*

Heater Voltage	117	117	117 Volts
Heater Current	75	75	75 Ma.
RMS Plate Supply Voltage	117	150	235 Volts
Input Filter Condenser	40	40	40 μf.
Minimum Effective Plate Supply Impedance (Per Plate)	15	40	100 Ohms
DC Output Current (Per Plate)	60	60	60 Ma.

*The sections may be used separately or in parallel.

VOLTAGE DOUBLER

	Half-Wave	Full-Wave
RMS Plate Supply Voltage Per Plate	117	117 Volts
Input Filter Condenser	40	40 μf.
Minimum Effective Plate Supply Impedance Per Plate	30	15 Ohms
DC Output Current	60	60 Ma.

APPLICATION

Sylvania Type 117Z6GT is a high-vacuum rectifier tube having two completely separate rectifier sections except for the common heater. The heater is designed to operate at power line voltages thus eliminating the need for dropping resistors. As a rectifier, each section may be used separately, paralleled or as a voltage doubler. Types 25Z5 and 25Z6GT are similar tubes and their data may be consulted for additional information.

884 Sylvania Type
885 Sylvania Type

GAS TRIODES



6Q-0-0
884



5A-0-0
885

PHYSICAL SPECIFICATIONS

	884	885
Base	Small Octal 6 Pin	Small 5 Pin
Bulb	ST12	ST12
Maximum Overall Length	4 1/8"	4 3/16"
Maximum Seated Height	3 9/16"	3 9/16"
Mounting Position	Any	Any

TYPICAL OPERATION

	884	885
Heater Voltage	6.3	2.5 Volts
Heater Current	0.600	1.5 Ampere
Maximum Plate Voltage	300	300 Volts
Peak Breakdown Voltage	350	350 Volts
Peak Plate Current	300	300 Ma.
Average Plate Current (0–200 cycles per Sec.)	3.0	3.0 Ma.
(200 +cycles per Sec.)	2.0	2.0 Ma.

Grid Resistor—1000 ohms per peak grid volt, should not exceed 500,000 ohms.

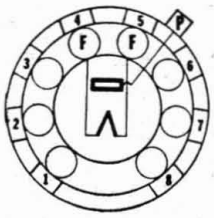
APPLICATION

Sylvania Types 884 and 885 are gas triodes used chiefly as sweep circuit oscillators in oscilloscopes. Both types are identical except for heater ratings and base connections.

1247 Sylvania Type

HIGH FREQUENCY DIODE





1247

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Top Connection	Flexible Lead
Maximum Overall Bulb Length	1 3/8"
Minimum Lead Length	1 1/4"
Mounting Position	Any

RATINGS

Filament Voltage AC or DC ±10%	0.7 Volts
Maximum AC Plate Voltage RMS	300 Volts
Maximum Peak Inverse Volts	850 Volts
Maximum DC Plate Current	1.0 Ma.
Maximum Peak Plate Current	5.0 Ma.
Tube Voltage Drop at 100 μa. (Approx.)	0.7 Volts

Direct Interelectrode Capacitances:

Plate to filament shielded*	0.8 μμf.
Plate to filament unshielded	0.6 μμf.

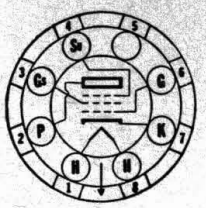
*With a 0.400" diameter shield connected to filament.

TYPICAL OPERATION

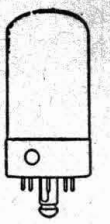
Filament Voltage	0.7 Volts
Filament Current	65 Ma.
AC Plate Voltage RMS	300 Volts
DC Plate Current	0.4 Ma.

APPLICATION

Sylvania Type 1247 is a filament type diode designed for use as the probe tube in vacuum tube voltmeters, such as the Sylvania Polymeter, where its small size makes possible a probe which operates satisfactorily up to 300 Mc.



8V-L-5



Sylvania Type 1273

NON-MICROPHONIC PENTODE

PHYSICAL SPECIFICATIONS

Identical to Type 7AJ7

RATINGS

Identical to Type 7AJ7

TYPICAL OPERATION

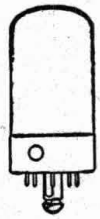
Identical to Type 7AJ7

APPLICATION

Sylvania Type 1273 is a pentode amplifier designed specially for use in the first stages of high gain amplifiers where low microphonism and tube noise are essential. Reference should be made to Type 14C7 for curves, and to Type 7C7 for resistance coupled amplifier data.



8V-L-5



Sylvania Type 1280

NON-MICROPHONIC PENTODE

PHYSICAL SPECIFICATIONS

Identical to Type 14C7

RATINGS

Identical to Type 14C7

TYPICAL OPERATION

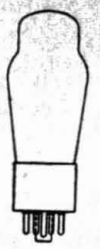
Identical to Type 14C7

APPLICATION

Sylvania Type 1280 is a pentode amplifier designed specially for use in the first stages of high gain amplifiers requiring series operation of tubes and where low microphonism and minimum tube noise are essential. Reference should be made to Type 14C7 for curves, and to Type 7C7 for resistance coupled amplifier data.

2050 Sylvania Type
2051 Sylvania Type

GAS TETRODES





6BR-0-0

PHYSICAL SPECIFICATIONS

Base	Small Octal 8 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

TYPICAL OPERATION

	2050	2051
Heater Voltage	6.3	6.3 Volts
Heater Current	0.6	0.6 Ampere
RMS Anode Voltage	400	220 Volts
Shield Grid Voltage	0	0 Volt
Peak Cathode Current	1000	375 Ma. Max.
Average Cathode Current	100	75 Ma. Max.
Control Grid Voltage (Approx. 180° out of phase with Plate Voltage)	5 0	4.0 Volts
Peak Signal Voltage	5.0	4.0 Volts
Control Grid Circuit Resistance	1.0	1.0 Megom
Anode Circuit Limiting Resistance*	2000	2000 Ohms

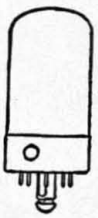
*Must be sufficient to limit anode current to maximum rating.
The Above Ratings are absolute Maximums.

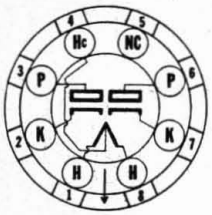
APPLICATION

Sylvania Types 2050 and 2051 are gas tetrodes designed for remote circuit control applications. If DC anode supplies are used, provision must be made for interrupting anode supply circuit after each operation to restore grid control action.

5679 Sylvania Type

DUODIODE





7CX-L-5

PHYSICAL SPECIFICATIONS
Identical to Type 7A6

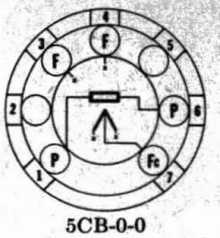
RATINGS
Identical to Type 7A6

TYPICAL OPERATION
Identical to Type 7A6

APPLICATION

Sylvania Type 5679 is a cathode type duodiode in which a center tap on the heater has been provided to permit balancing the sections. This adjustment is required in certain types of vacuum tube voltmeters, such as the Sylvania Polymeter. Reference should be made to Type 7A6 for curve data.

Additional series resistance may be required to limit the voltage across either section to the maximum of 3.5 volts under the highest line voltage condition.



5CB-0-0



Sylvania Type 5722

NOISE GENERATING DIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Vertical*

*Horizontal operation permitted if Pins 1 and 2 are in a vertical plane.

RATINGS

Maximum Filament Voltage	5.5 Volts
Minimum Filament Voltage	2.0 Volts
Filament Current at 4.9 Volts	1.6 Amperes
Maximum DC Plate Voltage	200 Volts
Maximum Plate Current	35 Ma.
Maximum Plate Dissipation	
Continuous Service	3.5 Watts
Intermittent Service	5.0 Watts
Maximum On Period in 50% Duty Cycle	5 Minutes

Direct Interelectrode Capacitances:*

Plate to Filament	1.5 $\mu\mu$f.

**With no external shield.

TYPICAL OPERATION

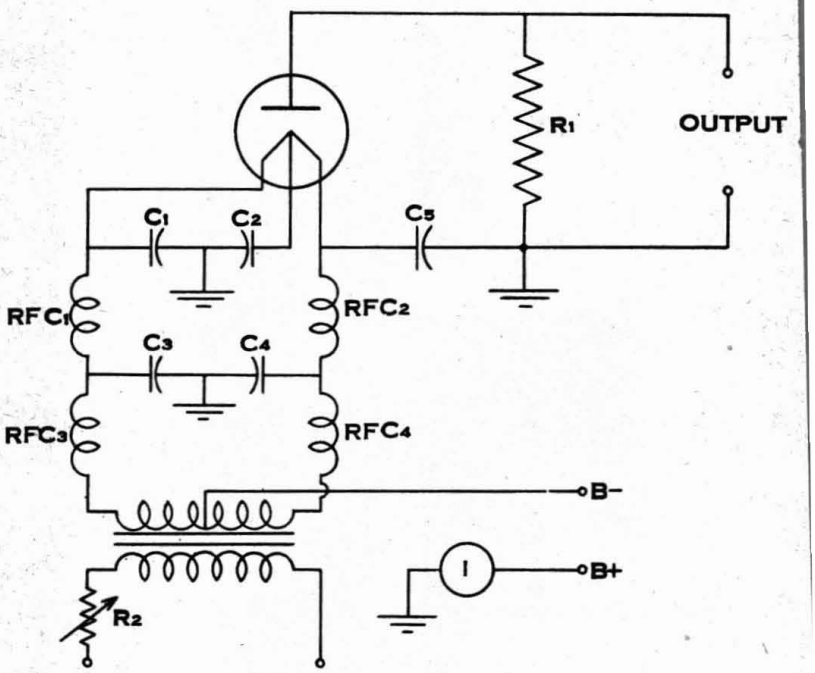
Sylvania Type 5722 is a tungsten filament diode designed for use as a noise generator at frequencies up to 400 or 500 mc. The filament center tap allows better RF grounding of the filament when used in the recommended circuit shown on a following page.

Since the tube has a tungsten filament the "shot effect" may be used as a standard noise source if sufficient plate voltage is applied to obtain saturation. The noise factor (NF) may be obtained from the equation $NF = 20\,IR$ where R is the total generator resistance and I is the diode plate current in amperes. To convert to decibels $NFdb = 10\,Log_{10}\,20\,IR$.

In use, the diode is coupled to the input of the amplifier under test and the filament voltage is increased until the noise output power is double that read without the diode. From the plate current reading and the generator resistance the noise factor can be calculated. Additional construction details may be obtained from the article "How Sensitive is Your Receiver," by Byron Goodman in the September 1947 issue of Q.S.T. and also "Coaxial Noise Diode" by H. Johnson, RCA Review, March 1947, Volume VIII, No. 1.

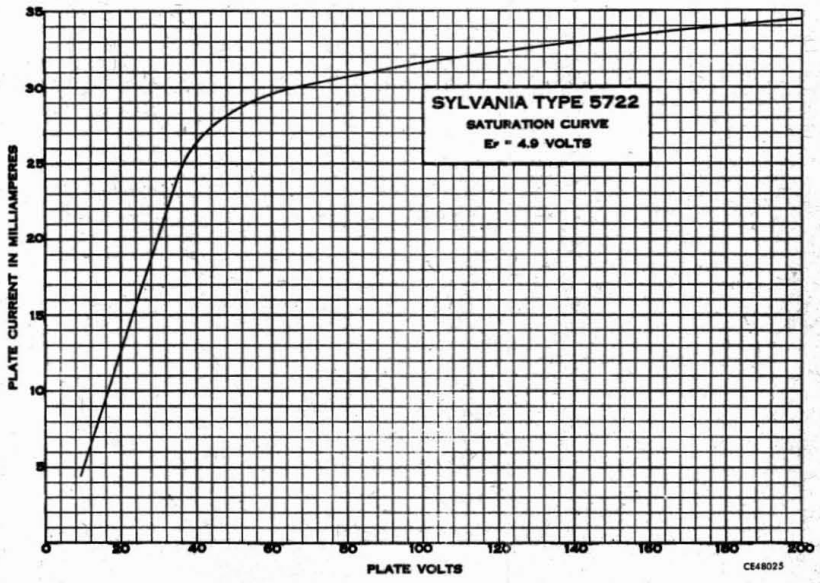
The useful life is dependent on the operating voltages since the usual causes of failure are burnout or vaporization of the tungsten filament.

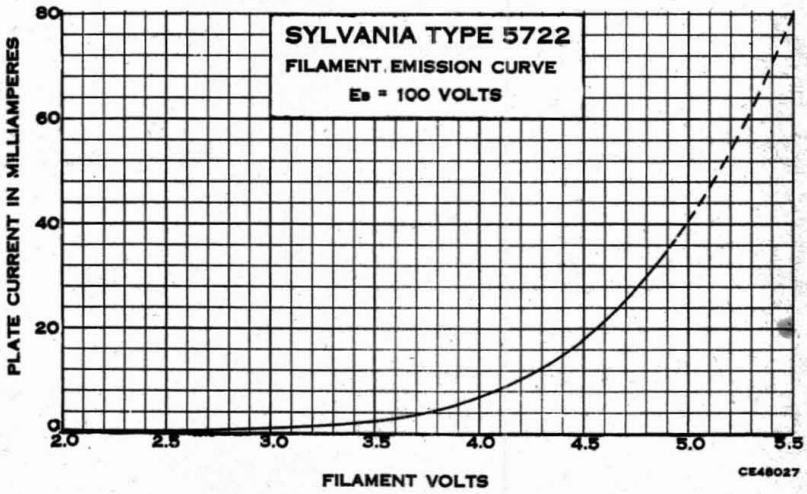
RECOMMENDED CIRCUIT



PARTS LIST

C_1, C_2, C_3, C_4, C_5	500 μμf
RFC_1, RFC_2	6 Turns #16 Enamel Wire on 3/16" Air Core
RFC_3, RFC_4	30 Turns #16 Enamel Wire on 3/8" O.D., 1/4" I.D. Bakelite Coil Form With Powdered Iron Core
R_1	50 to 300 Ohms as Required to Match Load
R_2	Filament Voltage Control


SYLVANIA TYPE 5722
SATURATION CURVE
Er = 4.9 VOLTS
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTS
CE48025


SYLVANIA TYPE 5722
FILAMENT EMISSION CURVE
Eb = 100 VOLTS
PLATE CURRENT IN MILLIAMPERES
FILAMENT VOLTS
CE48027

APPENDIX

FUNDAMENTAL ELECTRICAL LAWS

OHM'S LAW

When a continuous current is flowing thru a given conductor, whose temperature is maintained constant, the ratio of the potential difference or voltage existing between the conductor terminals and the current carried by the conductor is a constant, no matter what the value of the current may be. The mathematical formulae for Ohm's Law may be expressed in the following forms:

$$R = \frac{E}{I} \qquad I = \frac{E}{R} \qquad E = IR$$

Where R = resistance expressed in ohms
I = current expressed in amperes
E = potential difference or voltage in volts

A practical example is given to illustrate the use of Ohm's Law:

If the screen current for a certain tube is 2 milliamperes (0.002 ampere) what value of resistance should be used to reduce the screen voltage to 90 volts from a supply voltage of 250 volts?

Solution: The required voltage drop across the resistor would be 250 — 90 or 160 volts.

$$\text{Therefore } R = \frac{E}{I} = \frac{160 \text{ volts}}{0.002 \text{ ampere}} = 80{,}000 \text{ ohms}$$

POWER

Power is the time rate of doing work. Since energy is the ability to do work, power may also be defined as the time rate of expending energy. From the fundamental definitions of power, electromotive force and current it is easy to show that power may be computed from the following expression:

$$P = EI$$

If E is expressed in volts and I in amperes then the power P will be given in watts. Using values for E or for I from Ohm's Law, the above expression becomes either:

$$P = I^2 R \qquad \text{or} \qquad P = \frac{E^2}{R}$$

If the first equation for power is used, the wattage rating of the resistor used for reducing the screen voltage may be computed.

$$P = EI = 160 \text{ volts} \times 0.002 \text{ ampere} = 0.32 \text{ watt}$$

A 0.5 watt resistor should be employed.

RESISTORS CONNECTED IN SERIES AND IN PARALLEL:

When two or more resistors are connected in series, so that the same current flows through each resistor, the total effective resistance (R_t) of the network will be the sum of the separate resistances. Thus:

$$R_t = R_1 + R_2 + R_3 + \ldots.$$

If a number of resistors are connected in parallel so that the voltage drop is the same across each resistor, then the current in each resistor will be inversely proportional to the resistances. The total effective resistance (R_t) of the network, will be given by:

$$1/R_t = 1/R_1 + 1/R_2 + 1/R_3 + \ldots.$$

For the case of two resistors in parallel:

$$R_t = \frac{R_1\ R_2}{R_1 + R_2}$$

CALCULATION OF CONDENSERS IN SERIES AND IN PARALLEL:

When a number of condensers are connected in series, the total effective capacity (C_t) is computed from the relation:

$$1/C_t = 1/C_1 + 1/C_2 + 1/C_3 + \ldots.$$

For the case of two condensers connected in series this expression reduces to the form:

$$C_t = \frac{C_1\ C_2}{C_1 + C_2}$$

The total capacity (C_t) of any number of condensers connected in parallel is the sum of the separate capacities:

$$C_t = C_1 + C_2 + C_3 + \ldots.$$

CALCULATION OF PROPER RESISTOR FOR SELF-BIASING:

From Ohm's Law

$$R = \frac{\text{Grid Bias in Volts} \times 1000}{\text{Total Cathode Current in Ma.} \times \text{Number of Tubes Involved}}$$

For triodes the total cathode current is equal to the plate current.

For tetrodes and pentodes the total cathode current is the sum of the plate and screen currents.

For pentagrid converters the plate, screen and oscillator anode currents must be added to obtain the total cathode current.

Example: What biasing resistor is required for two Type 42 tubes operated in push-pull with 250 volts applied to the plates?

The following data are taken from the characteristics shown for Type 42:

Grid Bias	= 16.5 Volts
Plate Current	= 34.0 Ma.
Screen Current	= 7.5 Ma.
Total Cathode Current	= 41.5 Ma.

$$\text{Hence: } R = \frac{16.5 \times 1000}{41.5 \times 2} = \frac{16500}{83} = 198 \text{ ohms}$$

When over-biased operation is employed the recommended bias resistor values will be specified under Ratings or Circuit Application notes for the tube type involved.

FUNDAMENTAL PROPERTIES OF VACUUM TUBES

The major operating characteristics of a vacuum tube can be expressed in terms of the amplification factor (μ), the dynamic plate resistance (R_P) and the mutual conductance (G_M). When these are known one can make quantitative calculations of the tube performance under many conditions.

The **Amplification Factor** is defined as the ratio of a small increment in plate voltage to the corresponding change in grid voltage necessary to maintain constant plate current. In other words, it is the ratio of the effectiveness of the grid and plate voltages in producing electrostatic forces at the surface of the cathode. The amplification factor depends upon the configuration of the electrode system, especially the grid structure, and the electrode voltages. Changes which cause the grid to more completely shield the plate from the cathode will increase the value of μ.

The dynamic **Plate Resistance** may be defined as the ratio of a small change in plate voltage to the corresponding change in plate current produced. The value will depend upon the grid and plate voltages at the operating point under consideration. It will **not** be equal to the ratio of total plate voltage to total plate current. The dimensions and relative positions of the tube electrodes will largely determine the value of plate resistance.

The **Mutual Conductance** (G_M), sometimes called control grid-plate transconductance (S_M), is the ratio of the amplification factor to the plate resistance and represents the rate of change in plate current with respect to the change in grid voltage when the other voltages remain constant.

Interelectrode Capacities: The electrodes of a vacuum tube form a complicated electrostatic system, and each element may be considered as forming one plate of a small condenser. In a three-element tube the capacitance between the cathode and grid, between the grid and plate, and between the plate and cathode, are known as the interelectrode capacitances of the tube. Of these, the grid-plate capacity is generally the most important. The effect of these capacitances depends upon the relationship between their reactances and the associated external circuit impedances. Their effect is, therefore, a function of frequency and external load.

In multi-electrode tubes the number of separate interelectrode capacitances is larger than for a triode. Fortunately, only three of these direct interelectrode capacitances are of great importance in most applications. These are:

1. Grid-plate capacity (C_{GP}).
2. Direct input capacity from control grid to cathode plus all other electrodes except output plate.
3. Direct output capacity from plate to cathode plus all other electrodes except the input grid.

AMPLIFIER CLASSIFICATION

All radio receiving tubes except the rectifiers may be conveniently considered as amplifiers. Oscillators and detectors or frequency converters may be thought of as special cases of amplifiers in which use is made of the non-linear relations between the input voltages and output currents of the tube under consideration.

There are three major classes of amplifier service. Definitions describing these have been standardized by the Institute of Radio Engineers.

Class A Amplifier

A Class A, or Class A1, amplifier is one in which the grid bias and signal voltages are such that plate current in the tube, or in each tube of a push-pull stage flows at all times.

This is accomplished by operating at the center point of the plate current vs. grid voltage curve and using signal voltages which do not drive the grid into either the positive region or into the sharp bend near cut-off voltage.

Class A2 Amplifier

A Class A2 amplifier is the same as a Class A1 amplifier except that the signal may drive the grid into the positive region. This is accomplished by operating at a lower bias than the center point which would have been selected for class A operation.

Class B Amplifier

A Class B amplifier is an amplifier in which the grid bias is approximately equal to the cut-off value, so that the plate current is approximately zero when no signal voltage is applied and so that plate current in the tube or in each tube of a push-pull stage, flows for approximately one-half of each cycle when an alternating grid voltage is applied.

An important characteristic is that the grid circuit draws appreciable power which prevents it from being used with ordinary resistance coupled driver tubes.

Class AB1 Amplifier

A Class AB1 amplifier permits greater output to be obtained from small tubes, but requires push-pull operation to reduce distortion. It is characterized by operation at a higher bias than for Class A and uses a signal large enough to drive the grid into the cut-off region but not into the positive region.

Class AB2 Amplifier

A Class AB2 amplifier is the same as a Class AB1 above except that additional bias may be used, and the signal drives the grid into both the cut-off and grid current regions.

Class C Amplifier

A Class C amplifier is one in which the tubes operate at a bias much greater than cut-off voltage so that plate power is drawn only on the peaks of the signal voltage. It is not used in audio amplifiers because the distortion is too high but is the most efficient circuit for R. F. power amplifiers where the harmonics can be reduced by use of resonant circuits.

DEFINITIONS
OF COMMON RADIO TERMS

Anode Current: The total current passing to or from an anode. In vacuum tube terminology this is called plate current. Symbol I_b.

Cathode Current: The total space current passing to or from the emitter. This should not be confused with filament current in filament type tubes. Symbol I_k.

Conversion Transconductance: (Formerly called Conversion Conductance). The ratio of the desired beat frequency component of the plate current to the signal voltage applied to the grid. It is expressed in micromhos. Symbol Gc.

Coupling: The mutual relationship between circuits permitting a transfer of energy between them.

Degeneration: The result of a portion of the output signal appearing in the input circuit of a vacuum tube so as to reduce gain. It is sometimes introduced to stabilize the circuit and to improve the response. It may be called **negative or inverse feedback.**

Demodulation: The process of separating the modulation component from the carrier. It is commonly called detection.

Diode: A vacuum tube having two elements. It is usually used as a rectifier or detector. A **duo diode** is two diodes in one envelope; one element may or may not be common to both diodes.

Distortion: The change in wave form produced by the transmission device or amplifier.

Discriminator: A circuit which produces a DC voltage proportional in value and polarity to the variations in the applied frequency about the mean frequency, or which converts frequency modulated signals directly into audio frequency signals.

Electron Emission: The liberation of electrons from a surface into the surrounding space. If accomplished under the influence of heat it is called **Thermionic Emission.** If due to the impact of other electrons, it is called **Secondary Emission.** When emission occurs from a grid from any cause, it is called **Grid Emission.**

Fidelity: The degree of accuracy of reproduction of the original signal.

Filter: A selective network or circuit designed to pass a certain frequency or band of frequencies and reject all others.

Frequency Deviation: The amount of instantaneous carrier frequency shift from the mean frequency due to modulation in frequency modulated transmitters.

Frequency Modulation: A method of transmitting intelligence by means of varying the frequency of a transmitter about the mean frequency in accordance with the signal it is desired to transmit.

Gain: The ratio of output to input signal. It may be expressed in terms of power or voltage. **Conversion gain** is the ratio of intermediate frequency output to signal frequency input.

Power Amplifier: An amplifier designed to deliver power as distinguished from a voltage amplifier.

Power Output: The useful power developed in the output device or circuit. It is usually limited by permissible distortion.

Pulse: A single disturbance, such as half a square wave. **Grid pulsing** is a method of controlling a circuit by introducing a pulse into the grid circuit. **Plate Pulsing** is the same as grid pulsing except the pulse is introduced into the plate circuit.

Reactance Tube: A vacuum tube with operating conditions so chosen that the tube appears as an inductance or capacitance which can be varied by means of changes in the control voltage.

Rectifier: A device for converting alternating current into direct current by permitting much more current to flow in one direction than the other. A **half-wave rectifier** permits current flow only during one half of the cycle. A **full-wave rectifier** permits current flow from both halves of the cycle.

Regulation: The ratio between a reference voltage and change of voltage caused by the load. It is usually expressed in percent.

Ripple Voltage: The alternating component of the DC voltage after rectification or from a generator.

Selectivity: The ability of a circuit to choose between desired and undesired signals on adjacent frequencies.

Sensitivity: Is the term used to denote the ratio between input signal and output power. Generally expressed as microvolts per watt.

Side Bands: Those frequencies adjacent to, and associated with a carrier.

Space Charge: A cloud of electrons between elements of a vacuum tube.

Space Current: The current consisting entirely of the electron flow from the cathode to the anode and other positive elements in a vacuum tube.

Trigger Circuit: A circuit having two stable operating conditions readily changed from one to the other by a small change in operating conditions.

Triode: A three element vacuum tube having an anode, cathode and a control electrode.

Voltage Gain: The ratio of the voltage developed in the plate circuit to the grid voltage necessary to produce it.
Voltage Gain per stage may be obtained from the formula:

$$\text{Gain} = \frac{\mu \times Z_P}{Z_P + R_P} = \frac{G_M \times R_P \times Z_P}{(Z_P + R_P) \times 10^6}$$

Where G_m is in micromhos; R_p and Z_p in ohms

GENERAL TUBE AND CIRCUIT INFORMATION

Efficient tube performance requires that careful attention be given to proper installation and to circuit considerations. Numerous suggestions regarding tube ratings, voltage supplies for the various tube elements, volume controlling, shielding and filtering are discussed below. This information applies in a general way to all tube types and represents practical and approved methods employed in modern radio receivers. Additional instructions and precautions pertaining to a particular tube may be found under the **Circuit Application** for that type. Minor deviations from the information given may sometimes be desirable in special circuit designs, although in general it will be advisable to follow the recommendations.

INTERPRETATION OF RECEIVING TUBE RATINGS

Interpretation of tube ratings published in this manual are in accordance with RMA standards. The ratings shall be interpreted according to the conditions outlined in the following paragraphs.

Cathode

The heater or filament voltage is given as a normal value unless otherwise stated. This means that transformers or resistances in the heater or filament circuit should be designed to operate the heater or filament at rated value for full-load operating conditions under average supply-voltage conditions. A reasonable amount of leeway is incorporated in the cathode design so that moderate fluctuations of heater or filament voltage downward will not cause marked falling off in response; also, moderate voltage fluctuations upward will not reduce the life of the cathode to an unsatisfactory degree.

1.4 Volt Battery Tube Types

Dry Battery Operation: The 1.4 volt line of battery tubes is designed to be operated from a dry cell battery rated at a terminal potential of 1.5 volts. In no case should the voltage across any 1.4 volt section of filament exceed 1.6 volts. In the case of series operation, shunting resistors may be required to obtain this condition.

Operation from other Power Sources: When other power supply sources are used the voltage drop across each 1.4 volt section should have a nominal value of 1.3 volts and should be maintained within a range of 1.25 and 1.4 volts at normal line voltage and for tubes of rated filament current. In the case of series operation shunting resistors may be required to obtain this condition. This assumes a normal line voltage of 117 volts, and a normal storage battery terminal voltage of 2.0 volts per cell.

2.0 Volt Battery Tube Types

The 2.0 volt line of tubes is designed to be operated with 2.0 volts across the filament. In all cases the operating voltage range should be maintained within the limits of 1.8 volts to 2.2 volts.

Plate and Screen

In the case of plate voltage and screen voltage, however, recommended maximum values are given. The interpretation of this maximum value depends on the power source, as follows:

A-C or D-C Power Line: The maximum ratings of plate and screen voltages and dissipations given on the tube type data sheets are **Design Maximums.** For equipment designed for

use in the United States on nominal power-line services of 105 to 125 volts, satisfactory performance and serviceability may be anticipated, provided the equipment is designed so as not to exceed these **Design Maximums** at a line voltage of 117 volts.

Automobile Storage Batteries: When a tube is used in automobile receivers and other equipment operated from automobile storage batteries, consideration should be given to the larger percentage range over which the battery voltage varies as compared with the power-line voltage. The average voltage value of automobile batteries has been established as 6.6 volts. Automobile battery operated equipment should be designed so that when the battery voltage is 6.6 volts, the plate voltage, the plate dissipation, the screen voltage, the screen dissipation, and the rectifier load current will not exceed 90% of the respective recommended **Design Maximum** values given in the data for each tube type.

"B" Batteries: Equipment operated from "B" batteries should be designed so that under no condition of battery voltage will the plate voltage, the plate dissipation, the screen voltage, and the screen dissipation ever exceed the recommended respective maximum values shown in the data for each type by more than 10%.

Other Electrodes

When a tube is of the multigrid type, the voltages applied to the additional positive electrodes will be governed by the considerations stated under Plate and Screen.

Typical Operation

For many receiving tubes, the data show typical operating conditions in particular services. These typical operating values are given to show concisely some guiding information for the use of each type. They are not to be considered as ratings, because the tube can be used under any suitable conditions within its rating limitations.

VOLTAGE SUPPLIES

The B-voltage supply includes voltage for the operation of plate circuits, screen circuits, and sometimes for bias circuits. The principal methods for obtaining each in various kinds of receivers will be described.

In battery receivers used in locations remote from power supply lines, B batteries are usually employed for the plate voltage. The screen voltage may be tapped off at the appropriate voltage; or for some cases a series dropping resistor and shunt filter condenser is applicable. Bias voltage was formerly obtained from separate batteries. However, with certain 1.4 volt battery types, such batteries are unnecessary since the tubes may be operated with no initial bias other than that developed across the a-v-c diode resistor.

For all other receivers screen voltages are obtained either by using a voltage divider or a series dropping resistor from the positive supply lead.

Grid bias is usually then supplied by means of an adequately by-passed resistor placed in the cathode circuit, or if a more stable bias is required, by means of a resistor in the negative lead of the plate supply and also adequately by-passed. Since this resistor carries the total plate supply load current, bias developed in this manner is much less affected by individual tube and circuit variations. As an economy measure a speaker field or filter choke having the proper resistance can be substituted for this resistor. In this case, resistance capacity filter circuits will be necessary to prevent hum voltage from appearing in the bias circuits, since the choke or speaker field will then often become part of the filter circuit.

In the cathode or "self-biased" circuit it is essential, except in push-pull circuits or where degeneration is desired, that the cathode resistor be by-passed with sufficient capacity so that no appreciable a-c impedance exists between cathode and grid return. With the other method of C-bias mentioned, adequate filtering must be used in order to keep at a minimum any power supply hum which might be applied to the tube grids.

For a-c operated receivers a step-up power transformer and rectifier tube are used to supply pulsating d.c. to an appropriate filter system, the output of which is essentially pure d.c. This supply can then be utilized for the recommended plate, screen and bias voltages.

In ac-dc radio sets the line voltage is applied directly across a rectifier tube and the associated filter system without using a power transformer. Whenever operation above 117 volts is required, a resistor of 50 to 100 ohms should be inserted in series with the rectifier plates to prevent damage to the tube or filter condenser. In many modern sets a filter capacity of 30 mf or more has been used which requires the addition of a peak current limiting resistor to prevent damage to the rectifier tube. The proper value will be found specified for each type under the various conditions of load. Except in circuits designed for voltage doubling, the rectified voltage will be relatively low and somewhat below the peak value of the impressed line voltage supply.

The r.f., converter and power output tubes suitable for use in this type of receiver are indicated by the inclusion of a rating of 100 volts for both plate and screen. The characteristics under these conditions show very little reduction in the mutual conductance but a great decrease in the plate resistance due to the plate and screen being at the same potential. The effect of this on performance can be estimated from the gain formula on page 14. The reasons for it can be seen from any of the plate characteristic curves and is discussed in the section on the Use of Curve Data.

Receivers operated directly on d.c. employ a hum or commutator-ripple filter that is connected across the line, the positive side being used for the plate supply voltage.

Automobile receivers utilize either a motor generator designed to deliver high d-c voltage, or a vibrator-transformer with a suitable rectifier and filter system to supply the set with B voltages. Either method depends upon the car storage battery as the primary source.

HEATER VOLTAGE SUPPLIES

To obtain satisfactory performance it is important that proper voltages be supplied to the heaters or filaments at all times. The life of the tubes will be greatly shortened if excessive voltages are applied because the active or electron emitting material will be evaporated at a faster rate than required. If, on the other hand, the voltages are too low, the operating temperature of the cathode or filament will be inadequate to supply sufficient emission for proper operation.

The following sources of filament power supply are generally used:

Dry batteries
"Air Cell" batteries
Storage batteries
Direct Current 32 volt farm lighting power
Alternating Current power line

The voltage delivered by dry batteries falls off during life so that it is necessary to provide a rheostat or ballast tube in order that constant voltage may be supplied to the tubes during the life of the batteries.

The voltage delivered by an "air cell" battery remains quite constant until final exhaustion, when it drops very rapidly. A fixed series resistor used in connection with this battery supply device will usually prove entirely satisfactory.

Exceptions to the two preceding paragraphs exist when 1.4 volt battery tubes are employed. These types will operate directly from a suitable 1.5 volt dry battery without the use of a series dropping resistor or ballast tube since the filament design provides satisfactory performance over the useful range normally encountered during the life of the battery. Single cell "air cells" also provide satisfactory operation without the use of a fixed series resistor since the constant terminal battery voltage is within the normal operating range for these tubes.

The voltage delivered by a storage battery varies widely, depending upon the condition of charge. If 5 volt tubes are employed, it will be necessary to employ a rheostat to reduce the voltage at the socket terminals to 5 volts. If 6.3 volt heater type tubes are employed, it will be unnecessary to use a series resistor unless the voltage range exceeds the normal value by more than 10%.

Receivers designed to operate on 115 volt d-c lines usually employ tubes connected in series, and with sufficient fixed resistance introduced the heater current is kept normal with 117 volts applied. Under normal line voltage variations from 105 volts to 130 volts no additional adjustable resistors will be necessary.

The universal type of receiver so common at the present time employs the series filament method of connection described in the previous paragraph. In general, no special precautions are necessary to take care of line voltage fluctuations.

Receivers designed for use on a-c power lines of a specified frequency employ step-down transformers to supply the proper filament voltages. If extremely high line voltages are encountered it may be desirable to incorporate an added resistor to reduce the voltage applied to the primary to a nominal value.

VOLUME CONTROL CONSIDERATIONS

The method employed in older type receivers to control the volume was that of varying the screen voltage applied to the tubes. Later, with the advent of remote cut-off tubes, the system of C-bias variation was universally adopted. The bias voltage was obtained either from a potentiometer across the negative portion of the bleeder, or by inserting a variable resistance in the common cathode lead of several tubes when manual control of sensitivity was desired.

Most modern receivers employ automatic volume control. The function of the a-v-c circuit is to properly regulate the bias applied to the control grids of the r-f, converter and i-f tubes so that, in-so-far as the inherent limitations of the receiver permit, a nearly constant signal will be delivered to the input of the second detector. This is accomplished by utilizing the rectified voltage developed across the load resistor in the diode circuit for the control voltage impressed on the grids of the amplifier tubes. The diode current flowing through the resistor will place the cathode end at positive potential and the opposite end at negative potential. The negative voltage for biasing the grids is obtained from the negative end of this resistor. The value of the resistor should be such that for a given signal the drop in voltage across it will be sufficient to bias the tubes being controlled to a sensitivity consistent with the volume desired. An increase in the r-f signal input will raise the voltage drop, thereby applying more bias to the control tubes. This will decrease the receiver sensitivity and

maintain the receiver output at normal volume. On the other hand, a decrease in r-f signal input reduces the voltage drop and thus lowers the bias on the control tubes. This increases the receiver sensitivity and automatically maintains the volume constant.

With sharp cut-off tubes the cut-off voltage may be extended by feeding the screen through a series resistor from the full B-voltage source. The tube will then act somewhat similar to a remote cut-off type where the volume is controlled by varying the C-bias. The extended cut-off feature thus obtained is intermediate in magnitude between sharp and remote cut-off tubes Such service is not recommended where the signal voltage is apt to be large since the sharpness of the knee of the dynamic characteristic is not materially reduced. In no case will the dynamic curve become similar to the characteristic of true remote cut-off tubes.

SHIELDING

In order to obtain stable amplification which will be comparable with the theoretical limit it is essential that ample consideration be given to proper shielding. This is especially necessary in high gain circuits.

If tubes such as Types 6C6 and 6D6 are employed it will be necessary to use close fitting tube shields in order to keep the interelectrode capacities at a minimum. Other types of high frequency amplifiers, which are constructed with internal shields in the form of a cage around the plate, do not require as much external shielding. Ordinary tube shields will be adequate for types such as the 6J7G, 6K7G. 7A7, 7C7, etc. In some cases partition shielding mounted on the chassis itself is sufficient.

Each receiver layout will present different shielding problems. These become more complicated in small compact radios. Much can be done to minimize the necessity for shielding by using a layout scheme such that critical feed-back points are separated as far from each other as is conveniently possible. Over-all feed-back from the output tube to the antenna circuit should always be avoided.

FILTERING

There are two major classes of filters, the high frequency and the low frequency types. In the former, very good condensers having low resistance and inductance components are required. Electrolytic condensers are not generally satisfactory for high frequency work.

At low frequencies it is necessary to consider the peak voltage that may be impressed on the condensers, since this is considerably greater than the d-c voltage measured across them. If considerable power is to be delivered from the filter an inductance-capacity filter should be used. Whenever the load current from the filter is not excessive, a resistance-capacity filter can be used. This type is more economical and requires less space.

AVC filter systems usually employ resistance and capacity networks. Careful consideration must be given to the time constant. If this is made too long, a sudden disturbance such as static may cause the receiver to become inoperative for a noticeable period of time. When the constant is too short, low frequency degeneration and modulation distortion may occur. A suitable value for the time constant is of the order of one-tenth second.

Screen circuits usually require more careful filtering than the plate circuits, since the screen grid has a control effect quite similar to any other grid in the tube. Instability and general interaction between circuits often result from inadequately filtered screen grids.

C-bias filtering has been discussed in detail under Voltage Sources. The usual circuit elements involved are series resistors and low-voltage shunt condensers.

LOCK-IN TYPE TUBES

A group of single-ended tubes, of Lock-In construction, is a recent addition to Sylvania receiving tubes. These are small "all-glass" tubes without the familiar bakelite base. The contact pins are sealed into the glass bottom, thus eliminating soldered connections. This type of construction permits single-ended operation, as no top cap connections are present, and provides compactness, suitable shielding, and a special lock-in feature. Numerous types are especially suitable for use in UHF applications because of low lead inductances, low inter-electrode capacitances, and low dielectric losses. The lower portion of the tube is fitted with a metal shell and guide pin. This unit acts as a shield and makes possible the lock-in feature by employing a groove around the bottom of the locating pin which fits into a catch on the socket.

The locking arrangement holds the tubes in the sockets securely, assuring good contact at all times. Removal of these tubes from the sockets may be somewhat difficult when done by a direct upward pull. With a slight off-side pressure, the socket lock is released and the tube is readily removed.

These tubes are not directly interchangeable with other designs of receiving tubes because of the socket requirements. In many instances the electrical characteristics and applications are similar to other well known types. Adequate information is supplied under the various lock-in types shown elsewhere in this Manual.

METAL TUBES

Metal tubes are somewhat smaller than the regular types of glass tubes. The bulb or shell diameter is one inch except at the base where the maximum diameter is one and five-sixteenths inches. The shell is all metal and the lead wires are brought out through the "header", which seals the shell at the bottom. The shell is connected to a base pin and operates at ground potential to eliminate any danger of electric shocks. The over-all length of the tube is reduced and an octal base is provided.

The octal base has provisions for eight pins uniformly spaced. Where fewer than eight pins are required, they are omitted and the spacing of the remaining pins is unchanged. The pin numbering is in accordance with the RMA standard numbering system. In this system, numbers are assigned to each of the eight possible pin positions. Numbering begins at the shell connection, which is always the first pin to the left of the locating lug when the base is viewed from the bottom with the lug toward the observer. The direction of numbering is clockwise on the basis of possible pin position.

G, GT AND GT/G TUBES

Tubes are often classified according to their general design and construction. Lock-In and metal types have been briefly described. The so-called "regular" glass types are characterized by the style of glass envelope and particularly by the standard bakelite base equipped with four, five, six or seven pins as required, and the absence of any locating base lug.

G type tubes are glass tubes which are, in most cases, identical or very similar in operating characteristics to many of the regular types. The bases are of octal design with a bakelite locating lug while the top caps, if required, are of the miniature style. In these respects the G tubes resemble metal tubes.

A smaller version of the G tube is the GT style designed for use where tubes of this size are desired. For most GT types the characteristics are essentially the same as for the G type equivalent. All GT tubes are equipped with octal bases and a tubular bulb is employed. The suffix GT is derived from the base used on G types and tubular T style bulb. Reduction in physical size is secured through the use of a shorter stem.

Because of the similarity in characteristics between G tubes and the corresponding GT types it is usually possible to interchange GT for G tubes and vice versa if space permits. Consequently, many G types have been discontinued as such, the GT style adopted, and the tubes bulb-etched GT/G.

Two kinds of octal bases are employed on GT and GT/G types. Rectifier and output types are equipped with an all bakelite base as on G tubes. Converters, r-f and i-f types have metal shell bases, that is, a combination of a bakelite wafer to which is fastened a metal shell which is cemented to the glass bulb. The metal shell serves as a part of the shielding and is connected to pin No. 1. This arrangement often permits GT/G or GT tubes to be substituted for equivalent metal types. Slight realignment of tuned circuits may be required to secure correct performance. If additional shielding is necessary on GT/G tubes an external shield can be slipped over the metal shell. Other GT/G types may have one or the other style of base described above, this being optional with the manufacturer.

MINIATURE TUBES

One of the recent trends in radio tube manufacture is the reduction in size of the tube required for given performance. The group of tubes known as miniatures are good examples of the results which may be obtained in a small T-5½ bulb. Many of these types are particularly useful at high frequencies because of the short leads and the absence of the old style phenolic insulation. Some recent types of this design are Types 12AU6, 12AT6, 12BA6, 12BE6, 35W4 and 50B5.

BATTERY TUBES

There are two general groups of battery tubes: the group designed for 2-volt operation and the newer group of 1.4 volt types. The former are now employed primarily for replacement purposes and their characteristics are quite well known. The latter both in GT/G and Lock-In construction are widely used in all forms of battery receivers and several special features are outlined below.

The 1.4 volt group of battery tubes is of particular interest because of the economy afforded in power supply requirements

and the reduction in space which is possible. These tubes have been designed especially for economical operation, non-microphonic action and long life. With the exception of the output types, the tubes are designed for zero bias operation, thus simplifying circuit applications and reducing couplings to some extent.

Since these tubes are of the directly heated filament type there may be some small variation in contact potential which, in some instances, may result in slight variation in sensitivity between tubes of the same type if the grid return is made directly to minus filament. It is recommended that a resistance of at least 0.5 megohm, suitably by-passed, be connected between the grid return and minus filament. If these tubes are employed so that a-v-c voltage is applied to the grids, the resistors used for isolation and diode load will be sufficient.

Since the filament wire employed in these tubes is extremely small in diameter, some precautions may be necessary to prevent filament vibrations resulting mainly from acoustic and mechanical feed-back from the speaker to the tubes and chassis. Therefore, it is preferable not to mount the speaker directly on the chassis. A further point to bear in mind is the fact that the permanent magnet of the speaker produces a strong magnetic field which may influence the electron stream in tubes that are in close proximity to the magnet. With moderate care in lay-out this difficulty can be readily avoided.

TUBE AND BASE DIAGRAM SYMBOLS

A —Anode	IS —Internal Shield
Dp —Diode Plate	J —Jumper
F —Filament	K —Cathode
Fc —Filament Center Tap	NC—No Connection
G —Control Grid	P —Plate
Ga —Anode Grid	Rc —Ray Control
Gm—Modulator Grid	S —Metal Shell
Go —Oscillator Grid	SA—Starter Anode
Gs —Screen Grid	Su —Suppressor Grid
H —Heater	T —Target
Hc —Heater Center Tap	XS—External Shield
Ht —Heater Tap	□ —Top Cap
Ic —Internal Connection	→ —Locating Pin

The symbols listed above are those employed in connection with the tube and base diagrams accompanying the characteristics on individual types of Sylvania tubes shown in the following section of this Technical Manual. All base diagrams are illustrated as viewed from bottom of base and numbers are in accordance with the RMA standard numbering system. Basing diagrams are purely symbolic and are not to be interpreted as exact representations of tube structure.

BASE CONNECTION DIAGRAMS

Since the last thorough revision of the manual the Radio Manufacturer's Association have standardized on an improved method of designating the base connections. Formerly every

minor change of shielding really required a new drawing but now the location of the shielding elements is indicated by two following numbers (or letters) according to the following rules:

(1) The first group of 2 or 3 digits, one figure and one or more letters, indicates the basing arrangements as far as the **more important** elements are concerned. This is the same group formerly given in the manual.

(2) Following the dash separating it from the preceding group is a single numeral indicating the base pin to which is connected any **external shielding** such as base shielding or shell of metal tubes. The letter "L" means locking lug as on lock-in type tubes.

(3) Following the second dash is a figure (or figures) indicating to which pin any **internal shielding** is connected. In case connection is made to two pins both numbers appear, connected by the symbol &.

Examples are: Type 6SK7GT, basing symbol 8N-1-5 which means base diagram number 8N with base shield connected to Pin No. 1 and internal shield to pin No. 5. Type 7E6 basing symbol 8W-L-7 which means base diagram 8W with base shield connected to locking lug and internal shield connected to pin No. 7.

CATHODE RAY TUBES

Sylvania manufactures a line of television picture tubes and general purpose cathode ray tubes for a wide variety of initial equipment and renewal applications. Technical characteristics of the more popular types are provided in this tube manual. If additional data are required, write Commercial Engineering Dept., Sylvania Electric Products Inc., Emporium, Pennsylvania.

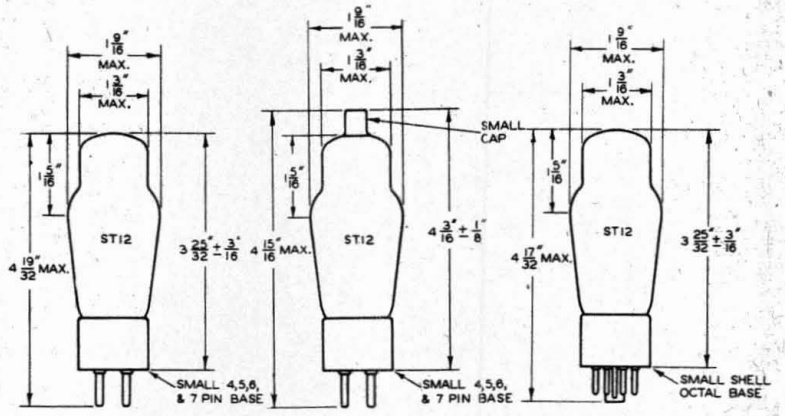
In radio servicing, as in any other work, certain precautions must be observed in order to work safely. With television receiver servicing the major dangers are from possible high voltage shock or injury from flying glass if a tube is carelessly or accidentally broken. To avoid shock we recommend taking no chances or short cuts; turn the power off and discharge the condenser before making changes. Be sure the interlocks and high voltage insulation in the set are in order. Also, use a dry linoleum or rubber mat to stand on and keep one hand in your pocket when making adjustments in a live set.

To avoid injury from broken glass it is recommended that gloves and goggles be worn when handling the larger picture tubes (over 5 inches in diameter) and that tubes not in a set be kept in their cartons. Be careful not to scratch the tube with tools or let it roll off the table. Worn out tubes should be disposed of by breaking the tip to let air in, making them safe for handling since only high vacuum makes implosion possible.

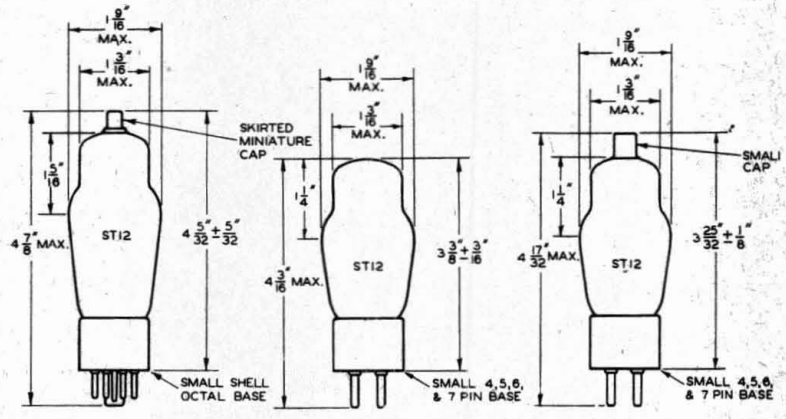
TUBE DIMENSIONS

It will be noted that with each tube type there appears a tube outline drawing showing the style of bulb and base employed. In the tabulations of characteristics the type of bulb is specified by a symbol and the style of base is also listed. Whenever it is desired to know the tube dimensions pertaining to any particular tube, reference may be made to the complete group of tube outlines on pages 24 to 28 which show all important dimensions.

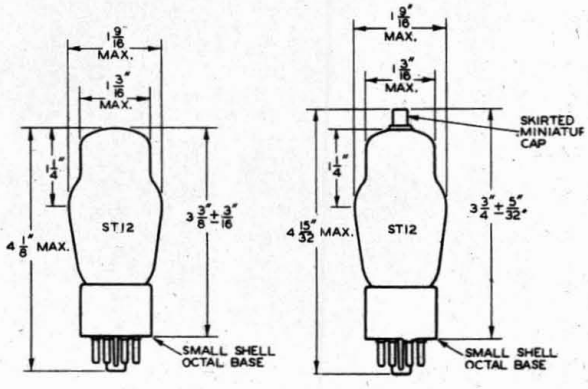
ST-12 STYLE



12-1 12-2 12-3



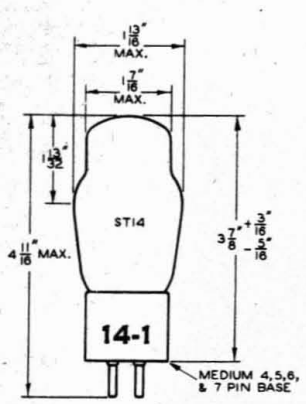
12-4 12-5 12-6

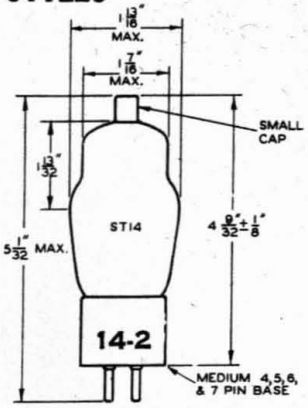


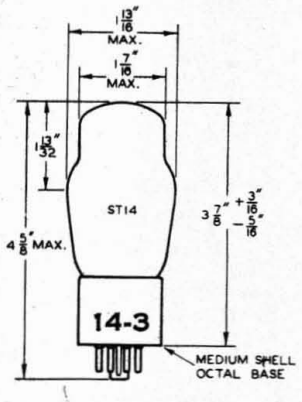
12-7 12-8

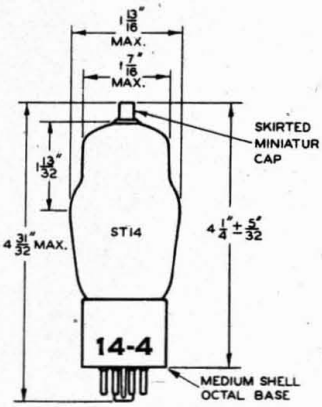
TUBE DIMENSIONS

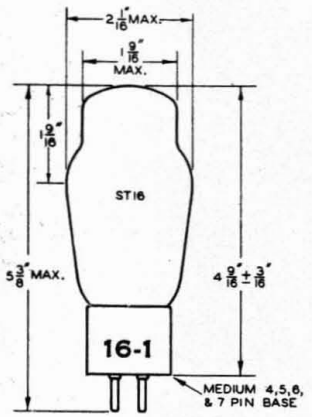
LARGER ST STYLES

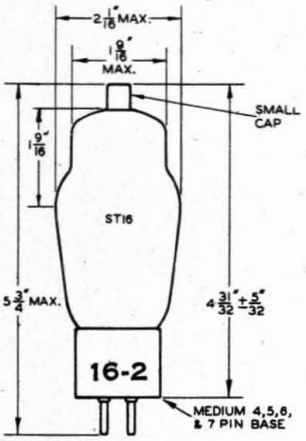


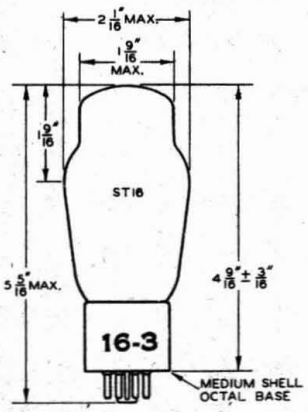


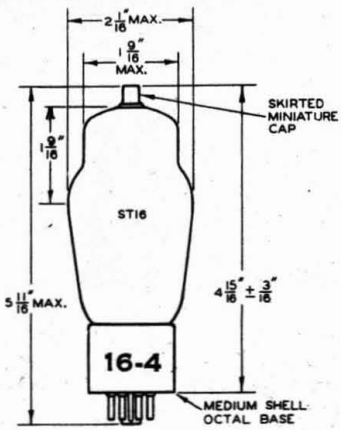






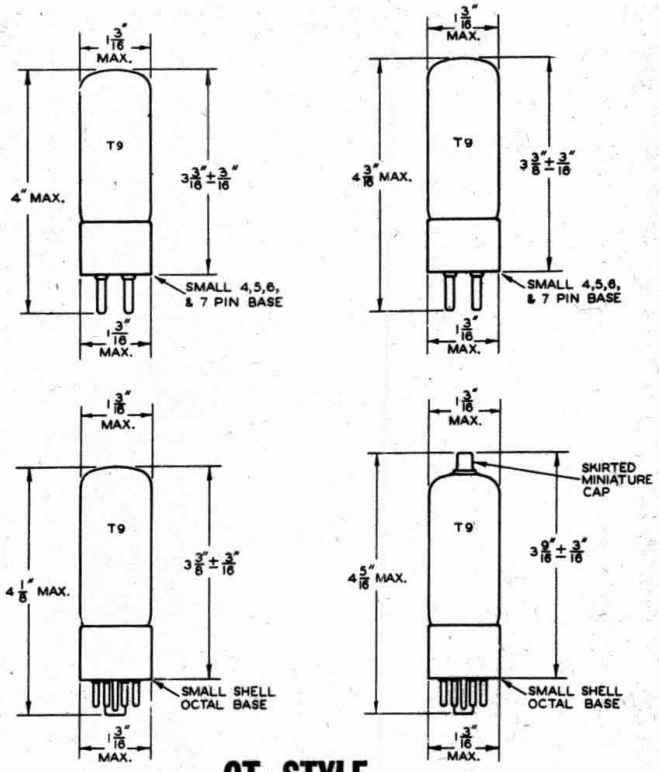




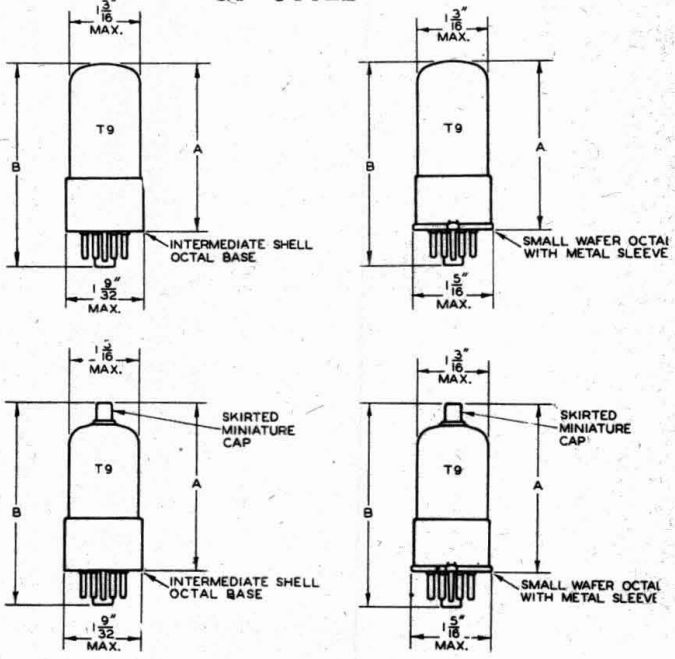


TUBE DIMENSIONS

T 9 STYLE



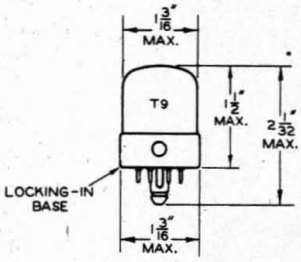
GT STYLE



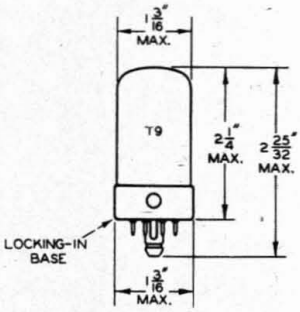
DIMENSIONS "A" AND "B" ARE GIVEN AS SEATED HEIGHT AND OVERALL LENGTH RESPECTIVELY FOR EACH INDIVIDUAL TYPE.

TUBE DIMENSIONS

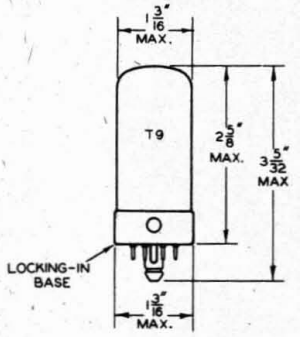
LOCK-IN STYLE



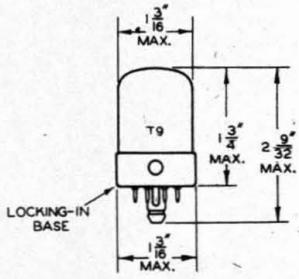
9-29



9-30

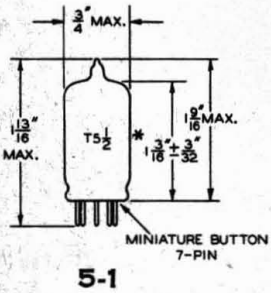


9-31

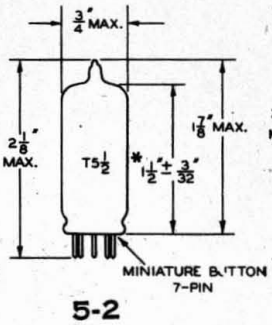


9-32

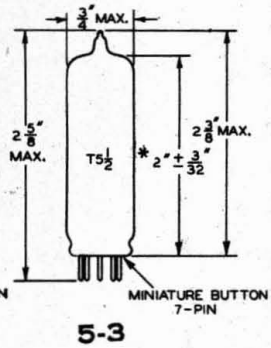
MINIATURE STYLE



5-1



5-2

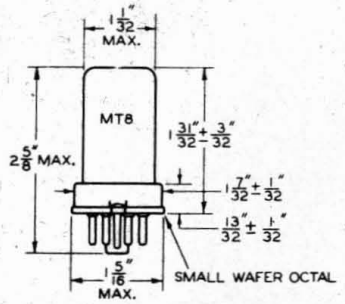


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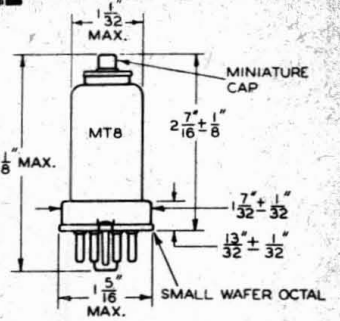
* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF 7/16" I.D.

TUBE DIMENSIONS

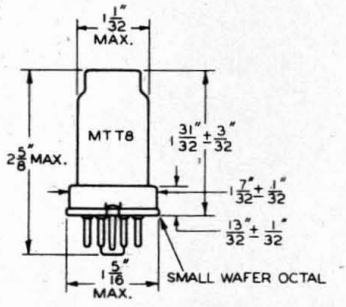
METAL STYLE



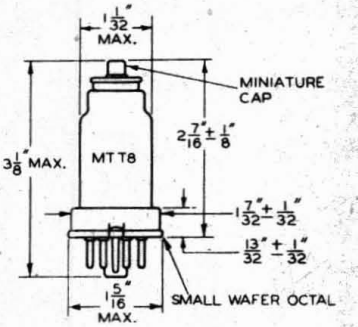
8-1



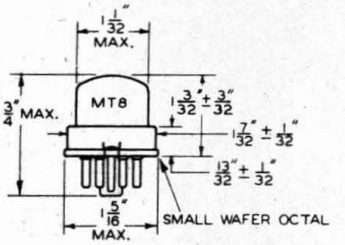
8-2



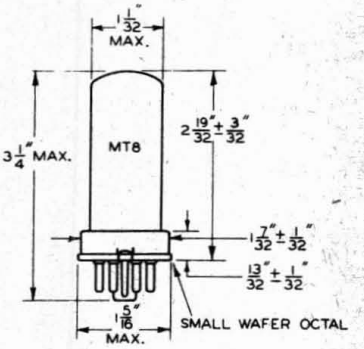
8-3



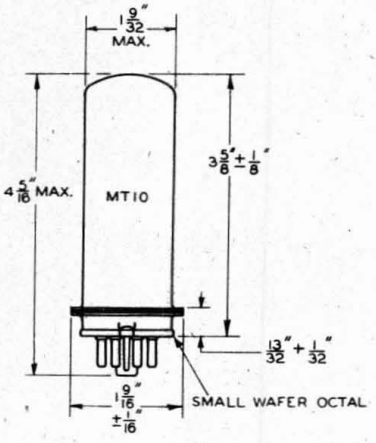
8-4



8-5



8-6



10-1

USE OF CURVES

Since this is the first Sylvania Technical Manual to include characteristic curves of tubes, a few words in explanation of their use may be helpful.

In general, curves are used to determine the proper operating point which will give a required characteristic. Audio amplifier tubes should be operated on the linear portion of the tube characteristic while detectors on the contrary should be operated on a non-linear portion. There are many curves which may be taken on tubes, but engineers have selected the following ones as being generally useful.

Plate Characteristic—This is the name given to the curve taken with plate current plotted along the vertical axis and plate voltage along the horizontal axis. A number of lines are generally shown, for different grid bias voltages at regular intervals over the range of probable use. In a screen grid tube there may be a number of plate families required, one for each recommended value of screen voltage.

On power tubes the plate characteristic may be used to determine the approximate power output for conditions not listed by the manufacturer. Let us take the type 7A4 as an example. Power output of this tube is not normally required so is not included in the characteristics, but suppose that a small amount of power were required from a triode of this nature, the procedure would be as follows:—Since the tube, when operated at 250 volts on the plate and —8 volts bias, draws 9 ma. this would seem to be a safe operating current. (For other plate voltages the bias voltage is generally taken as $\frac{.68 \times Eb}{\mu}$ Make a mark on the —8 volt curve above 250 volts on the plate voltage scale. The next step is to get a load line. If the load impedance is known, a line is drawn through the selected operating point such that the ratio of the voltage as read at the point of intersection with the horizontal axis to the current at the point of intersection on the vertical axis gives the desired value of load resistance. This is best done by arbitrarily selecting a value of current, say 20 ma., and if 20,000 ohms load is required the voltage intercept which gives this will be $E = I \times R = \frac{20}{1000} \times 20{,}000 = 400$

Then join 20 ma. with 400 volts. This does not give the desired load line because it does not pass through the required operating point. All lines parallel to this, however, have the same ratio of intercepts on the axes and so another line is drawn parallel to it but passing through the selected operating point.

From this line we can now read the instantaneous value of current for any instantaneous value of signal applied to the grid. If operation is limited to the negative region the peak signal cannot exceed 8 volts and the tube current will swing from 15½ ma. at 0 grid volts to 3½ ma. at —16 grid volts. The voltages at these points are read if the value of power output is required. These read about 125 and 355 respectively and the power output is:

$$\frac{\text{Change in current} \times \text{Change in voltage}}{8} \text{ watts}$$

$$\frac{12}{1000} \times \frac{230}{8} = .345 \text{ watts or } 345 \text{ milliwatts}$$

If more signal is available or if there is less signal, the end points selected may be different and the power correspondingly increased or decreased. If necessary to estimate the % 2nd. Harmonic Distortion, this is obtained from:

$$\frac{\text{Avg. Current} - \text{Current at Operating Point}}{\text{Change in Current}} \times 100$$

$$\frac{(9\frac{1}{2} - 9)}{12} \times 100 = 4.15\%$$

In cases where the best value of load is not known several lines may be drawn and the best one used.

Although a triode was selected as an example the procedure for use of a load line for a pentode is the same providing the distortion is kept to a reasonably low value.

The plate resistance for conditions not given in the rating or on other curves, may be taken approximately as the slope of the tangent to the plate current curve at the point required. The dynamic plate resistance is usually higher than that obtained in this way. It can be seen from the shape of the curves why the selectivity obtained with RF pentodes at 100 volts plate and screen is not as good as that obtained under the 250 volt condition. The plate resistance acts like a resistor shunted across the tuned plate circuit.

Transfer Characteristic—is the name given to the curve showing Mutual Conductance, Plate Current, Plate Resistance or Amplification Constant plotted on the vertical scale and grid bias on the horizontal axis. Its main uses are in determining the operating range for tubes used with AVC voltage, and the selection of the best point for operating a grid biased detector or a converter. Servicemen may need this in selecting a tube with the proper cut-off characteristic for use in a given circuit.

The instantaneous plate currents found by adding or subtracting a value of peak signal voltage from the operating center can also be used in those cases where the impedance of the plate load is negligible. Examples of such cases are pentode broad-band amplifiers and relay operation where the load impedance is low compared to the tube plate resistance.

Conversion Characteristic—These are given only for converter type tubes and are shown in two different ways: Characteristics vs. oscillator grid current, and characteristics vs. control grid volts. The first of these is important in selecting the oscillator strength for operation over a required frequency range. Since no practical circuit has the same oscillator grid current at all frequencies it is necessary to compromise for best overall performance. The other curve against control grid volts is used similarly to the transfer characteristic in showing the desired range of AVC voltage to be applied.

Diode Load Curve—This may be used in designing AVC systems or vacuum tube voltmeters. Taking the curves given under type 7B6 as an example, the load current may be found for any applied signal voltage and any of several values of DC load resistance. With 25 volts RMS applied signal and 0.1 meg. load resistance, for example the load current will be 270 ua. and the developed bias 26.8 volts.

RESISTANCE COUPLED AMPLIFIER DATA

On the following pages are given the necessary data for the construction of resistance coupled amplifiers using the types of tubes commonly employed for this purpose. The data are necessarily quite condensed but with the aid of the five reference diagrams and the equations given on the following page for determining the size by-pass and coupling condensers, any serviceman should be able to build a good amplifier or check the design of one under repair.

Notice that data are given for use under all the B supply voltages commonly used with a given type. Values of gain are given for two different values of applied signal; the first a typical small signal likely to be found for the type and the second is the maximum which can be used without exceeding the 5% distortion limit.

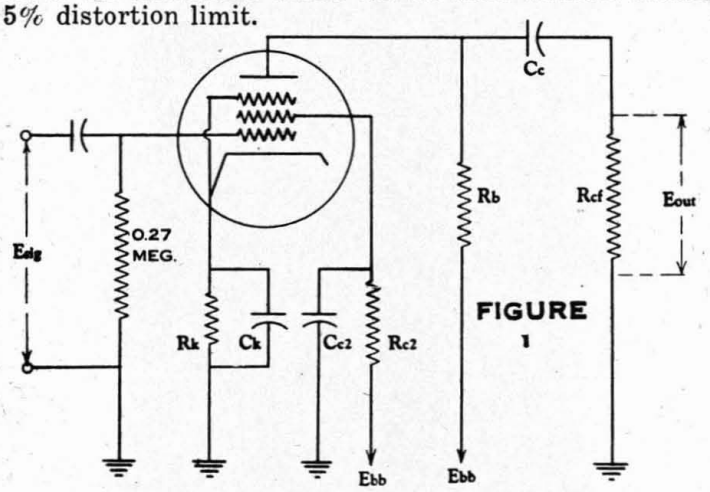


FIGURE 1

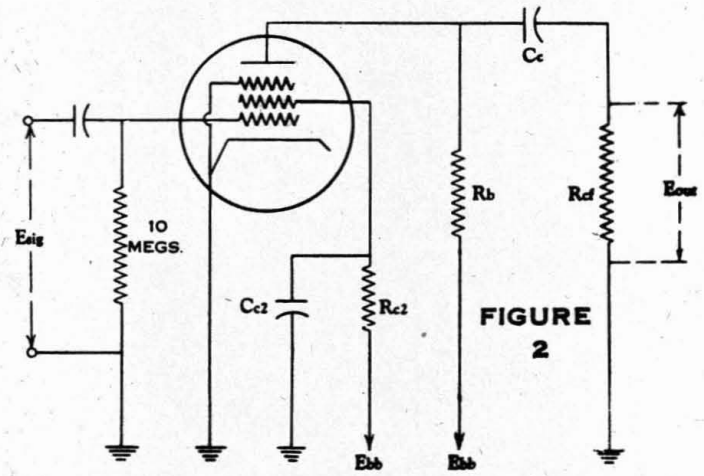


FIGURE 2

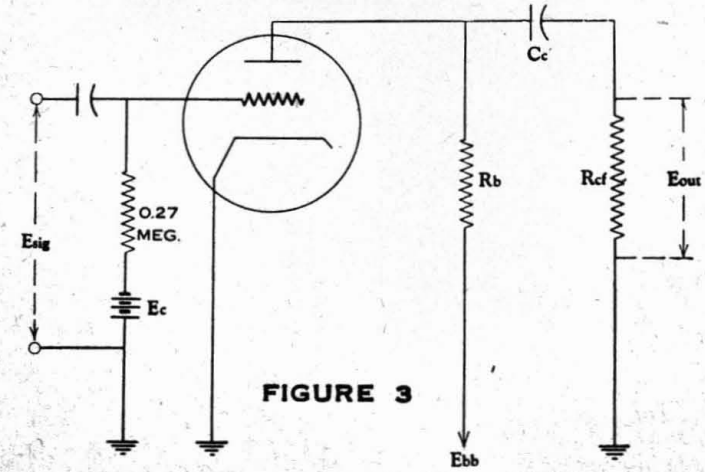


FIGURE 3

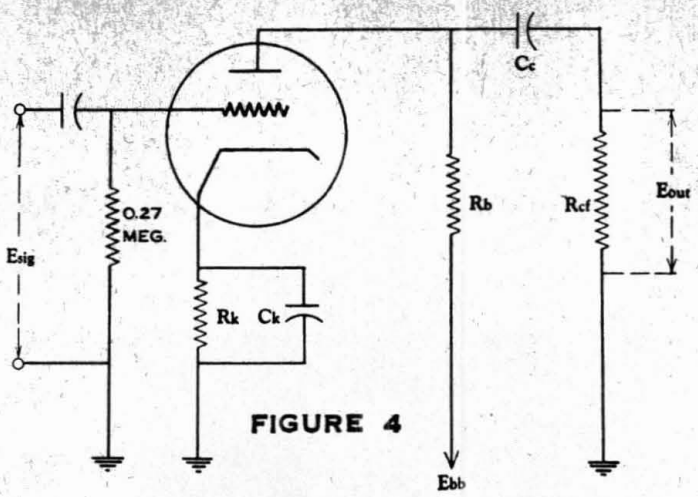


FIGURE 4

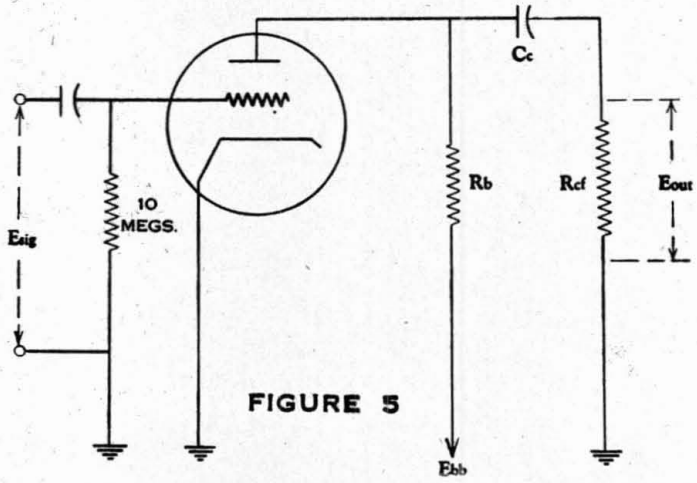


FIGURE 5

SYMBOLS USED

Symbol	Function	Unit
Rb	Plate Load Resistor	Megohms
Rc2	Screen Dropping Resistor	Megohms
Rcf	Grid Resistor of following Tube	Megohms
Ebb	Plate Supply Voltage	Volts
Eb	Plate Voltage at Plate	Volts
Ec or Ecl	Grid to Neg. Fil. Voltage	Volts
Ec2	Screen Grid Voltage	Volts
Esig	Input Signal	RMS Volts
Eout	Output to following Grid	RMS Volts
Ib	Plate Current	Ma.
Ic2	Screen Grid Current	Ma.
Cc	Coupling Condenser	mfd.
Cc2	Screen By-pass Condenser	mfd.

Values of capacity are not specified since these are dependent mostly on the frequency characteristic required in each individual case.

For low frequency limit = f_1

$$Cc = \frac{1.6 \times 10^6}{f_1 \, Rcf} \text{ mfd.}$$

$$Ck = \frac{1.6 \times 10^6}{f_1 \, Rk} \text{ mfd.} \qquad Cc2 = \frac{1.6 \times 10^6}{f_1 \, Rc2} \text{ mfd.}$$

Some text books show a more complicated method for calculating these by-pass condensers, but this method is quite rapid and gives conservative values. The loss due to incomplete by-passing will be less than 1% except for the cathode by-pass where it will be about 3%. The size condenser may be halved where economy is essential unless stages are cascaded and highest quality is required.

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS									Ebb = 67.5 VOLTS									Ebb = 90 VOLTS								
Rb	0.27			0.47			1.0			0.27			0.47			1.0			0.27			0.47			1.0		
Rc2	1.0			1.8			3.9			1.0			1.8			3.9			1.0			1.8			3.9		
Rcf	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10
Ib	.080	.080	.080	.050	.050	.050	.025	.025	.025	.145	.145	.145	.087	.087	.087	.045	.045	.045	.22	.22	.22	.13	.13	.13	.065	.065	.065
Eb	23.4	23.4	23.4	21.5	21.5	21.5	20.0	20.0	20.0	28.3	28.3	28.3	26.6	26.6	26.6	22.5	22.5	22.5	30.5	30.5	30.5	29.0	29.0	29.0	25.0	25.0	25.0
Ic2	.0232	.0232	.0232	.0146	.0146	.0146	.0077	.0077	.0077	.041	.041	.041	.025	.025	.025	.013	.013	.013	.061	.061	.061	.036	.036	.036	.0187	.0187	.0187
Ec2	21.8	21.8	21.8	18.7	18.7	18.7	15.0	15.0	15.0	26.5	26.5	26.5	22.5	22.5	22.5	16.8	16.8	16.8	29.0	29.0	29.0	25.0	25.0	25.0	17.0	17.0	17.0
Esig	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	1.55	1.94	2.25	2.15	2.75	2.85	2.80	3.25	3.50	4.10	5.0	5.7	5.5	6.8	7.0	7.1	8.2	8.65	4.9	6.0	6.9	6.65	8.35	8.7	9.0	10.4	11.0
Gain	31.0	38.8	45.0	43.0	55.0	57.0	56.0	65.0	70.0	41.0	50.0	57.0	55.0	68.0	70.0	71.0	82.0	86.5	49.0	60.0	69.0	66.5	83.5	87.0	90.0	104	110
% Distortion	2.10	1.90	1.20	2.00	1.70	1.60	2.90	2.40	2.0	1.80	1.30	1.60	1.70	2.0	2.1	2.30	2.50	2.70	.80	1.40	2.0	1.70	3.10	3.50	3.0	3.30	3.60
Esig (1)	0.13	0.17	0.19	0.12	0.15	0.15	0.1	0.11	0.11	0.26	0.28	0.30	0.21	0.23	0.24	0.15	0.17	0.17	0.34	0.34	0.34	0.28	0.28	0.28	0.18	0.18	0.17
Eout	3.95	6.0	7.55	5.0	7.40	7.6	5.60	6.50	6.90	9.85	12.6	15.2	10.4	13.9	14.8	10.0	12.8	13.4	14.4	17.5	20.0	16.5	20.3	21.0	15.1	17.4	17.6
Gain	30.4	35.3	39.7	41.6	49.3	50.6	56.0	59.0	62.7	37.9	45.0	50.6	49.6	60.3	61.8	66.8	75.3	78.8	42.4	51.5	58.9	59.0	72.5	75.0	84.0	96.8	103.5
% Distortion	4.90	4.60	4.70	4.60	4.90	4.60	4.70	4.80	4.70	4.80	4.60	4.80	4.50	4.50	4.90	4.40	4.90	4.60	4.40	4.50	5.0	4.60	4.50	4.80	4.70	4.90	4.80

Note (1) Maximum signal for 5.0% distortion.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS									Ebb = 67.5 VOLTS									Ebb = 90 VOLTS								
Rb'	0.27			0.47			1.0			0.27			0.47			1.0			0.27			0.47			1.0		
Rc1	1.5			2.7			5.6			1.5			2.7			5.6			1.5			2.7			5.6		
Rcf	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0
Ib (1)	0.066	0.066	0.066	0.043	0.043	0.043	0.023	0.023	0.023	0.125	0.125	0.125	0.077	0.077	0.077	0.04	0.04	0.04	0.189	0.189	0.189	0.114	0.114	0.114	0.059	0.059	0.059
Eb	27.2	27.2	27.2	24.8	24.8	24.8	22.0	22.0	22.0	33.7	33.7	33.7	31.3	31.3	31.3	27.5	27.5	27.5	39.0	39.0	39.0	36.4	36.4	36.4	31.0	31.0	31.0
Ic1	0.0142	0.0142	0.0142	0.009	0.009	0.009	0.0048	0.0048	0.0048	0.0259	0.0259	0.0259	0.0159	0.0159	0.0159	0.0082	0.0082	0.0082	0.0385	0.0385	0.0385	0.023	0.023	0.023	0.012	0.012	0.012
Ec1	23.7	23.7	23.7	20.7	20.7	20.7	18.1	18.1	18.1	28.6	28.6	28.6	24.5	24.5	24.5	21.6	21.6	21.6	32.2	32.2	32.2	27.9	27.9	27.9	22.8	22.8	22.8
Esig	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	1.46	1.75	2.10	2.0	2.54	2.62	2.47	2.97	3.24	4.05	4.82	5.50	5.45	6.8	7.05	6.85	8.4	8.9	4.9	5.7	6.75	6.65	8.45	8.75	8.55	10.4	10.8
Gain	29.8	35.0	42.0	40.0	50.8	52.4	49.5	59.4	64.8	40.5	48.2	55.0	54.5	68.0	70.5	68.5	84.0	89.0	49.0	57.0	67.5	66.5	84.5	87.5	85.5	104.0	108.0
% Distortion	2.2	1.9	1.5	2.4	2.0	1.7	3.1	2.2	2.1	2.3	1.8	1.6	3.1	2.3	2.2	4.0	3.2	2.8	1.1	0.9	0.7	2.0	1.2	1.2	2.4	1.7	1.7
Esig (2)	0.11	0.11	0.12	0.09	0.1	0.1	0.07	0.08	0.08	0.17	0.18	0.20	0.14	0.16	0.17	0.11	0.13	0.13	0.24	0.27	0.28	0.19	0.22	0.22	0.15	0.17	0.18
Eout	3.06	3.80	4.75	3.5	4.83	5.03	3.37	4.66	4.93	6.50	8.35	10.3	7.36	10.1	11.1	7.47	10.6	10.9	10.9	14.3	17.1	11.9	16.9	17.5	12.4	16.3	18.2
Gain	27.8	34.5	39.6	39.0	48.3	50.3	48.2	58.4	61.6	38.2	46.3	51.5	52.5	63.2	65.4	68.0	81.6	84.0	45.4	53.0	61.1	62.7	77.0	79.6	82.8	96.0	101.0
% Distortion	4.7	4.2	4.6	4.5	4.7	4.5	4.3	4.7	4.3	4.7	4.8	4.9	4.9	4.7	4.9	4.6	4.9	4.7	4.7	4.7	4.8	4.7	4.8	4.7	4.9	4.8	5.0

Note (1) Grid return to pin No. 8.
Note (2) Maximum signal for 5.0% distortion.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Fixed Bias Operation

	Ebb = 45 VOLTS						Ebb = 67.5 VOLTS						Ebb = 90 VOLTS					
Rb	0.047		0.10		0.27		0.047		0.10		0.27		0.047		0.10		0.27	
Rcf	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47
Ib	0.30	0.282	0.20	0.174	0.086	0.082	0.50	0.46	0.31	0.273	0.14	0.132	0.70	0.64	0.45	0.38	0.199	0.187
Ec	0.7	-0.8	-0.6	-0.8	-0.7	-0.8	-1.2	-1.4	-1.1	-1.4	-1.0	-1.2	-1.8	-2.1	-1.5	-2.0	-1.5	-1.7
Eb	30.9	32.3	25.0	27.6	21.8	22.9	44	45.9	36.5	40.2	34.7	31.9	57.1	60.0	45.0	52.0	36.2	39.5
Esig	0.10	0.10	0.10	0.10	0.10	0.10	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Eout	0.68	0.74	0.74	0.86	0.83	0.92	3.7	3.95	4.05	4.6	4.7	5.05	3.94	4.2	4.32	4.76	5.0	5.2
Gain	6.8	7.4	7.4	8.6	8.3	9.2	7.45	7.9	8.1	9.2	9.4	10.1	7.9	8.4	8.65	9.5	10.0	10.4
% Distortion	0.7	0.7	0.5	0.9	0.8	0.9	2.5	2.1	2.9	2.3	3.3	3.1	1.7	1.4	1.7	1.3	2.4	2.2
Esig (1)	0.50	0.56	0.42	0.56	0.50	0.56	0.85	0.99	0.78	0.99	0.7	0.85	1.27	1.48	1.06	1.41	1.06	1.2
Eout	3.33	4.1	3.1	4.85	4.22	5.2	6.3	7.8	6.3	9.1	6.6	8.6	10.0	12.4	9.15	13.4	10.6	12.5
Gain	6.66	7.32	7.4	8.65	8.44	9.3	7.42	7.88	8.1	9.2	9.4	10.1	7.88	8.4	8.65	9.5	10.0	10.4
% Distortion	4.4	4.5	4.1	4.6	5.0	5.0	4.6	4.9	5.0	5.0	4.8	5.0	4.7	5.0	4.7	5.0	5.0	5.0

Note (1) Peak signal equal to bias. Optimum bias chosen for 5% maximum distortion. Grid return to pin No. 8.

FOR CIRCUIT SEE FIGURE 3

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS (See Note 2)									Ebb = 67.5 VOLTS										Ebb = 90 VOLTS									
Rb	0.27			0.47			1.0			0.27			0.47			1.0				0.27			0.47			1.0		
Rcf	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0		0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0
Ib	0.0075	0.0075	0.0075	0.0064	0.0064	0.0064	0.005	0.005	0.005	0.03	0.03	0.03	0.0242	0.0242	0.0242	0.0168	0.0168	0.0168		0.071	0.071	0.071	0.053	0.053	0.053	0.032	0.032	0.032
Eb	43	43	43	42	42	42	40	40	40	59.4	59.4	59.4	56.1	56.1	56.1	50.7	50.7	50.7		70.8	70.8	70.8	65.1	65.1	65.1	58.0	58.0	58.0
Esig	.03	.03	.03	.03	.03	.03	.03	.03	.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	.168	.200	.234	.270	.336	.350	.405	.465	.490	0.77	0.91	1.03	1.08	1.26	1.29	1.37	1.52	1.60		2.2	2.35	2.8	3.0	3.4	3.5	3.65	3.95	4.05
Gain	5.6	6.7	7.8	9.0	11.2	11.7	13.5	15.5	16.3	15.4	18.2	20.6	21.6	25.2	25.8	27.4	30.4	32.0		22.0	25.5	28.0	30.0	34.0	35.0	36.5	39.5	40.5
% Distortion	5.1	5.0	4.9	4.5	4.2	3.8	3.9	3.7	3.6	3.5	3.3	2.9	3.2	2.9	2.8	2.6	2.3	2.2		2.7	2.4	2.1	2.5	2.1	2.0	2.6	2.3	2.1
Esig (1)	.03	.03	.03	.03	.04	.04	.05	.05	.05	0.07	0.08	0.08	0.08	0.09	0.10	0.09	0.10	0.11		0.17	0.18	0.20	0.17	0.19	0.20	0.16	0.18	0.19
Eout	.168	.200	.234	.270	.445	.465	0.67	0.76	0.81	1.07	1.44	1.63	1.7	2.24	2.50	2.43	2.97	3.45		3.60	4.45	5.40	4.89	6.20	6.65	5.66	6.80	7.45
Gain	5.6	6.7	7.8	9.0	11.1	11.6	13.4	15.2	16.2	15.3	18.0	20.4	21.3	24.9	25.0	27.0	29.7	31.4		21.2	24.7	27.0	28.7	32.6	33.2	35.4	37.8	39.2
% Distortion	5.1	5.0	4.9	4.5	5.2	5.1	5.2	5.0	4.9	4.7	4.7	4.6	4.7	4.5	4.8	4.5	4.5	4.7		4.6	4.3	4.7	4.5	4.5	4.7	4.5	4.65	4.7

Note (1) Maximum signal for 5.0% Distortion. Note (2) Operation at Ebb = 45 volts is not recommended. Above 45 volt data is shown only to assist in determining end of life performance with 67.5 volt supply. For 45 volt supply type 1L2S is recommended.

FOR CIRCUIT SEE FIGURE 5

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS									Ebb = 67.5 VOLTS									Ebb = 90 VOLTS								
Rb	0.27			0.47			1.0			0.27			0.47			1.0			0.27			0.47			1.0		
Rc1	1.2			2.2			4.7			1.2			2.2			4.7			1.2			2.2			4.7		
Rcf	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10
Ib	0.060	0.060	0.060	0.038	0.038	0.038	0.018	0.018	0.018	0.123	0.123	0.123	0.075	0.075	0.075	0.036	0.036	0.036	0.187	0.187	0.187	0.112	0.112	0.112	0.056	0.056	0.056
Eb	28.8	28.8	28.8	27.2	27.2	27.2	27.0	27.0	27.0	34.3	34.3	34.3	32.3	32.3	32.3	31.5	31.5	31.5	39.5	39.5	39.5	37.3	37.3	37.3	34.0	34.0	34.0
Ic2	0.0149	0.0149	0.0149	0.0095	0.0095	0.0095	0.005	0.005	0.005	0.029	0.029	0.029	0.0176	0.0176	0.0176	0.009	0.009	0.009	0.044	0.044	0.044	0.026	0.026	0.026	0.0134	0.0134	0.0134
Ec2	27.1	27.1	27.1	24.1	24.1	24.1	21.5	21.5	21.5	32.7	32.7	32.7	28.8	28.8	28.8	25.3	25.3	25.3	37.2	37.2	37.2	32.8	32.8	32.8	27.0	27.0	27.0
Esig	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	p.1
Eout	1.58	1.96	2.25	2.15	2.80	2.90	2.85	3.40	3.65	2.28	2.80	3.30	3.2	4.17	4.33	4.28	5.1	5.5	5.5	6.9	8.0	7.9	10.0	10.2	10.3	12.1	12.8
Gain	31.6	39.2	45.0	43.0	56.0	58.0	57.0	68.0	73.0	45.7	56.0	66.0	64.0	83.3	86.6	85.6	102.0	110.0	55.0	69.0	80.0	79.0	100	102	103	121	128
% Distortion	2.9	2.6	2.6	4.0	3.0	2.8	3.8	3.3	3.2	2.0	1.8	1.7	2.3	1.9	1.8	2.6	2.1	2.0	2.2	1.8	1.5	2.6	1.9	1.8	3.2	3.0	3.0
Esig (1)	0.09	0.09	0.09	0.07	0.08	0.08	0.06	0.07	0.07	0.13	0.15	0.17	0.11	0.13	0.14	0.09	0.1	0.11	0.21	0.23	0.25	0.17	0.19	0.19	0.13	0.14	0.14
Eout	2.75	3.45	4.0	3.0	4.45	4.60	3.40	4.68	4.90	3.65	8.00	10.2	6.7	10.0	10.9	7.4	9.6	10.9	10.8	14.4	17.8	12.5	17.2	17.9	12.9	16.1	17.0
Gain	30.6	38.3	44.4	42.8	55.6	57.5	56.6	66.9	70.0	43.5	53.3	60.0	61.0	77.0	77.8	82.3	96.0	99.0	51.5	62.5	71.2	73.5	90.5	94.2	99.0	115	121
% Distortion	5.0	4.7	4.5	4.4	4.8	4.7	4.6	5.0	4.8	4.6	4.7	4.8	4.8	4.5	4.9	4.6	4.5	5.0	5.0	4.9	4.8	4.9	4.7	4.6	4.9	4.9	4.9

Note (1) Maximum signal for 5.0% distortion.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS									Ebb = 67.5 VOLTS									Ebb = 90 VOLTS								
Rb	0.27			0.47			1.0			0.27			0.47			1.0			0.27			0.47			1.0		
Rc1	0.68			1.2			2.2			0.68			1.2			2.2			0.68			1.2			2.2		
Rcf	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10
Ib	.072	.072	.072	.043	.043	.043	.023	.023	.023	.134	.134	.134	.078	.078	.078	.041	.041	.041	.20	.20	.20	.116	.116	.116	.06	.06	.06
Eb	25.6	25.6	25.6	24.8	24.8	24.8	22.0	22.0	22.0	31.3	31.3	31.3	30.8	30.8	30.8	26.5	26.5	26.5	35.9	35.9	35.9	35.5	35.5	35.5	30.0	30.0	30.0
Ic1	.042	.042	.042	.025	.025	.025	.0146	.0146	.0146	.07	.07	.07	.0421	.0421	.0421	.024	.024	.024	.101	.101	.101	.06	.06	.06	.034	.034	.034
Ec1	16.5	16.5	16.5	15.0	15.0	15.0	12.9	12.9	12.9	20.0	20.0	20.0	17.0	17.0	17.0	14.6	14.6	14.6	21.3	21.3	21.3	18.0	18.0	18.0	15.0	15.0	15.0
Esig	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	1.64	1.94	2.30	2.05	2.67	2.80	2.77	3.27	3.58	4.58	5.5	6.45	6.08	7.8	8.1	7.85	9.25	9.8	5.5	6.67	8.0	7.5	10.0	10.4	10.0	11.4	12.2
Gain	32.8	38.8	46.0	41.0	53.4	56.0	55.5	65.5	71.7	45.8	55.0	64.5	60.8	78.0	81.0	78.5	92.5	98.0	55.0	66.7	80.0	75.0	100	104	100	114	122
% Distortion	2.70	2.40	3.30	3.00	2.80	2.80	3.10	2.80	2.50	2.60	2.10	1.70	4.20	3.60	3.00	3.80	3.00	2.80	1.60	1.20	1.20	2.40	1.70	1.70	2.40	2.50	2.90
Esig (1)	0.09	0.10	0.11	0.08	0.09	0.09	0.07	0.09	0.09	0.16	0.18	0.20	0.12	0.15	0.15	0.12	0.13	0.14	0.24	0.26	0.27	0.17	0.19	0.20	0.16	0.16	0.16
Eout	2.85	3.75	4.97	0.13	4.76	4.90	3.83	5.65	6.05	7.0	9.6	11.9	7.2	11.1	11.5	9.3	11.3	12.8	12.5	1.59	19.4	12.3	17.7	19.0	14.9	17.2	18.4
Gain	31.7	37.5	45.2	39.1	52.8	54.5	54.8	62.7	67.2	43.7	53.2	59.5	60.0	74.0	76.6	77.5	87.0	91.5	52.0	61.2	71.9	72.5	93.1	95.0	93.1	107	115
% Distortion	4.60	4.70	4.50	5.00	4.70	4.50	4.20	4.90	4.60	4.70	4.70	4.80	5.00	4.90	4.80	4.80	4.50	4.70	4.90	4.90	4.90	5.0	4.30	4.70	4.50	4.70	4.90

Note (1) Maximum signal for 5.0% Distortion.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 45 VOLTS									Ebb = 67.5 VOLTS									Ebb = 90 VOLTS								
Rb	0.27			0.47			1.0			0.27			0.47			1.0			0.27			0.47			1.0		
Rc1	1.0			1.8			3.9			1.0			1.8			3.9			1.0			1.8			3.9		
Rcf	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10	0.47	1.0	4.7	1.0	4.7	10	2.2	4.7	10
Ib	.080	.080	.080	.050	.050	.050	.025	.025	.025	.145	.145	.145	.087	.087	.087	.045	.045	.045	.22	.22	.22	.13	.13	.13	.065	.065	.065
Eb	23.4	23.4	23.4	21.5	21.5	21.5	20.0	20.0	20.0	28.3	28.3	28.3	26.6	26.6	26.6	22.5	22.5	22.5	30.5	30.5	30.5	29.0	29.0	29.0	25.0	25.0	25.0
Ic2	.0232	.0232	.0232	.0146	.0146	.0146	.0077	.0077	.0077	.041	.041	.041	.025	.025	.025	.013	.013	.013	.061	.061	.061	.036	.036	.036	.0187	.0187	.0187
Ec1	21.8	21.8	21.8	18.7	18.7	18.7	15.0	15.0	15.0	26.5	26.5	26.5	22.5	22.5	22.5	16.8	16.8	16.8	29.0	29.0	29.0	25.0	25.0	25.0	17.0	17.0	17.0
Esig	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	1.55	1.94	2.25	2.15	2.75	2.85	2.80	3.25	3.50	4.10	5.0	5.7	5.5	6.8	7.0	7.1	8.2	8.65	4.9	6.0	6.9	6.65	8.35	8.7	9.0	10.4	11.0
Gain	31.0	38.8	45.0	43.0	55.0	57.0	56.0	65.0	70.0	41.0	50.0	57.0	55.0	68.0	70.0	71.0	82.0	86.5	49.0	60.0	69.0	66.5	83.5	87.0	90.0	104	110
% Distortion	2.10	1.90	1.20	2.00	1.70	1.60	2.90	2.40	2.0	1.80	1.30	1.60	1.70	2.0	2.1	2.30	2.50	2.70	.80	1.40	2.0	1.70	3.10	3.50	3.0	3.30	3.60
Esig (1)	0.13	0.17	0.19	0.12	0.15	0.15	0.1	0.11	0.11	0.26	0.28	0.30	0.21	0.23	0.24	0.15	0.17	0.17	0.34	0.34	0.34	0.28	0.28	0.28	0.18	0.18	0.17
Eout	3.95	6.0	7.55	5.0	7.40	7.6	5.60	6.50	6.90	9.85	12.6	15.2	10.4	13.9	14.8	10.0	12.8	13.4	14.4	17.5	20.0	16.5	20.5	21.0	15.1	17.4	17.6
Gain	30.4	35.3	39.7	41.6	49.3	50.6	56.0	59.0	62.7	37.9	45.0	50.6	49.6	60.3	61.8	66.8	75.3	78.8	42.4	51.5	58.9	59.0	72.5	75.0	84.0	96.8	103.5
% Distortion	4.90	4.60	4.70	4.60	4.90	4.60	4.70	4.80	4.70	4.80	4.60	4.80	4.50	4.50	4.90	4.40	4.90	4.60	4.40	4.50	5.0	4.60	4.50	4.80	4.70	4.90	4.80

Note (1) Maximum signal for 5.0% distortion.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation — **Sylvania Type 1U4**

	Ebb = 45 VOLTS (See Note 2)									Ebb = 67.5 VOLTS										Ebb = 90 VOLTS									
Rb	0.27			0.47			1.0			0.27			0.47			1.0				0.27			0.47			1.0		
Rc1	1.0			1.5			3.3			1.0			1.5			3.3				1.0			1.5			3.3		
Rcf	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0	0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0		0.47	1.0	4.7	1.0	4.7	10.0	2.2	4.7	10.0
Ib	.048	.048	.048	.034	.034	.034	.0175	.0175	.0175	.101	.101	.101	.070	.070	.070	.035	.035	.035		.156	.156	.156	.11	.11	.11	.054	.054	.054
Eb	12.14	12.14	12.14	29.12	29.12	29.12	28.5	28.5	28.5	40.2	40.2	40.2	34.6	34.6	34.6	32.5	32.5	32.5		47.9	47.9	47.9	38.3	38.3	38.3	36.0	36.0	36.0
Ic1	.0165	.0165	.0165	.012	.012	.012	.006	.006	.006	.033	.033	.033	.0235	.0235	.0235	.0115	.0115	.0115		.049	.049	.049	.036	.036	.036	.017	.017	.017
Ec1	28.5	28.5	28.5	27.0	27.0	27.0	25.2	25.2	25.2	34.5	34.5	34.5	32.25	32.25	32.25	29.6	29.6	29.6		41.0	41.0	41.0	36.0	36.0	36.0	33.5	33.5	33.5
Esig	.05	.05	.05	.05	.05	.05	.04	.04	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05		.05	.05	.05	.05	.05	.05	.05	.05	.05
Eout	1.46	1.75	2.10	2.00	2.55	2.68	7.25	2.52	3.45	2.3	2.75	3.3	3.3	4.25	4.45	4.35	5.2	5.55		2.92	3.60	4.25	4.20	5.40	5.60	5.70	6.80	7.40
Gain	38.3	35	42	60	51	53.6	56.3	63.1	69.0	46	55	66	66	85.0	89	87	104	111		58.4	72.0	85.0	84.0	108	112	113	136	148
% Distortion	3.4	3.4	3.9	4.2	4.3	4.0	4.1	4.4	4.9	2.0	2.0	2.0	2.3	2.3	1.9	3.8	3.6	3.3		1.4	1.2	1.3	1.3	1.1	0.9	2.5	2.2	1.8
Esig (1)	.06	.06	.06	.05	.05	.06	.04	.04	.05	.10	.11	.11	.09	.10	.10	.06	.07	.07		0.13	0.15	0.15	0.13	0.15	0.16	0.09	0.09	0.11
Eout	1.70	2.08	2.50	2.00	2.55	3.20	2.25	2.52	3.45	4.45	5.9	7.0	5.8	8.35	8.60	5.20	7.15	7.6		7.35	10.3	12.0	10.4	15	16.5	10	11.8	15.1
Gain	28.3	34.8	41.7	60	51	53.4	56.3	63.1	69.0	44.5	53.5	63.5	64.5	83.5	86.0	86.8	102	108		56.5	68.8	80	80	100	103	111	131	138
% Distortion	4.4	4.3	4.5	4.2	4.3	4.9	4.1	4.4	4.9	4.6	5.0	4.8	4.8	4.9	4.1	4.6	5.0	4.6		4.4	5.0	4.8	4.8	4.9	5.0	4.9	4.4	4.6

Note (1) Maximum signal for 5.0% distortion. Note (2) Operation at Ebb = 45 volts is not recommended. Above 45 volts data is shown only to assist in determining end of life performance with 67.5 volt supply.

FOR CIRCUIT SEE FIGURE 2

RESISTANCE COUPLED AMPLIFIER DATA

Fixed Bias
Single Section

	Ebb = 45 VOLTS						Ebb = 67.5 VOLTS						Ebb = 90 VOLTS						Ebb = 135 VOLTS					
Rb	0.047		0.10		0.27		0.047		0.10		0.27		0.047		0.10		0.27		0.047		0.10		0.27	
Rcf	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47
Ib	0.32	0.30	0.197	0.184	0.092	0.087	0.52	0.49	0.32	0.27	0.14	0.13	0.72	0.68	0.45	0.39	0.192	0.179	1.17	1.08	0.71	0.59	0.30	0.276
Ec	-0.5	-0.6	-0.5	-0.6	-0.5	-0.6	-0.9	-1.0	-0.8	-1.1	-0.8	-1.0	-1.3	-1.4	-1.1	-1.5	-1.2	-1.4	-2.0	-2.3	-1.7	-2.4	-1.8	-2.1
Eb	30.0	30.9	25.3	26.6	20.2	21.5	43.1	44.5	35.5	40.5	29.7	32.4	56.2	58.1	45.0	51.0	38.1	41.7	80.0	84.2	64.0	76.0	54.0	60.5
Esig	0.10	0.10	0.10	0.10	0.10	0.10	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Eout	.985	1.06	1.05	1.25	1.29	1.32	5.40	5.80	5.80	6.65	6.8	7.1	3.75	6.20	6.30	7.25	7.15	7.60	6.20	6.50	6.75	7.40	7.55	7.85
Gain	9.85	10.6	10.5	12.5	12.9	13.2	10.8	11.6	11.6	13.3	13.8	14.2	11.5	12.4	12.6	14.5	14.3	15.2	12.4	13.0	13.5	14.8	15.1	15.7
% Distortion	1.50	1.40	1.70	1.30	1.60	1.10	3.90	3.40	4.30	3.30	3.80	3.10	2.60	2.20	2.90	2.30	2.70	2.40	1.50	1.50	2.0	1.80	2.10	1.90
Esig (1)	0.35	0.42	0.35	0.42	0.35	0.42	0.64	0.70	0.56	0.78	0.56	0.70	0.92	0.99	0.78	1.06	0.85	0.99	1.42	1.63	1.20	1.70	1.27	1.48
Eout	3.45	4.45	3.67	5.25	4.55	5.52	6.85	8.10	6.50	10.3	7.6	9.9	10.5	12.2	9.80	14.8	12.0	15.0	17.7	21.3	16.2	25.0	19.2	23.2
Gain	9.85	10.6	10.5	12.5	12.8	13.2	10.7	11.6	11.6	13.2	13.6	14.2	11.4	12.25	12.5	14.0	14.1	15.1	12.4	13.0	13.5	14.65	15.1	15.7
% Distortion	4.20	2.70	4.8	4.0	4.10	4.20	4.80	4.60	4.80	5.00	4.30	4.50	4.90	4.40	4.60	4.50	4.80	4.60	4.10	4.40	4.30	4.60	4.40	4.30

(1) Peak signal equal to bias. Optimum bias chosen for 5% maximum distortion. Grid return to pin No. 8.

FOR CIRCUIT SEE FIGURE 3

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1200	1200	2200	2700	6800	8200	1000	1000	1500	1800	4700	6800
Ib	1.22	1.22	.66	.628	.259	.246	3.2	3.2	1.78	1.72	.684	.63
Ec	1.465	1.465	1.45	1.695	1.76	2.02	3.2	3.2	2.67	3.10	3.21	4.28
Eb	42.7	42.7	34	37.2	30	33.6	150.5	150.5	72	78	65	80
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	6.25	6.6	6.35	6.75	6.3	6.3	13.5	14.1	13.8	14.3	13.4	13.2
Gain	12.5	13.2	12.7	13.5	12.6	12.6	13.5	14.1	13.8	14.3	13.4	13.2
% Distortion	4.0	3.6	4.3	2.9	3.0	2.5	3.3	3.1	3.8	2.8	2.5	2.0
Esig (1)	0.65	0.65	0.57	0.77	0.71	0.98	1.70	1.70	1.34	1.70	1.80	2.52
Eout	8.1	8.6	7.2	10.4	8.9	12.4	23.0	24.0	18.5	24.5	24.1	33.1
Gain	12.5	13.2	12.6	13.5	12.5	12.6	13.5	14.1	13.8	14.3	13.4	13.1
% Distortion	4.8	4.4	4.8	4.6	4.6	5.0	4.9	4.6	5.0	5.0	4.9	5.0

(1) At grid current point, less than ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1800	2200	2700	3900	6800	8200	1800	1800	2700	3900	6800	8200
Ib	0.98	0.90	0.58	0.51	0.24	0.227	2.50	2.50	1.45	1.28	0.60	0.57
Ec1	−1.765	−1.98	−1.365	−1.99	−1.63	−1.86	−4.50	−4.50	−3.92	−4.99	−4.08	−4.67
Eb	54	57.7	42	49	35.2	38.7	132.5	132.5	105	122	88	96
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	5.75	6.0	6.15	6.65	6.5	6.7	12.6	13.45	13.2	14.25	13.6	14.1
Gain	11.5	12.0	12.3	13.3	13.0	13.4	12.6	13.45	13.2	14.25	13.6	14.1
% Distortion	2.0	1.7	2.4	1.7	2.3	1.9	1.5	1.2	1.9	1.3	1.9	1.6
Esig (1)	0.92	1.1	0.8	1.1	0.86	1.0	3.07	3.07	2.5	3.3	2.58	3.0
Eout	10.55	13.2	9.8	14.6	11.1	13.3	38.4	41.2	32.6	46.8	35.0	42.0
Gain	11.5	12.0	12.25	13.3	12.9	13.3	12.5	13.4	13.05	14.2	13.55	14.0
% Distortion	4.0	4.0	4.1	4.1	4.5	4.1	5.0	4.0	5.0	4.8	5.0	5.0

Note (1) At grid current point, less than ¼ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 200 VOLTS					
Rb	0.047		0.10		0.27		0.047		0.10		0.27	
Rcf	0.10	0.27	0.10	0.47	0.27	0.47	0.10	0.27	0.10	0.47	0.27	0.47
Rk	1200	1500	2200	3300	8200	10,000	680	820	1500	2200	5600	6800
Ib	1.35	1.28	0.715	0.64	0.26	0.244	3.10	2.96	1.53	1.41	0.56	0.535
Ec	−1.62	−1.92	−1.57	−2.10	−2.13	−2.44	−2.11	−2.43	−2.29	−3.10	−3.14	−3.64
Eb	36.5	39.8	28.5	36.0	29.8	34.1	54.2	61.0	47.0	59.5	49.0	55.8
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	6.3	6.35	6.1	6.2	5.8	5.85	14.0	14.2	13.2	13.2	12.1	12.1
Gain	12.6	12.7	12.2	12.4	11.6	11.7	14.0	14.2	13.2	13.2	12.1	12.1
% Distortion	3.1	2.6	3.4	2.1	2.3	1.8	4.3	3.5	4.0	2.3	2.4	2.0
Esig (1)	0.66	0.89	0.62	1.00	1.00	1.21	1.01	1.25	1.14	1.69	1.71	2.05
Eout	8.3	11.3	7.6	12.4	11.6	14.2	14.1	17.7	15.0	22.3	20.6	24.7
Gain	12.6	12.7	12.2	12.4	11.6	11.7	14.0	14.2	13.2	13.2	12.1	12.1
% Distortion	4.8	4.7	4.3	4.5	5.0	5.0	4.5	4.8	4.8	4.7	4.8	4.7

Note (1) Maximum signal at grid current point less than ½ microampere.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	.047		0.10		0.27		.047		0.10		0.27	
Rcf	0.10	0.27	0.1	0.47	.27	.47	.10	.27	.10	.47	.27	.47
Rk	2200	2700	3300	5600	10,000	12,000	1800	2200	2700	4700	8200	10,000
Ib	1.0	.92	.59	.48	.227	.213	2.70	2.49	1.54	1.27	.60	.56
Ec	2.20	2.48	1.95	2.68	2.27	2.56	4.86	5.48	4.16	5.96	4.92	5.6
Eb	53	56.7	41	52	38.6	42.5	123	133	96	123	88	99
Esig	0.50	.50	.50	.50	.50	.50	1.0	1.0	1.0	1.0	1.0	1.0
Eout	5.7	6.10	6.0	6.3	6.25	6.65	12.4	12.8	12.9	13.4	13.4	13.9
Gain	11.40	12.20	12.0	12.6	12.5	13.30	12.40	12.80	12.90	13.40	13.40	13.90
% Distortion	1.8	1.6	1.8	1.6	2.0	1.4	1.3	1.2	1.7	1.2	1.6	1.2
Esig (1)	1.2	1.4	1.00	1.55	1.10	1.45	3.20	3.64	2.60	4.0	3.10	3.50
Eout	13.7	17.0	12.0	19.5	13.7	19.1	39.2	46.5	33.4	53.5	41.6	48.5
Gain	11.40	12.15	12.0	12.6	12.5	13.15	12.3	12.75	12.75	13.35	13.40	13.85
% Distortion	4.60	5.0	4.5	5.1	5.0	4.90	4.5	4.5	4.4	5.0	5.1	4.6

Note (1) At grid current point, less than ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation
Single Section of Type 6N7GT

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.10	.27	.10	.47	.27	.47	.10	.27	.10	.47	.27	.47
Rk	1800	1800	2700	3300	6800	6800	1000	1200	1500	1800	3300	3900
Ib	.81	.81	.51	.469	.225	.225	2.36	2.21	1.45	1.36	.64	.61
Ec	1.46	1.46	1.38	1.55	1.53	1.53	2.36	2.65	2.18	2.45	2.11	2.38
Eb	61.9	61.9	49	53.1	39.2	39.2	139	146	105	114	77	85.5
Esig	.10	.10	.10	.10	.10	.10	.50	.50	.50	.50	.50	.50
Eout	1.74	1.93	1.93	2.2	2.23	2.38	10.0	10.9	10.9	12.5	12.8	13.0
Gain	17.4	19.3	19.3	22.0	22.3	23.8	20.0	21.8	21.8	25.0	25.6	26.0
% Distortion	1.2	1.0	1.3	1.0	1.3	1.1	1.8	1.8	2.6	2.2	2.7	2.4
Esig (1)	.40	.40	.30	.50	.42	.42	1.20	1.40	1.00	1.22	.90	1.1
Eout	6.85	7.65	5.76	10.9	9.34	10.0	23.8	30.4	21.8	30.5	23.0	28.8
Gain	17.1	19.1	19.2	21.8	22.0	23.8	19.8	21.7	21.8	25.0	25.6	26.2
% Distortion	4.7	3.7	3.7	4.8	5.0	4.2	4.5	4.9	4.8	4.7	4.7	5.0

Note (1) At grid current point, less than ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27		0.47			0.1	0.27			0.47		
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	3300	3300	5600	5600	6800	8200	10,000	1800	2200	3300	3900	4700	3600	6800
Ib	.288	.288	.161	.161	.146	.108	.099	.95	.88	476	.46	.425	.31	.29
Ec	.95	.95	.9	.9	.99	.89	.99	1.71	1.94	1.57	1.79	2.0	1.73	1.97
Eb	71.2	71.2	56.5	56.5	60.6	49.2	53.5	155	162	121.5	125.8	135.2	104.4	113.7
Esig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.53	3.82	4.1	4.53	4.73	4.63	4.9	4.23	4.4	4.9	5.2	5.4	5.3	5.7
Gain	35.3	38.2	41.	45.3	47.3	46.3	49.	42.3	44.	49.	52.	54.	53.	57.
% Dist.	.55	0.9	1.6	1.2	1.1	1.5	1.2	.3	.3	.25	.3	.3	.2	.25
Esig. (1)	.23	.24	.19	.2	.25	.19	.25	.79	.89	.63	.77	.91	.71	.86
Eout	8.	8.9	7.75	8.93	11.8	8.7	12.2	33.3	38.5	30.8	39.6	49.	37.5	48.6
Gain	34.8	37.1	40.8	44.6	47.2	45.8	48.8	42.2	43.3	48.9	51.4	53.9	52.8	56.6
% Dist.	3.6	3.4	3.95	3.4	4.15	3.9	4.6	3.67	4.28	3.4	4.3	4.75	4.8	4.95

Note (1) For self bias operation this is taken at the grid current point with less than ¼ Microampere grid current.

FOR CIRCUIT SEE FIGURE 4

Zero Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27		0.47			0.1	0.27			0.47		
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ib	0.325	0.325	0.17	0.17	0.17	0.1125	0.1125	1.35	1.35	0.65	0.65	0.65	0.385	0.385
Ec	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eb	67.5	67.5	54.1	54.1	54.1	47.1	47.1	115	115	74.5	74.5	74.5	69	69
Esig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.7	3.8	4.35	4.6	4.83	4.6	5.2	4.5	4.75	5.2	5.8	5.8	5.7	6.2
Gain	37.0	38.0	43.5	46.0	48.3	46.0	52.0	45.0	47.5	52.0	58.0	58.0	57.0	62.0
% Dist.	0.806	0.72	1.58	1.17	0.88	1.56	0.985	0.583	0.61	0.53	0.65	0.65	0.5	0.64
Esig. (1)	0.26	0.28	0.21	0.24	0.28	0.21	0.26	0.9	0.96	0.76	0.87	0.97	0.74	0.88
Eout	8.8	9.8	8.25	10.5	12.5	9.2	12.5	37.0	41.7	36.5	44.2	53.0	39.3	50.0
Gain	33.8	35.0	39.3	43.7	44.6	43.8	48.1	41.2	43.4	48.0	50.8	54.6	53.1	56.8
% Dist.	4.71	4.9	4.96	4.79	4.96	4.8	4.78	4.8	4.88	4.86	4.96	4.88	4.89	4.89

Note (1) Maximum signal for 5.0% Distortion.

FOR CIRCUIT SEE FIGURE 5

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
R_{c_1}	0.39		1.2			1.8		0.39		1.2			2.2	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	1200	1200	2700	2700	2700	4700	4700	560	560	1200	1200	1200	1800	1800
Ib	0.645	0.645	0.259	0.259	0.259	0.165	0.165	1.77	1.77	0.675	0.675	0.675	0.402	0.402
I_{c_1}	0.18	0.18	0.068	0.068	0.068	0.045	0.045	0.50	0.50	0.183	0.183	0.183	0.102	0.102
E_{c_1}	-0.99	-0.99	-0.882	-0.882	-0.882	-0.99	-0.99	-1.27	-1.27	-1.03	-1.03	-1.03	-0.908	-0.908
E_{c_2}	29.8	29.8	18.5	18.5	18.5	19.0	19.0	55	55	30.5	30.5	30.5	25.5	25.5
Eb	35.5	35.5	30.2	30.2	30.2	22.5	22.5	73	73	67.8	67.8	67.8	61.2	61.2
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	6.85	7.8	8.2	10.2	12.5	10.2	13.1	10.2	11.5	13.6	17.9	21.6	19.5	25.6
Gain	68.5	78.0	82	102	125	102	131	102	115	136	179	216	195	256
% Distortion	0.6	0.7	3.4	2.6	2.3	2.8	3.2	0.7	0.8	2.2	1.8	1.5	3.1	2.4
Esig(1)	0.2	0.2	0.14	0.14	0.14	0.13	0.13	0.5	0.5	0.25	0.25	0.25	0.15	0.15
Eout	13.15	14.9	11.1	13.9	17.2	12.8	16.6	47	54	33	41.8	50	28	37
Gain	65.8	74.5	79.4	99.5	123	98.5	128	94	108	132	167.5	200	187	247
% Distortion	3.0	2.9	5.1	4.3	3.7	4.6	5.0	4.2	5.0	5.2	4.4	4.7	4.5	3.7

Note (1) At grid current point, less than ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 1

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation
Type 7A4 or Single Section of Type 7N7

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.10		0.27		0.047		0.10		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1800	2200	3300	4700	8200	10,000	1500	2200	2700	3900	6800	8200
Ib	1.05	0.97	0.57	0.50	0.24	0.22	2.79	2.4	1.49	1.31	0.61	0.58
Ec	-1.89	-2.13	-1.90	-2.35	-1.93	-2.19	-4.18	-5.28	-4.03	-5.11	-4.15	-4.74
Eb	50.6	54.4	43.0	50.0	36.5	40.9	119	137	101	119	85	94
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	6.6	7.1	6.8	7.4	7.3	7.4	14.8	15.0	15.2	16.2	15.9	16.2
Gain	13.2	14.2	13.6	14.8	14.6	14.8	14.8	15.0	15.2	16.2	15.9	16.2
% Distortion	1.9	1.8	2.4	2.0	2.0	1.7	1.4	1.4	1.8	1.3	1.6	1.3
Esig (1)	0.95	1.13	0.95	1.3	0.95	1.20	2.70	3.50	2.55	3.40	2.64	3.05
Eout	12.5	15.5	12.9	19.2	13.7	17.7	39.9	52.5	38.4	53.0	42.0	49.4
Gain	13.1	13.9	13.6	14.7	14.4	14.7	14.7	15.0	15.0	16.1	15.9	16.2
% Distortion	3.9	4.2	4.9	4.7	4.4	4.5	4.1	4.9	4.9	4.6	4.7	4.5

Note (1) For self bias operation this is taken at the grid current point with less than ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ib	0.223	0.223	0.126	0.126	0.126	0.89	0.89	1.1	1.1	0.54	0.54	0.54	0.34	0.34
Ec	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eb	77.7	77.7	66.0	66.0	66.0	58.2	58.2	140	140	104	104	104	90	90
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1
Eout	3.85	4.15	4.32	4.9	5.45	5.0	5.8	6.0	6.3	7.0	7.5	8.2	7.7	8.5
Gain	38.5	41.5	43.2	49.0	54.5	50.0	58.0	60.0	63.0	70.0	75.0	82.0	77.0	85.0
% Dist.	4.6	4.3	5.0	4.2	3.3	4.5	3.4	0.8	0.8	1.1	1.0	0.9	1.3	1.1
Esig (1)	0.1	0.11	0.1	0.11	0.14	0.1	0.14	0.46	0.46	0.35	0.40	0.48	0.36	0.45
Eout	3.85	4.55	4.32	5.35	7.4	5.0	7.84	25.3	26.0	22.5	28.0	35.3	25.1	34.2
Gain	38.5	41.4	43.2	48.6	53.0	50.0	56.0	55.0	56.5	64.4	70.0	74.0	70.0	76.0
% Dist.	4.6	4.9	5.0	4.7	5.0	4.5	5.0	4.8	4.7	4.9	4.8	4.8	5.0	4.8

Note (1) Maximum signal for 5% Distortion.

FOR CIRCUIT SEE FIGURE 5

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	3900	3900	5600	5600	6800	8200	10,000	1500	800	2700	2700	2700	3900	4700
Ib	0.22	0.22	0.144	0.144	0.13	0.10	0.091	0.84	0.76	0.443	0.443	0.443	0.295	0.271
Ec	-0.86	-0.86	-0.81	-0.81	-0.88	-0.82	-0.91	-1.26	-1.37	-1.19	-1.19	-1.19	-1.15	-1.27
Eb	78	78	61.1	61.1	64.9	53	57.2	166	174	131	131	131	111.5	123
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	4.25	4.3	4.8	5.35	5.62	5.4	6.4	5.65	5.8	6.5	7.15	7.65	7.3	7.65
Gain	42.5	43.0	48.0	53.5	56.2	54.0	64.0	56.5	58.0	65.0	71.5	76.5	73.0	76.5
% Dist.	4.1	4.1	4.3	3.7	3.2	4.1	3.6	0.9	0.9	1.0	1.0	1.0	1.3	1.7
Esig (1)	0.12	0.12	0.1	0.1	0.13	0.1	0.15	0.47	0.54	0.39	0.39	0.39	0.33	0.45
Eout	5.1	5.15	4.8	5.35	7.25	5.4	9.0	26.5	30.5	24.5	27.5	29.2	23.5	34.0
Gain	42.5	43.0	48	53.5	55.8	54.0	60.0	56.4	56.5	63.0	70.5	75.0	71.3	75.5
% Dist.	5.1	5.0	4.3	3.7	4.6	4.1	5.0	4.5	5.3	5.1	4.2	3.9	5.2	5.3

Note (1) For self bias operation this is taken at the grid current point with less than ½ microamp ere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ib	0.228	0.228	0.132	0.132	0.132	0.09	0.09	1.0	1.0	0.52	0.52	0.52	0.34	0.34
Ec	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eb	77.2	77.2	64.4	64.4	64.4	57.7	57.7	150	150	110	110	110	90	90
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.3	3.55	3.95	4.48	5.05	4.63	5.4	4.63	5.0	5.6	6.1	6.7	6.43	7.15
Gain	33.0	35.5	39.5	44.8	50.5	46.3	54.0	46.3	50.0	56.0	61.0	67.0	64.3	71.5
% Dist.	3.0	2.9	3.8	3.2	2.6	3.6	2.6	0.8	0.7	0.9	0.8	0.7	0.8	0.7
Esig (1)	0.15	0.16	0.12	0.14	0.17	0.13	0.17	0.55	0.6	0.5	0.57	0.65	0.5	0.6
Eout	4.73	5.4	4.65	6.12	8.3	5.9	8.8	23.4	26.6	25.5	31.8	39.0	29.5	39.5
Gain	31.5	33.8	38.7	43.8	49.0	45.4	51.7	42.5	44.5	51.0	56.0	60.0	59.0	66.0
% Dist.	4.9	5.0	4.9	4.8	5.0	5.0	5.0	4.7	4.9	5.0	4.9	4.9	5.0	5.0

Note (1) Maximum Signal for 5.0% Distortion

FOR CIRCUIT SEE FIGURE 5

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	3900	3900	5600	6800	6800	8200	10,000	1800	1800	2700	3300	3900	3900	4700
Ib	0.214	0.214	0.138	0.126	0.126	0.095	0.086	0.725	0.725	0.43	0.395	0.365	0.288	0.261
Ec	-0.835	-0.835	-0.774	-0.857	-0.857	-0.78	-0.86	-1.31	-1.31	-1.16	-1.30	-1.42	-1.12	-1.25
Eb	78.6	78.6	62.8	66.0	66.0	55.3	59.6	177.5	177.5	134	143.5	151.5	114.5	124.5
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.3	3.5	4.1	4.5	5.0	4.9	5.2	4.37	4.78	5.50	5.92	6.13	6.24	6.75
Gain	33.0	35.0	41.0	45.0	50.0	49.0	52.0	43.7	47.8	55.0	59.2	61.3	62.4	67.5
% Dist.	2.7	2.6	3.2	3.0	2.5	3.1	2.6	0.8	0.7	0.8	0.8	0.7	0.8	0.7
Esig (1)	0.16	0.16	0.10	0.17	0.17	0.12	0.19	0.55	0.55	0.40	0.53	0.61	0.40	0.53
Eout	5.15	5.5	4.1	7.3	8.2	5.75	9.7	23.9	26.0	21.8	31.2	37.0	25.0	36.0
Gain	32.2	34.4	41.0	43.0	48.1	48.0	51.0	43.5	47.4	54.5	59.0	60.6	62.4	67.5
% Dist.	4.5	4.0	3.2	5.0	4.5	4.0	5.0	4.5	4.0	3.3	4.0	1.5	3.3	3.8

Note (1) For self bias operation this is taken at the grid current point with less than $\frac{1}{4}$ Microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Zero Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1	0.27			0.47			1.0	0.27			0.47		
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ib	0.174	0.174	0.408	0.108	0.108	0.078	0.078	0.84	0.84	0.47	0.47	0.47	0.32	0.32
Ec	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eb	82.6	82.6	70.8	70.8	70.8	63.4	63.4	166	166	123	123	123	100	100
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	2.75	3.02	3.67	4.25	4.77	4.68	5.37	3.95	4.32	5.2	5.8	6.25	6.0	6.75
Gain	27.5	30.2	36.7	42.5	47.7	46.8	53.7	39.5	43.2	52.0	58.0	62.5	60.0	67.5
% Dist.	3.3	3.1	4.3	3.5	2.9	3.9	2.9	0.6	0.5	0.7	0.6	0.5	0.6	0.5
Esig (1)	0.14	0.15	0.12	0.14	0.15	0.12	0.15	0.55	0.55	0.5	0.53	0.6	0.48	0.58
Eout	3.7	4.45	4.22	5.5	6.9	5.35	7.7	19.8	21.9	23.6	27.9	34.0	27.4	37.0
Gain	26.4	29.6	35.0	39.2	46.0	44.5	51.4	36.0	39.8	47.2	52.6	56.6	57.0	63.9
% Dist.	4.6	5.0	5.0	4.9	5.0	4.8	5.0	5.0	4.8	5.0	4.8	4.9	5.0	5.0

Note (1) Maximum Signal for 5% Distortion.

FOR CIRCUIT SEE FIGURE 5

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1	0.27			0.47			0.1	0.27			0.47		
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	4700	4700	6800	6800	6800	10,000	10,000	1800	1800	2700	3300	3900	3900	4700
Ib	0.156	0.156	0.104	0.104	0.104	0.073	0.073	0.60	0.60	0.38	0.34	0.32	0.258	0.24
Ec	-0.734	-0.734	-0.707	-0.707	-0.707	-0.73	-0.73	-1.08	-1.08	-1.03	-1.12	-1.25	-1.01	-1.13
Eb	84.4	84.4	71.9	71.9	71.9	65.7	65.7	192	190	147	158	163.5	129	137
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	2.64	2.9	3.51	4.13	4.65	4.35	5.15	3.7	4.05	5.1	5.35	5.85	5.9	6.52
Gain	26.4	29.0	35.1	41.3	46.5	43.5	51.5	37.0	40.5	51.0	53.5	58.5	59.0	65.2
% Dist.	3.4	3.3	3.4	3.0	2.6	3.7	1.9	1.0	0.9	1.0	0.9	0.5	0.9	0.7
Esig (1)	0.15	0.15	0.12	0.12	0.12	0.14	0.14	0.55	0.55	0.41	0.53	0.60	0.46	0.50
Eout	3.95	4.3	4.16	4.9	5.35	6.0	7.15	19.8	22.0	19.4	28.0	34.0	22.8	32.3
Gain	26.4	28.6	34.7	40.7	44.5	43.0	51.0	36.0	40.0	47.5	52.9	57.0	57.0	64.6
% Dist.	5.0	4.7	4.3	3.7	3.5	5.0	4.0	5.0	4.5	3.7	4.8	4.6	3.6	3.6

Note (1)For self bias operation this is taken at the grid current point with less than ½ Microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
R_{c_2}	0.47		1.2			1.8		0.47		1.2			2.2	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	1000	1000	2200	2200	2200	3900	3900	470	470	1000	1000	1000	1500	1500
Ib	0.62	0.62	0.27	0.27	0.27	0.168	0.168	1.76	1.76	0.75	0.75	0.75	0.44	0.44
I_{c_2}	0.145	0.145	0.064	0.064	0.064	0.465	0.465	0.41	0.41	0.177	0.177	0.177	0.10	0.10
E_{c_1}	−0.765	−0.765	−0.735	−0.735	−0.735	−0.622	−0.622	−1.02	−1.02	−0.927	−0.927	−0.927	−0.81	−0.81
E_{c_2}	31.9	31.9	23.3	23.3	23.3	16.3	16.3	57.2	57.2	37.5	37.5	37.5	30	30
Eb	38	38	27.2	27.2	27.2	21	21	74	74	47.5	47.5	47.5	43.5	43.5
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	7.0	8.05	8.0	10.0	12.0	9.8	12.5	10.6	12.0	13.0	17.0	20.4	18.8	24.5
Gain	70.0	80.5	80	100	120	98	125	106	120	130	170	204	188	245
% Distortion	2.7	2.4	3.7	2.7	2.3	3.2	1.9	1.6	1.4	1.5	1.6	2.4	2.0	2.8
Esig (1)	0.18	0.18	0.14	0.14	0.14	0.14	0.14	0.4	0.4	0.27	0.27	0.27	0.18	0.18
Eout	12.3	13.9	10.8	13.8	16.7	13.2	17.0	40.3	45.2	33.0	41.6	49.5	32	41.5
Gain	68.5	77.2	77.2	98.7	119	94.5	121.5	101	113	122	154	183.5	178	230
% Distortion	4.7	4.1	5.5	4.6	3.8	4.9	5.0	4.3	4.4	5.0	5.0	5.9	4.3	4.9

Note (1) For self bias operation this is taken at the grid current point with less than ½ microampere grid current.

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1000	1200	1800	2200	4700	4700	560	680	820	1200	2700	2700
Ib	1.06	1.00	0.59	0.56	0.248	0.248	3.05	2.95	1.74	1.60	0.67	0.67
Ec	−1.06	−1.20	−1.06	−1.23	−1.17	−1.17	−1.71	−2.00	−1.43	−1.92	−1.81	−1.81
Eb	50.2	53	41	44	33	33	107	111.5	76	90	69	69
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	2.15	2.22	2.12	2.34	2.20	2.30	2.56	2.55	2.60	2.69	2.48	2.59
Gain	21.5	22.2	21.2	23.4	22.0	23.0	25.6	25.5	26.0	26.9	24.8	25.9
% Distortion	1.6	1.2	1.6	1.2	1.2	1.2	0.8	0.6	0.8	0.7	0.9	0.9
Esig (1)	0.29	0.39	0.20	0.40	0.39	0.39	0.82	1.00	0.64	0.96	0.78	0.78
Eout	6.25	8.65	4.25	9.30	8.55	8.95	21.0	25.5	16.6	25.8	19.3	20.2
Gain	21.5	22.2	21.2	23.2	21.9	23.0	25.6	25.5	26.0	26.9	24.8	25.9
% Distortion	4.3	4.9	3.0	4.4	4.8	4.0	5.0	5.0	4.7	4.9	5.0	4.8

Note (1) For self bias operation this is taken at the grid current point with less than ½ Microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1800	2200	2700	3900	6800	8200	1500	1800	2200	3300	5600	8200
Ib	1.07	1.0	0.62	0.56	0.256	0.240	2.85	2.69	1.63	1.46	0.661	0.60
Ec	−1.93	−2.2	−1.67	−2.18	−1.74	−1.97	−4.27	−4.84	−3.59	−4.82	−3.70	−4.92
Eb	49.6	53.0	38	44	31	35.2	116	123.8	87	104	71.8	88
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	5.3	5.4	5.6	5.8	5.7	5.8	11.2	11.8	11.8	12.4	12.1	12.2
Gain	10.6	10.8	11.2	11.6	11.4	11.6	11.2	11.8	11.8	12.4	12.1	12.2
% Distortion	2.1	1.9	2.0	1.8	2.2	1.8	1.3	1.2	1.8	1.3	1.8	1.3
Esig (1)	1.02	1.24	0.87	1.23	0.97	1.10	2.80	3.25	2.23	3.27	2.40	3.32
Eout	10.6	13.2	9.5	14.2	11.0	12.8	31.2	38.0	26.0	40.4	28.5	40.6
Gain	10.4	10.6	10.9	11.5	11.3	11.6	11.1	11.7	11.7	12.3	12.1	12.2
% Distortion	4.5	4.9	4.7	4.8	4.9	4.3	4.5	4.6	4.4	4.5	4.5	4.9

Note (1) For self bias operation this is taken at the grid current point with less than ½ microampere grid current

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation—All Values Per Single Section

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.10		0.27			0.47		0.10		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	4.7	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	3300	3300	5600	5600	6800	6800	8200	1800	2200	3300	3900	3900	4700	5600
Ib	0.30	0.30	0.169	0.169	0.152	0.1240	0.112	0.917	0.83	0.475	0.44	0.44	0.312	0.29
Ec	-0.99	-0.99	-0.948	-0.948	-1.03	-0.844	-0.92	-1.65	-1.83	-1.57	-1.72	-1.72	-1.47	-1.62
Eb	70	70	54.3	54.3	59.9	41.7	47.3	158.3	167	122	131	131	103	113.5
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.2	3.23	3.7	4.15	4.5	4.28	4.65	4.0	4.1	4.5	5.0	5.25	5.25	5.55
Gain	32.0	32.3	37.0	41.5	45.0	42.8	46.5	40.0	41.0	45.0	50.0	52.5	52.5	55.5
% Dist.	1.3	1.3	1.8	1.5	1.4	1.8	1.4	0.6	0.5	0.6	0.5	0.4	0.5	0.4
Esig (1)	0.33	0.33	0.21	0.21	0.34	0.2	0.3	0.87	1.03	0.83	0.97	0.97	0.77	0.90
Eout	10.3	10.4	7.7	8.6	14.8	8.5	13.5	33.6	41.5	36.3	46.6	48.8	38.8	48.5
Gain	31.2	31.5	36.6	41.0	43.5	42.5	45.0	38.6	40.2	43.7	48.0	50.4	50.4	54.0
% Dist.	4.9	4.8	4.0	3.1	5.0	3.4	4.4	4.0	4.8	4.5	4.8	3.8	3.9	3.7

Note (1) For self bias operation this is taken at the grid current point with less than ½ Microampere grid current.

FOR CIRCUIT SEE FIGURE 4

Zero Bias Operation—All Values Per Single Section

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ib	0.40	0.40	0.202	0.202	0.202	0.13	0.13	1.36	1.36	0.64	0.64	0.64	0.40	0.40
Ec	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eb	60.0	60.0	45.5	45.5	45.5	38.6	38.6	114	114	77.0	77.0	77.0	62.0	62.0
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.4	3.6	3.95	4.35	4.7	5.1	4.95	4.1	4.32	4.7	5.1	5.5	5.25	5.75
Gain	34.0	36.0	39.5	43.5	47.0	51.0	49.5	41.0	43.2	47.0	51.0	56.0	52.5	57.5
% Dist.	1.1	1.0	1.1	1.0	1.0	1.0	0.9	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Esig (1)	0.33	0.34	0.25	0.3	0.34	0.25	0.32	1.0	1.07	.86	.97	1.09	.83	1.03
Eout	10.3	11.2	9.25	11.8	14.7	10.4	14.7	37.0	41.5	37.3	45.4	53.6	40.0	53.0
Gain	31.2	33.0	37.0	39.4	43.4	41.6	46.0	37.0	38.8	43.4	46.8	49.3	48.3	51.5
% Dist.	5.0	4.8	4.9	5.0	5.0	5.0	5.0	4.9	5.0	5.0	5.0	4.8	5.0	5.0

Note (1) Maximum signal for 5.0% Distortion.

FOR CIRCUIT SEE FIGURE 5

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias—Single Section

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1000	1200	1800	2200	4700	4700	390	470	820	1000	2200	2200
Ib	0.90	0.84	0.51	0.48	0.22	0.22	3.0	2.86	1.58	1.50	0.66	0.66
Ec	-0.90	-1.01	-0.92	-1.05	-1.03	-1.03	-1.17	-1.34	-1.29	-1.50	-1.45	-1.45
Eb	57.7	60.5	49	52	40.5	40.5	109	115	92	100	72	72
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	2.65	2.65	2.65	3.0	2.85	3.0	3.38	3.82	3.56	3.65	3.40	3.60
Gain	26.5	26.5	26.5	30.0	28.5	30.0	33.8	38.2	35.6	36.5	34.0	36.0
% Distortion	2.1	1.8	2.3	1.6	1.7	1.5	1.1	0.9	1.0	0.7	0.8	0.7
Esig (1)	0.18	0.26	0.17	0.30	0.24	0.24	0.4	0.55	0.50	0.70	0.60	0.60
Eout	4.74	6.8	4.45	8.8	6.7	7.1	13.5	21.0	17.8	25.5	20.4	21.6
Gain	26.3	26.2	26.2	29.4	28.0	29.6	33.8	38.2	35.6	36.4	34.0	36.0
% Distortion	3.7	4.8	3.6	4.7	4.3	3.7	4.0	4.6	4.6	4.9	4.5	4.2

Note (1). For self bias operation this is taken at the grid current point with less than $\frac{1}{6}$ microampere grid current.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
R_{c_2}	0.39		1.0			1.8		0.39		1.0			1.8	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	1200	1200	2700	2700	2700	4700	4700	470	470	1000	1000	1200	1800	1800
Ib	0.61	0.61	0.271	0.271	0.271	0.163	0.163	1.75	1.75	0.75	0.75	0.74	0.44	0.44
I_{c_2}	0.173	0.173	0.076	0.076	0.076	0.044	0.044	0.49	0.49	0.212	0.212	0.207	0.121	0.121
E_{c_1}	−0.94	−0.94	−0.938	−0.938	−0.938	−0.974	−0.974	−1.05	−1.05	−0.962	−0.962	−1.14	−1.01	−1.01
E_{c_2}	32.5	32.5	23.5	23.5	23.5	20.5	20.5	59	59	38	38	43	32.1	32.1
Eb	39	39	26.9	26.9	26.9	23.4	23.4	75	75	47.5	47.5	50	43	43
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	7.8	8.9	8.0	10.2	12.2	9.6	12.5	13.6	15.5	15.4	19.8	22.0	19.5	25.5
Gain	78	89	80	102	122	96	125	136	155	154	198	220	195	255
% Distortion	4.6	4.3	5.0	3.8	3.0	5.2	3.9	2.2	2.1	2.8	2.1	2.0	3.0	3.1
Esig (1)	0.11	0.11	0.1	0.1	0.1	0.1	0.1	0.22	0.22	0.15	0.15	0.2	0.14	0.14
Eout	8.55	9.8	8.0	10.2	12.2	9.6	12.5	29	33	22.5	28.0	41.5	26.4	34.5
Gain	77.8	89	80	102	122	96	129	132	150	150	187	207.5	189	246.5
% Distortion	5.1	4.6	5.0	3.8	3.0	5.2	3.9	4.8	4.3	4.5	3.8	5.0	4.7	4.4

Note (1). For self bias operation this is taken at the grid current point with less than 1/5 microampere grid current.

FOR CIRCUIT SEE FIGURE 1

SYLVANIA CATHODE RAY TUBE DATA
ELECTROSTATIC TYPES

Type	Heater		Nominal Dimensions		Base	RMA Basing	Screen		Maximum Design Center Ratings				Typical Operating Conditions					
	Volts	Amperes	Diameter Inches	Length Inches			Fluorescence	Persistance	Anode #1 Volts	Anode #2 Volts	Anode #3 Volts	Anode #2 to Deflection Plate Peak Volts	Anode #2 Volts	Anode #1 Avg. Volts**	Anode #3 Volts	Grid Range Volts*	Deflection Avg. Volts DC/Inch	
																	D 1-2	D 3-4
†2AP1 †2AP1-A	6.3	0.6	2	7 1/16	Small Shell Magnal 11 Pin	11B 11L	Green	Medium	500	1000	.....	600	1000	250	....	30 to 90	230	196
3AP1-A	2.5	2.1	3	11 1/2	Medium Shell 7 Pin	7CE	Green	Medium	1000	1500	.....	500	800	230	....	14 to 40	61	58
													1000	287	....	17 to 50	76	73
													1200	345	....	20 to 60	91	87
													1500	430	....	25 to 75	114	109
†3BP1	6.3	0.6	3	10	Medium Shell Diheptal 12 Pin	14A	Green	Medium	1000	2000	.....	500	1500	430	....	22.5 to 67.5	150	111
													2000	575	....	30 to 90	200	148
3JP12	6.3	0.6	3	10	Medium Shell Diheptal 12 Pin	14J	Yellow-Orange □	Intermediate-Exponential	1000	2000	4000*	500	1500	430	1500	22.5 to 67.5	120	89
													2000	575	2000	30 to 90	160	119
													1500	430	3000	22.5 to 67.5	150	111
													2000	575	4000	30 to 90	200	148
†5AP1	6.3	0.6	5 1/4	13	Medium Shell Magnal 11 Pin	11A	Green	Medium	1000	2000	.....	500	1500	430	....	30 to 56	93	90
													2000	575	....	40 to 75	124	120
†5BP1 †5BP4	6.3	0.6	5 1/4	16 3/4	Medium Shell Magnal 11 Pin	11A	Green White	Medium	1000	2000	.....	500	1500	337	....	15 to 45	63	57
													2000	450	....	20 to 60	84	76

†5CP1	6.3	0.6	5¼	16¾	Medium Shell Diheptal 12 Pin	14B	Green	Medium	1000	2000	4000°	500	2000	575	2000	30 to 95	73	64
													1500	430	3000	22.5 to 67.5	69	59
													2000	575	4000	30 to 95	92	79
†5HP1	6.3	0.6	5¼	16¾	Same as Type 5BP1 but with Low Loss Base.													
†5NP1	6.3	0.6	5¼	16¾	Same as Type 5BP1 but with Special Internal Physical Tolerances for Radar Use.													
†7GP1 †7GP4	6.3	0.6	7	14½	Medium Shell Diheptal 12 Pin	14G	Green White	Medium	1500**	4000	.....	500	3000	1000	....	36 to 84	108	90
7JP1 7JP4	6.3	0.6	7	14½	Medium Shell Diheptal 12 Pin	14G	Green White	Medium	2800	6000	.....	750	4000	1350	....	48 to 112	144	118
													6000	2000	....	72 to 168	216	177
†10HP4	6.3	0.6	10	19¼	Medium Shell Diheptal 12 Pin	14G	White	Medium	2000	5000	.....	600	5000	1500	....	60 to 140	130	100

†Recommended for replacement use only.
□Phosphorescence: yellow-orange.
°Ratio of anode 3 voltage to anode 2 voltage—2.3 to 1 max.

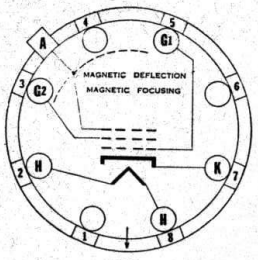
*Cut-off voltage. Supply should be adjustable from 0 to value shown
**Bogey value for focus. Voltage should be adjustable about value shown.

MAGNETIC TYPES

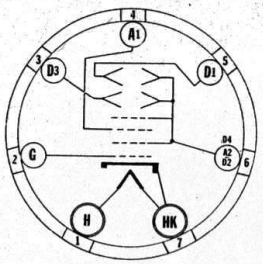
Type	Heater		Nominal Dimensions		Base	RMA Basing	Screen			Deflection Angle Degrees	Deflection Method	Focusing Method	Maximum Design Center Ratings		Typical Operating Conditions		
	Volts	Amperes	Diameter Inches	Length Inches			Fluorescence	Persistance	Phosphorescence				Anode Volts	Grid 2 Volts	Anode Volts	Grid 2 Volts	Grid 1 Volts*
†5FP7	6.3	0.6	4 15/16	11⅜	Long Medium Shell Octal 8 Pin	5 AN	Blue-White	Long	Yellow	53	Magnetic	Magnetic	7000	680	5000	250	25 to 70
10BP4°	6.3	0.6	10½	17⅝	Small Shell Duodecal 7 Pin	12 D	White	Medium	.....	50	Magnetic	Magnetic	10,000	410	9000	250	27 to 63
12LP4°	6.3	0.6	12 1/16	18¾	Small Shell Duodecal 7 Pin	12 D	White	Medium	.....	54	Magnetic	Magnetic	12,000	410	11,000	250	27 to 63

†Recommended for replacement use only.
°Ion trap type.
*Cut-off voltage. Supply should be adjustable from 0 to values shown.

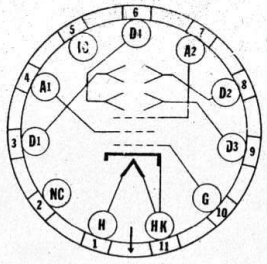
CATHODE RAY TUBE BASE DIAGRAMS



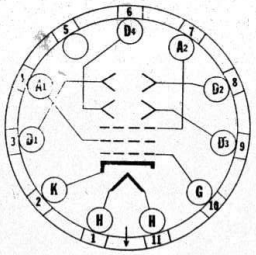
5-AN



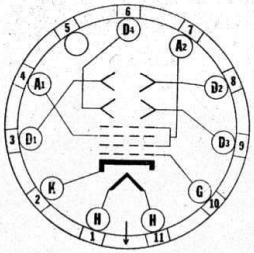
7-CE



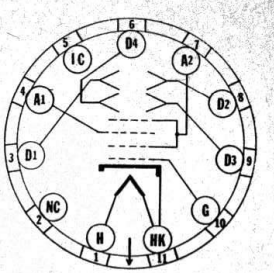
11-A



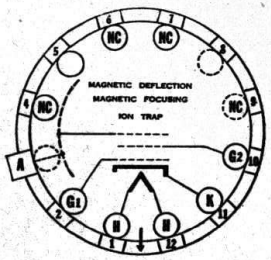
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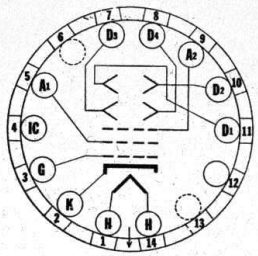
11-L



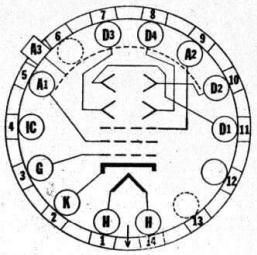
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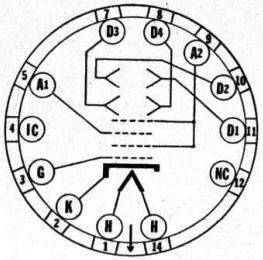
12-D



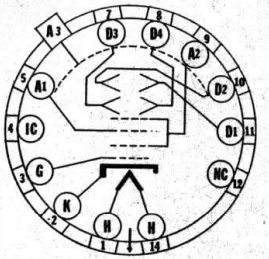
14-A



14-B



14-G



14-J

OBSOLETE AND SELDOM ENCOUNTERED TYPES

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
01A	ST-14	4D	Triode	Det. Amp.	Fil.	5.0	0.25	90 135	....	4.5 9.0	2.5 3.0	....	11,000 10,000	8.0 8.0	....	
0A2	Min.	5BO	Diode	Voltage Reg.	Cold K	....	....	Starting Voltage=155, Operating Voltage=150, Operating Current=5 to 30 Ma.								
0B2	Min.	5BO	Diode	Voltage Reg.	Cold K	....	....	Starting Voltage=115, Operating Voltage=105, Operating Current=5 to 30 Ma.								
0Y4	Metal	4BU	Gas Diode	H-W Rect.	Cold K	....	....	117 A.C. Volts Per Plate, RMS, 75 Ma. Max., 40 Ma. Min. Output Current								
0Z3	.....	5N	Gas Rect.	F.W. Rect.	Cold K	....	....	350 V. RMS Per Plate, 75 Ma. Max. DC Output.								0Z4
1, KR1	ST-12	4G	Diode	H.W. Rect.	Cath.	6.3	0.30	350 V. RMS Plate, 50 Ma. DC Output.								1V
1A3	Min.	5AP	Diode	Det.	Cath.	1.4	0.15	Single Diode, Cathode Type for H.F. Use.								
1A4	ST-12	4K	Tetrode	R.F. Amp.	Fil.	2.0	0.06	90 180	67.5 67.5	3.0 3.0	2.2 2.3	0.9 0.8	600,000 1.0 Meg.	720 750	....	1A4P, 1A4T
1A4P	ST-12	4M	Pentode	R.F. Amp.	Fil.	2.0 2.0	0.06 0.06	135 180	67.5 67.5	3.0 3.0	2.2 2.3	0.9 0.8	1 Meg. 1 Meg.	625 725	....	
1A4T	ST-12	4K	Tetrode	R.F. Amp.	Fil.	2.0 2.0	0.06 0.06	135 180	67.5 67.5	3.0 3.0	2.2 2.2	0.7 0.7	350,000 600,000	625 650	....	
1A6	ST-12	6L	Heptode	Converter	Fil.	2.0 2.0	0.06 0.06	135 180	67.5 67.5	3.0 3.0	1.8 1.5	2.1 2.0	400,000 500,000	275▼ 300▼	G_2=135 V. at 2.0 Ma.■ G_2=180 V. at 2.5 Ma.■	
1AB5	Lock-In	5BF	Pentode	R.F. Amp.	Fil.	1.2 1.2	0.13 0.13	90 150	90 150	0 1.5	3.5 6.8	0.8 2.0	275,000 120,000	1,100 1,350	....	
1B4	ST-12	4K	Tetrode	R.F. Amp.	Fil.	2.0	0.06	90 180	67.5 67.5	3.0 3.0	1.6 1.7	0.7 0.6	1.0 Meg.◆ 1.5 Meg.◆	600 650	....	1B4P 1B4T
1B4/951	ST-12	4K	Tetrode	R.F. Amp.	Fil.	2.0	0.06	Same as Type 1B4.								1B4 P or T
1B4P	ST-12	4M	Pentode	R.F. Amp.	Fil.	2.0 2.0	0.06 0.06	135 180	67.5 67.5	3.0 3.0	1.6 1.7	0.7 0.6	1.5 Meg. 1.5 Meg.	560 650	....	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
‡Plate to Plate.
■Through 20,000 Ohms.

*Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
1B5/25S	ST-12	6M	Duodi Tri.	Det. Amp.	Fil.	2.0	0.06	135	....	3.0	0.8	....	35,000	20	....	
1B7GT	GT	7Z	Heptode	Conv.	Fil.	1.4	0.10	90	45	0	1.5	1.3	350,000	350♥	G_2=90 V. at 1.6 Ma.	1A7GT
1C6	ST-12	6L	Heptode	Converter	Fil.	2.0	0.12	135	67.5	3.0	1.3	2.5	600,000	300♥	G_2=135 V. at 3.1 Ma.■	
						2.0	0.12	180	67.5	3.0	1.5	2.0	700,000	325♥	G_2=180 V. at 4.0 Ma.■	
1C7G	ST-12	7Z	Heptode	Converter	Fil.	2.0	0.12	Same as 1C6.								
1D5G	ST-12	5R	Tetrode	R.F. Amp.	Fil.	2.0	0.06	180	67.5	3.0	2.3	0.7	600,000	750	....	1D5GP, 1D5GT
1D5GP	ST-12	5Y	Pentode	R.F. Amp.	Fil.	2.0	0.06	135	67.5	3.0	2.2	0.9	1 Meg.	625	....	
						2.0	0.06	180	67.5	3.0	2.3	0.8	1 Meg.	725	....	
1D5GT	ST-12	5R	Tetrode	R.F. Amp.	Fil.	2.0	0.06	135	67.5	3.0	2.2	0.7	350,000	625	....	
						2.0	0.06	180	67.5	3.0	2.2	0.7	600,000	650	....	
1D7G	ST-12	7Z	Heptode	Converter	Fil.	2.0	0.06	135	67.5	3.0	1.8	2.1	400,000	275♥	G_2=135 V. at 2.0 Ma.■	
						2.0	0.06	180	67.5	3.0	1.5	2.0	500,000	300♥	G_2=180 V. at 2.5 Ma.■	
1E5G	ST-12	5R	Tetrode	R.F. Amp.	Fil.	2.0	0.06	180	67.5	3.0	1.7	0.6	....	650	....	1E5GP, 1E5GT
1E5GP	ST-12	5Y	Pentode	R.F. Amp.	Fil.	2.0	0.06	135	67.5	3.0	1.6	0.7	1.5 Meg.	560	....	
						2.0	0.06	180	67.5	3.0	1.7	0.6	1.5 Meg.	650	....	
1E5GT	ST-12	5R	Tetrode	R.F. Amp.	Fil.	2.0	0.06	Same as Type 1E5G.								1E5GP
1E7GT	ST-12	8C	Pentode	Pwr. Amp.	Fil.	2.0	0.24	90	90	3.0	3.8	1.1	340,000	1,150	110	
						2.0	0.24	135	135	4.5	7.5	2.2	260,000	1,425	290	
				Push pull Max. Signal		2.0	0.24	135	135	7.5	10.5◆	3.5◆	24,000↓	....	575	
1F4	ST-14	5K	Pentode	Pwr. Amp.	Fil.	2.0	0.12	90	90	3.0	4.0	1.1	20,000	1,400	110	
						2.0	0.12	135	135	4.5	8.0	2.4	16,000	1,700	310	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.
◆Approximate.
↓Plate to Plate.
■Through 20,000 Ohms.
⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
1F5G	ST-14	6X	Pentode	Pwr. Amp.	Fil.	2.0	0.12	Same as 1F4.								
1F6	ST-12	6W	Duodi Pent.	R.F. Amp.	Fil.	2.0	0.06	180	67.5	1.5	2.2	0.7	1 Meg.◆	650	....	
1F7G	ST-12	7AD	Duodi Pent.	R.F. Amp.	Fil.	2.0	0.06	Same as 1F6.								
1F7GV	ST-12	7AF	Duodi Pent.	R.F. Amp.	Fil.	2.0	0.06	Same as 1F7G except diodes placed one above the other.								
1G5G	ST-14	6X	Pentode	Pwr. Amp.	Fil.	2.0	0.12	90	90	6.0	8.7	3.0	8,500	1,500	250	
						2.0	0.12	124	124	11.0	10.7	4.3	8,000	1,500	600	
						2.0	0.12	135	135	13.5	9.7	3.6	9,000	1,550	550	
1H4G	ST-12	5S	Triode	Amp.	Fil.	2.0	0.06	90	....	4.5	2.5	....	11,000	9.3	....	
						2.0	0.06	135	....	9.0	3.0	....	10,300	9.3	....	
						2.0	0.06	180	....	13.5	3.1	....	10,300	9.3	....	
1H6G	ST-12	7AA	Duodi Tri.	Amp.	Fil.	2.0	0.06	135	....	3.0	0.8	....	35,000	20	....	
1J5G	ST-14	6X	Pentode	Pwr. Amp.	Fil.	2.0	0.12	135	135	16.5	7.0	1.8	13,500	1,000	450	
1J6G	ST-12	7AB	Duo Tri.	Pwr. Amp.	Fil.	2.0	0.24	135	....	0	24	....	10,000♦	....	2,200◆	
						2.0	0.24	135	....	3.0	26	....	10,000♦	....	2,000◆	
						2.0	0.24	135	....	6.0	30	....	10,000♦	....	1,600◆	
1N6G	T-9	7AM	Diode Pent.	Pwr. Amp.	Fil.	1.4	0.05	90	90	4.5	3.1	0.6	25,000	800	100	
1Q6	T-3	8CO	Diode Pent.	Det. Amp.	Fil.	1.25	0.04	30	30	0	0.33	0.09	500,000	330	....	
						1.25	0.04	67.5	67.5	0	1.60	0.40	400,000	600	....	
1R4	Lock-In	4AH	H.F. Diode	Detector	Cath.	1.4	0.15	117 V. RMS			1.0		Resonant Frequency 1,500 Mc.			
1SA6GT	GT	6BD	Pentode	R.F. Amp.	Fil.	1.4	0.05	45	45	0	1.1	0.3	700,000	750	....	
								67.5	67.5	0	2.4	0.7	600,000	950	....	1N5GT
								90	67.5	0	2.45	0.68	800,000	970	....	
1SB6GT	GT	6BE	Di. Pent.	Det. Amp.	Fil.	1.4	0.05	45	45	0	0.6	0.16	900,000	500	....	1LD5
								90	67.5	0	1.45	0.38	700,000	665	....	
1V	ST-12	4G	Diode	H.W. Rect.	Cath.	6.3	0.30	350 V. RMS Plate, 45 Ma. DC Output.								76

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♦ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
2A3	ST-16	4D	Triode	Pwr. Amp.	Fil.	2.5	2.5	250 300	....	45.0 62.0	60 40 per tube	....	2,500 3,000⇩	4.2	3,500 15,000	2A3H
2A3H	ST-16	4D	Triode	Pwr. Amp.	Cath.	2.5	2.5	Same as Type 2A3.								2A3
2A4G	ST-12	5S	Gas Triode	Relay Tube	Fil.	2.5	2.5	Instantaneous Forward or Inverse Anode Volts=200, Peak Anode Amps.=1.25, Average Anode Current=0.1 Amp. Max., Avg. Time=45 sec. Cold Starting Time=2 sec.								
2A5	ST-14	6B	Pentode	Pwr. Amp.	Cath.	2.5	1.75	250 285	250 285	16.5 20.0	34 38	6.5 7.0	7,000 7,000	....	3,200 4,800	
2A6	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	2.5	0.80	250	....	2.0	0.9	....	91,000	100	....	
2A7, 2A7S	ST-12	7C	Heptode	Converter	Cath.	2.5	0.80	Same Characteristics as Types 6A7 or 6A8G.								
2B7, 2B7S	ST-12	7D	Diode Pent.	Det. Amp.	Cath.	2.5	0.80	100 250	100 100	3.0 3.0	5.8 6.0	1.7 1.5	300,000 800,000	950 1,000	....	
2E5	T-9	6R	Elect. Ray	Indicator	Cath.	2.5	0.80	Same Characteristics as Type 6E5.								
2S/4S	ST-12	5D	Duo Diode	Det.	Cath.	2.5	1.35	Approximate 40 Ma. Per Plate, 50 Ma. DC Output.								
2V3G	ST-12	4Y	Diode	H.W. Rect.	Fil.	2.5	5.0	6000 V. RMS Plate, 2 Ma. DC Output.								2X2A
2W3GT	GT	4X	Diode	H.W. Rect.	Fil.	2.5	1.50	350 V. RMS Plate, 55 Ma. DC Output, Cond. Filter Input.								
2Z2/G84	ST-12	4B	Diode	H.W. Rect.	Fil.	2.5	1.50	350 V. RMS Plate, 50 Ma. DC Output.								
G2/2S	.....	5D	Duo Diode	Det.	Cath.	2.5	1.75	....	....	....	....	....	....	....	....	2S/4S
3A5	Min.	7BC	Duo. Tri.	Amp.	Fil.	1.4 2.8	0.22 0.11	90 135	....	2.5 20.0	3.7 30.0	....	8,300 Push-Pull Class C R.F. Amp.	15	 2,000	
3B5GT	GT	7AQ	Beam Amp.	Amp.	Fil.	1.4 2.8	0.10 0.05	45 67.5	45 67.5	4.5 7.0	4.4 6.7	0.3 0.5	8,000 5,000	1,400 1,500	70 180	
3B7	Lock-In	7BE	Duotriode	Osc. Amp.	Fil.	2.8 1.4	0.11 0.22	135 180	Class AB_2 Class C	0 0	22.0 25.0	....	16,000⇩ R.F. Pwr. Amp. 2800 mw. at 25 mc., 1400 mw. at 125 mc.	20	1,500	
4A6G	ST-12	8L	Duo Tri.	Pwr. Amp.	Fil.	2.0 4.0	0.12 0.06	 90	....	.... 1.5	.... 10.8	Class B Amp.	P to P Load 8,000	20	1,000	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
⇩Plate to Plate
■Through 20,000 Ohms.

*Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
G4/4S	.....	5D	Duo. Di.	Det.	Cath.	2.5	1.0	....	....	....	....	....	....	....	....	2S/4S
5T4	Metal	5T	Duo Di.	F.W. Rect.	Fil.	5.0	2.0	450 V. RMS Per Plate, 225 Ma. DC Output, Cond. Input Filter. 550 V. RMS Per Plate, 225 Ma. DC Output, Choke Input Filter.								5U4G
5X3	ST-14	4C	Duodiode	Rect.	Fil.	5.0	2.0	400 AC V. Per Plate, RMS, 110 Ma. Output Current. Choke or Cond. Input to Filter. 1275 AC V. Per Plate, RMS, 30 Ma. Output Current. Choke or Cond. Input to Filter.								
KR5	ST-16	5B	Pentode	Pwr. Amp.	Fil.	6.3	0.30	135	135	9.0	14	2.5	9,500	1,900	700	6A4/LA
6A3	ST-16	4D	Triode	Pwr. Amp.	Fil.	6.3	1.00	250	....	45.0	60.0	....	2,500	4.2	3,200	
						6.3	1.00	325	....	68.0	40.0※	Fixed Bias	3,000♦	....	15,000	
						6.3	1.00	325	....	....	40.0※	Self Bias 850 Ohms	5,000♦	....	10,000	
6A4/LA	ST-14	5B	Pentode	Pwr. Amp.	Fil.	6.3	0.30	100	100	6.5	9.0	1.6	11,000	1,200	310	
								180	180	12.0	22.0	3.9	8,000	2,200	1,400	
6A6	ST-14	7B	Duo. Tri.	Pwr. Amp.	Cath.	6.3	0.8	300	....	0	35.0	Per Plate	8,000♦	Max. Signal	10,000	6N7G
				Driver	.....	6.3	0.8	250	....	5.0	6.0	....	11,300	35	....	
				Driver	.....	6.3	0.8	294	....	6.0	7.0	....	11,000	35	....	
6A7S	ST-12	7C	Heptode	Converter	Cath.	6.3	0.30	Same as Type 6A7.								6A7
6AB5/6N5	T-9	6R	Electron Ray	Indicator	Cath.	6.3	0.15	135§ Series Plate Resistor 0.25 Meg., Target Current 2.0 Ma., Grid Bias=10 for 0° Shadow.								
6AB6G	ST-12	7AU	Duo Tri.	Pwr. Amp.	Cath.	6.3	0.50	250	Inp. Tri.	0	5.0	....	....	....	....	
								250	Outp. Tri.	....	34.0	....	8,000	....	3,500	6N6G
6AB7/1853	Metal	8N	Pentode	Amp.	Cath.	6.3	0.45	300	200	3.0	12.5	3.2	700,000	5,000	....	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

※Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
6AD5GT	GT	6Q	Triode	Amp.	Cath.	6.3	0.30	250	....	2.0	0.9	....	66,000	100	....	
6AD6G	T-9	7AG	Electron Ray	Indicator	Cath.	6.3	0.15	100§	Ray Control Volts=45 for 0° Shadow,= −23 Volts for 135° Shadow.							
						6.3	0.15	150§	Ray Control Volts=75 for 0° Shadow,= −50 Volts for 135° Shadow.							
6AD7G	ST-14	8AY	Tri. Pent.	Tri. Amp.	Cath.	6.3	0.85	250	....	25	3.7	....	19,000◆	6	....	
				Pent. Amp.	.....	6.3	0.85	250	250	16.5	34.0	6.5	7,000	2,500	3,200	
6AE5GT	GT	6Q	Triode	Amp.	Cath.	6.3	0.30	95	....	15.0	7.0	....	3,500	4.2	....	
6AE6G	ST-12	7AH	Duo Plate Tri.	Remote Cut-Off	Cath.	6.3	0.15	250	....	1.5	6.5	....	25,000	25	....	
						6.3	0.15	250	....	35.0	0.01	....	....	....	....	
				Sharp Cut-Off	.....	6.3	0.15	250	....	1.5	4.5	....	35,000	33	....	
						6.3	0.15	250	....	9.5	0.01	....	....	....	....	
6AE7GT	GT	7AX	Duo. Tri.	Amp.	Cath.	6.3	0.50	250	....	13.5	5.0	....	9,300	14	Per Section	
								(Driver for P.P.6AC5GT=250 V. 10 Ma., 6AC5GT Plate Ma.=76. Output 9.5 Watts with 10,000 Ohms Load.)							
6AF5G	ST-12	6Q	Triode	Amp.	Cath.	6.3	0.30	180	....	18.0	7.0	....	4,900	7.4	....	
6AF6G	T-9	7AG	Twin Elec. Ray	Indicator	Cath.	6.3	0.15	100§	Ray Control Volts=60◆ for 0° Shadow, ◆Zero Volts for 100° Shadow.							
								135§	Ray Control Volts=81◆ for 0° Shadow, ◆Zero Volts for 100° Shadow.							
								250§	Ray Control Volts=155◆ for 0° Shadow, ◆Zero Volts for 100° Shadow.							
6AH5G	ST-16	6AP	Beam Amp.	Amp.	Cath.	6.3	0.90	350	250	18.0	54.0	2.5	4,200	5,200	10,800	6L6G
6AH7GT	GT	8BE	Duotriode	Amp.	Cath.	6.3	0.30	100	....	3.6	3.7	....	10,300	16	....	
				(per unit)	.....	6.3	0.30	180	....	6.5	7.6	....	8,400	16	....	
6AL6G	ST-16	6AM	Beam Amp.	Pwr. Amp.	Cath.	6.3	0.90	Same as 6L6G.								6L6G
6AN6	Min.	7BJ	Quadruple Di.	Rectifier	Cath.	6.3	0.20	75 Volts RMS Per Plate, 8 Ma. D-C Output Per Plate.								
6AQ7GT	GT	8CK	Duodiode Tri.	Det. Amp.	Cath.	6.3	0.30	250	....	2.0	2.3	....	44,000	70	....	
6B5	ST-14	6AS	Duo Tri.	Pwr. Amp.	Cath.	6.3	0.80	300	Inp. Tri.	0	8.0	....	....	....	....	
								300	Outp. Tri.	....	45.0	....	7,000	....	4,000	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

#Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
6B6G	ST-12	7V	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	250	....	20	0.9	....	91,000	100	....	6Q7GT
6B7, 6B7S	ST-12	7D	Duodi Pent.	R.F. or I.F. Amp.	Cath.	6.3	0.30	100	100	3.0	5.8	1.7	300,000	950	....	
						6.3	0.30	250	125	3.0	9.0	2.3	600,000	1,125	....	
6B8GT	GT	8E	Duodi Pent.	Det. Amp.	Cath.	6.3	0.30	Characteristics Same as Type 6B7.								
6C6	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.30	100	100	3.0	2.0	0.50	1 Meg.	1,185	....	77
						6.3	0.30	250	100	3.0	2.0	0.50	>1 Meg.	1,225	....	
				As Triode	.....	6.3	0.30	180	....	5.3	5.3	....	11,000	20	....	
						6.3	0.30	250	....	8.0	6.5	....	10,000	20	....	
6C7	ST-12	7G	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	250	....	9.0	4.5	....	16,000	20	....	6SR7GT
6C8G	ST-12	8G	Duo Tri.	Amp. Inv.	Cath.	6.3	0.30	250	....	4.5	3.2	....	22,500	36	....	
6D5G	.....	6Q	Triode	Pwr. Amp.	Cath.	6.3	0.70	275	....	40	31	....	7,200	4.7	1,400	
6D6	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.30	100	100	3.0	8.0	2.2	250,000◆	1,500	....	78
						6.3	0.30	250	100	3.0	8.2	2.0	800,000◆	1,600	....	
6D7	ST-12	7H	Pentode	Amp.	Cath.	6.3	0.30	Same as 6C6.								6C6
6D8G	ST-12	8A	Heptode	Converter	Cath.	6.3	0.15	135	67.5	3.0	1.5	1.7	600,000	325♥	G_2=135 V. at 1.8 Ma.	7A8
						6.3	0.15	250	100	3.0	3.5	2.6	400,000	550♥	G_2=250 V. at 4.5 Ma.■	
6E6	ST-14	7B	Duotriode	Pwr. Amp.	Cath.	6.3	0.60	180	....	20.0	11.5	....	15,000♦	6.0	750	
								250	....	27.5	18.0	....	14,000♦	6.0	1,600	
6E7	ST-12	7H	Pentode	Amp.	Cath.	6.3	0.30	Same as 6D6.								6D6
6F7, 6F7S	ST-12	7E	Tri. Pent.	Amp.	Cath.	6.3	0.30	100	(Tri.)	3.0	3.5	....	16,200	8.5	....	
								250	100	3.0	6.5	1.5	850,000	1,100	(Pent.)	
6F8G	ST-12	8G	Duo Tri.	Amp. Inv.	Cath.	6.3	0.60	250	....	8.0	9.0	....	7,700	20	....	6SN7GT
6G5/6H5	T-9	6R	Elect. Ray	Indicator	Cath.	6.3	0.30	....	....	0–22	....	....	....	....	....	6U5/6G5

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
6H4GT	GT	5AF	Diode	Rect.	Cath.	6.3	0.15	100	....	....	4.0	....	....	....	....	7A6
6H5	T-9	6R	Elect. Ray	Indicator	Cath.	6.3	0.30	Same as 6G5/6H5.								6U5/6G5
6J4	Min.	7BQ	Triode	Amp.	Cath.	6.3	0.4	150	....	Self	15.0	....	4,500	55	200 Ohm Cath. Bias Resistor	
6P7G	ST-12	7U	Pent. Tri.	Amp.	Cath.	6.3	0.30	Same as 6F7.								6F7
6Q6, 6Q6G	.....	6Y	Diode Tri.	Det. Amp.	Cath.	6.3	0.15	250	....	3.0	1.2	....	....	65	....	6T7G
6Q6G/6T7G	.....	7V	Duodi Tri.	Det. Amp.	Cath.	6.3	0.15	250	....	3.0	1.2	....	....	65	....	6T7G
6R6G	ST-12	6AW	Pentode	R.F. Amp.	Cath.	6.3	0.30	250	100	3.0	7.0	1.7	800,000◆	1,450	....	
6SV7	Metal	7AZ	Diode Pent.	.....	Cath.	6.3 6.3	0.30 0.30	100 250	100 150	1.0 1.0	3.7 7.5	1.4 2.8	700,000 1.5 Meg.	2,600 3,600	....	
6T5	ST-12	6R	Elect. Ray	Indicator	Cath.	6.3	0.30	250§	....	0–22	3.0	....	....	....	....	6U5/6G5
6T7G	ST-12	7V	Duodiode Tri.	Det. Amp.	Cath.	6.3	0.15	100 250	....	1.5 3.0	0.3 1.2	....	95,000 62,000	65 65	....	
6T7G/6Q6G	ST-12	7V	Duodi Tri.	Det. Amp.	Cath.	6.3	0.15	250	....	3.0	1.2	....	62,000	65	....	6T7G
6W5G	ST-12	6S	Duo Diode	F.W. Rect.	Cath.	6.3	0.90	325 V. RMS Per Plate, 90 Ma. DC Output, Cond. Input Filter. 450 V. RMS Per Plate, 90 Ma. DC Output, Choke Input Filter.								6X5G
6Y3G	ST-12	4AC	Diode	H.W. Rect.	Cath.	6.3	0.70	5000 A.C. Volts Per Plate RMS 7.5 Ma. Output Current.								2X2A
6Y5	ST-12	6J	Duo Diode	F.W. Rect.	Cath.	6.3	0.80	350 V. RMS Per Plate, 50 Ma. DC Output.								6X5G
6Y5V	ST-12	6J	Duo Diode	F.W. Rect.	Cath.	6.3	0.80	350 V. RMS Per Plate, 60 Ma. DC Output.								6X5G
6Z3	.....	4G	Diode	H.W. Rect.	Cath.	6.3	0.30	350 V. RMS Plate, 50 Ma. DC Output.								1V
6Z4, 6Z4/84	ST-12	5D	Duo Diode	F.W. Rect.	Cath.	6.3	0.50	350 V. RMS Per Plate, 60 Ma. DC Output, Cond. Input Filter.								6X5G
6Z5, 6Z5/12Z5	ST-12	6K	Duo Diode	F.W. Rect.	Cath.	6.3 12.6	0.80 0.40	230 V. RMS Per Plate, 60 Ma. DC Output.								6X5G 14Y4
6ZY5G	ST-12	6S	Duo Diode	F.W. Rect.	Cath.	6.3	0.30	325 V. RMS Per Plate, 40 Ma. DC Output, Cond. Input Filter.								6X5G or 14Y4
7A7LM	Metal	8V	Pentode	Amp.	Cath.	6.3	0.30	250	100	3.0	8.6	2.0	800,000◆	2,000	....	7A7

① Load Resistance for Power Output Tubes.
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♥ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Thro h 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
7AB7	Lock In	8BO	Pentode	Amp.	Cath.	6.3	0.15	250	100	2.0	4.0	1.3	500,000	1,800	....	
7B5LT	T-9	6AE	Pentode	Pwr. Amp.	Cath.	6.3	0.40	250 315	250 250	18.0 21.0	32.0 25.5	5.5 4.0	7,600 9,000	2,300 2,100	3,400 4,500	7B5
7B6LM	Metal	8W	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	100 250	....	1.0 2.0	0.4 0.9	....	110,000 91,000	100 100	....	7B6
7B8LM	Metal	8X	Heptode	Converter	Cath.	6.3	0.30	100 250	50 100	1.5 3.0	1.1 3.5	1.3 2.7	600,000 360,000	360♥ 550♥	G_2=100 V. at 2.0 Ma.■ G_2=250 V. at 4.0 Ma.■	7B8
7C4	Lock-In	4AH	H.F. Diode	Detector	Cath.	6.3	0.15	117 V. RMS			5.0	Resonant Frequency 900 Mc.				
7C5LT	T-9	6AA	Beam Amp.	Pwr. Amp.	Cath.	6.3	0.45	250 315	250 225	12.5 13.0	45.0 34.0	4.5 2.2	5,000 8,500	4,100 3,750	4,500 5,500	7C5
7T7	Lock-In	8V	Pentode	Amp.	Cath.	6.3 6.3	0.30 0.30	100 250	100 150	1.0 1.0	5.3 10.8	2.1 4.1	350,000 900,000	4,000 4,900	....	
10	ST-16	4D	Triode	Pwr. Amp.	Fil.	7.5	1.25	250 350 425	....	23.5 32.0 40.0	10.0 16.0 18.0	....	13,000 11,000 10,200	8.0 8.0 8.0	400 900 1,600	
WD11	T-8	4F	Triode	Det. Amp.	Fil.	1.1	0.25	45 Det. + Fil. 0.25 to 5.0 Meg. Grid Leak. 90 Amp.		4.5	2.5	....	15,500	6.6	....	
WX12	T-10	4D	Triode	Det. Amp.	Fil.	1.1	0.25	Same as WD11.								
12A, 112A	ST-14	4D	Triode	Det. Amp.	Fil.	5.0	0.25	90 135	....	4.5 9.0	5.0 6.2	....	5,400 5,100	8.5 8.5	35 130	
12A5	ST-12	7F	Pentode	Pwr. Amp.	Cath.	12.6 6.3	0.30 0.60	100 180	100 180	15.0 25.0	19.0 48.0	6.0 14.0	4,500 3,300	1,700 2,400	800 3,400	
12A6	Metal	7AC	Beam Amp.	Pwr. Amp.	Cath.	12.6	0.15	250	250	12.5	30	3.5	7,500	3,000	3,400	
12A6GT	T-9	7AC	Beam Amp.	Pwr. Amp	Cath.	12.6	0.15	Same as 12A6.								

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

*Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
12A7	ST-12	7K	Diode Pent.	Rect. Amp.	Cath.	12.6	0.30	125 V. RMS Plate, 30 Ma. DC Output (Rect.)								
								135	135	13.5	9.0	2.5	13,500	975	550	
12AH7GT	GT	8BE	Duotriode	Amp.	Cath.	12.6	0.15	100	....	3.6	3.7	....	10,300	16	....	
								180	....	6.5	7.6	....	8,400	16	....	
12B7	Lock In	8V	Pentode	Amp.	Cath.	12.6	0.15	Same as Lock In Type 14A7.								14A7
12B8GT	GT	8T	Triode	Tri. Amp.	Cath.	12.6	0.30	90	....	0.0	2.8	....	37,000	90	....	6AT6
			Pentode	Pent. Amp.	.....	....	....	90	90	3.0	7.0	2.0	200,000	1,800	....	6BA6
12C8	Metal	8E	Duodi Pent.	Det. Amp.	Cath.	12.6	0.15	See Type 6B8.								
12L8GT	GT	8BU	Duo Pentode	Pwr. Amp.	Cath.	12.6	0.15	110	110	5.5	6.1✱	1.3✱	14,000✱	1,680✱	300✱	
								180	180	9.0	13.0✱	2.8✱	10,000✱	2,150✱	1,000✱	
12Z3	ST-12	4G	Diode	H.W. Rect.	Cath.	12.6	0.30	235 V. RMS Per Plate, 55 Ma. DC Output, Condenser Input Filter.								
12Z5	.....	7L	Duo Diode	Rect. Doub.	Cath.	12.6	0.30	225 V. RMS Per Plate, 60 Ma. DC Output, Condenser Input Filter.								
13	.....	4C	Duo Diode	F.W. Rect.	Fil.	5.0	....	....	....	....	....	....	....	....	....	80
14Z3	.....	4G	Diode	H.W. Rect.	Cath.	14.0	0.30	250 V. RMS Plate, 60 Ma. DC Output.								12Z3
15	ST-12	5F	Pentode	Amp.	Cath.	2.0	0.22	135	67.5	1.5	1.85	0.3	800,000	750	....	
16, 16B	.....	4B	Diode	H.W. Rect.	Fil.	7.5	....	....	....	....	....	....	....	....	....	81
18	ST-14	6B	Pentode	Pwr. Amp.	Cath.	14.0	0.30	See Type 6F6G.								
19	ST-12	6C	Duo Tri.	Pwr. Amp.	Fil.	2.0	0.26	135	....	0	10.0	....	10,000⇩	....	2,100	
						2.0	....	135	....	3.0	3.4	....	10,000⇩	....	1,900	
						2.0	....	135	....	6.0	0.2	....	10,000⇩	....	1,600	
20	T-8	4D	Triode	Pwr. Amp.	Fil.	3.3	0.132	90	....	16.5	2.8	....	9,600	3.5	50	
								135	....	22.5	6.0	....	6,500	3.5	130	
22	ST-14	4K	Tetrode	Amp.	Fil.	3.3	0.132	135	67.5	1.5	3.7	1.3	250,000	500	....	
22AC	.....	5E	Tetrode	Amp.	Cath.	2.5	1.75	250	90	3.0	4.0	1.7	....	1,050	....	24A

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
⇩Plate to Plate.
■Through 20,000 Ohms.

✱Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction: Style	Construction: Base Diag.	Class	Use	Emitter: Type	Emitter: Volts	Emitter: Amp.	Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
24A, 24S	ST-14	5E	Tetrode	R.F. Amp.	Cath.	2.5 2.5	1.75 1.75	180 250	90 90	3.0 3.0	4.0 4.0	1.7 1.7	400,000 600,000	1,000 1,050	....	
25, 25S	.....	6M	Duodi Tri.	Det. Amp.	Fil.	2.0	0.06	135	....	3.0	1.0	....	....	20	....	1B5/25S
25A7GT	GT	8F	Di. Pent.	H.W. Rect. Pwr. Amp.	Cath.	25.0 25.0	0.30 0.30	117 100	A-C Volts Per Plate, RMS, 75 Ma. Output Current. 100	15.0	20.5	4.0	4,500	1,800	770	
25AC5GT	GT	6Q	Triode	Pwr. Amp. Dyn. Coup. Amp.	Cath.	25.0 25.0	0.30 0.30	110 165	.... Bias from 6AE5GT Driver	+15	45.0 46.0	....	15,200 2,000	58	 2,000	
25B5	ST-12	6D	Duo Tri.	Pwr. Amp.	Cath.	25.0	0.30	See Type 25N6G.								
25B6G	ST-14	7S	Pentode	Pwr. Amp.	Cath.	25.0	0.30	105 200	105 135	16.0 23.0	48.0 62.0	2.0 1.8	1,700 2,500	4,800 5,000	2,400 7,100	25A6GT
25D8GT	.....	8AF	Di. Tri. Pent.	Det. Amp.	Cath.	25.0	0.15	100 100	 100	1.0 3.0	.5 8.5	.... 2.7	....	100 1,900	(Tri.) (Pent.)	12AV6 and 12BD6
25N6G	ST-12	7W	Duo Tri.	Pwr. Amp.	Cath.	25.0	0.30	110 180	110* 100*	0 0	45 46	7.0* 5.8*	2,000 4,000	....	2,000 3,800	
25Y5	ST-12	6E	Duo Diode	Rect. Doub.	Cath.	25.0	0.30	117 V. RMS Per Plate, 75 Ma. DC Output, Per Plate. 235 V. RMS Plate, 75 Ma. DC Output Per Plate.								25Z5
KR25	.....	6B	Pentode	Pwr. Amp.	Cath.	2.5	1.75	250	250	16.5	3.4	6.5	7,000	2,200	3,000	2A5
26	ST-14	4D	Triode	Amp.	Fil.	1.5	1.05	90 180	....	7.0 14.5	2.9 6.2	....	8,900 7,300	8.3 8.3	....	
27, 27S	ST-12	5A	Triode	Amp. Detector	Cath.	2.5 2.5 2.5 2.5 2.5	1.75 1.75 1.75 1.75 1.75	90 135 180 250 250	....	6.0 9.0 13.5 21.0 30.0◆	3.0 4.7 5.0 5.2 Adjust Bias for 0.2 Ma. Plate Current Without Signal.	....	10,000 9,000 9,000 9,250	9.0 9.0 9.0 9.0	....	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.

◆Approximate.
‡Plate to Plate.
■Through 20,000 Ohms.

*Screen Listings refer to Input Triode.
⁂ Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
27HM	.....	5A	Triode	Amp.	Cath.	2.5	1.75	180	....	13.5	5.0	....	9,600	13	....	56
28Z5	Lock-In	6BJ	Double Diode	F.W. Rect.	Cath.	28.0	0.24	325	A-C Volts Per Plate, RMS, 100 Ma. Output Current. Condenser Input to Filter.							
						28.0	0.24	450	A-C Volts Per Plate, RMS, 100 Ma. Output Current, 6h Choke Input to Filter.							
KR28	.....	5D	Duo Diode	F.W. Rect.	Cath.	6.3	0.50	350 V. RMS, 50 Ma. DC Output.								84, 6Z4
30	ST-12	4D	Triode	Amp.	Fil.	2.0	0.06	90	....	4.5	2.5	....	11,000	9.3	....	
						2.0	0.06	135	....	9.0	3.0	....	10,300	9.3	....	
						2.0	0.06	180	....	13.5	3.1	....	10,300	9.3	....	
31	ST-12	4D	Triode	Pwr. Amp.	Fil.	2.0	0.13	135	....	22.5	8.0	....	7,000	3.8	185	
						2.0	0.13	180	....	30.0	12.3	....	5,700	3.8	375	
32	ST-14	4K	Tetrode	R.F. Amp.	Fil.	2.0	0.06	135	67.5	3.0	1.7	0.4	950,000	640	....	
						2.0	0.06	180	67.5	3.0	1.7	0.4	1.2 Meg.	650	....	
				Detector	.....	2.0	0.06	180	67.5	6.0◆	Adjust Bias for 0.2 Ma. Plate Current Without Signal.					
32L7GT	GT	8Z	Diode Beam Amplifier	Rectifier	Cath.	32.5	0.30	125 RMS Volts Per Plate, 60 Ma. Output Current. Condenser Input to Filter.								
				Pwr. Amp.	.....	32.5	0.30	110	110	7.5	40.0	3.0	2,600	6,000	1,000	
33	ST-14	5K	Pentode	Pwr. Amp.	Fil.	2.0	0.26	135	135	13.5	14.5	3.0	7,000	1,450	700	
						2.0	0.26	180	180	18.0	22.0	5.0	6,000	1,700	1,400	
34	ST-14	4M	Pentode	R.F. Amp.	Fil.	2.0	0.06	67.5	67.5	3.0	2.7	1.1	400,000	560	....	
						2.0	0.06	135	67.5	3.0	2.8	1.0	600,000	600	....	
						2.0	0.06	180	67.5	3.0	2.8	1.0	1 Meg.	620	....	
35/51, 35S/51S	ST-14	5E	Tetrode	R.F. Amp.	Cath.	2.5	1.75	180	90	3.0	6.3	2.5	300,000	1,020	....	
						2.5	1.75	250	90	3.0	6.5	2.5	400,000	1,050	....	
35A5LT	T-9	5AA	Beam Pwr.	Amp.	Cath.	35.0	0.15	110	110	7.5	40	3.0	2,500	5,800	1,500	35A5
35Z3LT	T-9	4Z	Diode	H.W. Rect.	Cath.	35.0	0.15	235 V. RMS Plate, 100 Ma. DC Output.								35Z3
35Z6G	ST-14	7Q	Duo Diode	Doub. Rect.	Cath.	35.0	0.30	117 V. RMS Plate, 110 Ma. DC Output.								

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
36, 36A	ST-12	5E	Tetrode	R.F. Amp.	Cath.	6.3	0.30	100	55	1.5	1.8	Not	550,000	850	....	
						6.3	0.30	135	67.5	1.5	2.8	over 1/3	475,000	1,000	....	
						6.3	0.30	180	90	3.0	3.1	Plate	500,000	1,050	....	
						6.3	0.30	250	90	3.0	3.2	Cur.	550,000	1,080	....	
				Detector	.....	6.3	0.30	250	20 to 25	6.0◆	Adjust Bias for .1 Ma. Plate Current Without Signal.					
37, 37A	ST-12	5A	Triode	Amp.	Cath.	6.3	0.30	90	....	6.0	2.5	....	11,500	9.2	....	
						6.3	0.30	135	....	9.0	4.1	....	10,000	9.2	....	
						6.3	0.30	180	....	13.5	4.3	....	10,200	9.2	....	
						6.3	0.30	250	....	18.0	7.5	....	8,400	9.2	....	
38, 38A	ST-12	5F	Pentode	Pwr. Amp.	Cath.	6.3	0.30	100	100	9.0	7.0	1.2	15,000	875	270	
						6.3	0.30	135	135	13.5	9.0	1.5	13,500	925	550	
						6.3	0.30	180	180	18.0	14.0	2.4	11,600	1,050	1,000	
						6.3	0.30	250	250	25.0	22.0	3.8	10,000	1,200	2,500	
39, 39/44, 39A	ST-12	5F	Pentode	R.F. Amp.	Cath.	6.3	0.30	90	90	3.0	5.6	1.6	375,000	960	....	
						6.3	0.30	180	90	3.0	5.8	1.4	750,000	1,000	....	
						6.3	0.30	250	90	3.0	5.8	1.4	1 Meg.	1,050	....	
40	ST-14	4D	Triode	Amp.	Fil.	5.0	0.25	135	....	1.5	0.2	....	150,000	30	....	
40Z5/45Z5GT	GT	6AD	Diode	H.W. Rect.	Cath.	45	0.15	Characteristics same as Type 35Y4.								
41	ST-12	6B	Pentode	Pwr. Amp.	Cath.	6.3	0.40	Characteristics same as Type 6K6GT and 7B5.								
42	ST-14	6B	Pentode	Pwr. Amp.	Cath.	6.3	0.65	Characteristics same as Type 6F6G.								
43	ST-14	6B	Pentode	Pwr. Amp.	Cath.	25.0	0.30	Characteristics same as Type 25A6GT.								
44	.....	5F	Pentode	Amp.	Cath.	6.3	0.30	See Type 39 or 39/44.								39/44
45	ST-14	4D	Triode	Pwr. Amp.	Fil.	2.5	1.5	180	....	31.5	31.0	....	2,700	3.5	830	
						2.5	1.5	250	....	50.0	34.0	....	3,900	3.5	1,600	
						2.5	1.5	275	....	56.0	36.0	....	4,600	3.5	2,000	
45A	.....	4D	Triode	Pwr. Amp.	Fil.	2.5	1.50	325	....	68	43	....	3,200	3.5	3,000	45

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

※Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
46	ST-16	5C	Dual Grid Triode	Pwr. Amp.	Fil.	2.5	1.75	250	Tie Gs to P	33.0	22.0	....	6,400	5.6	1,250	
				(Class B)	.....	2.5	1.75	300	Tie Gs to G	0	150 Peak per tube		5,200♦	2 Tubes	16,000	
				(Class B)	.....	2.5	1.75	400	Tie Gs to G	0	200 Peak per tube		5,800♦	2 Tubes	20,000	
47	ST-16	5B	Pentode	Pwr. Amp.	Fil.	2.5	1.75	250	250	16.5	31.0	6.0	7,000	2,500	2,700	2A5
48	ST-16	6A	Tetrode	Pwr. Amp.	Cath.	30.	0.40	95	95	20.0	52	12.0	1,500	3,900	2,000	
								125	100	22.5	52	12.0	1,500	3,900	3,000	
49	ST-14	5C	Dual Grid Tri.	Class A Amp.	Fil.	2.0	0.12	135	Gs to P	20	6.0	....	11,000	4.7	170	
				Class B Amp.	.....	....	....	180	Gs to G	0	4.0	2 tubes	12,000♦	....	3,500	
50	ST-16	4D	Triode	Pwr. Amp.	Fil.	7.5	1.25	300	....	54.0	35.0	....	4,600	3.8	1,600	
						7.5	1.25	350	....	63.0	45.0	....	4,100	3.8	2,400	
						7.5	1.25	400	....	70.0	55.0	....	3,670	3.8	3,400	
						7.5	1.25	450	....	84.0	55.0	....	4,350	3.8	4,600	
HZ50	.....	4G	Diode	H.W. Rect.	Cath.	12.6	0.30	250 V. RMS Plate, 60 Ma. DC Output.								12Z3
51, 51S	ST-14	5E	Tetrode	Amp.	Cath.	2.5	1.75	See Type 35, 35/51.								35
52	ST-14	5C	Dual Grid Tri.	Class A Amp.	Fil.	6.3	0.30	110	....	0	43	....	2,000	5.2	1,500	6A4/LA
				Class B Amp.	.....	....	....	180	2 Tube	0	3.0	....	10,000	....	5,000	
53	ST-14	7B	Duo. Tri.	Pwr. Amp.	Cath.	2.5	2.0	Characteristics same as Type 6N7GT.								
55	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	2.5	1.0	Characteristics same as Type 6V7G.								
55S	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	2.5	1.00	250	....	20	8.0	....	7,500	8.3	350	55
56, 56S	ST-12	5A	Triode	Amp.	Cath.	2.5	1.0	250	....	13.5	5.0	....	9,500	13.8	....	
				Det.	.....	2.5	1.0	250	....	20.0◆	Adjust Bias for 0.2 Ma. Plate Current Without Signal.					
56AS	ST-12	5A	Triode	Amp.	Cath.	6.3	0.40	250	....	13.5	5.0	....	9,500	13.8	....	76

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

*Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
57, 57S	ST-12	6F	Pentode	Amp.	Cath.	2.5	1.0	100	100	3.0	2.0	0.5	1 Meg.	1,185	....	
						2.5	1.0	250	100	3.0	2.0	0.5	1 Meg.	1,225	....	
				Det.	.....	2.5	1.0	250†	100	4.3◆	Adjust Bias for 0.1 Ma Plate Current Without Signal.					
57AS	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.40	250	100	3.0	2.0	0.5	1 Meg.	1,225	....	6C6
58, 58S	ST-12	6F	Pentode	Amp.	Cath.	2.5	1.0	100	100	3.0	8.0	2.2	250,000	1,500	....	
						2.5	1.0	250	100	3.0	8.2	2.0	800,000	1,600	....	
58AS	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.40	250	100	3.0	8.2	2.0	800,000	1,600	....	6D6-78
59	ST-16	7A	Pentode	Pwr. Amp.	Cath.	2.5	2.0	250	250	18.0	35.0	9.0	6,000	2,500	3,000	
				Triode	.....	2.5	2.0	250	Tie Gs to P	28.0	26.0	....	5,000	2,600	1,250	
				Triode—Class B	.....	2.5	2.0	300	Tie Gs to G	0	10.0✱	....	4,600♦	....	15,000 (2 tubes)	
				Triode—Class B	.....	2.5	2.0	400	and Su to P	0	13.0✱	....	6,000♦	....	20,000 (2 tubes)	
59B	.....	7M	Pentode	Pwr. Amp.	Fil.	2.5	2.0	250	250	18.0	35.0	9.0	6,000	....	3,000	(See Type 59)
64, 64A	.....	5E	Tetrode	Amp.	Cath.	6.3	0.40	180	90	3.0	3.1	1.5	500,000	1,050	....	36
65, 65A	.....	5E	Tetrode	Amp.	Cath.	6.3	0.40	180	90	3.0	4.5	1.3	750,000	1,000	....	39/44
67, 67A	.....	5A	Triode	Det. Amp.	Cath.	6.3	0.40	180	....	13.5	4.3	....	10,200	9.2	....	37
68, 68A	.....	5E	Pentode	Pwr. Amp.	Cath.	6.3	0.40	135	90	13.5	14	3.0	7,500	1,400	650	38
70A7GT	T-9	8AB	Di. Beam Amp.	H.W. Rect.	Cath.	70.0	0.15	125 V. RMS Plate, 60 Ma. Output.								70L7GT
				Pwr. Amp.	.....	....	....	110	110	7.5	40	3.0	2,500	5,800	1,500	
71	ST-14	4D	Triode	Pwr. Amp.	Fil.	5.0	0.50	180	....	40.5	20	....	4,800	3	790	71A
71A	ST-14	4D	Triode	Pwr. Amp.	Fil.	5.0	0.25	90	....	16.5	10.0	....	3,000	3	125	
						5.0	0.25	135	....	27.0	17.3	....	3,000	3	400	
						5.0	0.25	180	....	40.5	20.0	....	4,800	3	790	
71B	ST-14	4D	Triode	Pwr. Amp.	Cath.	5.0	0.125	180	....	40.5	20	....	4,800	3	790	71A

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

†Applied through 250,000 Ohms.
✱Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
75, 75S	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	250	....	2.0	0.9	....	91,000	100	....	
76	ST-12	5A	Triode	Amp.	Cath.	6.3	0.30	100	....	5.0	2.5	....	12,000	13.8	....	
						6.3	0.30	250	....	13.5	5.0	....	9,500	13.8	....	
				Det.	.....	6.3	0.30	250	....	20.0◆	Adjust Bias for 0.2 Ma Plate Current Without Signal.					
77	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.30	100	60	1.5	1.7	0.4	600,000◆	1,100	....	
						6.3	0.30	250	100	3.0	2.3	0.5	>1.0 Meg.	1,250	....	
78	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.30	90	90	3.0	5.4	1.3	300,000	1,275	....	
						6.3	0.30	180	75	3.0	4.0	1.0	1 Meg.	1,100	....	
						6.3	0.30	250	100	3.0	7.0	1.7	800,000	1,450	....	
						6.3	0.30	250	125	3.0	10.5	2.6	600,000	1,650	....	
79	ST-12	6H	Duo Tri.	Pwr. Amp.	Cath.	6.3	0.60	250	Class B	0	21.0	Both Triodes	14,000♦	....	8,000	6N7
80M	.....	4C	Duo Di. M.V.	F.W. Rect.	Fil.	5.0	2.00	450 V. RMS Per Plate, 125 Ma. DC Output.								80
81, 81M	ST-16	4B	Diode	H.W. Rect.	Fil.	7.5	1.25	700 A-C Volts Per Plate, RMS, 85 Ma. Output Current. Condenser Input to Filter.								
82V	.....	....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	82
84/6Z4	ST-12	5D	Duodiode	F.W. Rect.	Cath.	6.3	0.50	325 A-C Volts Per Plate, RMS, 60 Ma. Output Current. Condenser Input to Filter.								
						6.3	0.50	450 A-C Volts Per Plate, RMS, 60 Ma. Output Current. 10h Choke Input to Filter.								
G84	.....	4B	Diode	H.W. Rect.	Fil.	2.5	1.50	350 V. RMS Plate, 50 Ma. DC Output.								2Z2/G84
G84/2Z2	.....	4B	Diode	H.W. Rect.	Fil.	2.5	1.50	350 V. RMS Plate, 50 Ma. DC Output.								2A6
85	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	Characteristics same as Type 6V7G.								6V7G
85AS	ST-12	6G	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	250	....	9.0	4.5	....	16,000	20	....	85
88	.....	4C	Duo Diode	F.W. Rect.	Fil.	5.0	2.00	450 V. RMS Per Plate, 125 Ma. DC Output.								83V
89	ST-12	6F	Pentode	Pwr. Amp.	Cath.	6.3	0.40	180	180	18.0	20.0	3.0	8,000	1,550	1,500	
				Triode	.....	6.3	0.40	160	Gs+Su to P	20.0	17.0	....	7,000	4.7	300	
				Triode Class B	.....	6.3	0.40	180	Tie Su to P	0	3.0	....	9,400♦	Tie Gs to G	3,500 (2 tubes)	

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
VR90/30	ST-12	4AJ	Diode	Voltage Reg.	Cold K	....	....	See Type 0B3.								0B3
95	.....	6B	Pentode	Pwr. Amp.	Cath.	2.5	1.75	315	315	22.0	42	8.0	7,000	2,300	5,000	2A5
96	.....	4G	Diode	H.W. Rect.	Cath.	10.0	0.50	350 V. RMS Plate, 100 Ma. DC Output.								1V
98	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	84
V99	T-8	4E	Triode	Det. Amp.	Fil.	3.3	.063	90	....	4.5	2.5	....	15,500	6.6	....	
X99	T-9	4D	Triode	Det. Amp.	Fil.	3.3	.063	Same as V99.								
VR105/30	ST-12	4AJ	Diode	Voltage Reg.	Cold K	....	....	See Type OC3.								OC3
117P7GT	GT	8AV	Diode Beam Amp.	H.W. Rect. Pwr. Amp.	Cath.	117.0	0.09	117 V. RMS Plate, 75 Ma. DC Output. 105	 105	 5.2	 43	 4.0	 4,000	 5,300	 850	
117Z4GT	GT	5AA	Diode	H.W. Rect.	Cath.	117	0.04	117 V. RMS Plate, 90 Ma. DC Output.								
143D	.....	.....	Diode	H.W. Rect.	.....	....	....	....	....	....	....	....	....	....	....	2X2
VR150/30	ST-12	4AJ	Diode	Voltage Reg.	Cold K	....	....	See Type OD3.								OD3
182B/482B	ST-14	4D	Triode	Pwr. Amp.	Fil.	5.0	1.25	250	....	35.0	20	....	4,500	5.0	1,350	71A or 45
183/483	ST-14	4D	Triode	Pwr. Amp.	Fil.	5.0	1.25	250	....	65.0	20	....	4,500	3.0	1,800	71A or 45
210T	ST-16	4D	Triode	Pwr. Amp.	Fil.	7.5	1.25	Standard Type 10 with Ceramic Base, See Type 10 Characteristics.								
288	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	83V
401	.....	4D	Triode	Det. Amp.	Cath.	3.0	1.35	90	....	3.0	5.0	....	9,500	9.5	....	27
482A	.....	4D	Triode	Pwr. Amp.	Fil.	5.0	0.80	200	....	45.0	18	....	4,500	2.0	1,500	71A
482B	.....	4D	Triode	Pwr. Amp.	Fil.	5.0	1.25	250	....	35.0	18	....	4,500	5.0	1,500	182B/482B
483	.....	4D	Triode	Pwr. Amp.	Fil.	5.0	1.25	250	....	65.0	20	....	4,500	3.0	2,000	183/483
484	.....	5A	Triode	Det. Amp.	Cath.	2.8	1.60	180	....	9.0	6.0	....	9,300	12.5	....	485
485	ST-12	5A	Triode	Det. Amp.	Cath.	3.0	1.25	180	....	9.0	5.8	....	8,900	12.5	....	27
585	.....	4D	Triode	Pwr. Amp.	Fil.	7.5	1.25	450	....	84.0	55	....	4,350	3.8	4,600	50

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp									
586	.....	4D	Triode	Pwr. Amp.	Fil.	7.5	1.25	450	....	84.0	55	....	4.350	3.8	4,600	50
P861	.....	5D	Duo Diode	F.W. Rect.	Cath.	6.3	0.50	225 V. RMS Per Plate, 50 Ma. DC Output.								84
864	T-9	4D	Triode	Amp.	Fil.	1.1	0.25	90 135	....	4.5 9.0	2.9 3.5	....	13,500 12,700	8.2 8.2	....	
879	ST-12	4AB	Diode	H.W. Rect.	Cath.	2.5	1.75	Now known as 2X2A.								2X2A
950	.....	5K	Pentode	Pwr. Amp.	Fil.	2.0	0.125	135	135	16.5	5.5	2.0	13,500	950	575	33
951	.....	4K	Tetrode	Amp.	Fil.	2.0	0.60	180	67.5	3.0	1.7	0.4	1.2 Meg.	650	....	1B4P
1201	Lock In	8BN	Triode	Osc. Amp.	Cath.	6.3	0.15	See Type 7E5.								
1203A	Lock In	4AH	H.F. Diode	Det.	Cath.	6.3	0.15	See Type 7C4.								
1204	Lock In	8BO	Pentode	Amp.	Cath.	6.3	0.15	See Type 7AB7.								
1206	Lock In	8BV	Duo Tetrode	R.F. Amp.	Cath.	6.3	0.30	See Type 7G8.								
1221	ST-12	6F	Pentode	Amp.	Cath.	6.3	0.30	Non Microphonic, See 6C6.								
1223	ST-12	7R	Pentode	Amp.	Cath.	6.3	0.30	Non Microphonic, See 6C6.								
1229	ST-12	4K	Tetrode	.....	Fil.	2.0	0.06	Special Type 32. Made for Low Grid Current Applications.								
1231	Lock In	8V	Pentode	Amp.	Cath.	6.3	0.45	300	150	200 Ohms	10.0	2.5	700,000	5,500	(Cath. Resistor)	
1232	Lock In	8V	Pentode	Amp.	Cath.	6.3	0.45	See Type 7G7.								
1265	ST-12	4AJ	Diode	Voltage Reg.	Cold K	....	....	Starting Voltage=135, Operating Voltage=90, Operating Current=5 to 30 Ma.								
1266	T-9	4AJ	Diode	Voltage Reg.	Cold K	....	....	Similar to Type OB3/VR-90-30, Except Regulating at 70 Volts.								
1267	T-9	4V	Gas Triode	Relay Tube	Cold K	....	....	Similar to Type OA4G.								OA4G
1275	ST-16	4C	Duodiode	Rect.	Fil.	5.0	1.75	Similar to Type 5Z3.								
1276	ST-16	4D	Triode	Amp.	Fil.	4.5	1.14	Similar to Type 6B4G.								
1291	Lock In	7BE	Duo Triode	Osc. Amp.	Fil.	1.4 2.8	.220 .110	See Type 3B7.								

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.
◆Approximate.
♦Plate to Plate
■Through 20,000 Ohms.
⁂Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
1293	T-9	4AA	Triode	Oscillator	Fil.	1.4 1.4	0.11 0.11	90 90	....	0 20	5.2 13.25	....	....	15 (120 Mc. Oscillator, Rg=10,000 Ohms)	....	
1294	Lock In	4AH	H.F. Diode	Det.	Cath.	1.4	.150	See Type 1R4.								
1299	Lock In	6BA	Beam Amp.	Pwr. Amp.	Fil.	1.4 2.8	.220 .110	See Type 3D6.								
1612	Metal	7T	Heptode	Mixer Amp.	Cath.	6.3	0.30	Non Microphonic, See 6L7.								
1626	ST-12	6Q	Triode	Osc. Amp.	Cath.	12.6	0.25	250	....	....	25 max.	....	....	5	4,000	
1629	T-9	7AL	Electron Ray	Indicator	Cath.	12.6	0.15	Same as Type 6E5.								
9002	Min.	7BS	Triode	Amp.	Cath.	6.3	0.15	250	....	7.0	6.3	....	11,400	25	....	
9003	Min.	7BD	Pentode	R.F. Amp.	Cath.	6.3	0.15	250	100	3.0	6.7	2.7	700,000	1,800	....	
AD	.....	4G	Diode	H.W. Rect.	Cath.	6.3	0.30	350 V. RMS Plate, 50 Ma. DC Output.								1V
AF	.....	4C	Duo Diode	F.W. Rect.	Fil.	2.5	3.00	500 V. RMS Per Plate, 125 Ma. DC Output.								82
AG	.....	4C	Duo Diode	F.W. Rect.	Fil.	5.0	3.00	500 V. RMS Per Plate, 250 Ma. DC Output.								83
AX	.....	4D	Triode	Det. Amp.	Fil.	5.0	0.25	135	....	9.0	....	....	20,000	8	55	01A
B	.....	4E	Triode	Det. Amp.	Fil.	3.3	0.063	90	....	4.5	2.5	....	15,500	6.6	....	V99
BA	.....	4J	Duo Diode	F.W. Rect.	Cold K	....	....	350 V. RMS Per Plate, 350 Ma. DC Output.								
BH	.....	4J	Duo Diode	F.W. Rect.	Cold K	....	....	350 V. RMS Per Plate, 125 Ma. DC Output.								0Z4
BR	.....	4H	Diode	H.W. Rect.	Cold K	....	....	300 V. RMS Plate, 50 Ma. DC Output.								0Z4
D½	.....	4B	Diode	H.W. Rect.	Fil.	7.5	1.25	700 V. RMS Plate, 85 Ma. DC Output.								81
D1	.....	4C	Duo Diode	F.W. Rect.	Fil.	5.0	2.00	350 V. RMS Per Plate, 125 Ma. DC Output.								80
DE1	.....	5A	Triode	Det. Amp.	Cath.	2.5	1.75	250	....	21.0	5.2	....	34,000	9	300	27
E	.....	4D	Triode	Pwr. Amp.	Fil.	3.3	0.132	135	....	22.5	6.5	....	6,500	3.3	110	20
G	.....	4D	Triode	Amp.	Fil.	5.0	0.25	180	....	3.0	0.2	....	150,000	30	....	40

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
▼ Conversion Conductance.

◆Approximate.
♦Plate to Plate.
■Through 20,000 Ohms.

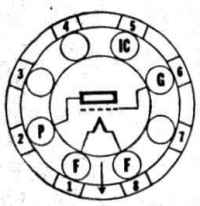
※Per Tube or Section—No Signal.
§Plate and Target Supply.

OBSOLETE AND SELDOM ENCOUNTERED TYPES—Cont.

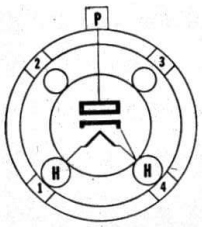
Type	Construction		Class	Use	Emitter			Plate Volts	Screen Volts	Neg. Grid Volts	Plate Current Ma.	Screen Current Ma.	Plate ① Resistance Ohms	Amp. ② Factor	Power Output Mw.	Suggested Replacement Type
	Style	Base Diag.			Type	Volts	Amp.									
H	.....	4D	Triode	Det. Amp.	Fil.	5.0	0.25	45	....	0	1.5	....	31,500	20	....	01A
H2-10	.....	4AB	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	2X2/879
LA	.....	5B	Pentode	Pwr. Amp.	Fil.	6.3	0.30	180	180	12.0	22	3.9	8,000	2,200	1,400	6A4
PZ	.....	5B	Pentode	Pwr. Amp.	Fil.	2.5	1.75	250	250	16.5	31	6.0	7,000	2,500	2,700	47
PZH	.....	6B	Pentode	Pwr. Amp.	Cath.	2.5	1.75	250	250	16.5	34	6.5	7,000	2,200	3,000	2A5
RE1	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	80
RE2	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	81
S02	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	50
Wunderlich A Auto	.....	6N	Dual Grid	Det.	Cath.	6.3	0.40	250	....	16.5	7.0	....	10,200	9.2	....	
Wunderlich A	.....	5H 6N	Dual Grid	Det.	Cath.	2.5	1.00	250	....	16.5	7.0	....	10,200	9.2	....	
Wunderlich B	.....	6P	Special	Det.	Cath.	2.5	1.00	250	....	....	17.0	....	....	....	....	
X6030	Lock In	X6030	Diode	Noise Diode	Fil.	3.0m	0.6	90 250 1400	....	....	4.0 3.0 0.535	....	....	....	....	
XXB	Lock In	7BW	Duo Triode	Amp.	Fil.	1.4	0.10	90	....	0	4.5	....	11,200	14.5	....	
XXD	Lock In	8AC	Duo Triode	Amp.	Cath.	12.6	0.15	See Type 14AF7/XXD.								
XXFM	Lock In	8BZ	Duodi Tri.	Det. Amp.	Cath.	6.3	0.30	See Type 7X7.								
XXL	Lock In	5AC	Triode	Amp.	Cath.	6.3	0.30	100 250	....	0 8.0	10.0 8.0	....	7,000 8,700	25 20	....	7A4

① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.
◆Approximate.
♦Plate to Plate.
■Through 20,000 C
*Per Tube or Section—No Signal.
§Plate and Target Supply.

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES



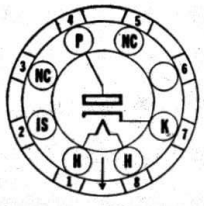
4AA



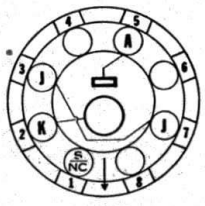
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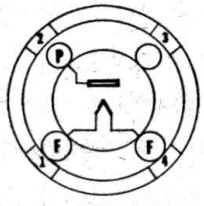
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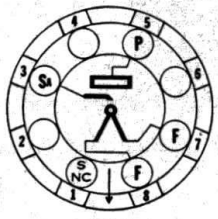
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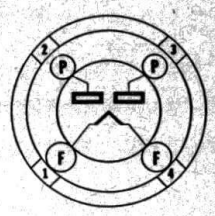
4AJ



4B



4BU



4C



4D



4E

4F

1	F
2	P
3	F
4	G



4G

4H

1	K
2	J
3	J
4	A

4J

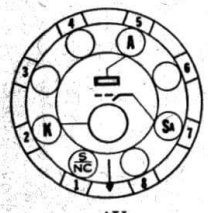
1	Al
2	K
3	NC
4	A2



4K



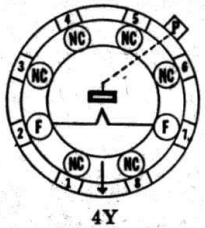
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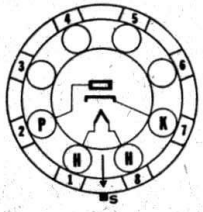
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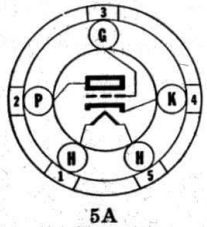
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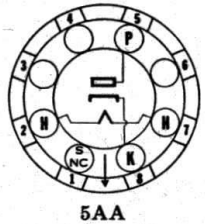
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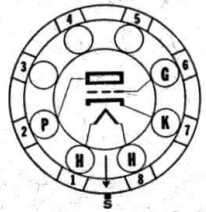
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5A



5AA

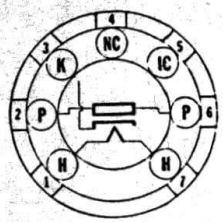


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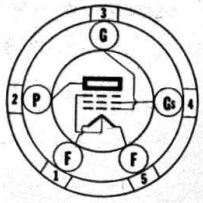


5AF

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.



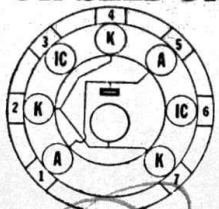
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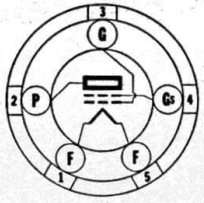
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5BF



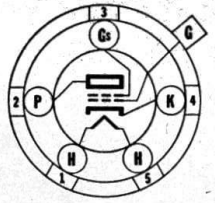
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5C



5D



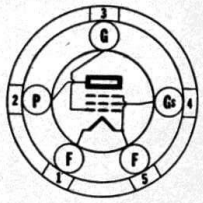
5E



5F

5H

1	H
2	G
3	P
4	G
5	H
Cap	K



5K

5N

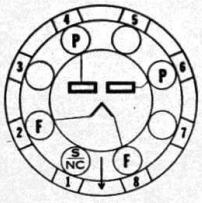
1	J
2	A
3	A
4	K
5	J



5R



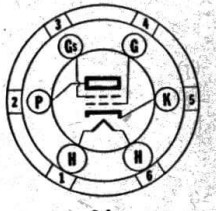
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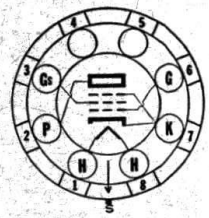
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5Y



6A



A



6AD

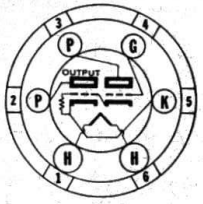




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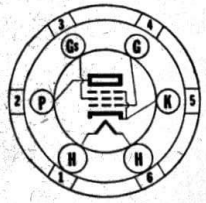








BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.



6B



6BA



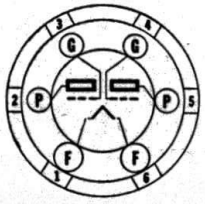
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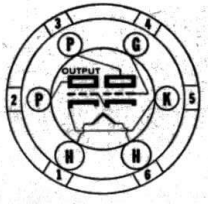
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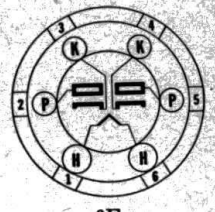
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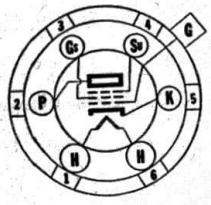
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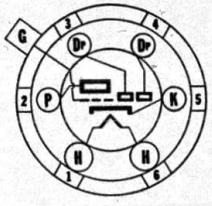
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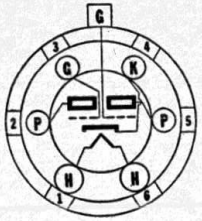
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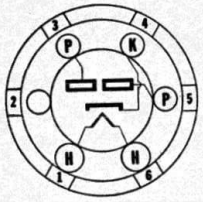
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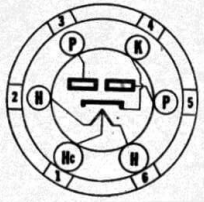
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6H



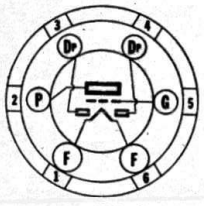
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6K



6L



6M

6N

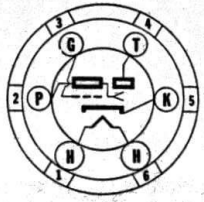
1	H
2	P
3	G
4	G
5	K
6	H

6P

1	H
2	P
3	G
4	G
5	K
6	H
Cap	Gs



6Q



6R



6S



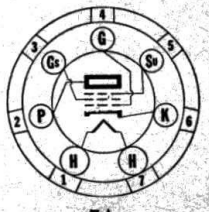
6W



6X

6Y

1	NC
2	H
3	P
4	NC
5	D
6	NC
7	H
8	K
Cap	G



7A

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.



7AA



7AB



7AC



7AD



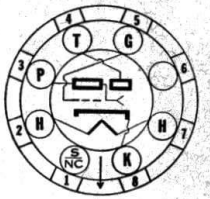
7AF



7AG



7AH



7AL



7AM



7AQ



7AU



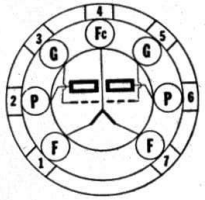
7AX



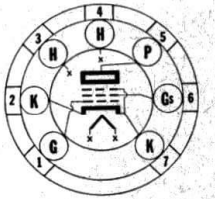
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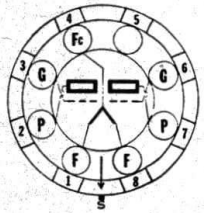
7B



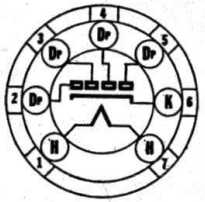
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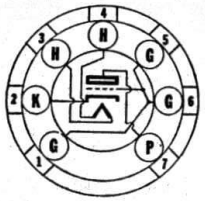
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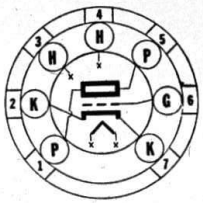
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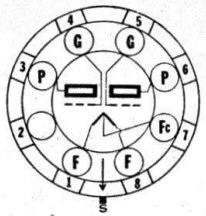
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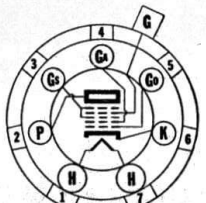
7BQ



7BS



7B

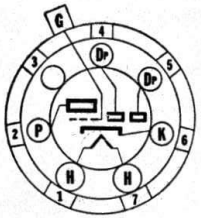




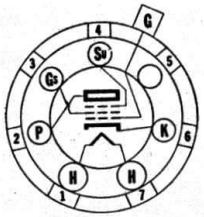




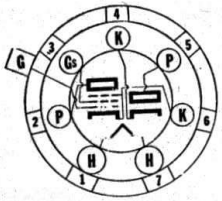
7F



7G



7H



7K

7L

1	H
2	P2
3	K2
4	Hc
5	Kl
6	Pl
7	H

7M

1	F
2	P
3	Gs
4	G
5	SU
6	NC
7	F



7Q



7R



7S



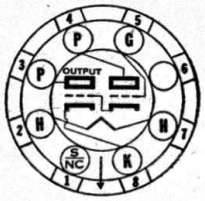
7T



7U



7V



7W



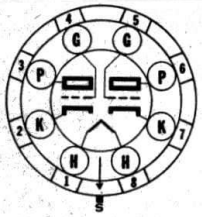
7Z



8A



8AB



8AC



8AF



8AV



8AY



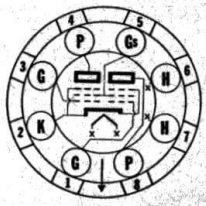
8BE



8BN

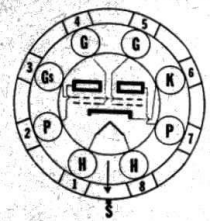


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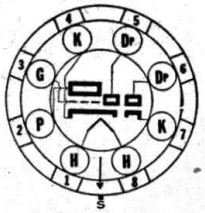


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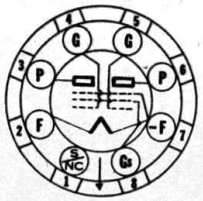
BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.



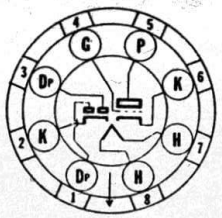
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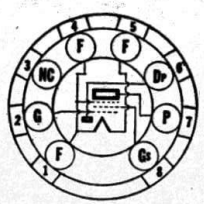
8BZ



8C



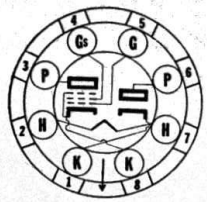
8CK



8CO



8E



8F



8G



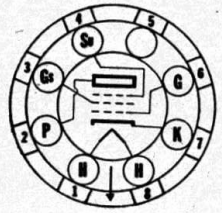
8L



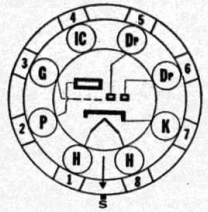
8N



8T



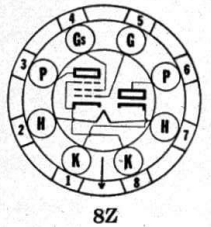
8V



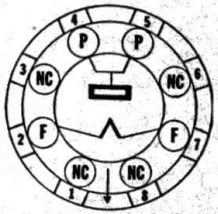
8W



8X



8Z



X6030

SYLVANIA PANEL LAMPS

A complete line of Sylvania Panel Lamps, especially designed for radio dials, tuning meters, flash-tuning arrangements, and the like, is now available. A market for some types of these lamps will also be found in flashlights, parking lights, auto panel boards, record players, pin-ball machines, and wherever a miniature lamp of this style is required.

The early types of panel lamps were used primarily as on-or-off indicators in radio receivers. Present-day panel lamps must be constructed to withstand speaker vibrations, have noise-free operation, current drain within the required limit (particularly when used in ac-dc receivers and battery receivers), and to provide shadowless illumination. Sylvania radio panel lamps have been constructed for all these requirements.

The replacement of panel lamps should be made with lamps having the same type number. This is particularly true in tuning meters, battery, and ac-dc receiver replacements. Sylvania Type S47 is the same as other lamps marked 40A. Lamps marked 49A may be replaced with Sylvania Type S49. Type S292 is mainly for use in 2.5 volt receivers where the line voltage is high and when regular 2.5 volt lamps will not give satisfactory life.

The filament wires of all standard panel lamps are mounted through a small colored glass bead located above the bulb press. If the markings on the lamp to be replaced are not legible, the bead color may be used as identification, since the color identifies the lamp type. The bead color of each lamp is shown in the tabulated data below, and it will be noted that in some cases the bead colors identify more than one particular type of lamp. In these cases other means of identification will be required, such as comparison of bulb, base, and circuit voltage.

CHARACTERISTICS

Type No.	Circuit Volts	Design		Bead Color	Bulb Style	Miniature Base	Usual Service	Type No.
		Volts	Amp.					
S40	6–8	6.3	0.15	Brown	T-3¼	Screw	Radio Dials	S40
S41	2.5	2.5	0.50	White	T-3¼	Screw	Radio Dials	S41
S42	3.2	3.2	0.35	Green	T-3¼	Screw	Radio Dials	S42
S43	2.5	2.5	0.50	White	T-3¼	Bayonet	Radio Dials and Tuning Meters	S43
S44	6–8	6.3	0.25	Blue	T-3¼	Bayonet	Radio Dials and Tuning Meters	S44
S45	3.2	3.2	0.35	White	T-3¼	Bayonet	Radio Dials	S45
S46	6–8	6.3	0.25	Blue	T-3¼	Screw	Radio Dials and Tuning Meters	S46
*S47	6–8	6.3	0.15	Brown	T-3¼	Bayonet	Radio Dials	*S47
S48	2.0	2.0	0.06	Pink	T-3¼	Screw	Battery Set Dials	S48
*S49	2.0	2.0	0.06	Pink	T-3¼	Bayonet	Battery Set Dials	*S49
S50	6–8	7.5	0.20	White	G-3½	Screw	Auto Sets Flash Lights	S50
S51	6–8	7.5	0.20	White	G-3½	Bayonet	Auto Sets, Auto Panels	S51
S55	6–8	6.5	0.40	White	G-4½	Bayonet	Auto Sets, Parking Lights	S55
S292	2.9	2.9	0.17	White	T-3¼	Screw	Radio Dials	S292
S292A	2.9	2.9	0.17	White	T-3¼	Bayonet	Radio Dials Coin Machines	S292A
S1455	18.0	18.0	0.25	Brown	G-5	Screw	Coin Machines	S1455
S1455A	18.0	18.0	0.25	Brown	G-5	Bayonet	Coin Machines	S1455A

*Sylvania Types S47 and S49 are interchangeable with Types 40A and 49A, respectively, in other brands.

SYLVANIA BALLAST TUBES AND PLUG-IN RESISTORS

Ballast Tubes and Plug-in Resistors form two divisions based upon differences in construction and regulating characteristics. The first group is employed mainly in battery operated receivers to maintain substantially constant current over a considerable range of battery voltage variation. The second group is used in ac-dc receivers and 32-volt sets where the voltage drop required may cover a wide range. Such a resistor tube affords some amount of regulation, but the characteristic is not as flat as for regulators intended for use in battery receivers. These should be operated as closely as possible to the standard current ratings in order to realize the most efficient performance.

The tubes for use in battery sets are designed to permit the operation of 2-volt types from a 3-volt battery source which may consist of two banks of dry cells in parallel, the banks being connected in series. The supply voltage varies from about 3.4 volts to 2.2 volts during the life of the batteries. For this range of supply voltage the types listed below will maintain the socket terminal voltage between 1.8 and 2.2 volts. During the major part of battery life the socket voltage remains very close to the rated value of 2.0 volts.

Due to the confusion in ballast and resistor tube type numbers there has been considerable misunderstanding as to the correct type of tube to be used for replacement purposes in receivers. All the Sylvania ballast tubes listed will replace any ballast tubes having the same type numbers. Furthermore, Sylvania ballast tubes will also replace any ballast tubes for similar service, regardless of designating type numbers, providing the filament current load is identical and the basing arrangement is the same. The same is true for the Sylvania resistor types employed in ac-dc service provided that, in addition, the average voltage drop is also the same.

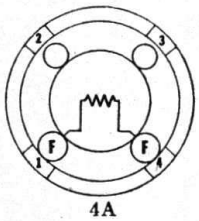
To determine the filament current load in series with the ballast tube it is necessary to include the total filament current drain of the receiver tubes plus the current drain of the dial light if the latter is employed. For example, a set using a Type 19, a Type 30, and 3 Type 34 tubes has a normal filament current drain of 500 milliamperes. The correct ballast tube would be a Type 1A1.

CHARACTERISTICS

Type	Use	Ma. Load Current	Average Voltage Drop*	Bulb	Base
1A1/5E1	Battery	500	1.0	ST-12	4-A
1B1	Battery	360	1.0	ST-12	4-A
1C1	Battery	745	1.0	ST-12	4-A
1D1	Battery	240	1.0	ST-12	4-A
1E1	Battery	480	1.0	ST-12	4-A
1F1	Battery	720	1.0	ST-12	4-A
1G1	Battery	420	1.0	ST-12	4-A
1J1	Battery	620	1.0	ST-12	4-A
1K1	Battery	550	1.0	ST-12	4-A
1R1G	Battery	540	1.0	ST-12	4-T
1T1G	Battery	560	1.0	ST-12	4-T
1X1	Battery	780	1.0	ST-12	4-A
1Y1	Battery	540	1.0	ST-12	4-A
1Z1	Battery	900	1.0	ST-12	4-A
2	DC or AC-DC	300	9.0	S-14	4-A
3	DC or AC-DC	300	128.0	ST-16	4-A
4	DC or AC-DC	400	115.0	ST-16	4-A
4A1	Battery	300	4.0	ST-12	4-A
5	DC or AC-DC	460	115.0	ST-16	4-A
6	Battery	685	1.0	ST-12	4-A
7	DC or AC-DC	300	176.0	ST-16	4-A
8	DC or AC-DC	300	132.0	ST-16	4-A
9	DC or AC-DC	300	50.0	ST-16	4-A
46A1	DC or AC-DC	400	46.1	ST-12	2-S
46B1	DC or AC-DC	300	46.1	ST-12	2-S

*The voltage drop shown is for average operation and may vary according to the supply voltage.

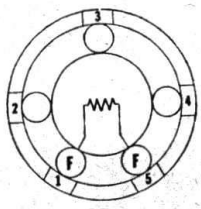
BASE VIEWS



4A



4T



2S

SYLVANIA PRODUCTS

LAMP DIVISION

Incandescent Lamps
Fluorescent Lamps
Fluorescent Sign Tubing
Fluorescent Starters
Germicidal Lamps
Heat Lamps
Black Light Lamps

RADIO TUBE DIVISION

Lock-in Receiving Tubes
Glass Receiving Tubes
Sub-Miniature Tubes
Radio Tube Parts
Weld and Wire Parts
Plastics
Special Tubes for Military Applications
Cathode Ray Tubes (Television Picture Tubes)
Radio and Television Service Equipment

FIXTURE DIVISION

Commercial Fluorescent Lighting Fixtures
Industrial Fluorescent Lighting Fixtures
Residential Fluorescent Lighting Fixtures
Special Fixtures for Appliances
Fluorescent Lamp-Holders and Starter-Sockets

ELECTRONICS DIVISION

Germanium & Silicon Diodes
Selenium Rectifiers
Magnetrons
Hydrogen Thyratrons
Strobotrons
T. R. Tubes
Gas Discharge Tubes
Laboratory Test Equipment
Electronic Computor Equipment
Radiation Detection Equipment
Custom Electronic Products for Industry

TUNGSTEN AND CHEMICAL DIVISION

Tungsten Materials
Fluorescent Powders
Special Chemicals

COLONIAL RADIO CORPORATION

(Subsidiary)

Private Brand Home Radio Receiving Sets
Automobile Radio Receiving Sets
Television Receivers

WABASH CORPORATION

(Subsidiary)

Photoflash Lamps
Photoflood Lamps
Photo Enlarger Lamps
Dark Room Lamps
Projection Lamps

HOW TO USE THE LOOSE-LEAF FEATURE

As explained in the Foreword of this book, data on important new tubes introduced too late to be found in this Manual will be included as extra sheets with our monthly publication SYLVANIA NEWS. These are already punched for insertion in this Manual. All you need to do is to separate them on the dotted lines and make the gadget shown below to assist in placing them in the Manual.

A piece of 1/16" thick aluminum, bakelite or hard fibre would be just the thing. The cut is shown full size so it will [illegible] for [illegible]

Round the edges so as not to scratch the plastic "comb" (that is the trade name for the white binder.)

Lay the manual on a flat surface open at the place where insertion is to be made. Put the point of the tool into the comb and shove it carefully the full length of the book. All the sheets on the right side will now be loose and the new sheets can be placed in position. Then line up all the holes and withdraw the tool slowly being sure that the first plastic ribbon catches all the sheets, after which you can withdraw the tool [illegible]

TECHNICAL HELPS FOR SERVICEMEN

In addition to this Technical Manual Sylvania publishes a number of other booklets useful to servicemen. Four of these illustrated below are free on request. In addition Sylvania publishes Sylvania News, a monthly bulletin, containing News, Merchandizing suggestions, and a Technical Section. This is free to servicemen on request.

Sales and advertising helps such as window displays, mailing cards, stationery, letter heads, bookkeeping forms, and office or service equipment are available to servicemen at prices well below their usual cost. When desired, imprinting of your name, address and telephone number is neatly done in the Sylvania Printing Department. This service is described in a special Multiplying Pennies Folder which may be obtained upon request.



RECEIVING TUBES
CHARACTERISTICS CHART

Contains tabulated data on most tubes found in service work. Should be used in connection with the Technical Manual as new types are added about twice a year.

TRANSMITTING TUBES
CHARACTERISTICS CHART

Contains tabulated data on all Transmitting tubes available from Sylvania. For convenience of Amateurs, arrangement is by type of service, permitting easy selection of the best type.

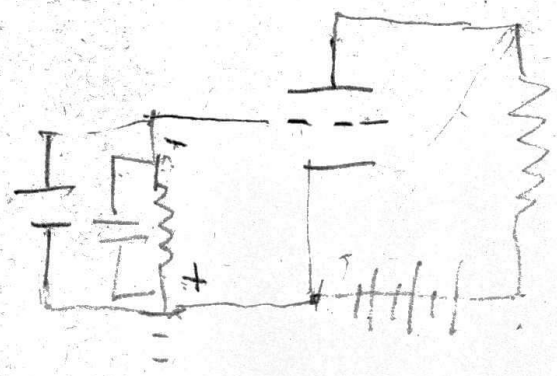
TELEVISION TUBES
CHARACTERISTICS CHART

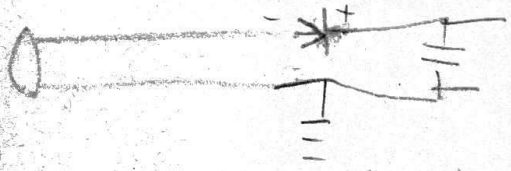
Contains complete data on the picture tubes commonly used in Television receivers and many of those used in Oscilloscopes.

ELECTRONIC TUBES
CHARACTERISTICS CHART

Contains tabulated data on the Sylvania line of Germanium Diodes, Strobotrons, Flash Tubes, Glow Modulators, Hydrogen Thyratrons, Silicon Diodes, TR Tubes, Rocket Tubes, Trigger Tubes, Klystrons, Gas Pressure Measuring Tubes, etc.

NOTES

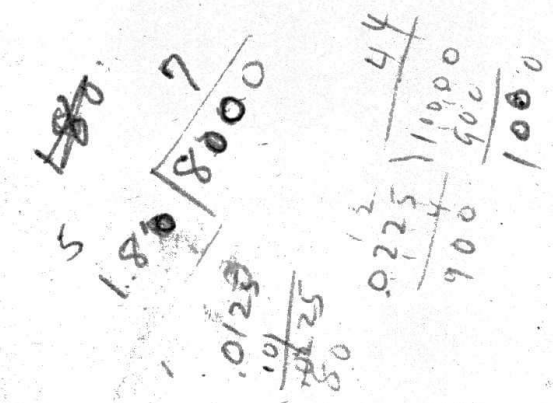




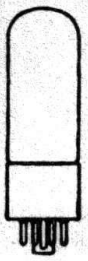
load line for

7N7 40K Ebb = 280

$$\Delta I_b = \frac{80 \times 10^{-3}}{40} = 2 \times 10^{-3}$$







Sylvania Type 6W6GT

BEAM POWER AMPLIFIER

Television Scanner

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T9
Maximum Overall Length	3 1/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Voltage#	150 Volts
Maximum Plate Dissipation	10 Watts
Maximum Screen Dissipation	1.25 Watts
Maximum Peak Positive-Pulse Plate Voltage*	1000 Volts
Maximum Grid Bias Voltage	−50 Volts
Maximum Peak Negative-Pulse Grid Voltage*	−200 Volts
Maximum Heater-Cathode Voltage	200 Volts

#Screen voltage may exceed this value providing the screen dissipation is kept within the rating specified by JETEC Standard J5-C4.

*The duration of the pulse should not exceed 15% of one vertical scanning cycle. In a 525 line, interlaced two to one, 30 frame per second television system 15% of one vertical scanning cycle is 2.5 milliseconds.

TYPICAL OPERATION

Class A1 Amplifier

Heater Voltage	6.3	6.3 Volts
Heater Current	1.2	1.2 Amperes
Plate Voltage	110	200 Volts
Screen Grid Voltage	110	125 Volts
Control Grid Voltage	−7.5	... Volts
Cathode Bias Resistor	...	180 Ohms
Peak AF Grid Signal	7.5	8.5 Volts
Plate Resistance (Approx.)	13,000	28,000 Ohms
Mutual Conductance	8000	8000 μmhos
Plate Current (Zero Signal)	49	46 Ma.
Plate Current (Maximum Signal)	50	47 Ma.
Screen Current (Zero Signal)	4.0	2.2 Ma.
Screen Current (Maximum Signal)	10.0	8.5 Ma.
Load Resistance	2000	5000 Ohms
Total Harmonic Distortion (Approx.)	10	10 %
Power Output	2.1	3.8 Watts

VERTICAL DEFLECTION AMPLIFIER (Triode Connection)

Plate Voltage	300 Volts
Signal Voltage (Total Approx. Peak to Peak)	95 Volts
Plate Current	20 Ma.
Output Voltage (Total Approx. Peak to Peak)	800 Volts
Cathode Bias Resistance	2000 Ohms
Maximum Grid Circuit Resistance	3.3 Megohms

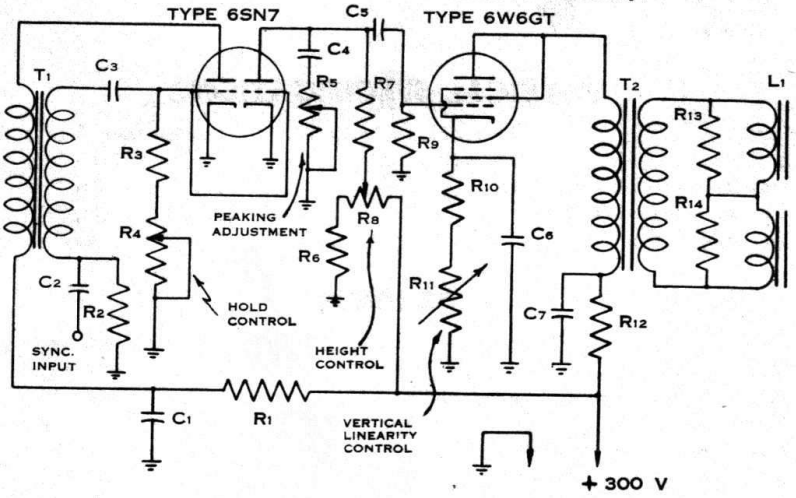
APPLICATION

Sylvania Type 6W6GT is a beam pentode amplifier rated for use as a vertical scanning output amplifier in television sets using Sylvania Type 16TP4 at an anode voltage up to 14,000 volts.

The relative values of the components in the blocking oscillator circuit are critical. Incorrect values will give peak voltages greatly in excess of the tube rating. With the constants as recommended in the typical circuit shown on the following page, the vertical retrace time will be approximately 750 microseconds.

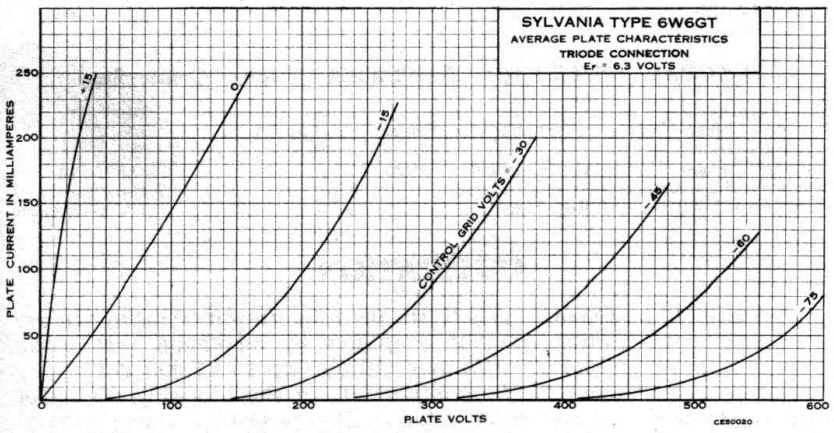
6W6GT (Cont'd)

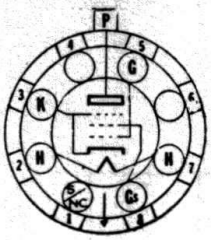
TYPICAL VERTICAL DEFLECTION CIRCUIT



PARTS LIST

R_1:	100,000 ohms	C_1:	0.1 μf
R_2:	1000 ohms	C_2:	.02 μf
R_3:	100,000 ohms	C_3:	0.1 μf
R_4:	100,000 ohms	C_4:	.05 μf
R_5:	50,000 ohms	C_5:	.25 μf
R_6:	500,000 ohms	C_6:	100 μf
R_7:	1 megohm	C_7:	10 μf
R_8:	1 megohm	T_1:	Vertical Blocking Oscillator Transformer, Stancor A-8121 or equivalent
R_9:	2.2 megohm	T_2:	Vertical Output Transformer Stancor A-8116 or equivalent
R_{10}:	560 ohms	L_1:	40 mh Yoke
R_{11}:	3000 ohms		
R_{12}:	1000 ohms		
R_{13}:	560 ohms		
R_{14}:	560 ohms		





5BT-0-0



Sylvania Type 6CD6G

BEAM POWER AMPLIFIER

Television Scanner

PHYSICAL SPECIFICATIONS

Base	Medium Octal 6 Pin
Bulb	ST-16
Cap	Small
Maximum Overall Length	5 1/16"
Maximum Seated Height	5 1/8"
Mounting Position	Vertical*

*Horizontal operation permitted if pins 2 and 7 are in a vertical plane.

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Heater Current	2.5 Amperes
Maximum Plate Voltage	700 Volts
Maximum Peak Positive-Pulse Plate Voltage**	6000 Volts
Maximum Peak Negative-Pulse Plate Voltage**	−1500 Volts
Maximum Screen Voltage	175 Volts
Maximum Negative Control Grid Voltage	50 Volts
Maximum Peak Negative Pulse Control Grid Voltage	150 Volts
Maximum DC Plate Current	170 Ma.
Maximum Screen Dissipation	3 Watts
Maximum Plate Dissipation	15 Watts
Maximum Control Grid Circuit Resistance	1 Megohm
Maximum Peak Heater-Cathode Voltage	± 135 Volts

**The duration of the pulse should not exceed 15% of one horizontal scanning cycle. In a 525 line, interlaced two to one, 30 frame per second television system, 15% of one horizontal scanning cycle is 10 microseconds.

Direct Interelectrode Capacitances:#

Grid to Plate	1.0 μμf Max.
Input	2.6 μμf
Output	10 μμf

#With no external shield.

TYPICAL OPERATION

Horizontal Deflection Amplifier for Type 19AP4

Heater Voltage	6.3 Volts
Heater Current	2.5 Amperes
Plate Voltage##	430 Volts
Screen Voltage	165 Volts
Cathode Bias Resistor	270 Ohms
Grid Signal Voltage (Peak to peak sawtooth components)	50 Volts
Grid Signal Voltage (Negative peaking component)	35 Volts
Plate Dissipation	9.6 Watts
Plate Current	112 Ma.
Screen Current	14 Ma.
Peak Positive-Pulse Output Voltage	3400 Volts
Cathode Current (Peak to peak)	470 Ma.
High Voltage Available for Picture Tube Anode	12 Kv.

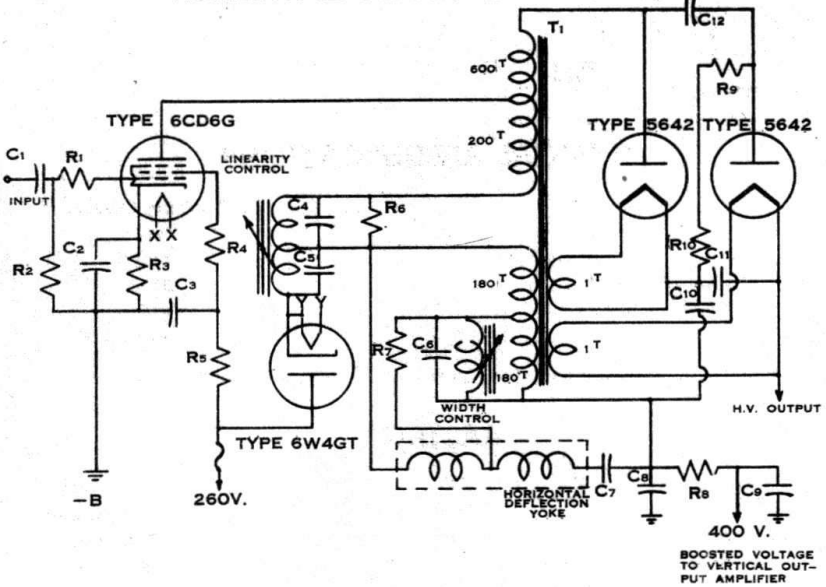
##This voltage consists of 250 volts from the DC power supply plus 180 volts boost from the damper circuit.

APPLICATION

Sylvania Type 6CD6G is a beam power tube designed for use in the horizontal output deflection circuits of television receivers. A typical circuit is shown on the following page for use with Sylvania Type 19AP4 and 250 volts supply.

6CD6G (Cont'd)

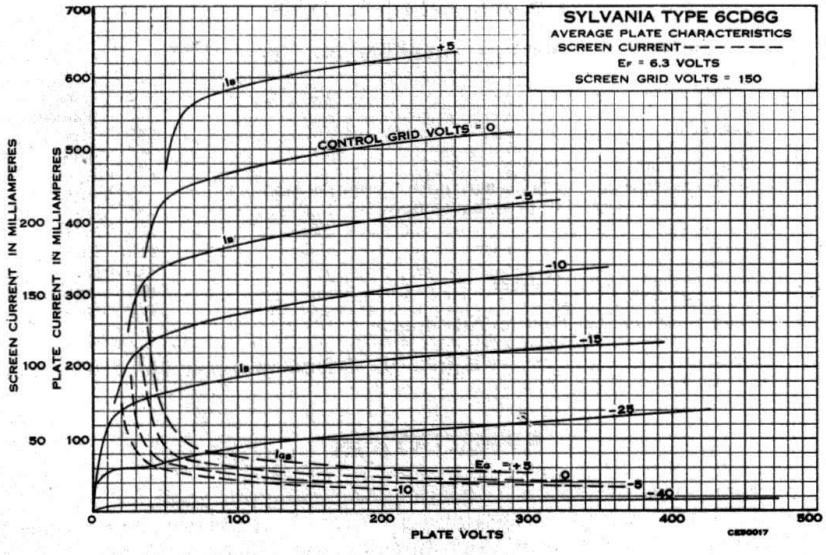
HORIZONTAL DEFLECTION CIRCUIT



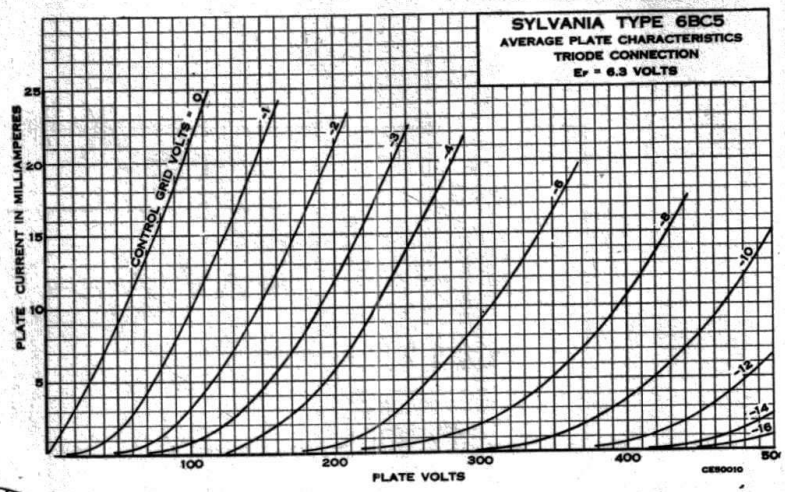
PARTS LIST

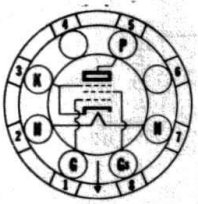
C_1	= 0.001 μf 500 V.	R_1	= 100 Ohm ½ Watt
C_2	= 2 μf 50 V.	R_2	= 470 K ½ Watt
C_3	= 0.05 μf 400 V.	R_3	= 270 Ohm 5 Watt
C_4	= 0.03 μf 600 V.	R_4	= 100 Ohm ½ Watt
C_5	= 0.1 μf 600 V.	R_5	= 6.8 K 2 Watt
C_6	= 1200 μμf 1000 V.	R_6	= 1 K 1 Watt
C_7	= 0.22 μf 200 V.	R_7	= 1 K ½ Watt
C_8	= 10 μf 450 V.	R_8	= 1K ½ Watt
C_9	= 10 μf 450 V.	R_9	= 1.5 Meg. 2 Watt
C_{10}	= 500 μμf 10 Kv.	R_{10}	= 1.5 Meg. 2 Watt
C_{11}	= 500 μμf 10 Kv.		
C_{12}	= 500 μμf 10 Kv.		

T_1 = Horizontal Output and H. V. Transformer
L_1 = Deflection Yoke 14 mh

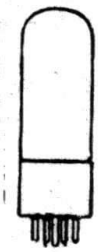


(Con'd) 6BC5





6CK-0-0



Sylvania Type 6BD5GT

TELEVISION DEFLECTION AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T9
Maximum Overall Length	3 7/8"
Maximum Seated Height	3 5/16"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 2 and 7 are in a vertical plane.

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	325 Volts
Maximum Screen Voltage	325 Volts
Maximum Plate Dissipation	10 Watts
Maximum Cathode Current	100 Ma.
Maximum Peak Positive Surge Plate Voltage*	4000 Volts
Maximum Peak Negative Surge Control Grid Voltage	200 Volts
Maximum Screen Dissipation	3.0 Watts
Maximum Control Grid Circuit Resistance	1.0 Megohm
Maximum Peak Cathode Current	300 Ma.
Maximum Heater to Cathode Voltage	135 Volts

*The duration of the voltage pulse must not exceed 10 microseconds or 15% of the pulse recurrence period, whichever is smaller.

TYPICAL OPERATION

Deflection Amplifier

Heater Voltage	6.3 Volts
Heater Current	0.9 Ampere
Plate and Screen Grid Supply Voltage	310 Volts
Peak Positive Surge Plate Voltage (approx.)	2500 Volts
Peak Control Grid Surge Voltage (approx.)	50 Volts
Cathode Current	90 Ma.
Mutual Conductance**	

**The mutual conductance is 5000 μmhos when measured with 200 volts on plate and screen, and -12 volts on the control grid.

APPLICATION

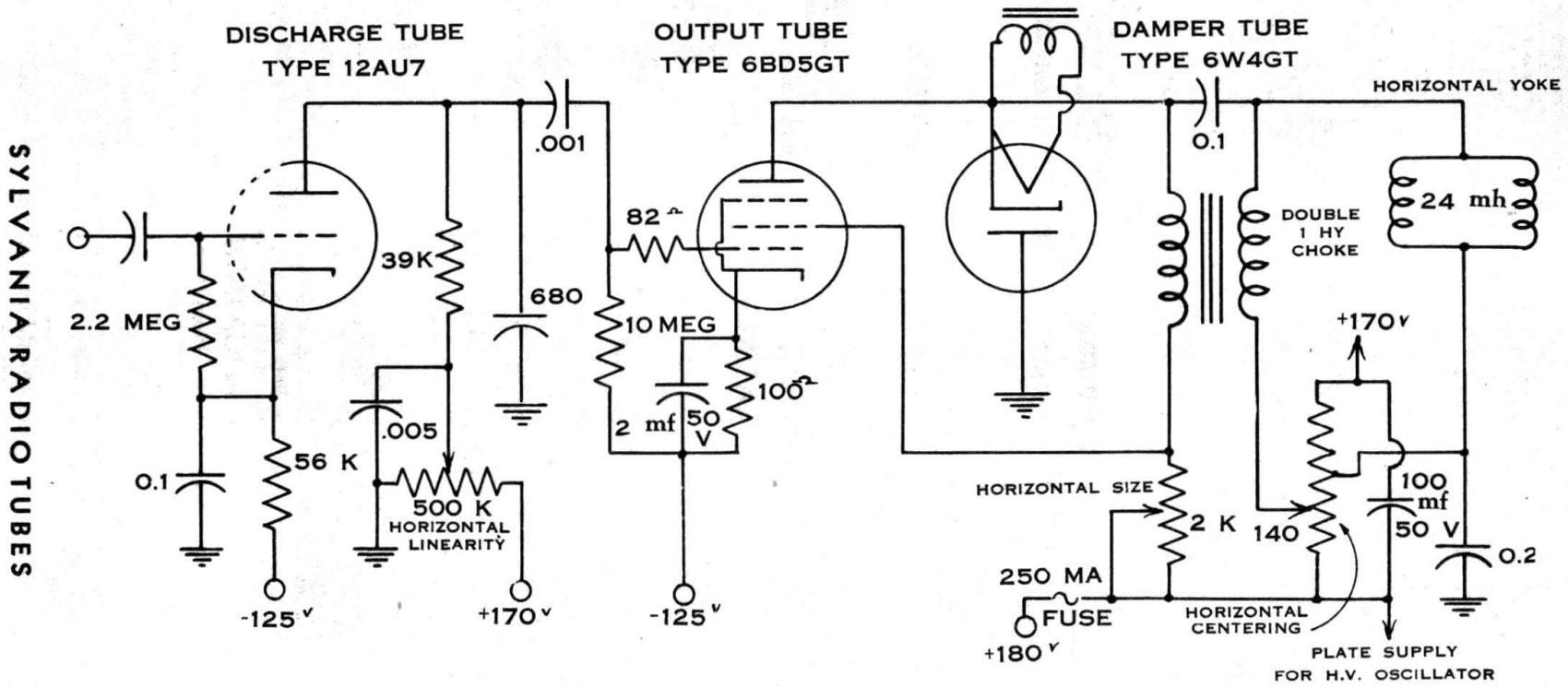
Sylvania Type 6BD5GT is a beam pentode tube adapted for use as a deflection amplifier tube in television sets. A typical circuit is shown on the following page. The use of this tube and circuit provides full horizontal scanning for a 50° 12 inch picture tube with 11,000 volts anode supply. The stem and basing arrangement permit the use of this tube under the peak voltage condition found in this type of service.

For curve data, reference should be made to type 6L6G, to which type 6BD5GT is similiar up to its wattage ratings.

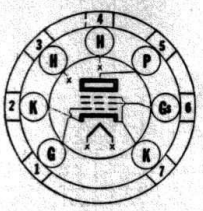
Issued as a supplement to the manual in Sylvania News for June - July 1950.

6BD5GT (Con'd)

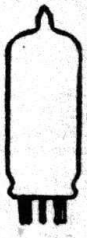
HORIZONTAL DEFLECTION AMPLIFIER



SYLVANIA RADIO TUBES



7BD-0-2 & 7



Sylvania Type 6BC5

SHARP CUTOFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.5 Watts
Maximum Heater Cathode Voltage	90 Volts

Direct Interelectrode Capacitances

	Shielded*	Unshielded
Pentode Connection		
Grid to Plate	0.020	0.030 μμf max.
Input	6.6	6.5 μμf
Output	3.1	1.8 μμf
Triode Connection**		
Grid to Plate	2.5	2.5 μμf
Input	4.0	3.9 μμf
Output	4.3	3.0 μμf

*With ¾" diameter shield (RMA Std. 316) connected to Pin 7.

TYPICAL OPERATION

Pentode Connection

Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	125	250 Volts
Screen Voltage	100	125	250 Volts
Cathode Resistor	180	100	180 Ohms
Mutual Conductance	4900	6100	5700 μmhos
Plate Current	4.7	8.0	7.5 Ma.
Screen Current	1.4	2.4	2.1 Ma.
Plate Resistance (approx.)	0.6	0.5	0.8 Megohm
Control Grid Voltage (approx.) for Ib — 10 μa.	-5	-6	-8 Volts

Triode Connection**

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	250	180 Volts
Grid Voltage	2.6	4.9 Volts
Cathode Resistor	820	330 Ohms
Mutual Conductance	4400	6000 μmhos
Plate Current	6.0	8.0 Ma.
Plate Resistance (approx.)	.009	.006 Megohm
Amplification Factor	40	42

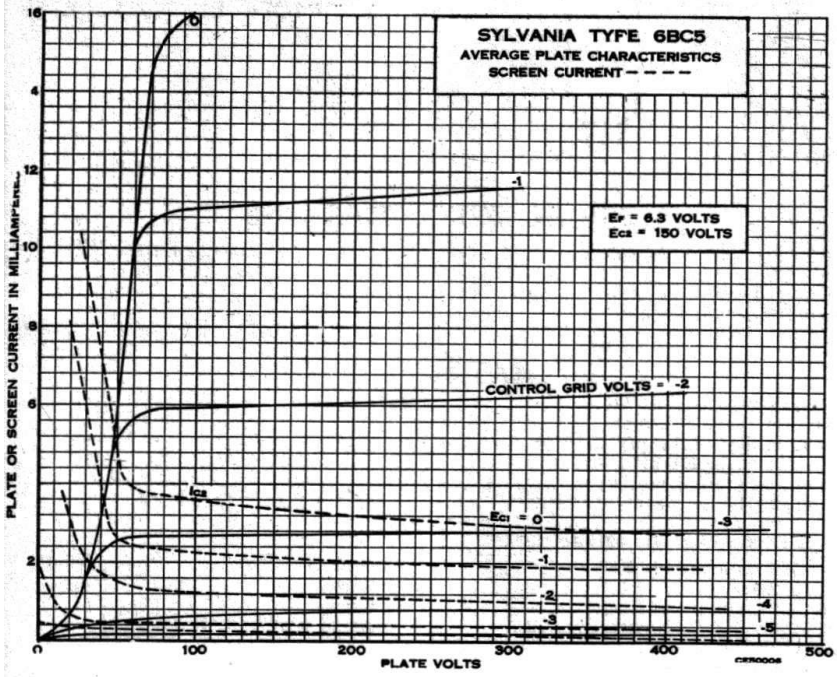
**For triode connection tie screen grid to plate.

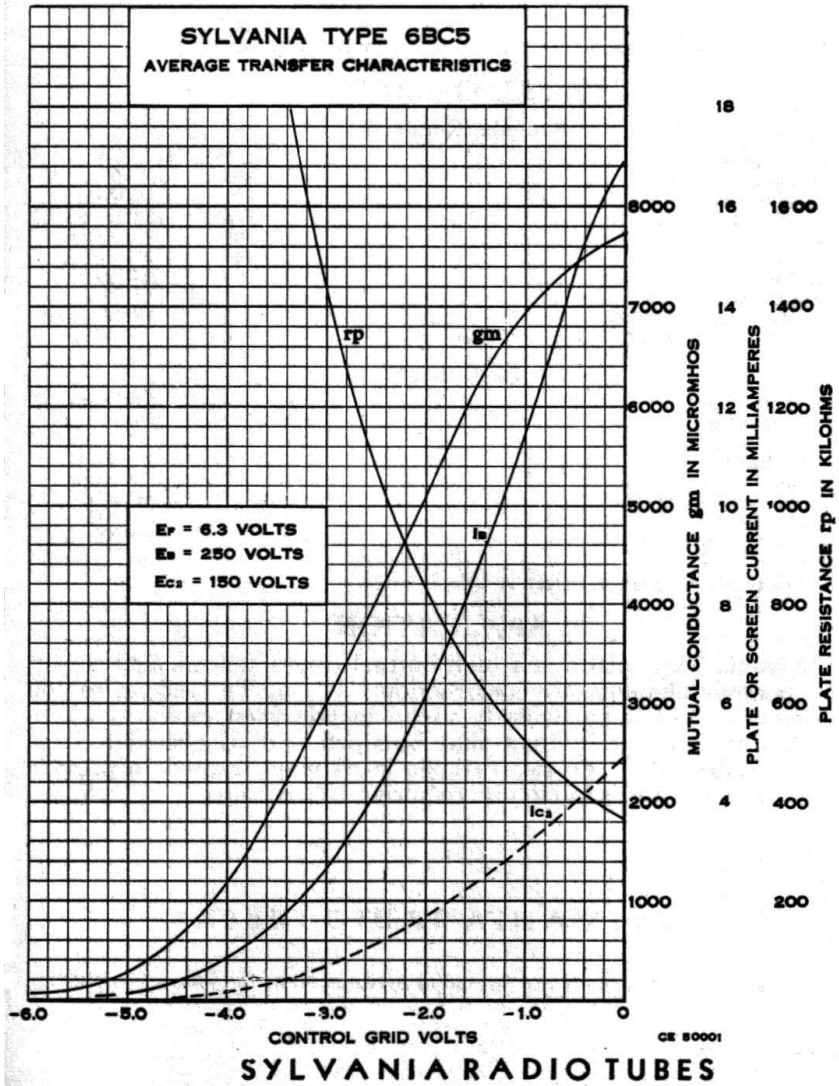
APPLICATION

Sylvania Type 6BC5 is a high mutual conductance sharp cut-off RF pentode of miniature construction. It may be used up to 400 megacycles and is particularly useful in television receivers where a slightly higher gain than that obtained with the similar Type 6AG5 is desired. The two cathode leads may be used to provide separate RF returns in circuits requiring this feature.

Issued as a supplement to the manual in Sylvania News for June - July 1950.

6BC5 (Con'd)

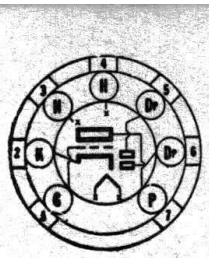




SYLVANIA RADIO TUBES

Sylvania Type 6BU6

DUO-DIODE TRIODE



7BT-0-2



PHYSICAL SPECIFICATIONS

Base	Small Button 7 Pin
Bulb	T5½″
Maximum Overall Length	2⅝″
Maximum Seated Height	2⅜″
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Positive dc Control Grid Voltage	0 Volts
Maximum Heater-Cathode Voltage	± 90 Volts
Average Diode Current per Diode at 10 Volts dc	4.0 Ma
Average Diode Current per Plate for Continuous Operation	1.0 Ma

Direct Interlectrode Capacitances

	Shielded*	Unshielded	
Either Diode Plate to Cathode	1.0	1.0	μμf
Diode Plate #1 to Grid	.01	.013	μμf Max.

*With a ¾″ diameter shield (RMA Std. No. 316) connected to cathode

TYPICAL OPERATION

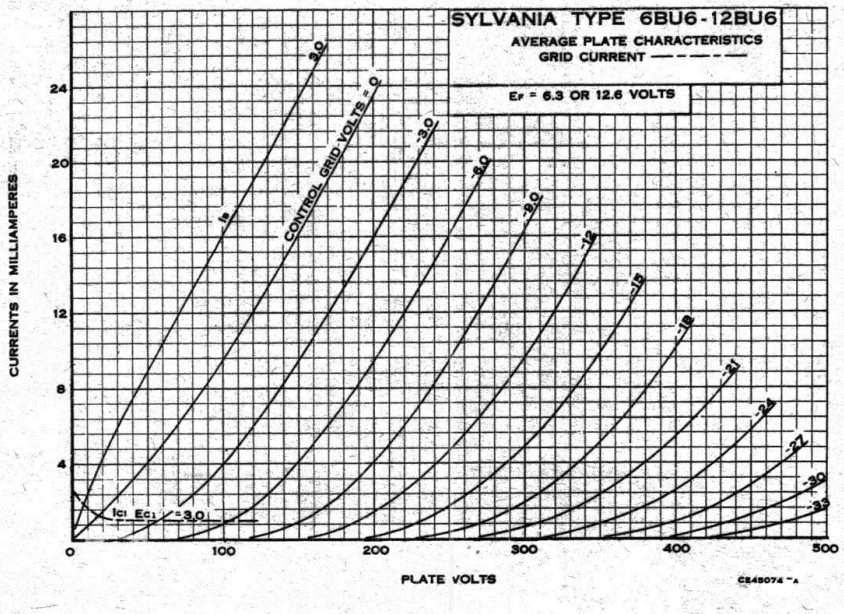
Class A1 Amplifier

Heater Voltage (ac or dc)	6.3	6.3 Volts
Heater Current	300	300 Ma
Plate Voltage	100	250 Volts
Grid Voltage	−3.0	−9.0 Volts
Self Bias Resistor	770	950 Ohms
Plate Current	3.9	9.5 Ma
Plate Resistance	11,000	8,500 Ohms
Mutual Conductance	1500	1900 μmhos
Amplification Factor	16.5	16
Load Resistance	—	10,000 Ohms
Power Output	—	300 Mw.
Total Harmonic Distortion	—	6.5 %

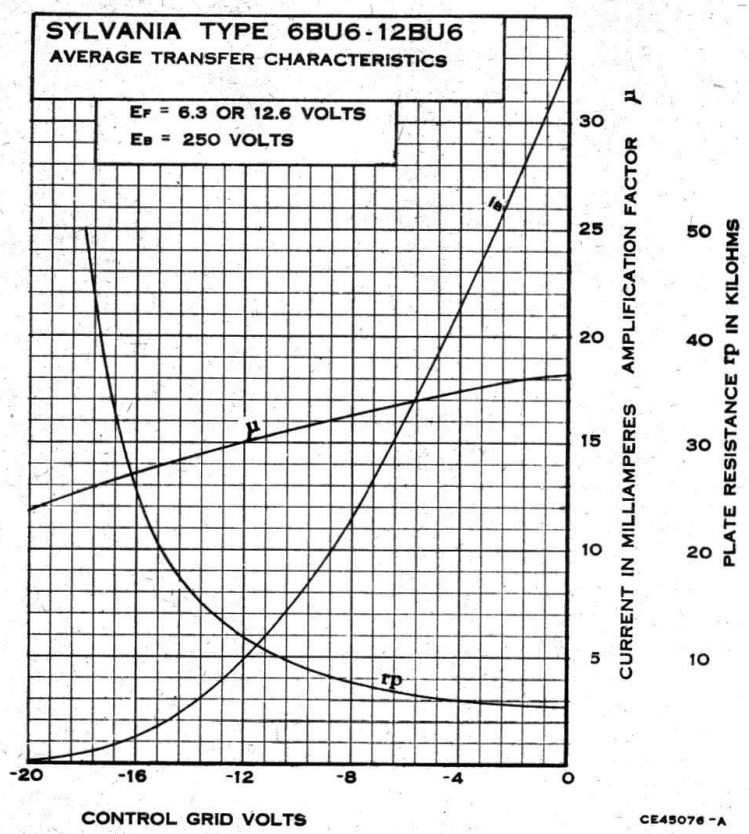
APPLICATION

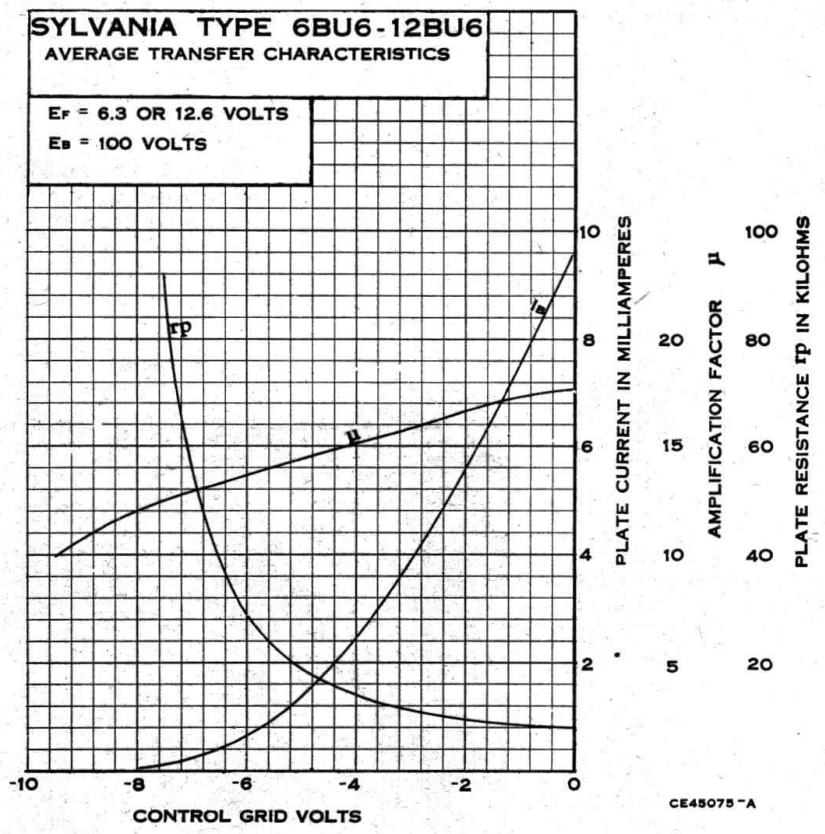
Sylvania Type 6BU6 is a miniature duo-diode triode having characteristics very similar to Type 6BF6, except for the improved diode characteristics. The improved diode perveance gives better rectification efficiency at low signals and the improved diode shielding reduces undesirable audio coupling between diode and triode.

A diode load curve may be found by referring to Type 6BK6. Design data for use in resistance coupled circuits may be found in the appendix.



6BU6 (Cont'd)





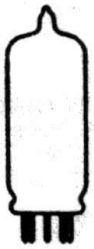
Issued as a supplement to the manual in SYLVANIA NEWS for September 1950.

Sylvania Type 6S4

MEDIUM MU TRIODE



9AC-0-0



PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T6½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	500 Volts
Maximum Peak Plate Voltage*	2000 Volts
Maximum Grid Voltage DC	−50 Volts
Maximum Peak Negative Pulse Grid Voltage	−200 Volts
Maximum Cathode Current	30 Ma.
Maximum Plate Dissipation	7.5 Watts
Maximum Peak Heater-Cathode Voltage	±200 Volts
Maximum Grid Circuit Resistance	2.2 Megohm
Minimum Cathode Bias Resistance	220 Ohms

*The duration of the voltage pulse must not exceed 15% of one scanning cycle. In typical television service this is 2.5 milliseconds.

TYPICAL OPERATION

Vertical Deflection Amplifier#

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Plate Voltage	450 Volts
Cathode Bias Resistor	820 Ohms
Grid Input Voltage (peak to peak of sawtooth)	60 Volts
(negative peaking component)	48 Volts
Plate Current	18 Ma.
Plate Output Voltage (peak positive pulse component)	800 Volts
(peak to peak of sawtooth)	350 Volts

Class A_1 Amplifier

Plate Voltage	250 Volts
Grid Voltage	−8.0 Volts
Plate Current	26 Ma.
Mutual Conductance	4500 μmhos
Amplification Factor	16
Plate Resistance	3600 Ohms

#For operation in a television receiver using a vertical deflection output transformer with a step-down ratio of approximately 11 to 1 to match the vertical deflection yoke coils having an inductance of approximately 40 mh.

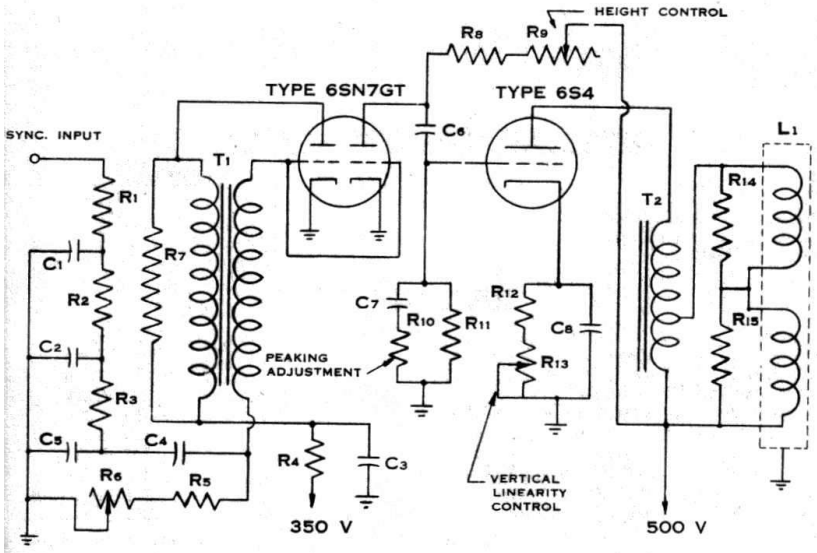
APPLICATION

Sylvania type 6S4 is a medium-mu triode in the miniature construction having characteristics designed for use as a vertical deflection amplifier in television receivers. When used with well designed components and adequate power supply, sufficient drive is available for use with 16" picture tubes such as Sylvania Type 16TP4 at its maximum anode voltage.

Issued as a supplement to the manual in Sylvania News for June - July 1950.

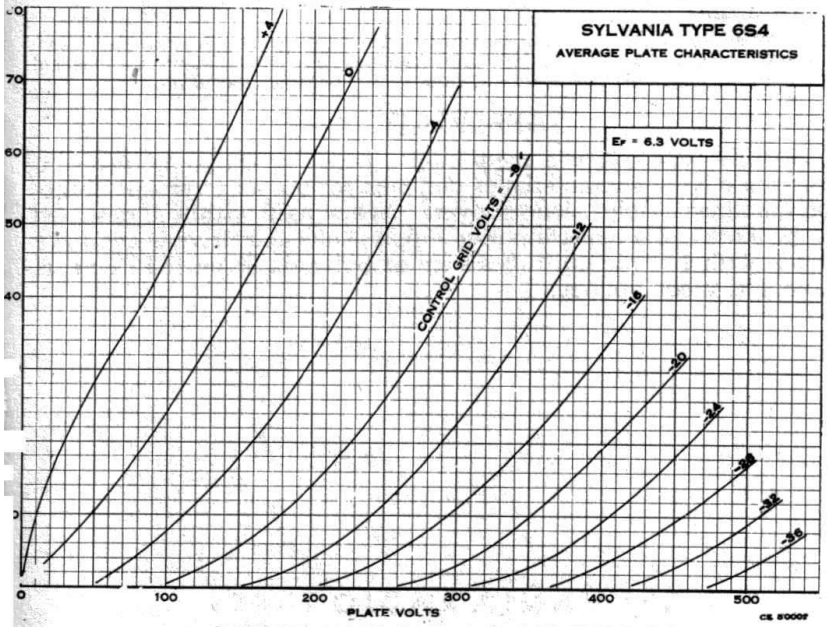
6S4 (Con'd)

TYPICAL VERTICAL DEFLECTION CIRCUIT
FOR SYLVANIA TYPE 16TP4 PICTURE TUBE



C1 C2 C4 C5: 0.005 μf, 400 v
C3: 4 μf, 400 v, electrolytic
C6: 0.1 μf, 600 v
C7: 0.05 μf, 600 v
C8: 100 μf, 50 v, electrolytic
L1: Vertical Coils of 70° Deflection Yoke
R1 R2 R3: 8200 Ohms, 0.5 watt
R4: 0.1 megohm, 0.5 watt
R5 R8: 1.0 megohm, 0.5 watt
R6: Potentiometer, 1.0 megohm, 0.5 watt
R7: 10,000 ohms, 0.5 watt
R9: Potentiometer, 3.0 megohms, 1 watt
R10: Potentiometer, 5000 ohms, 0.5 watt (see Note)
R11: 2.2 megohms, 0.5 watt
R12: 820 ohms, 1 watt
R13: Potentiometer, 3000 ohms, 1 watt, wire wound
R14 R15: 560 ohms, 0.5 watt
T1: Vertical Blocking Oscillator Transformer, Stancor A-8121 or equivalent
T2: Vertical-Deflection-Output Transformer, Stancor A-8116 or equivalent RCA 222T1

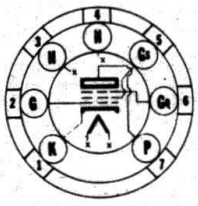
Note: *Fixed Resistance may be used after needed value for vertical peaking control has been determined with rheostat.*



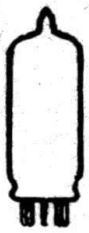
SYLVANIA RADIO TUBES

Sylvania Type 6BN6

BEAM PENTODE



7DF-0-1



PHYSICAL SPECIFICATIONS

Base	Miniature-Button 7-pin
Bulb	T5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage	6.3 Volts
Maximum Plate Voltage	135 Volts
Maximum Screen Voltage	100 Volts
Maximum Total Cathode Current	10 Ma
Maximum Peak Positive Grid Voltage	45 Volts

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	300 Ma
Plate Voltage (Supply)	80 Volts
Screen Voltage	60 Volts
Control Grid Voltage obtained by cathode bias resistor	
Cathode Bias Resistor*	200–400 Ohms
Plate Current	0.23 Ma
Screen Current	5.0 Ma
Plate Load Resistor	68000 Ohms

*Bias Voltage –1.3 approx. Fixed bias operation not recommended.

APPLICATION

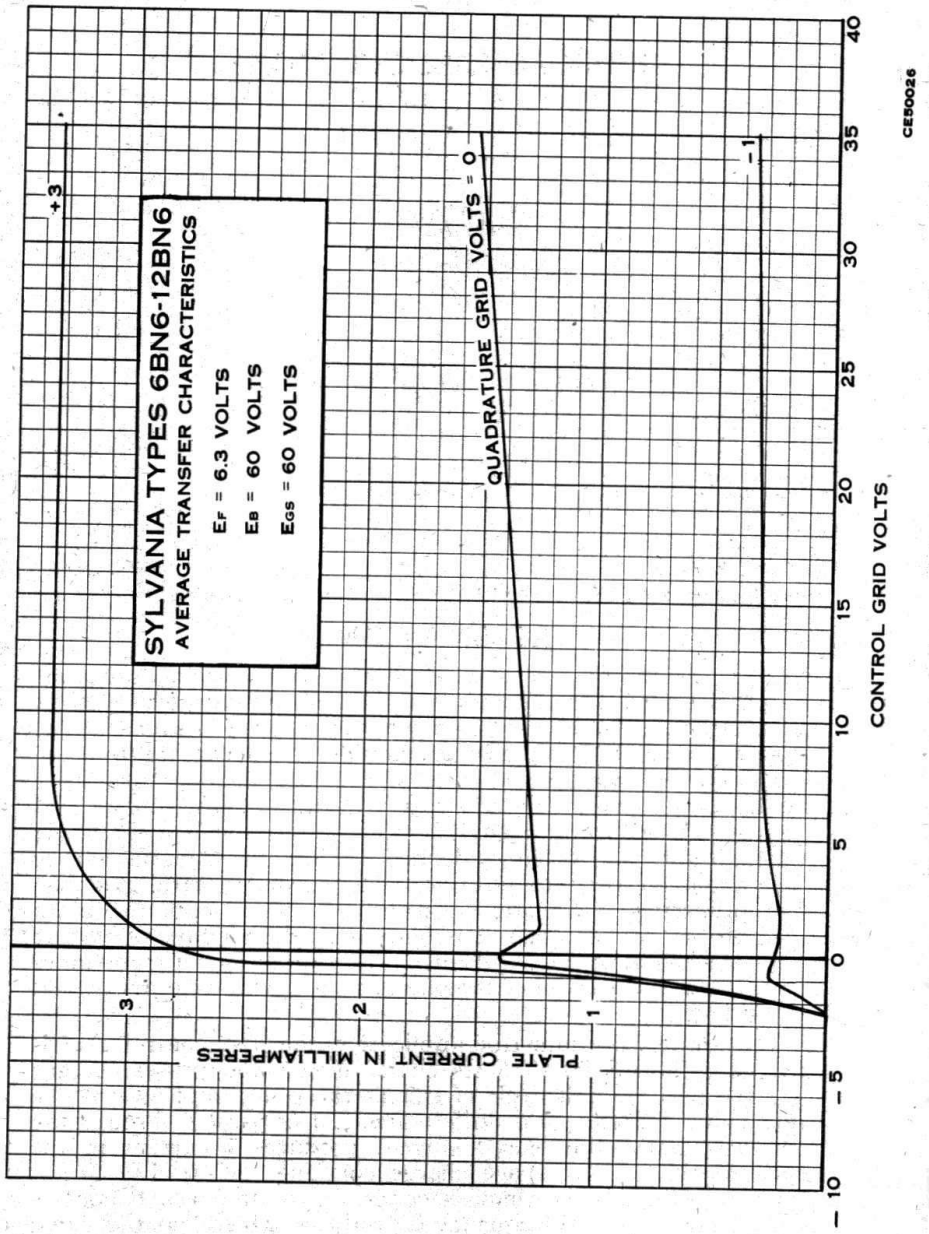
Sylvania Type 6BN6 is a gated beam tube in miniature construction designed specially for use in FM limiter-discriminator circuits. It may also be used as a sync separator and square wave generator. Type 6BN6 represents a considerable departure from the construction and characteristics of a conventional pentode. Due to the use of a sharply focused electron beam, the first control grid has a step shaped control characteristic, the plate current rising abruptly from zero to a sharply defined maximum as the grid voltage changes from negative to positive. The second control grid has similar properties. If made strongly negative it cuts the plate current off, or over a range of potentials in the vicinity of zero it controls the height of the plate current maximum, but if made more positive it loses all control of the plate current, which cannot exceed a certain level.

In the limiter discriminator application the first control grid is biased near the midpoint of its characteristic and passes current during the positive half cycle of signal, the peak amplitude of the current being limited to a definite value. After passing through the second accelerator the pulsed current produces a current in the second control grid by space charge coupling. If an LC circuit tuned to the signal frequency is connected to the second control grid, a voltage at signal frequency is produced which lags the signal voltage on grid 1, by about 90 degrees. The voltage on the second control grid, or quadrature grid, then controls the width of the plate current pulses to the plate, so that the average plate current is proportional to the frequency deviation of the signal, and the audio signal may be recovered from a load resistor in the plate circuit.

SYLVANIA RADIO TUBES

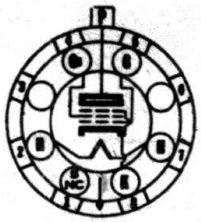
Issued as a supplement to the manual in Sylvania News for August 1950.

6BN6 (Cont'd)

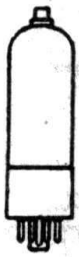

SYLVANIA TYPES 6BN6-12BN6
AVERAGE TRANSFER CHARACTERISTICS
EF = 6.3 VOLTS
EB = 60 VOLTS
EGS = 60 VOLTS
+3
QUADRATURE GRID VOLTS = 0
-1
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
CE50026

Sylvania Type 6BQ6GT

BEAM POWER AMPLIFIER



6AM-0-0



PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7-pin
Bulb	T9
Cap	Miniature
Maximum Overall Length	$3^{15}/_{16}$"
Maximum Seated Height	$3^{7}/_{16}$"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	550 Volts
Maximum Peak Positive Surge Plate Voltage*	5,000 Volts
Maximum Screen Voltage	200 Volts
Maximum Negative Control Grid Voltage	50 Volts
Maximum Peak Negative Surge Control Grid Voltage*	100 Volts
Maximum DC Plate Current	100 Ma
Maximum Screen Dissipation	2.5 Watts
Maximum Plate Dissipation	10 Watts
Maximum Control Grid Circuit Resistance	0.5 Megohms
Maximum Peak Heater-Cathode Voltage	135 Volts

*Absolute maximum value which must not be exceeded under any condition of operation. Ratings are based on use in typical television service in which the duty cycle of the voltage pulse must not exceed 15% on one scanning cycle or 10 microseconds, whichever is smaller.

Direct Interelectrode Capacitances†

Grid to Plate	0.95 μμf
Input	14 μμf
Output	9.5 μμf

†With no external shield

AVERAGE CHARACTERISTICS

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Plate Voltage	250 Volts
Screen Voltage	150 Volts
Control Grid Voltage	−22.5 Volts
Plate Current	55 Ma
Screen Current	2.1 Ma
Mutual Conductance	5,500 μmhos

TYPICAL OPERATION

Horizontal Deflection Amplifier

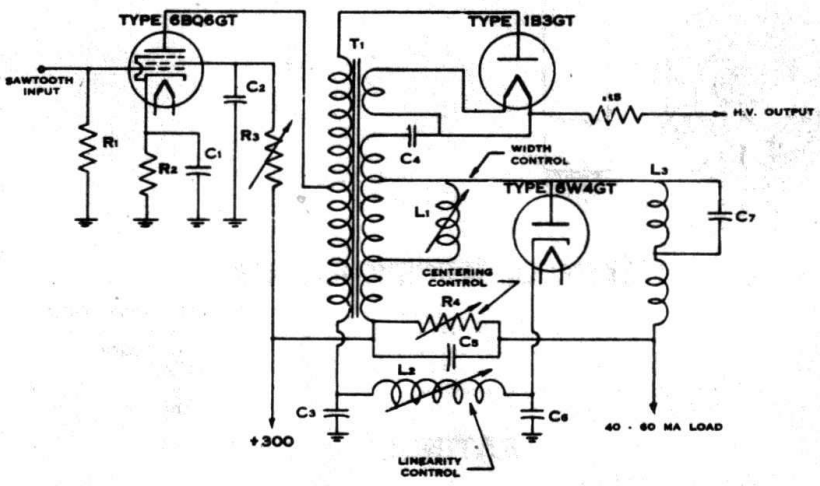
Plate and Screen Supply Voltage	275	300	325 Volts
Peak Positive Surge Plate Voltage	4000	4000	4,000 Volts
Peak Positive Grid Signal (Sawtooth)	50	50	50 Volts
Peak Negative Grid Signal (Sawtooth)	50	50	50 Volts
Cathode Bias Resistor	100	100	100 Ohms
Plate Current	85	85	83 Ma
Screen Current	9	7	5 Ma
Developed High Voltage	12.0	12.0	12.0 K Volts

APPLICATION

Sylvania Type 6BQ6GT is a beam power amplifier designed for use as a driver tube in the horizontal deflection amplifier for television circuits using electro-magnetic deflection. The plate being brought out to the top cap permits the use of high surge voltages. A typical circuit is shown on the following page.

Issued as a supplement to the manual in Sylvania News for August 1950.

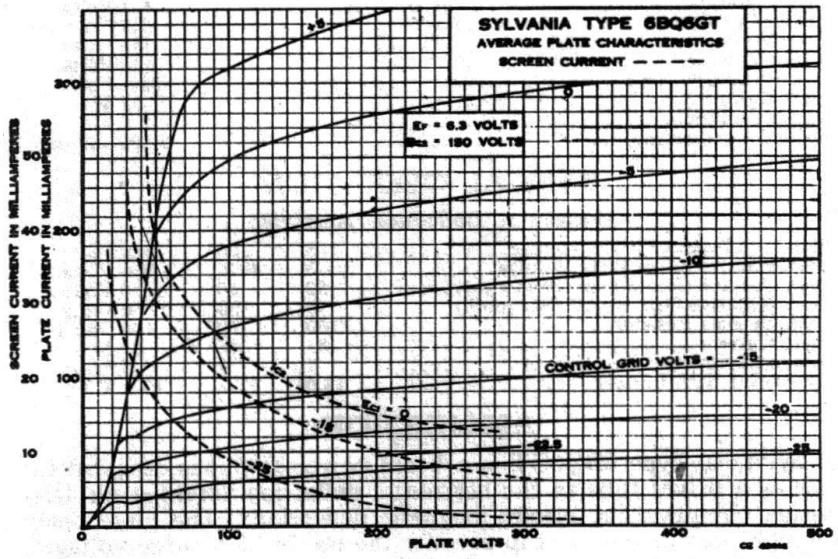
6BQ6GT (Cont'd)



TYPICAL DEFLECTION AMPLIFIER CIRCUIT
WITH "FLY BACK" TYPE HIGH VOLTAGE SUPPLY

PARTS LIST

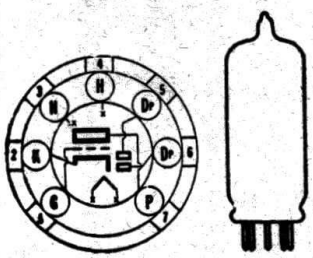
C_1 = 0.25 μf
C_2 = 0.25 μf
C_3 = 0.03 μf
C_4 = 500 μμf
C_5 = 0.5 μf
C_6 = 0.05 μf
C_7 = 56 μμf
R_1 = .470 Meg.
R_2 = 100 Ohms
R_3 = .30 Meg.
R_4 = 500 Ohms
R_5 = .470 Meg.
T_1 = G.E. Transformer #77J1-5 or Equivalent
L_1, L_2 = G.E. Variable Inductor #77J4 or Equivalent
L_3 = G.E. Yoke #77J11 or Equivalent



SYLVANIA RADIO TUBES

Sylvania Type 6BK6

DUO-DIODE HIGH-MU TRIODE



7BT-0-2

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Heater Current	300 Ma
Maximum Plate Volts	300 Volts
Average Diode Current per Diode at 10 Volts DC	4.0 Ma
Maximum Heater Cathode Voltage	±90 Volts
Maximum Diode Current for Continuous Operation	1.0 Ma
Maximum Positive Grid Voltage	0 Volts

Direct Interelectrode Capacitances:

	Shielded*	Unshielded	
Either Diode Plate to Cathode	1.0	1.0	μμf
Diode Plate No. 1 to Grid	01	.013	μμf

*With a ¾" diameter shield (RMA Std. No. 316) connected to cathode

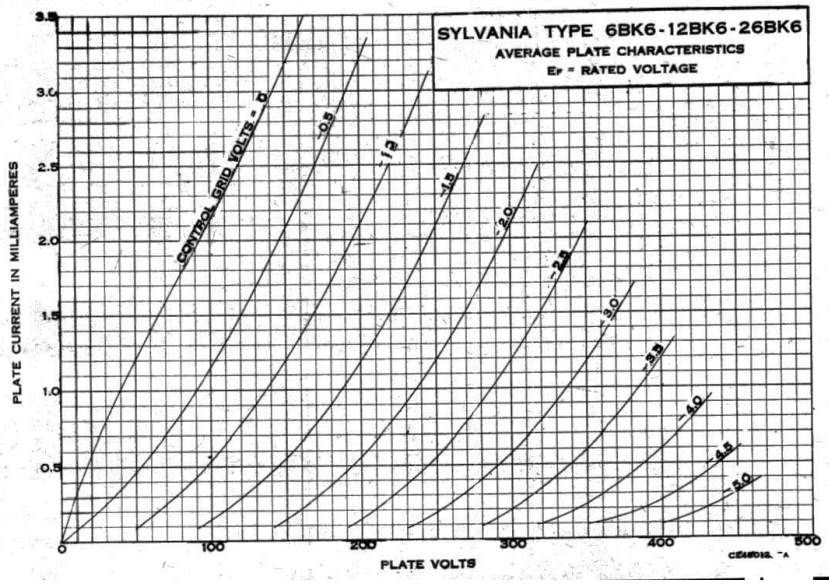
TYPICAL OPERATION

Heater Voltage (AC or DC)	6.3	6.3	Volts
Heater Current	300	300	Ma
Plate Voltage	100	250	Volts
Grid Voltage	−1.0	−2.0	Volts
Amplification Factor	100	100	
Plate Resistance	80,000	62,500	Ohms
Mutual Conductance	1250	1600	μmhos
Plate Current	0.5	1.2	Ma

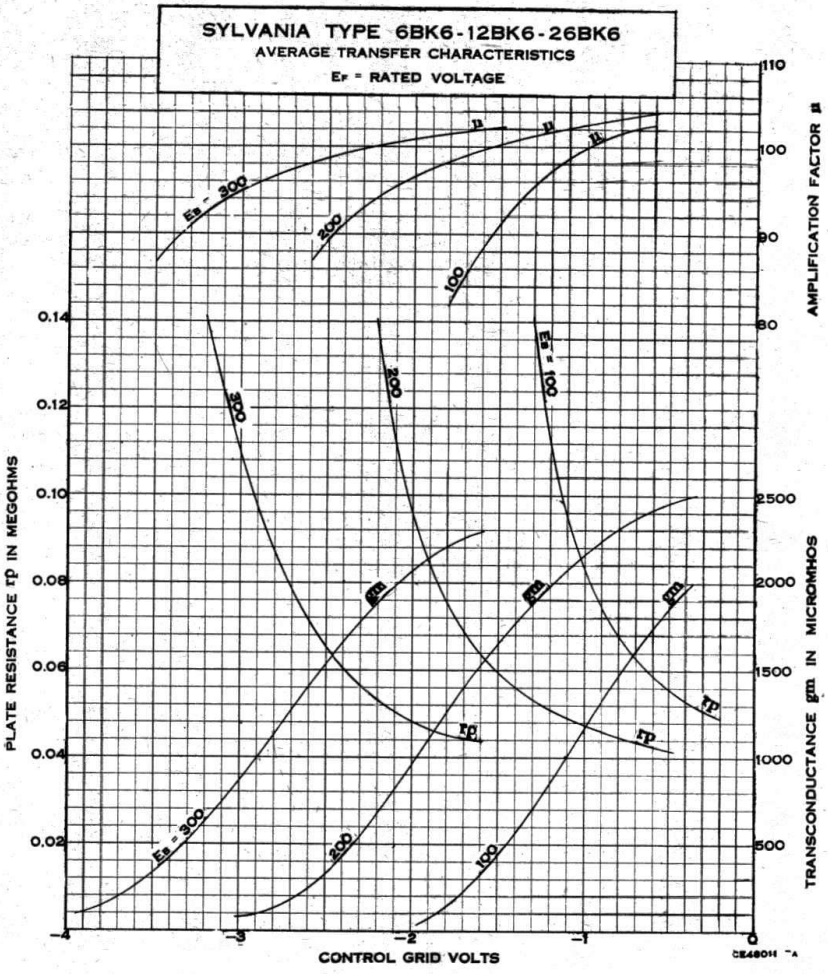
APPLICATION

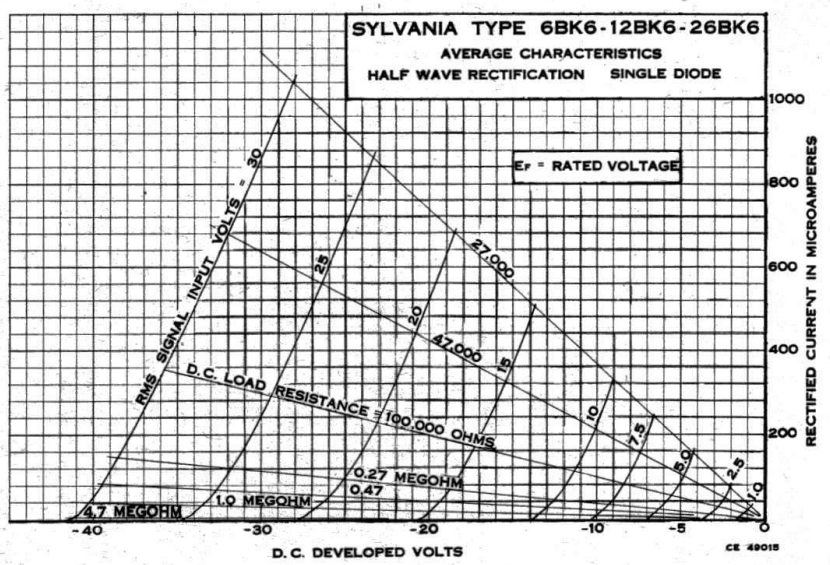
Sylvania Type 6BK6 is a miniature duo-diode high-mu triode having characteristics very similar to type 6AV6, except for the improved diode characteristics. The improved diode perveance gives better rectification efficiency at low signals and the improved diode shielding reduces undesirable audio coupling between diode and triode.

Data for use in Resistance Coupled Amplifier Circuits may be found in the appendix.



6BK6 (Cont'd)





SYLVANIA RADIO TUBES

Issued as a supplement to the manual in SYLVANIA NEWS for September 1950.

RESISTANCE COUPLED AMPLIFIER DATA

Sylvania Type 6BK6

Self Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	4700	5600	8200	10,000	10,000	12,000	15,000	1800	1800	3300	3300	3900	4700	5600
Ib	.23	.204	.132	.117	.117	.092	.08	.84	.84	.45	.45	.41	.30	.28
Ec	−1.08	−1.143	−1.03	−1.17	−1.17	−1.10	−1.2	−1.51	−1.51	−1.49	−1.49	−1.59	−1.41	−1.57
Eb	77.0	79.6	54.4	68.4	68.4	56.8	62.4	166.	166.	128.	128.	139.	109.	118.5
Esig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.6	3.8	4.2	4.35	5.0	4.7	5.2	5.4	5.7	6.1	6.6	6.9	6.6	7.1
Gain	36.0	38.0	42.0	43.5	50.0	47.0	52.0	54.0	57.0	61.0	66.0	69.0	66.0	71.0
% Dist.	3.4	3.4	3.6	3.2	2.6	3.2	2.6	0.3	....	0.5	0.2	0.2	0.4	0.2
Esig. (1)	.14	.14	.11	.14	.17	.13	.17	.5	.5	.41	.45	.54	.38	.48
Eout	5.0	5.2	4.6	6.0	8.3	6.1	8.5	26.5	28.5	24.5	29.0	37.0	25.0	33.5
Gain	35.7	37.2	41.8	42.9	48.8	46.9	50.0	53.0	52.0	59.8	64.4	68.5	65.8	69.8
% Dist.	5.0	5.1	4.1	4.9	5.1	4.4	5.0	5.0	4.4	4.95	4.4	4.8	4.1	4.2

(1) At grid current point, less than 1/8 Microampere grid current through 0.27 megohm grid resistor.

FOR CIRCUIT SEE FIGURE 4

Zero Bias Operation

	Ebb = 100 VOLTS							Ebb = 250 VOLTS						
Rb	0.1		0.27			0.47		0.1		0.27			0.47	
Rcf	0.27	0.47	0.27	0.47	1.0	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ib	.255	.255	.146	.146	.146	.100	.100	1.16	1.16	.57	.57	.57	.355	.355
Ec	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eb	74.5	74.5	60.6	60.6	60.6	53	53	134.	134.	123.	123.	123.	83.	83.
Esig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Eout	3.9	4.2	4.35	5.0	5.5	4.85	5.7	6.0	6.3	6.6	7.2	7.7	7.3	8.0
Gain	39	42	43.5	50	55	48.5	57	60	63	66	72	77	73	80
% Dist.	3.0	2.7	3.4	2.6	2.0	2.9	2.0	....	....	....	....	....	0.3	....
Esig. (1)	.14	.15	.13	.15	.18	.14	.18	.52	.56	.43	.5	.57	.42	.53
Eout	5.3	6.1	5.6	7.2	9.3	6.7	8.5	28.5	32.0	26.5	33.0	40.5	29.0	39.0
Gain	37.9	40.7	43	48	51.7	47.8	47.2	54.8	57.1	61.6	66	71.1	69.	73.6
% Dist.	4.8	4.8	4.8	4.7	4.9	4.7	4.8	4.8	5.0	4.9	5.0	4.9	4.8	4.8

(1) Maximum signal for 5.0% distortion.

FOR CIRCUIT SEE FIGURE 5

Sylvania Type 6BK6

12BK6
26BK6

6BU6 Sylvania Type

12BU6

RESISTANCE COUPLED AMPLIFIER DATA

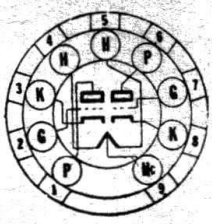
Self Bias Operation

	Ebb = 100 VOLTS						Ebb = 250 VOLTS					
Rb	0.047		0.1		0.27		0.047		0.1		0.27	
Rcf	0.1	0.27	0.1	0.47	0.27	0.47	0.1	0.27	0.1	0.47	0.27	0.47
Rk	1800	2200	2700	3900	6800	8200	1500	1800	2200	3300	5600	8200
Ib	1.07	1.0	0.62	0.56	0.256	0.240	2.85	2.69	1.63	1.46	0.661	0.60
Ec	-1.93	-2.2	-1.67	-2.18	-1.74	-1.97	-4.27	-4.84	-3.59	-4.82	-3.70	-4.92
Eb	49.6	53.0	38	44	31	35.2	116	123.8	87	104	71.8	88
Esig	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
Eout	5.3	5.4	5.6	5.8	5.7	5.8	11.2	11.8	11.8	12.4	12.1	12.2
Gain	10.6	10.8	11.2	11.6	11.4	11.6	11.2	11.8	11.8	12.4	12.1	12.2
% Distortion	2.1	1.9	2.0	1.8	2.2	1.8	1.3	1.2	1.8	1.3	1.8	1.3
Esig (1)	1.02	1.24	0.87	1.23	0.97	1.10	2.80	3.25	2.23	3.27	2.40	3.32
Eout	10.6	13.2	9.5	14.2	11.0	12.8	31.2	38.0	26.0	40.4	28.5	40.6
Gain	10.4	10.6	10.9	11.5	11.3	11.6	11.1	11.7	11.7	12.3	12.1	12.2
% Distortion	4.5	4.9	4.7	4.8	4.9	4.3	4.5	4.6	4.4	4.5	4.5	4.9

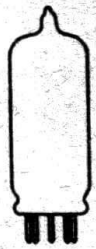
Note (1) For self bias operation this is taken at the grid current point with less than ⅛ microampere grid current

FOR CIRCUIT SEE FIGURE 4

Issued as a supplement to the manual in SYLVANIA NEWS for September 1950.



9-A-0-0



Sylvania Type 12AY7

MEDIUM-MU DUOTRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 9 Pin
Bulb	T6½"
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 51/16"
Mounting Position	Any

RATINGS

	Series	Parallel
Heater Voltage	12.6	6.3 Volts
Heater Current	0.15	0.3 Ampere
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation	1.5	1.5 Watts
Maximum Cathode Current	10	10 Ma
Maximum Heater-Cathode Voltage	90	90 Volts

Direct Interelectrode Capacitances*

Grid to Plate	1.3 μμf
Input	1.3 μμf
Output	0.6 μμf

*Without external shield.

TYPICAL OPERATION

Class A Amplifier (Each Section)

Plate Voltage	250 Volts
Grid Voltage	−4.0 Volts
Plate Current	3.0 Ma
Amplification Factor	40
Mutual Conductance	1750 μmhos

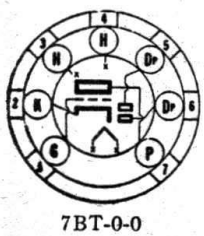
RESISTANCE COUPLED AMPLIFIER (Each section)

Heater Voltage** (AC or DC)	6.3 Volts
Plate Supply Voltage	150 Volts
Plate Load Resistor	20,000 Ohms
Cathode Resistor	2700 Ohms
Cathode bypass Capacitor	40 μf
Grid Resistor	0.1 Megohm
Voltage Gain	12.5

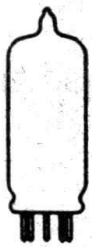
**For minimum hum tie pin #9 to negative B supply.

APPLICATION

Sylvania Type 12AY7 is a medium-mu duotriode which is designed for use as an af amplifier. It is a low noise, low microphonic tube having a center tapped heater which permits operation from either a 6.3 volt or 12.6 volt heater supply. It is recommended that the 12.6 volt connection be used to assure the low-hum operation for which Type 12AY7 was developed.



7BT-0-0



Sylvania Type 12BF6

DUO-DIODE TRIODE

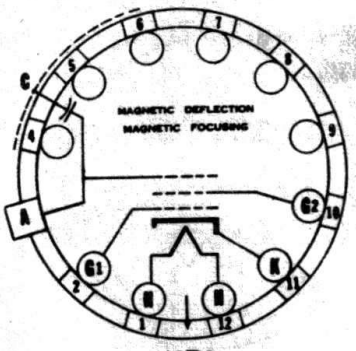
RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma

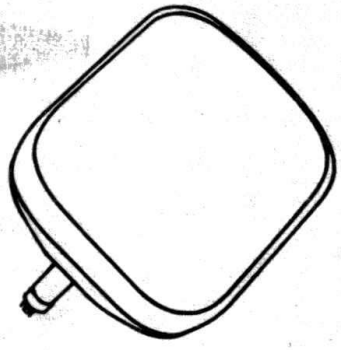
For other data refer to corresponding Type 6BF6 which is identical except for heater ratings. Curves and resistance coupled amplifier data may be found by reference to Type 7E6.

Sylvania Type 14BP4

PICTURE TUBE



12D2



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	17 5/16"
Maximum Rectangular Dimensions	9 3/16" x 12 5/8"
Picture Size	8 21/32" x 11 9/16"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Magnet	Double Field Type
Phosphor Color	White
Phosphor Persistance	Medium
Mounting Position	Any
Horizontal Deflection Angle (Approx.)	65°
Face Plate Transmission (Neutral Gray)	70%

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	12,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range*	−125 to 0 Volts
Peak Heater to Cathode Voltage**	125 Volts

*Signal voltages which drive the grid more than 2 volts positive are not recommended.

**During a warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	11,000 Volts
Accelerating Grid Voltage	250 Volts
Control Grid Voltage (for visual cut-off)	−27 to −63 Volts
Focusing Coil Current† (Approx.)	110 Ma.
Ion Trap Magnet Current†† (Approx.)	120 Ma.
Control Grid Circuit Resistance	1.5 Megohm

†For RMA Standard focus coil No. 106 or equivalent with the combined control grid bias voltage and video signal voltage adjusted to produce a highlight brightness of 20 foot lamberts on a 8 21/32" x 11 9/16" picture area. Distance from reference line of bulb to center of focus coil air gap should be 3¼".

††With RMA Standard ion trap magnet No. 108 or equivalent.

APPLICATION

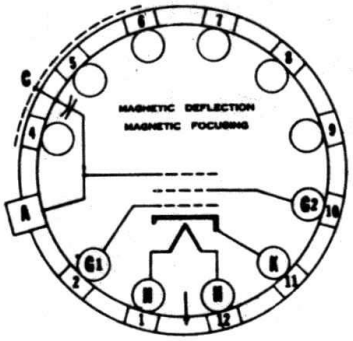
Sylvania Type 14BP4 is a direct view magnetic deflection television picture tube providing a rectangular screen 8 21/32" x 11 9/16". A double magnet ion trap is used to eliminate ion spot blemish. The face plate is made of neutral density (gray) glass for improved picture contrast and detail under high ambient light conditions.

WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given on page 16 of the appendix.

14CP4 Sylvania Type

PICTURE TUBE





12D2

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	17⅜"
Maximum Rectangular Dimensions	13 11/16" x 9 21/32"
Picture Size	8⅝" x 11½"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Horizontal Deflection Angle (Approx.)	65°
Face Plate Transmission (Neutral Gray)	65% (Approx.)

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage (AC or DC)	14,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range*	−125 to 0 Volts
Maximum Peak Heater to Cathode Voltage**	150 Volts

*Signal voltages which drive the grid more than 2 volts positive are not recommended.

**During a warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	12,000 Volts
Accelerating Grid Voltage	300 Volts
Control Grid Voltage (for visual cut-off)	−33 to −77 Volts
Focusing Coil Current# (Approx.)	115 Ma.
Ion Trap Magnet Field Strength##	23 Gausses
Maximum Control Grid Circuit Resistance	1.5 Megohms

#For RMA Focus Coil No. 109 or equivalent with the combined control grid bias and video signal voltage adjusted to produce a highlight brightness of 35 foot-lamberts on an 8⅝" x 11½" picture area.

##For use with RMA Standard No. 111 ion trap magnet or equivalent.

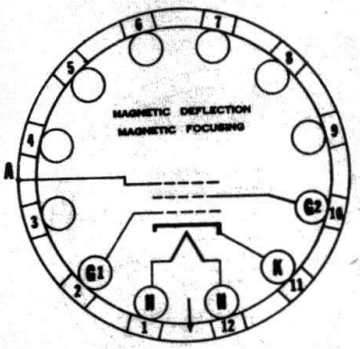
APPLICATION

Sylvania Type 14CP4 is a direct viewing magnetic deflection picture tube providing the space-saving feature of the rectangular bulb, neutral density face plate, ion trap, and the filter capacitance provided by the external conductive coating.

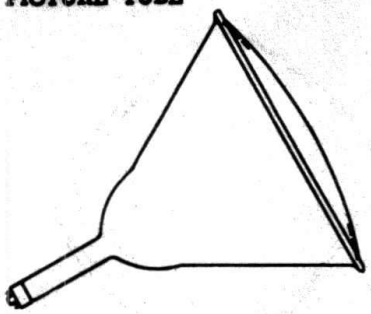
Warning. X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturers Maximum Rated Anode Voltage or 16,000 volts whichever is less. The precautions suggested for handling television tubes are given on page 16 of the appendix.

Sylvania Type 16GP4

PICTURE TUBE



12D3



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5-pin
Bulb Contact	Metal-Cone Lip
Maximum Overall Length	17 1/16"
Maximum Overall Diameter	16"
Minimum Useful Screen Diameter	14 3/8"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap	Bent Gun Type
Phosphor Color	White
Phosphor Persistance	Medium
Mounting Position	Any
Deflection Angle (Approx.)	70 degrees

RATINGS

Heater Voltage	6.3 Volts
Maximum Anode Voltage	14,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range*	−125 to 0 Volts
Maximum Peak Heater to Cathode Voltage**	150 Volts

*Signal voltages which drive the grid more than 2 volts positive are not recommended.

**During a warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	12,000 Volts
Accelerating Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current† (Approx.)	100 Ma
Ion Trap Magnet Field Strength††	23 Gausses

†For RMA focusing coil No. 109 positioned with air gap toward screen and center line of air gap 3 inches from reference line. The indicated current is for condition with combined control grid bias and video signal voltage adjusted to produce a highlight brightness of 30 foot lamberts on a 10" x 13½" picture area.

††Requires a single magnet type ion trap magnet. Strength is measured at center of field.

APPLICATION

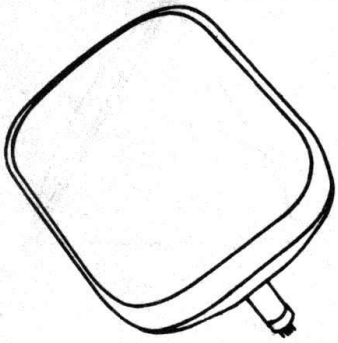
Sylvania Type 16GP4 is a magnetic deflection direct view picture tube for television use. This type combines the features of the bent gun ion trap and a lightweight metal cone envelope. The face plate is of higher quality than is commonly used on all-glass tubes. Since the anode voltage is applied to the metal shell, this type should be operated within an enclosure adequate to prevent accidental contact, and insulation for the maximum voltage should be provided in the tube mounting.

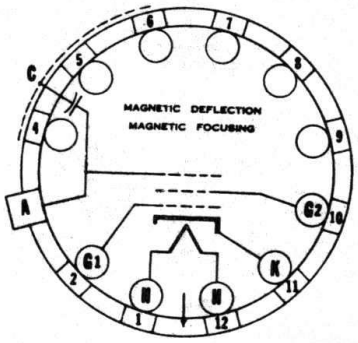
WARNING. X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given on page 16 of the appendix.

Issued as a supplement to the manual in Sylvania News for August 1950.

16TP4 Sylvania Type

PICTURE TUBE





12D2

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodual 5-pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	18¼"
Maximum Rectangular Dimensions	11½" x 14⅝"
Picture Size	10⅛" x 13½"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistance	Medium
Mounting Position	Any
Deflection Angle (Approx.) Horizontal	65 degrees

RATINGS

Heater Voltage	6.3 Volts
Maximum Anode Voltage	14,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control grid Voltage Range*	−125 to 0 Volts
Peak Heater to Cathode Voltage**	150 Volts

*Signal voltages which drive the grid more than 2 volts positive are not recommended.

**During a warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Anode Voltage	12,000 Volts
Accelerating Grid Voltage	250 Volts
Control Grid Voltage (for visual cut-off)	−33 to −77 Volts
Focusing Coil Current* (approx.)	115 Ma
Ion Trap Magnet Field Strength**	45 Gausses

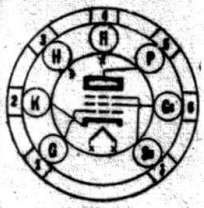
*For RMA focus coil No. 109 or equivalent, with the combined control grid bias voltage and video signal voltage adjusted to produce a highlight brightness of 13 foot lamberts on a 10⅛ x 13½" picture area. Distance from reference line of bulb to center of focus coil air gap should be 3.0".

**Requires a single magnet type ion trap magnet. Strength is measured at the center of the field.

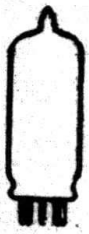
APPLICATION

Sylvania Type 16TP4 is a direct view magnetic television picture tube providing a rectangular screen 13½" x 10⅛". A single magnet ion trap is used to eliminate the ion spot blemish. The face plate is made of the neutral density (gray) glass for improved picture contrast and detail under high ambient light conditions.

WARNING. X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given on page 16 of the appendix.



7CM-0-7



Sylvania Type 6CB6

SHARP CUTOFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

RATINGS

Heater Voltage (AC or DC)	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Screen Voltage	150 Volts
Maximum Heater-Cathode Voltage	±90 Volts
Maximum Plate Dissipation	2.0 Watts
Maximum Screen Dissipation	0.5 Watts

Direct Interelectrode Capacitances*

Grid to Plate	0.020 μμf max.
Input	6.3 μμf
Output	1.9 μμf

*With no external shield.

TYPICAL OPERATION

Class A_1 Amplifier

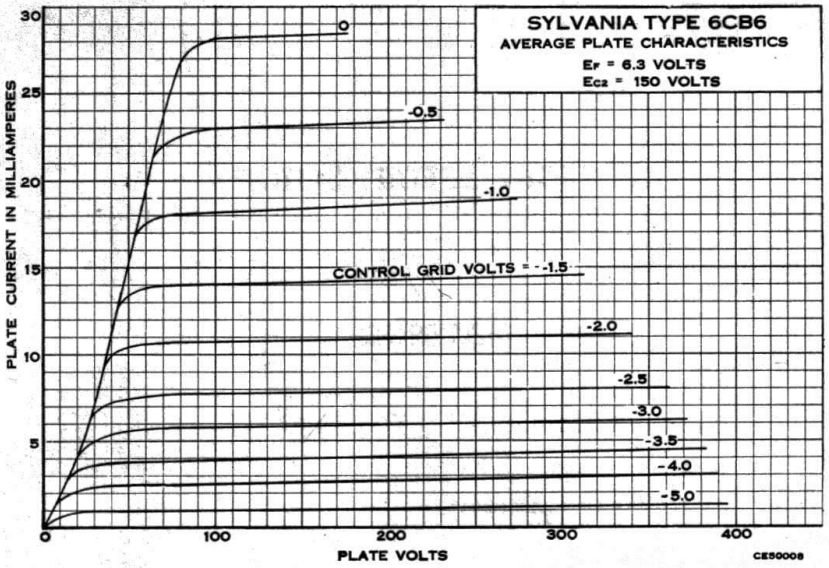
Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	200 Volts
Screen Voltage	150 Volts
Cathode Bias Resistor	180 Ohms
Plate Resistance (approx.)	0.6 Megohm
Mutual Conductance	6200 μmhos
Plate Current	9.5 Ma.
Screen Current	2.8 Ma.
Grid Voltage (approx.) for Ib = 10 μamps	−8 Volts

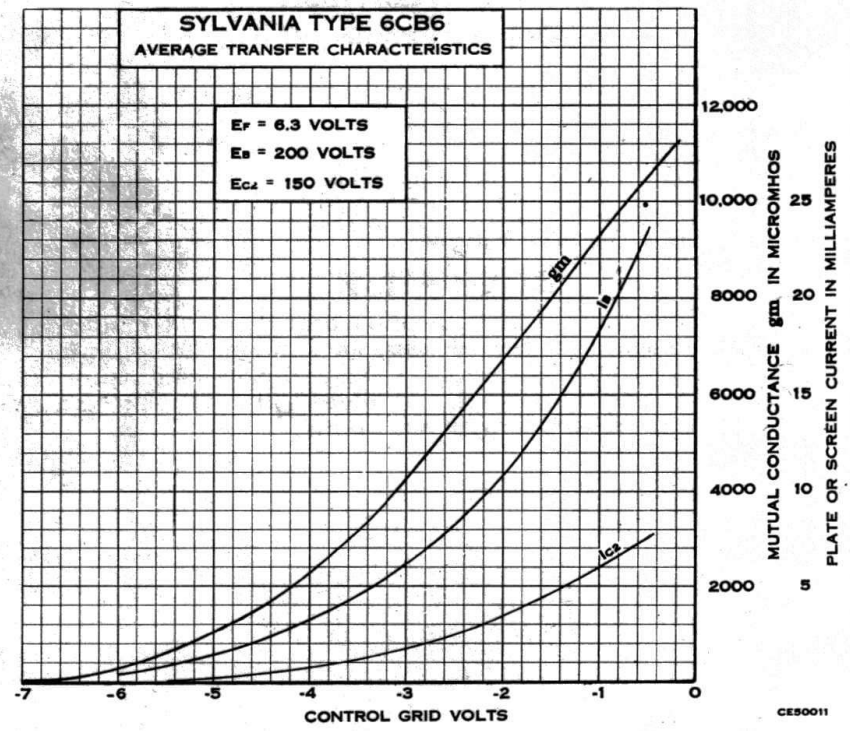
APPLICATION

Sylvania Type 6CB6 is a sharp cutoff pentode of the miniature construction designed for television use as an if amplifier operating in the vicinity of 40 megacycles. It may also be used as an rf amplifier in vhf television tuners. An added feature is the separate connection for the suppressor grid and internal shield.

Issued as a supplement to the manual in Sylvania News for June - July 1950.

6CB6, (Con'd)


SYLVANIA TYPE 6CB6
AVERAGE PLATE CHARACTERISTICS
Ef = 6.3 VOLTS
Ec2 = 150 VOLTS
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS = 0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-5.0
CE50008


SYLVANIA TYPE 6CB6
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 200 VOLTS
Ec2 = 150 VOLTS
gm
Ib
Ic2
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE OR SCREEN CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
CE50011