Technical MANUAL

SYLVANIA RADIO TUBES

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TECHNICAL MANUAL

SYLVANIA TUBES

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FOREWORD

The 9th Edition of the Technical Manual is a more complete and partially revised version of the popular 8th Edition. All supplements to the older edition have been included to bring the Manual up-to-date.

We have maintained the pocket-size volume which has proven so convenient for the serviceman, by moving some older tubes to the "Seldom Encountered Types" section. This is necessary because of the ever expanding number of vacuum tubes.

The basing diagrams of the Technical Manual are being changed to a more easily read style. All new supplements to the Manual will include this new type of diagram.

Cathode ray tubes are contained in a separate section which follows the receiving tube section. General data for the A and B versions of television picture tubes is listed with its prototype. Where the A or B version differs, such as basing diagram and conductive coating, it is listed separately.

The loose-leaf binder requires no explanation. Receiving tubes and cathode ray tubes are listed in numerical order. It is easily kept up-to-date by means of the monthly supplement sheets. These additions are published in conjunction with the SYLVANIA NEWS, available without charge by sending a request to Sylvania Electric Products Inc., Advertising Distribution Department, 1100 Main St., Buffalo 9, New York.

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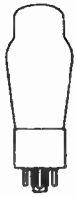


Sylvania Type 0A3(VR75)
Sylvania Type 0B3(VR90)
Sylvania Type 0C3(VR105)
Sylvania Type 0D3(VR150)

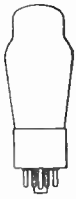
RATINGS

	OA3	OB3	OC3	OD3
Minimum Starting Voltage Required	105	125	133	185 Volts
Operating Current—Minimum	5	5	5	5 Ma.
Operating Current—Maximum	40	30	40	40 Ma.
Maximum Peak Current for 10 Seconds	100	100	100	100 Ma.

TYPICAL OPERATION

Heater Voltage	None Required			
Operating Voltage	75	90	105	150 Volts
Regulation (Maximum Voltage Change Minimum to Maximum Current)	6.5	6	4	5.5 Volts

4V-0-0



Sylvania Type 0A4G

COLD CATHODE CONTROL TUBE

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

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

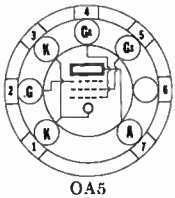
TYPICAL OPERATION

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 light sources.

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 μa.
Maximum Discharge Capacitance	0.5 μfd.
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

Anode Voltage DC	750 Volts
Trigger Grid Voltage	+90 Volts
Trigger Grid Circuit Resistance	0.25 Megohm
Trigger Pulse Voltage	85 Volts
Keep-Alive Current	50 μa.
Discharge Condenser	0.25 μfd.

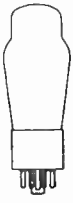
APPLICATION

Sylvania Type 0A5 is a miniature cold cathode gas discharge tube designed for use as a trigger tube for switching service requiring extremely high instantaneous peak currents (hundreds of amperes).

Sylvania Type 0A5 is manufactured under license granted by Edgerton, Germeshausen, and Grier, but no license is granted nor is a license to be implied under their circuit patents.

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

VOLTAGE REGULATORS



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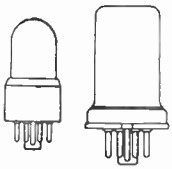
(SEE TYPE OA3 FOR SPECIFICATIONS AND RATINGS)



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.

6X-0-0

Sylvania Type 1A5GT

POWER AMPLIFIER PENTODE

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.

1A7GT Sylvania Type

HEPTODE CONVERTER

7Z-1-0

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8-Pin Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
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

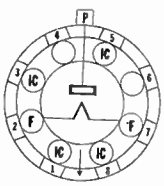
Filament Voltage	1.4 Volts
Filament Current	0.05 Ampere
Plate Voltage	90 Volts
Screen Voltage**	45 Volts
Anode-Grid Voltage	90 Volts
Control-Grid Voltage (G)†	0 Volts
Oscillator Grid Resistor (Go)	200000 Ohms
Plate Resistance	0.6 Megohm
Plate Current	0.55 Ma.
Screen Current	0.6 Ma.
Anode-Grid Current	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 hy-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.

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	$4\frac{1}{16}$"
Maximum Seated Height	$3\frac{1}{2}$"
Mounting Position	Any

RATINGS

Filament Voltage AC or DC	1.25 Volts
Filament Current	200 Ma.
Maximum Peak Inverse Plate Voltage	30,000 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 $\mu\mu$f.

** 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.

WARNING

The voltages employed in some television receivers and other high voltage equipment are sufficiently high that high-voltage rectifier tubes may produce X-rays which can constitute a health hazard, unless such tubes are adequately shielded.

6X-0-0

Sylvania Type 1C5GT

POWER CUTPUT PENTODE

PHYSICAL SPECIFICATIONS

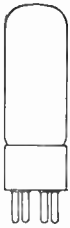
Base	Intermediate Octal 7-Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

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.

1D21



Sylvania Type 1D21

STROBOTRON

PHYSICAL SPECIFICATIONS

Base	Small 4 Pin
Bulb	T-9
Maximum Overall Length	4 1/2"
Maximum Seated Height	3 5/8"
Mounting Position	Any

1D21 (Cont'd)

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 manufactured under license granted by Edgerton, Germeshausen, and Grier, but no license is granted nor is a license to be implied under their circuit patents.

1G4GT Sylvania Type

MEDIUM-MU TRIODE

5S-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	3 3/16"
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.

7AB-0-0

Sylvania Type 1G6GT

DUO TRIODE POWER AMPLIFIER

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

5Z-1-7

Sylvania Type 1H5GT

DIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

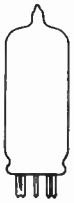
Base	Small Wafer 7 Pin Octal Metal Sleeve
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

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

For use in resistance coupled amplifiers see appendix.

1L6 Sylvania Type

PENTAGRID CONVERTER

7DC-0-0

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 Megohm

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.

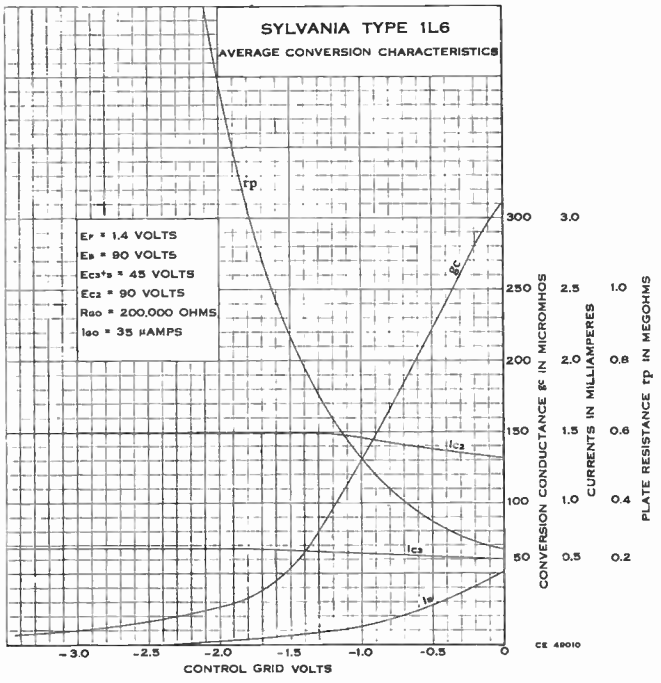
TYPICAL OPERATION

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 Megohm
Oscillator Grid Resistor (Rgo)	0.2 Megohm
Plate Resistance (Approx.)	0.65 Megohm
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

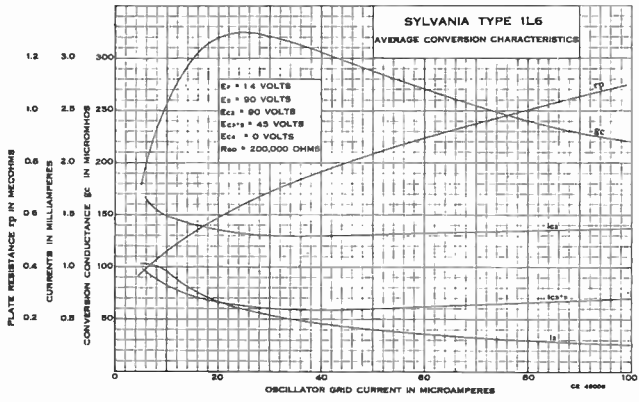
**Not oscillating, Eb = 90 V, Egs = 45 V, Ega = 90 V, Eg and Ego = 0 V.
#Obtained preferably by using a properly bypassed dropping resistor of from 45,000 ohms to 75,000 ohms in series with the B supply.

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)



1LA4 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	$2\,1/4$"
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.

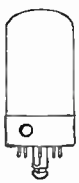
TYPICAL OPERATION AS A CLASS A_1 AMPLIFIER

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.

1LA6 Sylvania Type

HEPTODE CONVERTER



7AK-L-0

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

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

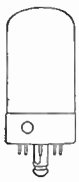
TYPICAL OPERATION

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.

5AD-L-0



Sylvania Type 1LB4

POWER OUTPUT 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

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

1LC5 Sylvania Type

SHARP CUT-OFF RF PENTODE

7AO-L-8

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 $1^5/_{16}$" diameter shield (RMA Std. 308) connected to negative filament

TYPICAL OPERATION

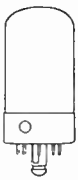
Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	45	90 Volts
Screen Voltage	45	45 Volts
Grid Voltage*	0	0 Volt
Suppressor	Connected to Negative Filament at Socket	
Plate Current	1.1	1.15 Ma.
Screen Current	.35	.30 Ma.
Plate Resistance	0.7	1.5 Megohm Approx.
Mutual Conductance	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.

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

1LC6 Sylvania Type

HEPTODE CONVERTER



7AK-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 or Anode Grid Supply	110 Volts
Maximum Anode-Grid Voltage	50 Volts
Maximum Screen Grid Voltage	45 Volts
Maximum Cathode Current	3.0 Ma.

Direct Interelectrode Capacitances:*

Grid G to Plate	0.28 $\mu\mu$f.
Mixer Input	9.00 $\mu\mu$f.
Mixer Output	5.50 $\mu\mu$f.
Oscillator Input	2.40 $\mu\mu$f.
Oscillator Output	4.80 $\mu\mu$f.

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

TYPICAL OPERATION

Filament Voltage	1.4	1.4 Volts
Filament Current	0.050	0.050 Ampere
Plate Voltage	45	90 Volts
Screen Voltage*	35	35 Volts
Anode-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.

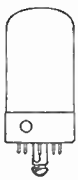
*Obtained preferably by using a properly by-passed voltage dropping resistor in series with B voltage supply. In order to avoid oscillation difficulties the screen voltage must be at least 10 volts lower than the oscillator anode.

†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.), μ=14, and anode-grid current=2.7 ma.

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

6AX-L-8



Sylvania Type 1LD5

DIODE PENTODE

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

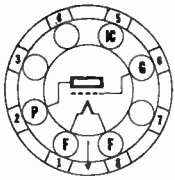
TYPICAL OPERATION

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

For resistance coupled information refer to table in appendix.

1LE3 Sylvania Type

MEDIUM-MU TRIODE



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 μμf.
Input	1.7 μμf.
Output	3.0 μμf.

*With $1^{5}/_{16}$" 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

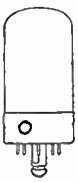
*Negative Filament return to Pin No. 8.

For use in resistance coupled circuits, see appendix.

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	$2^{25}/_{32}$"
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:*

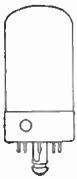
Grid to Plate	.007 μμf. Max.
Input	3.2 μμf.
Output	7.0 μμf.

*With $1^{5}/_{16}$" 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

5AG-L-1



Sylvania Type 1LH4

DIODE HIGH-MU TRIODE

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.
The negative filament voltage should be connected to pin No. 8.
Note: Diode plate location at negative end of filament.

For use in resistance coupled circuits, see appendix.

7AO-L-8

Sylvania Type 1LN5

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	110 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.007 μμf. Max.
Input	3.0 μμf.
Output	8.0 μμf.

*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.

For use in resistance coupled circuits, see appendix.

1N5GT Sylvania Type

SHARP CUT-OFF RF PENTODE

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.

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

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.

6AF-0-0

Sylvania Type 1Q5GT

BEAM POWER AMPLIFIER

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

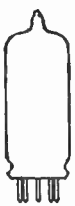
RATINGS

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

7AT-0-0



Sylvania Type 1R5

HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5 1/2
Maximum Overall Length	2 1/16"
Maximum Seated Height	1 7/8"
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:*

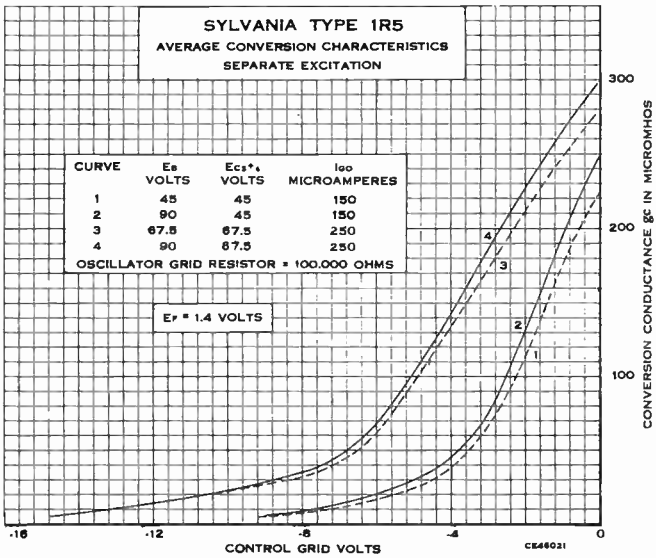
Grid Go to Plate	0.10 μμf.
Signal Input	7.0 μμf.
Mixer Output	7.5 μμf.
Oscillator Input	3.8 μμf.
Grid (G) to Plate	0.4 μμf. Max.
Grid (G) to Grid (Go)	0.2 μμf. Max.
Grid (Go) to Plate	0.1 μμf. Max.

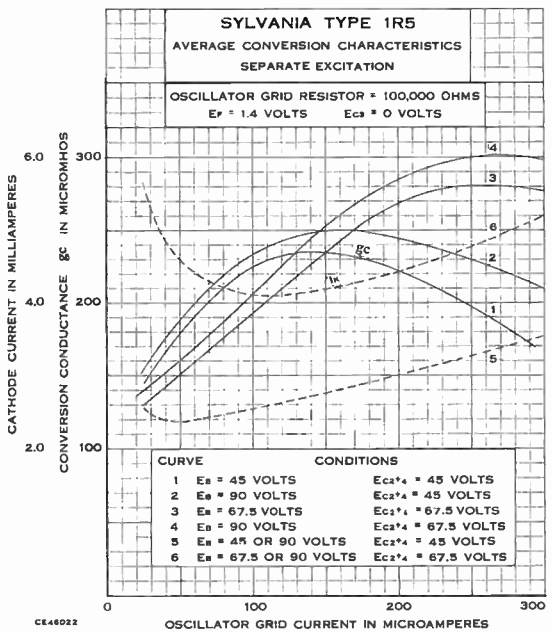
*Without shield.

1R5 (Cont'd)

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





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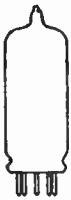


Sylvania Type 1S4

POWER AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5½
Maximum Overall Length	2 1/4"
Maximum Seated Height	1 7/8"
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

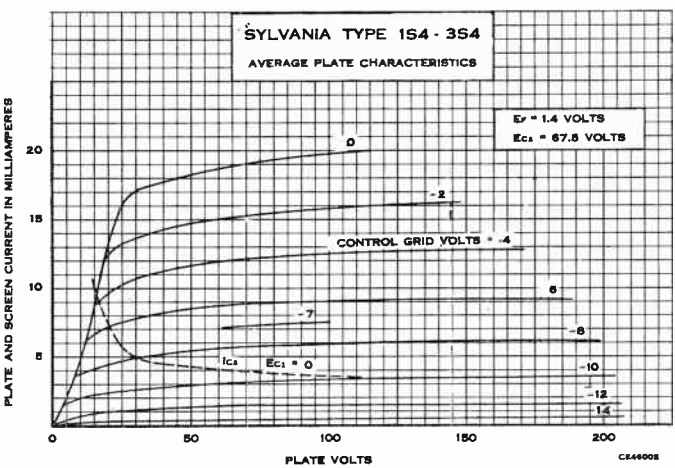
CLASS A AMPLIFIER

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.



1S5 Sylvania Type

DIODE PENTODE AMPLIFIER

6AU-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T5½
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	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

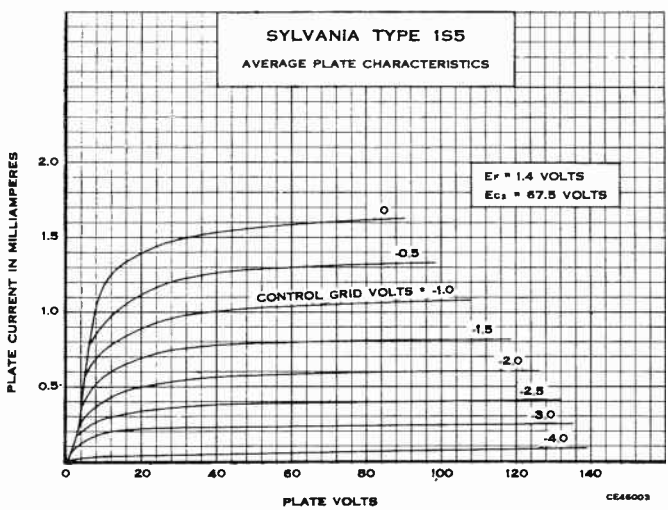
Filament Voltage DC	1.4	1.4 Volts
Filament Current	50	50 Ma.
Plate Voltage	67.5	90 Volts
Screen Voltage	67.5	90 Volts
Grid Voltage	0	0 Volt
Plate Current	1.6	2.7 Ma.
Screen Current	0.4	0.5 Ma.
Plate Resistance (Approx.)	0.6	0.5 Megohm
Mutual Conductance	625	720 μmhos

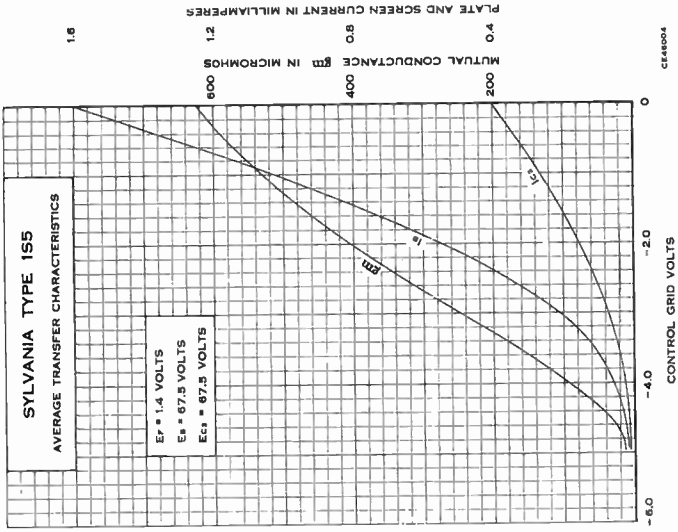
Note; Diode plate located at negative end of filament.

APPLICATION

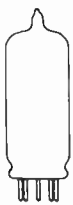
Sylvania Type 1S5 is a diode pentode of the miniature construction, especially designed for detector-audio service in compact, light weight, portable equipment. The high operating efficiency allows the tube to be used with extremely low B supply voltages. The internal construction of Type 1S5 is similar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

For use in resistance coupled circuits, see appendix.





6AR-0-1 & 5



Sylvania Type 1T4

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

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.

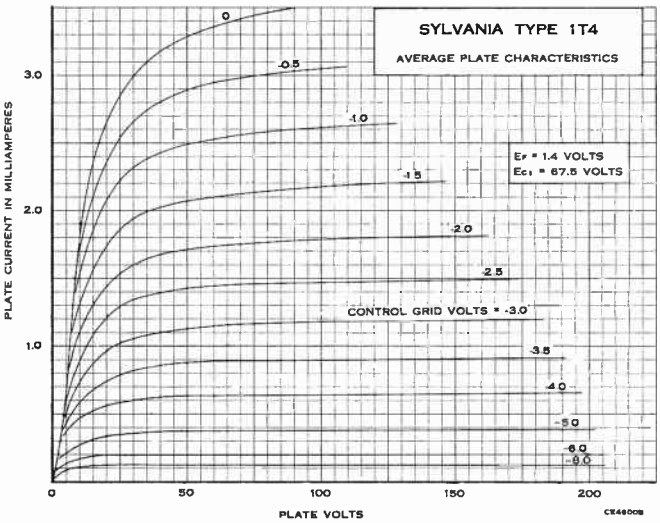
TYPICAL OPERATION

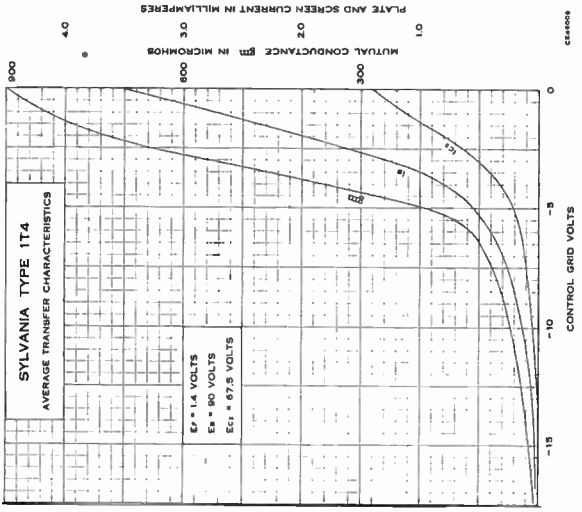
Filament Voltage DC	1.4	1.4	1.4	1.4 Volts
Filament Current	50	50	50	50 Mu.
Plate Voltage	45	67.5	90	90 Volts
Screen Voltage	45	67.5	45	67.5 Volts
Grid Voltage	0	0	0	0 Volt
Plate Current	1.7	3.4	1.8	3.5 Ma.
Screen Current	0.7	1.5	0.65	1.4 Ma.
Plate Resistance (Approx.)	0.35	0.25	0.8	0.5 Megohm
Mutual 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.

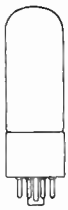
1T4 (Cont'd)





1T5GT Sylvania Type

PENTODE POWER AMPLIFIER



6X-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
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)	.025	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

6AR-0-1 & 5

Sylvania Type 1U4

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Miniature 7-Pin
Bulb	T-5½
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
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.

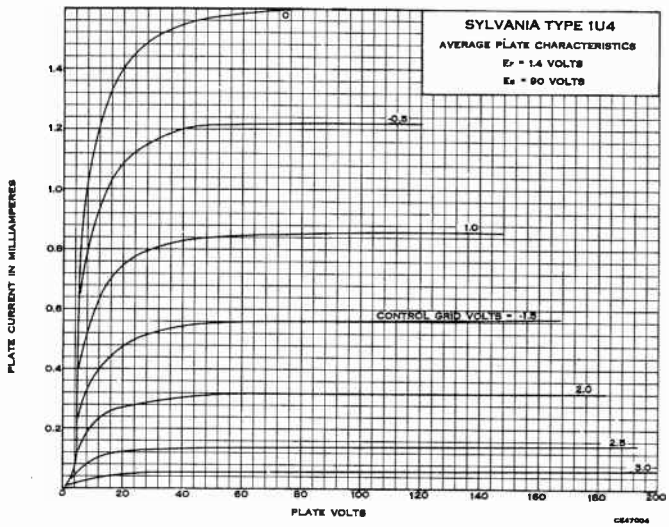
TYPICAL OPERATION

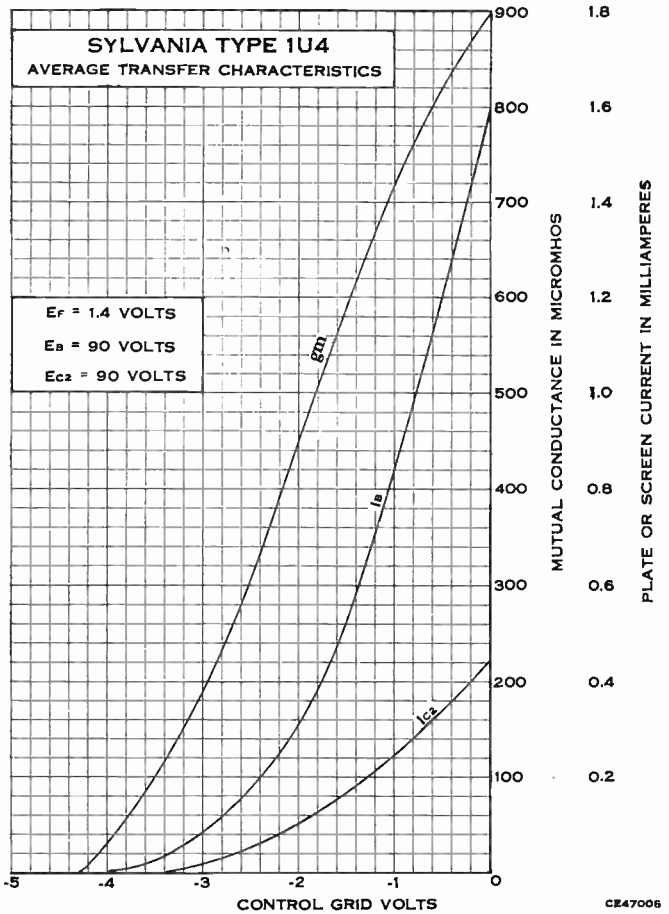
Filament Voltage DC	1.4 Volts
Filament Current	50 Ma.
Plate Voltage	90 Volts
Screen Voltage	90 Volts
Control Grid Voltage	0 Volts
Plate Resistance (Approx.)	1.5 Megohms
Mutual Conductance	900 μmhos
Plate Current	1.6 Ma.
Screen Current	0.45 Ma.
Grid Bias Voltage for Mutual Conductance of 10 μmhos	−4.5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





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.

9U-0-0

Sylvania Type 1V2

HALF WAVE VACUUM RECTIFIER

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

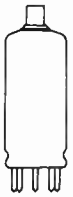
Heater Voltage (AC)	0.625 Volts
Heater Current	0.3 Amperes
Peak Inverse Plate Voltage (Max.)	7,500 Volts
Peak Plate Current (Max.)	10 Ma.
Average Plate Current (Max.)	0.5 Ma.
Direct Interelectrode Capacitance (Approx. with no external shield) Plate to Filament	0.8 μμf.

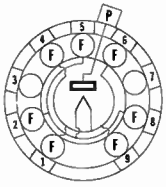
APPLICATION

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

1X2A Sylvania Type

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

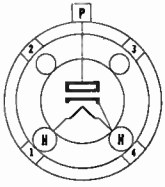
Filament Voltage	1.25 Volts
Filament Current	200 Ma.
Peak Inverse Plate Voltage (Max.)	20,000 Volts
Peak Plate Current (Max.)	10 Ma.
DC Output Current (Max.)	1 Ma.

APPLICATION

Sylvania Type 1X2A 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.

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 17/32"
Maximum Seated Height	3 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.

7BB-0-0

Sylvania Type 3A4

POWER AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

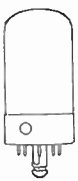
Base	Miniature Button 7 Pin
Bulb	T5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any

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.

6BB-L-0



Sylvania Type 3LF4

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	2 25/32"
Maximum Seated Height	2¼"
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	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.

3Q4 Sylvania Type

BEAM POWER AMPLIFIER

7BA-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5 ½
Maximum Overall Length	2 1/16"
Maximum Seated Height	1 7/8"
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
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

3Q5GT Sylvania Type

BEAM POWER AMPLIFIER

7AP-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	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 and operating 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

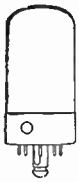
PHYSICAL SPECIFICATIONS

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



5T-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	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

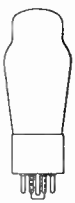
	Filter Circuit	
	Choke Input	Condenser Input
Filament Voltage AC	5.0	5.0 Volts
Filament Current	2.0	2.0 Amperes
AC Plate Voltage Per Plate (RMS)	500	350 Volts
DC Output Current	125	125 Ma.
Minimum Plate Supply Impedance Per Plate	...	50 Ohms
Input Choke	10	... Henrys

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.

5R4GY Sylvania Type

FULL WAVE RECTIFIER



5T-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 5-Pin
Bulb	ST-16
Maximum Overall Length	5 1/16"
Maximum Seated Height	4 3/4"
Mounting Position*	Vertical

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

RATINGS

Filament Voltage AC or DC	5.0 Volts
Filament Current	2.0 Amperes
Maximum Peak Inverse Voltage (No-Load Conditions)	2800 Volts
Maximum Peak Plate Current	650 Ma.

TYPICAL OPERATION

WITH CONDENSER-INPUT FILTER

AC Plate Voltage per Plate (RMS)	
Full Load	900 Volts
No Load	1000 Volts
Total Effective Plate-Supply Impedance per Plate**	575 Ohms
DC Output Current (Maximum)	150 Ma.

**For input condenser larger than 4 μf. a larger plate-supply impedance may be necessary to limit peak plate current to the rated value.

WITH CHOKE-INPUT FILTER

AC Plate Voltage per Plate (RMS)	
Full Load	950 Volts
No Load	1000 Volts
Input-Choke Inductance (Minimum)	10 Henries
DC Output Current (Maximum)	175 Ma.

APPLICATION

Sylvania Type 5R4GY is a full wave rectifier of the coated filament type. Operating conditions given above apply for use at altitudes up to 20,000 feet.

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.

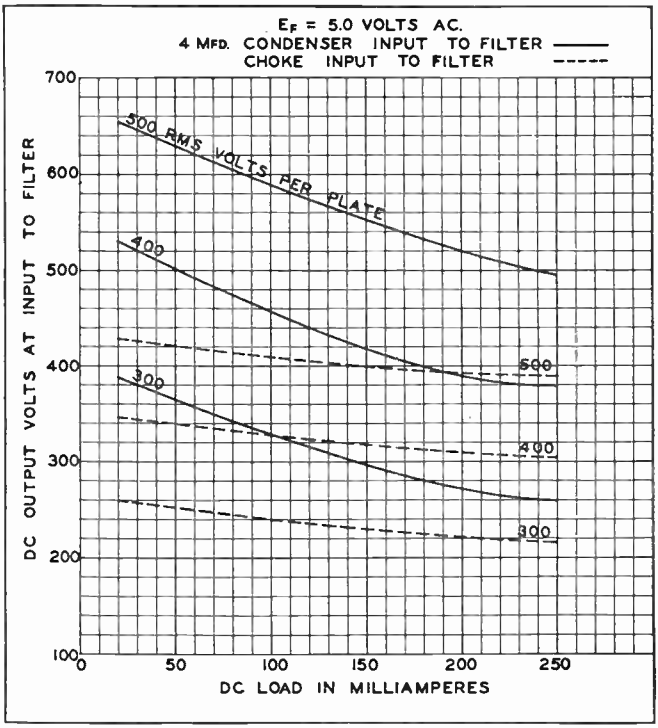
TYPICAL OPERATION

	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.

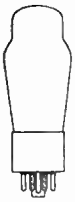
APPLICATION

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

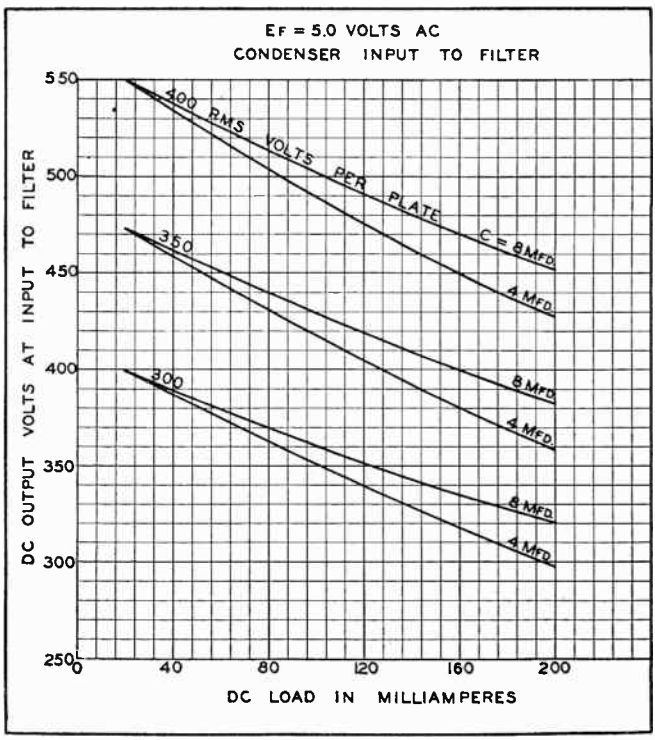
AC Voltage per Plate (RMS)	375 Volts Max.
DC Output Current	175 Ma. Max.
Plate Supply Impedance per Plate	100 Ohms Min.

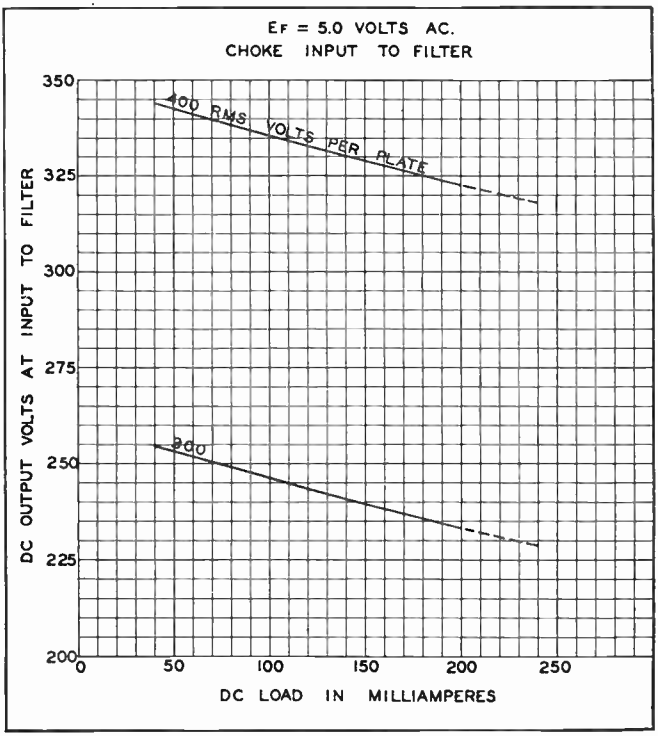
CHOKE INPUT TO FILTER

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

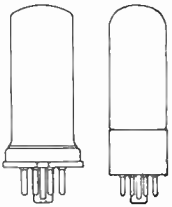
APPLICATION

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.





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



Sylvania Type 5W4GT

FULL-WAVE RECTIFIER

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 13/16"
Mounting Position	Any	Any

RATINGS

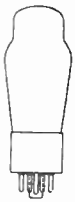
Filament Voltage AC	5.0 Volts
Filament Current	1.5 Amperes
Maximum Peak Inverse Voltage	1100 Volts
Tube Voltage Drop at 110 Ma. per Plate	50 Volts
Maximum Peak Plate Current (Per Plate)	300 Ma.

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

5X4G Sylvania Type

FULL-WAVE RECTIFIER



5Q-0-0

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.

5Y3GT Sylvania Type
5Y4G Sylvania Type

FULL-WAVE RECTIFIER

5Q-0-0
5Y4G

5T-0-0
5Y3GT

PHYSICAL SPECIFICATIONS

	5Y3GT	5Y4G
Base	Intermediate Octal 5-Pin	Medium Octal 8-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	375 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

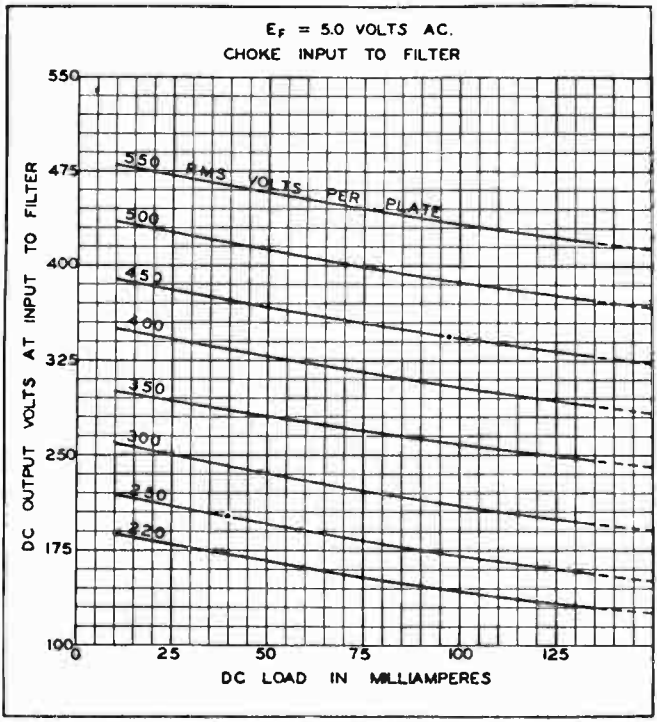
	Filter Circuit	
	Choke Input	Condenser Input
Filament Voltage AC	5.0	5.0 Volts
Filament Current	2.0	2.0 Amperes
AC Plate Voltage per Plate (RMS)	500	350 Volts
DC Output Current	125	125 Ma.
Minimum Plate Supply Impedance per Plate	...	50 Ohms
Input Choke	10	... Henrys

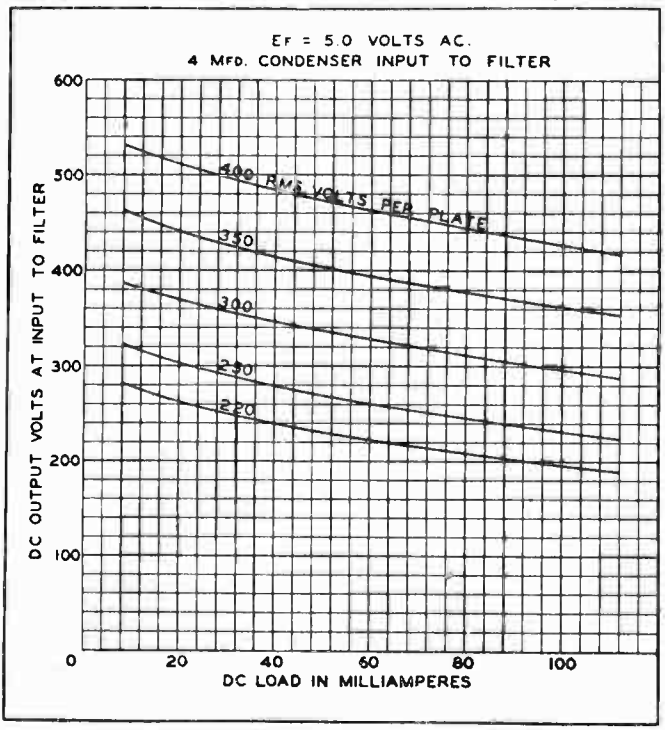
APPLICATION

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. 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).

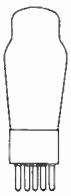
TYPES 5Y3G, 5Y4G, 80





5Z3 Sylvania Type

FULL-WAVE RECTIFIER



4C-0-0

PHYSICAL SPECIFICATIONS

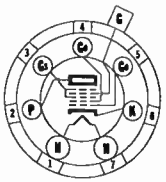
Base	Medium 4-Pin
Bulb	ST16
Maximum Overall Length	5 3/8"
Maximum Seated Height	4 3/4"
Mounting Position	Vertical†

†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.

6A7 Sylvania Type

HEPTODE CONVERTER



7C-0-0

PHYSICAL SPECIFICATIONS

Base	Small 7 Pin
Bulb	ST12
Cap	Small Metal
Maximum Overall Length	4 17/32"
Maximum Seated Height	3 29/32"
Mounting Position	Any

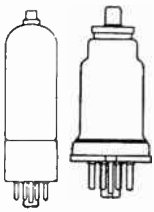
RATINGS

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

For typical operating conditions see Type 6A8G.

6A8G/GT Sylvania Type

HEPTODE CONVERTERS



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

PHYSICAL SPECIFICATIONS

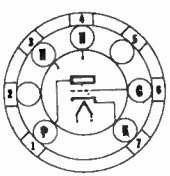
	6A8	6A8G	6A8GT
Base	Small Wafer Octal 8 Pin	Small Octal 8 Pin	Small Wafer Octal 8 Pin Metal Sleeve
Bulb	Metal 8-4	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 17/32"	3 5/16"
Maximum Seated Height	2 1/16"	3 29/32"	2 3/4"
Mounting Position	Any	Any	Any

TYPICAL OPERATION

Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
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.



5CE-0-2

Sylvania Type 6AB4

R F 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	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Heater-Cathode Voltage	90 Volts
Maximum Negative Control DC Grid Voltage	−50 Volts

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Grid to Plate	1.5	1.5 μμf.
Input	2.4	2.2 μμf.
Output	1.4	0.50 μμf.
(Grounded Grid Operation)		
Plate to Cathode	0.20	0.24 μμf.
Input	5.2	5.0 μμf.
Output	2.6	1.7 μμf.

*RMA standard shield No. 316.

It is recommended that pin number 2 be grounded.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Cathode Resistor	270	200 Ohms
Plate Current	3.7	10 Ma.
Plate Resistance	15,000	10,900 Ohms
Mutual Conductance	4,000	5,500 μmhos
Amplification Factor	60	60
Control Grid Voltage (approx.) for Ib = 10 μa.	−5	−12 Volts

Electrical characteristics and curves same as the 12AT7.

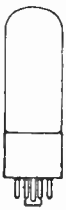
APPLICATION

Sylvania Type 6AB4 is a miniature triode to be used as a ground-grid rf amplifier, frequency converter or oscillator at frequencies below 300 megacycles.

6AC5GT Sylvania Type

HIGH-MU POWER AMPLIFIER

TRIODE



6Q-0-0

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.

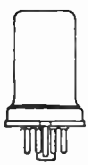
TYPICAL OPERATION FOR TWO TUBES:

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.

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.

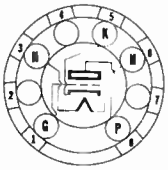
Direct Interelectrode Capacitances:†

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



8DK-0-0

Sylvania Type 6AD4

HIGH MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Overall Bulb Length	1 3/8"
Minimum Lead Length	1 1/2"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	150 Volts
Maximum Plate Dissipation	0.3 Watt
Maximum Heater-Cathode Voltage	90 Volts
Maximum Cathode Current	2 Ma.
Maximum Control Grid Circuit Resistance (cathode bias)	1 Megohm

Direct Interelectrode Capacitances:

	Unshielded	Shielded*
Grid to Plate	0.80	0.70 μμf.
Input	1.70	1.90 μμf.
Output	0.70	2.20 μμf.

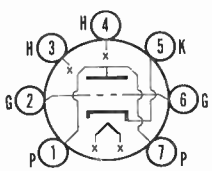
*External shield of 0.405" diameter connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Plate Voltage	100 Volts
Cathode Bias Resistor	820 Ohms
Plate Current	1.4 Ma.
Mutual Conductance	2000 μmhos
Amplification Factor	70
Plate Resistance	35,000 Ohms
Control Grid Voltage for Ib = 10 μa	−3.0 Volts

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



7 DK

Sylvania Type 6AF4

U H F TRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5 1/2
Maximum Overall Length	2 1/16"
Maximum Seated Height	1 7/8"
Mounting Position	Any
Basing	7 DK

RATINGS

Heater Voltage	6.3 Volts
Heater Current	225 Ma

6AF4 (Cont'd)

U H F Oscillator Service

Maximum Plate Voltage	150 Volts
Maximum Plate Input	2.5 Watts
Maximum Plate Dissipation	2.25 Watts
Maximum Negative Grid Voltage	50 Volts
Maximum Grid Current	8 Ma
Maximum Cathode Current	28 Ma
Maximum Heater-Cathode Voltage	80 Volts
Maximum Grid Circuit Resistance	
Fixed Bias	Not Recommended
Cathode Bias	0.5 Megohm

Direct Interelectrode Capacitances (Unshielded):

Grid to Plate	1.9 μμf
Input	2.2 μμf
Output	0.45 μμf

CHARACTERISTICS

Plate Voltage	80 Volts
Cathode Bias Resistor	150 Ohms
Plate Current	16 Ma
Transconductance	6600 μmhos
Amplification Factor	15
Plate Resistance	2270 Ohms

TYPICAL OPERATION (Oscillator at 950 MC)

Plate Voltage	100 Volts
Grid Voltage (Self Bias)	−4 Volts
Grid Resistor	10000 Ohms
Plate Current	22 Ma
Grid Current (approx.)	400 μamps

APPLICATION

A miniature medium mu triode designed for service as a u h f oscillator.

6AG5 Sylvania Type

SHARP CUT-OFF RF PENTODE

7BD-0-2 & 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	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

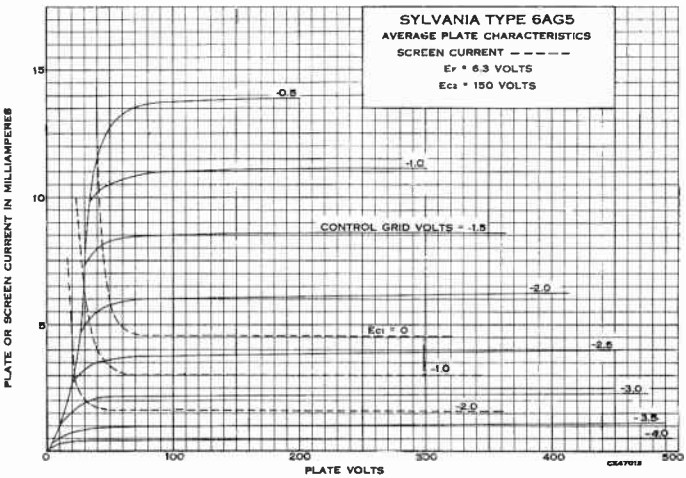
PENTODE CONNECTION

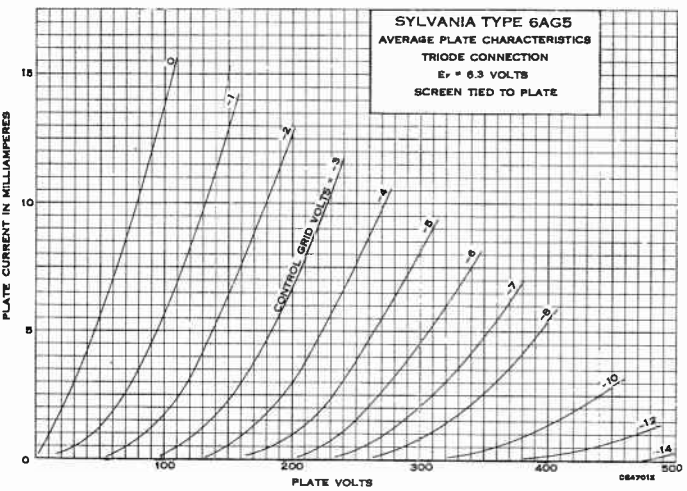
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	300	300	300 Ma.
Plate Voltage	100	125	250 Volts
Screen Voltage	100	125	150 Volts
Self-Bias Resistor	100	100	200 Ohms
Plate Current	5.5	7.2	7.0 Ma.
Screen Current	1.6	2.1	2.0 Ma.
Grid Bias for 10 μa Plate Current	−5.0	−6.0	−8.0 Volts
Plate Resistance (Approx.)	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 is similar to the 6BC5





6AG7 Sylvania Type

TELEVISION AMPLIFIER PENTODE

8Y-1-3

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

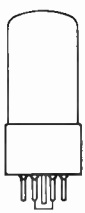
CLASS A_1 AMPLIFIER

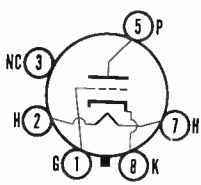
Heater Voltage	6.3 Volts
Heater Current	0.650 Ampere
Plate Voltage	300 Volts
Screen Voltage	150 Volts
Control Grid Voltage*	3.0 Volts
Self-Bias Resistor	81 Ohms
Peak AF Signal Voltage	3.0 Volts
Plate Resistance	0.13 Megohm
Mutual Conductance	11000 μmhos
Zero Signal Plate Current	30 Ma.
Maximum Signal 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.

6AH4GT Sylvania Type

VERTICAL DEFLECTION AMPLIFIER





8 EL

PHYSICAL SPECIFICATIONS

Base	Short Intermediate Shell Octal 6-Pin
Bulb	T-9
Maximum Overall Length	3 5/8"
Maximum Seated Height	2¾"
Mounting Position	Any
Basing	8 EL

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.75 Ampere

Vertical Deflection Amplifier[1]

Maximum Plate Voltage	500 Volts
Absolute Maximum Peak Positive Plate Voltage	2000 Volts
Maximum Plate Dissipation[2]	7.5 Watts
Maximum Positive Grid Voltage	0 Volts
Maximum Peak Negative Pulse Grid Voltage	200 Volts
Maximum Average Cathode Current	60 Ma
Maximum Peak Cathode Pulse Current	180 Ma
Maximum Heater-Cathode Voltage	
D C and Peak Pulse (Heater Pos. or Neg.)	200 Volts
D C (Heater Pos.)	100 Volts
Maximum Grid Circuit Resistance	2.2 Megohms

Direct Interelectrode Capacitances:

	Shielded[3]	Unshielded
Grid to Plate	4.2	4.4 μμf
Input	7.5	7.0 μμf
Output	3.2	1.7 μμf

CHARACTERISTICS

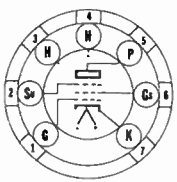
Plate Voltage	250	250 Volts
Control Grid Voltage	−33	−23 Volts
Plate Current	5.0	30 Ma
Transconductance		4500 μmhos
Amplification Factor		8
Plate Resistance		1780 Ohms
Grid Voltage for Ib = 0.5 Ma. (approx.)		−40 Volts

APPLICATION

A high perveance triode for use as a vertical deflection amplifier in television receivers.

Notes:

1. For operation in a 525 line, 30 frame system the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
2. An adequate bias resistor or other means is required to protect the tube in the absence of excitation.
3. Shield No. 308 connected to cathode.



7BK-0-0

Sylvania Type 6AH6

SHARP CUT-OFF RF PENTODE

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

6AH6 (Cont'd)

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.

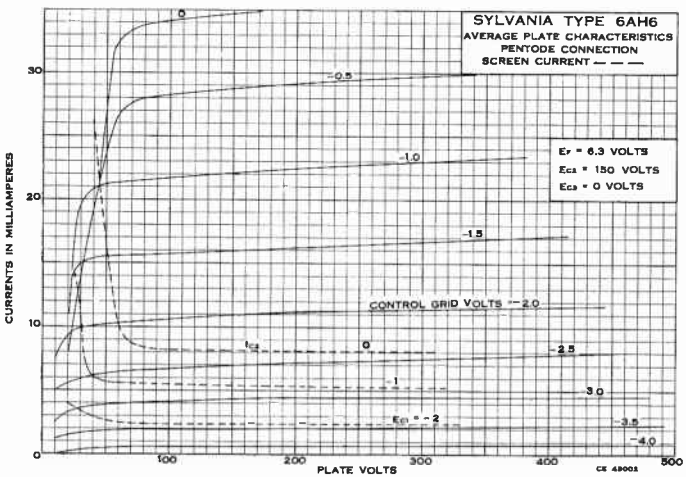
TYPICAL OPERATION

	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.



6AJ5 Sylvania Type

SHARP CUT-OFF PENTODE

7BD-0-0

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
Maximum Plate Voltage	180 Volts
Maximum Screen Supply Voltage	180 Volts
Maximum Plate Dissipation	1.7 Watts
Maximum Screen Dissipation	0.5 Watt
Maximum Positive Control DC Grid Voltage	0 Volts
Maximum Cathode Current	18 Ma.

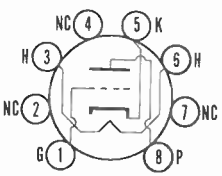
Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Grid to Plate	0.02	0.03 μμf.
Input	4.0	4.0 μμf.
Output	2.8	2.1 μμf.

*External shield connected to pins 2 and 7.

TYPICAL OPERATION
CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	175 Ma.
Plate Voltage	28 Volts
Screen Grid Voltage	28 Volts
Control Grid Voltage	−1 Volt
Plate Resistance (approx.)	0.1 Megohm
Mutual Conductance	2,500 μmhos
Plate Current	2.7 Ma.
Screen Grid Current	1 Ma.
Control Grid Voltage for Ib = 10 μa	−4.5 Volts



8-DK

Sylvania Type 6AK4

HIGH FREQUENCY TRIODE

PHYSICAL SPECIFICATIONS

Base	Subminiature Button, Flexible Leads
Bulb	T-3
Maximum Bulb Length	1.375"
Minimum Lead Length	1.500"
Mounting Position	Any
Basing	8-DK

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	250 Volts
Maximum Heater to Cathode Voltage	90 Volts
Maximum Plate Dissipation	3.0 Watts
Maximum Cathode Current	20 Ma.

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Grid to Plate	1.3	1.4 μμf.
Input	2.2	1.8 μμf.
Output	2.2	0.6 μμf.

*With 0.405" diameter shield connected to cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Plate Voltage	200 Volts
Grid Voltage* Obtained from Self Bias Resistor of	680 Ohms
Plate Current	9.5 Ma.
Transconductance	3800 μmhos
Amplification Factor	20
Plate Resistance	5300 Ohms
Grid Voltage for Plate Current Cut-Off to 10 μa	−20 Volts

*Provides an operating bias of approx. 6.5 volts.
Fixed bias operation is not recommended.

6AK4 (Cont'd)

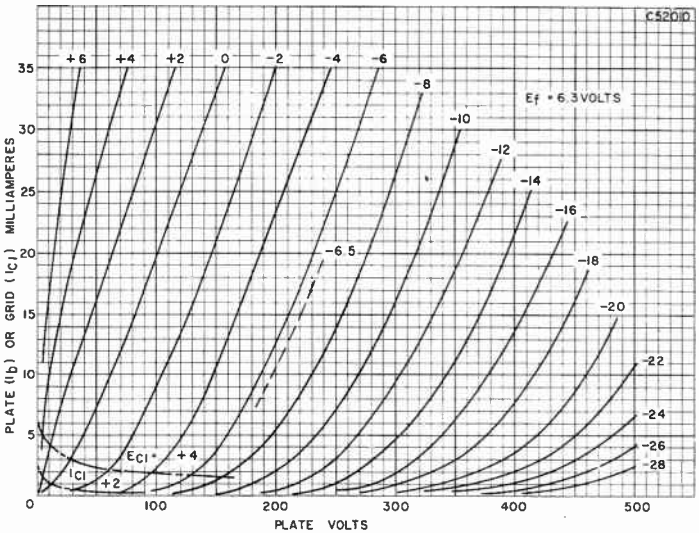
APPLICATION

Sylvania Type 6AK4 is a general purpose medium mu triode in the subminiature style. This tube is a commercial version of the 6K4 and is considered a replacement for it.

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

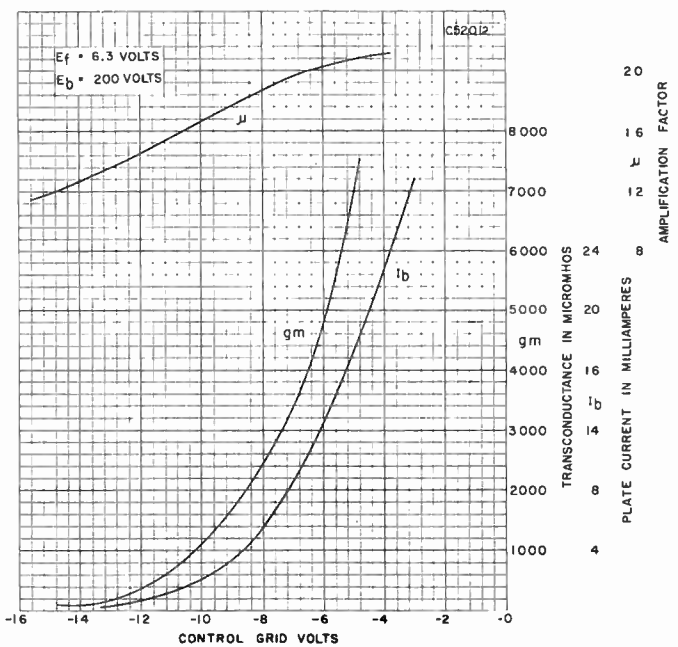
Sylvania Type 6AK4

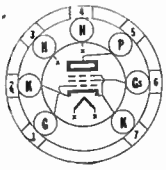
AVERAGE PLATE CHARACTERISTICS



Sylvania Type 6AK4

AVERAGE TRANSFER CHARACTERISTICS





7BD-0-2 & 7

Sylvania Type 6AK5

RF AMPLIFIER 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

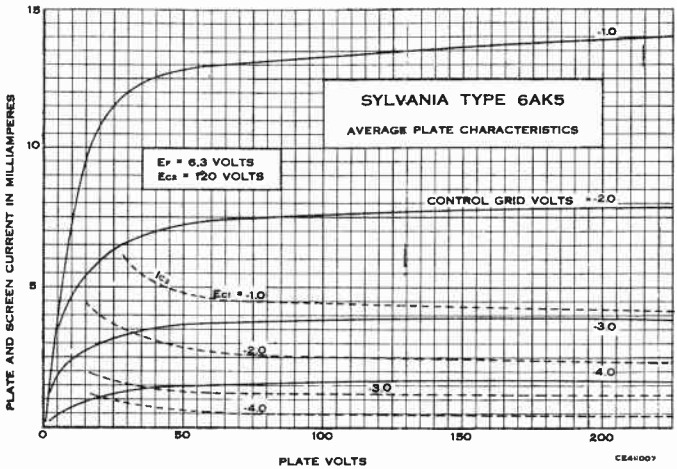
CLASS A_1 AMPLIFIER

Heater Voltage	6.3	6.3 Volts
Heater Current	175	175 Ma.
Plate Voltage	120	180 Volts
Screen Voltage	120	120 Volts
Cathode Resistor**	180	180 Ohms
Plate Resistance (approx.)	0.30	0.50 Megohm
Mutual Conductance	5000	5100 μmhos
Plate Current	7.5	7.7 Ma.
Screen Current	2.5	2.4 Ma.

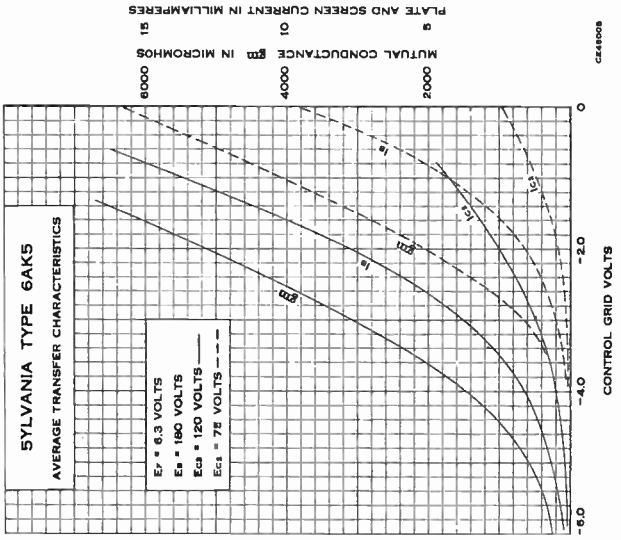
**Fixed Bias Operation is not recommended.

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'd)



6AK6 Sylvania Type

PENTODE POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7-Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅛"
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.

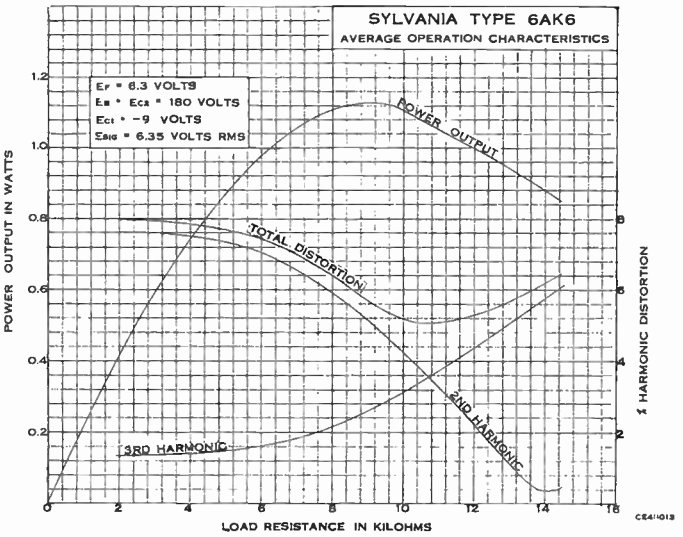
TYPICAL OPERATION

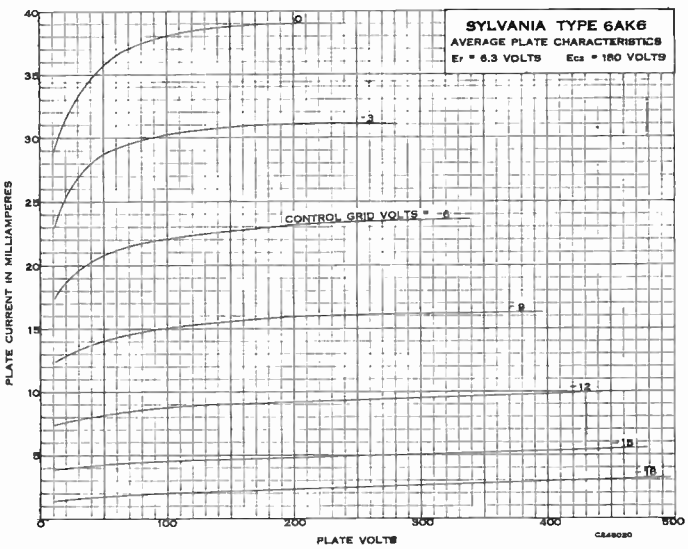
A.F. POWER AMPLIFIER

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

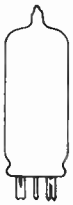
Sylvania Type 6AK6 is a power amplifier pentode designed for use in compact light-weight radio equipment. It is similar in characteristics to Sylvania Type 6G6G.





6AL5 Sylvania Type

DUODIODE



6BT-0-6

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	330 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.

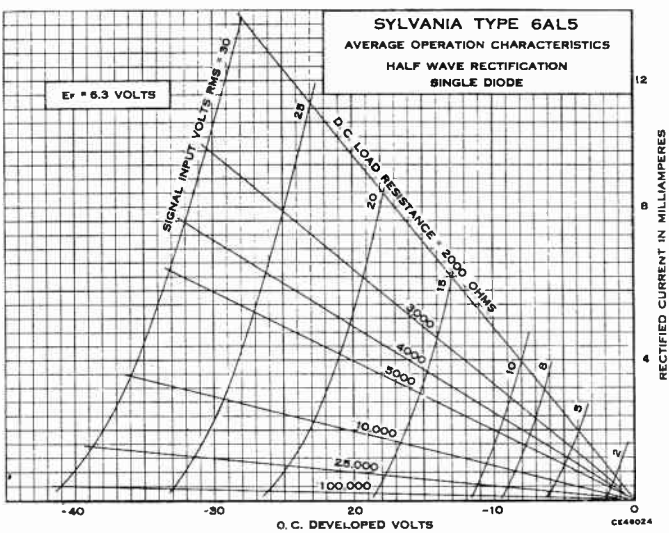
TYPICAL OPERATION
AS A HALF WAVE RECTIFIER

AC Voltage Per Plate (RMS)	117 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.



8CH-0-0

Sylvania Type 6AL7GT

TUNING INDICATOR

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 are indicated by the location and size of the illuminated area.

6AL7GT (Cont'd)

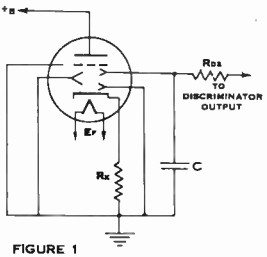


FIGURE 1

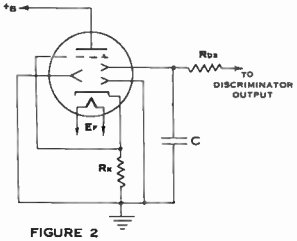


FIGURE 2

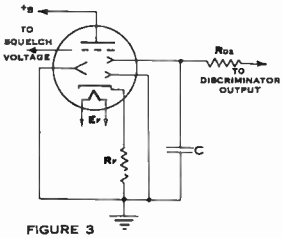


FIGURE 3

SQUELCH VOLTAGE
6 V. (APPROX.) FOR OFF CHANNEL

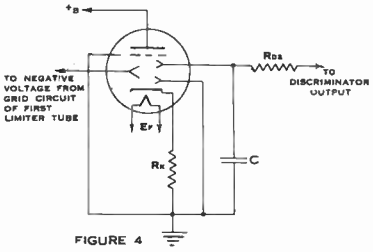


FIGURE 4

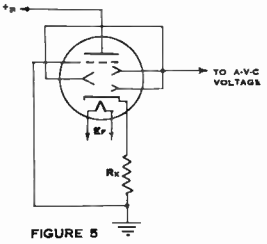
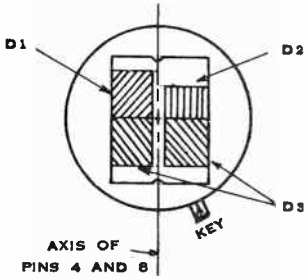


FIGURE 5

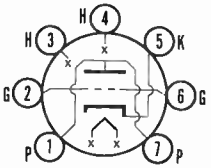


COMMON CONDITIONS FOR ALL CIRCUITS

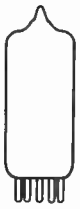
Er = 6.3 VOLTS
+B = 250 VOLTS D-C APPROXIMATE
Rx = 3300 OHMS
Rds = 1.0 MEGOHM
C = 0.05 MICROFARAD

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					



7 DK



Sylvania Type 6AN4

U H F AMPLIFIER-MIXER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	1⅜"
Maximum Seated Height	1½"
Mounting Position	Any
Basing	7DK

RATINGS

Heater Voltage	6.3 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	4 Watts
Maximum Cathode Current	30 Ma.
Maximum Heater-Cathode Voltage	
DC and Peak (Heater Pos. or Neg.)	200 Volts
DC (Heater Pos.)	100 Volts
Maximum Grid Circuit Resistance:	
Fixed Bias	0.1 Megohm
Cathode Bias	0.5 Megohm

TYPICAL OPERATION

Class A Amplifier

Heater Voltage	6.3 Volts
Heater Current	225 Ma.
Plate Voltage	200 Volts
Cathode Bias Resistor	100 Ohms
Plate Current	13 Ma.
Transconductance	10,000 μmhos
Amplification Factor	70
Grid Voltage for Ih = 20 μa	−7 Volts

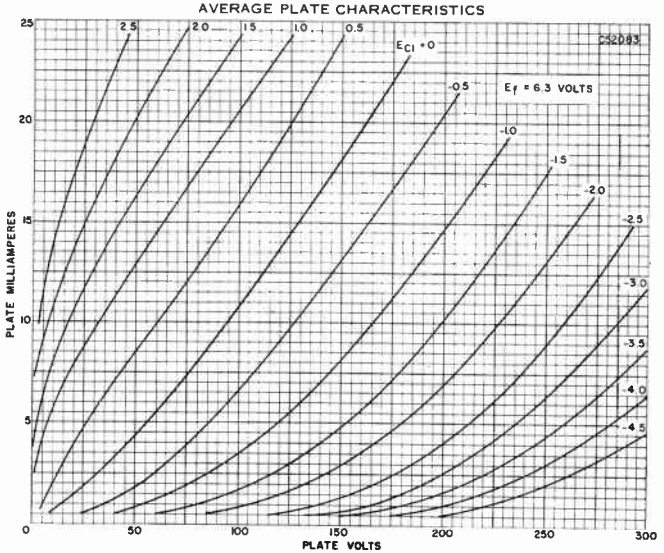
MIXER SERVICE

Plate Voltage	125 Volts
Cathode Bias Resistor	270 Ohms
Plate Current	7 Ma.
Oscillator Injection Voltage (RMS)	1.4 Volts
Conversion Conductance	2900 μmhos

APPLICATION

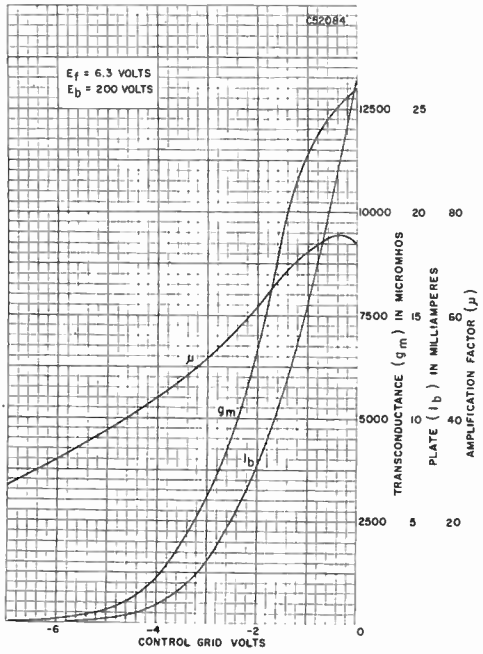
Miniature high mu triode designed for use as a grounded grid amplifier or mixer in u h f television applications.

SYLVANIA TYPE 6AN4
AVERAGE PLATE CHARACTERISTICS

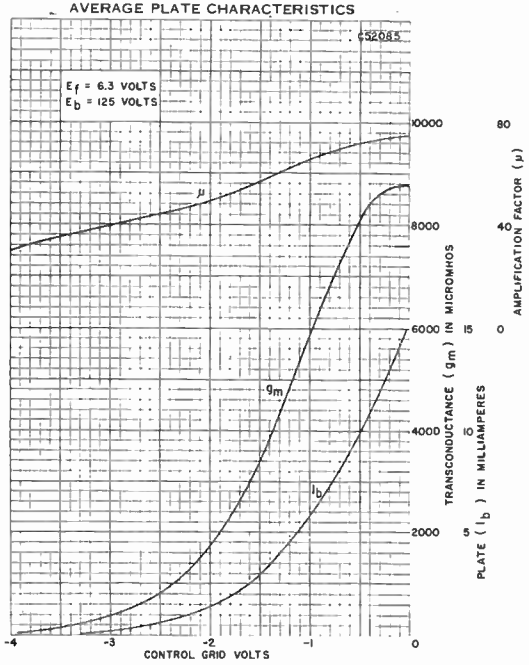


6AN4 (Cont'd)

SYLVANIA TYPE 6AN4
AVERAGE PLATE CHARACTERISTICS



SYLVANIA TYPE 6AN4
AVERAGE PLATE CHARACTERISTICS



7BZ-0-0

Sylvania Type 6AQ5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

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

RATINGS[1]

Heater Voltage AC or DC	6.3 Volts
Heater Current	450 Ma.
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts
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

Vertical Deflection Amplifier (Triode Connected)[2]

Maximum DC Plate Voltage	250 Volts
Maximum Peak Positive Voltage (Absolute Maximum)	1100 Volts
Maximum Plate Dissipation[3]	9 Watts
Maximum Negative Grid Voltage	250 Volts
Maximum Average Cathode Current	35 Ma.
Maximum Peak Cathode Current	105 Ma.
Maximum Grid Circuit Resistance (Cathode Bias)	2.2 Megohms

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.

Notes:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

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.

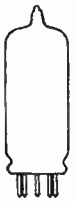
6AQ5 (Cont'd)

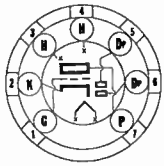
APPLICATION

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 These are shown with Sylvania Type 7C5.

6AQ6 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	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

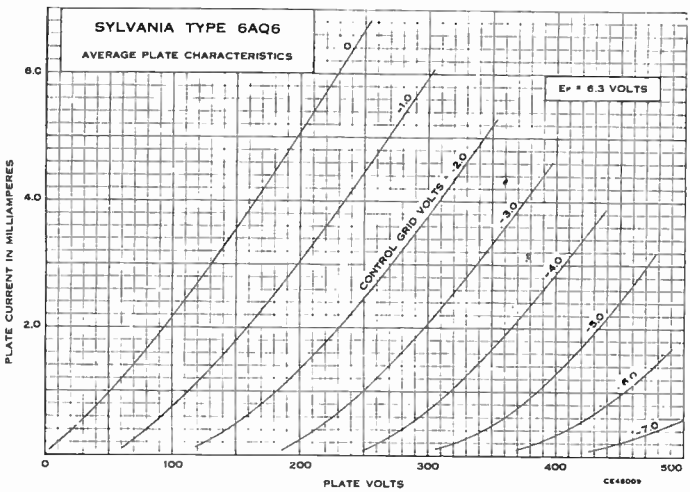
CLASS A_1 AMPLIFIER

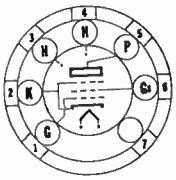
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1.0	−3.0 Volts
Amplification Factor	70	70
Plate Resistance	61000	58000 Ohms
Mutual Conductance	1150	1200 μmhos
Plate Current	0.8	1.0 Ma.

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.





6CC-0-0

Sylvania Type 6AR5

BEAM POWER AMPLIFIER

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
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

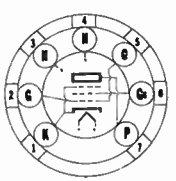
TYPICAL OPERATION

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 %

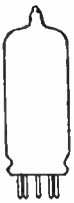
*Maximum grid circuit resistance should not exceed 0.5 megohms for self-bias operation, or 0.1 megohm for fixed bias operation.

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.



7CV-0-0



Sylvania Type 6AS5

BEAM POWER AMPLIFIER

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
Maximum Plate Voltage	150 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances: (approx.)*

Grid No. 1 (Control Grid) to Plate	0.6 μμf.
Input	12 μμf.
Output	6.2 μμf.

*With no external shield.

6AS5 (Cont'd)

TYPICAL OPERATION
CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	0.8 Ampere
Plate Voltage	150 Volts
Screen Voltage	110 Volts
Control Grid Voltage*	−8.5 Volts
Peak AF Grid Voltage	8.5 Volts
Plate Current (Zero Signal)	35 Ma.
Plate Current (Maximum Signal)	36 Ma.
Screen Current (Zero Signal)	2 Ma.
Screen Current (Maximum Signal)	6.5 Ma.
Mutual Conductance	5600 μmhos
Load Resistance	4500 Ohms
Power Output (Maximum Signal)	2.2 Watts
Total Harmonic Distortion	10 %

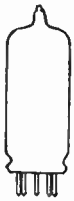
*Maximum grid circuit resistance should not exceed 0.5 megohm for self bias operation, or 0.1 megohm for fixed bias operation.

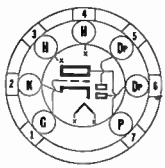
APPLICATION

Sylvania Type 6AS5, a miniature beam power amplifier, is used in the output stage of automobile and ac operated receivers. It delivers relatively large power output at low plate and screen voltages.

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

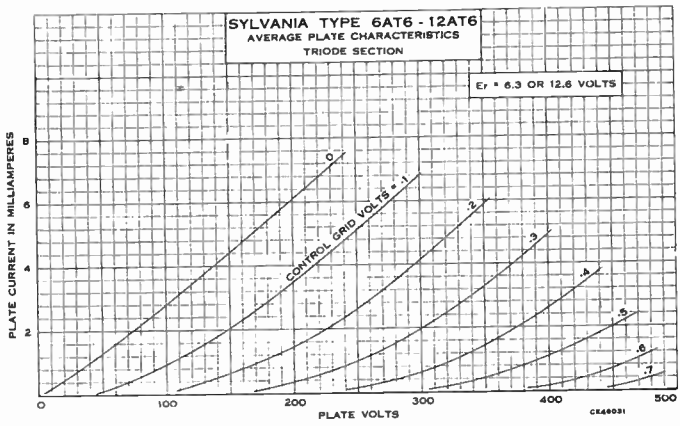
Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts
Direct Interelectrode Capacitances:*	
Grid to Plate	2.1 μμf.
Input	2.3 μμf.
Output	1.1 μμf.
Diode No. 2 (Pin 5) to Grid	025 μμf. Max.

*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

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



6CK-0-0

Sylvania Type 6AU5GT

BEAM POWER AMPLIFIER
TELEVISION SCANNER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6-Pin
Bulb	T-9
Maximum Overall Length	3⅛"
Maximum Seated Height	2¾"
Mounting Position	Any

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	1.25 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

Horizontal Deflection Amplifier[2]

Maximum DC Plate Supply Voltage (Boost + DC Power Supply)	550 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	5500 Volts
Maximum Peak Negative Plate Voltage	1250 Volts
Maximum Plate Dissipation[3]	10 Watts
Maximum Peak Negative Control Grid Voltage	300 Volts
Maximum DC Screen Grid Voltage	200 Volts
Maximum Screen Grid Dissipation	2.5 Watts
Maximum Average Cathode Current	110 Ma.
Maximum Peak Cathode Current	400 Ma.
Maximum Control Grid Circuit Resistance	0.47 Megohm
Maximum Bulb Temperature (At Hottest Point)	210° C

Direct Interelectrode Capacitances:

Grid to Plate	0.5 μμf
Input	11.3 μμf
Output	7.0 μμf

CHARACTERISTICS

Pentode Operation:

Plate Voltage	60	115 Volts
Screen Voltage	175	175 Volts
Control Grid Voltage	0	−20 Volts
Plate Current	210	60 Ma.
Screen Grid Current	25	6.8 Ma.
Transconductance		5600 μmhos
Plate Resistance		6000 Ohms
Control Grid Voltage with Eb = 115 V and Ec2 = 150 V for Ib = 1 Ma. (approx.)		−45 Volts

6AU5GT (Cont'd)

Triode Connected:

Plate Voltage	100 Volts
Screen Voltage	100 Volts
Control Grid Voltage	-4.5 Volts
Amplification Factor	5.9

Notes:

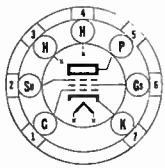
1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system the duty cycle of the voltage pulse must not exceed 15% of a scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

APPLICATION

Sylvania Type 6AU5GT is a beam power amplifier designed especially for use as a horizontal scanner in television receivers using magnetic deflection.

6AU6 Sylvania Type

SHARP CUT-OFF RF PENTODE



7BK-0-2

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.

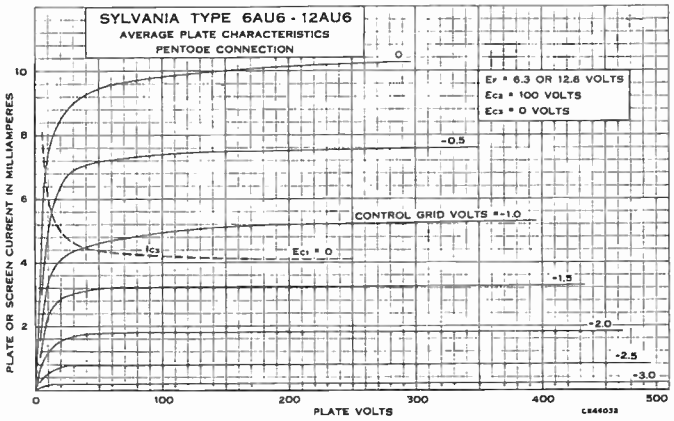
APPLICATION

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.

SYLVANIA RADIO TUBES

(Cont'd) 6AU6

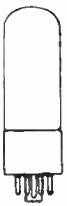
6AU6 (Cont'd)

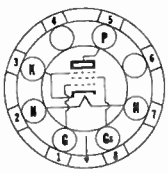


6AV5GT Sylvania Type

BEAM POWER AMPLIFIER

TELEVISION SCANNER





6CK-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

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

Horizontal Deflection Amplifier[2]

Maximum DC Plate Supply Voltage (Boost + DC Power Supply)	550 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	5500 Volts
Maximum Peak Negative Plate Voltage	1250 Volts
Maximum Plate Dissipation[3]	11 Watts
Maximum Peak Negative Control Grid Voltage	300 Volts
Maximum DC Screen Grid Voltage	175 Volts
Maximum Screen Grid Dissipation	2.5 Watts
Maximum Average Cathode Current	110 Ma.
Maximum Peak Cathode Current	400 Ma.
Maximum Control Grid Resistance	0.47 Megohm
Maximum Bulb Temperature (At Hottest Point)	210° C

Direct Interelectrode Capacitances:

Grid to Plate	0.7 μμf
Input	14 μμf
Output	7.0 μμf

CHARACTERISTICS

Pentode Operation:	Instantaneous Values	
Plate Voltage	60	250 Volts
Screen Voltage	150	150 Volts
Control Grid Voltage		-22.5 Volts
Plate Current	225	55 Ma.
Screen Current	25	2.1 Ma.
Transconductance		5500 μmhos
Plate Resistance		20,000 Ohms
Control Grid Voltage for Ib = 1 Ma.		-46 Volts

Triode Connected:

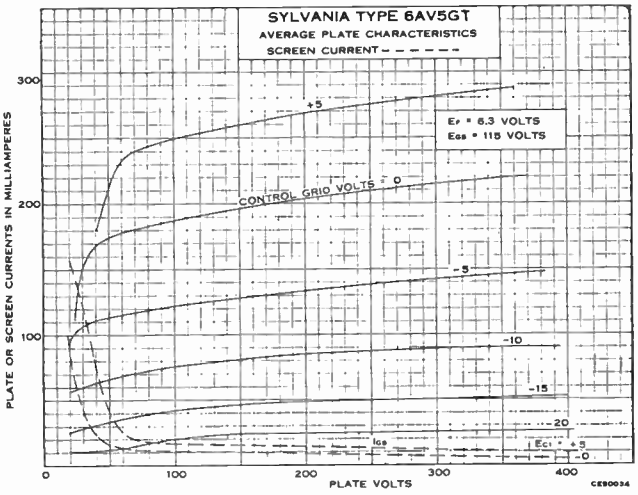
Plate Voltage	150 Volts
Screen Voltage	150 Volts
Control Grid Voltage	-22.5 Volts
Amplification Factor	4.3

Notes:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

APPLICATION

Sylvania Type 6AV5GT is a beam power amplifier designed especially for use as a horizontal scanner tube in television receivers using magnetic deflection.



7BT-0-0

Sylvania Type 6AV6

DUODIODE TRIODE

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

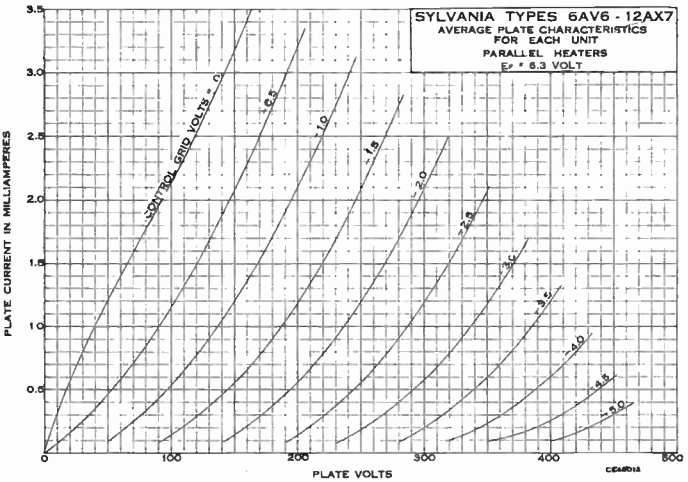
TYPICAL OPERATION

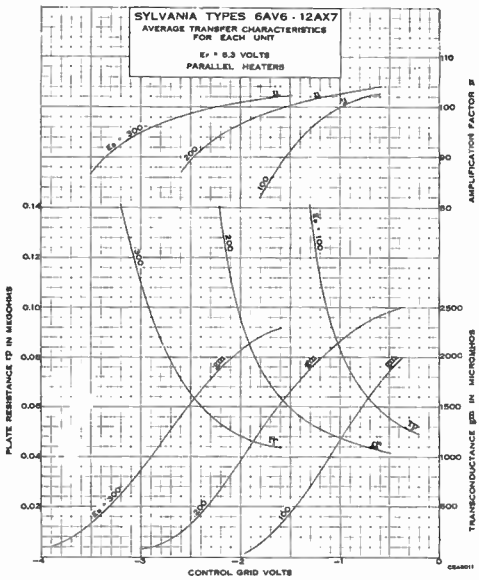
TRIODE UNIT - CLASS A_1 AMPLIFIER

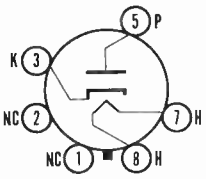
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Amplification Factor	100	100
Plate Resistance	80,000	62,500 Ohms
Transconductance	1250	1600 μmhos
Plate Current	0.5	1.2 Ma.

APPLICATION

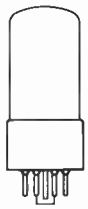
Sylvania Type 6AV6 is a high mu diode triode in the miniature style. It is very similar in characteristics to lock-in Type 7B4 and the resistance coupled data given in appendix will be substantially correct for this type also. Type 12AV6 is the 150 Ma. equivalent for use in AC-DC sets.







4CG



Sylvania Type 6AX4GT

TV DAMPER DIODE

PHYSICAL SPECIFICATIONS

Base	Short Intermediate Shell Octal 6-Pin
Bulb	T-9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any
Basing	4CG

RATINGS

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Damper Service[1]	
Maximum Peak Inverse Voltage	4000 Volts
Maximum Steady State Peak Current	600 Ma.
Maximum Transient Peak Current	3.0 Amperes
Maximum Heater-Cathode Voltage (Heater Negative)	900 Volts
Maximum Heater-Cathode Voltage (Heater Positive)	100 Volts
Maximum Peak Heater-Cathode Voltage (Heater Negative)	4000 Volts
Average Tube Drop (At 250 Ma.)	32 Volts
Maximum DC Plate Current	125 Ma.

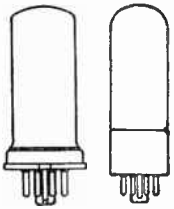
Notes:

1. For operation in a 525 line, 30 frame television system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

APPLICATION

An indirectly heated half-wave rectifier, designed for service as a damping diode in television receiver direct drive sweep circuits.

6S-0-0



Sylvania Type 6AX5GT

FULL-WAVE RECTIFIER

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

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	1.2 Amperes
Maximum Peak Inverse Plate Voltage	1250 Volts
Maximum Peak Heater-Cathode Voltage	450 Volts
Maximum Peak Plate Current (per plate)	375 Ma.

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

AC Voltage per Plate (RMS)	350	450 Volts
Plate Supply Impedance per Plate	50	105 Ohms
Filter Input Capacitor	10	10 μf.
DC Output Voltage at Input to Filter (approx.)		
At Half-Load Current of 62.5 Ma.	395	... Volts
40 Ma.	...	540 Volts
At Full-Load Current of 125 Ma.	350	... Volts
80 Ma.	...	490 Volts

6AX5GT (Cont'd)

CHOKE INPUT TO FILTER

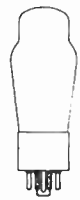
AC Voltage per Plate (RMS)	350	450 Volts
Filter Input Choke	10	10 Henries
DC Output Voltage at Input to Filter (approx.)		
At Half-Load Current of 75 Ma	270	... Volts
62.5 Ma	...	365 Volts
At Full-Load Current of 150 Ma	250	... Volts
125 Ma	...	350 Volts

APPLICATION

Sylvania Type 6AX5GT is a full-wave rectifier featuring the unipotential cathode. It is designed for use in ac operated receivers and automobile receivers.

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 $\mu\mu$f.
Input	7 $\mu\mu$f.
Output	5 $\mu\mu$f.

*Without external shield.

TYPICAL OPERATION AS AMPLIFIER

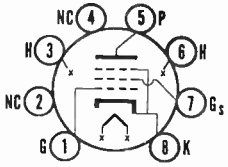
	Class A One Tube	Push Pull Class AB Two Tubes Fixed Bias	Self Bias
Filament Voltage	6.3	6.3	6.3 Volts
Filament Current	1.0	1.0	1.0 Ampere
Plate Voltage	250	325	325 Volts
Grid Voltage*	−45	−68	..... Volts
Self-Bias Resistor	750	.....	850 Ohms
Plate Current (Per Tube)	60	40	40 Ma.
Plate Resistance	800	.....	..... 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.

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.



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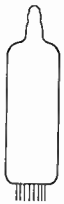


Sylvania Type 6BA5

PENTODE VOLTAGE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Overall Bulb Length	1.375"
Minimum Lead Length	1.500"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	150 Volts
Maximum Screen Voltage	140 Volts
Maximum Plate Dissipation	0.7 Watt
Maximum Screen Dissipation	0.3 Watt
Maximum Heater-Cathode Voltage	90 Volts
Maximum Grid Circuit Resistance (cathode bias)	1 Megohm

Direct Interelectrode Capacitances:

	Unshielded	Shielded*
Grid to Plate	0.1	.065 μμf.
Input	3.2	3.4 μμf.
Output	1.6	3.6 μμf.

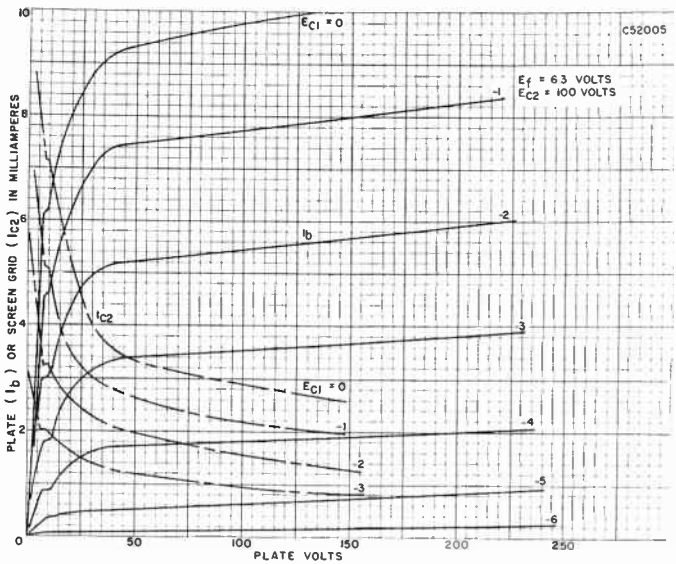
*External shield of 0.405" diameter connected to cathode.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	150 Ma.
Plate Voltage	100 Volts
Screen Voltage	100 Volts
Cathode Bias Resistor	270 Ohms
Plate Current	5.5 Ma.
Screen Current	2 Ma.
Mutual Conductance	2,150 μmhos
Plate Resistance	175,000 Ohms
Control Grid Bias Voltage for Ib = 10 μa.	−13.5 Volts

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



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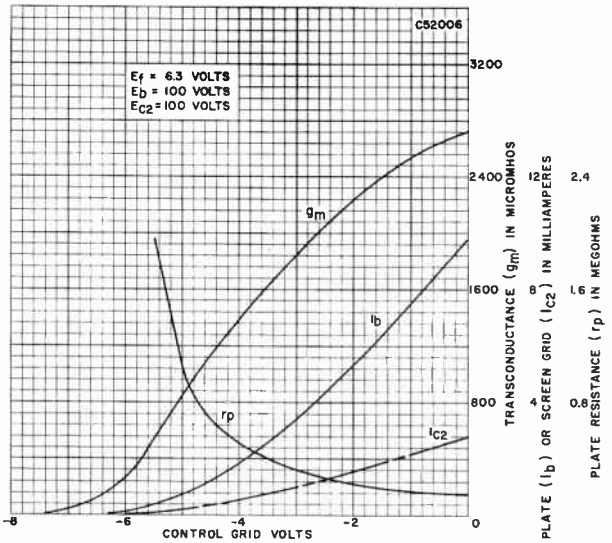


6BA6 Sylvania Type

REMOTE CUT-OFF RF PENTODE

7BK-0-2

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	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.

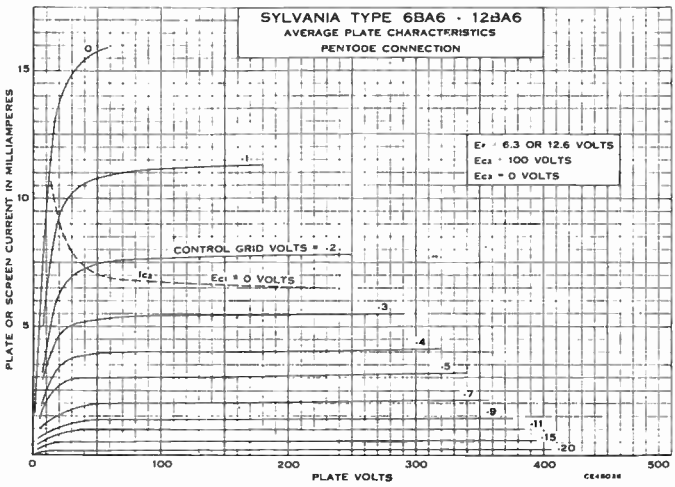
*Without external shield.

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.



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:

Pentode Connection	Shielded*	Unshielded
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.
**For triode connection tie screen grid to plate.

6BC5 (Cont'd)

TYPICAL OPERATION

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

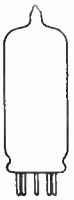
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	250	180 Volts
Grid Voltage	2.6	4.9 Volts
Cathode Resistor	820	330 Ohms
Mutual Conductance	4400	6000 μmhos
Plate Current	6.0	8.0 Ma.
Plate Resistance (approx.)	.009	.006 Megohm
Amplification Factor	40	42

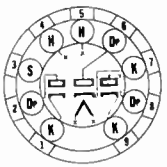
APPLICATION

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.

6BC7 Sylvania Type

TRIPLE DIODE





9AX-0-3

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

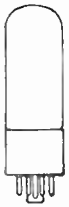
RATINGS

Heater Voltage AC or DC	6.3 Volts.
Heater Current	450 Ma.
Maximum Diode Operation Current per Plate	12 Ma.
Maximum Peak Heater-Cathode Voltage	200 Volts

Direct Interelectrode Capacitances: (Unshielded)

Plate of Diode #1 to All Other Elements	3.5 μμf.
Plate of Diode #2 to All Other Elements	5.5 μμf.
Plate of Diode #3 to All Other Elements	3.5 μμf.

6CK-0-0



Sylvania Type 6BD5GT

TELEVISION DEFLECTION AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6-Pin
Bulb	T-9
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

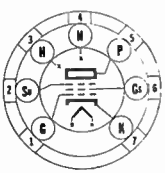
*The duration of the voltage pulse must not exceed 10 microseconds or 15% of the pulse recurrence period, whichever is smaller.

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.



7BK-0-2

Sylvania Type 6BD6

REMOTE CUT-OFF RF 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

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.

6BD6 (Cont'd)

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

6BE6 Sylvania Type

HEPTODE CONVERTER

7CH-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 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.

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)	0.4	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.

(Cont'd) **6BE6**

Sylvania Type 6BF5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

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

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

CLASS A_1 AMPLIFIER

Maximum Plate Voltage	250 Volts
Maximum Screen Grid Voltage	117 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Grid Dissipation	1.25 Watts

VERTICAL DEFLECTION AMPLIFIER (Triode Connected)[2]

Maximum DC Plate Voltage	250 Volts
Maximum Peak Positive Voltage (Absolute Maximum)	900 Volts
Maximum Plate Dissipation[3]	5.0 Watts
Maximum Peak Negative Grid Voltage	250 Volts
Maximum Average Cathode Current	40 MA
Maximum Peak Cathode Current	120 MA
Maximum Grid Circuit Resistance	2.2 Megohms

Direct Interelectrode Capacitances

Grid to Plate	0.65 μμf
Input	14 μμf
Output	6 μμf

CHARACTERISTICS AND TYPICAL OPERATION

CLASS A_1 AMPLIFIER (Single Tube)

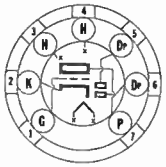
Plate Voltage	110 Volts
Screen Grid Voltage	110 Volts
Control Grid Voltage	−7.5 Volts
Peak AF Control Grid Voltage	7.5 Volts
Zero-Signal Plate Current	36.0 MA
Maximum-Signal Plate Current	39 MA
Zero-Signal Screen Grid Current	4.0 MA
Maximum-Signal Screen Grid Current	10.5 MA
Plate Resistance (approx.)	12,000 Ohms
Transconductance	7500 μmhos
Load Resistance	2500 Ohms
Maximum-Signal Power Output	1.9 Watts
Total Harmonic Distortion (approx.)	10 Percent

TRIODE CONNECTED

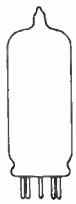
Plate Voltage	225 Volts
Grid Voltage	−30 Volts
Plate Current	10 MA
Transconductance	2700 μmhos
Amplification Factor	6.7
Plate Resistance	2500 Ohms
Grid Voltage (approx.) for Ib = 0.5 MA	−40 Volts

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.



7BT-0-0



Sylvania Type 6BF6

DUODIODE TRIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2¼"
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 Watt
Maximum Peak Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:—Triode Unit

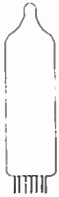
	Shielded	Unshielded
Grid to Plate	2.0	2.0 μμf.
Grid to Cathode	1.8	1.8 μμf.
Plate to Cathode	1.4	1.1 μμf.

TYPICAL OPERATION

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

Data for use in Resistance Coupled Amplifiers may be obtained by referring to type 7E6 in the appendix.

8DG-0-0



Sylvania Type 6BF7

DUOTRIODE

PHYSICAL SPECIFICATIONS

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

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	110 Volts
Maximum Plate Dissipation (each section)	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:

	Unshielded*	Shielded
Grid to Plate (each section)	1.5	1.5 μμf.
Input (each section)	2.0	2.0 μμf.
Output (section #1)	0.28	1.6 μμf.
(section #2)	0.30	2.0 μμf.
Grid to Grid	0.009	0.008 μμf.
Plate to Plate	0.75	0.55 μμf.

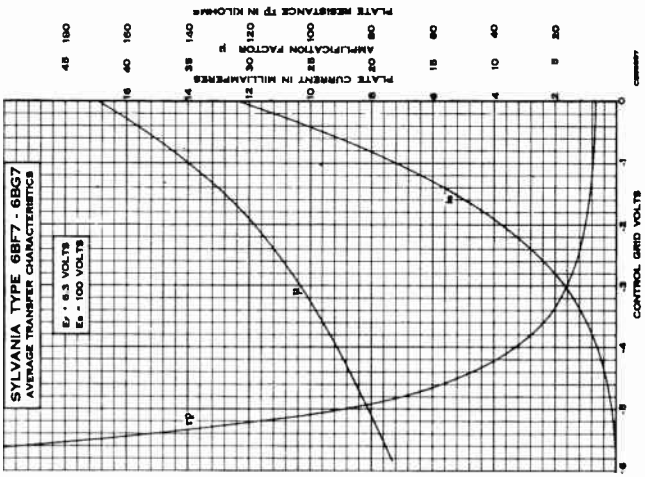
*External shield 0.405" diameter connected to cathode.

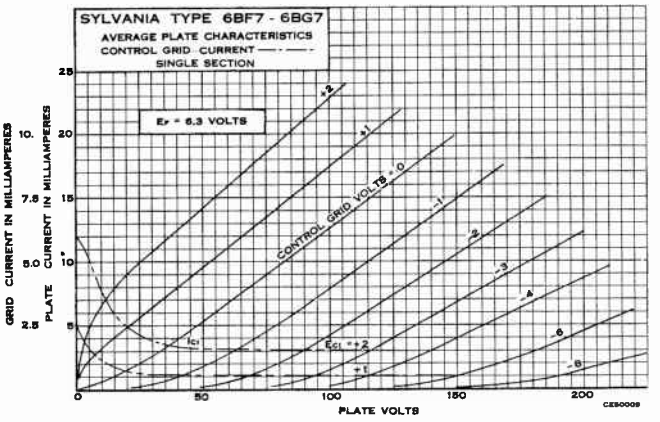
TYPICAL OPERATION

Heater Voltage AC or DC	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	100 Volts
Cathode Bias Resistor	100 Ohms
Plate Current	8.0 Ma.
Amplification Factor	35
Mutual Conductance	4,800 μmhos
Plate Resistance	7,000 Ohms
Control Grid Voltage for Ib = 10μa.	−7.5 Volts

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

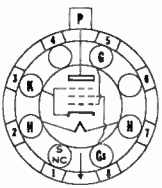
6BF7 (Cont'd)





6BG6-G Sylvania Type

BEAM POWER AMPLIFIER



5BT-0-0

PHYSICAL SPECIFICATIONS

Base	Medium-Shell Octal 6 Pin
Bulb	ST-16
Cap	Miniature
Maximum Overall Length	$5^{11}/_{16}$"
Maximum Seated Height	$5\,^{1}/_{8}$"
Mounting Position	Vertical, Base Up or Down Horizontal, with Plane of Pins 2 and 7 Vertical

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	0.9 Ampere
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

HORIZONTAL DEFLECTION AMPLIFIER[2]

Maximum DC Plate Supply Voltage (Boost + DC Power Supply)	700 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	6600 Volts
Maximum Peak Negative Plate Voltage	1500 Volts
Maximum Plate Dissipation[3]	20 Watts
Maximum Peak Negative Control Grid Voltage	300 Volts
Maximum DC Screen Grid Voltage	350 Volts
Maximum Screen Grid Dissipation	3.2 Watts
Maximum Average Cathode Current	110 MA
Maximum Peak Cathode Current	400 MA
Maximum Control Grid Circuit Resistance	0.47 Megohm
Maximum Bulb Temperature (At Hottest Point)	210° C

Direct Interelectrode Capacitances

Grid to Plate	0.34 μμf
Input	12 μμf
Output	6.5 μμf

CHARACTERISTICS

	Instantaneous Values	
Plate Voltage	60	250 Volts
Screen Voltage	250	250 Volts
Control Grid Voltage	0	−15 Volts
Plate Current	180	75 MA
Screen Current	18	4 MA
Transconductance		6000 μmhos
Plate Resistance		25,000 Ohms
Control Grid Voltage for Ib = 1 MA (approx.)		−45 Volts

TRIODE CONNECTED

Plate Voltage	250 Volts
Screen Voltage	250 Volts
Control Grid Voltage	−15 Volts
Amplification Factor	8

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

TYPICAL OPERATION

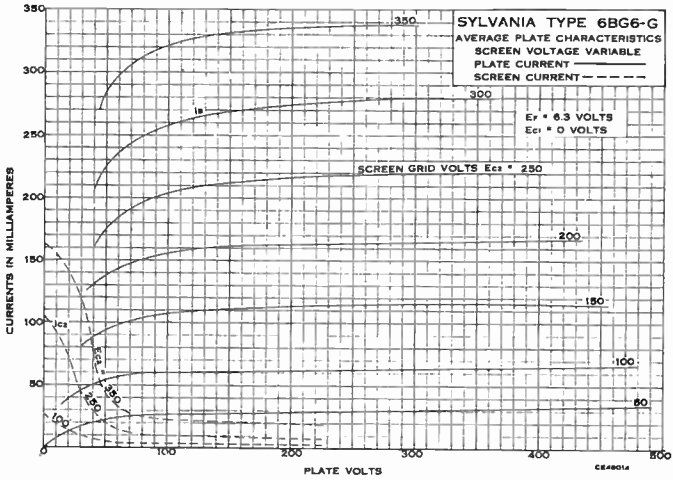
HORIZONTAL OUTPUT AMPLIFIER

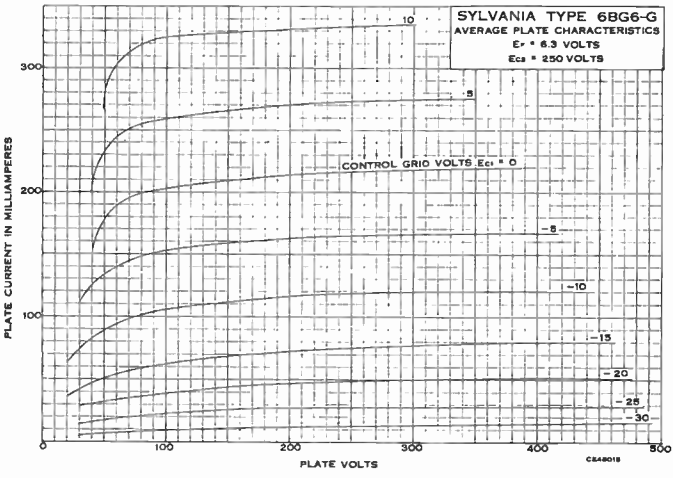
Plate Supply	400 Volts
DC Supply + Boost	600 Volts
Peak Positive Plate Pulse	5600 Volts
Screen Voltage	225 Volts
Screen Current	8.5 MA
Average Cathode Current	90 MA
Peak Cathode Current	300 MA
Peak to Peak Grid Voltage	150 Volts
Sawtooth Component Grid Voltage	80 Volts
Picture Tube	17BP4
Anode Voltage	12 KV
Anode Current	100 μa

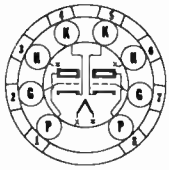
APPLICATION

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.

6BG6-G (Cont'd)







8DG-0-0

Sylvania Type 6BG7

DUOTRIODE

PHYSICAL SPECIFICATIONS

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

For other data, refer to corresponding Type 6BF7 which is identical except for lead length.

7CM-0-7

Sylvania Type 6BH6

SHARP CUT-OFF RF PENTODE

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
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

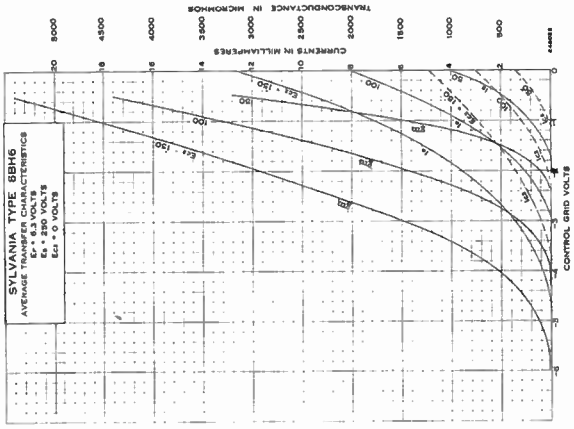
CLASS A_1 AMPLIFIER

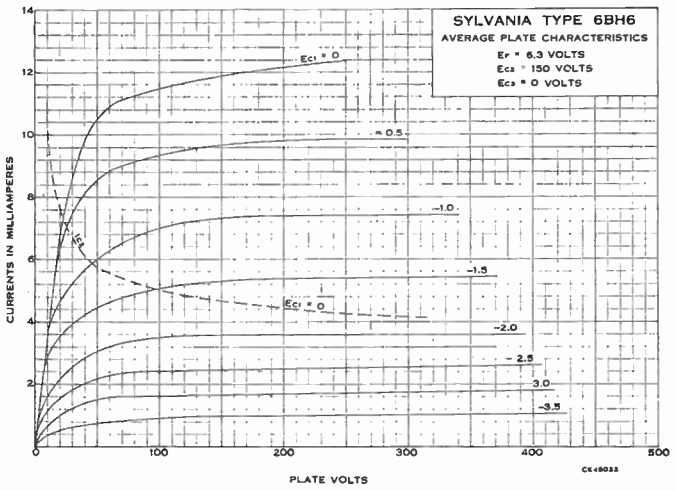
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Suppressor	Connected to cathode at socket	
Screen Voltage	100	150 Volts
Control Grid Voltage	−1	−1 Volt
Plate Current	3.6	7.4 Ma.
Screen Current	1.4	2.9 Ma.
Control Grid Bias (approx.) for 10 μa Plate Current	−5	−7.7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

6BH6 (Cont'd)





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 $\mu\mu$f. Max.
Input	4.5 $\mu\mu$f.
Output	5.0 $\mu\mu$f.

*Without external shield.

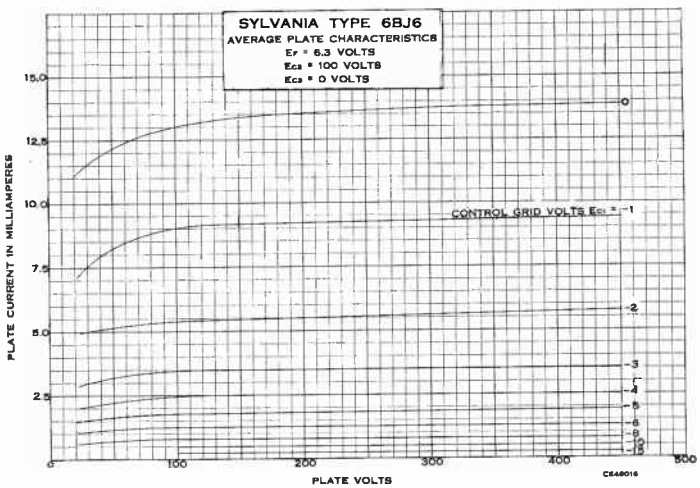
TYPICAL OPERATION

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.



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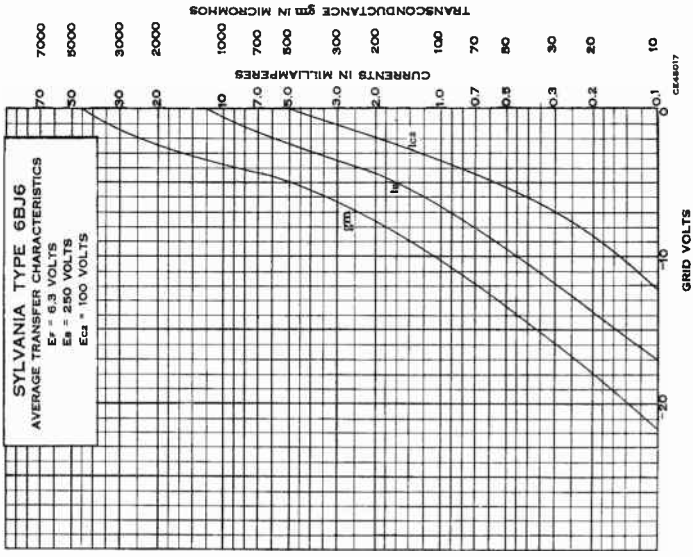
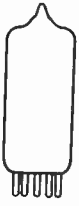
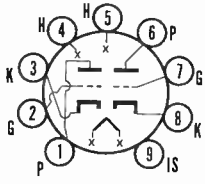


6BK7 Sylvania Type

DUO TRIODE RF AMPLIFIER





9AJ

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 13/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.45 Amp.
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.7 Watts
Maximum Peak Heater-Cathode Voltage*	90 Volts

*When the 6BK7 is used as a cascode amplifier and the two sections are connected in series, the heater-cathode voltage of the grounded-grid stage may be as high as 250 volts maximum with the heater negative with respect to the cathode.

Direct Interelectrode Capacitances **

	Section No. 1†		Section No. 2
Grid to Plate	1.9		1.9 μμf.
Input	3.0		3.0 μμf.
Output	1.1		1.0 μμf.
Heater to Cathode	3.2		3.4 μμf.
Grid to Grid (Max.)		0.003	μμf.
Plate to Plate (Max.)		0.075	μμf.
Grounded Grid Operation			
Plate to Cathode	0.24		0.24 μμf.
Input	6.0		6.0 μμf.
Output	2.8		2.6 μμf.

**Without external shield.

†Section 1 connects to pins 6, 7 and 8.

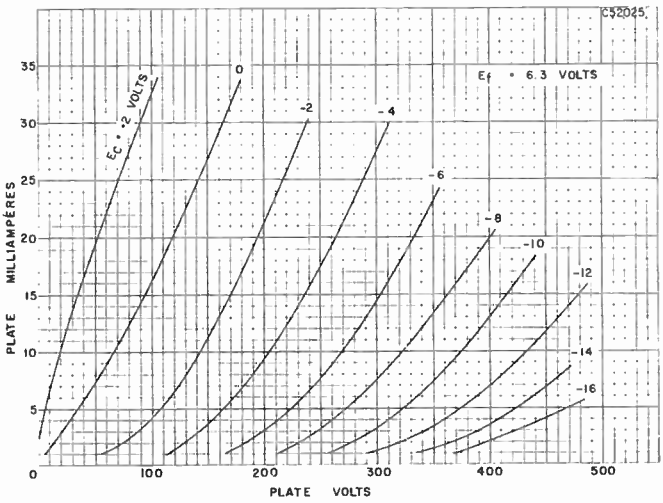
TYPICAL OPERATION

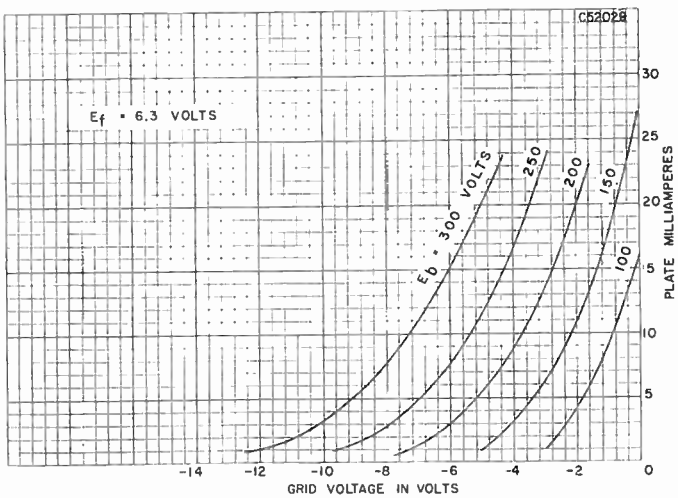
Class A_1 Amplifier

Plate Voltage	100	150 Volts
Cathode Bias Resistor	120	56 Ohms
Amplification Factor	37	40
Plate Resistance (approx.)	6100	4700 Ohms
Transconductance	6100	8500 μmhos
Plate Current	9.0	18 Ma.
Grid Voltage (approx.) for Ib = 10 μamps	−9	−12 Volts

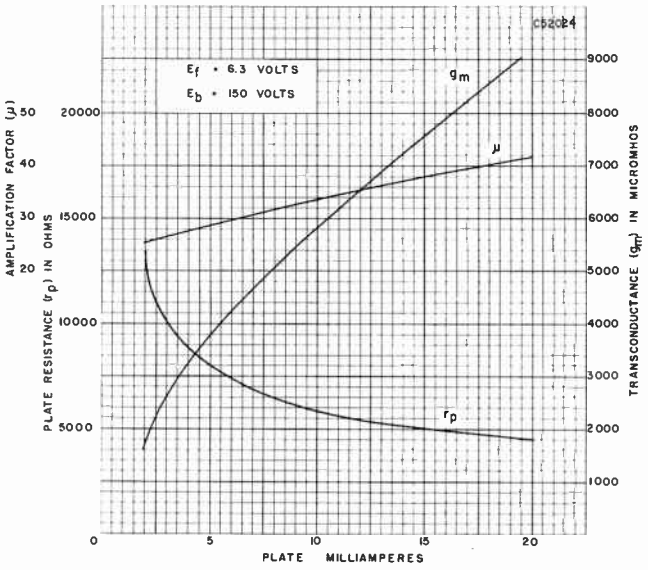
APPLICATION

The 6BK7 is a miniature type duo-triode designed primarily for use as a cascode amplifier at frequencies below approximately 300 megacycles. The electrical characteristics of the 6BK7 are similar to those of the 12AV7; however, the 6BK7 has an internal shield which reduces the capacitance between sections and thus makes the 6BK7 especially suited for use in cascode amplifiers and other applications in which a minimum of coupling between the two sections is required.



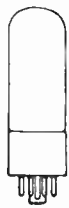


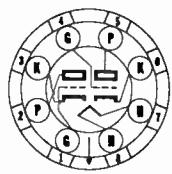
6BK7 (Cont'd)



6BL7GT Sylvania Type

DUOTRIODE





8BD-0-0

PHYSICAL SPECIFICATIONS

Base	Short 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)	6.3 Volts
Heater Current	1.5 Amperes
Maximum Plate Supply Voltage	600 Volts
Maximum Plate Voltage	500 Volts
Maximum Peak Plate Voltage*	2000 Volts
Maximum Peak Negative Grid Voltage	-500 Volts
Maximum Cathode Current per Section	60 Ma.
Maximum Plate Dissipation per Section**	10 Watts
Maximum Peak Heater-Cathode Voltage	±200 Volts
Maximum Grid Circuit Resistance	4.7 Megohms

*The duration of the voltage 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.

**Total dissipation for both sections is limited to 12 watts.

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Section 1†—Grid to Plate	4.2	4.2 μμf.
Input	5.0	4.4 μμf.
Output	3.4	1.1 μμf.
Section 2—Grid to Plate	4.0	4.0 μμf.
Input	5.0	4.8 μμf.
Output	3.2	1.2 μμf.
Coupling—Grid to Grid	0.1	1.11 μμf.
Plate to Plate	1.2	1.5 μμf.

*With a 1 5/16" diameter tube shield (RMA Std. #308) connected to cathode of section under test.

†Section 1 connects to pins 4, 5 and 6.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER—SINGLE SECTION

Heater Voltage	6.3 Volts
Heater Current	1.5 Amperes
Plate Voltage	250 Volts
Grid Voltage	−9.0 Volts
Plate Current	40 Ma.
Amplification Factor	15
Mutual Conductance	7000 μmhos
Plate Resistance	2150 Ohms
Grid Voltage for Ib = 25 μa (approx.)	−25 Volts
Grid Voltage for Ib = 50 μa at Eb = 600 Volts (approx.)	−60 Volts

AS A VERTICAL DEFLECTION AMPLIFIER

SINGLE SECTION SCANNING A TYPE 16TP4 AT 14 KV.

Plate Supply Voltage	350 Volts
Peak Positive Plate Voltage	1030 Volts
Plate Voltage (Pulse Component)	510 Volts
Plate Voltage, Peak to Peak (Sawtooth)	340 Volts
Cathode Bias Resistor	2800 Ohms
Signal Voltage (Negative Peaking Component)	20 Volts
Signal Voltage, Peak to Peak (Sawtooth)	45 Volts
Average Plate Current	10.2 Ma.
Plate Current, Peak to Peak	40 Ma.
Plate Input	3.3 Watts
Plate Dissipation	2.2 Watts
Retrace Time	250 μseconds

PARALLELED SECTIONS FOR HIGH EFFICIENCY WITH A TYPE 16TP4 AT 14 KV.

Plate Supply Voltage	300 Volts
Peak Positive Plate Voltage	1020 Volts
Plate Voltage (Pulse Component)	540 Volts
Plate Voltage, Peak to Peak (Sawtooth)	360 Volts
Cathode Bias Resistor	2600 Ohms
Signal Voltage (Negative Peaking Component)	22 Volts
Signal Voltage, Peak to Peak (Sawtooth)	43 Volts
Average Plate Current	10.2 Ma.
Plate Current, Peak to Peak	40 Ma.
Plate Input	2.8 Watts
Plate Dissipation	1.6 Watts
Retrace Time	220 μseconds

APPLICATION

Sylvania Type 6BL7GT is a high mutual conductance duotriode designed for use as a vertical deflection amplifier in television receivers. The high current available at low voltage provides the power necessary to deflect wide angle picture tubes, such as Sylvania Type 16TP4, when operated at their maximum (14 Kv.) second anode voltage. For certain applications where the plate supply voltage must be kept low and the highest efficiency obtained, the parallel connection of the two sections may be used. A separate triode will then be required for the sawtooth generator.

A circuit diagram using the 6BL7GT is shown on a following page together with the recommended components. Wave forms obtained at different points in the circuit are shown in Fig. 2 as obtained in the circuit of Fig. 1.

The operating efficiency of the Sylvania Type 6BL7GT is greater at low plate supply voltages for the reason that the power required for scanning is constant and the lowest plate supply voltage necessary to provide this power is, therefore, the condition of lowest power loss.

The data given for higher voltages, however, are useful in showing the reserve power available for conservative design, for picture tubes requiring greater deflection power, and for flexibility in the choice of supply voltage.

The use of the boost voltage from the horizontal scanning circuit may permit the use of a lower supply voltage in the receiver.

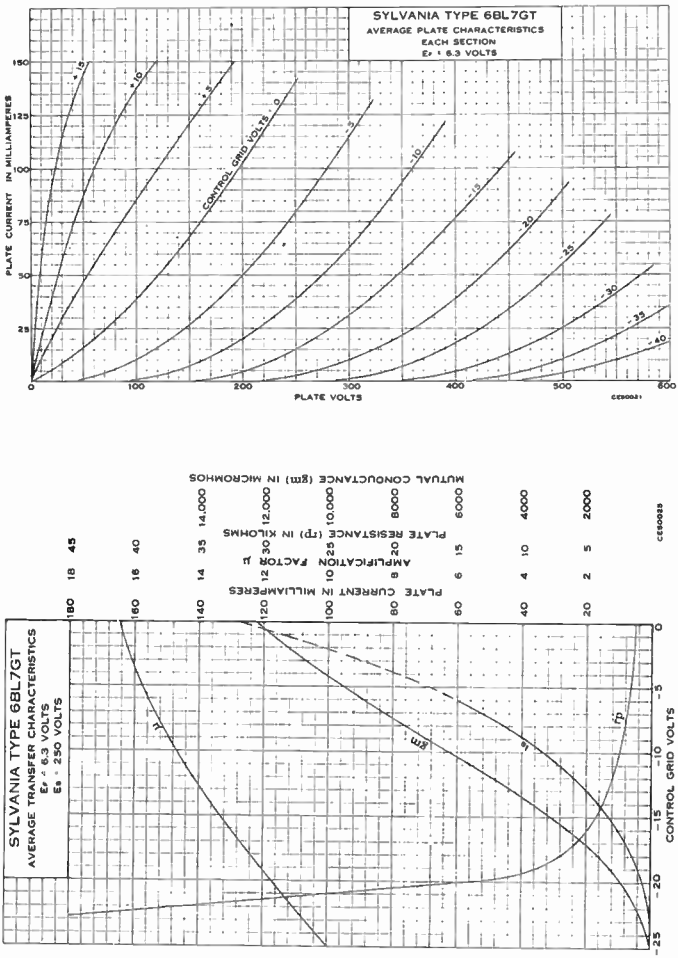


FIGURE 2

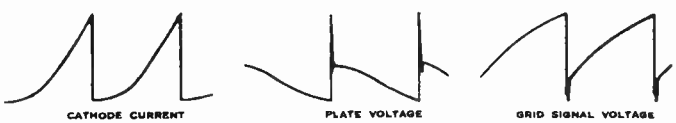
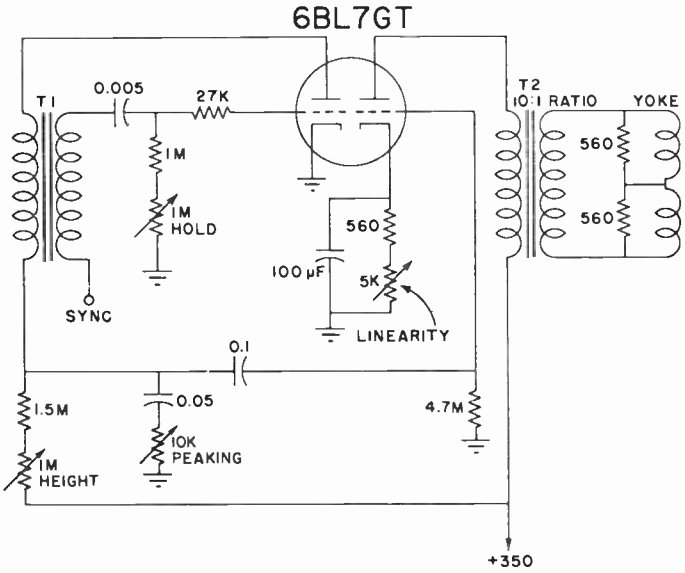
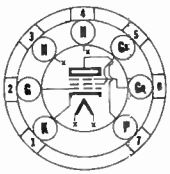


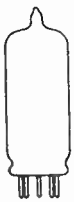
FIGURE 1



TYPICAL VERTICAL DEFLECTION CIRCUIT USING A SINGLE SECTION OF TYPE 6BL7GT IN THE OUTPUT CIRCUIT. THE SECOND SECTION IS USED FOR THE SAWTOOTH GENERATOR.



7DF-0-1



Sylvania Type 6BN6

GATED BEAM DISCRIMINATOR

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
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

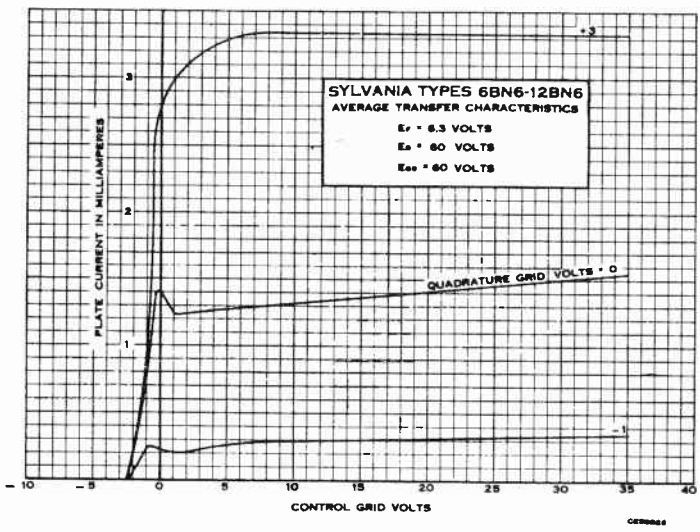
Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Plate Voltage (Supply)	80 Volts
Screen Voltage	60 Volts
Control Grid Voltage obtained by cathode bias resistor	
Cathode Bias Resistor*	200-400 Ohms
Plate Current	0.23 Ma.
Screen Current	5.0 Ma.
Plate Load Resistor	68000 Ohms

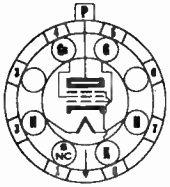
*Bias Voltage −1.3 approx. Fixed bias operation not recommended.

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.





6AM-0-0

Sylvania Type 6BQ6GT

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
Bulb	T-9
Cap	Miniature
Maximum Overall Length	3⅞"
Maximum Seated Height	3⅝"
Mounting Position	Any

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

HORIZONTAL DEFLECTION AMPLIFIER[2]

Maximum DC Plate Supply Voltage (Boost + DC Power Supply)	550 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	5500 Volts
Maximum Peak Negative Plate Voltage	1250 Volts
Maximum Plate Dissipation[3]	11 Watts
Maximum Peak Negative Control Grid Voltage	300 Volts
Maximum DC Screen Grid Voltage	175 Volts
Maximum Screen Grid Dissipation	2.5 Watts
Maximum Average Cathode Current	110 MA
Maximum Peak Cathode Current	400 MA
Maximum Control Grid Circuit Resistance	0.47 Megohm
Maximum Bulb Temperature (At Hottest Point)	220° C

Direct Interelectrode Capacitances

Grid to Plate	0.6 μμf
Input	15 μμf
Output	7.5 μμf

CHARACTERISTICS

	Instantaneous Values	
Plate Voltage	60	250 Volts
Screen Voltage	150	150 Volts
Control Grid Voltage	0	−22.5 Volts
Plate Current	225	55 MA
Screen Current	25	2.1 MA
Transconductance		5500 μmhos
Plate Resistance		20,000 Ohms
Control Grid Bias for Ib = 1 MA (approx.)		−46 Volts

TRIODE CONNECTED

Plate Voltage	150 Volts
Screen Voltage	150 Volts
Control Grid Voltage	−22.5 Volts
Amplification Factor	4.3

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

TYPICAL OPERATION

HORIZONTAL OUTPUT AMPLIFIER

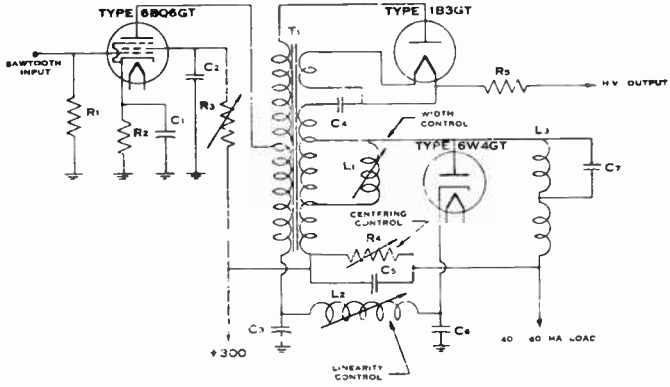
Plate Supply	330 Volts
DC Supply + Boost	550 Volts
Peak Positive Plate Pulse	4500 Volts
Screen Voltage	165 Volts
Screen Current	10 MA
Average Cathode Current	85 MA
Peak Cathode Current	300 MA
Peak to Peak Grid Voltage	125 Volts
Sawtooth Component Grid Voltage	75 Volts
Picture Tube	21EP4
Anode Voltage	15 KV
Anode Current	150 μa

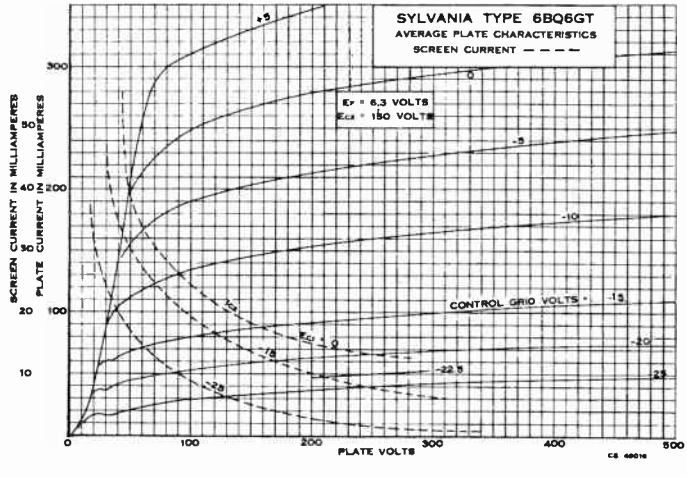
APPLICATION

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 below.

TYPICAL DEFLECTION AMPLIFIER CIRCUIT

WITH "FLY BACK" TYPE HIGH VOLTAGE SUPPLY





9AJ-0-9

Sylvania Type 6BQ7

MEDIUM MU DUOTRIODE

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

Heater Voltage AC or DC	6.3 Volts
Maximum Plate Voltage	250 Volts
Maximum Plate Dissipation	2 Watts
Maximum Cathode Current	20 Ma.
Maximum Peak Heater-Cathode Voltage	200 Volts

Direct Interelectrode Capacitances (Shielded):

	Section #1	Section #2
Grid to Plate	1.15	1.15 μμf.
Input	2.55	.... μμf.
Input (Grounded Grid)	....	4.75 μμf.
Output	1.30	.... μμf.
Output (Grounded Grid)	....	2.40 μμf.

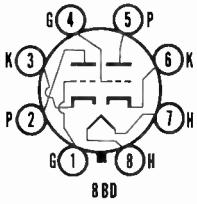
TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Heater Voltage	6.3 Volts
Heater Current	400 Ma.
Plate Voltage	150 Volts
Cathode Bias Resistor	220 Ohms
Plate Current	9 Ma.
Amplification Factor	35
Plate Resistance	5,800 Ohms
Mutual Conductance	6,000 μmhos

APPLICATION

Sylvania Type 6BQ7 is a miniature type medium-mu duotriode designed for use in low-noise, vhf amplifiers.



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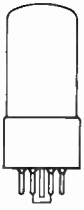


Sylvania Type 6BX7GT

DUO TRIODE

PHYSICAL SPECIFICATIONS

Base	Short Intermediate Shell Octal 8-Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{3}{4}$"
Mounting Position	Any
Basing	8BD

RATINGS

Heater Voltage	6.3 Volts
Heater Current	1.5 Amps.

6BX7GT (Cont'd)

Vertical Deflection Amplifier and Oscillator[1,2]

Maximum Plate Voltage	500 Volts
Absolute Maximum Peak Positive Plate Voltage	2000 Volts
Maximum Plate Dissipation[3]	
Each Plate	10 Watts
Both Plates	12 Watts
Maximum Positive Grid Voltage (DC)	0 Volts
Maximum Peak Negative Grid Voltage	−500 Volts
Maximum Average Cathode Current (DC) (Each Section)	60 Ma.
Maximum Peak Cathode Current (Each Section)	180 Ma.
Maximum Heater-Cathode Voltage	
Heater Positive with Respect to Cathode	
DC	100 Volts
Total DC and Peak	200 Volts
Heater Negative with Respect to Cathode	
Total DC and Peak	200 Volts
Maximum Grid Circuit Resistance	2.2 Megohms

Direct Interelectrode Capacitances:

	Shielded[4]	Unshielded
Section No. 1		
Grid to Plate	4.2	4.2 μμf.
Input	5.0	4.4 μμf.
Output	3.4	1.1 μμf.
Section No. 2		
Grid to Plate	4.0	4.0 μμf.
Input	5.0	4.8 μμf.
Output	3.2	1.2 μμf.
Grid to Grid	0.10	0.11 μμf.
Plate to Plate	1.2	1.5 μμf.

CHARACTERISTICS (Each Section)

Conditions:		
Plate Voltage	100	250 Volts
Grid Voltage	0	Volts
Cathode Resistor	0	390 Ohms
Plate Current	80	42 Ma.
Amplification Factor		10
Transconductance		7600 μmhos
Plate Resistance		1300 Ohms
Grid Voltage for 50 μa Plate Current		−40 Volts

APPLICATION

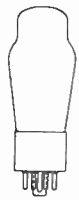
A high perveance double triode designed for use as a vertical deflection amplifier and oscillator in television receivers.

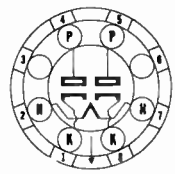
NOTES:

1. For operation in a 525 line, 30 frame system, the duration of the voltage pulse is not to exceed 15% of one scanning cycle.
2. When one section is operated as an oscillator it is recommended that section No. 1 (pins 4, 5 and 6) be used.
3. An adequate bias resistor or other means is required to protect the tube in the absence of excitation.
4. External shield No. 308 connected to cathode of section under test.

6BY5G Sylvania Type

FULL-WAVE RECTIFIER





6CN-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 7 Pin
Bulb	ST-14
Maximum Overall Length	4 5/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Maximum Peak Inverse Voltage	
Rectifier Service	1,400 Volts
Damper Service*	3,000 Volts
Maximum Heater-Cathode Voltage	
Heater Negative With Respect to Cathode	450 Volts
Heater Positive With Respect to Cathode	100 Volts
Maximum DC Output Current	175 Ma.
Maximum Peak Plate Current	525 Ma.
Tube Voltage Drop (Tube Conducting 175 Ma. Each Plate)	32 Volts

*Duration of voltage pulse not to exceed 15% of one scanning cycle. In the 525 line, 30 frame television system 15% of one scanning cycle is 10 microseconds.

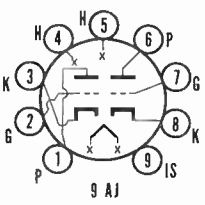
TYPICAL OPERATION

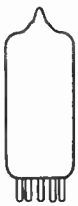
FULL WAVE RECTIFIER, CONDENSER-INPUT FILTER

Heater Voltage	6.3 Volts
Heater Current	1.6 Amperes
AC Plate Supply Voltage (each plate) RMS	375 Volts
Filter Input Capacitance	8 μf.
Effective Plate Supply Impedance per Plate	100 Ohms
DC Output Voltage	380 Volts
DC Output Current	175 Ma.

APPLICATION

Sylvania Type 6BY5G is a duodiode with separate unipotential cathodes. It is suitable for damper-diode service in television deflection circuits or as a rectifier in conventional power supply applications.





Sylvania Type 6BZ7

V H F TWIN TRIODE

PHYSICAL SPECIFICATIONS

Base	Small Button, 9-Pin
Bulb	T-6½
Maximum Bulb Length	$2\frac{3}{16}$"
Maximum Seated Height	$1\frac{15}{16}$"
Mounting Position	Any
Basing	9-AJ

RATINGS

Heater Voltage	6.3 Volts
Heater Current	400 Ma.
Maximum Plate Voltage	250 Volts
Maximum Plate Dissipation	2 Watts
Maximum Cathode Current	20 Ma.
Maximum Peak Heater-Cathode Voltage	±200 Volts

Direct Interelectrode Capacitances (Shielded)*:

	Section 1**	Section 2
Grid to Plate	1.15	1.15 μμf.
Input	2.5	μμf.
Output	1.35	μμf.
Plate to Cathode	0.15	0.15 μμf. Max.
Heater to Cathode	2.6	2.70 μμf.
Plate Section 1 to Plate Section 2		0.010 μμf. Max.
Plate Section 2 to Plate Section 1 and Grid Section 1 Grounded Grid Operation		0.024 μμf. Max.
Input		4.95 μμf.
Output		2.27 μμf.

*RTMA Standard Shield No. 315

**Section 1 connects to Pins 6, 7 and 8. Section 2 connects to Pins 1, 2 and 5.

6BZ7 (Cont'd)

TYPICAL OPERATION

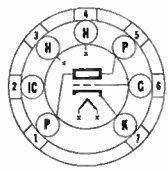
Plate Voltage	150 Volts
Cathode Bias Resistor	220 Ohms
Plate Current	10 Ma.
Transconductance	6800 μmhos
Amplification Factor	38
Plate Resistance	5600 Ohms
Grid Voltage (approx.) for Plate Current of 10 μa	−11 Volts

APPLICATION

A miniature medium mu twin triode designed for use in low noise v h f amplifier application and particularly for cascode operation. It features improved cascode tuner gain and higher mutual conductance than the 6BQ7 to which it is otherwise similar.

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

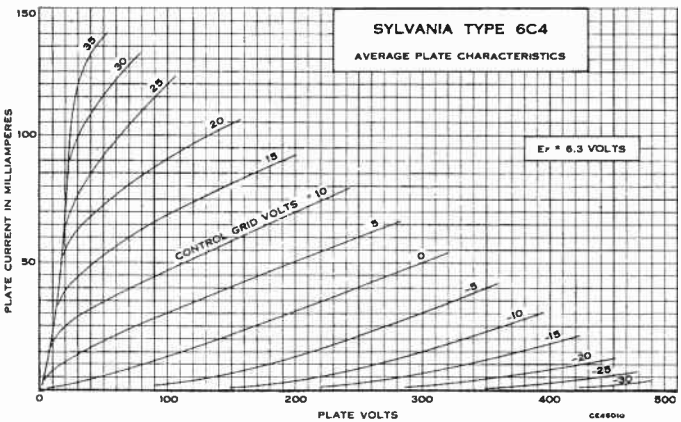
**Maximum grid circuit resistance should not exceed 0.25 megohm with fixed bias or 1.0 megohm with cathode resistor bias.

***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.

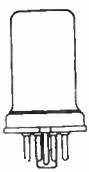
APPLICATION

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	300 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

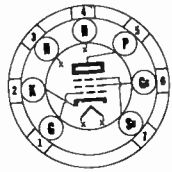
Heater Voltage	6.3 Volts
Heater Current	0.3 Amperes
Plate Voltage	250 Volts
Grid Voltage**	-8 Volts
Plate Current	8 Ma.
Plate Resistance	10000 Ohms
Mutual Conductance	2000 μmhos
Amplification Factor	20

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

For use in resistance coupled circuits see data in appendix.

6CB6 Sylvania Type

SHARP CUTOFF 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
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.

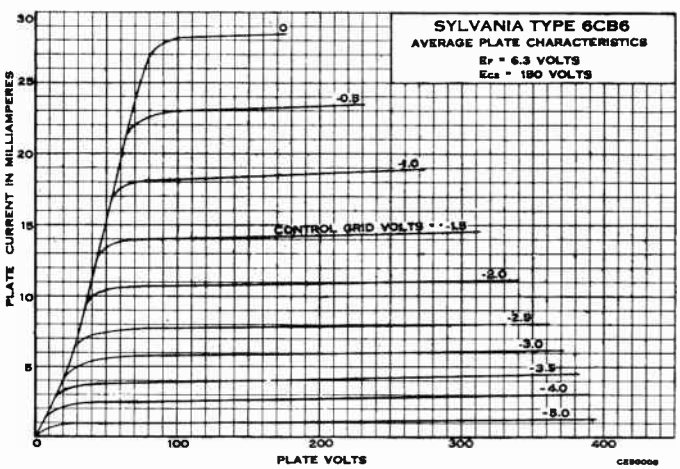
TYPICAL OPERATION

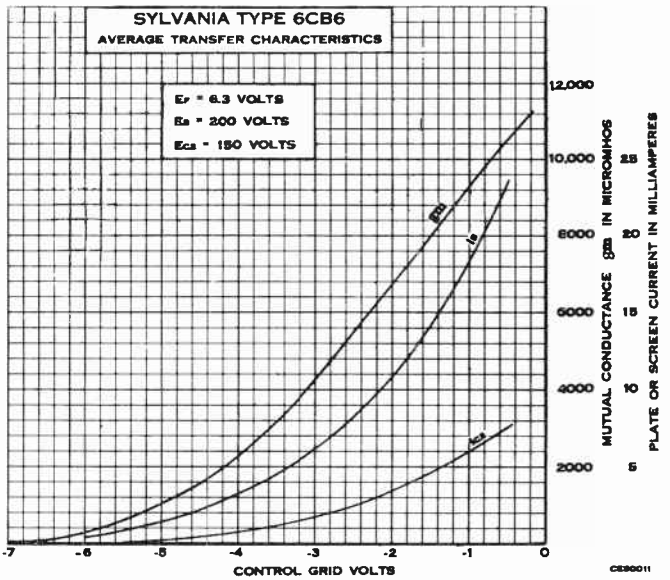
CLASS A_1 AMPLIFIER

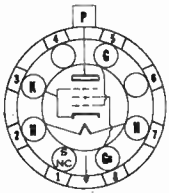
Heater Voltage	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	200 Volts
Screen Voltage	150 Volts
Cathode Bias Resistor	180 Ohms
Plate Resistance (approx.)	0.6 Megohm
Mutual Conductance	6200 μmhos
Plate Current	9.5 Ma.
Screen Current	2.8 Ma.
Grid Voltage (approx.) for Ib = 10 μamps.	−8 Volts

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.







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 11/16"
Maximum Seated Height	5 1/8"
Mounting Position	Vertical*

*Horizontal operation permitted if pins 2 and 7 are in a vertical plane.

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	2.5 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

HORIZONTAL DEFLECTION AMPLIFIER[2]

Maximum DC Supply Voltage (Boost + DC Power Supply)	700 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	6000 Volts
Maximum Peak Negative Plate Voltage	1500 Volts
Maximum Plate Dissipation[3]	15 Watts
Maximum Peak Negative Control Grid Voltage	150 Volts
Maximum DC Screen Grid Voltage	175 Volts
Maximum Screen Grid Dissipation	3 Watts
Maximum DC Plate Current	170 MA
Maximum Control Grid Circuit Resistance	1.0 Megohm
Maximum Bulb Temperature (At Hottest Point)	210° C

Direct Interelectrode Capacitances

Grid to Plate	1.0 μμf
Input	26 μμf
Output	10 μμf

CHARACTERISTICS

	Instantaneous Values	
Plate Voltage	60	175 Volts
Screen Voltage	100	175 Volts
Control Grid Voltage	0	−30 Volts
Plate Current	230	80 MA
Screen Grid Current	21	5.5 MA
Transconductance		7700 μmhos
Plate Resistance		7200 Ohms
Control Grid Voltage for Ib = 1 MA (approx.)		−55 Volts

TRIODE CONNECTED

Plate Voltage	175 Volts
Screen Voltage	175 Volts
Control Grid Voltage	−30 Volts
Amplification Factor	3.9

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

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.

TYPICAL OPERATION

HORIZONTAL OUTPUT AMPLIFIER FOR 27" PICTURE TUBE

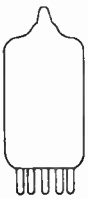
Plate Supply	315 Volts
DC Supply + Boost	725 Volts
Peak Positive Plate Pulse	5000 Volts
Screen Voltage	165 Volts
Screen Current	15 MA
Average Cathode Current	135 MA
Peak Cathode Current	500 MA
Peak to Peak Grid Voltage	125 Volts
Sawtooth Component Grid Voltage	90 Volts
Picture Tube	27" Rect. 90 degree
Anode Voltage	20 KV
Anode Current	150 μa

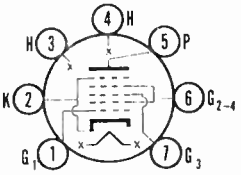
APPLICATION

Sylvania Type 6CD6G is a beam power tube designed for use in the horizontal output deflection circuits of television receivers.

Sylvania Type 6CS6

DUAL CONTROL HEPTODE





7 CH

PHYSICAL SPECIFICATIONS

Base	Miniature Button 9-Pin
Bulb	T-5½
Maximum Overall Length	2⅛"
Maximum Seated Height	1⅞"
Mounting Position	Any
Basing	7CH

RATINGS (Each Section)

Heater Voltage	6.3 Volts
Heater Current	300 Ma
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	1.0 Watt
Maximum Screen Voltage	100 Volts
Maximum Screen Supply Voltage	300 Volts
Maximum Screen Dissipation	4.0 Watt
Maximum Cathode Current	14 Ma
Maximum Grid 1 Circuit Resistance	0.47 Megohm
Maximum Grid 3 Circuit Resistance	2.2 Megohms
Maximum Heater-Cathode Voltage	
Heater Positive with Respect to Cathode DC	100 Volts
Total DC and Peak	200 Volts
Heater Negative with Respect to Cathode	
Total DC and Peak	200 Volts

Direct Interelectrode Capacitances (Unshielded)

Grid 1 to Plate	0.05 μμf Max.
Grid 3 to Plate	0.36 μμf Max.
No. 1 Input[1]	5.5 μμf
No. 2 Input[2]	7.0 μμf
Output[3]	7.5 μμf
Coupling[4]	0.15 μμf Max.

CHARACTERISTICS AND TYPICAL OPERATION

Plate Voltage	100	100	100 Volts
Screen Voltage	30	30	30 Volts
Grid 1 Voltage	0	0	1.0 Volts
Grid 3 Voltage	0	1.0	0 Volts
Plate Current	1.2	0.80	0.75 Ma
Screen Current	4.1	4.0	1.1 Ma
Grid 1 Transconductance			950 μmhos
Grid 3 Transconductance		1250	μmhos
Plate Resistance (approx.)		0.70	1.0 Megohm
Cutoff Voltage for I_b = 50 μamps			
Grid 1			-2.5 Volts
Grid 3		-2.2	Volts

NOTES:

1. Grid 1 to cathode, heater, grid 2, grid 3 and grid 5.
2. Grid 3 to cathode, heater, grid 1, grid 2 and grid 5.
3. Plate to cathode, heater, grid 1, grid 2, grid 3 and grid 5.
4. Grid 1 to grid 3.

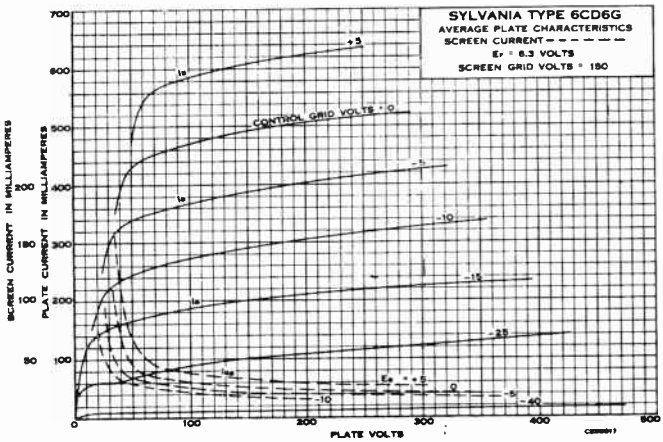
APPLICATION

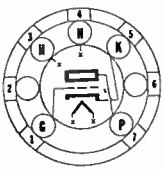
A miniature dual control heptode designed for television service as a combined sync separator and sync clipper. A constant sync output is developed in a well designed circuit. The sharp cut-off characteristics of grid 3 make the Type 6CS6 particularly adaptable to this type of operation.

SYLVANIA RADIO TUBES

Issued as a supplement to the manual in Sylvania News for July-August 1953

SYLVANIA RADIO TUBES





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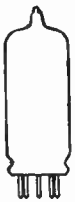


Sylvania Type 6D4

GAS 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	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.

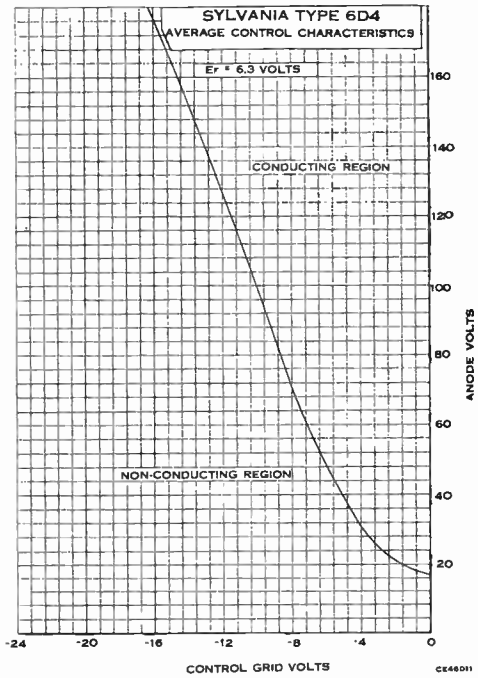
TYPICAL OPERATION

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

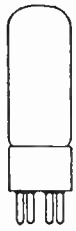
Sylvania Type 6D4 is a gas triode of miniature construction. It may be used as a relay control tube or as a relaxation oscillator. The miniature construction lends itself readily to use in compact light weight equipment.

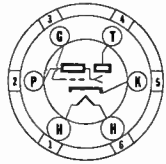
6D4 (Cont'd)



6E5 Sylvania Type

ELECTRON RAY INDICATOR TUBE





6R-0-0

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

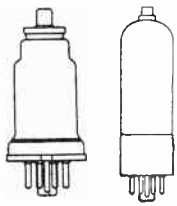
Heater Voltage	6.3	6.3	6.3 Volts
Plate Supply Voltage	100	200	250 Volts
Target Supply Voltage	100	200	250 Volts
Plate Current (Triode Unit)*	0.19	0.19	0.24 Ma.
Target Current (Approximate)*	1.0	3.0	4.0 Ma.
Grid Voltage (Triode Unit) † Approximate	0.0	0.0	0.0 Volt
Grid Voltage (Triode Unit) ‡ Approximate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

This tube is designed primarily for use as a visible tuning indicator of the electron ray type. Type 6U5/6G5 may be used to replace the 6E5 in nearly all present applications, and in general no circuit changes will be necessary.

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



Sylvania Type 6F5GT

HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

	6F5	6F5GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 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

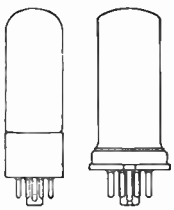
CLASS A AMPLIFIER

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.

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

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



Sylvania Type 6F6GT

POWER AMPLIFIER PENTODES

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 1/16"	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	250 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

6F6GT (Cont'd)

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

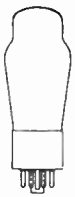
*With screen grid tied to plate.

APPLICATION

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.

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

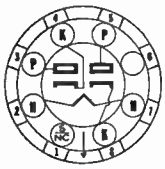
Heater Voltage AC or DC	6.3 Volts
Heater Current	0.150 Ampere
Maximum Plate Voltage	180 Volts
Maximum Screen Voltage	180 Volts
Maximum Plate Dissipation	2.75 Watts
Maximum Screen Dissipation	0.75 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

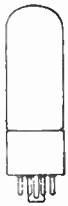
CLASS A_1 AMPLIFIER

	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.



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



Sylvania Type 6H6GT

DUODIODES

PHYSICAL SPECIFICATIONS

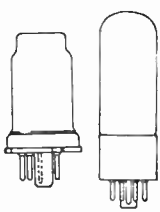
	6H6	6H6GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-5	T9
Maximum Overall Length	1¾"	3 5/16"
Maximum Seated Height	1 5/16"	2 5/16"
Mounting Position	Any	Any
Direct Interelectrode Capacitances:*		
Plate No. 1 to Cathode	3.0	3.1 μμf.
Plate No. 2 to Cathode	3.4	4.0 μμf.
Coupling—Plate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

6Q-1-0



Sylvania Type 6J5GT

MEDIUM-MU TRIODES

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		300 Ma.
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**	**6J5GT**
Grid to Plate	3.4	3.8 μμf.
Input	3.4	4.2 μμf.
Output	3.6	5.0 μμf.

*With standard RMA tube shield for Type 6J5GT or shell of 6J5 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
Plate Current	10.0	9.0 Ma.
Plate Resistance (Approximate)	6700	7700 Ohms
Mutual Conductance (Approximate)	3000	2600 μmhos
Amplification Factor	20	20

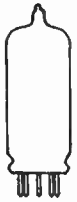
**The DC Resistance in the Grid Circuit should not exceed 1.0 Megohm.

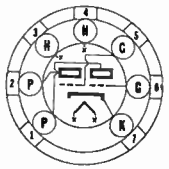
APPLICATION

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 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	0.45 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.

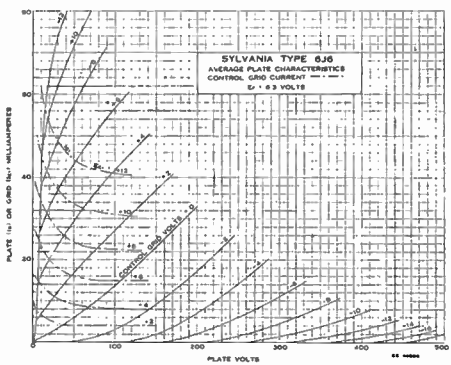
MIXER

Plate Voltage	150 Volts
Cathode-Bias Resistor*	820 Ohms
Oscillator Peak Voltage	3 Volts
Plate Resistance	10,200 Ohms
Conversion Transconductance	1900 μmhos
Plate Current	4.8 Ma.

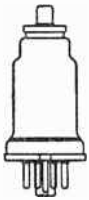
*Under rated maximum conditions total grid circuit resistance should not exceed 0.5 megohm. Fixed bias operation is not recommended.

APPLICATION

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



7R-1-1 (6J7, GT)
7R-0-1 (6J7G)



Sylvania Type 6J7 GT

SHARP CUT-OFF RF PENTODES

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 Ampere
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.

8H-0-8

Sylvania Type 6J8G

TRIODE HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

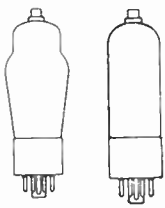
Base	Small Octal 8 Pin
Bulb	ST-12
Cap	Miniature
Maximum Overall Length	$4^{15}/_{32}$"
Maximum Seated Height	$3^{29}/_{32}$"
Mounting Position	Any

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 may be obtained by reference to this type.

5U-0-0



Sylvania Type 6K5 GT

HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Small Octal 7 Pin
Bulb	T9 or ST12
Cap	Miniature
Maximum Overall Length	$4^{15}/_{32}$"
Maximum Seated Height	$3^{29}/_{32}$"
Mounting Position	Any

Direct Interelectrode Capacitances:*

Grid to Plate	2.0 μμf.
Input	2.4 μμf.
Output	3.6 μμf.

*No external shield.

6K5GT (Cont'd)

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.

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

6K6GT Sylvania Type

POWER OUTPUT PENTODE

7S-0-0

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

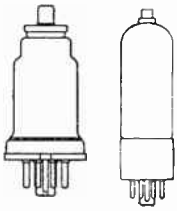
APPLICATION

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.

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



Sylvania Type 6K7GT

REMOTE CUT-OFF RF PENTODES

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 9/16"	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:*

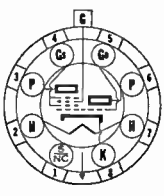
Grid to Plate	.005	.007	.005 μμf. Max.
Input G1 to (F+K+G2+G3)	7	5	4.6 μμf.
Output P to (F+K+G2+G3)	12	12	12 μμf.

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

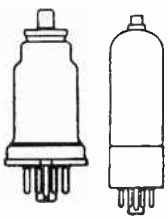
TYPICAL OPERATION

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



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 5/16"
Maximum Seated Height	2 9/16"	3 29/32"	3"
Mounting Position	Any	Any	Any

6K8GT (Cont'd)

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:*

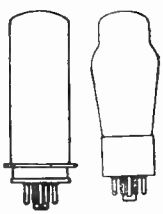
	6K8	6K8G, 6K8GT
Grid G to Hexode Plate (P)	0.03	0.08 $\mu\mu$f. Max.
Grid G to Oscillator Plate	0.02	0.05 $\mu\mu$f. Max.
Grid G to Oscillator Grid (Go)	0.2	0.2 $\mu\mu$f. Max.
Oscillator Grid (Go) to Oscillator Plate	1.1	1.8 $\mu\mu$f.
Oscillator Grid (Go) to Mixer Plate	0.1	0.15 $\mu\mu$f. Max.
Signal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

†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

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



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

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 3/16"	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 beam power amplifier tubes. They provide high power output, power sensitivity and efficiency.

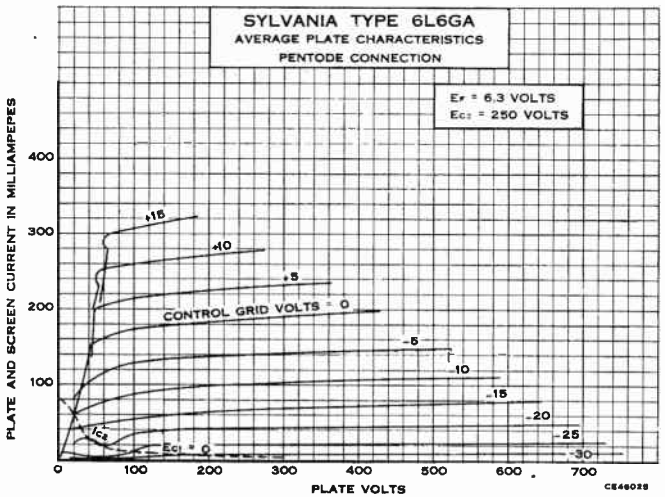
The beam forming plates produce an efficient suppressor action due to the space-charge effects formed between the screen and plate. Very little power is taken by the screen.

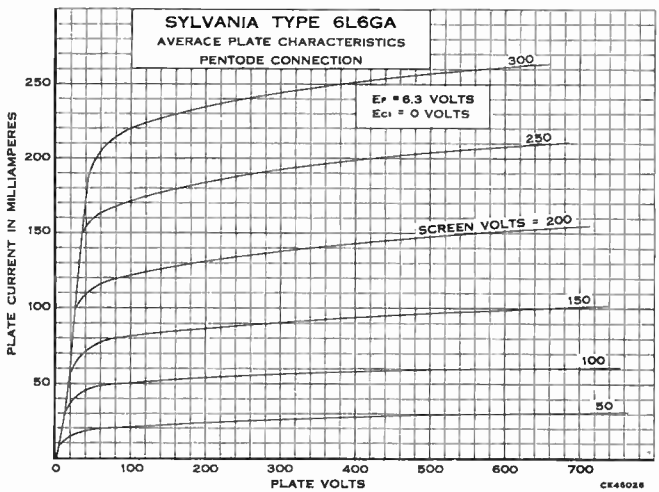
Second harmonics are easily eliminated by two tubes in push-pull, single tubes using negative feedback, or single tubes with out-of-phase second harmonics generated in preceding audio stages. Third and higher order harmonic distortion is negligible.

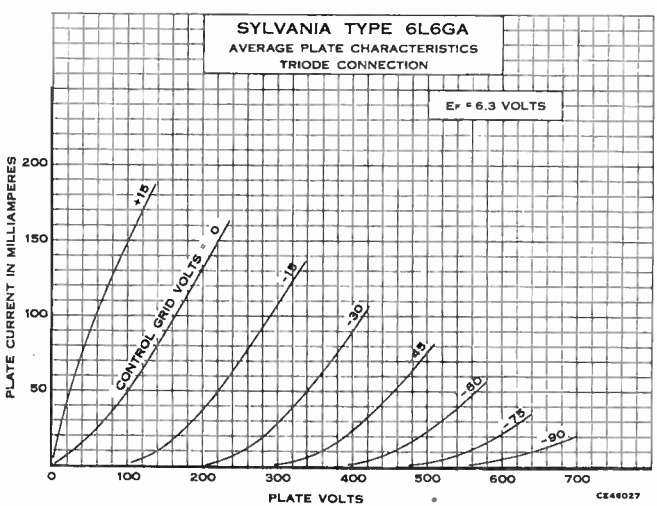
Transformer or impedance coupling devices are recommended and the resistance introduced in the grid circuit should be kept as low as possible. For fixed bias this resistance should not exceed 0.1 megohm. The maximum grid circuit resistance when self-bias is employed may be 0.25 megohm if the heater voltage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

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.

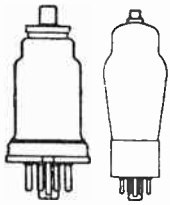
6L6GA (Cont'd)


SYLVANIA TYPE 6L6GA
AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
Ef = 6.3 VOLTS
Ec2 = 250 VOLTS
PLATE AND SCREEN CURRENT IN MILLIAMPEPES
CONTROL GRID VOLTS = 0
+15
+10
+5
-5
-10
-15
-20
-25
-30
Ic2
Ec1 = 0
PLATE VOLTS
CE46028


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


SYLVANIA TYPE 6L6GA
AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
Ef = 6.3 VOLTS
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS = 0
+15
-15
-30
-45
-60
-75
-90
PLATE VOLTS
CE46027

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



Sylvania Type 6L7, G

HEPTODE CONVERTER, AMPLIFIER

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

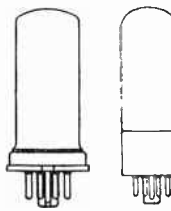
TYPICAL OPERATION—MIXER

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

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



Sylvania Type 6N7GT

DUO TRIODE POWER AMPLIFIERS

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

6N7GT (Cont'd)

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

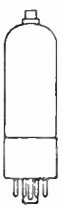
(Both grids and both plates connected together at the socket)

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

For use in resistance coupled circuits see data in appendix.

6Q7GT Sylvania Type

DUODIODE HIGH-MU TRIODE



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

PHYSICAL SPECIFICATIONS

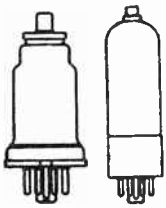
	6Q7	6Q7G	6Q7GT
Base	Small Wafer Octal 7 Pin	Small Octal 7 Pin	Small Wafer Metal Sleeve Octal 7 Pin
Bulb	Metal 8-4	ST12	T9
Cap	Miniature	Miniature	Miniature
Maximum Overall Length	3 1/8"	4 15/32"	3 5/16"
Maximum Seated Height	2 9/16"	3 29/32"	2 3/4"
Mounting Position	Any	Any	Any

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. For resistance coupled circuit data, see the appendix.

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



Sylvania Type 6R7GT

DUODIODE MEDIUM-MU TRIODE

PHYSICAL SPECIFICATIONS

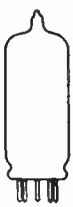
	6R7	6R7GT
Base	Small Wafer Octal 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-4	T9
Cap	Miniature	Miniature
Maximum Overall Length	3 1/8"	3 5/16"
Maximum Seated Height	2 5/16"	2 3/4"
Mounting Position	Any	Any

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

For resistance coupled circuit data, see appendix.

9AC-0-0



Sylvania Type 6S4

MEDIUM MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T-6½
Maximum Overall Length	2 5/16"
Maximum Seated Height	2 3/16"
Mounting Position	Any

RATINGS[1]

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

VERTICAL DEFLECTION AMPLIFIER[2]

Maximum DC Plate Voltage	500 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	2200 Volts
Maximum Plate Dissipation[3]	7.5 Watts
Maximum Peak Negative Grid Voltage	250 Volts
Maximum Average Cathode Current	30 MA
Maximum Peak Cathode Current	105 MA
Maximum Grid Circuit Resistance (Cathode Bias)	2.2 Megohms

Direct Interelectrode Capacitances

Grid to Plate	2.6 μμf
Input	4.2 μμf
Output	0.9 μμf

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

CHARACTERISTICS

Plate Voltage	250 Volts
Grid Voltage	-8 Volts
Plate Current	26 MA
Transconductance	4500 μmhos
Amplification Factor	16
Plate Resistance (approx.)	3600 Ohms
Plate Current at Ec = -15 Volts	4.5 MA
Grid Voltage (approx.) for Ib = 50 μa	-23 Volts

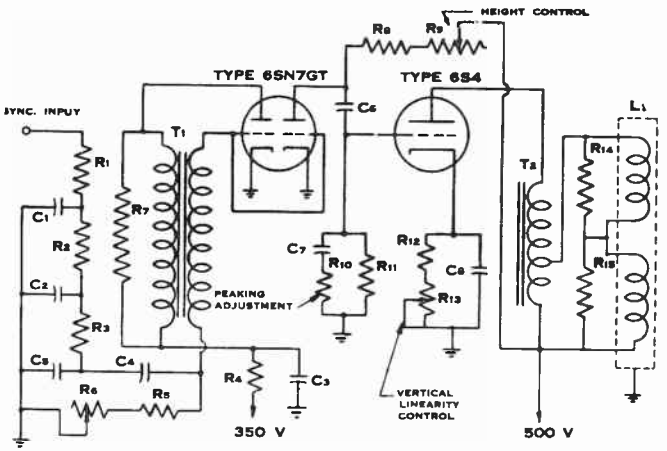
NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

APPLICATION

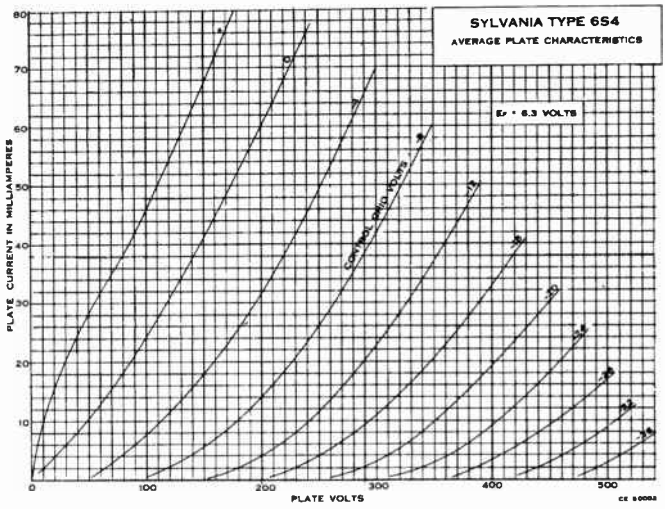
Sylvania Type 6S4 is a medium-mu triode in the miniature construction having characteristics designed for use as a vertical deflection amplifier in television receivers. When used with well designed components and adequate power supply, sufficient drive is available for use with 16" picture tubes such as Sylvania Type 16TP4 at its maximum anode voltage.

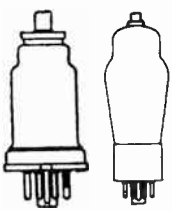
TYPICAL VERTICAL DEFLECTION CIRCUIT
FOR SYLVANIA TYPE 16TP4 PICTURE TUBE



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 (using two windings) or RCA-222T1 (Autotransformer)

Note: *Fixed Resistance may be used after needed value for vertical peaking control has been determined with rheostat.*





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 15/64"
Maximum Seated Height	2 9/16"	3 29/64"
Mounting Position	Any	Any

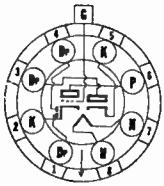
TYPICAL OPERATION

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.

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

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

6SA7GT Sylvania Type

HEPTODE CONVERTER

8AD-1-6
6SA7GT

8R-1-0
6SA7

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:*

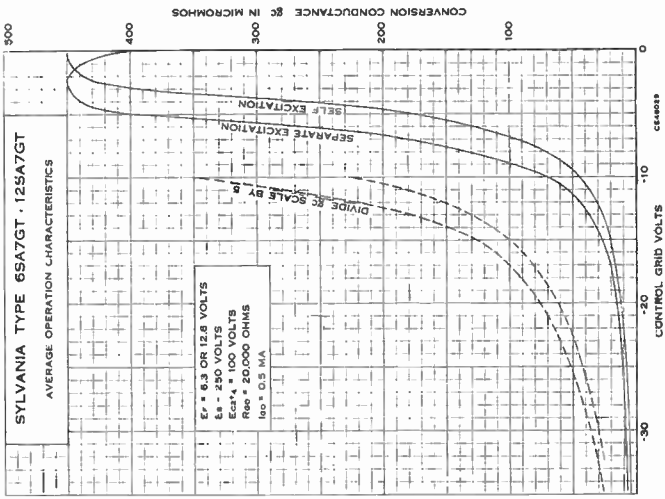
	6SA7*	6SA7GT**
Grid G to all other Electrodes (Signal Input)	9.5 μμf.	9.5 μμf.
Plate to all other Electrodes (Mixer Output)	12 μμf.	9.5 μμf.
Grid Go to all other Electrodes	7 μμf.	8.0 μμf.
Grid G to Plate	0.13 μμf. Max.	0.5 μμf.
Grid Go to Grid G	0.15 μμf. Max.	0.4 μμf.
Grid Go to Plate	0.06 μμf. Max.	0.4 μμf.
Grid Go to all other Electrodes except K	4.4 μμf.	5.0 μμf.
Grid Go to K	2.6 μμf.	3.5 μμf.
K to all other Electrodes except Grid Go	5 μμf.	20 μμf.

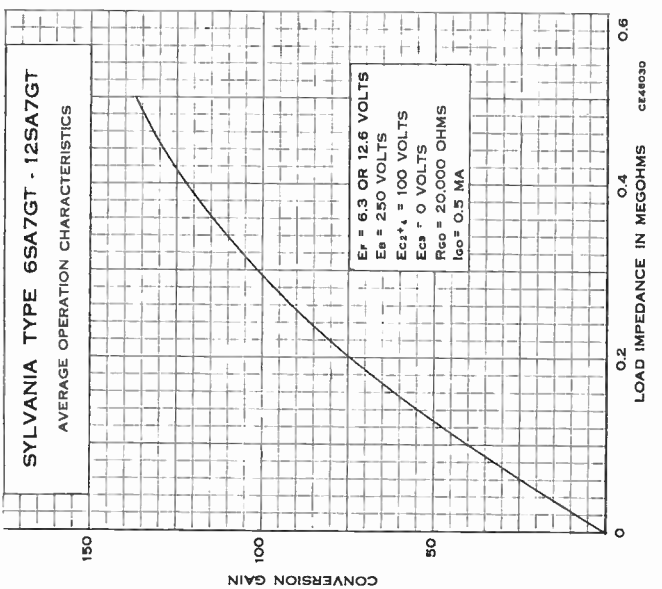
*With shell connected to cathode.
**With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

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	3.3	3.5 Ma.
Screen Grid Current	8	8	8.5	8.5 Ma.
Oscillator Grid Current	0.5	0.5	0.5	0.5 Ma.
Plate Resistance (Approx.)	0.5	0.8	0.5	1.0 Megohm
Conversion Transconductance	425	450	425	450 μmhos
Control Grid Voltage (2 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.

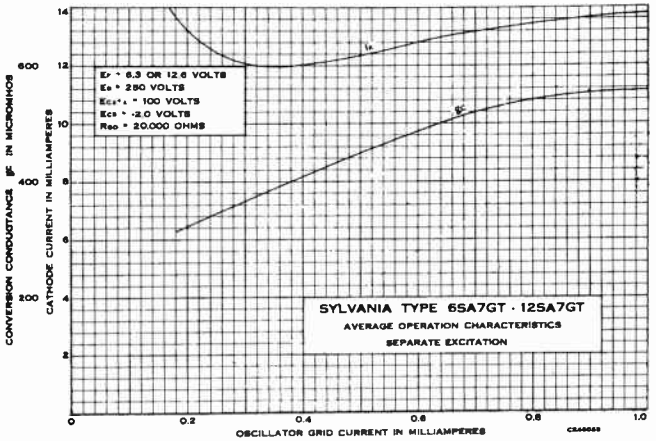




6SA7GT (Cont'd)

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.



6SC7 Sylvania Type

HIGH-MU DUO TRIODE

8S-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

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

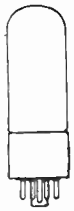
Plate Supply Voltage	90	300 Volts
Plate Current per Section	0.15	0.65 Ma.
Plate Load Resistor (per Plate)	0.25	0.25 Megohm
Self-Bias Resistor	3750	1675 Ohms
Grid Resistor for Following Tubes	0.5	0.5 Megohm
Voltage Amplification (At 5 volts RMS Output)	30	42
Peak Output Voltage (RMS)*	18	110 Volts

*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.

8N-1-5



Sylvania Type 6SE7GT

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin Metal Sleeve
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	0.300 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.

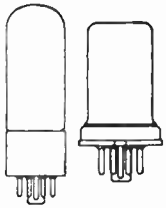
*With $1\frac{5}{16}$" diameter shield (RMA Std. M8-308) connected to cathode.

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.



6AB-1-0 (6SF5)
6AB-0-0 (6SF5GT)

Sylvania Type 6SF5GT

HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

	6SF5	6SF5GT
Base	Small Wafer Octal 6 Pin	Intermediate Octal 6 Pin
Bulb	Metal 8-1	T9
Maximum Overall Length	$2\frac{5}{8}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{1}{16}$"	$2\frac{3}{4}$"
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 $1\frac{5}{16}$" diameter shield (RMA Std. M8-308) connected to cathode.

6SF5GT (Cont'd)

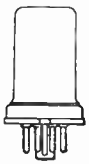
TYPICAL OPERATION
CLASS A AMPLIFIER

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.

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.

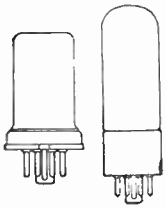
*With shell connected to cathode.

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.

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 Octal 8 Pin	6SG7GT Small Wafer Octal 8 Pin Metal Sleeve
Base		
Bulb	Metal 8-1	T9
Maximum Overall Length	$2\frac{5}{8}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{1}{16}$"	$2\frac{3}{4}$"
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 $\mu\mu$f. Max.
Input	8.5	8.5 $\mu\mu$f.
Output	7.0	7.0 $\mu\mu$f.

*Shell connected to cathode.

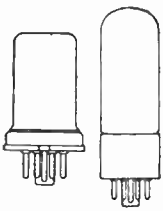
**With $1\frac{5}{16}$" diameter tube shield (RMA Std. 308) connected to cathode.

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	-11.0	-17.5 Volts

8BK-1-1



Sylvania Type 6SH7GT

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

	6SH7 Small Wafer Octal 8 Pin	6SH7GT Small Wafer Octal 8 Pin Metal Sleeve
Base		
Bulb	Metal 8-1	T9
Maximum Overall Length	$2\frac{5}{8}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{1}{16}$"	$2\frac{3}{4}$"
Mounting Position	Any	Any

6SH7GT (Cont'd)

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.

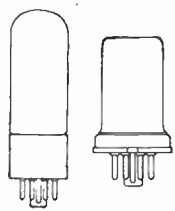
**With 1 5/16" diameter shield (RMA Std. M8-308) connected to cathode.

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.

6SJ7GT Sylvania Type

SHARP CUT-OFF RF PENTODE



8N-1-1 (6SJ7)
8N-1-5 (6SJ7GT)

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	2 5/8"	3 5/16"
Maximum Seated Height	2 1/16"	2 3/4"
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

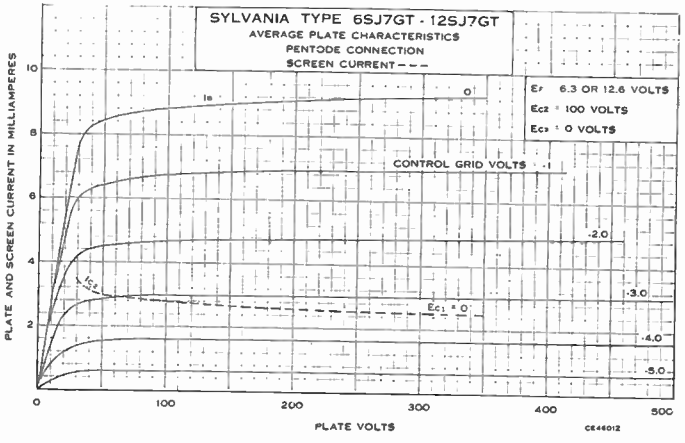
Heater Voltage	6.3	6.3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	100	250 Volts Max.
Grid Voltage	−3	−3 Volts
Screen Voltage	100	100 Volts Max.
Suppressor	Tie to Cathode	
Plate Current	2.9	3.0 Ma.
Screen Current	0.9	0.8 Ma.
Plate Resistance (Approximate)	0.7	1.0 Megohm
Mutual Conductance	1575	1650 μmhos
Heater-Cathode Voltage	90	90 Volts Max.

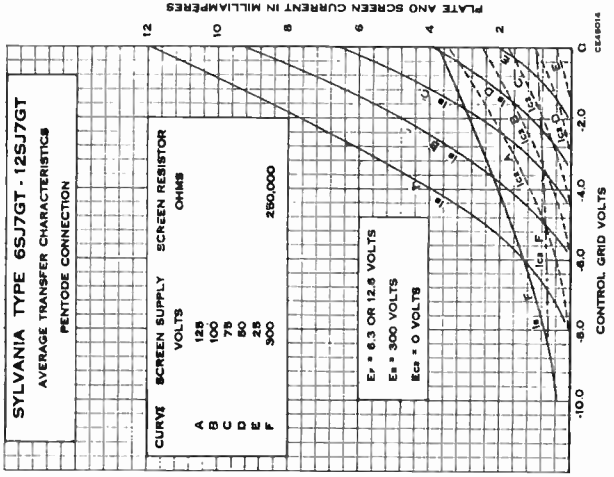
TRIODE CONNECTION

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	8200	7600 Ohms
Mutual Conductance	2300	2500 μmhos
Plate Current	6.0	9.2 Ma.

APPLICATION

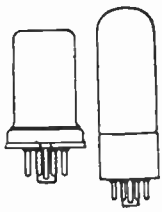
Sylvania Types 6SJ7, GT are single-ended r-f pentode tubes having a sharp cut-off characteristic and designed for applications similar to those for Sylvania Type 6J7. Characteristics for this tube are also very similar to Type 7C7, but are not identical. For additional information on circuit application refer to Type 7C7. Resistance coupled circuit data may be found in the appendix.





6SJ7GT (Cont'd)

8N-1-1 (6SK7)
8N-1-5 (6SK7GT)



Sylvania Type 6SK7GT

REMOTE CUT-OFF RF PENTODE

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	0.003 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 1/16" 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.

8BD-0-0

Sylvania Type 6SL7GT

HIGH-MU DUO TRIODE

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T9
Maximum Overall Length	3 5/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

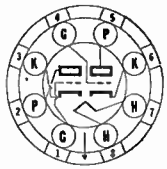
TYPICAL OPERATION*

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.

6SN7GT Sylvania Type

MEDIUM-MU DUO TRIODE



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[1]

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.60 Ampere
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

CLASS A_1 AMPLIFIER

Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation: Each Plate	3.5 Watts
Both Plates	5.0 Watts
Maximum Cathode Current	20 MA
Maximum Grid Circuit Resistance	1.0 Megohm

	Vertical[2] Deflection Amplifier	Vertical[2] Deflection Oscillator	Horizontal[2] Deflection Oscillator
Maximum DC Plate Voltage	300	300	300 Volts
Maximum Peak Positive Plate Voltage (Absolute Maximum)	300	300	300 Volts
Maximum Plate Dissipation: Each Plate	3.5	3.5	3.5 Watts
Both Plates	5.0	5.0	5.0 Watts
Maximum Peak Negative Grid Voltage	250	400	600 Volts
Maximum Average Cathode Current	20	20	20 MA
Maximum Peak Cathode Current	70	70	300 MA
Maximum Grid Circuit Resistance	2.2	2.2	2.2 Megohms

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

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.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A_1 AMPLIFIER (PER SECTION)

Heater Voltage	6.3	6.3	Volts
Heater Current	0.6	0.6	Ampere
Plate Voltage	90	250	Volts
Grid Voltage	0	−8	Volts
Self Bias Resistor	0	900	Ohms
Plate Current	10	9.0	Ma.
Plate Resistance	6700	7700	Ohms
Mutual Conductance	3000	2600	μmhos
Amplification Factor	20	20	

For resistance coupled data, refer to Type 7A4 in appendix.

Sylvania Type 6SN7GTA

The Sylvania Type 6SN7GTA is similar to the 6SN7GT except for higher voltage and plate dissipation rating.

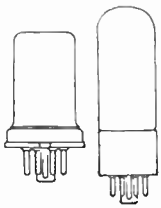
RATINGS[1]

Maximum DC Plate Voltage	450 Volts
Maximum Peak Positive Plate Voltage as Vertical Deflection Amplifier (Absolute Maximum)	1500 Volts
Maximum Plate Dissipation[2]	
Each Plate	5.0 Watts
Both Plates	7.5 Watts

NOTES:

1. All values are evaluated on design center system except where absolute maximum is stated.
2. In stages with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

8Q-1-1 (6SQ7)
8Q-1-3 (6SQ7GT)



Sylvania Type 6SQ7GT

DUODIODE HIGH-MU TRIODE

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

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.

6SS7 Sylvania Type

REMOTE CUT-OFF RF PENTODE

8N-1-0

PHYSICAL SPECIFICATIONS

Base	Small Wafer Octal 8 Pin
Bulb	Metal 8-1
Maximum Overall Length	2⅜"
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

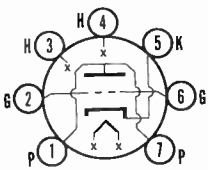
TYPICAL OPERATION

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.

6T4 Sylvania Type

U H F TRIODE



7DK

PHYSICAL SPECIFICATIONS

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

RATINGS

Heater Voltage	6.3 Volts
Heater Current	225 MA
Maximum Plate Voltage	200 Volts
Maximum Plate Dissipation	3.5 Watts
Maximum Grid Current	8 MA
Maximum Cathode Current	30 MA
Maximum Heater-Cathode Voltage	
Total DC and Peak Pulse	±200 Volts
Heater Positive DC to Cathode	100 Volts

Direct Interelectrode Capacitances (Unshielded)

Grid to Plate	1.8 μμf
Input	2.4 μμf
Output	0.45 μμf

CHARACTERISTICS

Plate Voltage	80 Volts
Cathode Bias Resistor	150 Ohms
Plate Current	18 MA
Transconductance	7000 μmhos
Amplification Factor	13
Plate Resistance	1860 Ohms
Grid Voltage for 50 μa Plate Current	−15 Volts

TYPICAL OPERATION (Oscillator at 950 MC)

Plate Voltage	100 Volts
Grid Voltage (Self Bias)	−4 Volts
Grid Resistor	10,000 Ohms
Plate Current	22 MA
Grid Current (approx.)	400 μa

APPLICATION

A miniature low mu triode designed for service as a u h f oscillator.

PLATE CHARACTERISTICS

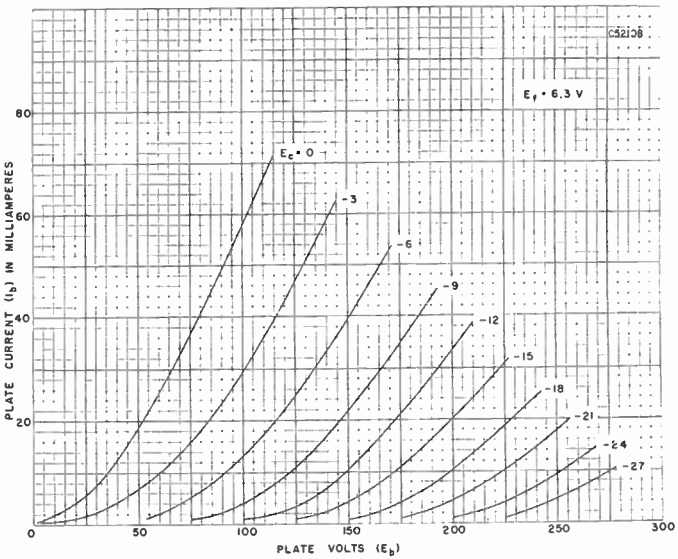
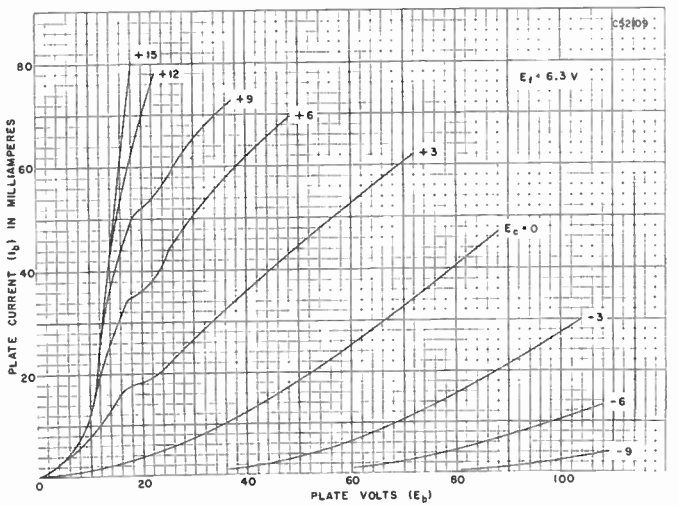
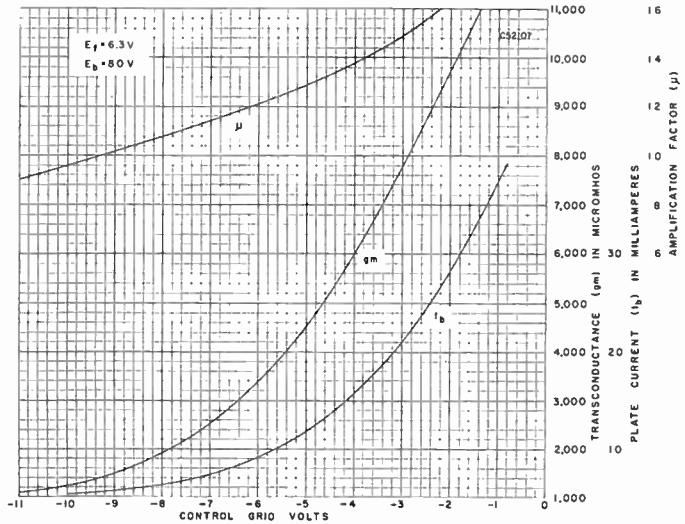


PLATE CHARACTERISTICS



6T4 (Cont'd)

AVERAGE TRANSFER CHARACTERISTICS



6T8 Sylvania Type

TRIPLE DIODE TRIODE

9E-0-3 & 7

PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T-6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 13/16"
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:*

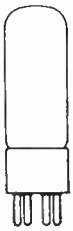
Grid to each diode plate	0.035 μμf. Max.
Diode input (pins 1 or 6)	3.8 μμf.
Diode input (pin 2)	4.5 μμf.

*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

4CG-0-0



Sylvania Type 6U4GT

HALF WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 6 Pin
Bulb	T-9
Maximum Overall Length	3 3/8"
Maximum Seated Height	2 13/16"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	6.3 Volts
Heater Current	1.2 Amperes
Maximum Peak Inverse Plate Voltage	
Television Damper Service*	3850 Volts
Conventional Rectifier Service	1375 Volts
Maximum Peak Plate Current	660 Ma.
Maximum DC Output Current	138 Ma.
Maximum Hot-Switching Transient Plate Current for Duration of 0.2 Second Maximum	3.85 Amperes
Maximum Peak Heater-Cathode Voltage (Conventional Rectifier).	
Heater Negative With Respect to Cathode	500 Volts
Heater Positive With Respect to Cathode	110 Volts
Maximum Peak Heater-Cathode Voltage (Television Damper)	
Heater Negative With Respect to Cathode*	3850 Volts
Heater Positive With Respect to Cathode	110 Volts
Tube Voltage Drop at 250 Ma. DC	21 Volts

*Duration of voltage pulse not to exceed 15% of one scanning cycle. In the 525 line, 30 frame television system 15% of one scanning cycle is 10 microseconds.

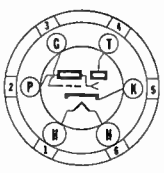
TYPICAL OPERATION

HALF WAVE RECTIFIER

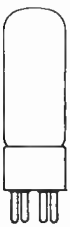
Heater Voltage	6.3 Volts
AC Plate Voltage (RMS)	350 Volts
Filter-Input Capacitor	20 μf.
Total Effective Plate-Supply Impedance	145 Ohms
DC Output Current	125 Ma.
DC Output Voltage	335 Volts

APPLICATION

Sylvania Type 6U4GT is a half wave rectifier featuring the unipotential cathode and a high peak heater-cathode rating, eliminating the necessity for a low-capacitance heater isolation transformer in television horizontal deflection circuits using a high-impedance yoke with direct coupling.



6R-0-0



Sylvania Type 6U5

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	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

6U5 (Cont'd)

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.

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.

6U7G Sylvania Type

REMOTE CUT-OFF RF PENTODE

7R-0-8

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

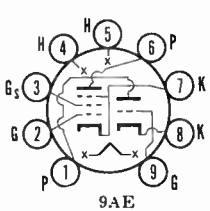
TYPICAL OPERATION

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

6U8 Sylvania Type

HIGH FREQUENCY TRIODE PENTODE



9AE

PHYSICAL SPECIFICATIONS

Base	Small Button, 9-Pin
Bulb	T-6½
Maximum Bulb Length	2 3/16"
Mounting Position	Any
Basing	9-AE

RATINGS

	Triode Unit	Pentode Unit
Heater Voltage	6.3	6.3 Volts
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation	2.5	2.8 Watts
Maximum Screen Voltage		300 Volts
Maximum Screen Dissipation		0.5 Watt
Minimum External Control Grid Bias	0	0 Volts
Maximum Heater to Cathode Voltage	90	90 Volts

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Pentode Unit		
Grid No. 1 to Plate	0.006 Max.	0.01 μμf. Max.
Input	5.0	5.0 μμf.
Output	3.5	2.6 μμf.
Triode Unit		
Grid to Plate	1.8	1.8 μμf.
Grid to Cathode	2.5	2.5 μμf.
Plate to Cathode	1.0	0.4 μμf.
Cathode to Heater (Each Section)	3.0	3.0 μμf.

*RMA Std. Shield No. 315

TYPICAL OPERATION

	Triode Unit		Pentode Unit
Heater Voltage		6.3	Volts
Heater Current		450	Ma.
Plate Voltage	150		250 Volts
Screen Voltage			110 Volts
Cathode Resistor	56		68 Ohms
Plate Current	18		10 Ma.
Screen Current			3.5 Ma.
Plate Resistance	0.005		0.4 Megohm
Transconductance	8500		5200 μmhos
Amplification Factor	40		
Control Grid Voltage for Plate Current of 10 μa	−12		−10 Volts

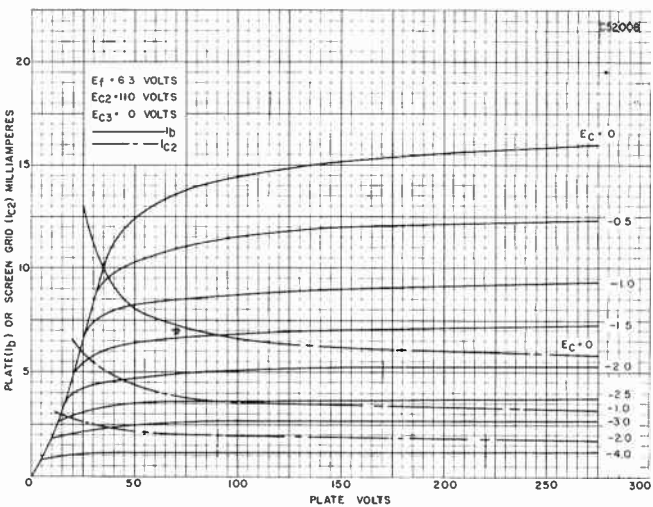
APPLICATION

The Sylvania Type 6U8 is a 9-pin miniature triode-pentode. The two sections are electrically independent and capable of good performance at the higher frequencies. The tube may be used as a local oscillator-pentode mixer and many other combined functions in fm and tv receivers.

Sylvania Type 6U8

PENTODE SECTION

AVERAGE PLATE CHARACTERISTICS

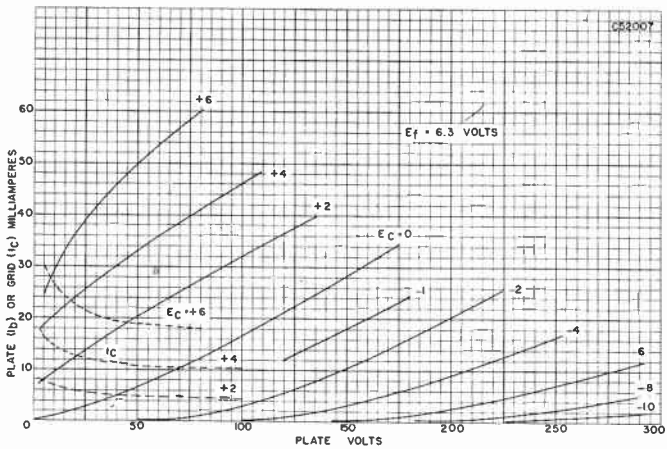


Sylvania Type 6U8

TRIODE SECTION

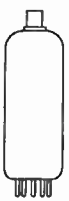
PENTODE SECTION-TRIODE CONNECTED

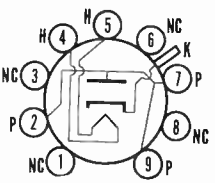
AVERAGE PLATE CHARACTERISTICS



6V3 Sylvania Type

HALF WAVE RECTIFIER





9BD

PHYSICAL SPECIFICATIONS

Base	Small Button, 9-Pin
Bulb	T6½
Basing	9BD
Cap	Skirted Miniature
Cathode	Unipotential
Mounting Position	Any

RATINGS AND OPERATION

Heater Voltage	6.3 Volts
Heater Current	1.75 Amperes

Half Wave Rectifier Service

AC Plate Voltage	350 Volts Max.
Average Tube Drop (at 150 Ma.)	14 Volts
DC Output Current	125 Ma. Max.
Filter Input Capacitor	20 μf.
Minimum Total Effective Plate Supply Impedance	145 Ohms

Damper Service*

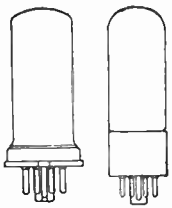
Peak Inverse Voltage	6000 Volts Max.
Steady State Peak Current	600 Ma. Max.
Heater-Cathode Voltage (Heater Negative)	750 Volts Max.
Peak Heater-Cathode Voltage	6750 Volts Max.
DC Output Current	135 Ma. Max.

*Absolute Maximum Values—Should not be exceeded under any condition of high line voltage or misadjustment. For operation in a 525 line, 30 frame television system the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

APPLICATION

The Sylvania Type 6V3 is an indirectly heated half-wave rectifier designed for service as a damping diode in television receiver direct drive sweep circuits. The cathode is connected to the top cap.

7S-1-0 (6V6)
7S-0-0 (6V6GT)



Sylvania Type 6V6GT

BEAM POWER AMPLIFIER

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[1]

Heater Voltage	6.3 Volts
Heater Current	450 MA
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

	Class A1 Amplifier	Vertical[2,3] Deflection Amplifier
Maximum Plate Voltage	315	315 Volts
Maximum Peak Positive Voltage (Absolute Maximum)		1200 Volts
Maximum Plate Dissipation[4]	12	9 Watts
Maximum Screen Grid Voltage	285	Volts
Maximum Screen Grid Dissipation	2	Watts
Maximum Peak Negative Grid Voltage		250 Volts
Maximum Average Cathode Current		35 MA
Maximum Peak Cathode Current		105 MA
Maximum Grid Circuit Resistance		
Fixed Bias	0.1	Megohm
Cathode Bias	0.5	2.2 Megohms

Direct Interelectrode Capacitances

Grid to Plate	0.7 μμf
Input	9.0 μμf
Output	7.5 μμf

NOTES:

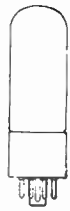
1. All values are evaluated on design center system except where absolute maximum is stated.
2. Triode connected.
3. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
4. Deflection amplifier service—In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

APPLICATION

For further data, curves, etc., reference should be made to corresponding Lock-In type 7C5 which is identical in electrical characteristics.

6W4GT Sylvania Type

HALF-WAVE RECTIFIER



4CG-0-0

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

Caution Note: Precautions should be taken on Terminals 1, 2, 4, and 6 when used as tie points, due to high voltage breakdown.

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*	3500 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*#	2100 Volts
Heater Positive with respect to Cathode	100 Volts
Heater to Cathode Capacitance (Max.)	7.0 $\mu\mu$f.

*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 microseconds.

#DC component of heater-cathode voltage should not exceed 450 volts.

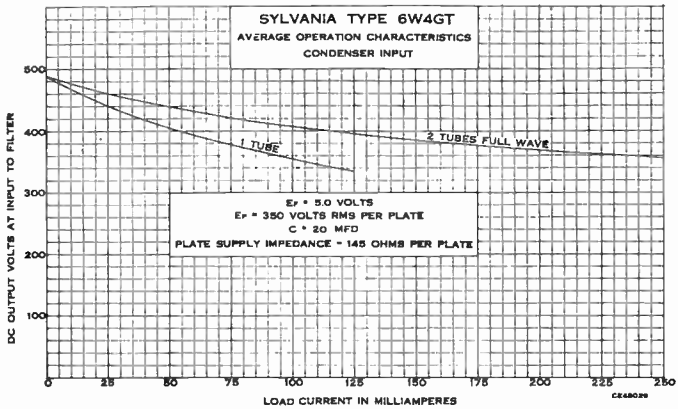
TYPICAL OPERATION

	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

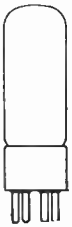
APPLICATION

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.



7S-0-0



Sylvania Type 6W6GT

BEAM POWER AMPLIFIER

TELEVISION SCANNER

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[1]

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

CLASS A_1 AMPLIFIER

Maximum Plate Voltage	300 Volts
Maximum Screen Grid Voltage	150 Volts
Maximum Plate Dissipation	10 Watts
Maximum Screen Grid Dissipation	1.25 Watts
Maximum Control Grid Circuit Resistance	
Fixed Bias	0.1 Megohm
Cathode Bias	0.5 Megohm

VERTICAL DEFLECTION AMPLIFIER (Triode Connected)[2]

Maximum DC Plate Voltage	300 Volts
Maximum Peak Positive Voltage (Absolute Maximum)	1200 Volts
Maximum Plate Dissipation[3]	7.5 Watts
Maximum Peak Negative Grid Voltage	250 Volts
Maximum Average Cathode Current	40 MA
Maximum Peak Cathode Current	140 MA
Maximum Grid Circuit Resistance (Cathode Bias)	2.2 Megohms

Direct Interelectrode Capacitances

Grid to Plate	0.5 μμf
Input	15.0 μμf
Output	9.0 μμf

NOTES:

1. Values are evaluated on design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

CHARACTERISTICS (Triode Connected)

Plate Voltage	225 Volts
Grid Voltage	-30 Volts
Plate Current	22 MA
Transconductance	3800 μmhos
Amplification Factor	6.2
Plate Resistance (approx.)	1600 Ohms
Grid Voltage (approx.) for Ib = 0.5 MA	-42 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

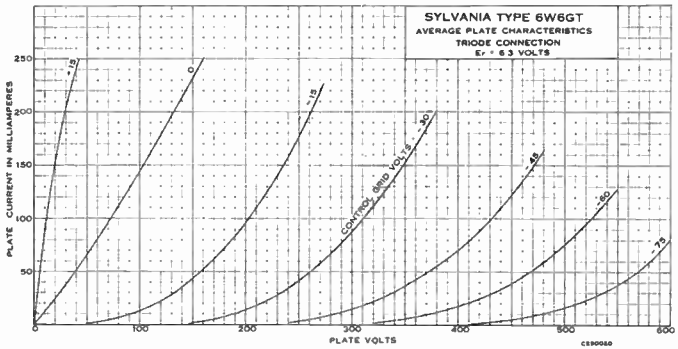
Heater Voltage	6.3	6.3 Volts
Heater Current	1.2	1.2 Amperes
Plate Voltage	110	200 Volts
Screen Grid Voltage	110	125 Volts
Control Grid Voltage	-7.5	... Volts
Cathode Bias Resistor	...	180 Ohms
Peak AF Grid Signal	7.5	8.5 Volts
Plate Resistance (Approx.)	13,000	28,000 Ohms
Mutual Conductance	8000	8000 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)

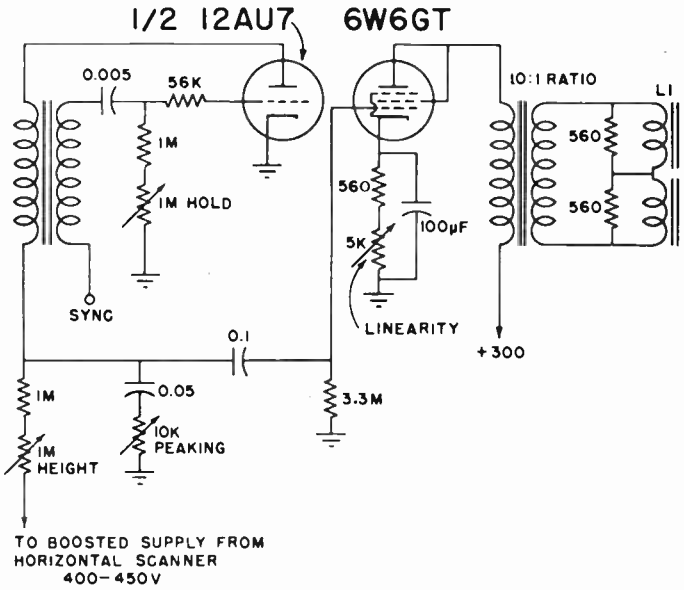
Plate Voltage	300 Volts
Control Grid Voltage (Negative Peaking Component)	35 Volts
Control Grid Voltage (Sawtooth Peaking Component)	65 Volts
Plate Current	10.2 Ma.
Cathode Bias Resistance	4,000 Ohms
Maximum Control Grid Circuit Resistance	3.3 Megohms
Plate Voltage (Pulse Component)	480 Volts
Plate Voltage (Sawtooth Component)	320 Volts
Retrace Time	220 μseconds

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.



TYPICAL VERTICAL DEFLECTION CIRCUIT



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

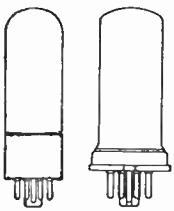
TYPICAL OPERATION

	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.

6S-1-0 (6X5)
6S-0-0 (6X5GT)



Sylvania Type 6X5GT

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

	6X5	6X5GT
Base	Small Wafer Octal 6 Pin	Intermediate Octal 6 Pin
Bulb	Metal 8-6	T9
Maximum Overall Length	$3\frac{1}{16}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{11}{16}$"	$2\frac{3}{4}$"
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

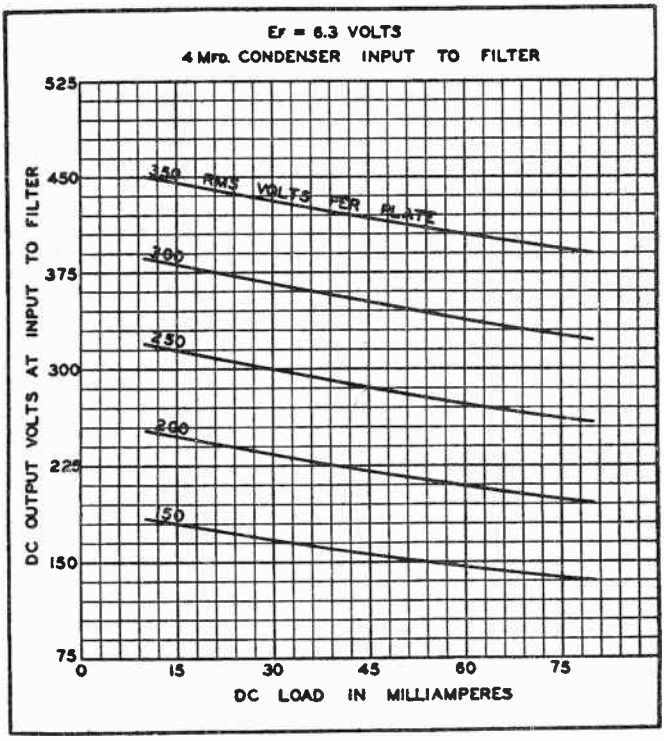
Sylvania Type 6X5 and 6X5GT are designed for use as rectifiers for auto-radio receivers or for a-c operated receivers where the demand for rectified current is low. They are similar to the Type 7Y4 except for heater current rating and therefore usable in similar applications.

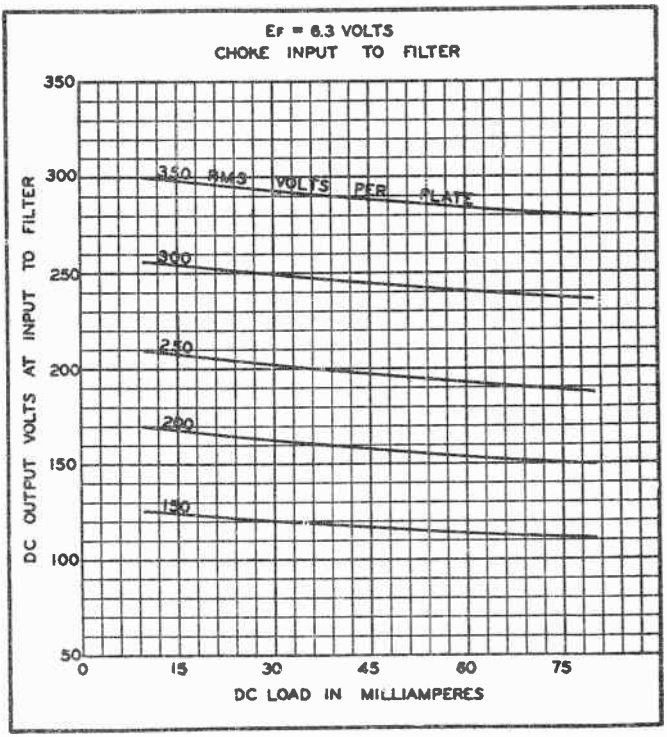
In order to obtain satisfactory output and regulation, careful consideration should be given to proper filtering. Filter circuits of the condenser-input or the choke-input type are applicable.

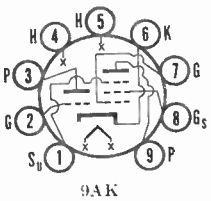
The d-c output will be considerably greater with a condenser-input filter than when the other type is used. Also, it will be true that higher peak plate currents will be encountered. The first condenser in the filter circuit, therefore, should not be too large in capacitance. It is not likely that the 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







Sylvania Type 6X8

HIGH FREQUENCY TRIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Small Button, 9-Pin
Bulb	T-6½
Maximum Bulb Length	$2\frac{3}{16}$"
Mounting Position	Any
Basing	9-AK

RATINGS

	Triode Unit-Osc.	Pentode Unit-Mixer
Heater Voltage	6.3	Volts
Maximum Plate Voltage	250	250 Volts
Maximum Plate Dissipation	1.5	2.0 Watts
Maximum Screen Supply Voltage		250 Volts
Maximum Screen Voltage		See Screen Input Curve
Maximum Negative Control Grid Bias	40	Volts
Maximum Positive Control Grid Bias	0	Volt
Maximum Control Grid Input	0.5	Watt
Maximum Heater to Cathode Voltage	100	100 Volts

Direct Interelectrode Capacitances:

	Shielded*	Unshielded
Pentode Unit		
Grid No. 1 to Plate	0.06	0.09 μμf. Max.
Input	4.5	4.3 μμf.
Output	1.4	0.7 μμf.
Triode Unit		
Grid to Plate	1.4	1.4 μμf.
Input	2.6	2.0 μμf.
Output	1.0	0.5 μμf.
Pentode Grid No. 1 to Triode Plate	0.035	0.045 μμf. Max.
Pentode Plate to Triode Plate	0.008	0.040 μμf. Max.

*RTMA Std. Shield No. 315 tied to Cathode

CHARACTERISTICS

	Triode Unit	Pentode Unit
Plate Voltage	100	250 Volts
Suppressor Connected to Cathode at Socket		
Screen Voltage		150 Volts
Cathode Bias Resistor	100	200 Ohms
Amplification Factor	40	
Plate Resistance (approx.)	6900	750,000 Ohms
Transconductance	5800	4600 μmhos
Control Grid Bias (approx.) for Plate Current of 10 μamp	−10	−10 Volts
Plate Current	8.5	7.7 Ma.
Screen Current		1.6 Ma.
Control Grid Circuit Resistance		
Fixed Bias	0.1	Megohm Max.
Cathode Bias	0.5	Megohm Max.

TYPICAL OPERATION

	Triode Unit as 250 mc Osc.	Pentode Unit as Mixer*
Heater Voltage	6.3	Volts
Heater Current	450	Ma.
Plate Voltage	150	150 Volts
Suppressor Connected to Cathode		
Screen Voltage		150 Volts
Mixer Control Grid Supply Voltage		−3.5 Volts
Osc. Voltage at Mixer Grid RMS		2.6 Volts
Mixer Control Grid Circuit Resistance		120,000 Ohms
Oscillator Grid Resistance	2700	Ohms
Conversion Transconductance		2100 μmhos
Plate Current	13	6.2 Ma.
Screen Current		1.8 Ma.
Control Grid Current	3.6	Ma.
Control Grid Current		2.0 μamp
Oscillator Power Output #	0.5	Watt

* With separate excitation and triode unit grounded.

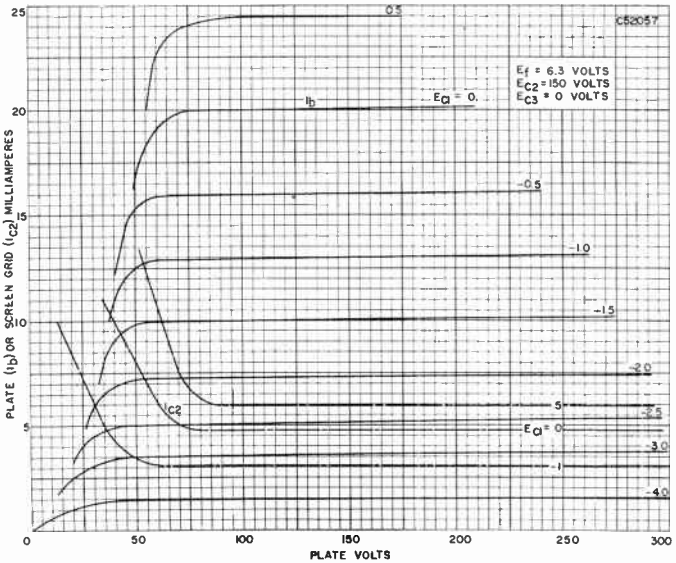
In t v and f m receivers, it is generally desirable to operate the oscillator with less power input than shown in the data in order to avoid over-excitation and excessive oscillator radiation.

APPLICATION

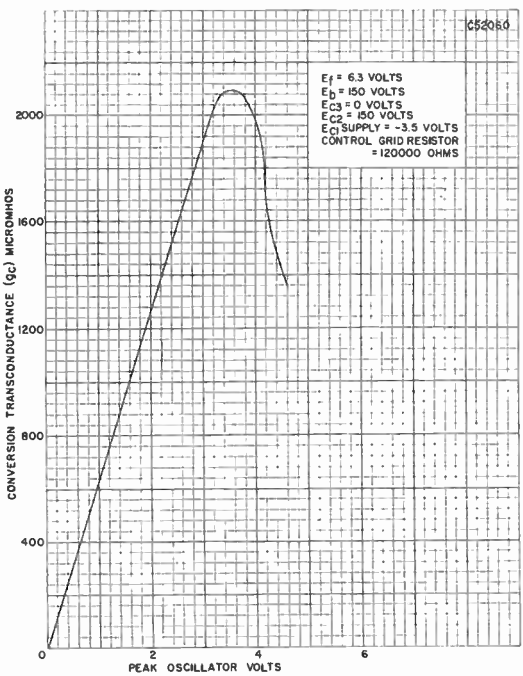
A miniature medium mu triode and a sharp cutoff pentode in one envelope. Designed primarily for use as a combined oscillator and mixer in television receivers utilizing an i f in the order of 40 mc. The 6X8 gives performance comparable to that obtainable with a 6AG5 mixer and a oscillator consisting of one unit of a type 6J6.

Sylvania Type 6X8

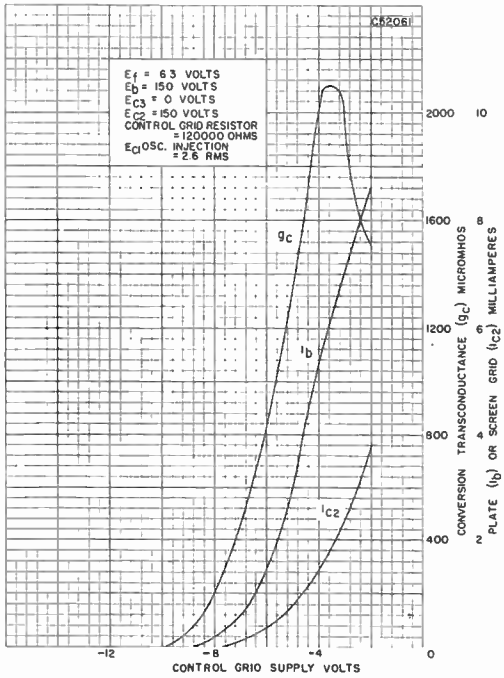
PENTODE SECTION
AVERAGE PLATE CHARACTERISTICS



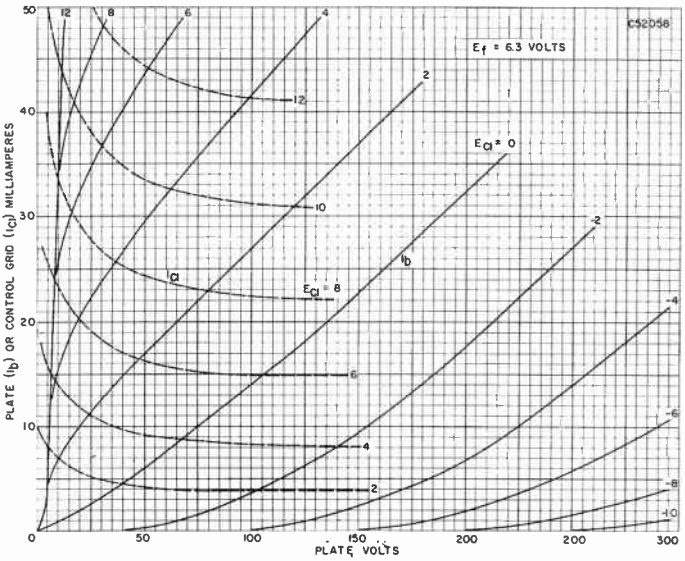
PENTODE SECTION
MIXER CHARACTERISTICS WITH SEPARATE EXCITATION



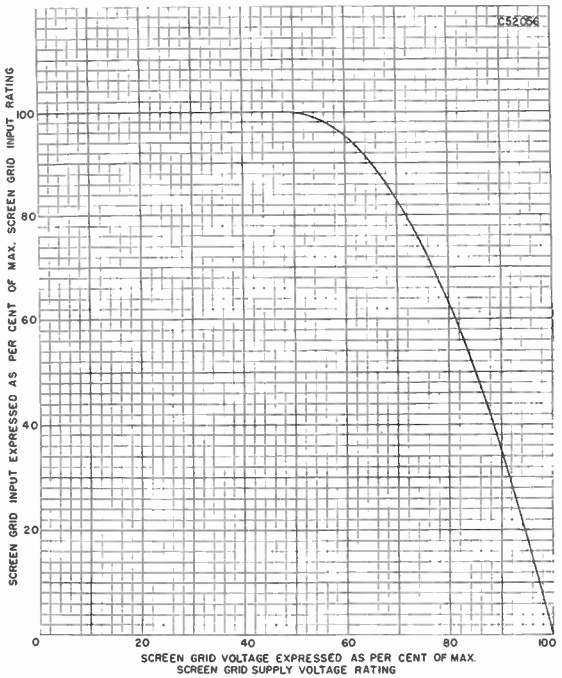
PENTODE SECTION
MIXER CHARACTERISTICS WITH SEPARATE EXCITATION



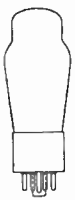
TRIODE SECTION
AVERAGE PLATE CHARACTERISTICS



SCREEN GRID INPUT RATING CURVE



7S-0-0



Sylvania Type 6Y6G

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Medium Octal 7 Pin
Bulb	ST14
Maximum Overall Length	4 3/8"
Maximum Seated Height	4 1/16"
Mounting Position	Any

RATINGS

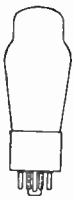
Heater Voltage AC or DC	6.3 Volts
Heater Current	1.25 Ampere
Maximum Plate Voltage	200 Volts
Maximum Screen Voltage	135 Volts
Maximum Plate Dissipation	12.5 Watts
Maximum Screen Dissipation	1.75 Watts
Maximum Heater-Cathode Voltage	90 Volts

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

6ZY5G Sylvania Type

FULL-WAVE RECTIFIER



6S-0-0

PHYSICAL SPECIFICATIONS

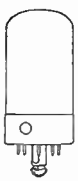
Base	Small Octal 6 Pin
Bulb	ST12
Maximum Overall Length	4 1/8"
Maximum Seated Height	3 9/16"
Mounting Position	Any

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	....

7A4 Sylvania Type

MEDIUM-MU TRIODE



5AC-L-0

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 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 μμf.
Grid to Cathode	3.4 μμf.
Plate to Cathode	3.0 μμf.

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

TYPICAL OPERATION

CLASS A AMPLIFIER

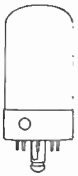
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	90	250 Volts
Grid Voltage	0	−8 Volts
Self-Bias Resistor	0	900 Ohms
Plate Current	10	9 Ma.
Plate Resistance (Approximate)	6700	7700 Ohms
Mutual Conductance	3000	2600 μmhos
Amplification Factor	20	20

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.

6AA-L-0



Sylvania Type 7A5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 1/2"
Maximum Seated Height	2 3/8"
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

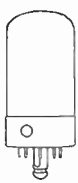
**Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

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.

7AJ-L-5



Sylvania Type 7A6

DUODIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/16"
Maximum Seated Height	2 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

7A6 (Cont'd)

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 5/16" diameter shield (RMA Std. 308) connected to cathode

TYPICAL OPERATION

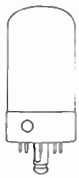
Heater Voltage	6.3 Volts
Heater Current	150 Ma.
AC Voltage per Plate (RMS)	150 Volts
DC Output Current	8.0 Ma.

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.

7A7 Sylvania Type

REMOTE CUT-OFF RF PENTODE



8V-L-5

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 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:*

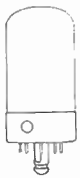
Grid to Plate	0.003 μμf. Max.
Input; Grid to ($F+K+G_2+G_3$)	5.5 μμf.
Output; Plate to ($F+K+G_2+G_3$)	7.0 μμf.

*With 1 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

8U-L-7



Sylvania Type 7A8

OCTODE 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 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 $\mu\mu$f. Max.
Grid G to Grid Ga	0.3 $\mu\mu$f. Max.
Grid G to Grid Go	0.15 $\mu\mu$f. Max.
Grid Go to Grid Ga	0.60 $\mu\mu$f.
Grid G to all Electrodes (r-f Input)	7.5 $\mu\mu$f.
Grid Ga to all Electrodes except Go (Osc. Output)	3.4 $\mu\mu$f.
Grid Go to all Electrodes except Ga (Osc. Input)	3.8 $\mu\mu$f.
Plate to all Electrodes (Mixer Output)	9.0 $\mu\mu$f.

*With $1^{3}/_{16}$" 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 (G_s) 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

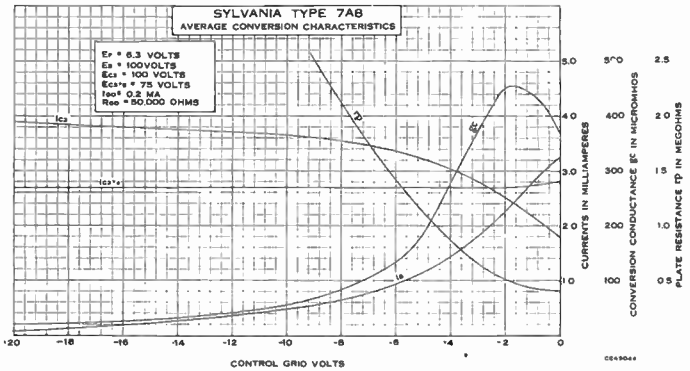
Anode Grid Current (Ga)	10 Ma.
Mutual Conductance (Ga to Go)	1600 μmhos
Amplification Factor (Ga to Go)	65

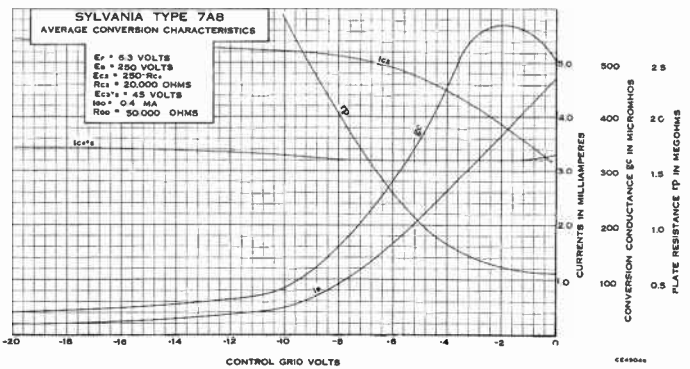
Measurements taken with a plate voltage of 250 volts, anode grid voltage of 180 volts, screen voltage of 100 volts, with oscillator grid at 0.0 volt.

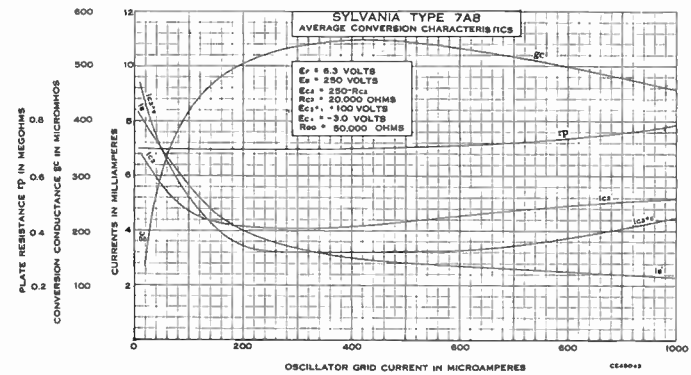
APPLICATION

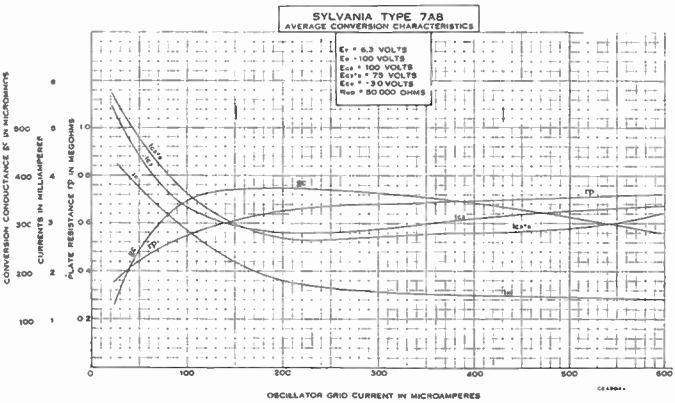
Sylvania Type 7A8 is a single-ended oscillator-mixer tube of lock-in design for service in AC, AC-DC and auto receivers. Compact size, short leads and good shielding are some of the features of this tube. Application and operation are similar to the older types of oscillator-mixer tubes. The addition of a suppressor grid in Type 7A8 serves to increase the plate resistance for improved performance, particularly when operated at low plate supply voltages.

7A8 (Cont'd)









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 5/16" 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.

7AD7 (Cont'd)

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

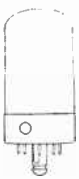
APPLICATION

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.

7AF7 Sylvania Type

DOUBLE TRIODE AMPLIFIER



8AC-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)	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 $\mu\mu$f.
Input (Per Section)	2.2 $\mu\mu$f.
Output (Per Section)	1.6 $\mu\mu$f.
Grid 1 to Grid 2	0.20 $\mu\mu$f. Max.
Plate 1 to Plate 2	0.60 $\mu\mu$f. Max.
Grid 1 to Plate 2	0.06 $\mu\mu$f. Max.
Grid 2 to Plate 1	0.10 $\mu\mu$f. Max.

*Measured without shield.

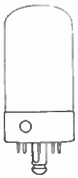
TYPICAL OPERATION

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

8V-L-5



Sylvania Type 7AG7

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

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 $1^{5}/_{16}$" diameter shield (RMA Std. 308) connected to cathode.

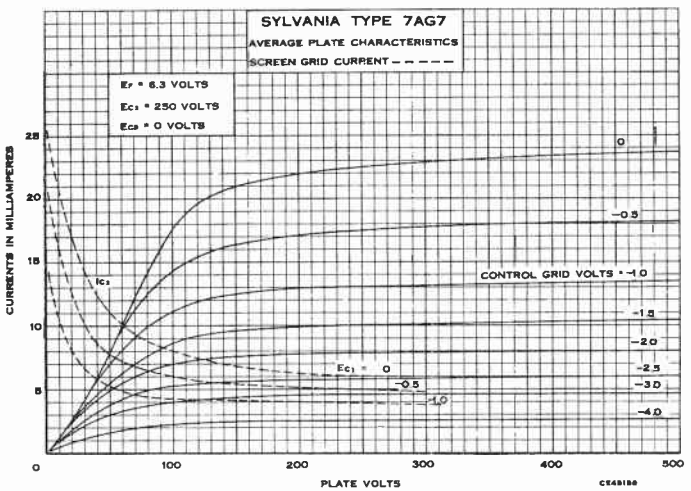
TYPICAL OPERATION

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

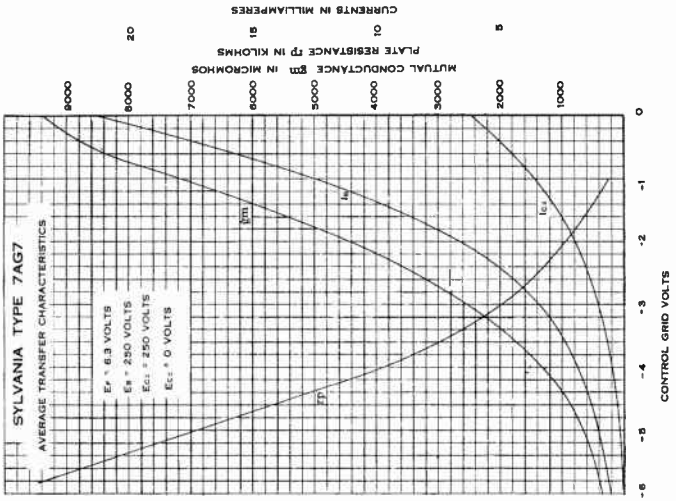
*Bias voltage developed is approximately 2.0 volts. Fixed bias operation is not recommended.

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.



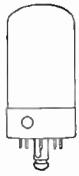
7AG7 (Cont'd)



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 15/32"
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.

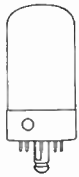
*With 1 1/16" diameter shield (RMA Std. 308) connected to cathode.

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 (Approx.)	-20 Volts

**Bias voltage is approximately 2.0 volts but fixed bias is not recommended.

8V-L-O



Sylvania Type 7AK7

PENTODE WITH SUPPRESSOR CONTROL

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) 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 5/16" diameter shield (RMA Std. 308) connected to cathode

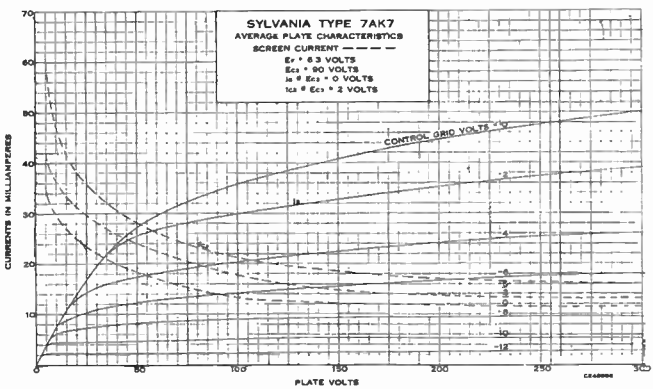
TYPICAL OPERATION

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
Mutual Conductance	5500	....	..... 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.



7B4 Sylvania Type

HIGH-MU TRIODE

5AC-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 Plate Voltage	300 Volts
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

CLASS A_1 AMPLIFIER

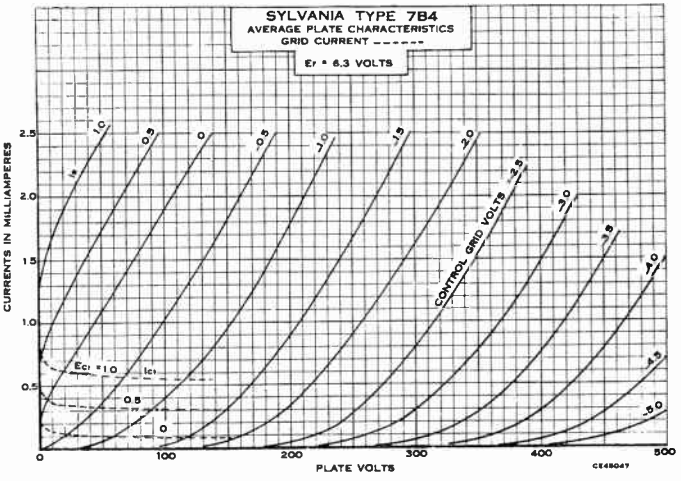
Heater Voltage	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Plate Current	0.4	0.9 Ma.
Plate Resistance (Approximate)	85000	66000 Ohms
Mutual Conductance (Approximate)	1150	1500 μmhos
Amplification Factor	100	100

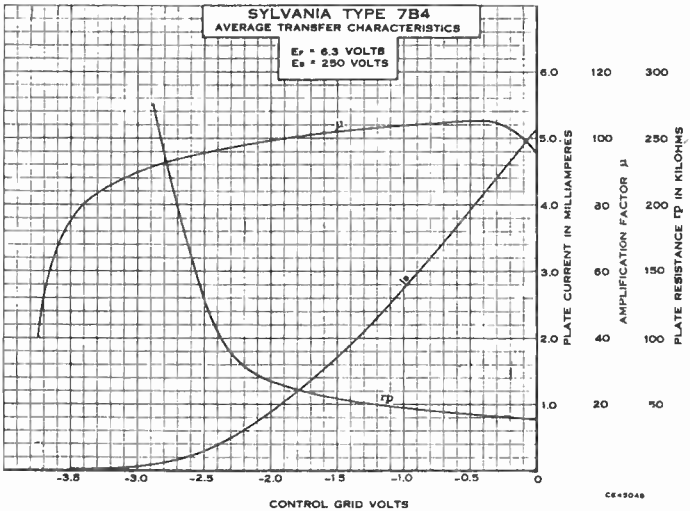
APPLICATION

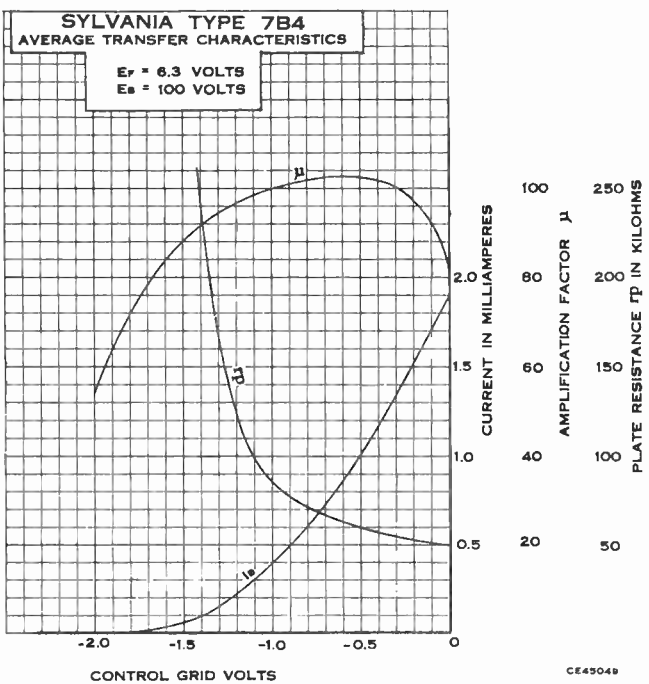
Sylvania Type 7B4 is a single-ended high-mu triode having electrical characteristics and applications similar to those for Type 6F5G.

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.

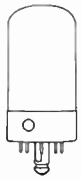



SYLVANIA TYPE 7B4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250 VOLTS
μ
ib
rp
6.0
5.0
4.0
3.0
2.0
1.0
120
100
80
60
40
20
300
250
200
150
100
50
PLATE CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0
CONTROL GRID VOLTS
CE45048


SYLVANIA TYPE 7B4
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
μ
rp
ib
2.0
1.5
1.0
0.5
100
80
60
40
20
250
200
150
100
50
CURRENT IN MILLIAMPERES
AMPLIFICATION FACTOR μ
PLATE RESISTANCE rp IN KILOHMS
-2.0
-1.5
-1.0
-0.5
0
CONTROL GRID VOLTS
CE45049

7B5 Sylvania Type

POWER OUTPUT PENTODE



6AE-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{1}{2}$"
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	8.5 Watts
Maximum Screen Dissipation	2.8 Watts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.8 $\mu\mu$f.
Input	7.4 $\mu\mu$f.
Output	8.0 $\mu\mu$f.

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

TYPICAL OPERATION

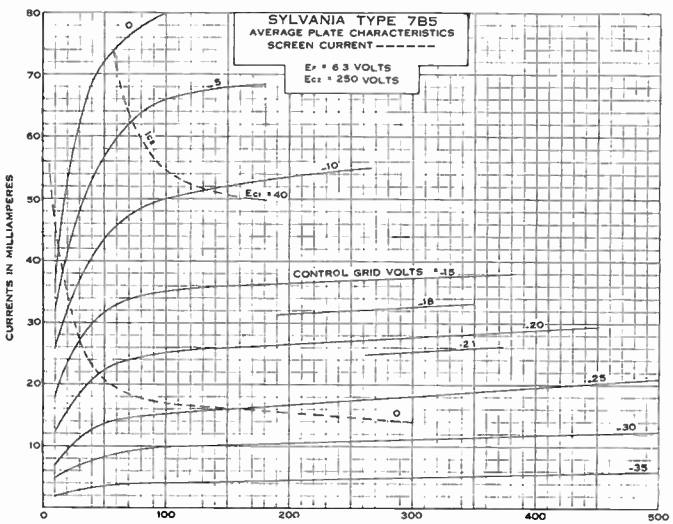
SINGLE-TUBE CLASS A_1 AMPLIFIER

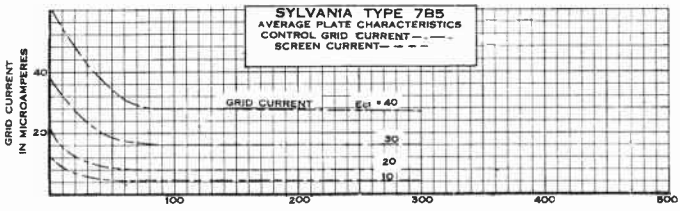
Heater Voltage	6.3	6.3	6.3 Volts
Heater Current	400	400	400 Ma.
Plate Voltage	100	250	315 Volts
Screen Voltage	100	250	250 Volts
Grid Voltage§	−7.0	−18	−21 Volts
Self-Bias Resistor	650	500	700 Ohms
Peak Signal Voltage	7.0	18	21 Volts
Plate Current (Zero Signal)	9.0	32.0	25.5 Ma.
Plate Current (Maximum 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

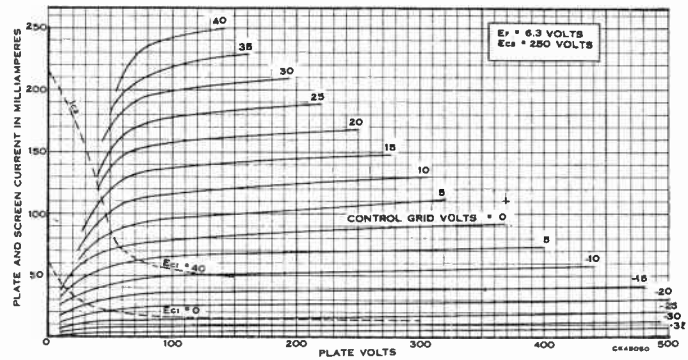
§The DC resistance in the grid circuit should not exceed 0.5 Meg.

APPLICATION

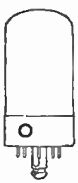
Sylvania Type 7B5 is a power output pentode of lock-in design. It is suitable for use in automobile and A-C operated receivers with the lock-in design providing ruggedness and compact size.







8W-L-7



7B6 Sylvania Type

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	2 35/64"
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 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 5/16" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION

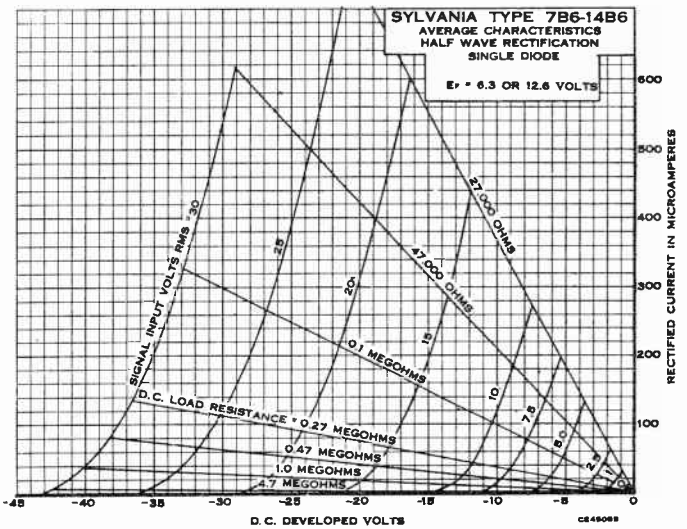
Heater Voltage	6.3	6 3 Volts
Heater Current	0.3	0.3 Ampere
Plate Voltage	100	250 Volts
Grid Voltage	−1	−2 Volts
Plate Current	0.4	0.9 Ma.
Plate Resistance	110000	91000 Ohms
Mutual Conductance	900	1100 μmhos
Amplification Factor	100	100

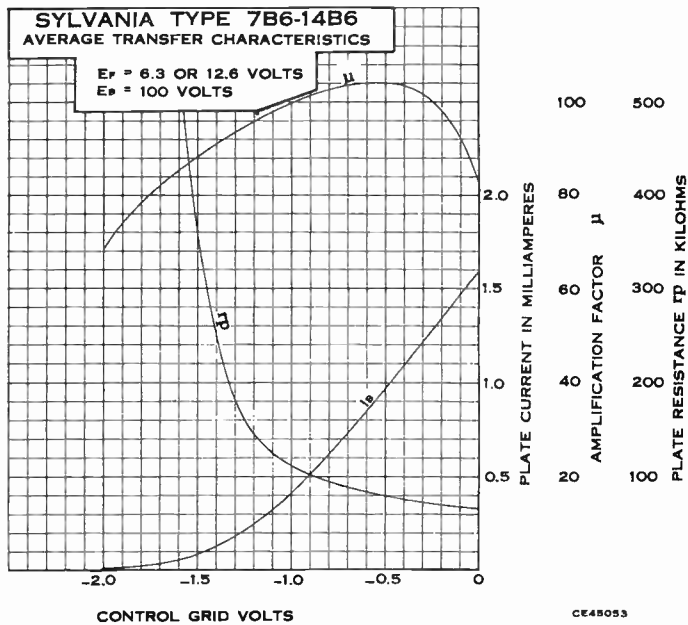
APPLICATION

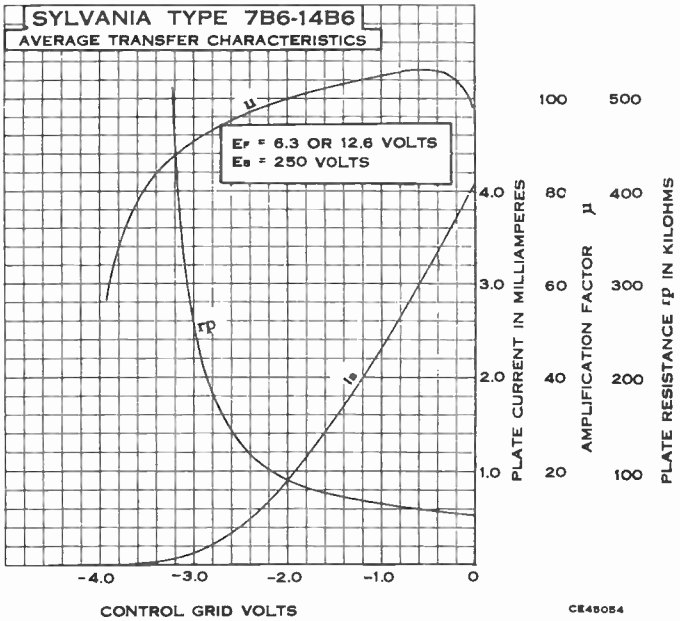
Sylvania Type 7B6 is a duodiode high-mu triode suitable for detector audio amplifier service in AC or auto receivers. For AC-DC receivers, the Types 7C6 or 14B6, having lower heater current ratings, should prove more satisfactory.

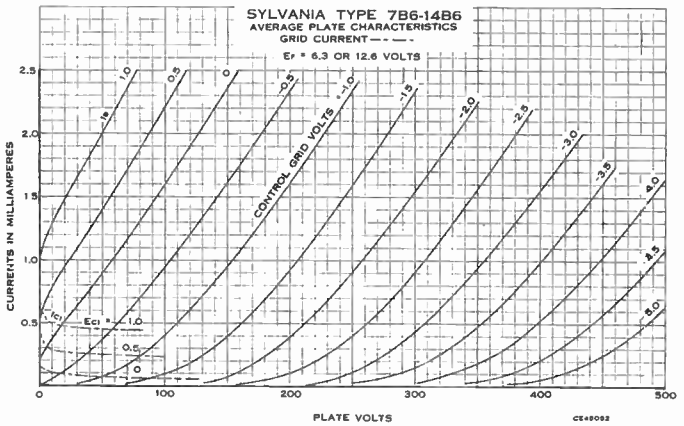
The diodes are independent of each other and of the triode unit except that the cathode structure is common to all. Type 7K7 or 7X7 should be considered if it is necessary to have more complete separation between the various sections.

Resistance coupled amplifier data will be found in the table in the appendix.



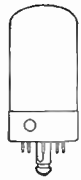






7B7 Sylvania Type

REMOTE CUT-OFF RF PENTODE



8V-L-5

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	0.004 $\mu\mu$f. Max.
Input; Grid to (F+K+Gs+Su))	5.0 $\mu\mu$f.
Output; Plate to (F+K+Gs+Su)	6.0 $\mu\mu$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
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

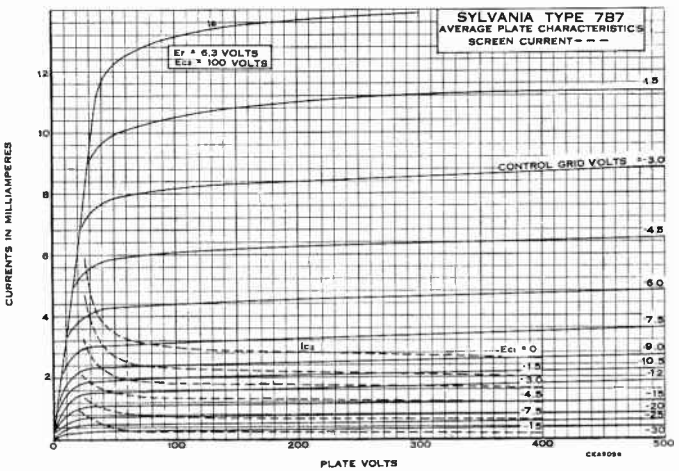
APPLICATION

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.

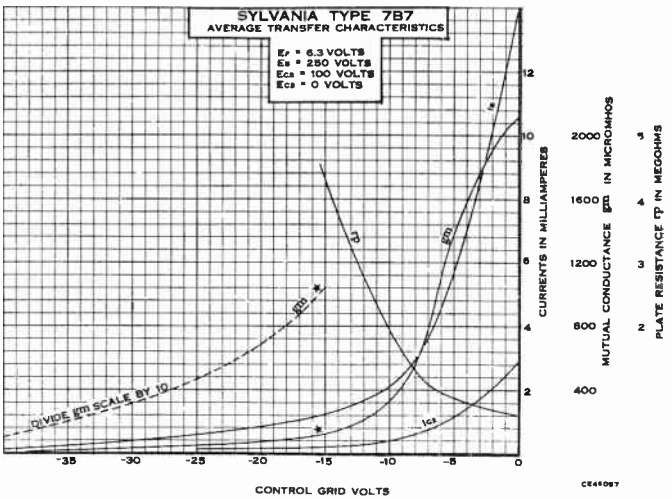
All of the grids terminate a base pins, thus providing an r-f amplifier tube without a top cap. An internal cage-like shield connected to pin Number 5 is used to obtain a small grid to plate capacity.

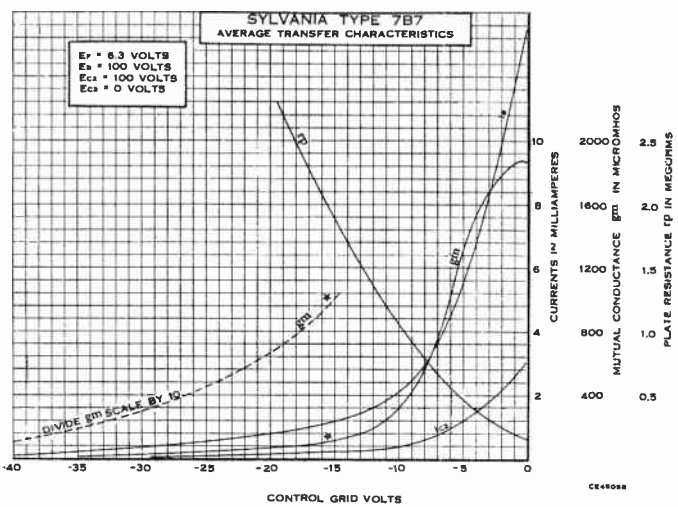
The electrical characteristics and applications of Type 7B7 are very similar to those for Type 7A7. Reference may be made to this type for application notes.

For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.

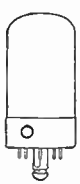


SYLVANIA RADIO TUBES





8X-L-0



Sylvania Type 7B8

HEPTODE CONVERTER

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 $\mu\mu$f. Max.
Grid G to Grid Ga	0.3 $\mu\mu$f. Max.
Grid G to Grid Go	0.2 $\mu\mu$f. Max.
Grid Go to Grid Ga	0.9 $\mu\mu$f.
Grid G to all Electrodes (R-F Input)	10.0 $\mu\mu$f.
Grid Ga to all Electrodes except Go (Osc. Output)	3.4 $\mu\mu$f.
Grid Go to all Electrodes except Ga (Osc. Input)	5.0 $\mu\mu$f.
Plate to all Electrodes (Mixer Output)	9.0 $\mu\mu$f.

*With 1⅝" 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

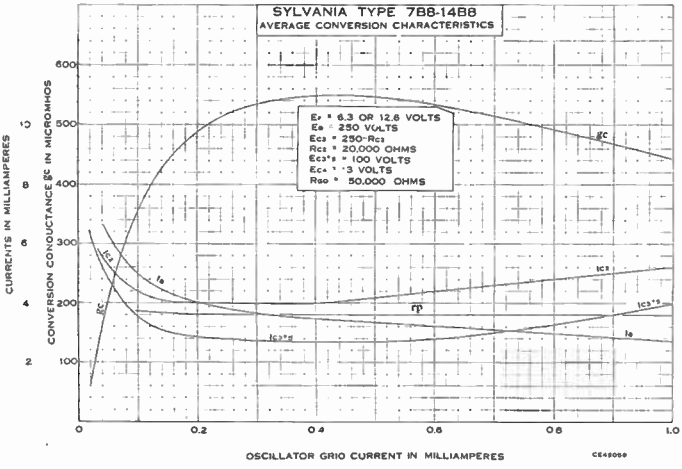
**Applied through 20,000 ohm dropping resistor.

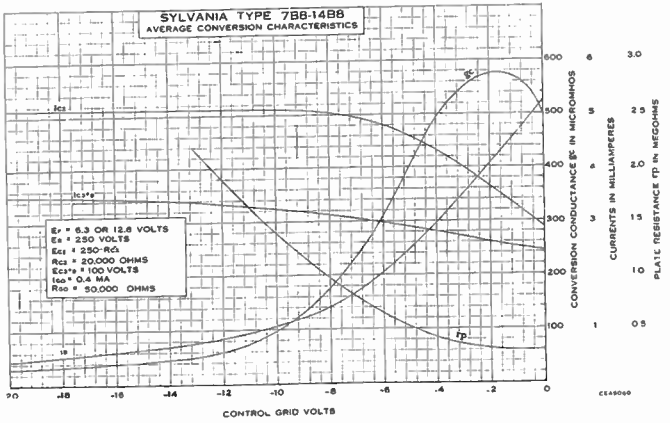
The oscillator section, not oscillating, has a Gm of 1150 μmhos, a mu of 75 at an anode grid current of 4.0 ma. when Ep = 250 Volts; Ega = 100 Volts; Egs = 55 Volts; Eg = 2.0 Volts and Ego = −1.0 Volt.

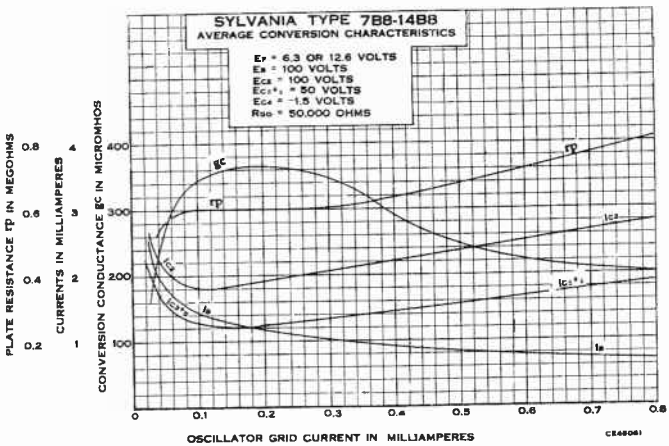
APPLICATION

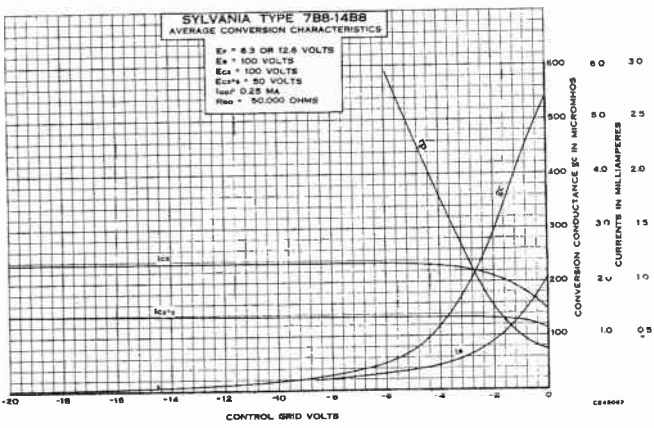
Sylvania Type 7B8 is a lock-in converter tube designed for use in AC or auto receivers. For AC-DC service, Type 14B8 with lower heater current rating will usually prove more satisfactory.

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.



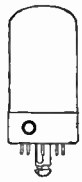

SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 250 VOLTS
Ec1 = 250-Rk
Rk = 20,000 OHMS
Ec3=g = 100 VOLTS
Ic3=g = 0.4 MA
Rgo = 50,000 OHMS
gc
rp
Ic1
Ic3=g
CONTROL GRID VOLTS
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CE49060

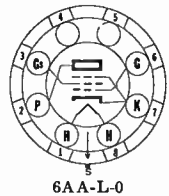

SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec1=3 = 50 VOLTS
Ec4 = -1.5 VOLTS
Rgo = 50,000 OHMS
gc
rp
Ic2
Ic1=3
Ic4
Ib
OSCILLATOR GRID CURRENT IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CURRENTS IN MILLIAMPERES
CONVERSION CONDUCTANCE gc IN MICROMHOS
CE48061


SYLVANIA TYPE 7B8-14B8
AVERAGE CONVERSION CHARACTERISTICS
Ef = 6.3 OR 12.6 VOLTS
Eb = 100 VOLTS
Ec2 = 100 VOLTS
Ec1=3 = 50 VOLTS
Ic3=g = 0.25 MA
Rgo = 50,000 OHMS
rp
gc
Ic2
Ic3=g
Ib
CONTROL GRID VOLTS
CONVERSION CONDUCTANCE gc IN MICROMHOS
CURRENTS IN MILLIAMPERES
PLATE RESISTANCE rp IN MEGOHMS
CE48067

7C5 Sylvania Type

BEAM POWER AMPLIFIER





6AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 3/8"
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 1/16" 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)

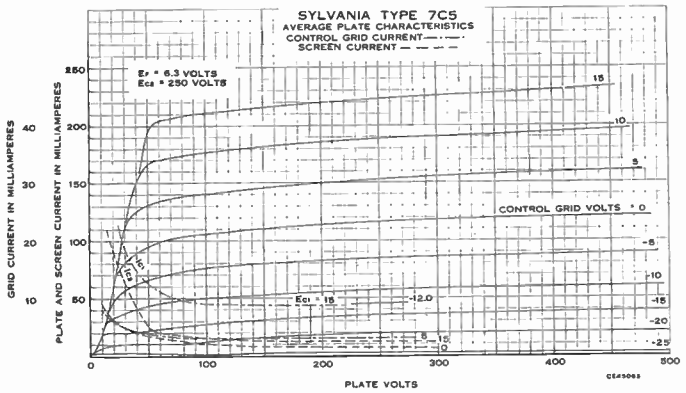
Heater Voltage	6.3	6.3 Volts
Heater Current	.90	.90 Ampere
Plate Voltage	250	285 Volts
Screen Voltage	250	285 Volts
Grid Voltage	-15	-19 Volts
Self-Bias Resistor	200	260 Ohms
Peak Input Signal (Grid to Grid)	30	38 Volts
Plate Current (Zero Signal)	70	70 Ma.
Plate Current (Maximum Signal)	79	92 Ma.
Screen 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 0.1 megohm. With cathode bias the grid circuit resistance must not exceed 0.5 megohm.



8W-L-7

Sylvania Type 7C6

DUODIODE HIGH-MU TRIODE

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 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 19 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.

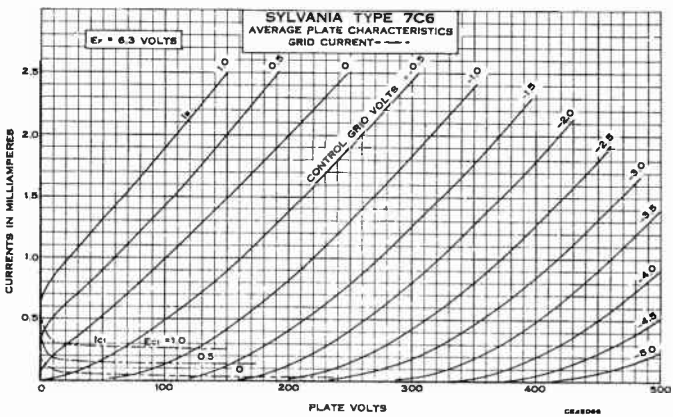
The diodes are substantially the same as those employed in other Sylvania duodiode high-mu triode types and therefore are suitable for conventional circuit applications. Diode curves are given under Type 7B6.

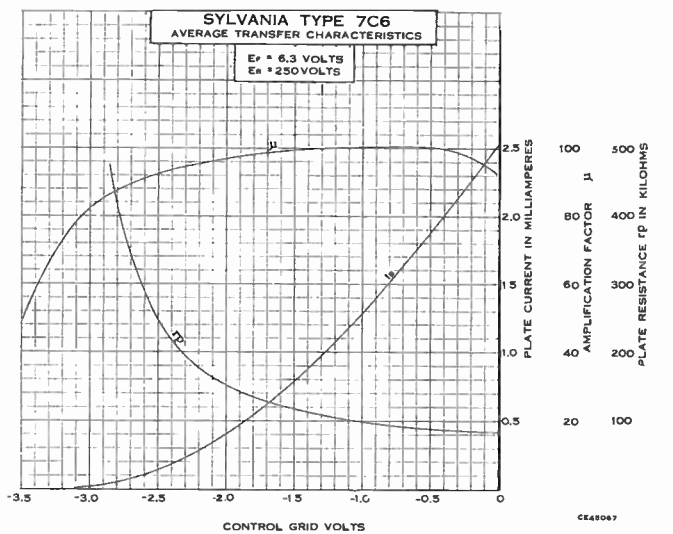
The triode section should not be employed with fixed bias. A high value of grid resistor is required and the triode operated essentially under zero bias conditions. With a plate supply voltage of 250 volts, the plate load resistor should be approximately 0.25 megohm. For special applications this value may be varied to suit the conditions.

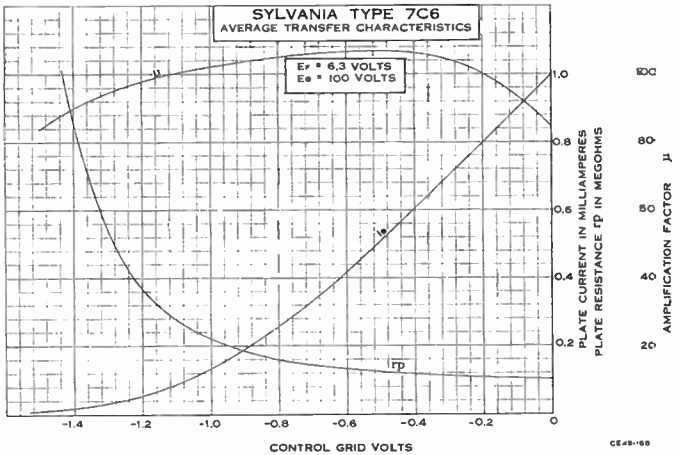
Resistance coupled data is given in the appendix.

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.

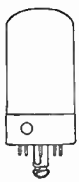
The lock-in construction provides compactness, suitable shielding and the special lock-in feature. For a-c service the 7-volt heater rating corresponds to a 130-volt line condition.







8V-L-5



Sylvania Type 7C7

SHARP CUT-OFF RF PENTODE

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 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)	0.004 μμf. Max.
Input; G1 to (F+K+Gs+Su+Shield)	5.5 μμf.
Output; P to (F+K+Gs+Su+Shield)	6.5 μμf.

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

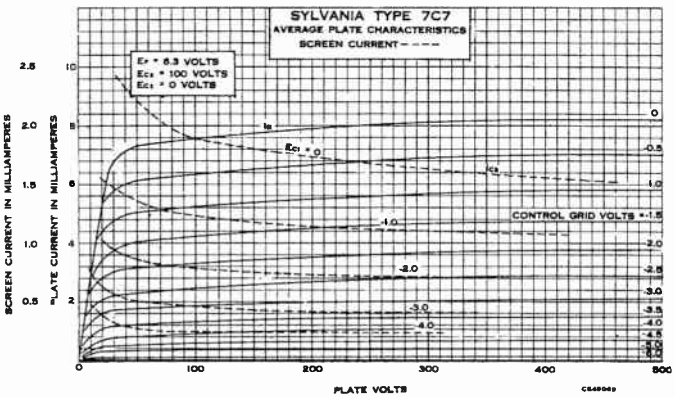
TYPICAL OPERATION

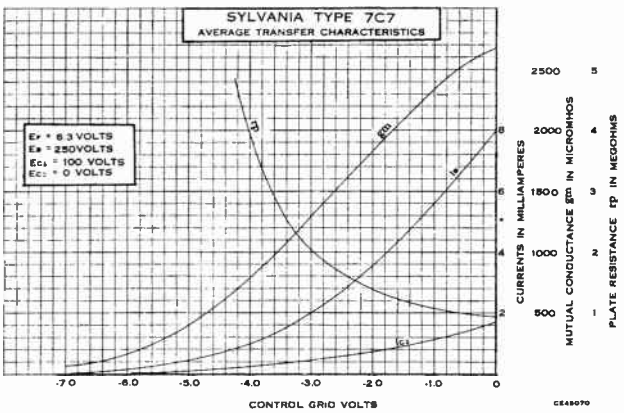
Heater Voltage	6.3	6.3 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts Max.
Screen Voltage	100	100 Volts Max.
Grid Voltage	−3	−3 Volts Min.
Self-Bias Resistor	1350	1200 Ohms
Suppressor Grid	Connect to Cathode	
Plate Current	1.8	2.0 Ma.
Screen Current	0.4	0.5 Ma.
Plate Resistance (Approximate)	1.2	2 Megohms
Mutual Conductance	1225	1300 μmhos

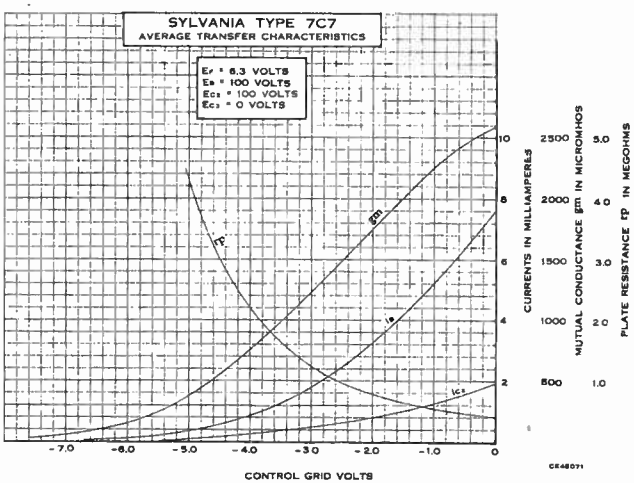
APPLICATION

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.

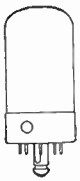
7C7 (Cont'd)


SYLVANIA TYPE 7C7
AVERAGE PLATE CHARACTERISTICS
SCREEN CURRENT - - - -
Ef = 6.3 VOLTS
Ec3 = 100 VOLTS
Ec1 = 0 VOLTS
SCREEN CURRENT IN MILLIAMPERES
PLATE CURRENT IN MILLIAMPERES
CONTROL GRID VOLTS
PLATE VOLTS
CE48069


SYLVANIA TYPE 7C7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 250VOLTS
Ec3 = 100 VOLTS
Ec1 = 0 VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE48070


SYLVANIA TYPE 7C7
AVERAGE TRANSFER CHARACTERISTICS
Ef = 6.3 VOLTS
Eb = 100 VOLTS
Ec3 = 100 VOLTS
Ec1 = 0 VOLTS
CURRENTS IN MILLIAMPERES
MUTUAL CONDUCTANCE gm IN MICROMHOS
PLATE RESISTANCE rp IN MEGOHMS
CONTROL GRID VOLTS
CE48071

8W-L-7



Sylvania Type 7E6

DUODIODE MEDIUM-MU TRIODE

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 $1^{5}/_{16}$" 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.

8AE-L-7

Sylvania Type 7E7

DUODIODE RF PENTODE

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 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

7E7 (Cont'd)

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 1⅝" diameter shield (RMA Std. 308) connected to cathode.

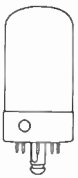
TYPICAL OPERATION

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

7F7 Sylvania Type

HIGH-MU DUO TRIODE



8AC-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	2 25/32"
Maximum Seated Height	2 ¼"
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 μμf.
Input	2.4 μμf.
Output	2.0 μμf.
Grid 1 to Grid 2	0.2 μμf. Max.
Plate to Plate	1.0 μμf. Max.

*With 1⅝" diameter shield (RMA Std. 308) connected to cathode.

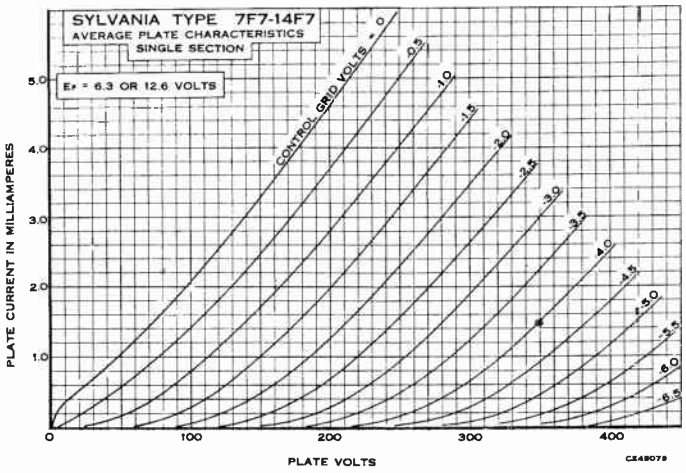
TYPICAL OPERATION

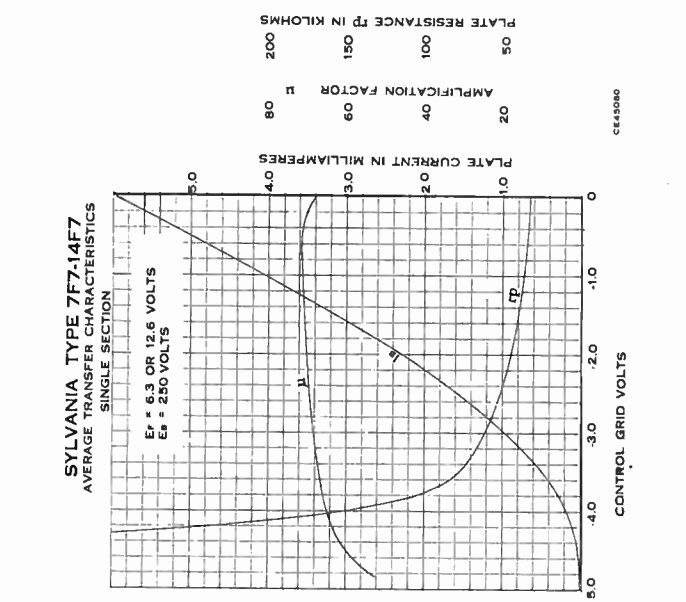
CLASS A AMPLIFIER PER SECTION

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

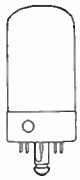
Sylvania Type 7F7 is a double triode high-mu amplifier tube of Lock-In construction. It is designed for use as a resistance coupled amplifier or phase inverter. All elements except the common heater are brought out separately allowing each triode section to operate independently of the other. Resistance 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
PLATE VOLTS
CE45079


SYLVANIA TYPE 7F7-14F7
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
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 hoth 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

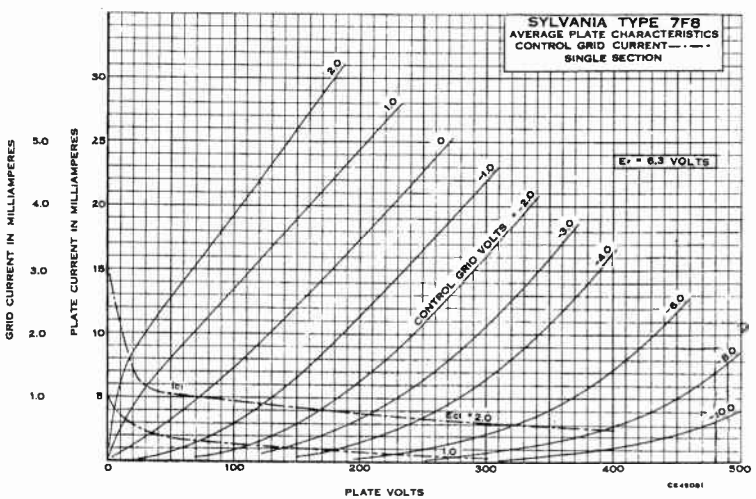
Per Section except Heater

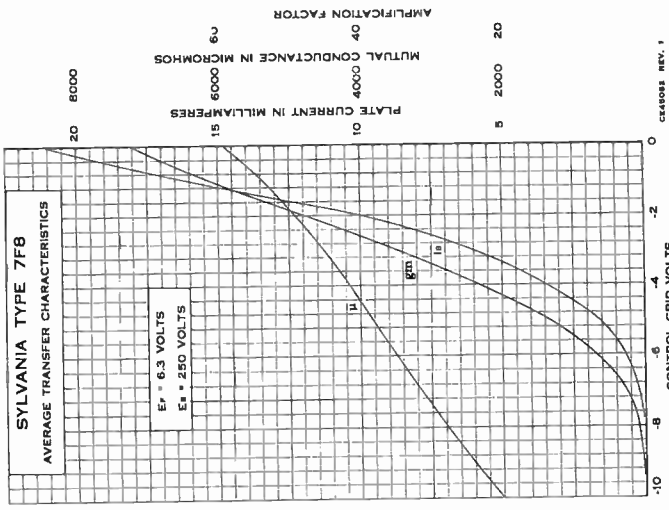
Heater Voltage (AC or DC)	6.3 Volts
Heater Current	300 Ma.
Plate Voltage	250 Volts
Self-Bias Resistor	500 Ohms
Plate Current	6.0 Ma.
Mutual Conductance	3300 μmhos
Amplification Factor	48
Grid Voltage for 10 μa. DC Plate Current (Approx.)	-11.0 Volts
Maximum Grid Circuit Resistance	0.5 Megohm

APPLICATION

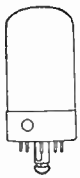
Sylvania Type 7F8 is a high mutual conductance double triode designed for use at frequencies up to 300 or 400 megacycles. With proper care each section may be used separately to effect tube and space savings since all elements except heater are separate.

Design data for use in resistance coupled circuits may be found in the appendix.





8V-L-5



Sylvania Type 7G7

SHARP CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T9
Maximum Overall Length	$2^{35}/_{64}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage (Nominal) AC or DC	7.0 Volts
Maximum Plate Voltage	250 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	0.006 $\mu\mu$f. Max.
Input: G to (F+K+Gs+Su+Internal Shield)	9.0 $\mu\mu$f.
Output: P to (F+K+Gs+Su+Internal Shield)	7.0 $\mu\mu$f.

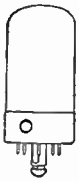
*With $1\frac{5}{16}$" diameter shield (RMA Std. 308) connected to cathode.

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

7H7 Sylvania Type

SEMI-REMOTE 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	2¼"
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	0.004 μμf. Max.
Input	8.0 μμf.
Output	7.0 μμf.

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

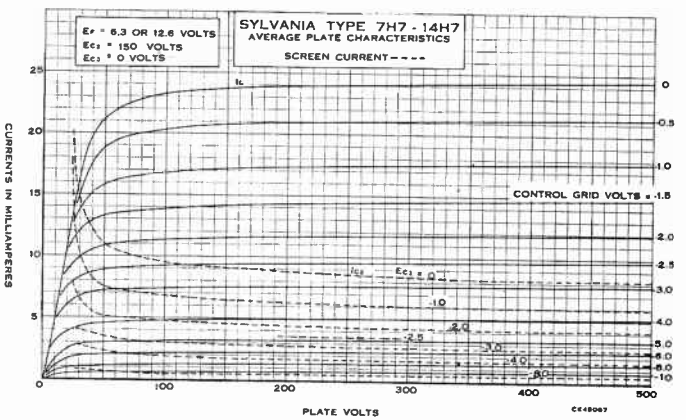
TYPICAL OPERATION

CLASS A_1 AMPLIFIER

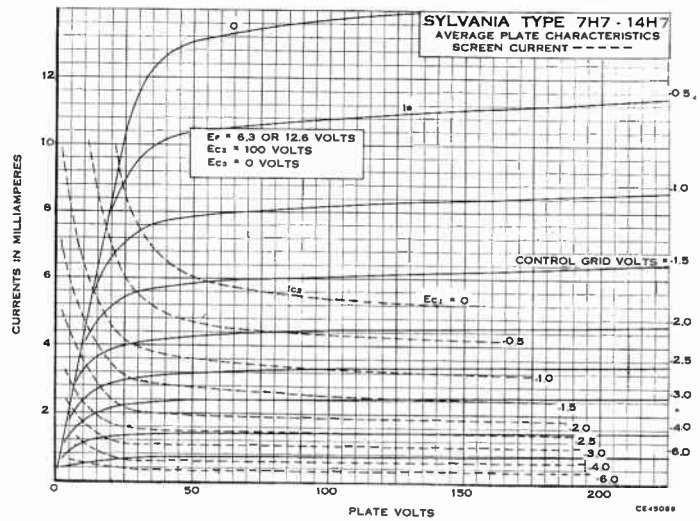
Heater Voltage (AC or DC)	6.3	6.3 Volts
Heater Current	300	300 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	150 Volts
Grid Voltage	−1.5	..... Volts
Self-Bias Resistor	150	180 Ohms
Suppressor and Internal Shield	Connect to Cathode	
Plate Current	7.5	10.0 Ma.
Screen Current	2.6	3.2 Ma.
Plate Resistance	0.35	0.8 Megohm
Mutual Conductance	4000	4000 μmhos
Grid Voltage for Mutual Conductance of 35 μmhos (Approximate)	−12	−19 Volts

APPLICATION

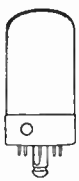
Sylvania Type 7H7 is a semi-remote cut-off pentode suitable for RF or television service. It is similar to Type 6AB7 except for lower heater current and slightly lower mutual conductance. The Lock-In construction provides ruggedness, suitable shielding and short leads so necessary in high-frequency circuits. The high mutual conductance helps to compensate for the low gain associated with high-frequency and wide-band amplifier designs.



SYLVANIA RADIO TUBES



8BL-L-7



Sylvania Type 7J7

TRIODE HEPTODE CONVERTER

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.

7J7 (Cont'd)

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 (E_{c_1} = −20)	2	2 μmhos
Total Cathode Current	7.7	9.6 Ma.

**Applied through 20000 ohms series resistance properly by-passed.

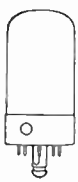
TRIODE CHARACTERISTICS

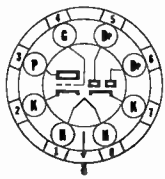
Heater Voltage	6.3 Volts
Plate Voltage	150 Volts
Grid Voltage	−3 Volts
Plate Current	6.6 Ma.
Plate Resistance	10700 Ohms
Mutual Conductance (Approximate)	1400 μmhos
Amplification Factor (Approximate)	15

7K7 Sylvania Type

DUODIODE HIGH-MU TRIODE

(Separate Diode Cathode)





8BF-L-7

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 AC or DC (Nominal)	7.0 Volts
Maximum Plate Voltage	250 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.

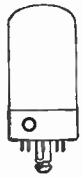
*With 1 5/16" diameter shield (RMA Std. 308) connected to cathode.

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.

Resistance coupled amplifier data appears under Type 7F7 in the appendix.

8V-L-5



Sylvania Type 7L7

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 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:*

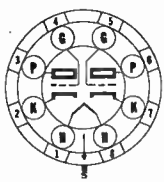
Grid to Plate	0.01 μμf. Max.
Input: G to (F+K+Gs+Su+Internal Shield)	8.0 μμf.
Output: P to (F+K+Gs+Su+Internal Shield)	6.5 μμf.

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

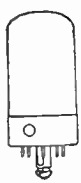
TYPICAL OPERATION

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.



8AC-L-0



Sylvania Type 7N7

MEDIUM-MU DUOTRIODE

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 (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 1/16" 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

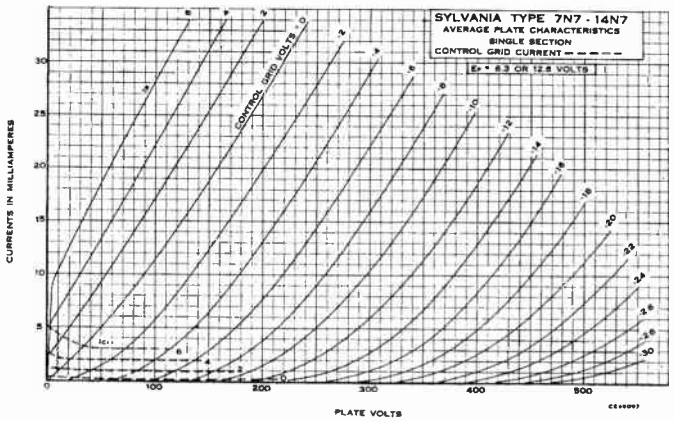
Heater Voltage (AC or DC)	6.3	6.3 Volts
Heater Current	0.600	0.600 Ampere
Plate Voltage	90	250 Volts
Grid Voltage	0	−8 Volts
Self-Bias Resistor	0	900 Ohms
Plate Current	10.0	9.0 Ma.
Plate Resistance	6700	7700 Ohms
Mutual Conductance	3000	2600 μmhos
Amplification Factor	20	20

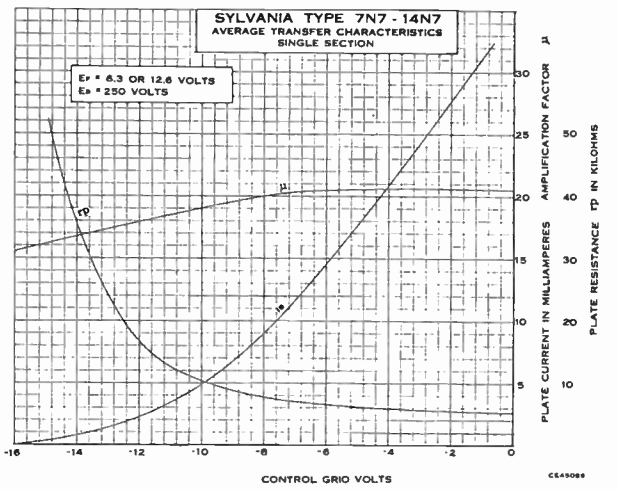
PHASE INVERTER

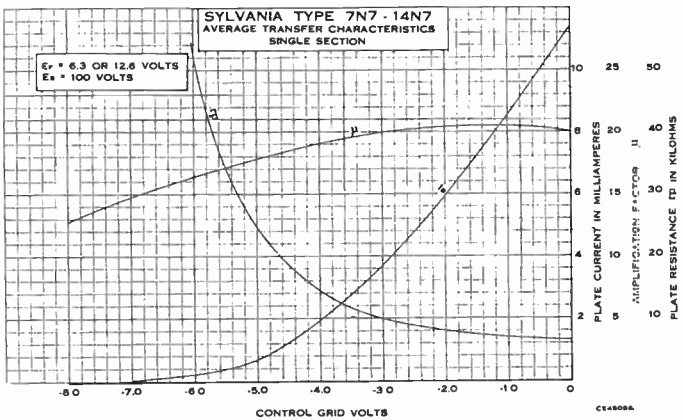
Plate Supply Voltage	100	250 Volts
Grid Voltage	−2.25	−5.5 Volts
Plate Current per Section	1.5	2.4 Ma.
Plate Resistor	30000	50000 Ohms
Self-Bias Resistor	750	1150 Ohms
Maximum Output Voltage (RMS)	20	65 Volts

APPLICATION

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.







8AL-L-0

Sylvania Type 7Q7

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 (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	0.15 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 $1\,1/16$" 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.

TYPICAL OPERATION (Cont'd)

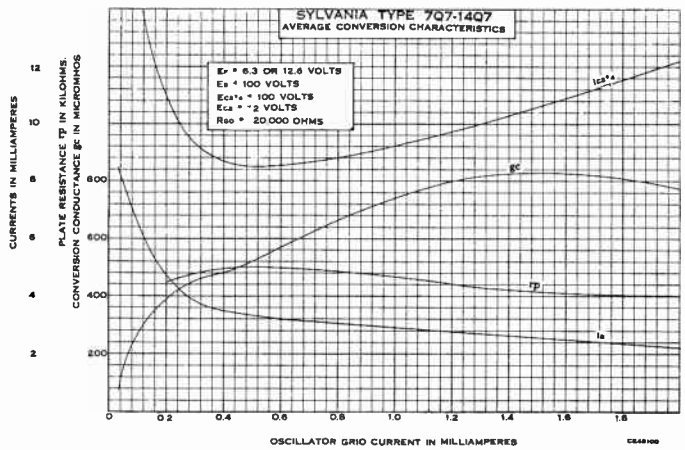
Screen Current (Gs)	8.5	8.5 Ma.
Total Cathode Current	12.3	12.5 Ma.
Conversion Conductance at Ec3= −2	525	550 μmhos
Conversion Conductance at Ec3= −6	275	300 μmhos
Conversion Conductance at Ec3= −10	65	70 μmhos
Conversion Conductance at Ec3= −35 (Approx.)	2	2 μmhos

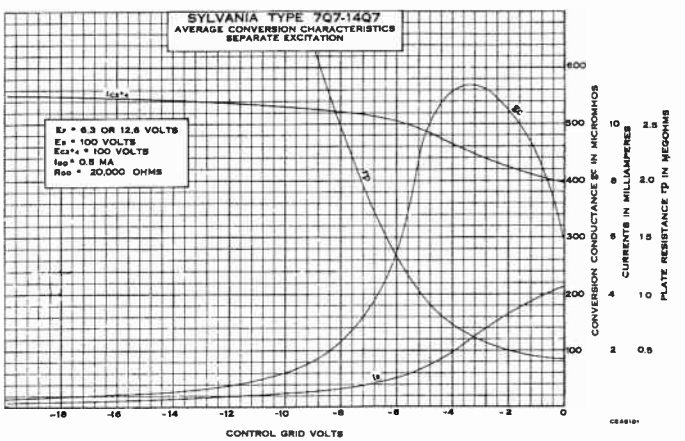
**Characteristics for self excitation are similar to those given for separate excitation except the control grid (Grid G bias voltage is 0 volt).

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.

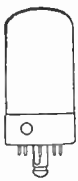
APPLICATION

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.





8AE-L-7



Sylvania Type 7R7

DUODIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/16"
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 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

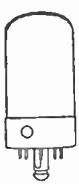
Heater Voltage AC or DC	6.3	6.3	6.3	6.3 Volts
Heater Current	300	300	300	300 Ma.
Plate Voltage	100	100	250	250 Volts
Screen Voltage	100	100	100	100 Volts
Grid Voltage	-2.0	-1.0	-2.0	-1.0 Volts
Self-Bias Resistor	450	130	450	130 Ohms
Plate Current	3.4	5.5	3.5	6.2 Ma.
Screen Current	1.0	2.2	1.0	1.6 Ma.
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

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.

8BL-L-7



Sylvania Type 7S7

TRIODE HEPTODE CONVERTER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/16"
Maximum Seated Height	2 1/4"
Mounting Position	Any

7S7 (Cont'd)

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.

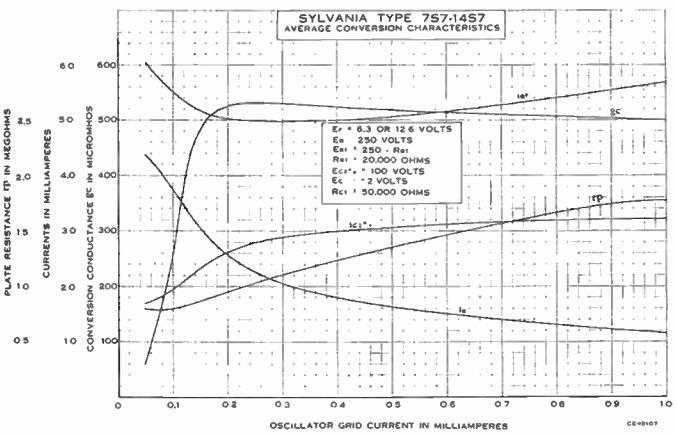
†Applied through a 20,000 ohm dropping resistor properly by-passed.

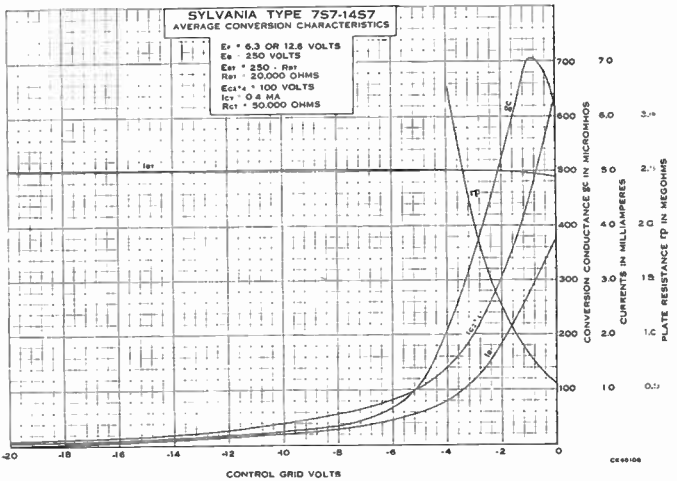
TRIODE CHARACTERISTICS

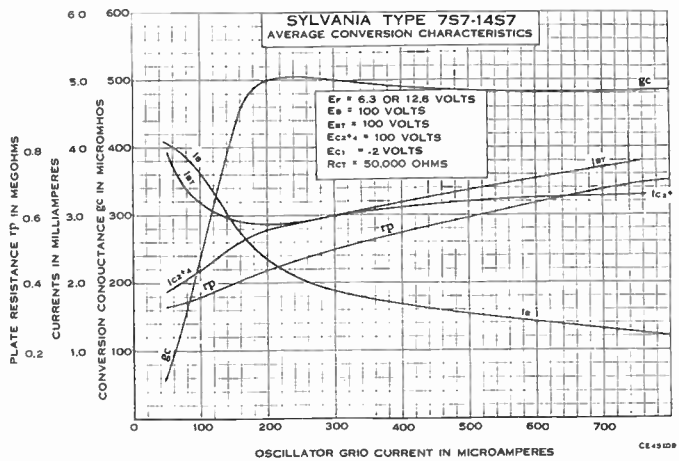
Heater Voltage	6.3 Volts
Plate Voltage	100 Volts
Grid Voltage	0 Volts
Plate Current	6.5 Ma.
Plate Resistance	11000 Ohms
Mutual Conductance	1650 μmhos
Amplification Factor	18

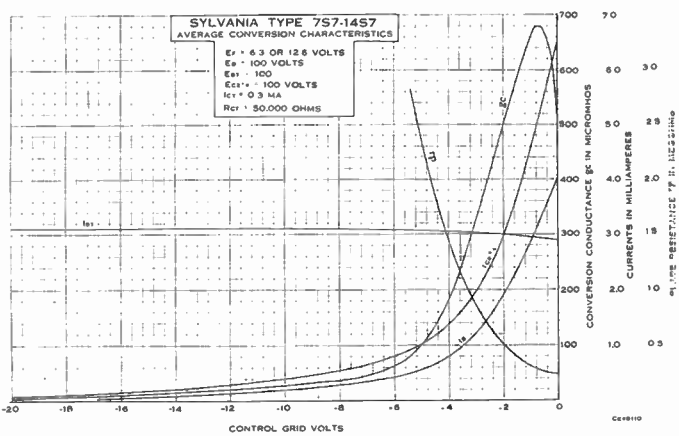
APPLICATION

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.



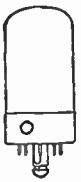






7V7 Sylvania Type

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	0.002 $\mu\mu$f. Max.
Input	9.5 $\mu\mu$f.
Output	6.5 $\mu\mu$f.

*With $1\frac{1}{16}$" 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.

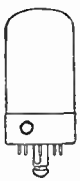
APPLICATION

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.

7W7 Sylvania Type

SHARP CUT-OFF RF PENTODE



8BJ-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 Plate Dissipation	4.0 Watts
Maximum Screen Dissipation	0.8 Watt
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances:*

Grid to Plate	0.002 μμf. Max.
Input	9.5 μμf.
Output	7.0 μμf.

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

TYPICAL OPERATION

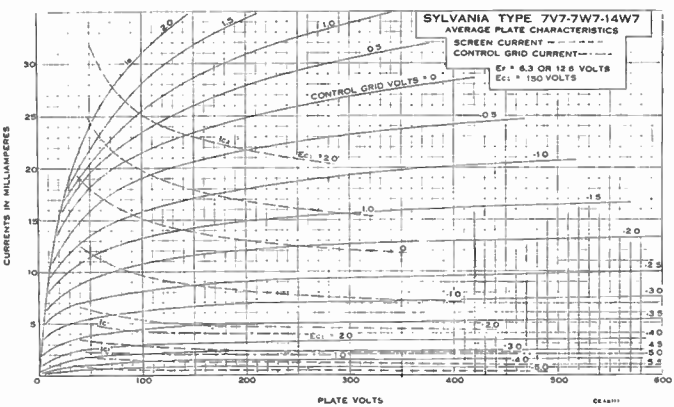
	§Condition 1	§Condition 2
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	450	450 Ma.
Plate Voltage	300	300 Volts
Screen Supply	150	300 Volts
Screen Series Resistor	....	40000 Ohms
Suppressor	Connected to Cathode	
Self-Bias Resistor	160	160 Ohms
Plate Current	10.0	10.0 Ma.
Screen Current	3.9	3.9 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.

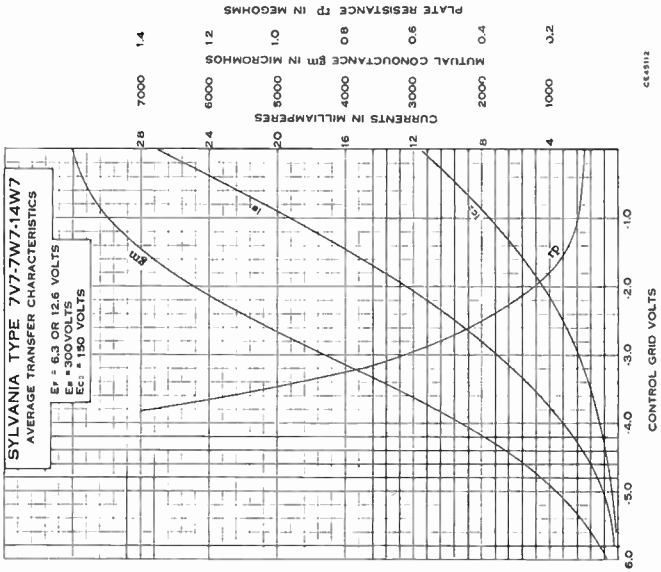
APPLICATION

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'd)



7X6 Sylvania Type

FULL-WAVE RECTIFIER

7AJ-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3 5/32"
Maximum Seated Height	2 3/8"
Mounting Position	Any

RATINGS

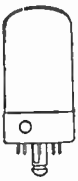
Heater Voltage AC or DC (Nominal) ..... 7.0 Volts

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	1.2 Amperes

For other rating, operation and application data, refer to Sylvania Type 50X6.

8BZ-L-4



Sylvania Type 7X7

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3½"
Maximum Seated Height	2⅝"
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 5 Volts (Minimum)	1.0 Ma.

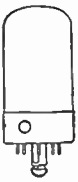
TYPICAL OPERATION

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	67000 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.

5AB-L-0



7Y4 Sylvania Type

FULL WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2¹⁵⁄₁₆"
Maximum Seated Height	2¼"
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

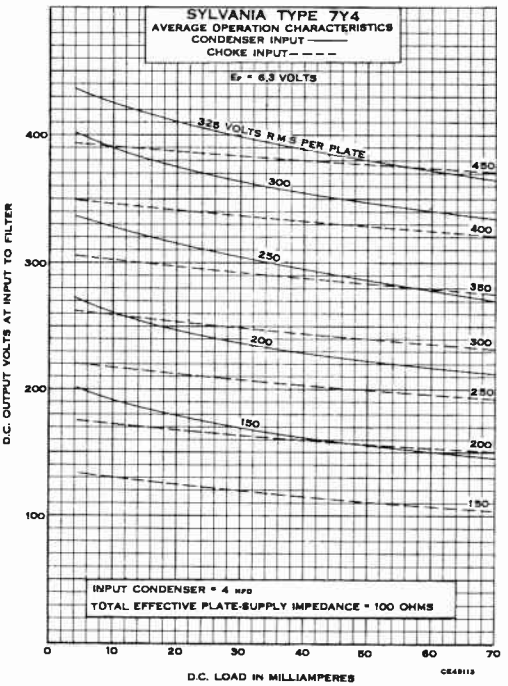
	Condenser Input	Choke Input
Heater Voltage	6.3	6.3 Volts
Heater Current	500	500 Ma.
RMS Plate Voltage	325	450 Volts
DC Output Current	70	70 Ma.
Plate Supply Impedance* (Minimum per Plate)	150	.... Ohms
Minimum Input Choke Value	....	10 Henrys

*When greater than 40 μfd input filter condenser is used it may be necessary to increase minimum plate supply impedance.

7Y4 (Cont'd)

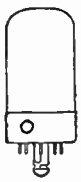
APPLICATION

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.



7Z4 Sylvania Type

DUODIODE RECTIFIER



5AB-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 (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.

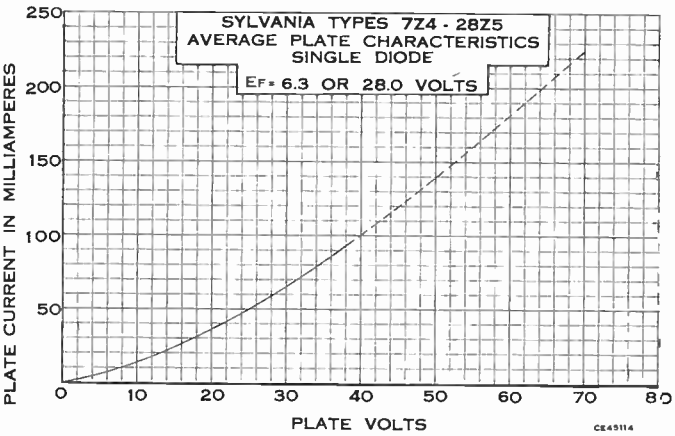
TYPICAL OPERATION

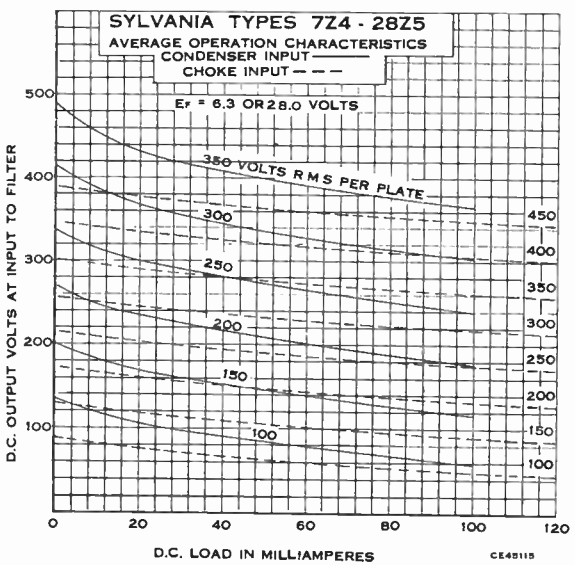
Condenser Input to Filter	
Heater Voltage AC or DC	6.3 Volts
Heater Current	0.900 Ampere
AC Plate Voltage (RMS per Plate)	325 Volts
DC Output Current	100 Ma.
Plate Supply Impedance (Per Plate)§	75 Ohms
Choke Input to Filter	
Heater Voltage	6.3 Volts
Heater Current	0.900 Ampere
AC Plate Voltage (RMS Per 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.





12A8GT Sylvania Type

PENTAGRID CONVERTER

8A-1-0

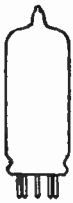
RATINGS AND OPERATION

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.

12AL5 Sylvania Type

DUODIODE



6BT-0-6

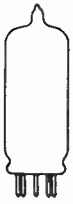
RATINGS AND OPERATION

Heater Voltage	12.6 Volts
Heater Current	150 Ma.

For other rating, operation, and application data, refer to corresponding Type 6AL5.

12AT6 Sylvania Type

DUODIODE HIGH-MU TRIODE



7BT-0-0

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 9/16"
Maximum Seated Height	1 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.

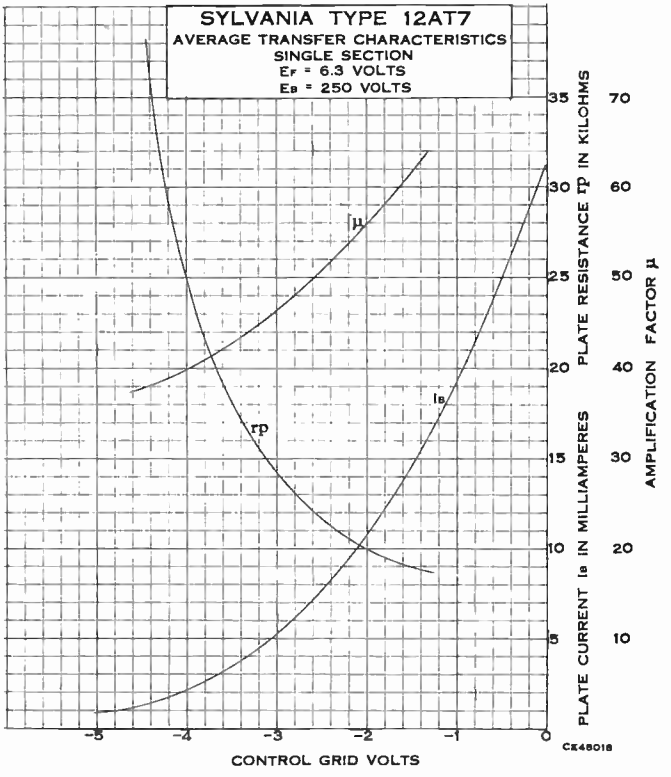
†Triode 1 has the plate connected to Pin No. 6.

TYPICAL OPERATION
CLASS A_1 AMPLIFIER - EACH TRIODE UNIT

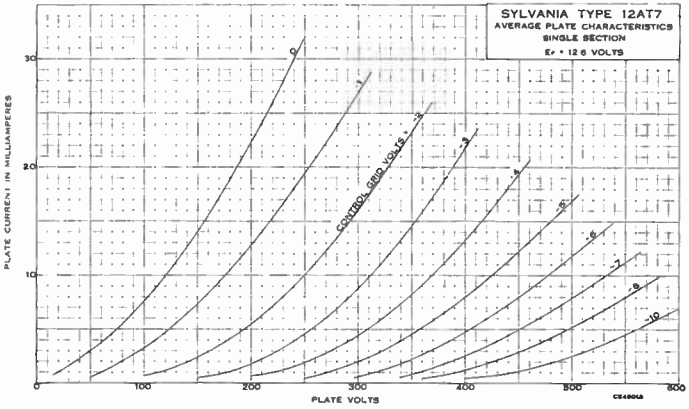
Heater Voltage	12.6 or	6.3	Volts
Heater Current	150 or	300	Ma.
Plate Voltage	100	180	250 Volts
Grid Voltage	−1	−1	−2 Volts
Cathode Bias Resistor	270	90	200 Ohms
Plate Resistance (Approx.)	15,000	9,400	10,900 Ohms
Mutual Conductance	4000	6600	5500 μmhos
Amplification Factor	60	62	60
Plate Current	3.7	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.

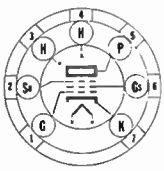


12AT7 (Cont'd)



12AU6 Sylvania Type

SHARP CUT-OFF RF PENTODE



7BK-0-2

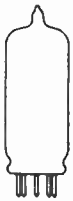
RATINGS AND OPERATION

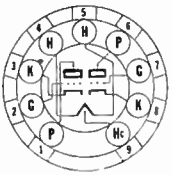
Heater Voltage	12.6 Volts
Heater Current	150 Ma.

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)

Heater Voltage	12.6/6.3 Volts
Heater Current	150/300 MA
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.75 Watts
Maximum Cathode Current	20 Ma.
Maximum Grid-Circuit Resistance	
For Cathode Bias	1.0 Megohm
For Fixed Bias	0.25 Megohm

	Vertical Deflection Oscillator	Horizontal Deflection Oscillator
Maximum DC Plate Voltage	300	300 Volts
Maximum Plate Dissipation		
Each Plate	2.75	2.75 Watts
Both Plates	5.5	5.5 Watts
Maximum Peak Negative Grid Voltage	400	600 Volts
Maximum Average Cathode Current	20	20 Ma.
Maximum Peak Cathode Current	60	300 Ma.
Maximum Grid Circuit Resistance	2.2	2.2 Megohms

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	0.40	0.32 μμf.

*Without external shield.

Note:—Triode No. 1 has the plate connected to pin No. 6.

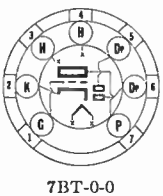
TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Plate Voltage	100	250 Volts
Grid Voltage	0	−8.5 Volts
Amplification Factor	20	17
Plate Resistance	6500	7700 Ohms
Transconductance	3100	2200 μmhos
Plate Current	11.8	10.5 Ma.

APPLICATION

For curve and resistor coupled amplifier data reference should be made to Type 6C4.



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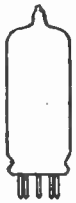


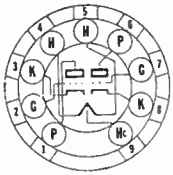
Sylvania Type 12AV6

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.



9A-0-0

Sylvania Type 12AV7

DUOTRIODE

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

12AV7 (Cont'd)

RATINGS

	Series	Parallel
Heater Voltage AC or DC	12.6	6.3 Volts
Heater Current	225	450 Ma.
Maximum Plate Voltage	300	300 Volts
Maximum Plate Dissipation (each section)	2.7	2.7 Watts
Maximum Negative DC Control Grid Voltage	-50	-50 Volts
Maximum Heater-Cathode Voltage	90	90 Volts
Driect Interelectrode Capacitances:	**Unshielded**	**With Shield #315**
Grid to Plate (each section)	1.9	1.9 μμf.
Input (each section)	3.1	3.2 μμf.
Output (section #1)	0.5	1.3 μμf.
(section #2)	0.4	1.6 μμf.
Heater to Cathode (each section)	3.8	4.0 μμf.
Grounded Grid		
Input (each section)	6.9	7.0 μμf.
Output (section #1)	2.0	2.8 μμf.
(section #2)	2.0	3.2 μμf.
Plate to Cathode (each section)	0.24	0.23 μμf.

NOTE:—Triode No. 1 has the plate connected to pin No. 6.

TYPICAL OPERATION

CLASS A_1 AMPLIFIER (Each Section)

Heater Voltage		
Series	12.6	12.6 Volts
Parallel	6.3	6.3 Volts
Heater Current		
Series	225	225 Ma.
Parallel	450	450 Ma.
Plate Voltage	100	150 Volts
Plate Current	9.0	18 Ma.
Cathode Bias Resistor	120	56 Ohms
Plate Resistance	6,100	4,800 Ohms
Mutual Conductance	6,100	8,500 μmhos
Amplification Factor	37	41
Control Grid Voltage (approx.) for Ib = 10 μa.	-9	-12 Volts

12AW6 Sylvania Type

SHARP CUT-OFF 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

	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.

9A-0-0

12AX7 Sylvania Type

HIGH MU DUOTRIODE

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.

12AX7 (Cont'd)

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.

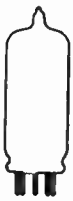
APPLICATION

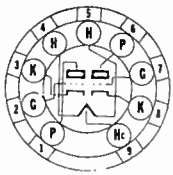
Sylvania Type 12AX7 is a high mu duotriode for use as a voltage amplifier or phase inverter in portable or compact radio equipment. The use of the 9 pin base allows connection to be made to the center tap of the heater permitting operation in parallel on 6 volt supplies or in series for AC-DC service. For typical curves and resistance coupled amplifier data, reference should be made to Sylvania Type 6BK6.

SAME 6AV6

12AY7 Sylvania Type

MEDIUM-MU DUOTRIODE





9A-0-0

PHYSICAL SPECIFICATIONS

Base	Miniature 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	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

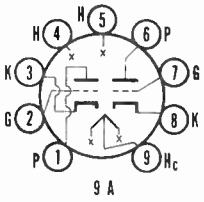
RESISTANCE COUPLED AMPLIFIER (Each section)

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.

Sylvania Type 12AZ7

DUO TRIODE



9 A

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T-6½
Maximum Overall Length	2 3/16"
Maximum Seated Height	1 13/16"
Mounting Position	Any
Basing	9A

RATINGS (Each Section)

Heater Voltage Series/Parallel	12.6/6.3 Volts
Heater Current Series/Parallel	225/450 Ma
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	2.5 Watts
Maximum Grid Voltage (dc)	-50 Volts
Maximum Heater-Cathode Voltage	90 Volts

Direct Interelectrode Capacitances

	Shielded[1]	Unshielded
Grid to Plate (Each Section)	1.9	1.9 μμf
Input (Each Section)	3.2	3.1 μμf
Output (Section 1)[2]	1.3	0.5 μμf
Output (Section 2)	1.6	0.4 μμf
Grounded Grid Operation		
Input (Each Section)	7.0	6.9 μμf
Output (Section 1)[2]	2.8	2.0 μμf
(Section 2)	3.2	2.0 μμf
Plate to Cathode (Each Section)	0.23	0.24 μμf

CHARACTERISTICS AND TYPICAL OPERATION

Class A_1 Amplifier

Plate Voltage	100	250 Volts
Cathode Bias Resistor	270	200 Ohms
Plate Current	3.7	10 Ma
Transconductance	4000	5500 μmhos
Amplification Factor	60	60
Plate Resistance	15,000	10,900 Ohms
Grid Voltage (approx.) I_b = 10 μa	-5	-12 Volts

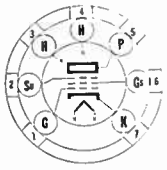
NOTES:

1. Shield No. 315.
2. Section No. 1 connects to pins No. 6, 7 and 8. Section No. 2 connects to Pins No. 1, 2 and 3.

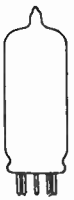
Issued as a supplement to the manual in Sylvania News for June 1953

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 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.



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

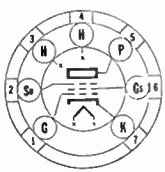
Sylvania Type 12BA7

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.



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.

12BE6 Sylvania Type

HEPTODE CONVERTER

7CH-0-0

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.

12BF6 Sylvania Type

DUO-DIODE TRIODE

7BT-0-0

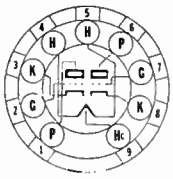
RATINGS AND OPERATION

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.

12BH7 Sylvania Type

MEDIUM-MU DUOTRIODE



9A-0-0

PHYSICAL SPECIFICATIONS

Base	Small Button 9 Pin
Bulb	T-6½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any

RATINGS[1]

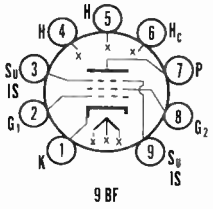
Heater Voltage	12.6/6.3 Volts
Heater Current	300/600 MA
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode: Total DC and Peak	200 Volts
Heater Positive with Respect to Cathode: DC	100 Volts
Total DC and Peak	200 Volts

VERTICAL DEFLECTION AMPLIFIER[2]

Maximum DC Plate Voltage	450 Volts
Maximum Peak Positive Pulse Plate Voltage (Absolute Maximum)	1500 Volts
Maximum Peak Negative Pulse Grid Voltage	250 Volts
Maximum Cathode Current (Each Unit)	20 MA
Maximum Plate Dissipation (Each Unit)[3]	3.5 Watts
Maximum Grid Circuit Resistance	
For Self Bias	2.2 Megohms

Sylvania Type 12BY7

VIDEO AMPLIFIER PENTODE



9 BF

PHYSICAL SPECIFICATIONS

Base	Small Button 9-Pin
Bulb	T-6½
Maximum Overall Length	2⅝"
Maximum Seated Height	2⅜"
Mounting Position	Any
Basing	9BF

RATINGS

Heater Voltage Series/Parallel	12.6/6.3 Volts
Heater Current Series/Parallel	300/600 Ma
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	6.25 Watts
Maximum Screen Voltage	175 Volts
Maximum Screen Dissipation	1.0 Watts
Maximum Control Grid Voltage	
Negative	50 Volts
Positive	0 Volts
Maximum Control Grid Resistance	
Fixed Bias	.25 Megohm
Cathode Bias	1.0 Megohm
Maximum Heater-Cathode Voltage	180 Volts

Direct Interelectrode Capacitances (Unshielded)

Grid to Plate	0.055 $\mu\mu$f
Input	11.1 $\mu\mu$f
Output	3.0 $\mu\mu$f

CHARACTERISTICS AND TYPICAL OPERATION

Class A_1 Amplifier

Plate Voltage	250 Volts
Screen Voltage	150 Volts
Cathode Bias Resistor	68 Ohms
Plate Current	25 Ma
Screen Current	6.0 Ma
Transconductance	12,000 μmhos
Plate Resistance	110,000 Ohms
Grid Voltage for Ib = 20 μa	−10 Volts
Amplification Factor (Triode Connected)	28

APPLICATION

High transconductance pentode designed for use as a video amplifier. Furnishes large output voltages across low values of load resistance and supply voltages.

Issued as a supplement to the manual in Sylvania News for May 1953

SYLVANIA RADIO TUBES

VERTICAL DEFLECTION OSCILLATOR[2]

Maximum DC Plate Voltage	450 Volts
Maximum Plate Dissipation (Each Plate)	3.5 Watts
Maximum Peak Negative Grid Voltage	400 Volts
Maximum Average Cathode Current	20 MA
Maximum Peak Cathode Current	70 MA
Maximum Grid Circuit Resistance	2.2 Megohms

Direct Interelectrode Capacitances

	Triode No. 1	Triode No. 2
Grid to Plate	2.6	2.6 μμf
Input	3.2	3.2 μμf
Output	0.5	0.4 μμf
Plate #1 to Plate #2	0.8	μμf

NOTES:

1. All values are evaluated on the design center system except where absolute maximum is stated.
2. For operation in a 525 line, 30 frame system, the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
3. In stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

TYPICAL OPERATION

VERTICAL OUTPUT AMPLIFIER

Plate Supply	450 Volts
Peak Positive Plate Voltage	1200 Volts
Sawtooth Component Plate Voltage	330 Volts
Sawtooth Component Grid Voltage	60 Volts
Peak to Peak Grid Voltage	130 Volts
Cathode Current	
Average	16 MA
Peak	45 MA
Picture Tube	21"
Anode Voltage	15 KV
Cathode Bias Resistor	1600 Ohms

APPLICATION

Sylvania Type 12BH7 is a duotriode designed for use as a vertical deflection amplifier in television receivers using picture tubes which require wide deflection angles.

The 12BH7 may also be used in Class A_1 amplifier applications.

7DF-0-1

Sylvania Type 12BN6

GATED BEAM DISCRIMINATOR

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6BN6 which is identical except for heater ratings.

12F5^{GT} 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.

12J5^{GT} Sylvania Type

MEDIUM-MU TRIODE

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.

12J7^{GT} 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.

7V-1-8

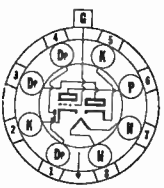
Sylvania Type 12Q7GT

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

PENTAGRID CONVERTER

8AD-1-6
12SA7GT

8R-1-0
12SA7

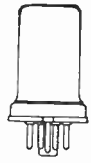
RATINGS AND OPERATION

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

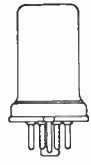
RATINGS AND OPERATION

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.

12SF7 Sylvania Type

DIODE REMOTE CUT-OFF RF PENTODE



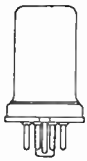
7AZ-1-0

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

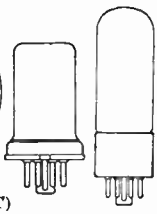
SEMI-REMOTE CUT-OFF RF PENTODE

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

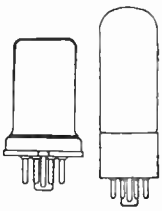
SHARP CUT-OFF RF PENTODE

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

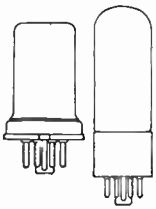
SHARP CUT-OFF RF PENTODE

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.

8N-1-1 (12SK7)
8N-1-5 (12SK7GT)



Sylvania Type 12SK7GT

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 6SK7GT which is identical except for heater ratings.

12SL7GT Sylvania Type

DOUBLE TRIODE AMPLIFIER

8BD-0-0

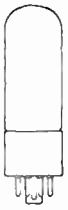
RATINGS AND OPERATION

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



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

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.

12SR7 Sylvania Type

DUODIODE MEDIUM-MU TRIODE

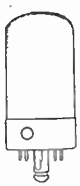
8Q-1-1

RATINGS AND OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other data, refer to corresponding Type 6SR7 in the "Seldom Used Types" section which is identical except for heater ratings.

8V-L-5



Sylvania Type 14A7

REMOTE CUT-OFF RF PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{35}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

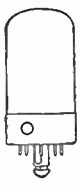
Heater Voltage AC or DC (Nominal)	14.0 Volts

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 7A7.

8AC-L-0



Sylvania Type 14AF7

TWIN TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{35}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

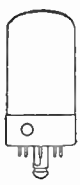
Heater Voltage AC or DC (Nominal)	14.0 Volts

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 7AF7.

8W-L-7



Sylvania Type 14B6

DUODIODE HIGH-MU TRIODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$2^{35}/_{32}$"
Maximum Seated Height	$2^{1}/_{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

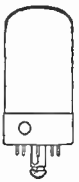
OPERATION

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 7B6.

14B8 Sylvania Type

PENTAGRID CONVERTER



8X-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/32"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

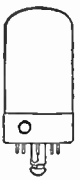
OPERATION

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 7B8.

14C5 Sylvania Type

BEAM POWER AMPLIFIER



6AA-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)	14.0 Volts

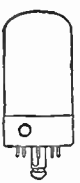
OPERATION

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.

14C7 Sylvania Type

SHARP CUT-OFF RF PENTODE



8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/32"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 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	0.004 μμf. Max.
Input	6.0 μμf.
Output	6.5 μμf.

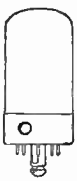
*With 1⅛" diameter shield (RMA Std. 308) connected to cathode.

TYPICAL OPERATION CLASS A_1 AMPLIFIER

Heater Voltage	12.6	12.6 Volts
Heater Current	150	150 Ma.
Plate Voltage	100	250 Volts
Screen Voltage	100	100 Volts
Control Grid Voltage	-1.0	-3.0 Volts
Self-Bias Resistor	180	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 (Approximate)	.400	1.0 Megohm
Mutual Conductance	2275	1575 μmhos
Grid Bias for Approx. Plate Current Cut-Off	-8.5	-8.5 Volts

Data for use in Resistance Coupled Amplifiers may be obtained by referring to type 7C7 in appendix.

8AE-L-7



Sylvania Type 14E7

DUODIODE PENTODE

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 25/32"
Maximum Seated Height	2 ¼"
Mounting Position	Any

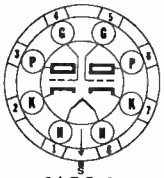
RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

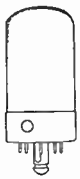
OPERATION

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

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 25/32"
Maximum Seated Height	2 ¼"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

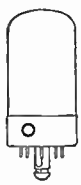
OPERATION

Heater Voltage AC or DC	12.6 Volts
Heater Current	150 Ma.

For other rating, operation and application data, refer to Sylvania Type 7F7.

14F8 Sylvania Type

DOUBLE TRIODE



8BW-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8-Pin
Bulb	T-9
Maximum Overall Length	2 15/32"
Maximum Seated Height	1 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

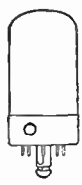
TYPICAL OPERATION

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



8V-L-5

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	2 15/32"
Maximum Seated Height	2 1/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

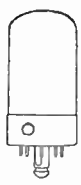
OPERATION

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 7H7.

14J7 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 1/4"
Mounting Position	Any

RATINGS

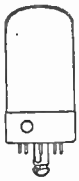
Heater Voltage AC or DC (Nominal)	14.0 Volts

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



Sylvania Type 14N7

MEDIUM-MU DUO TRIODE

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

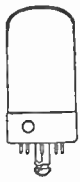
Heater Voltage AC or DC (Nominal)	14.0 Volts

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

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

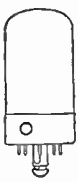
Heater Voltage AC or DC (Nominal)	14.0 Volts

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.

8AE-L-7



Sylvania Type 14R7

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)	14.0 Volts

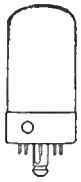
OPERATION

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	$2^{25}/_{32}$"
Maximum Seated Height	$2\frac{1}{4}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC (Nominal)	14.0 Volts

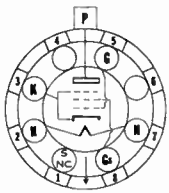
OPERATION

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 7S7.

19BG6G Sylvania Type

BEAM POWER AMPLIFIER



5BT-0-0

PHYSICAL SPECIFICATIONS

Base	Medium Octal 6 Pin
Bulb	ST-16
Maximum Overall Length	$5^{11}/_{16}$"
Maximum Seated Height	$5\frac{1}{8}$"
Mounting Position*	Vertical, Base Up or Down

*Horizontal operation is permitted if the plane passing through pins 2 and 7 is vertical.

RATINGS

Heater Voltage	18.9 Volts
Heater Current	300 Ma.

For other ratings operation and application data, refer to Sylvania Type 6BG6G.

19J6 Sylvania Type

MEDIUM MU DUOTRIODE

7BF-0-0

PHYSICAL SPECIFICATIONS

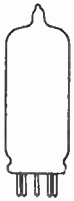
Base	Miniature Button 7 Pin
Bulb	T-$5\frac{1}{2}$
Maximum Overall Length	$2\frac{1}{8}$"
Maximum Seated Height	$1^{7}/_{8}$"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	18.9 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	300 Volts
Maximum Plate Dissipation	1.5 Watts
Maximum Peak Heater-Cathode Voltage	90 Volts

For other data, refer to Type 6J6, which has identical operating conditions.

9E-0-3 & 7



Sylvania Type 19T8

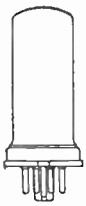
TRIPLE DIODE TRIODE

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.

7S-1-0 (25A6)
7S-0-0 (25A6GT)



Sylvania Type 25A6GT

POWER AMPLIFIER PENTODE

PHYSICAL SPECIFICATIONS

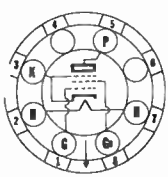
	25A6	25A6GT
Base	Small Wafer 7 Pin	Intermediate Octal 7 Pin
Bulb	Metal 8-6	T-9
Maximum Overall Length	3¼"	3 5/16"
Maximum Seated Height	2 11/16"	2¾"
Mounting Position	Any	Any

RATINGS

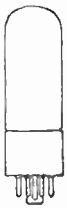
Heater Voltage AC or DC	25.0 Volts
Heater Current	300 Ma.
Maximum Plate Voltage	160 Volts
Maximum Screen Voltage	135 Volts
Maximum Plate Dissipation	5.3 Watts
Maximum Screen Dissipation	1.9 Watts
Maximum Heater-Cathode Voltage	90 Volts

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



6CK-0-0



Sylvania Type 25AV5GT

BEAM POWER AMPLIFIER

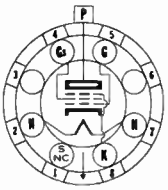
RATINGS AND OPERATION

Heater Voltage AC or DC	25 Volts
Heater Current	300 Ma.

For other data, refer to corresponding Type 6AV5GT which is identical except for heater ratings.

25BQ6GT Sylvania Type

BEAM POWER AMPLIFIER



6AM-0-0

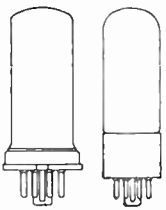
RATINGS AND OPERATION

Heater Voltage AC or DC	25 Volts
Heater Current	300 Ma.

For other data refer to corresponding Type 6BQ6GT which is identical except for heater ratings.

25L6GT Sylvania Type

BEAM POWER AMPLIFIER



7S-1-0 (25L6)
7S-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	$3\frac{1}{4}$"	$3\frac{5}{16}$"
Maximum Seated Height	$2\frac{11}{16}$"	$2\frac{3}{4}$"
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

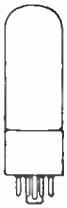
*For fixed bias circuits the grid circuit resistance should not exceed 0.1 megohm; for self-bias operation 0.5 megohm should be the maximum.

**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.

4CG-0-0



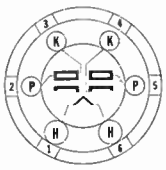
Sylvania Type 25W4GT

HALF WAVE HIGH VACUUM RECTIFIER

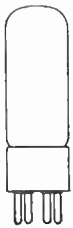
RATINGS AND OPERATION

Heater Voltage AC or DC ..... 25.0 Volts
Heater Current ..... 300 Ma.

For other rating, operation and application data refer to corresponding Type 6W4GT.



6E-0-0



Sylvania Type 25Z5

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base ..... Small 6 Pin
Bulb ..... T9 or ST12
Maximum Overall Length ..... 4 1/16"
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
Maximum 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.

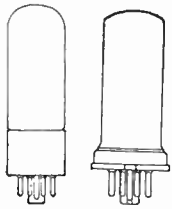
HALF-WAVE RECTIFIER

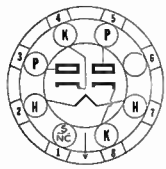
Heater Voltage	25.0	25.0	25.0 Volts
A-C Plate Voltage per Plate (RMS)	117	150	235¶ Volts
D-C Output Current per Plate	75¶	75¶	75¶ Ma.
Plate Supply Impedance	15	40	100 Ohms

¶Maximum.

25Z6GT Sylvania Type

HIGH-VACUUM RECTIFIER





7Q-1-0 (25Z6)
7Q-0-0 (25Z6GT)

PHYSICAL SPECIFICATIONS

	25Z6	25Z6GT
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

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
Maximum Steady State Peak 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.
Peak Plate Current*	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.

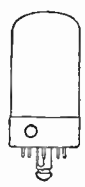
HALF-WAVE RECTIFIER

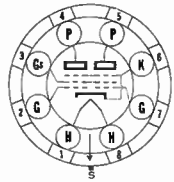
Heater Voltage	25.0	25.0	25.0 Volts
AC Plate Voltage Per Plate (RMS)	117	150	235¶ Volts
DC Output Current Per Plate	75¶	75¶	75¶ Ma.
Plate Supply Impedance	15	40	100 Ohms

¶Maximum.

28D7 Sylvania Type

DOUBLE BEAM POWER AMPLIFIER





8BS-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	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

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.

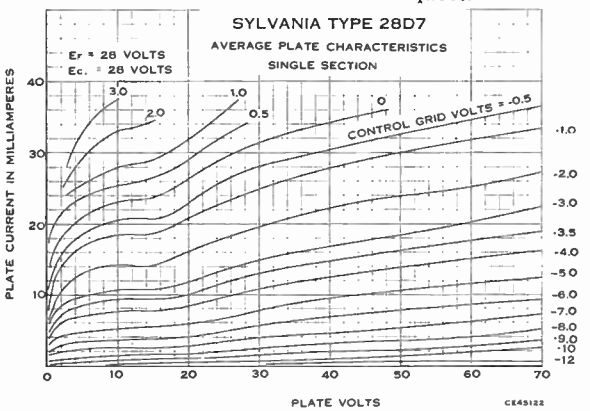
APPLICATION

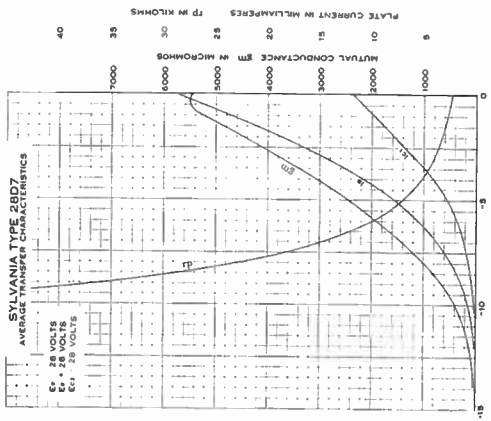
Sylvania Type 28D7 is a double beam power output tube of Lock-In construction designed for low voltage operation. Comparatively large power outputs are obtainable with very low applied plate voltages. Power outputs of 150 milliwatts or more are readily obtainable using this type of tube in a push-pull 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.

28D7 (Cont'd)

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.

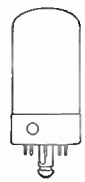
Additional information available on request.

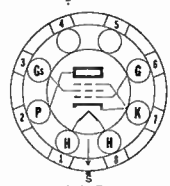




35A5 Sylvania Type

BEAM POWER AMPLIFIER





6AA-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3½"
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

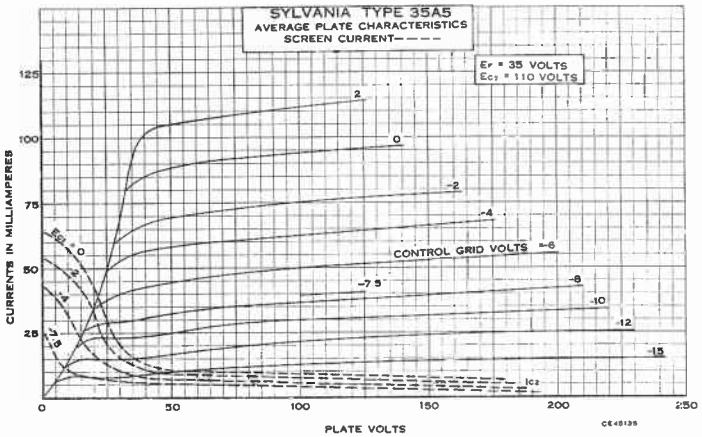
Heater Voltage AC or DC	35.0	35.0 Volts
Heater Current	150	150 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage*	-7.5	*** Volts
Peak Signal Voltage	7.5	8.0 Volts
Self-Bias Resistor	175	180 Ohms
Zero Signal Plate Current	40	43 Ma.
Maximum Signal Plate Current	41	43 Ma.
Zero Signal 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.



Sylvania Type 35B5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 3/16"
Maximum Seated Height	2 3/8"
Mounting Position	Any

35B5 (Cont'd)

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

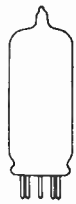
Heater Voltage	35.0 Volts
Heater Current	150 Ma.
Plate Voltage	110 Volts
Screen Voltage	110 Volts
Control Grid Voltage	-7.5 Volts
Peak Signal Voltage	7.5 Volts
Self-Bias Resistor	175 Ohms
Zero Signal Plate Current	40 Ma.
Maximum Signal Plate Current	41. Ma.
Zero Signal Screen Current	3.0 Ma.
Maximum 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 %

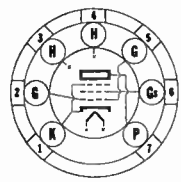
APPLICATION

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.

35C5 Sylvania Type

BEAM POWER AMPLIFIER





7CV-0-0

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

7S-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

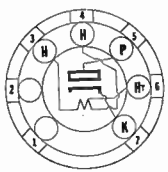
Heater Voltage	35.0	35.0 Volts
Heater Current	150	150 Ma.
Plate Voltage	110	200 Volts
Screen Voltage	110	125 Volts
Grid Voltage *	−7.5	** Volts
Cathode Bias Resistor	175	180 Ohms
Peak Signal Voltage	7.5	8.0 Volts
Plate Current	40	43 Ma.
Maximum Signal Plate Current	41	43 Ma.
Screen Current (Approx.)	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.

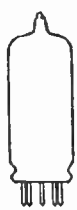
**Obtained by self-bias resistor. Fixed bias operation at maximum ratings is not recommended.

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
Tube Voltage Drop at 200 Ma. Plate Current	18 Volts

TYPICAL OPERATION

With No. 40 or No. 47 Panel Lamps and 40 μf. Condenser Input Filter

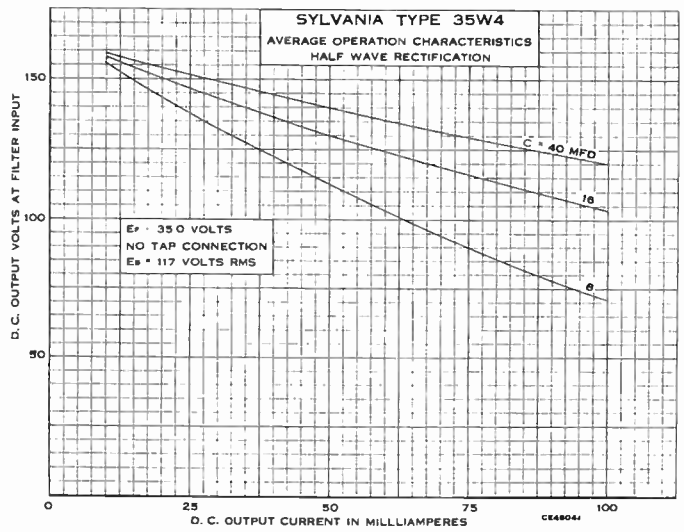
Heater Voltage	32.0	32.0	32.0	32.0 Volts
Heater Current	150	150	150	150 Ma.
RMS Plate Supply	117	117	117	117 Volts
Min. Effective Plate Supply Impedance	15	15	15	15 Ohms
Panel Lamp Shunting Resistor	....	300	150	100 Ohms
DC Output Current	60	70	80	90 Ma.

35W4 (Cont'd)

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

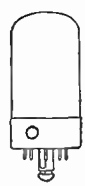
APPLICATION

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



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	18 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

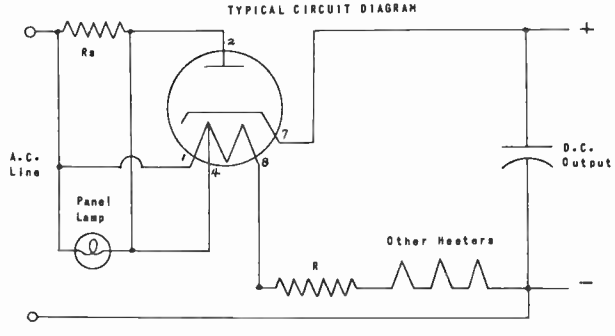
With 40 Mfd. Input Condenser and No Panel Lamp

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

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.

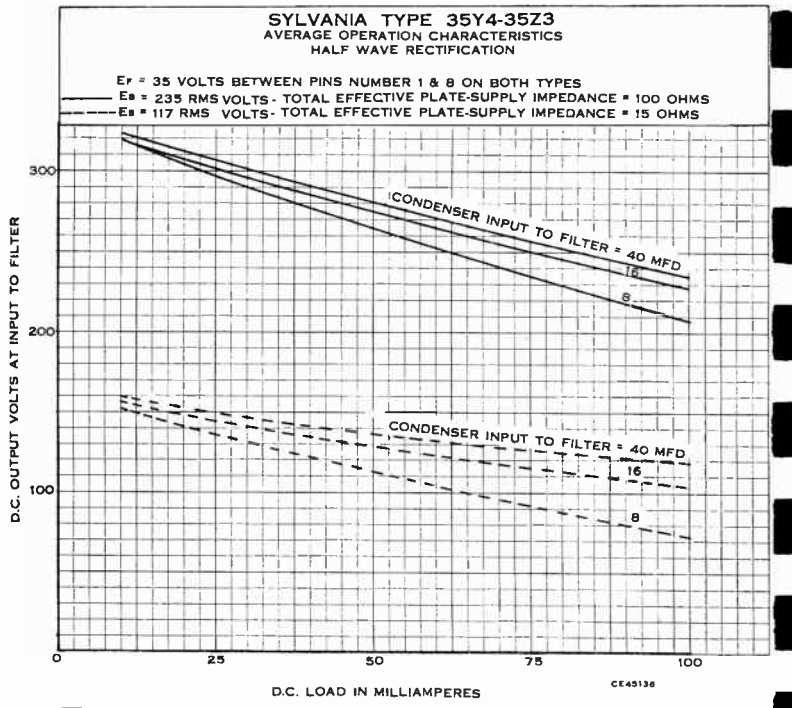
TYPICAL CIRCUIT DIAGRAM



Rs Pilot Lamp Shunt Resistor

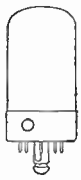
R Ballast Resistor

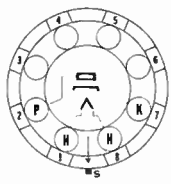
35Y4 (Cont'd)



35Z3 Sylvania Type

HALF-WAVE RECTIFIER





4Z-L-0

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{3}{32}$"
Maximum Seated Height	$2\frac{5}{8}$"
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	18 Volts
Maximum DC Output Current	100 Ma.

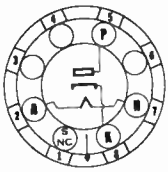
TYPICAL OPERATION

HALF-WAVE RECTIFIER

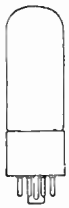
Heater Voltage (AC or DC)	35.0	35.0 Volts
Heater Current	150	150 Ma.
AC Plate Voltage RMS	117	235 Volts
Minimum Total Effective Plate Supply Impedance	15	100 Ohms
DC Output Current	100	100 Ma.

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.



5AA-0-0



Sylvania Type 35Z4GT

HALF-WAVE RECTIFIER

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.
Tube Voltage Drop at 200 Ma. DC Plate Current		18 Volts

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

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.**	18 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

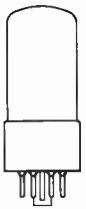
Sylvania Type 35Z5G is a half-wave high-vacuum rectifier designed for use in ac-dc and dc line operated receivers. The 35-volt heater is tapped to permit operation of a Sylvania S40 or S47 panel lamp across Pins 2 and 3. Conventional half-wave rectifier circuits are applicable.

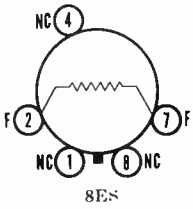
A peak limiting resistor of at least 25 ohms must be used in series with the plate and a surge limiting resistor should be placed in series with the heaters of the other tubes in the heater circuit.

Reference should be made to the Lock-In equivalent Type 35Y4 for further data.

40A1 Sylvania Type

HORIZONTAL STABILIZER





8ES

PHYSICAL SPECIFICATIONS

Base	Intermediate Shell Octal 5-Pin
Filament	Iron
Type of Cooling	Radiation
Maximum Overall Length	3¼"
Maximum Seated Height	$2^{11}/_{16}$"
Mounting Position	Vertical, Base Down
Basing	8ES

RATINGS

Absolute Maximum Current Range	70 to 95 MA
Absolute Maximum Voltage Range	20 to 60 Volts
Absolute Maximum Ambient Temperature	65° C

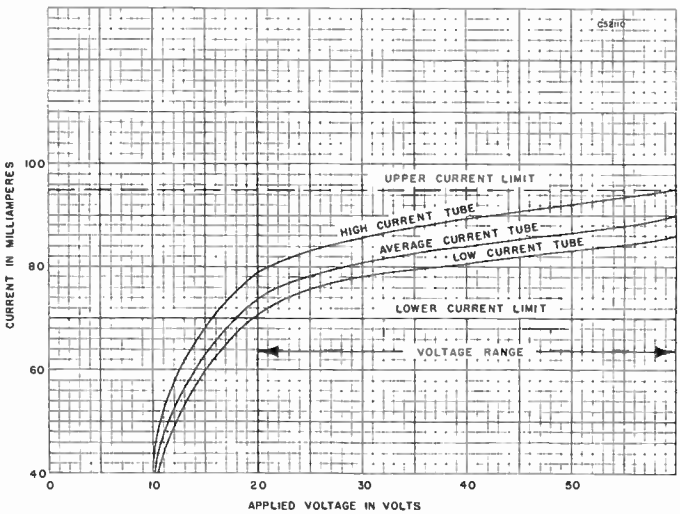
TYPICAL OPERATION

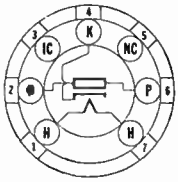
Average Operating Current at 40 Volts	84 MA
Average Operating Current at 20 Volts	74 MA
Average Operating Current at 60 Volts	90 MA

APPLICATION

The Type 40A1 is a gas filled ballast tube designed to maintain relatively constant current over a specified operating voltage range. The type is designed for application as a horizontal deflection stabilizer in television receivers.

AVERAGE CHARACTERISTICS





5AM-0-0

Sylvania Type 45Z3

HALF-WAVE HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

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

RATINGS

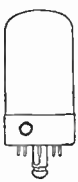
Heater Voltage AC or DC	45 Volts
Heater Current	75 Ma.
Maximum Peak Inverse Voltage	350 Volts
Maximum Peak Plate Current	390 Ma.
Maximum Peak Heater-Cathode Voltage	330 Volts

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.

6AA-L-0



Sylvania Type 50A5

BEAM POWER AMPLIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	3⅝"
Maximum Seated Height	2⅝"
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

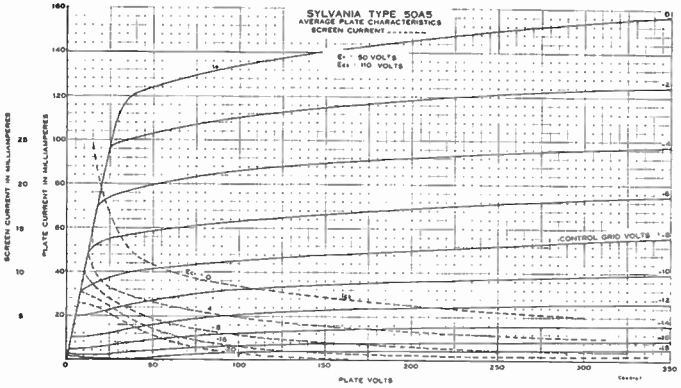
*The maximum grid circuit resistance under fixed bias conditions should not exceed 0.1 megohm and for self-bias 0.5 megohm.

**Obtained by self-bias resistor; fixed bias operation not recommended.

50A5 (Cont'd)

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.



50AX6G Sylvania Type

FULL WAVE RECTIFIER

7Q-0-0

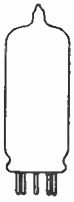
RATINGS AND OPERATION

Heater Voltage AC or DC	50 Volts
Heater Current	300 Ma.

For other data, refer to corresponding Type 6AX6G which is identical except for heater ratings.

50B5 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

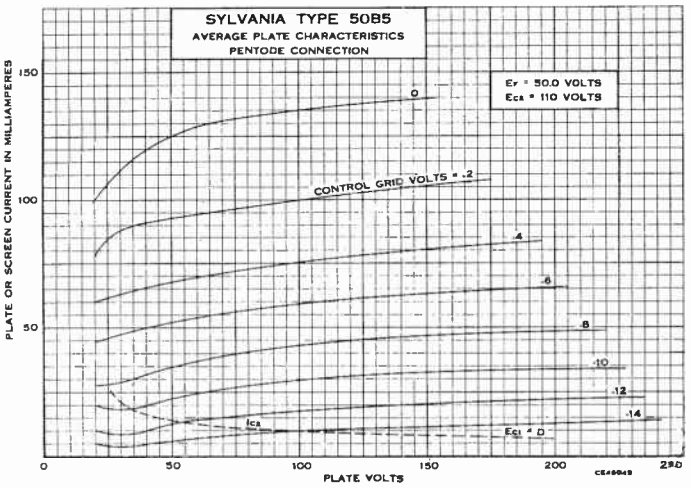
Heater Voltage AC or DC	50 Volts
Heater Current	150 Ma.
Maximum Plate Voltage	135 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	5.5 Watts
Maximum Screen Dissipation	1.25 Watts
Maximum Heater-Cathode Voltage	180 Volts

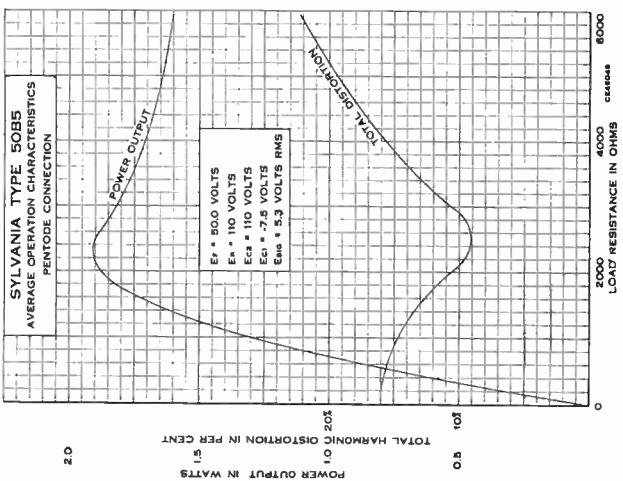
TYPICAL OPERATION

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

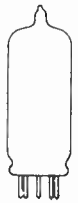
Sylvania Type 50B5 is a beam power output amplifier tube of miniature style of construction. It is similar in application to Type 35L6GT, 50L6GT and Lock-In Types 35A5 and 50A5. Grid circuit resistances should not exceed 0.5 megohm for self bias or 0.1 megohm for fixed bias. Due to the high temperature at which these tubes operate, adequate ventilation should be assured in equipment designed for their use.

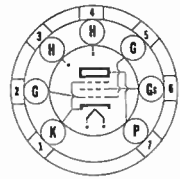




50C5 Sylvania Type

BEAM POWER AMPLIFIER





7CV-0-0

NOTE: With the exception of the base diagram given above the characteristics of Type 50C5 are identical with those given for Type 50B5.

50C6G Sylvania Type

BEAM POWER AMPLIFIER

7S-0-0

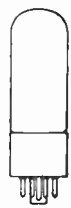
RATINGS AND OPERATION

Heater Voltage AC or DC	50.0 Volts
Heater Current	150 Ma.

For other data refer to corresponding Type 6Y6G which is identical except for heater ratings.

50L6GT Sylvania Type

BEAM POWER AMPLIFIER



7S-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 7 Pin
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 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

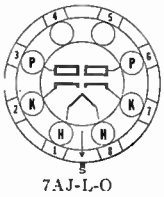
CLASS A_1 AMPLIFIER

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 (Approx.)	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 (Approx.)	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.



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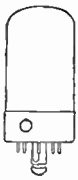


Sylvania Type 50X6

HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Lock-In 8 Pin
Bulb	T-9
Maximum Overall Length	$3\frac{5}{8}$"
Maximum Seated Height	$2\frac{5}{8}$"
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.

7Q-0-0

Sylvania Type 50Y6GT

HIGH-VACUUM RECTIFIER

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 1/16"
Maximum Seated Height	2 3/4"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	50 Volts
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

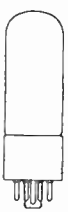
APPLICATION

Sylvania Type 50Y7GT is a high-vacuum rectifier designed for voltage doubler or half-wave service in sets requiring a panel lamp.

70L7GT Sylvania Type

RECTIFIER

BEAM POWER AMPLIFIER



8AA-0-0

PHYSICAL SPECIFICATIONS

Base	Intermediate Octal 8 Pin
Bulb	T-9
Maximum Overall Length	3 1/16"
Maximum Seated Height	2 7/8"
Mounting Position	Any

RATINGS

Heater Voltage AC or DC	70.0 Volts
Heater Current	0.150 Ampere

RECTIFIER UNIT

Maximum AC Plate Voltage (RMS)	117 Volts
Maximum Peak Inverse Voltage	350 Volts
Maximum DC Heater-Cathode Voltage	175 Volts
Maximum Steady State Peak Plate Current	420 Ma.
Tube Voltage Drop at 140 Ma. applied DC	20 Volts

AMPLIFIER UNIT

Maximum Plate Voltage	117 Volts
Maximum Screen Voltage	117 Volts
Maximum Plate Dissipation	5.0 Watts
Maximum Screen Dissipation	1.0 Watt
Maximum Heater-Cathode Voltage	90 Volts

TYPICAL OPERATION

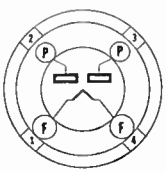
Heater Voltage	70 Volts
Heater Current	0.150 Ampere

RECTIFIER UNIT

AC Plate Voltage	117 Volts
DC Output Current	70 Ma.
Minimum Effective Plate Supply Impedance	15 Ohms

AMPLIFIER UNIT CLASS A_1

Plate Voltage	110 Volts
Screen Voltage	110 Volts
Grid Voltage	−7.5 Volts
Self-Bias Resistor	175 Ohms
Peak AF Grid Voltage	7.5 Volts
Zero Signal Plate Current	40 Ma.
Maximum Signal Plate Current	43 Ma.
Zero Signal Screen Current (Nominal)	3.0 Ma.
Maximum Signal Screen Current (Nominal)	6.0 Ma.
Plate Resistance	15000 Ohms
Mutual Conductance	7500 μmhos
Load Resistance	2000 Ohms
Maximum Signal Power Output	1.8 Watts
Total Harmonic Distortion	10 Percent



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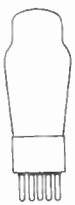


Sylvania Type 80

FULL-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

Base	Medium 4 Pin
Bulb	ST14
Maximum Overall Length	$4^{11}/_{16}$"
Maximum Seated Height	$4^{1}/_{16}$"
Mounting Position	Vertical†

†Horizontal operation permitted if pins 1 & 2 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	10 Henrys

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

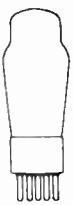
CHOKE INPUT TO FILTER

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

83V Sylvania Type

FULL-WAVE HIGH-VACUUM

RECTIFIER



4AD-0-0

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
Maximum Peak Inverse Voltage	1400 Volts
Tube Voltage Drop (175 Ma. per Plate)	25 Volts

TYPICAL OPERATION

CONDENSER INPUT TO FILTER

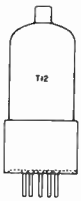
AC Voltage per Plate (RMS)	375 Volts Max.
DC Output Current	175 Ma. Max.
Plate Supply Impedance per Plate	100 Ohms Min.

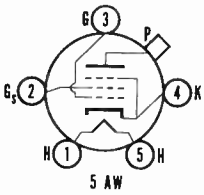
CHOKE INPUT TO FILTER

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

Sylvania Type 807
807W

BEAM POWER AMPLIFIER





5 AW

PHYSICAL SPECIFICATIONS

	807W	807
Base	5 Pin Low Loss Phenolic	Medium Shell Small 5-Pin
Bulb	T12	ST16
Maximum Overall Length	4.69"	5 3/4"
Maximum Seated Height	4.06"	5 1/8"
Maximum Diameter	1.70"	2 1/16"
Cap	Small	Small
Mounting Position	Any	Any
Basing	5AW	5AW

RATINGS

Heater Voltage	6.3	6.3 Volts
Heater Current	.9	.9 Ampere
Maximum Peak Heater-Cathode Voltage	±135	±135 Volts

Class AB$_1$ Triode Connected[1] A F Power Amplifier and Modulator

	CCS[2]	ICAS[3]
Maximum Plate Voltage	400	400 Volts
Maximum DC Plate Current at Max. Sig.[4]	125	125 Ma
Max. Plate Plus Grid 2 Input at Max. Sig.[4]	50	50 Watts
Maximum Plate Plus Grid 2 Input[4]	25	30 Watts

Class AB$_2$ A F Power Amplifier and Modulator

Maximum DC Plate Voltage	600	750 Volts
Maximum Grid 2 Voltage	300	300 Volts
Maximum DC Plate Current at Max. Sig.[4]	120	120 Ma
Maximum Plate Input at Max. Sig.[4]	60	90 Watts
Maximum Grid 2 Input at Max. Sig.[4]	3.5	3.5 Watts
Maximum Plate Dissipation	25	30 Watts

Class C R F Power Amplifier and Oscillator

Maximum DC Plate Voltage	600	750 Volts
Maximum DC Grid 2 Voltage	300	300 Volts
Maximum DC Grid 1 Voltage	-200	-200 Volts
Maximum DC Plate Current	100	100 Ma
Maximum DC Grid 1 Current	5	5 Ma
Maximum Plate Input	60	75 Watts
Maximum Grid 2 Input	3.5	3.5 Watts
Maximum Plate Dissipation	25	30 Watts

Direct Interelectrode Capacitances

Grid 1 to Plate (Shielded)	0.2 μμf Max.
Input (Unshielded)	12 μμf
Output (Unshielded)	7 μμf

NOTES:

1. Grid 2 connected to plate.
2. CCS—Continuous Commercial Service.
3. ICAS—Intermittent Commercial and Amateur Service.
4. Averaged over any audio frequency cycle of sine-wave form.

Issued as a supplement to the manual in Sylvania News for September 1953

TYPICAL OPERATION

Class AB_1 A F Power Amplifier and Modulator

(2 tubes triode connected)	CCS[1]	ICAS[2]
DC Plate Voltage	400	400 Volts
DC Grid 1 Voltage[3]	−45	−45 Volts
Peak A F Grid 1 to Grid 1 Voltage[4]	90	90 Volts
Zero Signal DC Plate Current	60	60 Ma
Maximum Signal DC Plate Current	140	140 Ma
Effective Load Resistance (Plate to Plate)	3000	3000 Ohms
Maximum Signal Driving Power (approx.)	0	0 Watts
Total Harmonic Distortion	3	3 Percent
Maximum Signal Power Output (approx.)	15	15 Watts

Class AB_2 A F Power Amplifier and Modulator (values are for two tubes)

DC Plate Voltage	400	500	600	750 Volts
DC Grid 2 Voltage[5]	300	300	300	300 Volts
DC Grid 1 Voltage (Fixed Bias)	−25	−29	−30	−32 Volts
Peak Grid to Grid Signal Voltage	78	86	78	92 Volts
Plate Current (Zero Signal)	90	72	60	52 Ma
Plate Current (Max. Signal)	240	240	200	240 Ma
Grid 2 Current (Zero Signal)	5	5	5	5 Ma
Grid 2 Current (Max. Signal)	10	10	10	10 Ma
Load Resistance (Plate to Plate)	3200	4240	6400	6950 Ohms
Driving Power (approx.) Max. Signal[6]	0.2	0.2	0.1	0.2 Watts
Power Output (approx.)[7]	55	75	80	120 Watts

Class C Unmodulated R F Power Amplifier or Oscillator (single tube)

DC Plate Voltage	400	500	600	750 Volts
Grid 2 Voltage[1]	250	250	250	250 Volts
Grid 2 Dropping Resistor	20,000	42,000	50,000	85,000 Ohms
Grid 1 Voltage[8]	−45	−45	−45	−45 Volts
Peak Signal Voltage	65	65	65	65 Volts
Plate Current	100	100	100	100 Ma
Grid 2 Current	7.5	6.0	7.0	6.0 Ma
Grid 1 Current (approx.)	3.5	3.5	3.5	3.5 Ma
Driving Power (approx.)	0.2	0.2	0.2	0.2 Watts
Power Output (approx.)	25	30	40	50 Watts

NOTES:

1. CCS—Continuous Commercial Service.
2. ICAS—Intermittent Commercial and Amateur Service.
3. The dc grid 1 circuit resistance should be limited to 100,000 ohms with fixed bias or 500,000 ohms with cathode bias.
4. The driver stage should be capable of supplying the No. 1 grids of the class AB_1 stage with the specified driving voltage at low distortion.
5. May be obtained from a separate well regulated source or from the plate supply voltage if a voltage divider is used.
6. The effective grid circuit resistance should not exceed 500 ohms per grid, or the impedance 700 ohms.
7. Distortion in practical circuits should not exceed 5%, 5% and 3% respectively, under CCS conditions.
8. Bias may be provided by use of 12,800 ohm grid leak, 410 ohm cathode resistor, fixed separate source or a combination of these. The grid circuit resistance should not exceed 25,000 ohms.

4CB-0-0

Sylvania Type 117Z3

HALF-WAVE RECTIFIER

PHYSICAL SPECIFICATIONS

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

NOTE: Do not use pin 1 as a tie point.

RATINGS

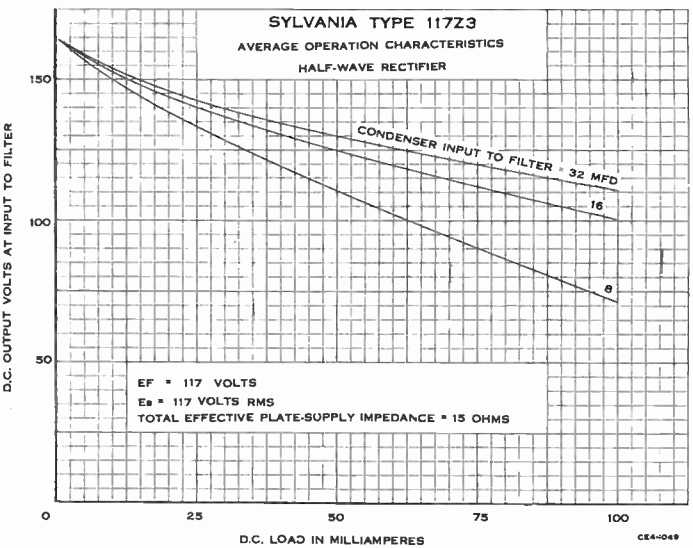
Heater Voltage (AC or DC)	117 Volts
Heater Current	40 Ma.
Maximum AC Plate Voltage (RMS)	117 Volts
Maximum Peak Heater to Cathode Voltage	
Cathode Positive	330 Volts
Cathode Negative	165 Volts
Maximum Peak Inverse Voltage	330 Volts
Maximum Steady State Peak Plate Current	540 Ma.
Tube Voltage Drop at 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

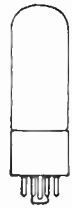
APPLICATION

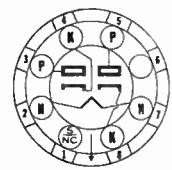
Sylvania Type 117Z3 is a miniature half-wave rectifier designed for use in portable and AC-DC receivers. The output is sufficient for operation of combination battery portables with the high efficiency 50 Ma tubes in series.



117Z6GT Sylvania Type

HIGH-VACUUM RECTIFIER





7Q-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 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.

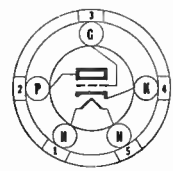
VOLTAGE DOUBLER

	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.

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 5/16"	3 5/16"
Mounting Position	Any	Any

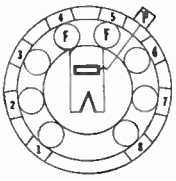
TYPICAL OPERATION

	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 1247

HIGH FREQUENCY DIODE

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Top Connection	Flexible Lead
Maximum Overall Bulb Length	1⅜"
Minimum Lead Length	1¼"
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.

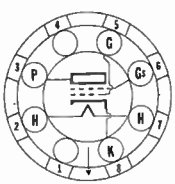
*With a 0.400" diameter shield connected to filament.

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 satisfactprily up to 300 Mc.



6BS-0-0

Sylvania Type 2050
Sylvania Type 2051

GAS TETRODES

PHYSICAL SPECIFICATIONS

Base	Small Octal 8 Pin
Bulb	ST12
Maximum Overall Length	4⅛"
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

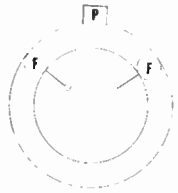
*Must be sufficient to limit anode current to maximum rating.
The Above Ratings are absolute Maximums.

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.

5642 Sylvania Type

HALF-WAVE RECTIFIER



5642

PHYSICAL SPECIFICATIONS

Base	Flexible Leads
Bulb	T-3
Maximum Bulb Length	2.160"
Minimum Lead Length	1¼"
Mounting Position	Any

RATINGS

Filament Voltage (AC or DC)	1.25 Volts
Maximum Peak Inverse Voltage	10,000 Volts
Maximum Peak Plate Current #	5 Ma.
Maximum Average Output Current	0.25 Ma.
Minimum Frequency of Supply Voltage	5.0 Kc

Direct Interelectrode Capacitances:*

Filament to Plate	0.6 μμf.

*With no external shield.

TYPICAL OPERATION

As a Pulse Type Rectifier Doubler in Television Scanning Circuits #

Filament Voltage	1.25 Volts
Filament Current (per tube)	200 Ma.
Peak Plate Pulse Voltage from Scanning Section	8000 Volts
Output Current	150 μa.
Output Voltage (two tubes in circuit shown)	12,000 Volts

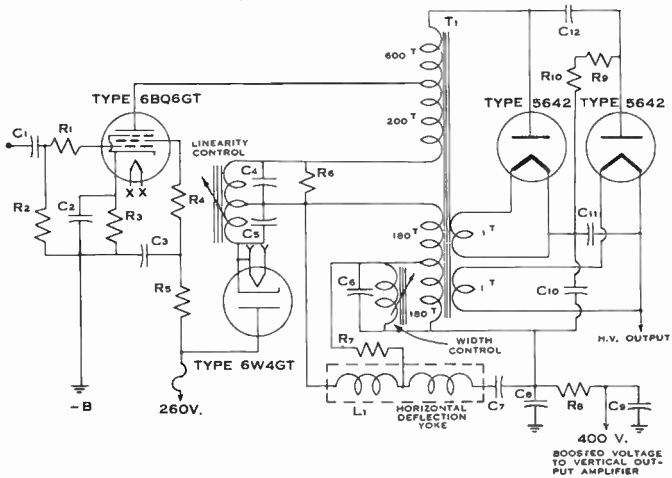
The duration of the voltage pulse should not exceed 15% of one horizontal scanning cycle. In a 525 line, interlaced two to one, 30 frame per second television system, 15% of one horizontal scanning cycle is 10 microseconds.

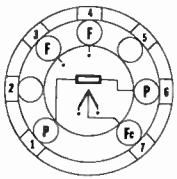
APPLICATION

Sylvania Type 5642 is a subminiature half-wave rectifier designed for use in high voltage power supplies where high efficiency and compactness are required. The use of a wired-in tube assists in avoiding socket insulation and leakage problems.

Leads should not be bent within 1/16" of the glass. Avoid soldering filament leads within ¼" of the bulb, and the top (plate) lead should not be soldered within ⅛" of the glass.

The following circuit shows a typical application in a flyback rectifier delivering 12,000 volts dc to the picture tube anode.





5CB-0-0

Sylvania Type 5722

NOISE GENERATING DIODE

PHYSICAL SPECIFICATIONS

Base	Miniature Button 7 Pin
Bulb	T-5½
Maximum Overall Length	2 1/8"
Maximum Seated Height	1 7/8"
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 μμf.

*With no external shield.

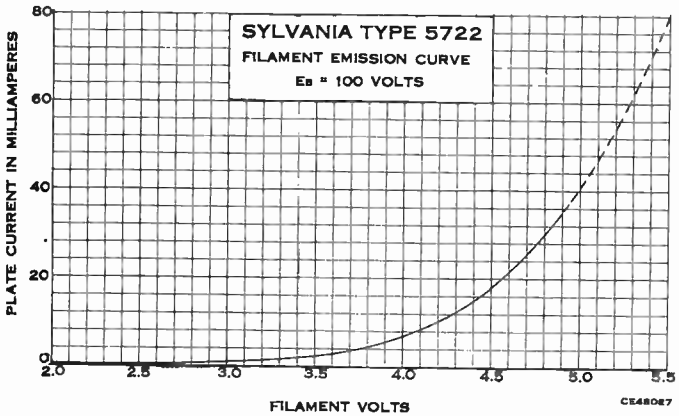
TYPICAL OPERATION

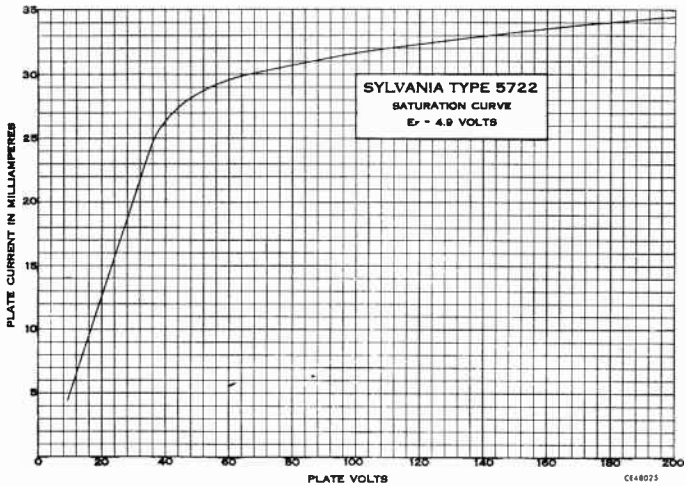
Sylvania Type 5722 is a tungsten filament diode designed for use as a noise generator at frequencies up to 400 or 500 mc. The filament center tap allows better RF grounding of the filament when used in the recommended circuit shown on a following page.

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.

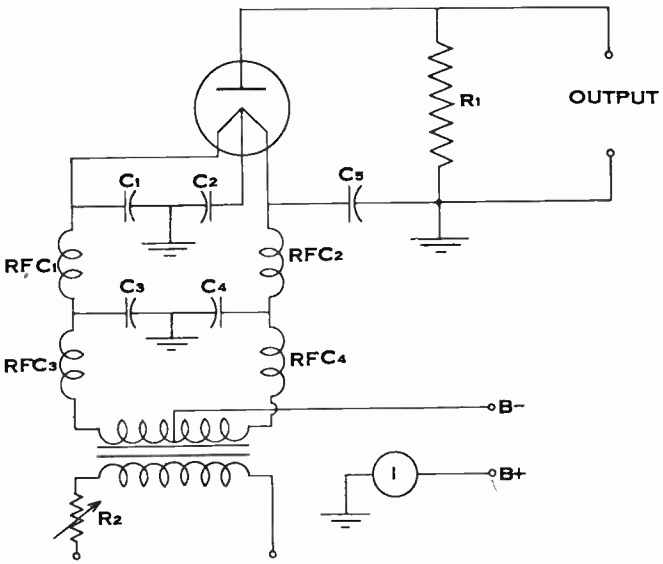
In use, the diode is coupled to the input of the amplifier under test and the filament voltage is increased until the noise output power is double that read without the diode. From the plate current reading and the generator resistance the noise factor can be calculated. Additional construction details 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.





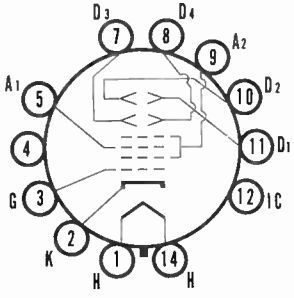
RECOMMENDED CIRCUIT



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

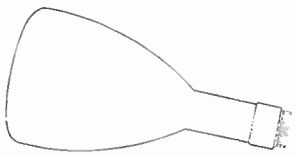
SYLVANIA
TELEVISION PICTURE TUBES



14-R

Sylvania Type 7JP1
Sylvania Type 7JP4
Sylvania Type 7JP7

PICTURE TUBE



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.

NOTES:

7JP1 is identical to Type 7JP4 except it has Green Phosphor Color.

7JP7 is identical to Type 7JP4 except it has Blue-White Phosphor and Long Persistence.

APPLICATION

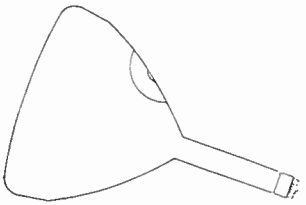
Sylvania Type 7JP4 is a direct viewing Television Picture Tube employing electrostatic deflection and focusing.

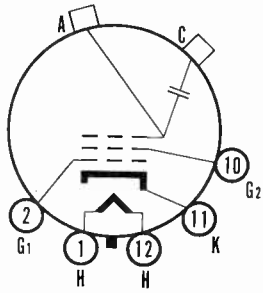
Type 7JP4 may be used as a direct replacement for Type 7GP4 providing no connections are made to the socket connections for Pins 4 and 12.

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.

10BP4 Sylvania Type

PICTURE TUBE





12N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 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.

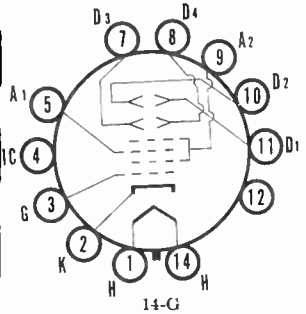
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

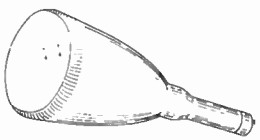
10BP4A

Sylvania Type 10BP4A is identical to Type 10BP4 except for having the gray face plate.

Sylvania Type 10HP4

PICTURE TUBE





PHYSICAL SPECIFICATIONS

Base	Medium Shell Diheptal 12 Pin
Maximum Overall Length	19⅝″
Maximum Overall Diameter	10¼″
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.

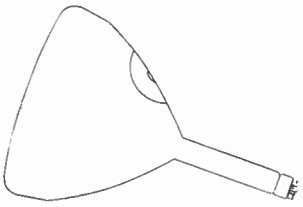
APPLICATION

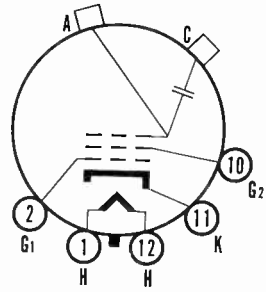
Sylvania Type 10HP4 is an electrostatic type Television Picture Tube recommended for replacement use in sets designed for it.

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.

12LP4 Sylvania Type,

PICTURE TUBE





12-N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19 1/8"
Maximum Overall Diameter	12 1/2"
Picture Size	7 1/2 x 10"
Deflection Method	Electromagnetic
Focusing Method	Electromagnetic
Ion Trap Type	Tilted Lens
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
External Conductive Coating Capacitance (Maximum)	3000 μμf
(Minimum)	750 μμf

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	Double Field 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 750 to 3000 μμf.

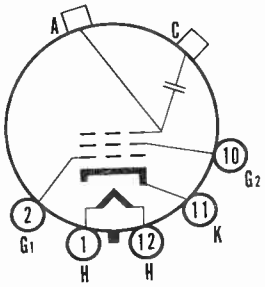
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

12LP4A

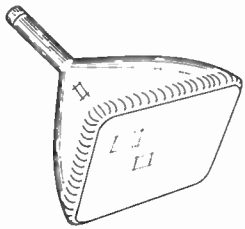
Sylvania Type 12LP4A is identical to Type 12LP4 except for having the gray face plate.

Sylvania Type 14BP4

PICTURE TUBE



12-N



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	17 3/16"
Maximum Rectangular Dimensions	9 5/16" 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 Persistence	Medium
Mounting Position	Any
Horizontal Deflection Angle (Approx.)	65°
Face Plate Transmission (Neutral Gray)	70%
External Conductive Coating Capacitance (Maximum)	2000 μμf
(Minimum)	500 μμf

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

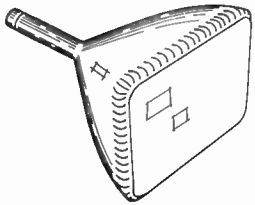
Sylvania Type 14BP4 is a direct view magnetic deflection television picture tube providing a rectangular screen 8-21/32" x 11-9/16". A double magnet ion trap is used to prevent ion spot blemish. The face plate is made of neutral density (gray) glass for improved picture contrast and detail under high ambient light conditions.

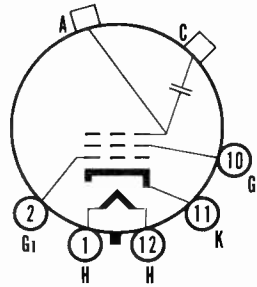
The coating on the outside of the bulb should be grounded to provide a filter capacitance of 500 to 2000 μμf.

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 in the appendix.

14CP4 Sylvania Type

PICTURE TUBE





12-N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	17 1/8"
Maximum Rectangular Dimensions	12 17/32" x 9 23/32"
Minimum Useful Screen Dimensions	8 1/2" x 11 3/8"
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)	66% (Approx.)
External Conductive Coating Capacitance (Maximum)	2000 μμf
(Minimum)	750 μμf

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
Maximum Grid Circuit Resistance	1.5 Megohms

*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##	35 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 footlamberts on an 8 5/8" x 11 1/2" picture area.

##For use with RMA Standard No. 111 ion trap magnet or equivalent.

APPLICATION

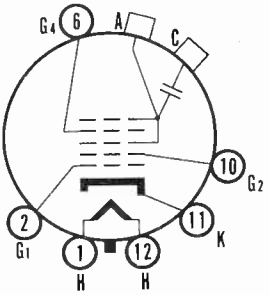
Sylvania Type 14CP4 is a direct viewing magnetic deflection picture tube providing the space-saving feature of the rectangular bulb, neutral density face plate, ion trap, and the filter capacitance provided by the external conductive coating of 750 to 2000 μμf.

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 in the appendix.

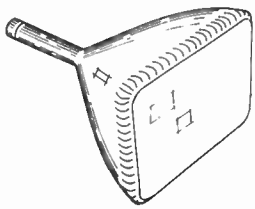
14EP4 Identical to Type 14CP4 except that the Maximum Overall Length is 16-17/32".

Sylvania Type 14GP4

PICTURE TUBE



12L



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 6-Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	17 3/16"
Maximum Rectangular Dimensions	9 27/32" x 12 29/32"
Picture Size	8 1/2" x 11 3/8"
Deflection Method	Magnetic
Focusing Method	Electrostatic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (approx.) Horizontal	65 degrees
External Conductive Coating Capacitance (Maximum)	2000 μμf
(Minimum)	750 μμf

RATINGS

Heater Voltage	6.3 Volts
Maximum Anode Voltage	14,000 Volts
Maximum Accelerating Grid Voltage	500 Volts
Maximum Focusing Grid Voltage	5,000 Volts
Maximum Control Grid Voltage Range*	−125 to 0 Volts
Maximum Peak Heater to Cathode Voltage**	180 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
Focusing Grid Voltage	2170 to 2940 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Ion Trap Magnet Field Strength***	35 Gausses

***Requires a single magnet type ion trap magnet. Strength is measured at the center of the field.

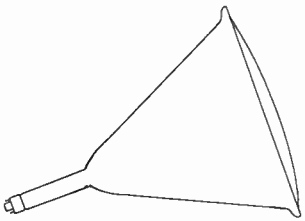
APPLICATION

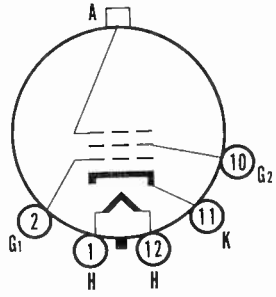
Sylvania Type 14GP4 is a direct view television picture tube with electrostatic focusing and magnetic deflection providing a rectangular screen 8½" x 11⅜". The face plate is made of neutral density (gray) glass for improved picture contrast and detail under high ambient light conditions. An external conductive coating is used on the bulb.

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.

16AP4 Sylvania Type

PICTURE TUBE





12-D

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Metal-Cone Lip
Maximum Overall Length	22⅝"
Maximum Overall Diameter	16"
Minimum Useful Screen Diameter	14⅜"
Deflection Method	Electromagnetic
Focusing Method	Electromagnetic
Ion Trap Type	Tilted Lens
Phosphor Color	White
Phosphor Persistence	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 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 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	Double Field Type	
Focus Coil Current with Typical Coil	55-92	67-112 Ma.

16AP4A

Sylvania Type 16AP4A is identical to 16AP4 except for having a gray face plate.

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.

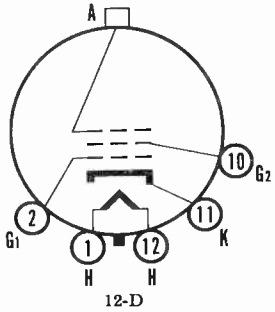
Since the anode voltage is applied to the metal shell, this tube should be operated only within an enclosure adequate to prevent accidental contact, and insulation for the maximum voltage should be provided in the tube mounting. Connection to the metal cone should be made through a clip or metal piece 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.

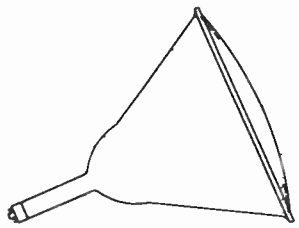
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

Sylvania Type 16GP4

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Metal-Cone Lip
Maximum Overall Length	17 11/16"
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 Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.)	70°

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.

16GP4A

Sylvania Type 16GP4A is identical to Type 16GP4 except for having a clear face plate.

16GP4B

Sylvania Type 16GP4B is identical to Type 16GP4 except for having a gray frosted face plate.

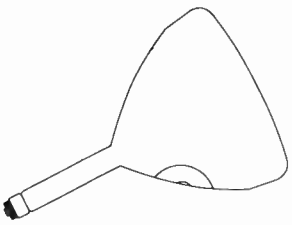
APPLICATION

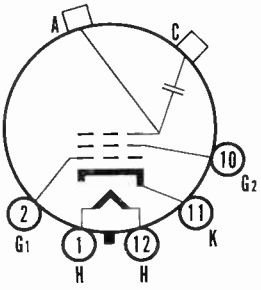
Sylvania Type 16GP4 is a magnetic deflection direct view picture tube for television use. This type combines the features of the bent gun ion trap and a lightweight metal cone envelope. The gray face plate is of higher quality than is commonly used on all-glass tubes. Since the anode voltage is applied to the metal shell, this tube should be operated only 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 in the appendix.

16JP4 Sylvania Type

PICTURE TUBE





12-N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	$21\frac{1}{8}$"
Maximum Overall Diameter	$16\frac{3}{8}$"
Minimum Useful Screen Diameter	15"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type*	Double Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.) Horizontal	60°
External Conductive Coating Capacitance (Maximum)	2000 μμf.
(Minimum)	750 μμf

*Single field type may be used if other means of beam centering are employed.

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***	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 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
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focus Coil Current (Approx.)	115 Ma.
Ion Trap Magnet Strength	35 Gausses

APPLICATION

Sylvania Type 16JP4 is a direct-view picture tube using magnetic deflection and focusing. It is to be used with an ion trap magnet. There is an external conductive coating on the bulb. The socket for the base should have flexible leads, and should not be rigidly mounted.

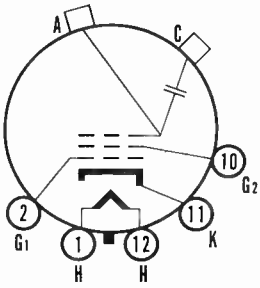
16JP4A

Sylvania Type 16JP4A is identical to Type 16JP4 with the exception of having a neutral gray face plate.

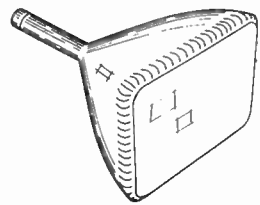
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

Sylvania Type 16KP4

PICTURE TUBE



12-N



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19⅛"
Maximum Rectangular Dimensions	11⅝" x 14⅞"
Picture Size	10⅜" x 13¾"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.)	
Horizontal	65°
Diagonal	70°
External Conductive Coating Capacitance (Maximum)	1500 μμf
(Minimum)	750 μμf
Gray Filter Face Plate	
Light Transmission (Approx.)	66%

RATINGS

Heater Voltage	6.3 Volts
Maximum Anode Voltage	16,000 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 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	14,000 Volts
Accelerating Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	108 Ma.
Ion Trap Magnet Field Strength†	35 Gausses

†Requires a single magnet type ion trap magnet. Strength is measured at the center of the field.

APPLICATION

Sylvania Type 16KP4 is a direct-view magnetic deflection and focusing television picture tube providing a rectangular screen 13¾" x 10⅜". A single magnet ion trap is used to prevent 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.

An external conductive coating is used on the bulb.

16KP4A

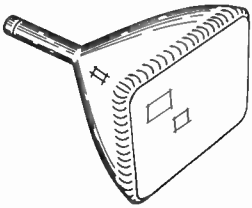
Sylvania Type 16KP4A is identical to Type 16KP4 except for having the metal-backed screen for increased light output.

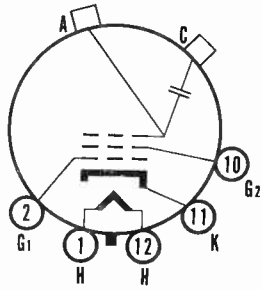
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

16RP4 Sylvania Type

TELEVISION PICTURE TUBE

16" Direct Viewed — Rectangular Glass Type
Gray Filter Glass — Magnetic Deflection
Magnetic Focus — Single Field Ion Trap
External Conductive Coating





12-N

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
External Conductive Coating to Anode[1]	2000 μμf Max. 750 μμf Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	13½x10⅛ Inches
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts d-c
Grid No. 2 Voltage	410 Volts d-c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d-c
Positive Bias Value	0 Volts d-c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d-c
After Equipment Warm-up Period	150 Volts d-c
Heater Positive with Respect to Cathode	150 Volts d-c

Recommended Operating Conditions

Anode Voltage[2]	14,000 Volts d-c
Grid No. 2 Voltage	300 Volts d-c
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts d-c
Focusing Coil Current (approx.)[4]	108 MA d-c
Ion Trap Magnet Strength (approx.)	50 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

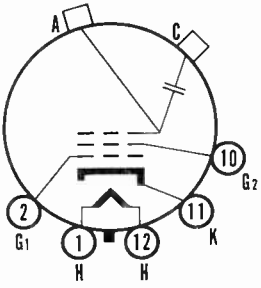
NOTES:

1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC focusing coil 109 or equivalent three and one half inches from reference line, bias adjusted to 30 foot lamberts on a 13½ x 10⅛ inch picture area sharply focused at center of screen.

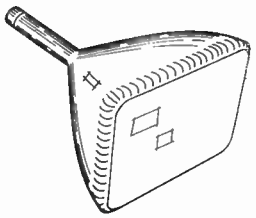
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 16TP4

PICTURE TUBE



12-N



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	18½"
Maximum Rectangular Dimensions	11½" x 14¾"
Picture Size	10⅛" x 13½"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.) Horizontal	65°
External Conductive Coating Capacitance (Maximum)	2000 μμf
(Minimum)	750 μμf

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	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 Gauses

*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.

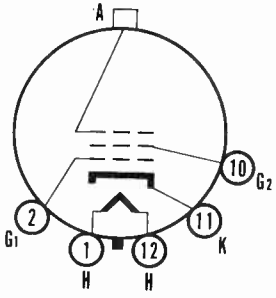
APPLICATION

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. An external conductive coating is used on the bulb.

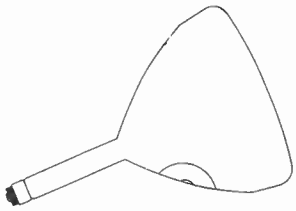
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the appendix.

16WP4 Sylvania Type

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	18⅛"
Maximum Overall Diameter	16"
Minimum Useful Screen Diameter	14½"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type*	Double Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Gray Filter Face Plate	
Light Transmission (Approx.)	66%
Deflection Angle (Approx.)	70°

*Single field type may be used if other means of beam centering are employed.

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	16,000 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 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
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focus Coil Current (Approx.)	110 Ma.
Ion Trap Magnet Strength	35 Gausses

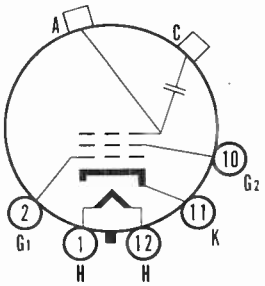
APPLICATION

Sylvania Type 16WP4 is a magnetic deflection and focusing television picture tube for television use. It is a direct-view, all glass, round picture tube without external conductive coating. It utilizes a neutral density (gray) glass face plate. The socket for the base should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

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 in the appendix.

(Cont'd) 16WP4A

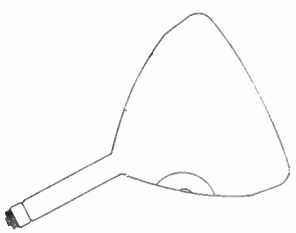
Sylvania Type 16WP4A is identical to Type 16WP4 except for having the external capacitive coating of 750 to 1500 $\mu\mu f$ and the basing.

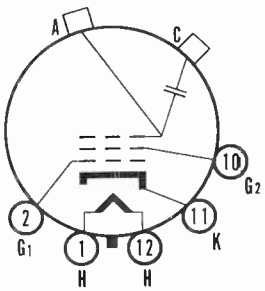


12-N

Sylvania Type 16ZP4

PICTURE TUBE





12-N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	22 5/8"
Maximum Overall Diameter	16"
Minimum Useful Screen Diameter	14 1/2"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type*	Double Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Gray Filter Face Plate Light Transmission (Approx.)	66%
Deflection Angle (Approx.) Horizontal	52°
External Conductive Coating Capacitance (Maximum)	1500 $\mu\mu f$
(Minimum)	750 $\mu\mu f$

*Single Field type may be used if other means of beam centering are employed.

16ZP4 (Cont'd)

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	16,000 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 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
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	110 Ma.
Ion Trap Magnet Strength	35 Gausses

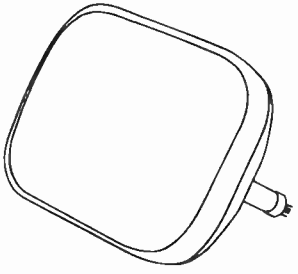
APPLICATION

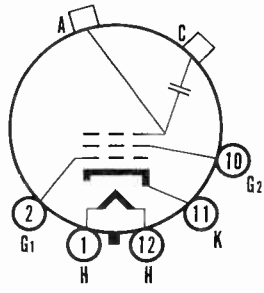
Sylvania Type 16ZP4 is a direct-view television picture tube utilizing magnetic deflection and focusing. It has a neutral density (gray) face plate. It contains an electron gun designed to be used with an ion trap magnet, and has a conductive coating on the bulb. The socket for the base should have flexible leads and be allowed to move freely.

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 in the appendix.

17AP4 Sylvania Type

PICTURE TUBE





12-N

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19"
Screen Width	14¼"
Screen Height	10¾"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.)	
Horizontal	65°
Diagonal	70°
External Conductive Coating Capacitance (Maximum)	2000 μμf
(Minimum)	750 μμf

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	16,000 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 warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to cathode.

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	12,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for visual cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	115 Ma.

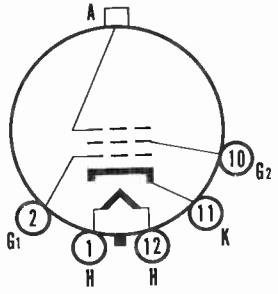
APPLICATION

Sylvania Type 17AP4 is a direct-view rectangular picture tube intended for television applications. It has magnetic deflection and focusing, and utilizes the gray filter face plate. An Ion Trap Magnet should be used to prevent ion spot blemish. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. An external conductive coating is used on the bulb.

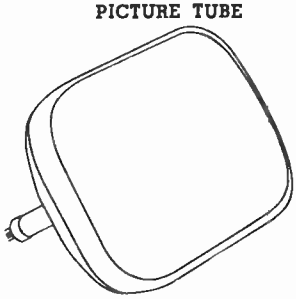
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the Appendix.

Sylvania Type 17BP4

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19⅜"
Maximum Rectangular Dimensions	12⅜" x 15½"
Minimum Useful Screen Dimensions	10¾" x 14¼"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Gray Filter Face Plate	
Light Transmission (Approx.)	66%
Deflection Angle (Approx.)	
Horizontal	65°
Diagonal	70°

17BP4 (Cont'd)

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	16,000 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 warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

TYPICAL OPERATION

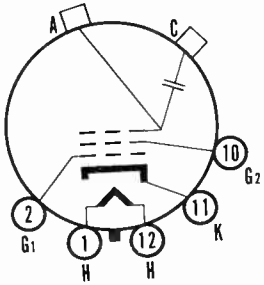
Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	14,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	115 Ma.
Ion Trap Magnet Strength	35 Gausses

APPLICATION

Sylvania Type 17BP4 is a direct-view rectangular picture tube intended for television applications. It has magnetic deflection and focusing, and utilizes the gray filter face plate. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

17BP4A

Sylvania Type 17BP4A is identical to Type 17BP4 except for having the external conductive coating of 750 to 1500 $\mu\mu$f and the basing.

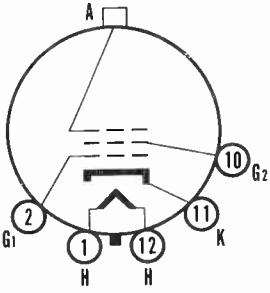


12-N

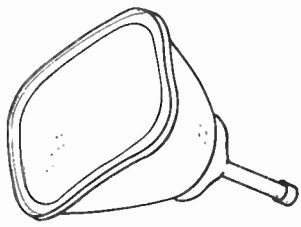
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less. The precautions suggested for handling television tubes are given in the Appendix.

Sylvania Type 17CP4

PICTURE TUBE



12-D



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Metal-Cone Lip
Maximum Overall Length	19"
Maximum Rectangular Dimension at Lip	12 3/8" x 16 1/16"
Minimum Useful Screen Dimensions	10 11/16" x 14 3/8"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Frosted Gray Filter Face Plate	
Light Transmission (Approx.)	66%
Deflection Angle (Approx.)	
Horizontal	66°
Diagonal	70°

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	16,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Control Grid Voltage Range*	−125 to 0 Volts
Peak Heater to Cathode Voltage**	180 Volts
Maximum Grid Circuit Resistance	1.5 Megohms

*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	14,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	104 Ma.
Ion Trap Magnet Strength	35 Gausses

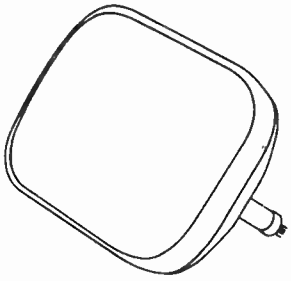
APPLICATION

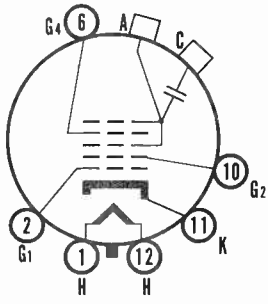
Sylvania Type 17CP4 is a direct-view rectangular picture tube with metal cone intended for television applications, having the frosted gray filter glass face plate. Care should be exercised in handling this picture tube to avoid bumps and shocks on the lip and rim of the face plate, especially to the inside edge of the lip. The principle support and clamping should be applied to the corner sections only. Anode voltage connection to the metal cone should be made through a clip or metal piece on which the polished lip rests when in use. Since the anode voltage is applied to the metal shell, operations should be within an enclosure adequate to prevent accidental contact.

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 in the Appendix.

17FP4 Sylvania Type

PICTURE TUBE





12-L

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 6-Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	19⅝"
Maximum Rectangular Dimensions	12⅜" x 15½"
Picture Size	11" x 14½"
Deflection Method	Magnetic
Focusing Method	Electrostatic
Ion Trap Magnet	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (approx.) Horizontal	65 degrees
External Conductive Coating Capacitance (Maximum)	750 μμf
(Minimum)	500 μμf

RATINGS

Heater Voltage	6.3 Volts
Maximum Anode Voltage	18,000 Volts
Maximum Accelerating Grid Voltage	410 Volts
Maximum Focusing Grid Voltage	5,000 Volts
Maximum 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	16,000 Volts
Accelerating Grid Voltage	300 Volts
Focusing Grid Voltage	3100 to 4100 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Ion Trap Magnet Field Strength***	40 Gausses

***Requires a single magnet type ion trap magnet. Strength is measured at the center of the field.

APPLICATION

Sylvania Type 17FP4 is a direct view television picture tube with electrostatic focusing and magnetic deflection providing a rectangular screen 11" x 14½". The face plate is made of neutral density (gray) glass for improved picture contrast and detail under high ambient light conditions. An external conductive coating is used on the bulb.

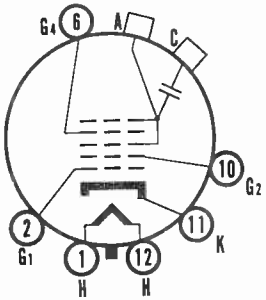
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 17HP4/17RP4

TELEVISION PICTURE TUBE

17" Direct Viewed Rectangular Glass Type
Gray Filter Glass

Magnetic Deflection
Low Voltage Electrostatic Focus
Single Field Ion Trap



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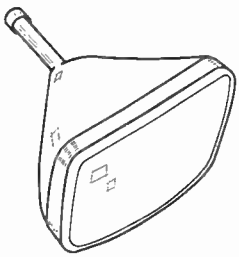


CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Per cent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f.
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f.
External Conductive Coating to Anode[1]	1500 $\mu\mu$f. Max. 750 $\mu\mu$f. Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	10¾ x 14¼
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts dc
Grid No. 4 (Focusing Electrode) Voltage	−500 to + 1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Notes:

[1]External conductive coating must be grounded.

17HP4/17RP4 (Cont'd)

Recommended Operating Conditions

Anode Voltage[2]	14,000 Volts dc
Grid No. 4 Voltage	−50 to + 310 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage[3] Required for Cutoff	−33 to −77 Volts dc
Ion Trap Magnet Field Strength (approx.)	40 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

[2]Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.

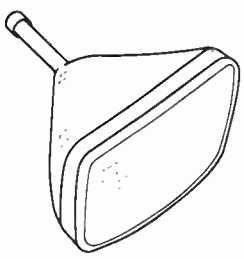
[3]Visual extinction of undeflected focused spot.

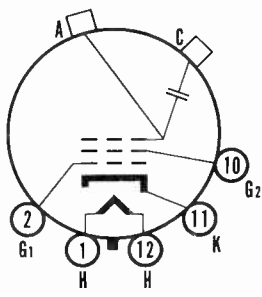
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

17JP4 Sylvania Type

TELEVISION PICTURE TUBE

17" Direct Viewed — **Rectangular Glass Type**
Gray Filter Glass — **Magnetic Deflection**
Magnetic Focus — **Single Field Ion Trap**
External Conductive Coating





12-N

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflecting Angle	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
External Conductive Coating to Anode[1]	750 μμf. Max. 500 μμf. Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	14¼" x 10¾"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts dc
Grid No. 2 Voltage	410 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	150 Volts dc
Heater Positive with Respect to Cathode	150 Volts dc

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[3]	-33 to -77 Volts dc
Focusing Coil Current (approx.)[4]	100 Ma. dc
Ion Trap Magnet Field Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

[1]External conductive coating must be grounded.

[2]Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.

[3]Visual extinction of undeflected focused spot.

[4]For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 10¾ x 14¼ inch picture area sharply focused at center of screen.

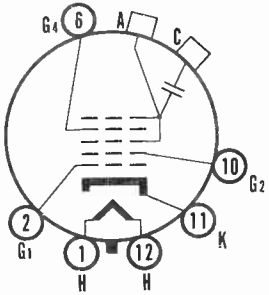
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 17LP4/17VP4

TELEVISION PICTURE TUBE

17" Direct Viewed
Cylindrical Faceplate
Magnetic Deflection
Single Field Ion Trap

Rectangular Glass Type
Gray Filter Glass
Low Voltage Electrostatic Focus
External Conductive Coating



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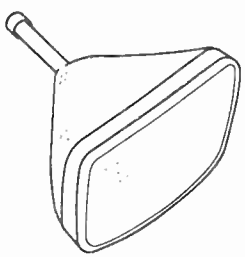


17LP4/17VP4 (Cont'd)

CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f.
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f.
External Conductive Coating to Anode[1]	1500 $\mu\mu$f. Max. 750 $\mu\mu$f. Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	10¾" x 14¼"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts dc
Grid No. 4 (Focusing Electrode) Voltage	-500 to + 1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Recommended Operating Conditions

Anode Voltage[2]	14,000 Volts dc
Grid No. 4 Voltage	-56 to +310 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage[3] Required for Cutoff	-33 to -77 Volts dc
Ion Trap Magnet Strength (approx.)	35 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.

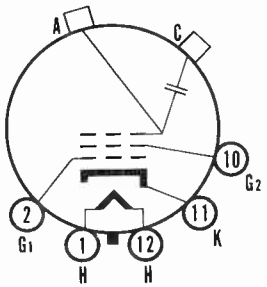
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 17QP4

TELEVISION PICTURE TUBE

17" Direct Viewed
Rectangular Glass Type
Cylindrical Faceplate
Gray Filter Glass

Magnetic Deflection
Magnetic Focus
Single Field Ion Trap
External Conductive Coating



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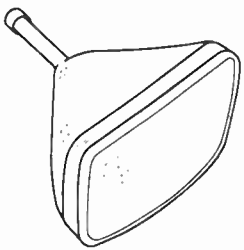


CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
External Conductive Coating to Anode[1]	1500 μμf. Max. 750 μμf. Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	10¾" x 14¼"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts dc
Grid No. 2 Voltage	410 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	150 Volts dc
Heater Positive with Respect to Cathode	150 Volts dc

Recommended Operating Conditions

Anode Voltage[2]	14,000 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[3]	-33 to -77 Volts dc
Focusing Coil Current (approx.)[4]	100 Ma. dc
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

17QP4 (Cont'd)

Notes:

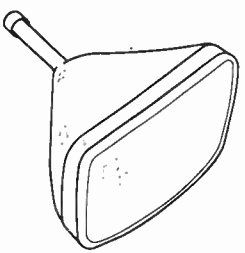
1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 10¾ x 14¼ inch picture area sharply focused at center of screen.

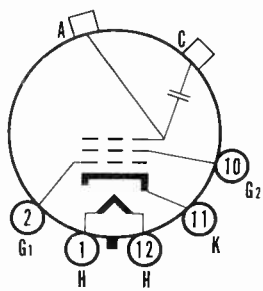
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

17YP4 Sylvania Type

TELEVISION PICTURE TUBE

17" Direct Viewed	Magnetic Deflection
Rectangular Glass Type	Magnetic Focus
Cylindrical Faceplate	Single Field Ion Trap
Gray Filter Glass	External Conductive Coating





12-N

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
External Conductive Coating to Anode[1]	750 μμf. Max. 500 μμf. Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	10¾" x 14¼"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	150 Volts dc
Heater Positive with Respect to Cathode	150 Volts dc

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts dc
Focusing Coil Current (approx.)[4]	100 Ma. dc
Ion Trap Magnet Strength (approx.)	45 Gausses

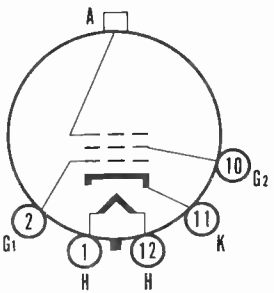
Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not he less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 10¾ x 14¼ inch picture area sharply focused at center of screen.

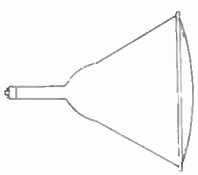
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.



12D

Sylvania Type 19AP4

PICTURE TUBE



PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5-Pin
Bulb Contact	Metal Cone Lip
Maximum Overall Length	22"
Maximum Overall Diameter	18¾"
Minimum Useful Screen Diameter	17⅜"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Deflection Angle (Approx.)	66°
Raster Size (Approx.)	11¾" x 15¾"

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	19,000 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 warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to the cathode.

19AP4 (Cont'd)

TYPICAL OPERATION

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	14,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	-33 to -77 Volts
Focusing Coil Current	115 Ma.
Ion Trap Magnet Strength	35 Gausses

APPLICATION

Sylvania Type 19AP4 is a round, metal cone envelope picture tube, intended for television applications, having the tilted electron gun and clear face plate. It employs magnetic deflection and focusing. Care should be exercised to avoid bumps and shocks on the lip and rim of the face plate, especially the inside edge of the lip. Anode voltage connection to the metal cone should be made through a clip or metal piece on which the lip rests when in use. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Since the anode voltage is applied to the metal cone, operation should be within an enclosure to prevent accidental contact.

19AP4A Sylvania Type 19AP4A is identical to Type 19AP4 except for having the neutral-density gray face plate.

19AP4B Sylvania Type 19AP4B is identical to Type 19AP4 except for having the tinted, frosted face plate.

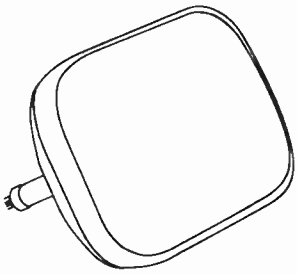
19AP4C Sylvania Type 19AP4C is identical to Type 19AP4 except for having the tinted, frosted face plate with aluminum backed screen.

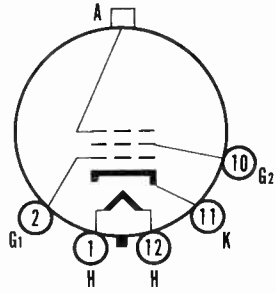
19AP4D Sylvania Type 19AP4D is identical to Type 19AP4 except for having the clear, frosted face plate.

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 in the Appendix.

20CP4 Sylvania Type

PICTURE TUBE





12-D

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	21 13/16"
Maximum Rectangular Dimensions	15 1/16" x 18 13/16"
Minimum Useful Screen Dimensions	12 3/4" x 17"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field Type
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Gray Filter Face Plate	
Light Transmission (Approx.)	66%
Deflection Angle (Approx.)	
Horizontal	65°
Diagonal	70°

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	18,000 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 warm-up period not exceeding 15 seconds the heater may be 410 volts negative with respect to cathode.

TYPICAL OPERATION

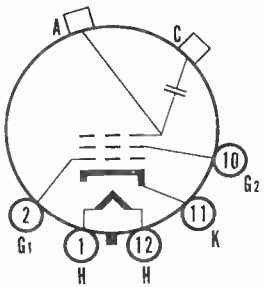
Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Anode Voltage	14,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	95 Ma.
Ion Trap Magnet Strength	35 Gausses

APPLICATION

Sylvania Type 20CP4 is a direct-view rectangular picture tube intended for television applications. It has magnetic deflection and focusing, and utilizes the gray filter face plate. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

Sylvania Type 20CP4A is identical to Type 20CP4 except for having an external conductive coating of 500 to 750$\mu\mu$f.

20CP4A

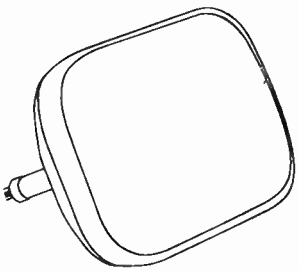


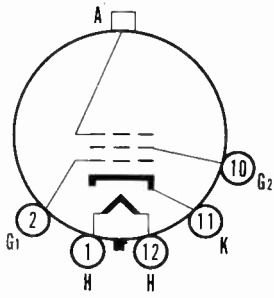
12-N

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 in the appendix.

20DP4 Sylvania Type

PICTURE TUBE





12D

PHYSICAL SPECIFICATIONS

Base	Small Shell Duodecal 5 Pin
Bulb Contact	Recessed Small Cavity
Maximum Overall Length	22 1/8"
Maximum Rectangular Dimensions	15 1/16" x 18 13/16"
Minimum Useful Screen Dimensions	12 3/4" x 17"
Deflection Method	Magnetic
Focusing Method	Magnetic
Ion Trap Type	Single Field
Phosphor Color	White
Phosphor Persistence	Medium
Mounting Position	Any
Gray Filter Face Plate	
Light Transmission (Approx.)	66%
Deflection Angle (Approx.)	
Horizontal	65°
Diagonal	70°

RATINGS

Heater Voltage	6.3 Volts
Heater Current	0.6 Ampere
Maximum Anode Voltage	18,000 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 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	14,000 Volts
Accelerator Grid Voltage	300 Volts
Control Grid Voltage for Visual Cut-off	−33 to −77 Volts
Focusing Coil Current (Approx.)	95 Ma.
Ion Trap Magnet Strength	35 Gausses

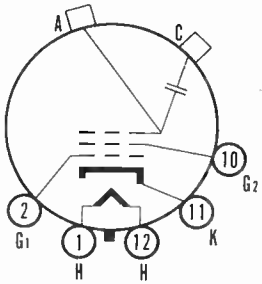
APPLICATION

Sylvania Type 20DP4 is a direct-view rectangular picture tube intended for television applications. It has the gray filter face plate, and provides for the use of a single magnet ion trap. Magnetic focusing and deflection are used. The socket for the base should not be rigidly mounted. It should have flexible leads and be allowed to move freely.

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 in the Appendix.

20DP4A

Sylvania Type 20DP4A is identical to Type 20DP4 except for having an external conductive coating of 500 to 750 $\mu\mu$f.

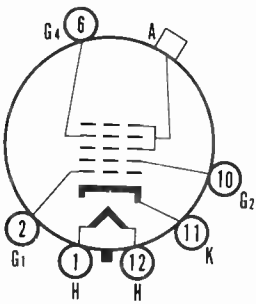


12-N

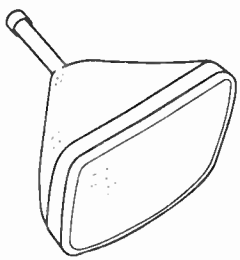
Sylvania Type 20HP4 20HP4A

TELEVISION PICTURE TUBE

20" Direct Viewed — Rectangular Glass Type
Gray Filter Glass — Magnetic Deflection
Single Field Ion Trap — Low Voltage Electrostatic Focus
(20HP4A Has External Conductive Coating)



12-M



CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

20HP4 (Cont'd)
20HP4A

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (Approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	12¾" x 17"
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)

Final Anode Voltage	16,000 Volts dc
Grid No. 4 (Focusing Electrode) Voltage	-500 to + 1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Recommended Operating Conditions

Final Anode Voltage[1]	14,000 Volts dc
Grid No. 4 Voltage	-56 to +310 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[2]	-33 to -77 Volts dc
Ion Trap Magnet Field Strength (approx.)	40 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

[1]Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.

[2]Visual extinction of undeflected focused spot.

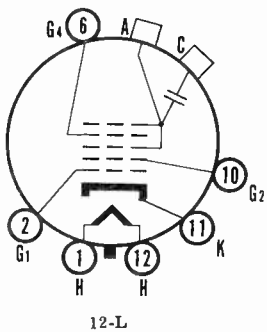
20HP4A

The Sylvania Type 20HP4A is equivalent to the Type 20HP4 except for the addition of an external conductive coating.

External Conductive Coating to Anode Capacitance[1]	
Maximum	1500 μμf.
Minimum	750 μμf.
Basing	12L

Notes:

[1]External conductive coating must be grounded.



12-L

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.

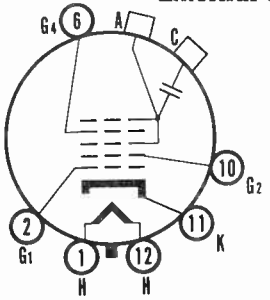
Sylvania Type 20MP4

TELEVISION PICTURE TUBE

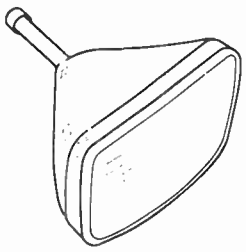
20″ Direct Viewed
Gray Filter Glass
Single Field Ion Trap

Rectangular Glass Type
Magnetic Deflection
Low Voltage Electrostatic Focus

External Conductive Coating



12-L



CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittanee (approx.)	66 Pereent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Intereleetrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
External Conduetive Coating to Anode[1]	750 μμf Max. 500 μμf Min.
Ion Trap Magnet	External. Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	12¾x17 Inehes
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts dc
Grid No. 4 (Foeusing Electrode) Voltage	-500 to +1000 Volts dc
Grid No. 2 Voltage	500 Volts de
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Heater Negative with Respeet to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respeet to Cathode	180 Volts dc

Recommended Operating Conditions

Anode Voltage[2]	14,000 Volts dc
Grid No. 4 Voltage	-55 to +300 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[3]	-33 to -77 Volts dc
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistanee	1.5 Megohms Max.

NOTES:

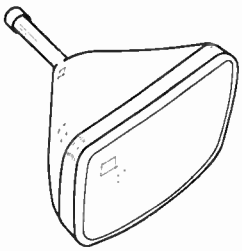
1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinetion of undeflected focused spot.

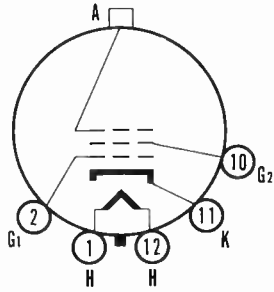
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

21EP4 Sylvania Type
21EP4A

TELEVISION PICTURE TUBE

21" Direct Viewed — Rectangular Glass Type
Cylindrical Faceplate — Gray Filter Glass
Magnetic Deflection — Magnetic Focus
Single Field Ion Trap





12-D

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Vertical	50 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	19⅛" x 13⅞"
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12D

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Recommended Operating Conditions

Anode Voltage*	16,000 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff†	-33 to -77 Volts dc
Focusing Coil Current (approx.) #	95 Ma. dc
Ion Trap Magnet Field Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

*Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.

†Visual extinction of undeflected focused spot.

For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 19⅛ x 13⅞ inch picture area sharply focused at center of screen.

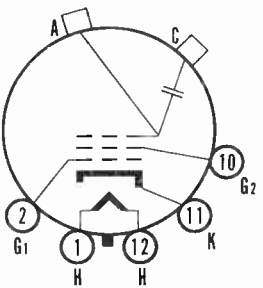
21EP4A

The Sylvania Type 21EP4A is identical to the Type 21EP4 except for the addition of an external conductive coating.

External Conductive Coating to Anode Capacitance	
Maximum	750 μμf.
Minimum	500 μμf.
Basing	12N

Notes:

External conductive coating must be grounded.



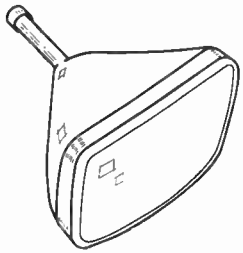
12-N

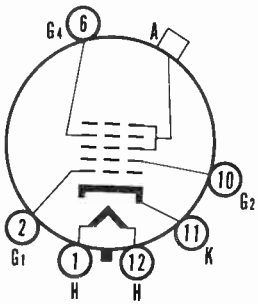
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

21FP4 Sylvania Type
21FP4A

TELEVISION PICTURE TUBE

21" Direct Viewed — **Rectangular Glass Type**
Cylindrical Faceplate — **Gray Filter Glass**
Magnetic Deflection — **Single Field Ion Trap**
Low Voltage Electrostatic Focus





12-M

CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Vertical	50 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf.
Grid No. 1 to All Other Electrodes	6 μμf.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	19⅛" x 13¾"
Bulb Contact. (Recessed Small Cavity)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts dc
Grid No. 4 Voltage (Focusing Electrode)	-500 to +1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Recommended Operating Conditions

Anode Voltage*	16,000 Volts dc
Grid No. 4 Voltage	−64 to 350 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff†	−33 to −77 Volts dc
Ion Trap Magnet Field Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

Notes:

*Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.

†Visual extinction of undeflected focused spot.

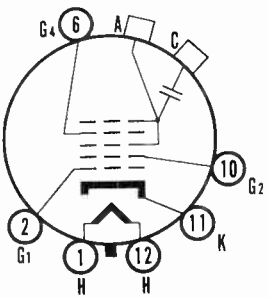
21FP4A

The Sylvania Type 21FP4A is identical to the Type 21FP4 except for the addition of an external conductive coating.

External Conductive Coating to Anode Capacitance	
Maximum	750 μμf.
Minimum	500 μμf.
Basing	12L

Notes:

External conductive coating must be grounded.



12-L

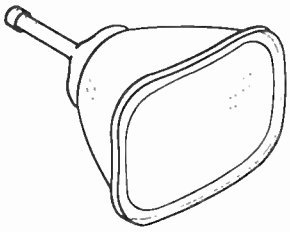
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

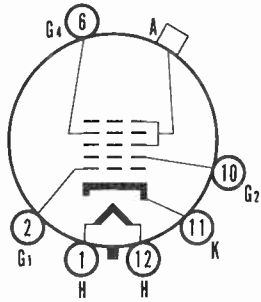
21MP4 Sylvania Type

TELEVISION PICTURE TUBE

21" Direct Viewed Frosted Filter Glass Single Field Ion Trap

Rectangular Metal Type Magnetic Deflection Low Voltage Electrostatic Focus





12-M

CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Frosted Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	$18\frac{1}{8}$x$13\frac{11}{16}$ Inches
Bulb Contact	Metal Cone Lip
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12M

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	16,000 Volts dc
Grid No. 4 (Focusing Electrode) Voltage	-500 to +1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	125 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode	180 Volts dc

Recommended Operating Conditions

Anode Voltage[1]	14,000 Volts dc
Grid No. 4 Voltage	-55 to +300 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage Required for Cutoff[2]	-33 to -77 Volts dc
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

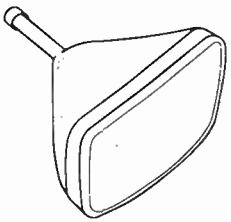
1. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
2. Visual extinction of undeflected focused spot.

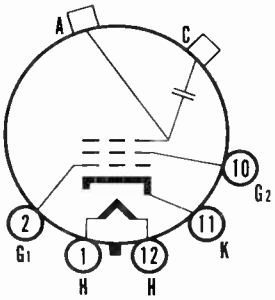
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 21WP4

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Magnetic Focus
Single Field Ion Trap — Rectangular Glass Type
External Conductive Coating





12-N

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
External Conductive Coating to Anode[1]	750 $\mu\mu$f Max.
	500 $\mu\mu$f Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	17 x 12¾ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 5-Pin)	B5-57
Basing	12N

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts d c
Grid No. 2 Voltage	410 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d c
After Equipment Warm-up Period	150 Volts d c
Heater Positive with Respect to Cathode	150 Volts d c

Issued as a supplement to the manual in Sylvania News for July-August 1953

21WP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts d c
Focusing Coil Current[4]	100 ± 20% Ma. d c
Ion Trap Magnet Current[5]	75 ± 50% Ma. d c

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

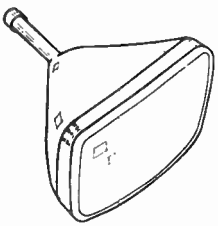
1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC focusing coil 109 or equivalent three and one quarter inches from reference line, bias adjusted to produce anode current of 100 μa on a picture area of 17 x 12¾ inches.
5. For JETEC 111 single field ion trap.

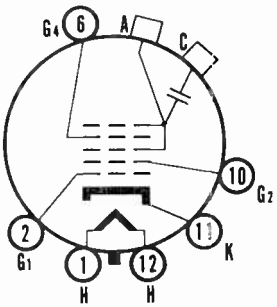
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 21XP4

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Rectangular Glass Type
Single Field Ion Trap — Low Voltage Electrostatic Focus
External Conductive Coating





12-L

CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	72 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
External Conductive Coating to Anode[1]	750 $\mu\mu$f Max. 500 $\mu\mu$f Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	17 x 12¾ Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts d c
Grid No. 4 Voltage (Focusing Electrode)	-500 to +1000 Volts d c
Grid No. 2 Voltage	410 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d c
After Equipment Warm-up Period	150 Volts d c
Heater Positive with Respect to Cathode	150 Volts d c

21XP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts d c
Grid No. 4 Voltage	-64 to +352 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[3]	-33 to -77 Volts d c
Ion Trap Magnet Current	75 ± 50% Ma d c

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.
4. For JETEC 111 single field ion trap.

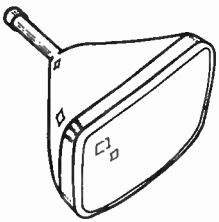
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

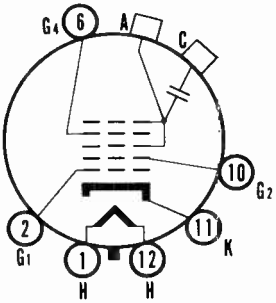
Sylvania Type 21YP4

TELEVISION PICTURE TUBE

21" Direct Viewed — Magnetic Deflection
Gray Filter Glass — Rectangular Glass Type
Single Field Ion Trap — Low Voltage Electrostatic Focus

EXTERNAL CONDUCTIVE COATING





12-L

CHARACTERISTICS

General Data

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	66 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	66 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 $\mu\mu$f
Grid No. 1 to All Other Electrodes	6 $\mu\mu$f
External Conductive Coating to Anode[1]	750 $\mu\mu$f Max. 500 $\mu\mu$f Min.
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	19⅛ x 13⅞ Inches
Bulb Contact, (Recessed Small Cavity Cap)	J1-21
Base, (Small Shell Duodecal 6-Pin)	B6-63
Basing	12L

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts d c
Grid No. 4 (Focusing Electrode) Voltage	-500 to +1000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater Negative with Respect to Cathode	
During Warm-up Period not to Exceed 15 Seconds	410 Volts d c
After Equipment Warm-up Period	180 Volts d c
Heater Positive with Respect to Cathode	180 Volts d c

Issued as a supplement to the manual in Sylvania News for May 1953

21YP4 (cont'd)

Recommended Operating Conditions

Anode Voltage[2]	16,000 Volts d c
Grid No. 4 Voltage	−64 to +350 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[3]	−33 to −77 Volts d c
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

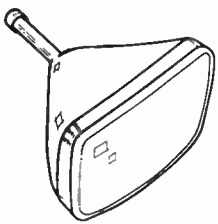
1. External conductive coating must be grounded.
2. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
3. Visual extinction of undeflected focused spot.

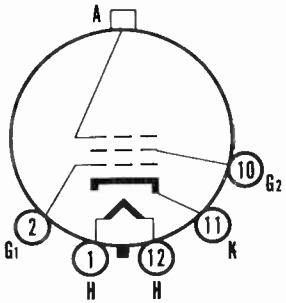
WARNING: X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Sylvania Type 21ZP4
21ZP4A

TELEVISION PICTURE TUBE

21" Direct Viewed
Gray Filter Glass
Single Field Ion Trap
Magnetic Deflection
Rectangular Glass Type
Magnetic Focus





12-D

CHARACTERISTICS

General Data

Focusing Method	Magnetic
Deflecting Method	Magnetic
Deflection Angle (approx.)	
Horizontal	65 Degrees
Diagonal	70 Degrees
Phosphor	P4
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmittance (approx.)	75 Percent

Electrical Data

Heater Voltage	6.3 Volts
Heater Current (approx.)	0.6 Ampere
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 μμf
Grid No. 1 to All Other Electrodes	6 μμf
Ion Trap Magnet	External, Single Field Type

Mechanical Data

Minimum Useful Screen Dimensions	19 1/8 x 14 3/16 Inches
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Basing	12D

RATINGS

Maximum Ratings (Design Center Values)

Anode Voltage	18,000 Volts d c
Grid No. 2 Voltage	500 Volts d c
Grid No. 1 Voltage	
Negative Bias Value	125 Volts d c
Positive Bias Value	0 Volts d c
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	
During Warm-Up Period Not to Exceed 15 Secs.	410 Volts d c
After Equipment Warm-Up Period	180 Volts d c
Heater Positive with Respect to Cathode	180 Volts d c

Issued as a supplement to the manual in Sylvania News for September 1953

21ZP4 (cont'd)
21ZP4A

Recommended Operating Conditions

Anode Voltage[1]	16,000 Volts d c
Grid No. 2 Voltage	300 Volts d c
Grid No. 1 Voltage Required for Cutoff[2]	−33 to −77 Volts d c
Focusing Coil Current[3]	95 ±20% Ma d c
Ion Trap Magnet Strength (approx.)	45 Gausses

Circuit Values

Grid No. 1 Circuit Resistance	1.5 Megohms Max.

NOTES:

1. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than this value.
2. Visual extinction of undeflected focused spot.
3. For JETEC focusing coil 109 or equivalent three inches from reference line, bias adjusted to 20 foot lamberts on a 19⅛ x 14$^{3}/_{16}$ inch picture area sharply focused at center of screen.

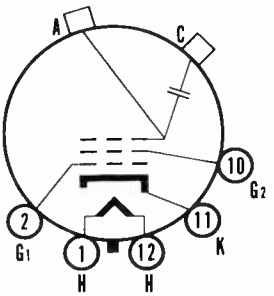
21ZP4A

The Sylvania Type 21ZP4A is identical to the Type 21ZP4 except for the addition of an external conductive coating.

External Conductive Coating To Anode Capacitance	
Maximum	750 μμf
Minimum	500 μμf
Basing	12N

NOTE:

External conductive coating must be grounded.



12-N

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.

APPENDIX

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 transconductance (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 **Transconductance** (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).
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.

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 RTMA 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. In some cases, 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. 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.

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

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.

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.

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 on page 7 are those used in connection with the tube base diagrams accompanying the characteristics on individual types of Sylvania tubes shown in this Technical Manual. All base diagrams are illustrated as viewed from bottom of base. Basing diagrams are purely symbolic and are not to be interpreted as exact representations of tube structure.

BASE CONNECTION DIAGRAMS

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.

(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 the Technical Publications Section, Sylvania Electric Products Inc., Emporium, Pennsylvania.

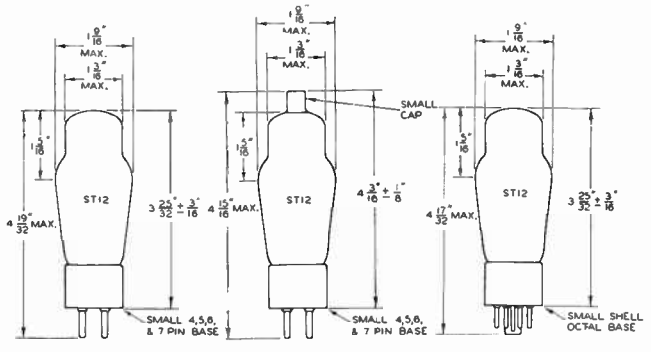
In radio servicing, as in any other work, certain precautions must be observed in order to work safely. With television receiver servicing the major dangers are from possible high voltage shock or injury from flying glass if a tube is carelessly or accidentally broken. To avoid shock we recommend taking 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 9 to 14 which show all important dimensions.

ST-12 STYLE



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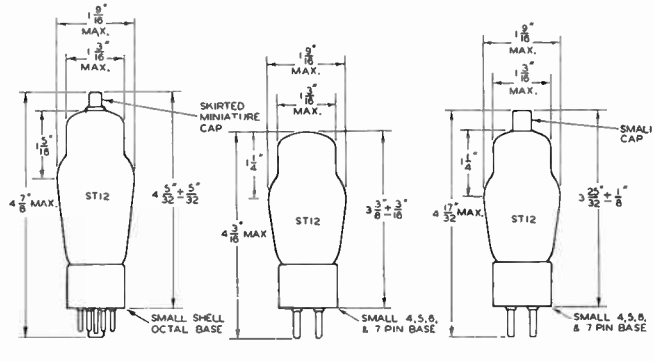
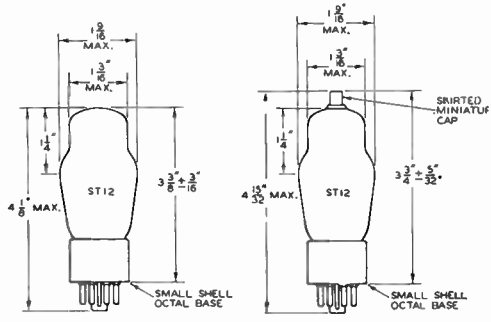


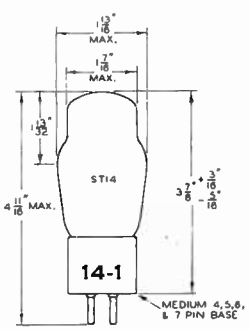
12-4 12-5 12-6

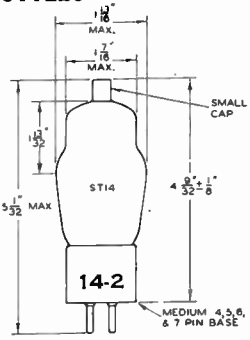


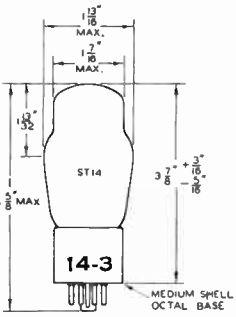
12-7 12-8

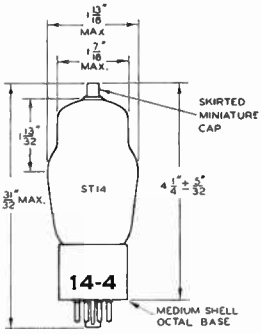
TUBE DIMENSIONS

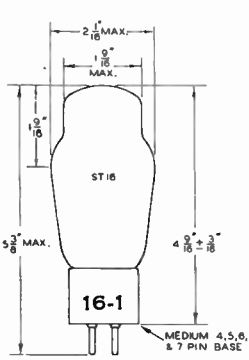
LARGER ST STYLES

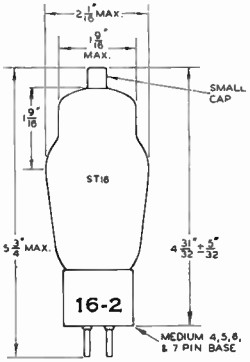


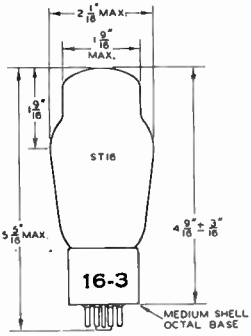


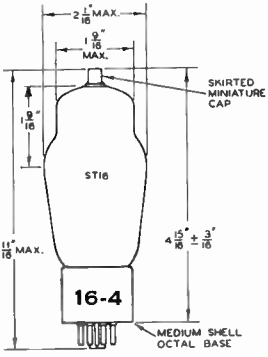






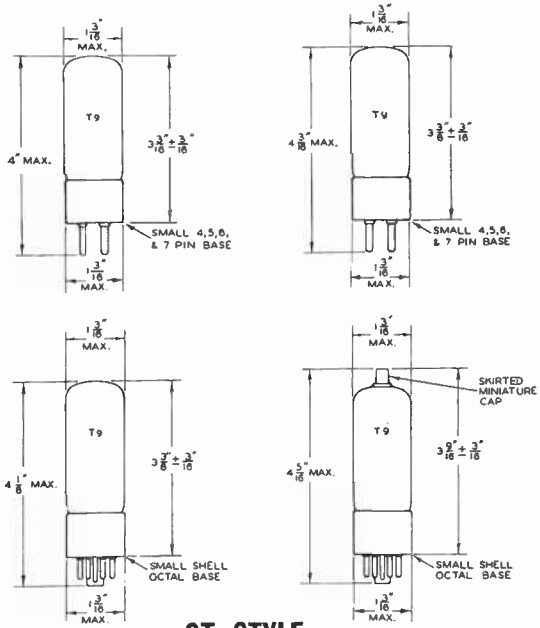




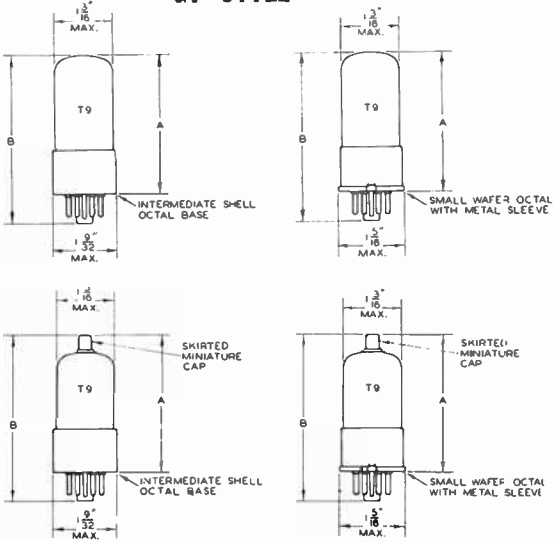


TUBE DIMENSIONS

T 9 STYLE



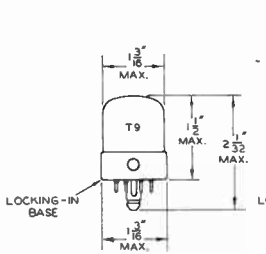
GT STYLE



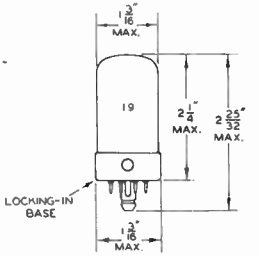
DIMENSIONS "A" AND "B" ARE GIVEN AS SEATED HEIGHT AND OVERALL LENGTH RESPECTIVELY FOR EACH INDIVIDUAL TYPE.

TUBE DIMENSIONS

LOCK-IN STYLE



9-29



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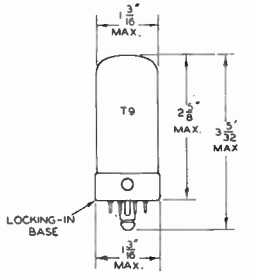

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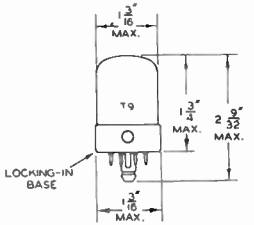
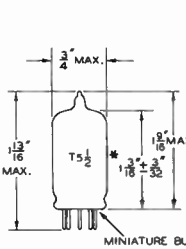
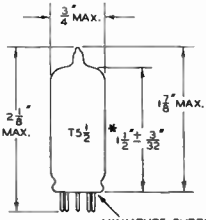


9-32

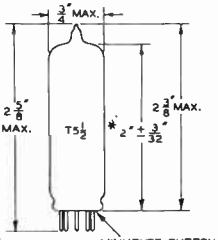
MINIATURE STYLE



5-1



5-2



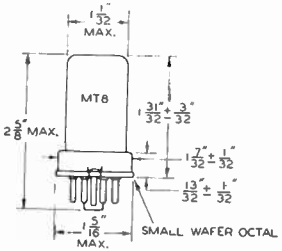
5-3

* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF 7/16" I.D

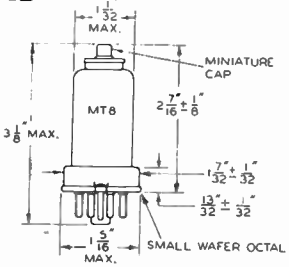
The construction of the T6½ type is comparable to that of the T5½ types 5-2 and 5-3. The major differences are the bulb diameters and bases, the T6½ having a 9 pin base and a 7/8" maximum bulb diameter.

TUBE DIMENSIONS

METAL STYLE



8-1



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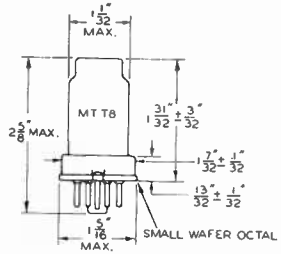

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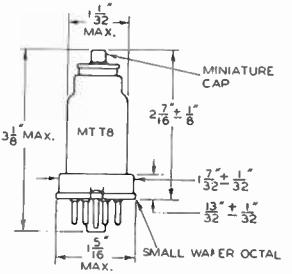

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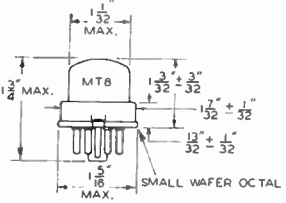
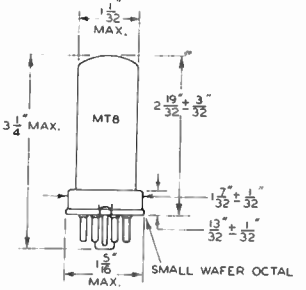
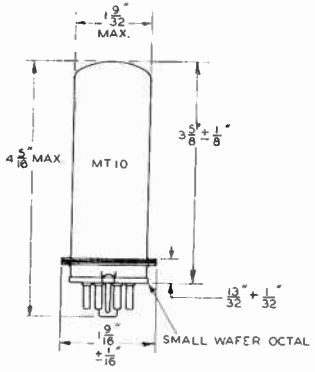


8-5



8-6



10-1

USE OF CURVES

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 axis 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 Transconductance, Plate Current, Plate Resistance or Amplification Factor 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.

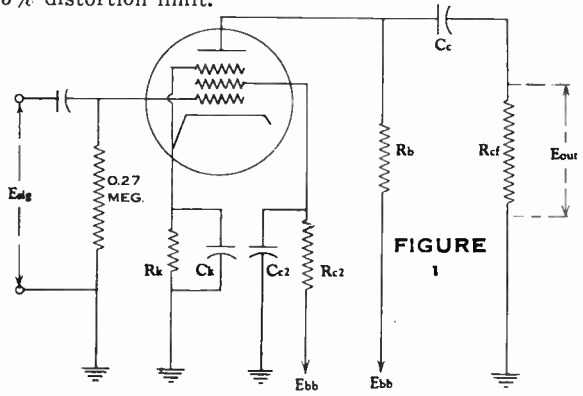


FIGURE 1

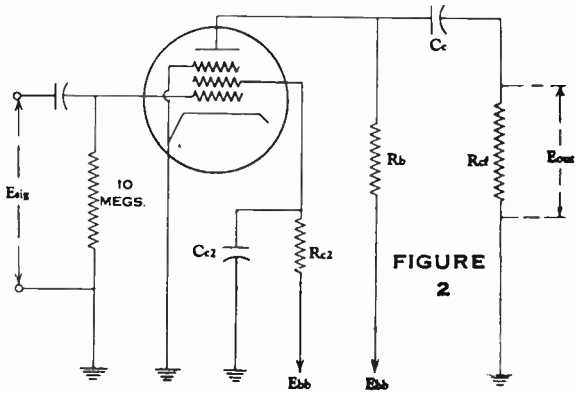


FIGURE 2

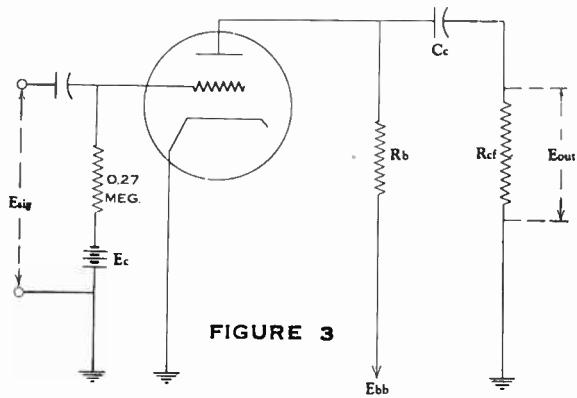


FIGURE 3

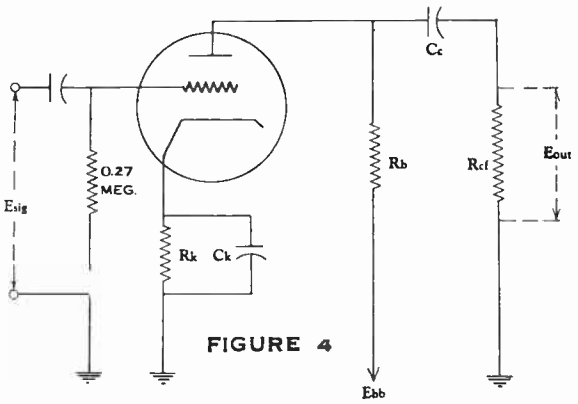


FIGURE 4

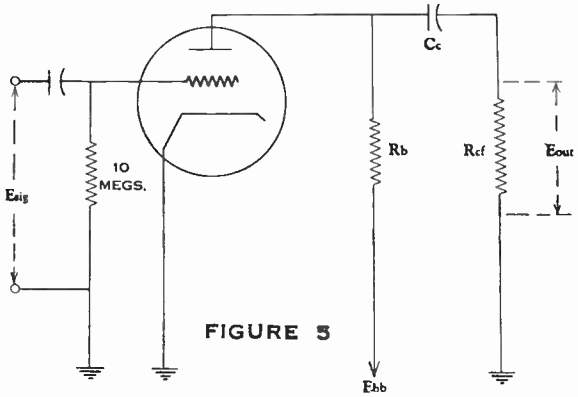


FIGURE 5

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 Ec1	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		
Rc_2	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
Ic_2	.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
Ec_2	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	53.7	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
Ic2	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	29.2	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	2.55	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 1LD5 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		
R_{c_2}	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
I_{c_2}	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
E_{c_2}	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	5.65	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		
Rc₂	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
Ic₂	.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
Ec₂	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	72.3	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		
Rc_2	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
Ic_2	.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
Ec_2	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 — 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	32.14	32.14	32.14	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	2.25	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	28.3	35	42	40	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	40	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

Zero Bias Operation

	Ebb = 100 Volts							Ebb = 250 Volts						
Rb	0.10		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	0.39	0.39	0.192	0.192	0.192	0.124	0.124	1.48	1.48	0.65	0.65	0.65	0.40	0.40
Ec	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Eb	61.0	61.0	48.2	48.2	48.2	41.7	41.7	102.0	102.0	74.5	74.5	74.5	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	3.60	3.80	3.70	4.00	4.30	3.90	4.35	4.85	5.20	5.05	5.40	5.60	5.20	5.60
Gain	36.0	38.0	37.0	40.0	43.0	39.0	43.5	48.5	52.0	50.5	54.0	56.0	52.0	56.0
% Dist.	2.0	1.9	2.3	1.7	1.3	1.9	1.4	0.4	0.4	0.8	0.7	0.6	0.8	0.6
Esig (1)	0.21	0.23	0.19	0.24	0.28	0.22	0.29	0.72	0.75	0.56	0.67	0.78	0.60	0.78
Eout	7.4	8.4	6.7	9.3	11.0	8.2	11.5	30.5	33.0	25.0	31.5	38.0	27.5	37.5
Gain	35.2	36.5	35.2	38.8	39.3	37.2	39.7	42.4	44.0	44.6	47.0	48.7	45.8	48.1
% Dist.	4.9	5.0	4.8	4.9	5.0	4.8	5.0	4.8	4.9	5.0	5.0	4.9	5.0	5.0

(1) Maximum Signal For 5.0% Distortion

FOR CIRCUIT SEE FIGURE 5

Self Bias Operation

	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	0.47	1.0	0.27	0.47	0.27	0.47	1.0	0.47	1.0
Rk	3300	3300	5600	6800	6800	10,000	10,000	1200	1200	2700	2700	3300	3900	4700
Ib	0.340	0.340	0.175	0.168	0.168	0.112	0.107	1.20	1.20	0.550	0.550	0.510	0.345	0.324
Ec	-1.122	-1.122	-0.980	-1.142	-1.142	-1.120	-1.070	-1.440	-1.440	-1.485	-1.485	-1.682	-1.345	-1.522
Eb	66.0	66.0	52.7	54.7	54.7	47.4	49.7	130.0	130.0	101.5	101.5	112.3	88.0	97.7
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	3.40	3.60	3.45	3.80	4.10	3.70	4.05	4.60	4.70	4.6	4.9	4.95	4.90	5.05
Gain	34.0	36.0	34.5	38.0	41.0	37.0	40.5	46.0	47.0	46.0	49.0	49.5	49.0	50.5
% Dist.	2.2	2.0	2.4	1.9	1.6	2.0	1.4	0.6	0.6	0.9	0.7	0.6	0.8	0.6
Esig (1)	0.21	0.22	0.20	0.23	0.24	0.22	0.27	0.53	0.53	0.53	0.53	0.68	0.46	0.59
Eout	6.90	7.80	7.05	8.60	9.70	8.15	10.7	23.5	24.0	24.0	25.2	33.0	22.3	29.5
Gain	32.8	34.4	35.2	37.4	40.4	37.0	39.6	44.3	45.3	45.3	47.6	48.5	48.4	50.0
% Dist.	5.0	4.9	4.9	4.8	4.2	4.9	4.3	3.1	2.9	4.9	4.0	4.2	3.8	3.7

(1) At Grid Current Point, Less Than ½ Microampere Grid Current Through 0.27 Megohm Grid Resistor.

FOR CIRCUIT SEE FIGURE 4

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation

	Ebb = 100 VOLTS										
Rb	.047			.1			.27			.47	
Rc2	.22			.39			1.0			1.8	
Ref	.047	.10	.27	.10	.27	.47	.27	.47	1.0	.47	1.0
Rk	680	680	680	1500	1500	1500	3300	3300	3300	5600	5600
Ib	1.13	1.13	1.13	.61	.61	.61	.265	.265	.265	.158	.158
Ic2	.280	.280	.280	.167	.167	.167	.074	.074	.074	.043	.043
Ec1	-0.96	-0.96	-0.96	-1.17	-1.17	-1.17	-1.12	-1.12	-1.12	-1.12	-1.12
Ec2	38.4	38.4	38.4	35.0	35.0	35.0	26.0	26.0	26.0	22.6	22.6
Eb	46.9	46.9	46.9	39.0	39.0	39.0	28.5	28.5	28.5	25.7	25.7
E sig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
E out	4.2	5.7	6.7	5.4	7.7	8.3	7.6	9.0	10.5	8.5	10.5
Gain	42	57	67	54	77	83	76	90	105	85	105
% Dist.	3.3	2.7	2.1	2.9	2.0	1.6	2.0	2.1	3.0	2.0	2.3
E sig. (1)	0.15	0.17	0.20	0.14	0.20	0.22	0.16	0.8	0.20	0.15	0.17
E out	6.2	9.2	12.8	7.5	14.4	17.0	11.5	15.7	20.7	12.6	17.7
Gain	41.3	54.1	64.0	53.5	72.0	77.5	72.0	87.2	103	84.0	104
% Dist.	4.8	5.0	5.0	4.7	4.9	5.0	4.6	4.6	4.5	4.7	4.6

	Ebb = 150 VOLTS										
Rb	.047			.1			.27			.47	
Rc2	.22			.47			1.2			2.2	
Ref	.047	.10	.27	.10	.27	.47	.27	.47	1.0	.47	1.0
Rk	470	470	470	1000	1000	1000	2200	2200	2200	3900	3900
Ib	1.86	1.86	1.86	.97	.97	.97	.41	.41	.41	.24	.24
Ic2	.460	.460	.460	.234	.234	.234	.101	.101	.101	.057	.057
Ec1	-1.09	-1.09	-1.09	-1.20	-1.20	-1.20	-1.13	-1.13	-1.13	-1.16	-1.16
Ec2	48.9	48.9	48.9	40.0	40.0	40.0	28.9	28.9	28.9	24.5	24.5
Eb	62.6	62.6	62.6	53.0	53.0	53.0	39.1	39.1	39.1	37.0	37.0
E sig.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
E out	5.2	6.9	8.4	7.2	9.8	10.7	10.4	12.1	14.2	11.7	14.8
Gain	52	69	84	72	98	107	104	121	142	117	148
% Dist.	2.2	1.7	1.0	2.3	1.6	1.2	2.4	1.4	1.0	2.4	1.4
E sig. (1)	0.22	0.26	0.31	0.17	0.23	0.25	0.17	0.20	0.22	0.16	0.19
E out	11.2	17.0	24.0	11.9	21.6	25.0	17.2	23.2	29.5	18.5	26.8
Gain	50.8	65.4	77.5	70.0	93.9	100	101	116	134	115	141
% Dist.	4.9	4.9	5.0	4.8	4.9	4.8	4.9	4.8	4.8	4.9	5.0

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 1

RESISTANCE COUPLED AMPLIFIER DATA

Self Bias Operation
Single Section of Types 6BF7 or 6BG7

	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	1500	2200	2700	6800	8200	680	820	1200	1800	3900	4700
Ib	1.12	1.04	0.61	0.58	0.24	0.226	3.23	3.07	1.75	1.57	0.67	0.63
Ec	-1.34	-1.56	-1.34	-1.57	-1.64	-1.85	-2.20	-2.52	-2.10	-2.83	-2.61	-2.96
Eb	47.4	51.1	39.0	42.0	35.1	39.0	98.0	106.7	75.0	93.0	69.0	80.0
Esig	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	0.5	0.5
Eout	1.95	1.90	1.85	2.0	1.91	1.88	11.0	11.2	10.8	11.2	9.9	10.0
Gain	19.5	19.0	18.5	20.0	19.1	18.8	22.0	22.4	21.6	22.4	19.8	20.0
% Distortion	.56	.42	.54	.35	.31	.37	1.4	1.2	1.8	.89	1.1	.71
Esig (1)	0.43	0.60	0.44	0.58	0.63	0.79	1.07	1.31	0.97	1.52	1.34	1.62
Eout	8.2	11.4	8.0	11.6	11.8	14.5	23.4	28.8	20.8	33.2	26.5	32.3
Gain	19.0	19.0	18.2	20.0	18.7	18.4	21.8	21.9	21.4	21.9	19.8	20.0
% Distortion	4.1	4.9	4.5	4.0	4.8	4.9	5.0	4.7	4.5	4.7	4.9	4.6

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	0.047		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
Ecl	-1.765	-1.98	-1.565	-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 ⅛ 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	
Rof	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 1/4 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	5600	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 ½ 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	
Rc2	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
Ic2	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
Ec1	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
Ec2	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	
Ref	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	3.30	2.64	3.05
Eout	12.5	15.5	12.9	19.2	13.7	17.7	39.9	52.5	38.4	51.0	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	0.1	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	1.2
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 microamperes 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	4.5	3.3	3.8

Note (1) For self bias operation this is taken at the grid current point with less than .1 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	0.108	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	193	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	0.40	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 ⅛ 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 ⅛ microampere grid current.

FOR CIRCUIT SEE FIGURE 1

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 ⅓ 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 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}	0.39		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 ½ microampere grid current.

FOR CIRCUIT SEE FIGURE 1

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	64.4	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 ½ 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

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
0Z4A	T-7	4R	Gas Duodiode	F.W. Rect.	Ionic	....	....	300 A.C. Volts Per Plate, RMS, 110 Ma. Max., 30 Ma. Min. Output Current								
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	....	
1AC5	T-3	8CP	Pentode	Pwr. Amp.	Fil.	1.25	.040	67.5	67.5	4.5	2.0	0.4	.150 Meg.	750	50	
1AD5	T-3	8CP	Pentode	R.F. Amp.	Fil.	1.25	.040	67.5	67.5	0	1.85	0.75	0.7 Meg.	735	....	
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

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
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	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	....	
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.								
1C8	T-3	8CN	Pentagrid	Converter	Fil.	1.25	.040	67.5	67.5	0	1.0	1.5	0.4 Meg.	150▼	....	
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.■	
1D8	T-9	8AJ	Diode Triode	Det. Amp.	Fil.	1.4	0.1	45	....	0	....	....	77,000	25	....	
								90	....	0	....	....	43,500	25	....	
			Pentode	Pwr. Amp.	....	....	....	45	45	4.5	1.6	0.3	20,000	650	35	
								90	90	9.0	5.0	1.0	12,000	925	200	
1E4	T-9	5S	Triode	Det. Amp.	Fil.	1.4	0.05	Same Characteristics as Type 1LE3.								
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

① Load Resistance for Power Output Tubes.
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▼ 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.									
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	
1E8	T-3	8CN	Pentagrid	Converter	Fil.	1.25	.040	67.5	67.5	0	1.0	1.5	0.4 Meg.	150▼	....	
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	
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	

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§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.									
1Q6	T-3	8CO	Diode Pent.	Det. Amp.	Fil.	1.25 1.25	0.04 0.04	30 67.5	30 67.5	0 0	0.33 1.60	0.09 0.40	500,000 400,000	330 600	....	
1R4	Lock-In	4AH	H.F. Diode	Detector	Cath.	1.4	0.15	117 V. RMS			1.0	Resonant Frequency 1,500 Mc.				
1S6	T-3	8DA	Di. Pent.	Det. Amp.	Fil.	1.25	.040	67.5	67.5	0	1.6	0.4	0.4 Meg.	600	....	
1SA6GT	GT	6BD	Pentode	R.F. Amp.	Fil.	1.4	0.05	45 67.5 90	45 67.5 67.5	0 0 0	1.1 2.4 2.45	0.3 0.7 0.68	700,000 600,000 800,000	750 950 970	....	1N5GT
1SB6GT	GT	6BE	Di. Pent.	Det. Amp.	Fil.	1.4	0.05	45 90	45 67.5	0 0	0.6 1.45	0.16 0.38	900,000 700,000	500 665	....	1LD5
1T6	T-3	8DA	Di. Pent.	Det. Amp.	Fil.	1.25	.040	67.5	67.5	0	1.6	0.4	0.4 Meg.	600	....	
1V	ST-12	4G	Diode	H.W. Rect.	Cath.	6.3	0.30	350 V. RMS Plate, 45 Ma. DC Output.								76
1V5	T-3	8CP	Pentode	Pwr. Amp.	Fil.	1.25	.040	67.5	67.5	4.5	2.0	0.4	.150 Meg.	750	50	
1W4	T5½	5BZ	Pentode	Pwr. Amp.	Fil.	1.4	.050	90	90	9.0	5.0	1.0	0.25 Meg.	925	200	
1W5	T-3	8CP	Pentode	R.F. Amp.	Fil.	1.25	.040	67.5	67.5	0	1.85	0.75	0.7 Meg.	735	....	
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.								

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♦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.									
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	....	
2C4	T-5½	5AS	Gas Triode	Control Tube	Fil.	2.5	0.65	350	....	50	5	Voltage Drop = 16 Volts				
2D21	T-5½	7BN	Gas Tetrode	Relay Tube	Cath.	6.3	0.6	400	....	5	Average Cathode Current = 100 Ma. Max., Averaged over any 30 sec. interval					
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	.... Push-Pull Class C	8,300 R.F. Amp.	15	 2,000	
3A8GT	GT	8AS	Di. Tri. Pentode	Det. Amp. Amp.	Fil.	2.8 1.4	.050 .100	90 90	0 90	0 0	0.2 1.5	0 0.5	0.2 Meg. 0.8 Meg.	325 250	....	1H5 and 1N5 1C3 and 1S5
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	.... R.F. Pwr. Amp. 2800 mw. at 25 mc., 1400 mw. at 125 mc.	16,000♦	20	1,500	
3D6	Lock-In	6BB	Beam Pwr.	Amp.	Fil.	1.4	0.220	150	90	4.5	9.9	1.0	14,000	2400	600	
3E6	Lock-In	7CJ	Pentode	R.F. Amp.	Fil.	1.4 2.8	0.1 .050	90 90	90 90	0 0	4.2 2.9	1.7 1.2	.25 Meg. .325 Meg.	2000 1700	....	....
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	
G4/4S	.....	5D	Duo. Di.	Det.	Cath.	2.5	1.0	....	....	....	....	....	....	....	....	2S/4S
5AX4GT	GT	5T	Duo. Di.	F.W. Rect.	Fil.	5.0	2.5	350 V. RMS Plate, 175 Ma. DC Output, Cond. Input. 500 V. RMS Plate, 175 Ma. DC Output, Choke Input.								

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♦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.									
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.								
5Z4	Metal	5L	Duo. Di.	F.W. Rect.	Fil.	5.0	2.0	350 V. RMS Plate, 125 Ma. DC Output, Cond. Input. 500 V. RMS Plate, 125 Ma. DC Output, Choke Input.								
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 6.3 6.3	1.00 1.00 1.00	250 325 325	....	45.0 68.0	60.0 40.0* 40.0*	.... Fixed Bias Self Bias 850 Ohms	2,500 3,000♦ 5,000♦	4.2	3,200 15,000 10,000	
6A4/LA	ST-14	5B	Pentode	Pwr. Amp.	Fil.	6.3	0.30	100 180	100 180	6.5 12.0	9.0 22.0	1.6 3.9	11,000 8,000	1,200 2,200	310 1,400	
6A5G	ST-16	6T	Triode	Pwr. Amp.	Cath.	6.3	1.25	250	0	45	60	0	800	5,250	3.75	
6A6	ST-14	7B	Duo. Tri.	Pwr. Amp. Driver Driver	Cath.	6.3 6.3 6.3	0.8 0.8 0.8	300 250 294	....	0 5.0 6.0	35.0 6.0 7.0	Per Plate	8,000♦ 11,300 11,000	Max. Signal 35 35	10,000	6N7G
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.								

① Load Resistance for Power Output Tubes.
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♥ 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.									
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	....	
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	....	

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.									
6AS6	T5½	7CM	Pentode	R.F. Amp.	Cath.	6.3	.175	120	120	2	5.2	3.5	0	3200	....	
6AS7G	ST-16	8BD	Duo Triode	Amp.	Cath.	6.3	2.5	135	0	....	125	0	280	2000	....	
6AX6G	ST-14	7Q	Duo Diode	F.W. Rect..	Cath.	6.3	2.5	350 V. RMS Plate, 250 Ma. DC Output, Cond. Input.								
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	
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.								
6BA7	T-6½	8CT	Heptode	Converter	Cath.	6.3	.300	250	100	1	3.8	10	1.0 Meg.	950▼	....	
6BK6	T-5½	7BT	Duodi-Tri.	Det. Amp.	Cath.	6.3	0.3	250	....	−2.0	1.2	....	62,500	100	....	
								100	....	−1.0	0.5	....	80,000	100	....	
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.■	

① Load Resistance for Power Output Tubes.
② Mutual Conductante 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.									
6E6	ST-14	7B	Duotriode	Pwr. Amp.	Cath.	6.3	0.60	180 250	....	20.0 27.5	11.5 18.0	....	15,000♦ 14,000♦	6.0 6.0	750 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	100 250	(Tri.) 100	3.0 3.0	3.5 6.5	.... 1.5	16,200 850,000	8.5 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
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	
6K4	T-3	6K4	Triode	R.F. Amp.	Cath.	6.3	0.15	200	....	Self	11.5	....	4,650	16	680 Ohm Cath. Bias Resistor	6AK4
6L5G	ST-12	6Q	Triode	Amp.	Cath.	6.3	.150	250	0	9	8.0	0	9,000	1900		
6N6G	ST-14	7AU	Duo Triode	Direct Coupled Pwr. Amp.	Cath.	6.3	0.8	300	....	0	42/9	....	24,000	2400	4.000	
6P5GT	T-9	6Q	Triode	Amp.	Cath.	6.3	.300	250	....	13.5	5	....	9,500	13.8		
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	....	
6SB7Y	Metal	8R	Heptode	Converter	Cath.	6.3	.300	250	100	1.0	3.8	10.0	1.0 Meg.	950♥		
6SD7GT	T-9	8N	Pentode	R.F. Amp.	Cath.	6.3	.300	250	100	2	6.0	1.9	1.0 Meg.	3600		
6SR7GT	T-9	8Q	Duodi Tri.	Det. Amp.	Cath.	6.3	.300	250	....	9	9.5	....	8,500	16	....	

① Load Resistance for Power Output Tubes.
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♥ 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
6ST7	Metal	8Q	Duodi Tri.	Det. Amp.	Cath.	6.3	.15	250	....	9	9.5	....	8,500	16	....	
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
6U6GT	T-9	7S	Beam Pwr.	Pwr. Amp.	Cath.	6.3	.75	200	135	14	55	3.0	3,000	6200	5.500	
6V7G	ST-12	7V	Duodi-Triode	Det. Amp.	Cath.	6.3	0.3	Same Characteristics as Type 85.								
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
6W7G	ST-12	7R	Pentode	R.F. Amp.	Cath.	6.3	.150	250	100	3	2.0	0.5	1 Meg.	1250	....	
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
6Y7G	ST-12	8B	Duo Triode	Class B Amp.	Cath.	6.3	0.6	Same Characteristics as Type 79.								
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
6Z7G	ST-12	8B	Duo Triode	Class B Amp.	Cath.	6.3	0.3	135 180	....	0 0	60 60	....	....	9,000 12,000	2,500 4,200	

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.									
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
7AB7	Lock In	8BO	Pentode	Amp.	Cath.	6.3	0.15	250	100	2.0	4.0	1.3	500,000	1,800	....	
7AJ7	Lock-In	8V	Pentode	R.F. Amp.	Cath.	6.3	.3	250	100	3	2.2	0.7	1 Meg.	1,575	....	
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
7E5	Lock-In	8BN	Triode	Amp.-Osc.	Cath.	6.3	.15	180	....	3	5.5	....	.12 Meg.	36	....	
7G8	Lock-In	8BV	Duo Tetrode	Amp.	Cath.	6.3	.3	250	100	2.5	4.5#	0.8#	225 Meg.	2100	....	
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	

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.									
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	....	4.5	5.0	....	5,400	8.5	35	
								135	....	9.0	6.2	....	5,100	8.5	130	
12A5	ST-12	7F	Pentode	Pwr. Amp.	Cath.	12.6	0.30	100	100	15.0	19.0	6.0	4,500	1,700	800	
						6.3	0.60	180	180	25.0	48.0	14.0	3,300	2,400	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.								
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.								
12F5GT	T-9	5M	Triode	Amp.	Cath.	12.6	.150	250	....	2	0.9	....	66,000	100	....	
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✱	
12S8GT	T-9	8CB	3 Di-Tri.	Det. Amp.	Cath.	12.6	.150	250	....	2.0	0.9	....	91,000	100	....	
12SC7	Metal	8S	Triode	Amp.	Cath.	12.6	.150	250	....	2.0	2.0	....	53,000	70	....	
12SF5	T-9	6AB	Triode	Amp.	Cath.	12.6	.150	250	....	2.0	0.9	....	66,000	100	....	

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.									
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
14A4	Lock-In	5AC	Triode	Amp.	Cath.	12.6	.150	250	....	8	9	....	7,700◆	20	....	
14A5	Lock-In	6AA	Beam Pwr.	Pwr. Amp	Cath.	12.6	.150	250	250	12.5	30	3.5	7,500	3000	2,800	
14E6	Lock-In	8W	Duodi Tri.	Det. Amp.	Cath.	12.6	.150	250	....	9.0	9.5	....	8,500	16		
14W7	Lock-In	8BJ	Pentode	R.F. Amp.	Cath.	12.6	.225	300	300	....	10.0	3.9	0.3 Meg.	5800	....	
14X7	Lock-In	8BZ	Duodi Tri.	Det. Amp.	Cath.	12.6	.150	250	....	1.0	1.9	....	67,000	100	....	
14Y4	Lock-In	5AB	Duodi	F.W. Rect.	Cath.	12.6	0.300	450 V. RMS Plate, 70 Ma. DC Output, Choke Input. 325 V. RMS Plate, 70 Ma. DC Output, Cond. Input.								
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 GT	6C	Duo Tri.	Pwr. Amp.	Fil.	2.0 2.0 2.0	0.26	135 135 135	....	0 3.0 6.0	10.0 3.4 0.2	....	10,000♦ 10,000♦ 10,000♦	....	2,100 1,900 1,600	
19C8	T-6½	9E	3 Di.-Tri.	Det. Amp.	Cath.	18.9	.150	100	....	1.0	0.5	....	80,000	100	....	
20	T-8	4D	Triode	Pwr. Amp.	Fil.	3.3	0.132	90 135	....	16.5 22.5	2.8 6.0	....	9,600 6,500	3.5 3.5	50 130	
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
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	....	

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.									
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
25B8	T-9	8T	Triode Pentode	Tri. Amp. Pent. Amp.	Cath. Cath.	25	0.15	100 100	 100	1.0 3.0	0.6 7.6	.... 2.0	75,000 185,000	112 370	....	
25C6G	ST-14	7S	Beam Pwr.	Amp.	Cath.	25.0	.300	200	135	14.0	61	2.2	2,600	7,100	6,000	
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	....	
26A6	T-5½	7BK	Pentode	R.F. Amp.	Cath.	26.5	0.07	26.5 250	26.5 250	....	1.7 10.5	0.7 4.0	250,000 1,000,000	....	....	
26A7	T-9	8BU	Duo Pent.	Pwr. Amp.	Cath.	26.5	0.6	26.5	26.5	4.5	20	2.0	1,500	5,500#	200	
26C6	T-5½	7BT	Duodi, Tri.	Det. Amp.	Cath.	26.5	0.07	Same Characteristics as Type 7E6.								

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: 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
26D6	T-5½	7CH	Heptode	Converter	Cath.	26.5	0.07	26.5	26.5	0.5	0.45	1.6	....	270	....	
							)	100	100	1.5	2.8	8.0	500,000	455	....	
								250	100	1.5	3.0	7.8	1,000,000	475	....	
27, 27S	ST-12	5A	Triode	Amp.	Cath.	2.5	1.75	90	....	6.0	3.0	....	10,000	9.0	....	
						2.5	1.75	135	....	9.0	4.7	....	9,000	9.0	....	
						2.5	1.75	180	....	13.5	5.0	....	9,000	9.0	....	
						2.5	1.75	250	....	21.0	5.2	....	9,250	9.0	....	
				Detector	.....	2.5	1.75	250	....	30.0◆	Adjust Bias for 0.2 Ma. Plate Current Without Signal.					
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	....	

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.									
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.								
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 ⅛	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	....	50.0	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	
50Z7G	ST-12	8AN	Duo Diode	F.W. Rect.	Cath.	50	0.15	117 V. RMS Per Plate. 65 Ma. DC Output.								
EF50	Lock-In	9C	Pentode	R.F. Amp.	Cath.	6.3	0.3	250	250	....	10	3.1	600,000	....	....	
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.								
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)	
89Y	.....	.....	.....	.....	.....	....	....	Same as Type 89. Has low-loss base.								

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 ② 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
117L7GT	T-9	8AO	Beam Pwr. Diode	Amp. H.W. Rect.	Cath. Cath.	117	.090	105 117 V. RMS Plate, 75 Ma. DC Output, Cond. Input.	105	5.2	43	4.0	4,000	5,300	850	
117N7GT	T-9	8AV	Beam Pwr. Diode	Amp. Rect.	Cath. Cath.	117	.090	100 117 V. RMS Plate, 75 Ma. DC Output, Cond. Input	100	6.0	51	5.0	3,000	7,000	1,200	
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

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.									
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
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		
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.								

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.
⊙Cathode Resistor

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.									
1267	T-9	4V	Gas Triode	Relay Tube	Cold K	....	....	Similar to Type OA4G.								OA4G
1273	Lock-In	8V	Pentode	Amp.	Cath.	6.3	.300	Non-Microphonic 7AJ7								
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.								
1280	Lock-In	8X	Pentode	Amp.	Cath.	12.6	.150	Non-Microphonic 14C7								
1291	Lock In	7BE	Duo Triode	Osc. Amp.	Fil.	1.4 2.8	.220 .110	See Type 3B7.								
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.								
5679	Lock-In	7CX	Duodi	H.W. Rect.	Cath.	6.3	.150	150 V. RMS Plate, 8.0 Ma. DC Output.								7A6
5691	T-9	8BD	Duo Triode	Amp.	Cath.	6.3	0.6	250	....	....	2.3‡	....	44,000	70	....	6SL7GT
5692	T-9	8BD	Duo Triode	Amp.	Cath.	6.3	0.6	250	....	8.0	9.0‡	....	7,700	20	....	6SN7GT
5693	Metal	8N	Pentode	Amp.	Cath.	6.3	0.3	250	100	3.0	3.0	0.8	1.0 Meg.	1,650	....	6SJ7GT
9001	T-5½	7PM	Pentode	Det. Amp.	Cath.	6.3	0.15	90 250	90 100	3 3	1.2 2.0	0.5 0.7	1,000,000 1 Meg. Min.	 1,400	....	
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	....	
9006	T-5½	6BH	UHF Diode	Rect.	Cath.	6.3	0.15	270 V. RMS Plate. 5 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—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.									
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
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
X6030	Lock In	X6030	Diode	Noise Diode	Fil.	3.0m	0.6	90 250 1400	....	....	4.0 3.0 0.535	Basing (Pins 4 and 5 - Plate, 2 and 7 - fil.)				
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

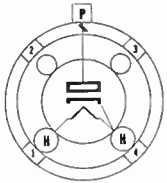
① Load Resistance for Power Output Tubes.
② Mutual Conductance for Tetrodes, Pentodes, Etc.
♥ Conversion Conductance.

♦Approximate.
♦Plate to Plate
■Through 20,000 Ohms.

*Per Tube or Section— No Signal.
§Plate and Target Supply.

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES

4AA



4AB

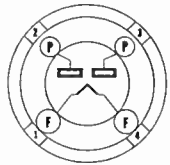
4AC

4AH

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	A1
2	K
3	NC
4	A2

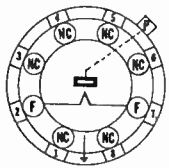
4K

4M

4R

4V

4X



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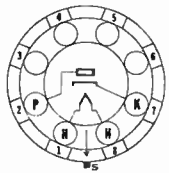

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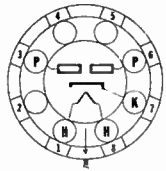
5A

5AA



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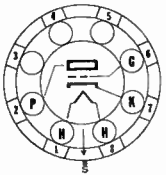
BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.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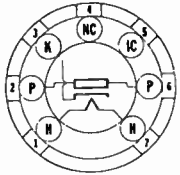
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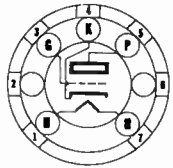
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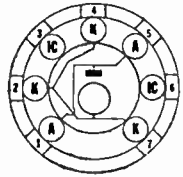
5B


5BF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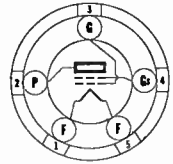
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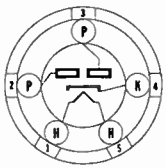
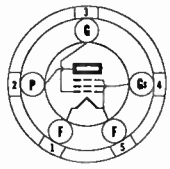

5D


5E


5F

5H

1	H
2	G
3	P
4	G
5	H
Cap	K


5K


5L


5M

5N

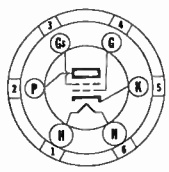
1	J
2	A
3	A
4	K
5	J


5R


5S


5T


5Y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6AA


6AB


6AD

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.


6AE


6AF


6AM


6AP


6AS


6AW

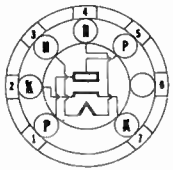

6B


6BA


6BB


6BD


6BE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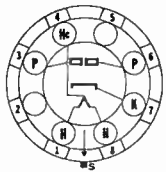
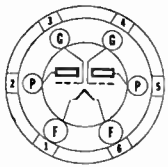
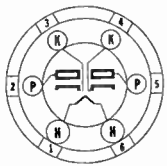

6BJ


6C


6D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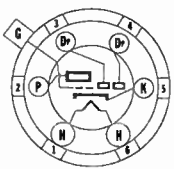
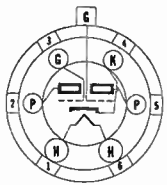
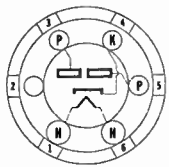
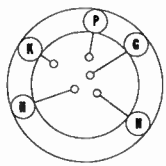
6F


6G

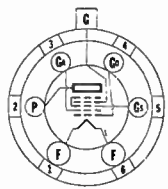

6H

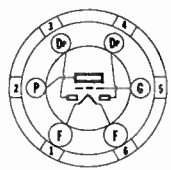

6J


6K



6K4


6L


6M

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.

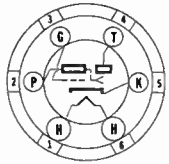
6N

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

6T

6W

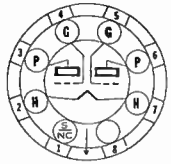
6X

6Y

1	NC
2	H
3	P
4	NC
5	D
6	NC
7	H
8	K
Cap	G

7A

7AA



7AB

7AC

7AD

7AF

7AG

7AH

7AL

7AM

7AQ

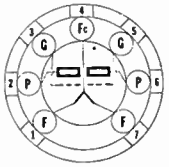
7AU

7AX

7AZ

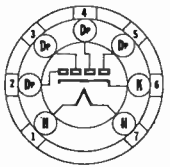
7B

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.

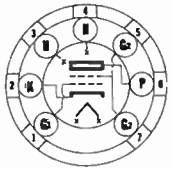

7BC


7BD

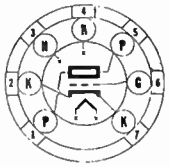

7BE

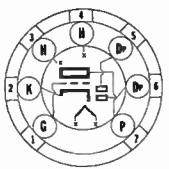

7BJ


7BK

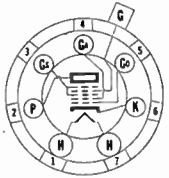

7BN


7BQ


7BS

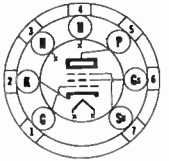

7BT

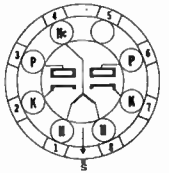

7BW


7C

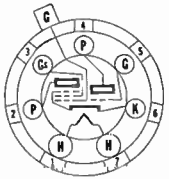

7CH


7CJ

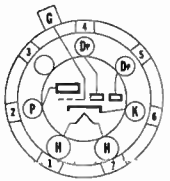

7CM


7CX


7D


7E


7F


7G


7H


7K

7L

1	H
2	P2
3	K2
4	Hc
5	K1
6	P1
7	H

7M

1	F
2	P
3	Gs
4	G
5	SU
6	NC
7	F


7Q

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.

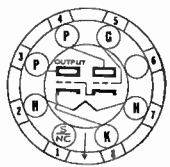

7R


7S


7T

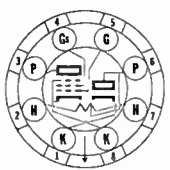

7U

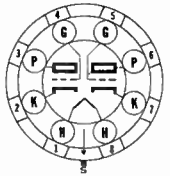

7V


7W


7Z


8A


8AB

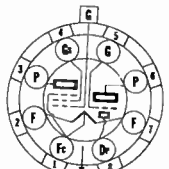

8AC


8AF


8AJ


8AN

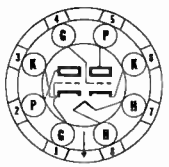

8AO


8AS


8AV


8AY


8B


8BD


8BE

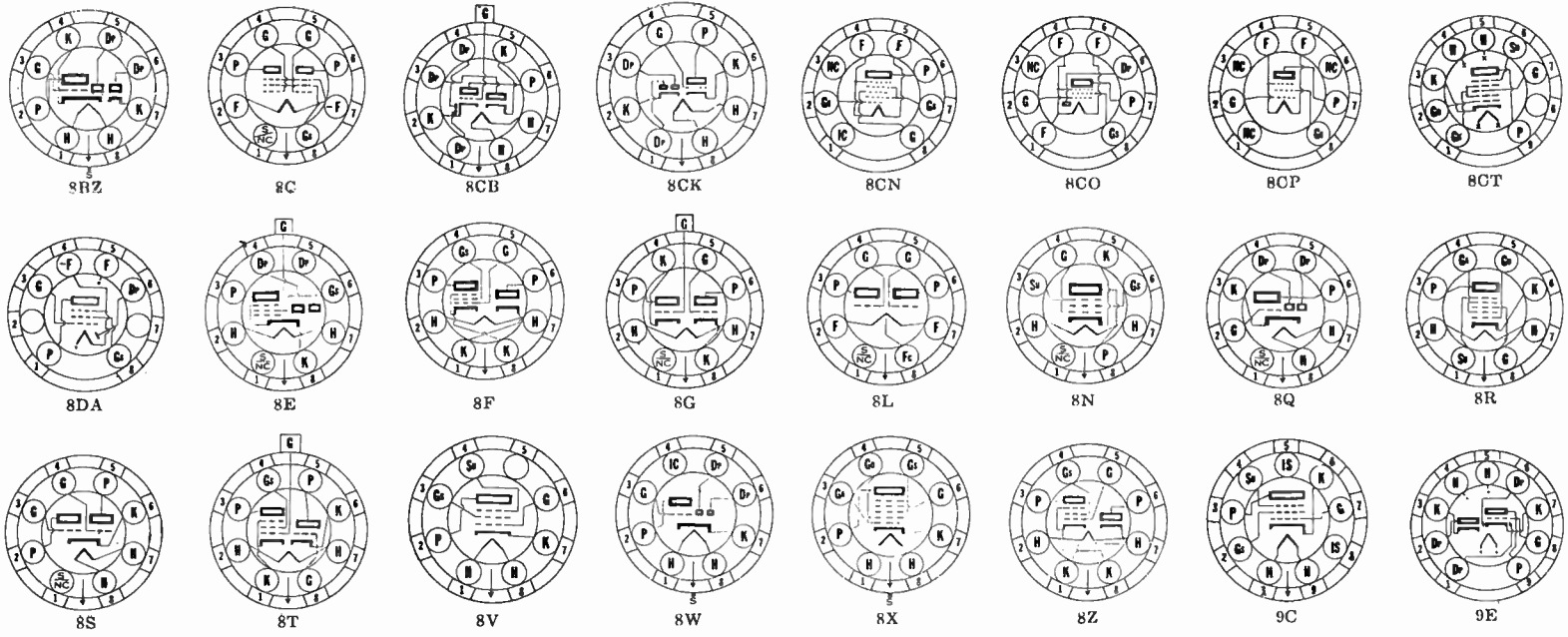

8BN


8BO


8BU


8BV

BASE DIAGRAMS FOR SELDOM ENCOUNTERED TYPES—Cont.



SYLVANIA CRYSTAL DIODES

Type	Construction	Description	Replacement Sylvania Type
1N34	Germanium-ceramic	General Purpose Diode	1N34A, 1N54, 1N54A
1N34A	Germanium-glass	General Purpose Diode	1N54A, 1N58A, 1N38A, 1N55A
1N35	Germanium-ceramic	Matched Duo-diode	1N54, 1N54A (Use two)
1N38	Germanium-ceramic	100 Volt Diode	1N38A, 1N55, 1N55A
1N38A	Germanium-glass	100 Volt Diode	1N55A, 1N58A*z
1N39	Germanium-ceramic	200 Volt Diode	1N38, 1N38A, 1N55, 1N55A (Use two)
1N40	Germanium-plug-in	Varistor	1N42, 1N41 @
1N41	Germanium-lug-type	Varistor	1N42@, 1N40@
1N43	Germanium	General Purpose Diode	1N34, 1N34A
1N44	Germanium	General Purpose Diode	1N58, 1N58A
1N45	Germanium	General Purpose Diode	1N34A
1N46	Germanium	General Purpose Diode	1N34, 1N34A, 1N60
1N54	Germanium-ceramic	High Back Resistance	1N54A, 1N38, 1N38A, 1N55, 1N55A
1N54A	Germanium-glass	High Back Resistance	1N38A, 1N55A, 1N58A*
1N55	Germanium-ceramic	150 Volt Diode	1N55A, 1N39
1N55A	Germanium-glass	150 Volt Diode	1N38A (Use two)
1N56	Germanium-ceramic	Low Impedance Diode	1N56A
1N56A	Germanium-glass	Low Impedance Diode	None
1N58	Germanium-ceramic	100 Volt Diode	1N58A, 1N38, 1N38A, 1N55, 1N55A
1N58A	Germanium-glass	100 Volt Diode	1N38A, 1N55A
1N60	Germanium-ceramic	Video Detector Diode	1N34*, 1N34A*, 1N54*, 1N54A*
1N63	Germanium	High Back Resistance	1N38A, 1N54A
1N64	Germanium	Video Detector Diode	1N60
1N65	Germanium	High Back Resistance	1N58, 1N58A, 1N38, 1N38A
1N66	Germanium	General Purpose Diode	1N34, 1N34A
1N69	Germanium	General Purpose Diode	1N34A
1N70	Germanium	General Purpose Diode	1N38A
1N71	Germanium-plug-in	Low Impedance Varistor	None, 1N40† (Different Basing)
1N72	Germanium	U H F Mixer Diode	1N82
1N77	Transparent-plastic	Photodiode	None
1N79	Silicon-cartridge	U H F Instrument Rectifier	1N21B*
1N82	Silicon	U H F Mixer Diode	None

* May give slightly inferior performance in some circuits.
z Read chart backwards only on these types.
@ Differs mechanically. †For emergency replacement only.

PHYSICAL SPECIFICATIONS

Style	See Outline
Connections	.025 Leads
Maximum Body Length	¾"
Maximum Body Diameter	9/64"
Maximum Lead Length per Lead	1⅝"
Mounting Position	Any
Temperature Range	−50 to +75° C.
Nominal Shunt Capacitance	1 μμf.

Cathode Terminal Indicated by Green Band on Body.

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.
1N34Ø	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
1N38Ø	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
1N54Ø	35	150	500	40	5.0	10 at −10 v
1N55Ø	150	150	500	40	3.0	300 at −100 v; 800 at −150 v
1N56Ø	40	200	1000	50	15.0	300 at −30 v
1N57	80	150	500	40	4.0	500 at −75 v
1N58Ø	100	150	500	40	4.0	800 at −100 v
1N60	50	150	500	40	**	**
1N71ff	40	200	1000	50	15.0	300 at −30 v
1N77	Photodiode similar to 1N34 in reverse direction.					
1N79	Specially tested instrument rectifier, 0-10,000 mc range					
1N82	U H F Mixer—Max. local osc. drive 5 ma., Max. cont. rev. working volt 5 volts, Freq. range 0-1000 mc, Max. noise figure 16 db					

*Type 1N35 consists of two Diode 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.

ØAvailable in ceramic or glass cartridge. The letter A following the type number designates glass type.

**Units are tested in a circuit employing an input of 1.8 volts rms at 40 mc. 70% modulated at 400 cycles. Demodulated output across a 4700 ohm resistor shunted by a 5 μμf. capacitor is a minimum of 1.1 volts peak to peak.

ffConsists of four matched low impedance germanium diodes each of which, with a voltage of one volt impressed in the forward direction, will pass a current within one ma. of the average current of the four. Ratings shown above are for each diode.

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 Volts	Design Amp.	Bead Color	Bulb Style	Miniature Base	Usual Service	Type No.
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.

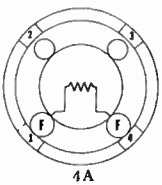
To determine the filament current load in series with the ballast tube it is necessary to include the total filament current drain of the receiver tubes plus the current drain of the dial light if the latter is employed. For example, a set using a Type 19, a Type 30, and 3 Type 34 tubes has a normal 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

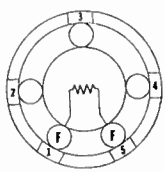
*The voltage drop shown is for average operation and may vary according to the supply voltage.

BASE VIEWS



4A

4T



2S

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