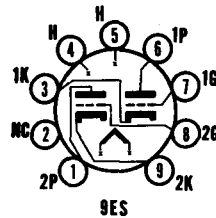




SYLVANIA TYPE 6CM7 8CM7

DOUBLE TRIODE



MECHANICAL DATA

Bulb.....	T-6 $\frac{1}{2}$
Base.....	E9-1, Small Button, 9-Pin
Outline.....	6-3
Basing.....	9ES
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6CM7	8CM7
Heater Voltage.....	6.3	8.4 Volts
Heater Current.....	600	450 Ma
Heater Warm-up Time ¹	11	11 Seconds
Heater-Cathode Voltage (Design Center Values)		
Heater Negative with Respect to Cathode Total D C and Peak.....	200	200 Volts Max.
Heater Positive with Respect to Cathode D C.....	100	100 Volts Max.
Total D C and Peak.....	200	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

	Triode No. 1	Triode No. 2
Grid to Plate (g to p).....	3.8	3.0 μf
Input: g to (k + h).....	2.0	3.5 μf
Output: p to (k + h).....	0.5	0.4 μf

RATINGS (Design Center Values—Except as Noted)

Vertical Deflection Oscillator and Amplifier²

	Triode No. 1 (Oscillator)	Triode No. 2 (Amplifier)
D C Plate Voltage.....	500	500 Volts Max.
Peak Positive Pulse Plate Voltage.....		2200 Volts Abs. Max.
Peak Negative Pulse Grid Voltage.....	200	200 Volts Max.
Plate Dissipation ³	1.25	5.5 Watts Max.
Average Cathode Current.....	15	20 Ma Max.
Peak Cathode Current.....	70	70 Ma Max.
Grid Circuit Resistance		
Cathode Bias.....	2.2	2.5 Megohms Max.
Fixed Bias.....	2.2	1.0 Megohms Max.

AVERAGE CHARACTERISTICS

	Triode No. 1 (Oscillator)	Triode No. 2 (Amplifier)
Plate Voltage.....	200	250 Volts
Grid Voltage.....	-7	-8 Volts
Plate Current.....	5	20 Ma
Transconductance.....	2000	4400 μmhos
Amplification Factor.....	21	18
Plate Resistance.....	10,500	4100 Ohms
Plate Current at $E_c = -10$ Volts.....	1.0	Ma
Grid Voltage for $I_b = 10 \mu\text{a}$	-14	Volts

NOTES:

1. Heater Warm-up Time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. For operation in a 525 line, 30-frame system as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." 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

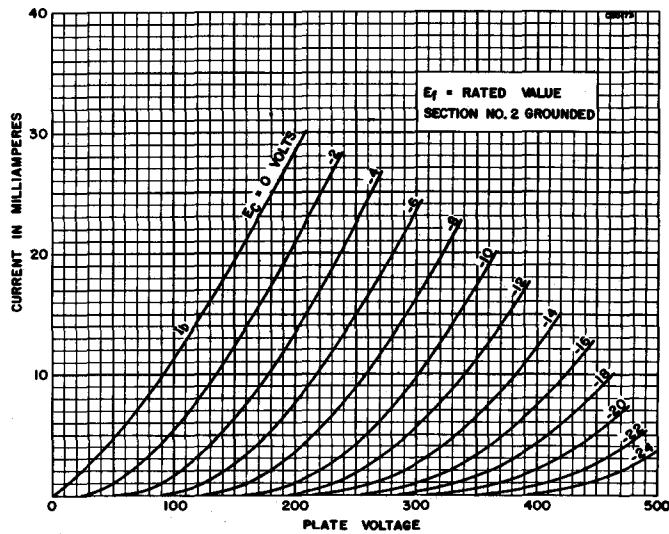
Each of these types is a miniature double triode having dissimilar sections. Section No. 1 is intended for operation as a vertical deflection oscillator and Section No. 2 as a vertical deflection amplifier. The 8CM7 features a 450 Ma heater and is identical to the 6CM7 except for heater characteristics. Both types have controlled heater warm-up time and are intended for use in series string television receivers.

SYLVANIA ELECTRONIC TUBES

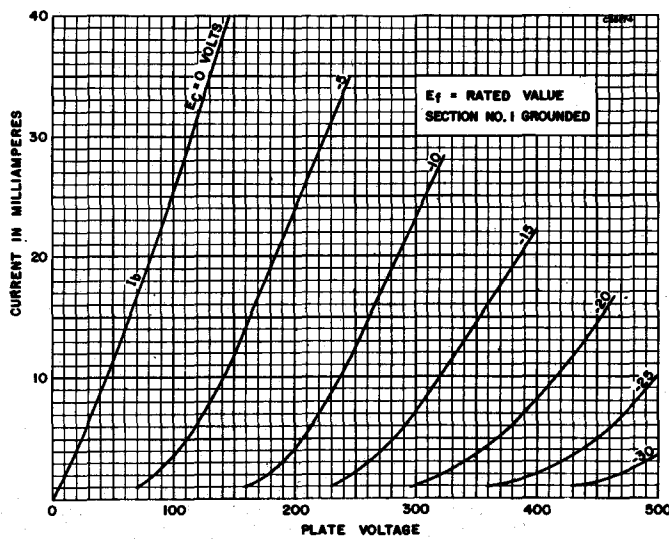
Issued as a supplement to the manual in Sylvania News for January 1957

SYLVANIA TYPE 6CM7 (Cont'd)
8CM7

AVERAGE PLATE CHARACTERISTICS
SECTION I

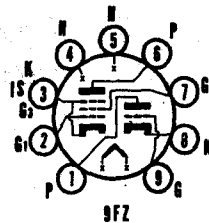


AVERAGE PLATE CHARACTERISTICS
SECTION II





**SYLVANIA TYPE 6CM8
5CM8**
HIGH-MU TRIODE
SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb.....	T-6 1/2
Base.....	E9-1, Small Button 9-Pin
Outline.....	6-2
Basing.....	9FZ
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	5CM8	6CM8
Heater Voltage.....	4.7	6.3 Volts
Heater Current.....	600	450 Ma
Heater Warm-up Time ¹	11	11 Seconds
Heater-Cathode Voltage (Design Center Values) Heater Negative with Respect to Cathode Total D C and Peak.....		200 Volts Max.
Heater Positive with Respect to Cathode D C.....		100 Volts Max.
Total D C and Peak.....		200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Approx.)

Triode Section

Grid to Plate.....	1.9 μ f
Input: g to (h + k).....	1.6 μ f
Output: p to (h + k).....	0.22 μ f

Pentode Section

Grid No. 1 to Plate.....	0.02 μ f Max.
Input: g1 to (h+k+g2+g3+I.S.).....	6.0 μ f
Output: p to (h+k+g2+g3+I.S.).....	2.6 μ f

Coupling

Pentode Plate to Triode Grid.....	0.01 μ f Max.
Pentode Grid No. 1 to Triode Plate.....	0.15 μ f Max.
Pentode Plate to Triode Plate.....	0.10 μ f Max.

MAXIMUM RATINGS (Design Center Values)

	Triode Section	Pentode Section
Plate Voltage.....	300	300 Volts
Grid No. 2 Supply Voltage.....	300	300 Volts
Grid No. 2 Voltage.....	See 6AM8 Rating Chart	0 Volts
Positive Grid No. 1 Voltage.....	0	0 Volts
Plate Dissipation.....	1.0	2.0 Watts
Grid No. 2 Dissipation.....		0.5 Watt
Grid No. 1 Circuit Resistance Self Bias.....		1.0 Megohm
Fixed Bias.....		0.25 Megohm

CHARACTERISTICS

Class A₁ Amplifier

	Triode Section	Pentode Section
Plate Supply Voltage.....	250	200 Volts
Grid No. 2 Voltage.....		150 Volts
Grid No. 1 Voltage.....	-2	0 Volts
Cathode Bias Resistor.....		180 Ohms
Plate Current.....	1.8	9.5 Ma
Grid No. 2 Current.....		2.8 Ma
Amplification Factor.....	100	
Plate Resistance (approx.).....	50,000	600,000 Ohms
Transconductance.....	2000	6200 μ mhos
Grid No. 1 Voltage for I _b = 10 μ a (approx.)...		-8 Volts

NOTE:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.

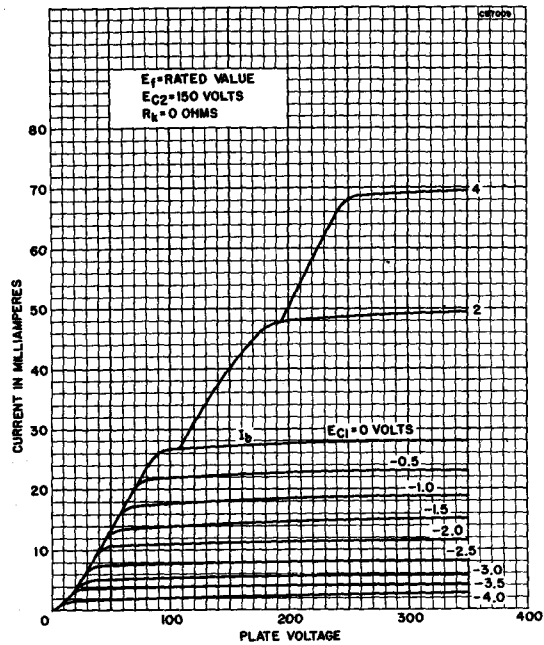
APPLICATION

The Sylvania Type 6CM8 is a high mu triode and sharp cutoff pentode. The pentode section may be used as an I F amplifier, video amplifier, AGC amplifier and reactance tube.

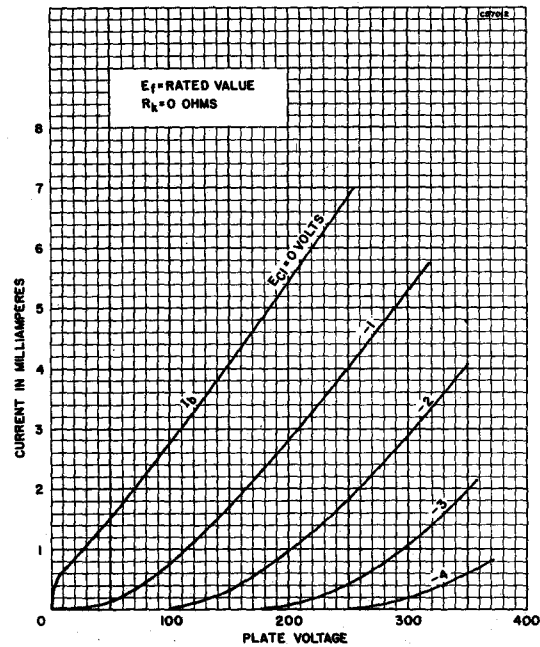
The 5CM8 is identical to the 6CM8 except for heater characteristics. Both types employ controlled heater warm-up time for service in series heater string television receivers.

6CM8, 5CM8 (Cont'd)

AVERAGE PLATE CHARACTERISTICS (PENTODE SECTION)



AVERAGE PLATE CHARACTERISTICS (TRIODE SECTION)

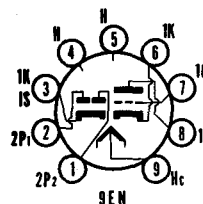


SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6CN7 8CN7

DOUBLE DIODE
HIGH MU TRIODE



MECHANICAL DATA

Bulb.....	T-6 $\frac{1}{2}$
Base.....	E9-1, Small Button 9-Pin
Outline.....	6-2
Basing.....	9EN
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6CN7	8CN7
Heater Voltage ¹ Series/Parallel.....	6.3/3.15	8.4/4.2 Volts
Heater Current.....	300/600	225/450 Ma
Heater Warm-up Time ²	11	11 Seconds
Heater-Cathode Voltage (Design Center Values)		
Heater Negative with Respect to Cathode		
Total D C and Peak.....	200	200 Volts Max.
Heater Positive with Respect to Cathode		
D C.....	100	100 Volts Max.
Total D C and Peak.....	200	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES³

Triode Grid to Plate.....	1.8 μ f
Triode Input.....	1.5 μ f
Triode Output.....	0.5 μ f
Grid to Each Diode Plate.....	0.006 μ f
Diode p1 to (dk + h).....	3.6 μ f
Diode p2 to (dk + h).....	3.6 μ f

RATINGS (Design Center Values)

Plate Voltage.....	300 Volts Max.
Positive D C Grid Voltage.....	0 Volts
Plate Dissipation.....	1.0 Watt Max.
Diode Current for Continuous Operation.....	5.0 Ma Max.
Each Diode.....	5.0 Ma Max.

CHARACTERISTICS AND TYPICAL OPERATION

Class A₁ Amplifier

Plate Voltage.....	100	250 Volts
Grid Voltage.....	-1.0	-3.0 Volts
Amplification Factor.....	70	70
Plate Resistance (approx.).....	54,000	58,000 Ohms
Transconductance.....	1300	1200 μ mhos
Plate Current.....	0.8	1.0 Ma
Average Diode Current, Each Diode with 5.0 Volts D C Applied.....		20 Ma

NOTES:

1. Heater Warm-up Time applies to parallel connection only.
2. Heater Warm-up Time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
3. Without external shield.

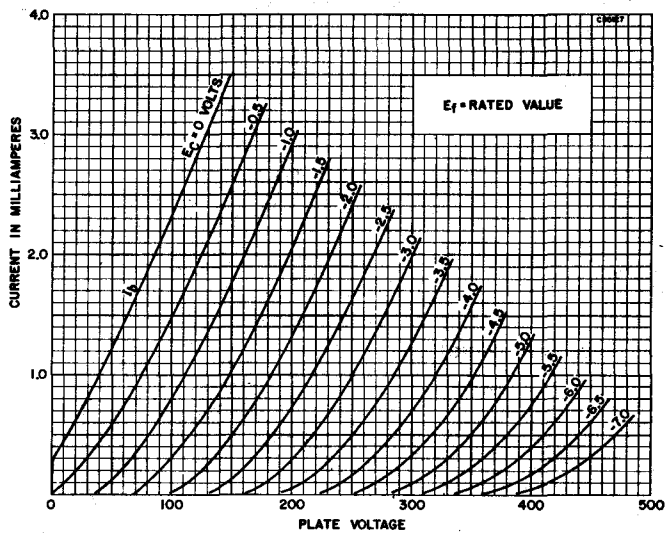
APPLICATION

These tubes have separate cathodes for each section. Either tube may be used as a combined horizontal phase detector and reactance tube for series heater string television receivers. The triode section may be used in sync-separator, sync-amplifier, or audio-amplifier circuits. The 6CN7 has a 600 Ma heater and the 8CN7 has a 450 Ma heater. Both tubes have controlled heater warm-up time.

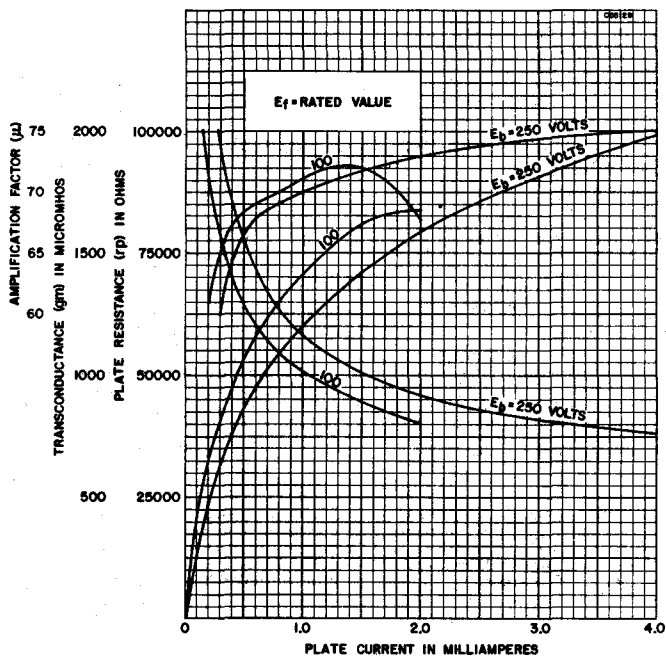
SYLVANIA ELECTRONIC TUBES

SYLVANIA TYPE 6CN7 (Cont'd)
8CN7

AVERAGE PLATE CHARACTERISTICS



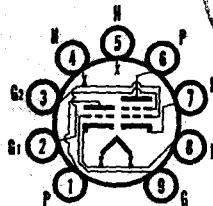
AVERAGE TRANSFER CHARACTERISTICS





SYLVANIA TYPE 6CQ8

MEDIUM MU TRIODE
SHARP CUTOFF TETRODE



9GE

MECHANICAL DATA

Bulb	T-6 1/2
Base	E9-1, Miniature Button 9-Pin
Outline	6-2
Basing	9GE
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage	6.3 Volts
Heater Current	450 Ma
Heater Warm-up Time ¹	11 Seconds
Heater Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode	
Total D C and Peak	200 Volts Max.
Heater Positive with Respect to Cathode	
D C	100 Volts Max.
Total D C and Peak	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES

Triode Section	Shielded ²	Unshielded
Grid to Plate	1.8	1.8 μf
Input: g to (h+k)	2.7	2.7 μf
Output: p to (h+k)	0.4	1.2 μf
Pentode Section		
Grid No. 1 to Plate	0.019	0.015 μf Max.
Input: g1 to (h+k+g2+I.S.)	5	5 μf
Output: p to (h+k+g2+I.S.)	2.5	3.3 μf
Coupling		
Triode Plate to Tetrode Plate	0.07	0.01 μf Max.

MAXIMUM RATINGS (Design Center Values)

	Triode Section (Oscillator)	Tetrode Section (Mixer)
Plate Voltage	300	300 Volts
Grid No. 2 Voltage	See 6AM8 Rating Chart	300 Volts
Grid No. 2 Supply Voltage		300 Volts
Positive Grid Voltage	0	0 Volts
Plate Dissipation	2.7	2.8 Watts
Grid No. 2 Input (Up to 150 Volts)		0.6 Watt
Grid No. 2 Input (150 Volts to 300 Volts)	See 6AM8 Rating Chart	0.6 Watt
Grid Input	0.5	Watt
Grid Circuit Resistance		
Fixed Bias	0.5	0.25 Megohm
Cathode Bias	1.0	1.0 Megohm

CHARACTERISTICS AND TYPICAL OPERATION

Class A ₁ Amplifier	Triode Section	Tetrode Section
Plate Voltage	125	125 Volts
Grid No. 2 Voltage		125 Volts
Grid No. 1 Voltage		-1.0 Volts
Cathode Resistor	56	Ohms
Plate Current	15	12 Ma
Grid No. 2 Current		4.2 Ma
Transconductance	8000	5800 μmhos
Amplification Factor	40	
Plate Resistance (approx.)	5000	140,000 Ohms
E _{c1} for I _b = 100 μa (approx.)	-7	-7 Volts

NOTES:

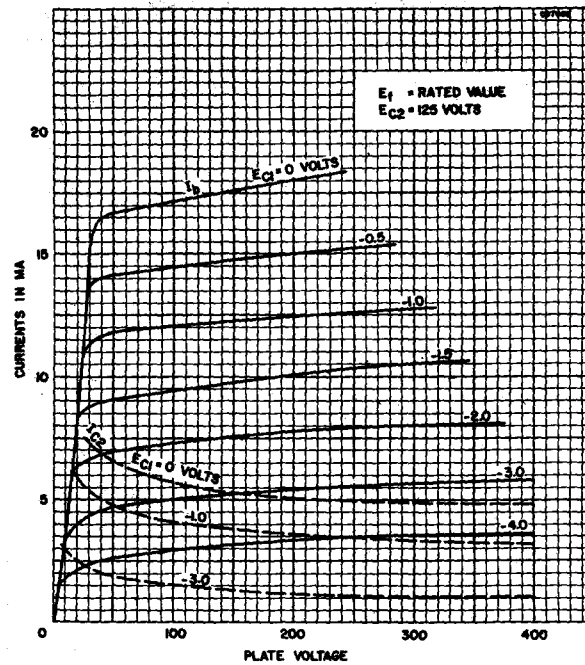
- Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
- With external JETEC No. 315 shield connected to cathode of section under test.

APPLICATION DATA:

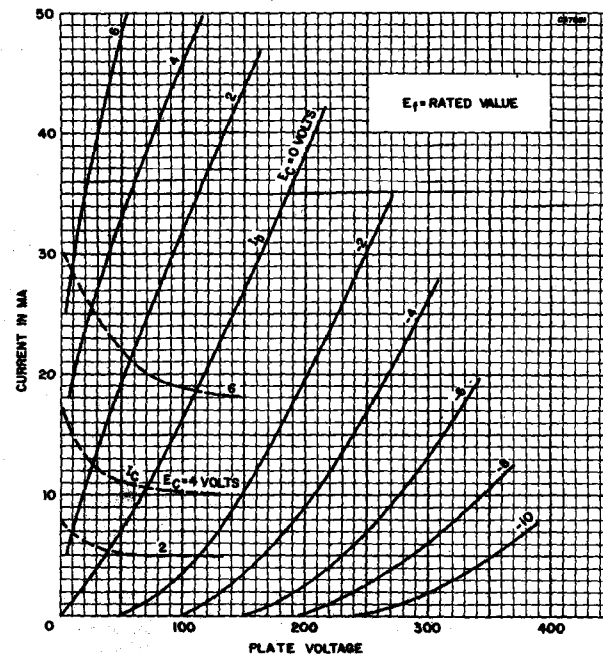
The Sylvania Type 6CQ8 is a miniature medium mu triode and sharp cutoff tetrode designed for use as a combined v h f oscillator and mixer.
Type 6CQ8 has controlled heater warm-up time for series string operation.

6CQ8 (Cont'd)

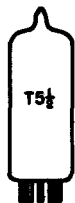
AVERAGE PLATE CHARACTERISTICS (TETRODE SECTION)



AVERAGE PLATE CHARACTERISTICS (TRIODE SECTION)



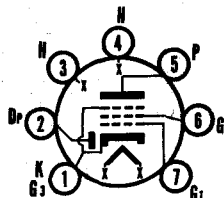
SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6CR6

12CR6

DIODE DETECTOR
REMOTE CUTOFF PENTODE



7EA

MECHANICAL DATA

Bulb.....	T-5½
Base.....	E7-1, Miniature Button 7-Pin
Outline.....	5-2
Basing.....	7EA
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6CR6	12CR6
Heater Voltage.....	6.3	12.6 Volts
Heater Current.....	300	150 Ma
Heater-Cathode Voltage (Design Center Values)		
Heater Negative with Respect to Cathode		
Total D C and Peak.....		100 Volts Max.
Heater Positive with Respect to Cathode		
Total D C and Peak.....		100 Volts Max.

MAXIMUM RATINGS (Design Center Values)

Plate Voltage.....	300 Volts
Grid No. 2 Supply Voltage.....	300 Volts
Grid No. 2 Voltage.....	See 6AM8 Rating Chart
Plate Dissipation.....	2.5 Watts
Grid No. 2 Dissipation.....	0.3 Watt
Positive D C Grid No. 1 Voltage.....	0 Volts
Grid No. 1 Circuit Resistance.....	1.0 Megohm

CHARACTERISTICS AND TYPICAL OPERATION

Class A₁ Amplifier

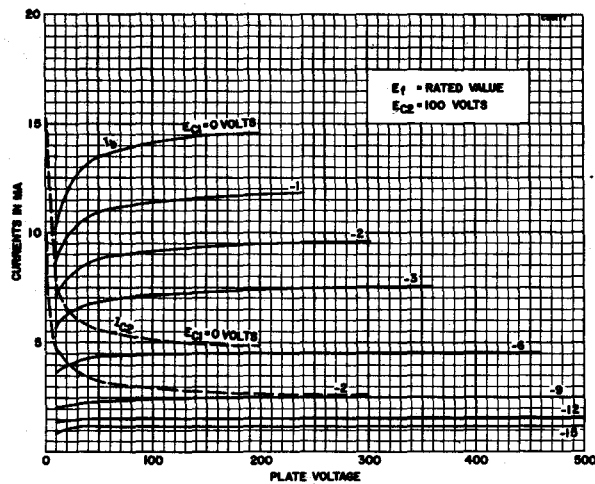
Plate Voltage.....	250 Volts
Grid No. 2 Voltage.....	100 Volts
Grid No. 1 Voltage.....	-2 Volts
Plate Current.....	9.6 Ma
Grid No. 2 Current.....	2.6 Ma
Transconductance.....	2200 μmhos
Plate Resistance (approx.).....	0.8 Megohm
Grid No. 1 Voltage for G _m = μmhos (approx.).....	-32 Volts
Minimum Diode Current with 10 Volts D C Applied.....	2 Ma

APPLICATION

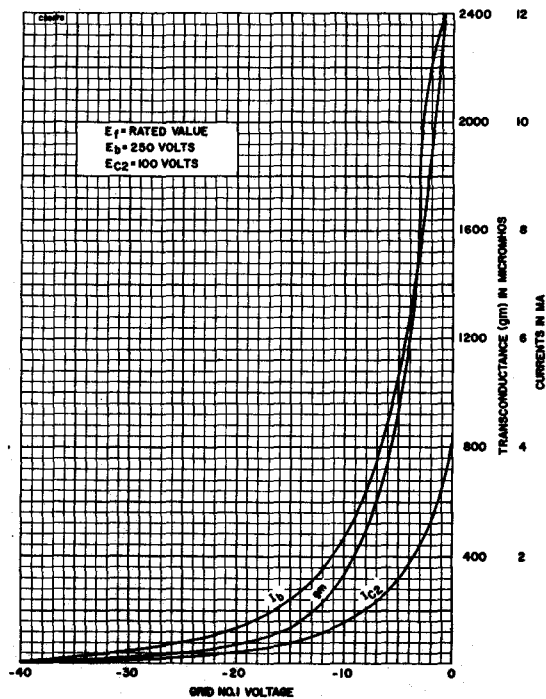
The Sylvania Types 6CR6 and 12CR6 have a diode detector and remote cutoff pentode contained in one envelope. The pentode section is intended for use as an audio amplifier in which AVC voltage is applied to the No. 1 Grid for improved AVC operation in receivers.

6CR6, 12CR6 (Cont'd)

AVERAGE PLATE CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS



6CL6 (Cont'd)

CHARACTERISTICS AND TYPICAL OPERATION

Class A₁ Amplifier

Plate Voltage.....	250 Volts
Grid No. 3 Voltage.....	Connected to Cathode at Socket
Grid No. 2 Voltage.....	150 Volts
Grid No. 1 Voltage.....	-3.0 Volts
Peak A F Grid No. 1 Voltage.....	3.0 Volts
Plate Current (Maximum Signal).....	31 Ma
Plate Current (Zero Signal).....	30 Ma
Grid No. 2 Current (Maximum Signal).....	7.2 Ma
Grid No. 2 Current (Zero Signal).....	7.0 Ma
Plate Resistance (approx.).....	0.15 Megohm
Transconductance.....	11000 μ hos
Load Resistance.....	7500 Ohms
Total Harmonic Distortion.....	8 Percent
Maximum Signal Power Output.....	2.8 Watts
Grid No. 1 Bias for $I_b = 10 \mu a$ (approx.).....	-14 Volts

Video Amplifier, 4 Mc Bandwidth

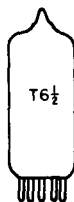
Plate Supply Voltage.....	300 Volts
Grid No. 3 Voltage.....	Connected to Cathode at Socket
Grid No. 2 Supply Voltage.....	300 Volts
Grid No. 2 Resistor.....	24000 Ohms
Grid No. 1 Voltage.....	-2.0 Volts
Grid No. 1 Resistance.....	0.1 Megohm
Grid No. 1 Signal Voltage (Peak to Peak).....	3.0 Volts
Plate Current (Zero Signal).....	30 Ma
Grid No. 2 Current (Zero Signal).....	7.0 Ma
Load Resistance.....	3900 Ohms
Voltage Output (Peak to Peak).....	132 Volts

APPLICATION

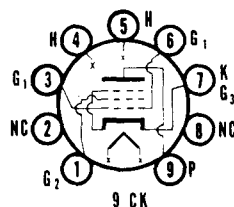
The Type 6CL6 is a miniature power pentode designed primarily for use as the video output amplifier in television receivers. It is useful for driving large television picture tubes and for wide-band amplifiers in industrial and laboratory equipment.

SYLVANIA TUBE TESTER SETTINGS

	A	B	C	D	E	F	G	Test or K
139/140	6.3	0	59	0	3	36	29	Y
	6.3	0	36	0	3	59	29	Y
219/220	6.3	4	359S	27	5	28Z	6	1
	6.3	4	258S	27	5	039Z	6	1



SYLVANIA TYPE 6CM6
BEAM POWER PENTODE



MECHANICAL DATA

Bulb.....	T-6 1/2, Outline 6-3
Base.....	Small Button 9-Pin
Basing.....	9CK
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	450 Ma
Maximum Heater-Cathode Voltage.....	
D C, Heater Positive with Respect to Cathode.....	100 Volts
Total D C and Peak.....	200 Volts

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Grid to Plate.....	0.7 μ f
Input.....	8.0 μ f
Output.....	8.5 μ f

6CM6 (Cont'd)

MAXIMUM RATINGS (Design Center Values—Except as Noted)

Class A₁ Amplifier

Plate Voltage	315 Volts
Plate Dissipation	12 Watts
Grid No. 2 Voltage	285 Volts
Grid No. 2 Dissipation	2 Watts
Grid No. 1 Circuit Resistance	
Fixed Bias	0.1 Megohm
Cathode Bias	0.5 Megohm

Vertical Deflection Amplifier¹

	Pentode Connected	Triode Connected
Plate Voltage	315	315 Volts
Peak Positive Plate Voltage (Abs. Max.)	2000	2000 Volts
Plate Dissipation ²	8	8 Watts
Grid No. 2 Voltage	285	Volts
Grid No. 2 Dissipation ²	1.75	Watts
Peak Negative Grid Voltage	250	250 Volts
Average Cathode Current	40	40 Ma
Peak Cathode Current	120	120 Ma
Grid No. 1 Circuit Resistance, Cathode Bias	2.2	2.2 Megohms

NOTES:

- For operation in a 525-line, 30 frame system, the duty cycle of the voltage pulse is not to exceed 15% of one scanning cycle.
- In stages operating with a grid leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

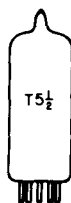
For Characteristics and Typical Operation refer to Type 6V6GT which is identical except for envelope size and maximum ratings.

SYLVANIA TUBE TESTER SETTINGS

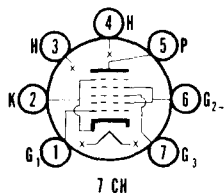
	A	B	C	D	E	F	G	Test or K
139/140	6.3	0	4	0	4	026	35	Y
	6.3	0	6	0	4	024	35	Y
219/220	6.3	4	56	26	5	013Z	9	7
	6.3	4	35	26	5	016Z	9	7

TYPE 6CR6

(See Condensed Data Section)



SYLVANIA TYPE 6CS6 DUAL CONTROL HEPTODE



MECHANICAL DATA

Bulb	T-5 1/2, Outline 5-2
Base	Miniature Button 7-Pin
Basing	7CH
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage	6.3 Volts
Heater Current	300 Ma
Maximum Heater-Cathode Voltage	
D C, Heater Positive with Respect to Cathode	100 Volts
Total D C and Peak	200 Volts

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Grid No. 1 to Plate	0.07 μ f Max
Grid No. 3 to Plate	0.36 μ f Max
Grid No. 1 Input (g1 to h+k+g2+g3 and p5)	5.5 μ f
Grid No. 3 Input (g3 to h+k+g1+g2+g5)	7.0 μ f
Output (p to All)	7.5 μ f
Coupling (g1 to g3)	0.22 μ f Max

6CS6 (Cont'd)

MAXIMUM RATINGS (Design Center Values)

Plate Voltage	300 Volts
Plate Dissipation	1.0 Watt
Grid No. 2 and 4 Voltage	100 Volts
Grid No. 2 and 4 Supply Voltage	300 Volts
Grid No. 2 and 4 Dissipation	1.0 Watts
Cathode Current	14 Ma
Grid No. 1 Circuit Resistance	0.47 Megohm
Grid No. 3 Circuit Resistance	2.2 Megohms

CHARACTERISTICS

Plate Voltage	10	100	100 Volts
Grid No. 2 and 4 Voltage	30	30	30 Volts
Grid No. 1 Voltage	0	0	-1.0 Volts
Grid No. 3 Voltage	0	-1.0	0 Volts
Plate Current	2.0	0.8	1.0 Ma
Grid No. 2 and 4 Current	4.5	5.5	1.3 Ma
Transconductance			
Grid No. 1			1100 μ hos
Grid No. 3	1500		μ hos
Plate Resistance (approx.)	0.7		1.0 Megohm
Grid Voltage for $I_b = 50 \mu$ a			
Grid No. 1			-2.5 Volts
Grid No. 3	-2.2		Volts

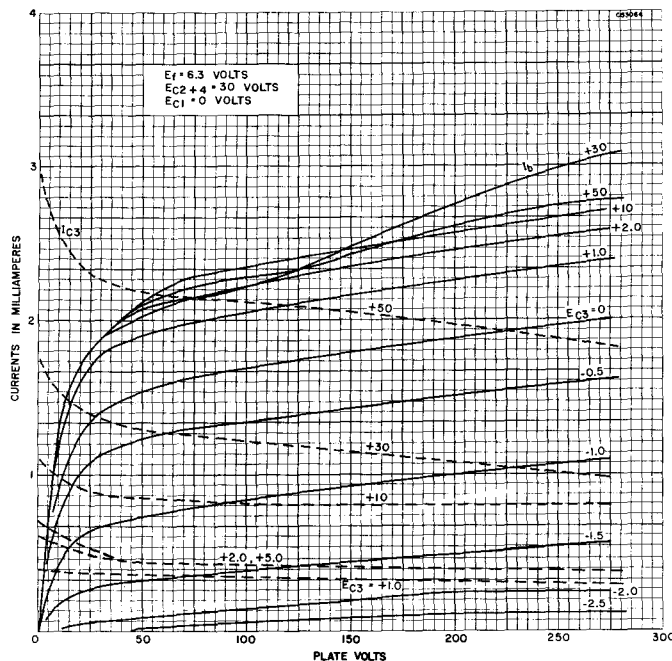
APPLICATION

Sylvania Type 6CS6 is 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 cutoff characteristics of grid 3 make the Type 6CS6 particularly adaptable to this type of operation.

SYLVANIA TUBE TESTER SETTINGS

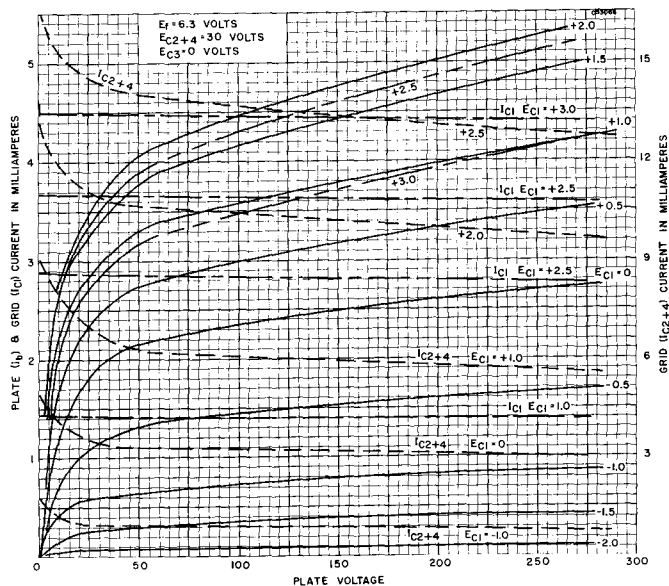
	A	B	C	D	E	F	G	Test or K
139/140	6.3	0	—	0	4	46	19	V
	6.3	0	—	0	5	3	42	U
219/220	6.3	3	4	49	4	067SU	5	2
	6.3	3	4	19	4	1SU	6	2

AVERAGE PLATE CHARACTERISTICS

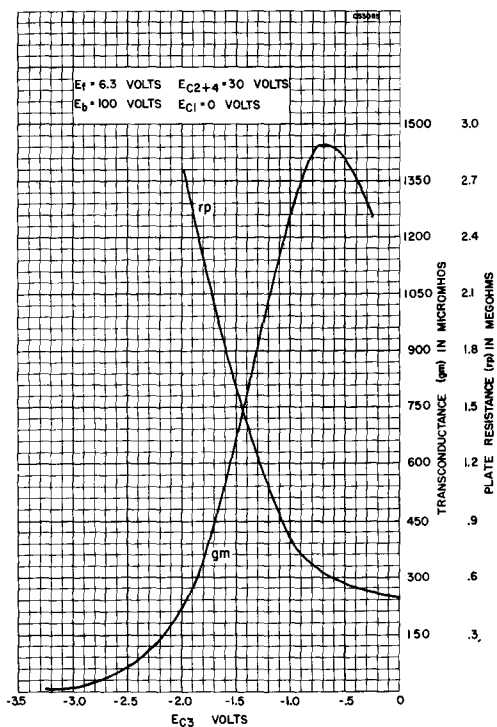


6CS6 (Cont'd)

AVERAGE PLATE CHARACTERISTICS

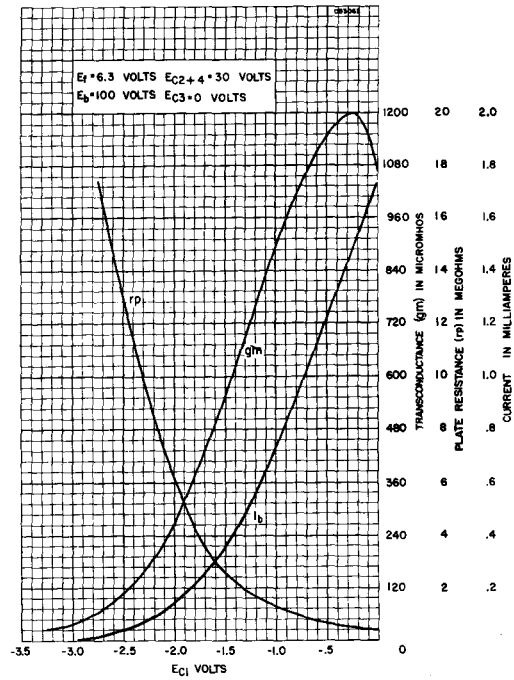


AVERAGE TRANSFER CHARACTERISTICS

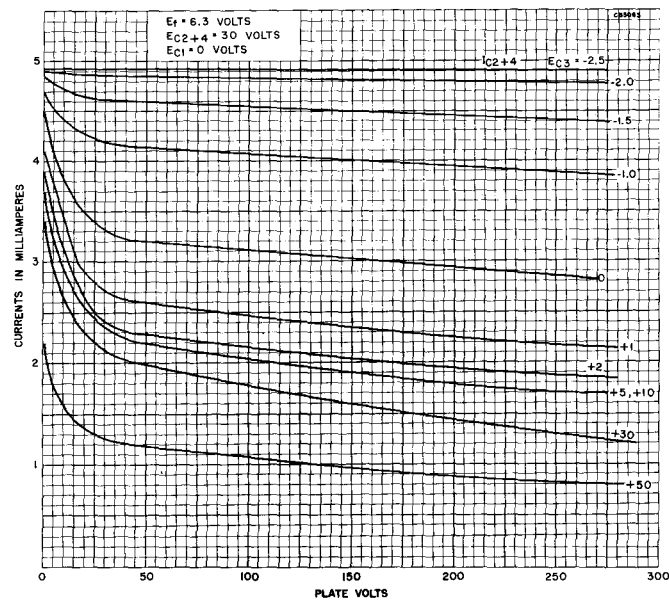


6CS6 (Cont'd)

AVERAGE TRANSFER CHARACTERISTICS



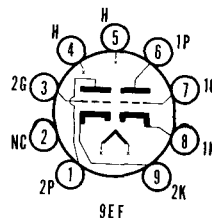
AVERAGE CHARACTERISTICS





SYLVANIA TYPE 6CS7

DOUBLE TRIODE



MECHANICAL DATA

Bulb.....	T-6 1/2
Base.....	E9-1, Small Button, 9-Pin
Outline.....	6-3
Basing.....	9EF
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	600 Ma
Heater Warm-up Time (See Appendix).....	11 Seconds
Heater-Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode	
Total D C and Peak.....	200 Volts Max.
Heater Positive with Respect to Cathode	
D C.....	100 Volts Max.
Total D C and Peak.....	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

	Triode No. 1 ¹	Triode No. 2
Grid to Plate.....	2.6	2.6 $\mu\mu\text{f}$
Input: g to (k+h+e.s.).....	1.8	3.0 $\mu\mu\text{f}$
Output: p to (k+h+e.s.).....	0.5	0.5 $\mu\mu\text{f}$

RATINGS (Design Center Values—Except as Noted)

Vertical Deflection Oscillator and Amplifier²

	Triode No. 1 ¹ (Oscillator)	Triode No. 2 (Amplifier)
D C Plate Voltage.....	500	500 Volts Max.
Peak Positive Pulse Plate Voltage (Abs. Max.).....		2200 Volts
Peak Negative Pulse Grid Voltage.....	400	250 Volts Max.
Plate Dissipation ³	1.25	6.5 Watts Max.
Average Cathode Current.....	20	30 Ma Max.
Peak Cathode Current.....	70	105 Ma Max.
Grid Circuit Resistance.....	2.2	2.2 Megohms Max

AVERAGE CHARACTERISTICS

	Triode No. 1 ¹	Triode No. 2
Plate Voltage.....	250	250 Volts
Grid Voltage.....	-8.5	-10.5 Volts
Plate Current.....	10.5	19.0 Ma
Transconductance.....	2200	4500 μmhos
Amplification Factor.....	17.0	15.5
Plate Resistance.....	7700	3450 Ohms
Plate Current at $E_c = -16$ Volts.....		3.0 Ma
Grid Voltage for $I_b = 10 \mu\text{a}$	-24	Volts
Grid Voltage for $I_b = 50 \mu\text{a}$		-22 Volts

NOTES:

- Triode No. 1 connects to pins 6, 7 and 8.
Triode No. 2 connects to pins 1, 3 and 9.
- For operation in a 525 line, 30-frame system as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
- 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.

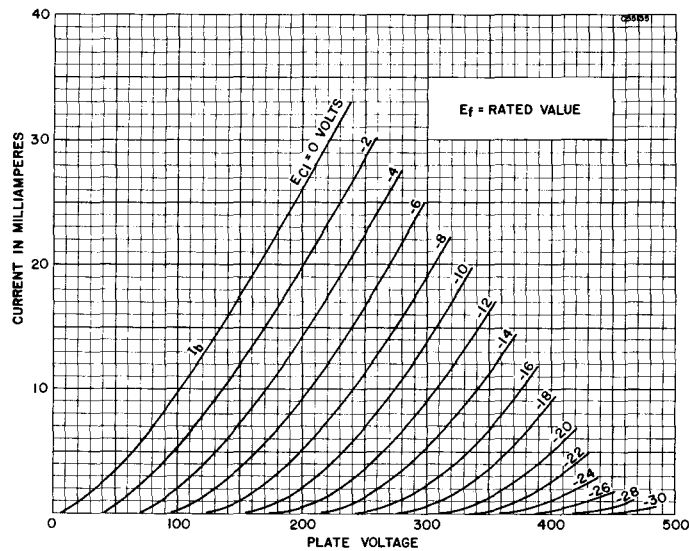
APPLICATION

The Sylvania Type 6CS7 is a miniature double triode having dissimilar sections. Section No. 1 is intended for operation as a vertical deflection oscillator and Section No. 2 as a vertical deflection amplifier. The 6CS7 incorporates controlled heater warm-up time to insure dependable operation in television receivers employing a series heater string.

6CS7 (Cont'd)

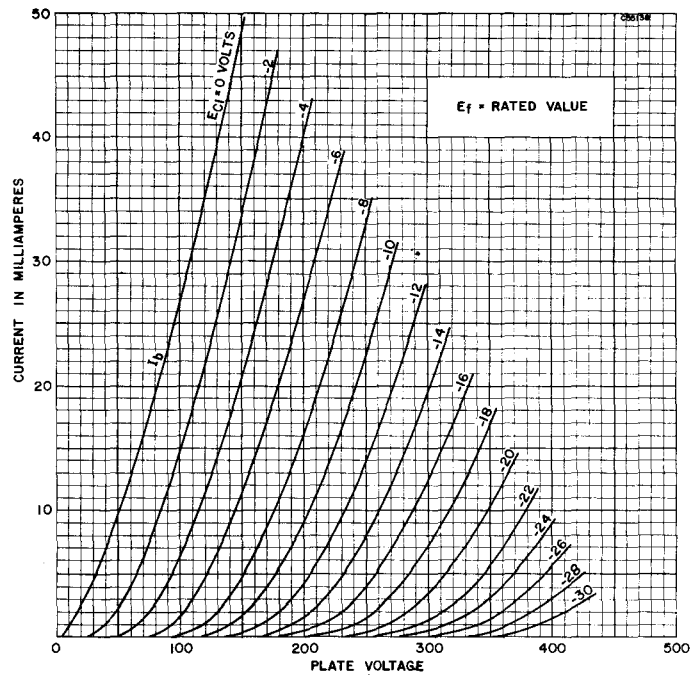
AVERAGE PLATE CHARACTERISTICS

Triode No. 1

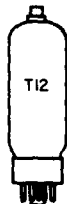


AVERAGE PLATE CHARACTERISTICS

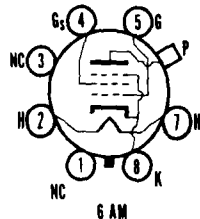
Triode No. 2



SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6CU6
BEAM POWER AMPLIFIER



MECHANICAL DATA

Bulb.....	T-12, Outline 12-105
Base.....	Medium Shell Octal
Basing.....	6AM
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	1.2 Amperes
Maximum Heater-Cathode Voltage Total D C and Peak.....	200 Volts
D C, Heater Positive with Respect to Cathode.....	100 Volts

DIRECT INTERELECTRODE CAPACITANCES

Grid to Plate.....	0.55 μ mf
Input.....	15 μ mf
Output.....	7.0 μ mf

MAXIMUM RATINGS (Design Center Values)

Identical to Type 6BQ6GTA except: Maximum D C Plate Supply Voltage.....	550 Volts
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CHARACTERISTICS AND TYPICAL OPERATION

Identical to Type 6BQ6GTA

APPLICATION

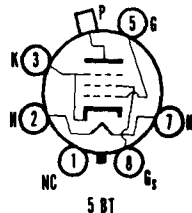
The Sylvania Type 6CU6 is a beam power amplifier designed for service as the horizontal deflection amplifier in television receivers. It has similar ratings and identical characteristics to Type 6BQ6GTA.

**TYPES 6D5G, 6D6, 6D7, 6D8G,
6DB6, 6DC6, 6DE6**

(See Condensed Data Section)



SYLVANIA TYPE 6DN6
25DN6
BEAM POWER AMPLIFIER



MECHANICAL DATA

Bulb.....	T-12
Base.....	B8-118, Short Medium Shell Octal, 8-Pin
Basing.....	5BT
Top Cap.....	C1-1 Small
Cathode.....	Coated Unipotential
Mounting Position.....	Vertical ¹

6DN6, 25DN6 (Cont'd)

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DN6	25DN6	
Heater Voltage	6.3	25.0	Volts
Heater Current	2.5	0.60	Amperes
Heater Warm-up Time (See Appendix)		11	Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Negative with Respect to Cathode			
Total D C and Peak	200	200	Volts Max.
Heater Positive with Respect to Cathode			
D C	100	100	Volts Max.
Total D C and Peak	200	200	Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Approx.)

Grid No. 1 to Plate	0.8	$\mu\mu\text{f}$
Input	22	$\mu\mu\text{f}$
Output	11.5	$\mu\mu\text{f}$

RATINGS (Design Center Values—Except as Noted)

Horizontal Deflection Amplifier:

D C Plate Supply Voltage (Boost + D C Power Supply)	700	Volts	Max.
Peak Positive Pulse Plate Voltage (Abs. Max.)	6600	Volts	
Peak Negative Pulse Plate Voltage	1500	Volts	Max.
Plate Dissipation ³	15	Watts	Max.
Peak Negative Grid No. 1 Voltage	200	Volts	Max.
D C Grid No. 2 Voltage	175	Volts	Max.
Grid No. 2 Dissipation	3.0	Watts	Max.
Average Cathode Current	200	Ma	Max.
Peak Cathode Current	700	Ma	Max.
Grid No. 1 Circuit Resistance	0.47	Megohm	Max.
Bulb Temperature (At Hottest Point)	225°	C	Max.

AVERAGE CHARACTERISTICS

Pentode Operation:

With $E_b = 125$ V, $E_{c2} = 125$ V and $E_{c1} = -18$ V			
Plate Current	70	Ma	
Grid No. 2 Current	6.3	Ma	
Transconductance	9000	μmhos	
Plate Resistance (approx.)	4000	Ohms	

Zero Bias:

With $E_b = 50$ V, $E_{c2} = 100$ V and $E_{c1} = 0$ V (Instantaneous Values)			
Plate Current	240	Ma	
Grid No. 2 Current	30	Ma	

Cutoff:

For $I_b = 0.5$ Ma with $E_b = 125$ V and $E_{c2} = 125$ V			
Grid No. 1 Voltage (approx.)	-36	Volts	

Triode Amplification Factor:

With $E_b = E_{c2} = 125$ V and $E_{c1} = -18$ V	4.35
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NOTES:

- Horizontal operation permitted if plane of Pins 1 and 3 is vertical.
- For operation in a 525 line, 30 frame system as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
- 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.

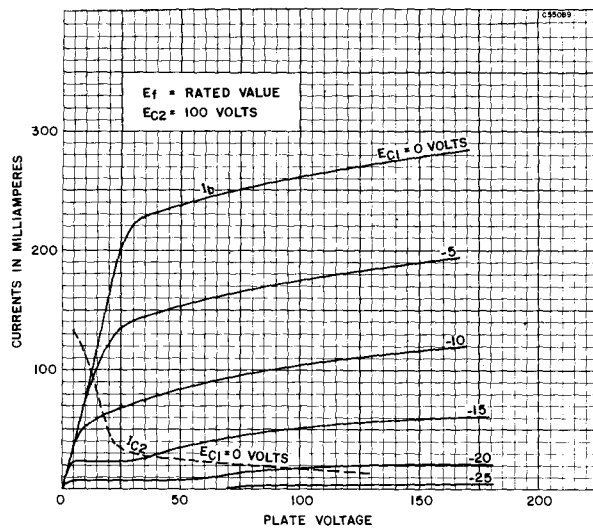
APPLICATION DATA

The Sylvania Types 6DN6 and 25DN6 are beam power amplifiers designed for use as horizontal deflection amplifiers in television receivers having low B supply voltages. These types exhibit extremely low plate knee characteristics at zero bias.

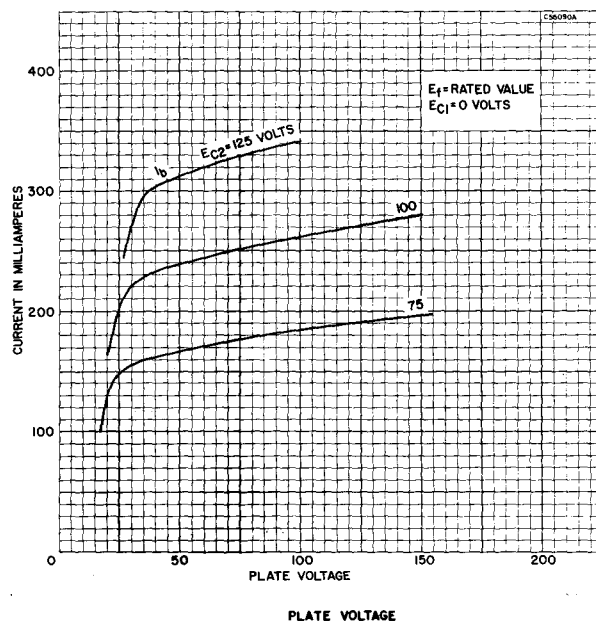
The 25DN6 features a 25.0 volt, 600 Ma heater and controlled heater warm-up time for series string operation. Except for heater characteristics, the 25DN6 is identical to the 6DN6.

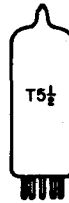
6DN6, 25DN6 (Cont'd)

AVERAGE PLATE CHARACTERISTICS



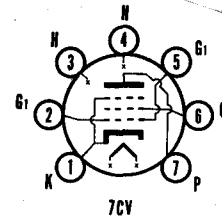
AVERAGE PLATE CHARACTERISTICS





**SYLVANIA TYPE 6CU5
12CU5
17CU5**

BEAM POWER TUBE



MECHANICAL DATA

Bulb.....	T-5½
Base.....	E7-1, Miniature Button, 7-Pin
Outline.....	5-3
Basing.....	7CV
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6CU5	12CU5	17CU5
Heater Voltage.....	6.3	12.6	16.8 Volts
Heater Current.....	1200	600	450 Ma
Heater Warm-up Time ¹		11	11 Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Neg. with Respect to Cath. Total D C and Peak.....	200	200	200 Volts Max.
Heater Pos. with Respect to Cath. Total D C and Peak.....	200	200	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Grid to Plate.....	0.7 μf
Input.....	13.2 μf
Output.....	8.6 μf

RATINGS (Design Center Values)

Plate Voltage.....	135 Volts Max.
Grid No. 2 Voltage.....	117 Volts Max.
Plate Dissipation.....	6.0 Watts Max.
Grid No. 2 Dissipation.....	1.25 Watts Max.
Positive D C Grid No. 1 Voltage.....	0 Volts Max.
Grid No. 1 Circuit Resistance	
Fixed Bias.....	0.1 Megohm Max.
Cathode Bias.....	0.5 Megohm Max.
Bulb Temperature (At hottest point).....	220° C Max.

CHARACTERISTICS AND TYPICAL OPERATION (Single Tube)

Class A₁ Amplifier

Plate Voltage.....	120 Volts
Grid No. 2 Voltage.....	110 Volts
Grid No. 1 Voltage.....	-8.0 Volts
Peak AF Grid No. 1 Voltage.....	8.0 Volts
Zero Signal Plate Current.....	49 Ma
Maximum Signal Plate Current.....	50 Ma
Zero Signal Grid No. 2 Current.....	4.0 Ma
Maximum Signal Grid No. 2 Current.....	8.5 Ma
Plate Resistance (approx.).....	10,000 Ohms
Transconductance.....	7,500 μmhos
Load Resistance.....	2,500 Ohms
Maximum Signal Power Output.....	2.3 Watts
Total Harmonic Distortion (approx.).....	10 Per cent

NOTE:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.

APPLICATION

These tubes are intended primarily for use in the audio output stage of television receivers employing low B supply voltage. The 12CU5 employs a 600 Ma heater while the 17CU5 has a 450 Ma heater. Both types have controlled heater warm-up time and are intended for use in receivers having a series heater string. The 6CU5, 12CU5 and 17CU5 exhibit characteristics similar to those of the 50C5.

SYLVANIA ELECTRONIC TUBES

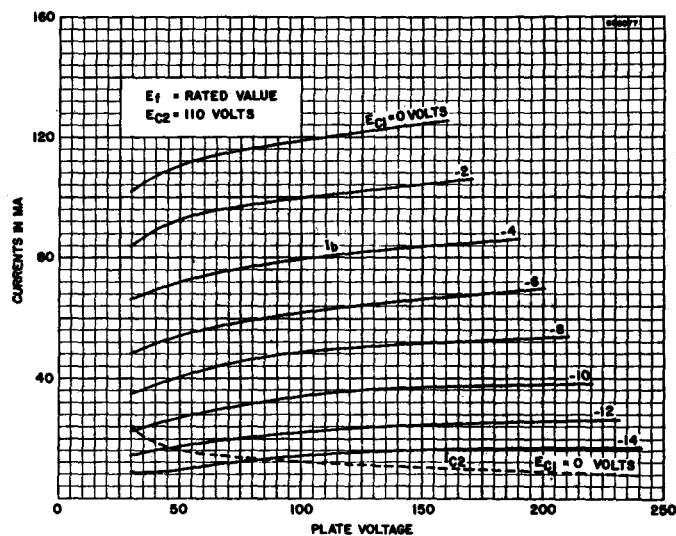
Issued as a supplement to the manual in Sylvania News for Nov.-Dec. 1956

SYLVANIA TYPE 6CU5 (Cont'd)

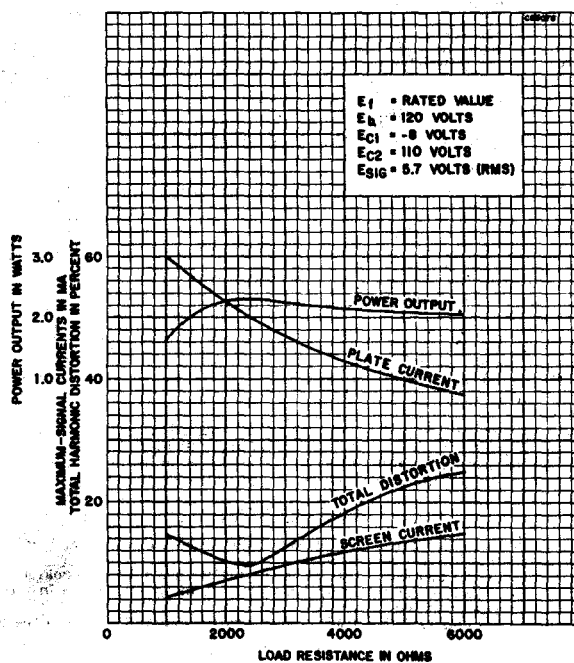
12CU5

17CU5

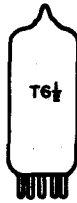
AVERAGE PLATE CHARACTERISTICS



AVERAGE OPERATION CHARACTERISTICS

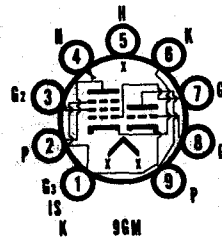


SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6CU8

MEDIUM MU TRIODE
SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb	T-6 1/2
Base	E9-1, Small Button 9-Pin
Outline	6-2
Basing	9GM
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage	6.3 Volts
Heater Current	450 Ma
Heater Warm-up Time ¹	11 Seconds
Heater-Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode	
Total D C and Peak	200 Volts Max.
Heater Positive with Respect to Cathode	
D C	100 Volts Max.
Total D C and Peak	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Triode Section

Grid to Plate	1.6 μf
Grid to (k+h+g3+I.S.)	1.9 μf
Plate to (k+h+g3+I.S.)	1.6 μf

Pentode Section

Grid No. 1 to Plate	0.025 μf Max.
Grid No. 1 to (k and g3+g2+h+Tk+I.S.)	7.0 μf
Plate to (k and g3+g2+h+Tk+I.S.)	2.4 μf

Coupling

Pentode Grid No. 1 to Triode Plate	0.02 μf
Pentode Plate to Triode Plate	0.04 μf
Triode Grid to Pentode Plate	0.005 μf

MAXIMUM RATINGS (Design Center Values)

	Triode Section	Pentode Section
Plate Voltage	300	300 Volts
Grid No. 2 Supply Voltage		300 Volts
Grid No. 2 Voltage	See 6AM8 Rating Chart	
Plate Dissipation	2.6	2 Watts
Positive Grid No. 1 Voltage	0	0 Volt
Grid No. 2 Input:		
For Grid No. 2 Voltages up to 150 Volts		0.5 Watt
For Grid No. 2 Voltages Between 150 Volts and 300 Volts	See 6AM8 Rating Chart	
Grid No. 1 Circuit Resistance		
Fixed Bias	0.5	0.25 Megohm
Self Bias	1.0	1.0 Megohm

AVERAGE CHARACTERISTICS

	Triode Section	Pentode Section
Plate Voltage	200	200 Volts
Grid No. 2 Voltage		150 Volts
Grid Voltage	-6	Volts
Cathode Bias Resistor		180 Ohms
Plate Current	13	9.5 Ma
Grid No. 2 Current		2.0 Ma
Transconductance	3300	6200 μmhos
Amplification Factor	19	
Plate Resistance	5750	300,000 Ohms
E _{c1} for I _b = 10 μa (approx.)	-19	-8 Volts

NOTE:

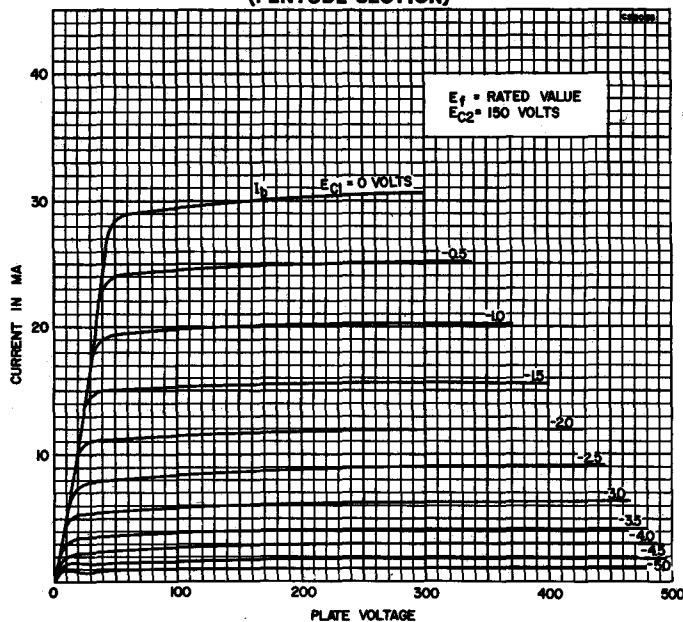
1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.

6CU8 (Cont'd)

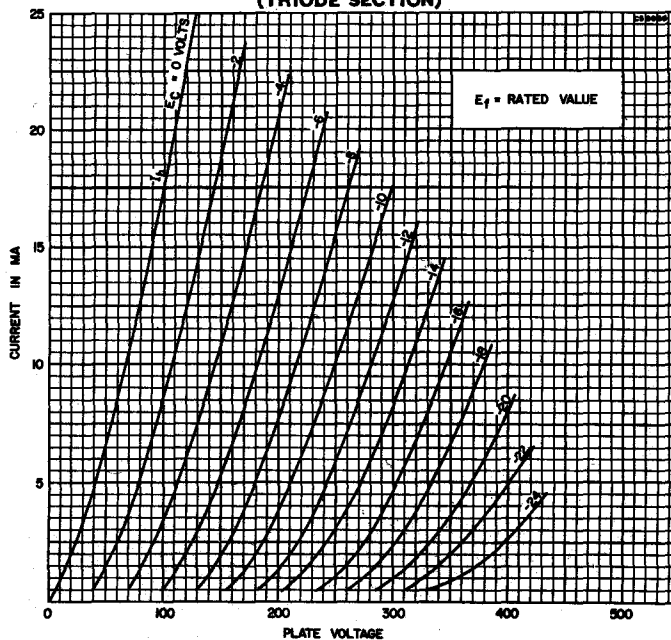
APPLICATION

The Sylvania Type 6CU8 is a medium mu triode and sharp cutoff pentode contained in a T-6½ envelope. The pentode section is suitable for use as an IF, video or a/c amplifier. The triode section is well suited for use in low frequency oscillator, sync-separator, sync-clipper and phase-splitter circuits. Type 6CU8 has controlled heater warm-up time for series string operation.

AVERAGE PLATE CHARACTERISTICS (PENTODE SECTION)



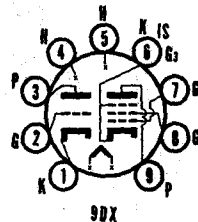
AVERAGE PLATE CHARACTERISTICS (TRIODE SECTION)



SYLVANIA ELECTRONIC TUBES



**SYLVANIA TYPE 6CX8
8CX8**
MEDIUM MU TRIODE
SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb	T-6 1/2
Base	E9-1, Small Button, 9-Pin
Outline	6-3
Base	9D X
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6CX8	8CX8
Heater Voltage	6.3	8.0 Volts
Heater Current	750	600 Ma
Heater Warm-up Time ¹		11 Seconds
Heater-Cathode Voltage (Design Max. Values)		
Heater Negative with Respect to Cathode		
Total D C and Peak		200 Volts Max.
Heater Positive with Respect to Cathode		
D C		100 Volts Max.
Total D C and Peak		200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Triode Section

Grid to Plate	4.4 μ f
Input	2.2 μ f
Output	0.38 μ f

Pentode Section

Grid No. 1 to Plate	0.06 μ f
Input	9.0 μ f
Output	4.4 μ f

Coupling

Pentode Grid No. 1 to Triode Plate	0.005 μ f Max.
Pentode Plate to Triode Grid	0.018 μ f Max.
Pentode Plate to Triode Plate	0.17 μ f Max.

MAXIMUM RATINGS (Design Maximum Values)²

	Triode Section	Pentode Section
Plate Voltage	330	330 Volts
Grid No. 2 Supply Voltage		330 Volts
Grid No. 2 Voltage	See 6AM8 Rating Chart	
Positive Grid No. 1 Voltage	0	0 Volts
Plate Dissipation	2.0	5.0 Watts
Grid No. 2 Dissipation		1.1 Watts
Grid No. 1 Circuit Resistance		
Fixed Bias	0.5	0.25 Megohm
Cathode Bias	1.0	1.0 Megohm

CHARACTERISTICS AND TYPICAL OPERATION

	Triode Section	Pentode Section
Class A1 Amplifier		
Plate Voltage	150	200 Volts
Grid No. 2 Voltage		125 Volts
Cathode Bias Resistor	150	68 Ohms
Plate Current	9.2	24 Ma
Grid No. 2 Current		5.2 Ma
Transconductance	4600	10,000 μ mhos
Amplification Factor	40	
Plate Resistance (approx.)	8700	70,000 Ohms
Grid No. 1 Voltage for $I_b = 100 \mu$ a (approx.)	-5.0	-8.5 Volts
Plate Knee Characteristics: (Instantaneous Values)		
$E_b = 40$ Volts, $E_{c2} = 125$ Volts, $E_{c1} = 0$ Volts		
Plate Current		40 Ma
Grid No. 2 Current		15.5 Ma

NOTES:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. Design-maximum ratings are the limiting values expressed with respect to bogie tubes at which satisfactory tube life can be expected to occur. To obtain satisfactory circuit performance, therefore, the equipment designer must establish the circuit design so that no design-maximum value is exceeded with

SYLVANIA ELECTRONIC TUBES

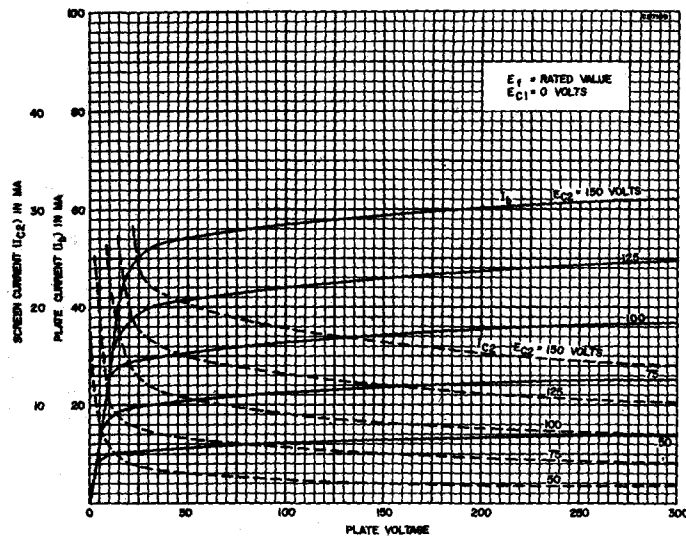
6CX8, 8CX8 (Cont'd)

a bottle tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, and environmental conditions.

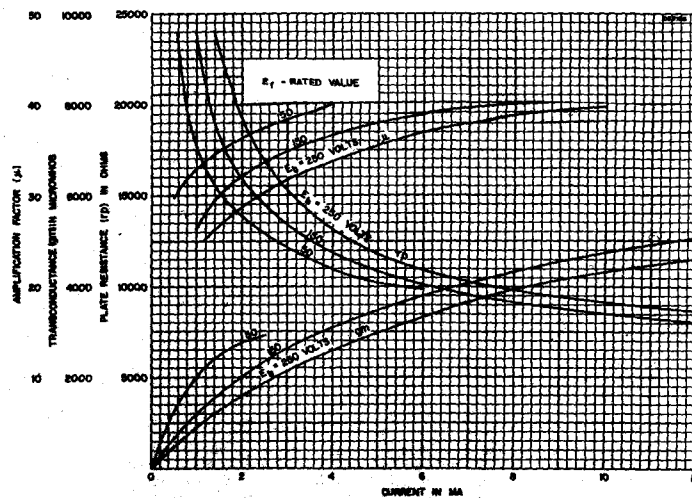
APPLICATION

The Sylvania Type 6CX8 is a miniature, medium- μ triode and a sharp-cutoff pentode. The pentode section is intended for use as a video amplifier and the triode section has a variety of low frequency amplifier and oscillator applications. The 8CX8 has controlled heater warm-up time for series string operation.

AVERAGE PLATE CHARACTERISTICS (PENTODE SECTION)

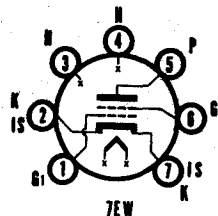


AVERAGE TRANSFER CHARACTERISTICS (TRIODE SECTION)





SYLVANIA TYPE 6CY5
VHF AMPLIFIER
2CY5
3CY5
4CY5



MECHANICAL DATA

Bulb.....	T-5½
Base.....	E7-1, Miniature Button 7-Pin
Outline.....	5-2
Basing.....	7EW
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	2CY5	3CY5	4CY5	6CY5
Heater Voltage.....	2.4	2.9	4.5	6.3 Volts
Heater Current.....	600	450	300	200 Ma
Heater Warm-up Time ¹	11	11	11	Seconds
Heater-Cathode Voltage (Design Maximum Values) ²				
Heater Negative with Respect to Cathode				100 Volts Max.
Total D C and Peak				100 Volts Max.
Heater Positive with Respect to Cathode				100 Volts Max.
Total D C and Peak				100 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Shielded)³

Grid No. 1 to Plate.....	0.03 $\mu\mu\text{f}$
Input.....	4.5 $\mu\mu\text{f}$
Output.....	3.0 $\mu\mu\text{f}$

MAXIMUM RATINGS (Design Maximum Values)

Plate Voltage.....	180 Volts
Grid No. 2 Supply Voltage.....	180 Volts
Grid No. 2 Voltage.....	See 6AM8 Rating Chart
Plate Dissipation.....	2.0 Watts
Grid No. 2 Dissipation.....	0.5 Watts
Positive Grid No. 1 Voltage.....	0 Volts
Cathode Current.....	20 Ma

CHARACTERISTICS AND TYPICAL OPERATION

Plate Voltage.....	125 Volts
Grid No. 2 Voltage.....	80 Volts
Grid No. 1 Voltage.....	-1 Volt
Plate Current.....	10 Ma
Grid No. 2 Current.....	1.5 Ma
Transconductance.....	8000 μmhos
Plate Resistance.....	0.1 Megohm
Grid No. 1 Voltage for $I_b = 20 \mu\text{a}$	-6 Volts

NOTES:

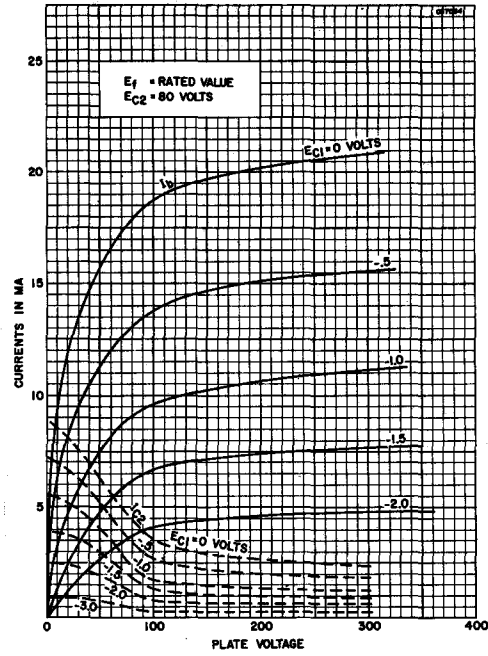
- Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three times rated heater voltage divided by rated heater current.
- Design-Maximum Ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.
 The device manufacturer chooses these values to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics.
 The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, and environmental conditions.

APPLICATION

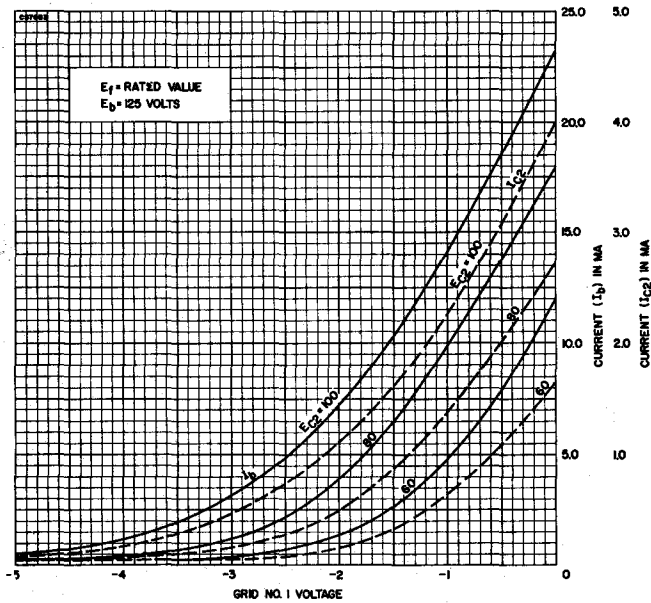
The 2CY5, 3CY5, 4CY5 and 6CY5 are miniature, sharp cutoff tetrodes designed particularly for service as a vhf amplifier in television receiver tuners. Except for heater characteristics the 2CY5, 3CY5, 4CY5 and 6CY5 are identical. The 2CY5, 3CY5 and 4CY5 feature controlled heater warm-up time for use in series string television receivers.

6CY5, 2CY5, 3CY5, 4CY5 (Cont'd)

AVERAGE PLATE CHARACTERISTICS



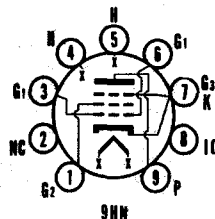
AVERAGE TRANSFER CHARACTERISTICS



SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6CZ5
BEAM PENTODE AMPLIFIER



MECHANICAL DATA

Bulb	T-6 $\frac{1}{2}$
Base	E9-1, Miniature Button, 9-Pin
Outline	6-3
Basing	9HN
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage	6.3 Volts
Heater Current	450 Ma
Heater Warm-up Time ¹	11 Seconds
Heater-Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode	
Total D C and Peak	200 Volts Max.
Heater Positive with Respect to Cathode	
D C	100 Volts Max.
Total D C and Peak	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES

Grid No. 1 to Plate	0.7 μ f Max.
Input: g1 to (k+h+g3+g2)	8 μ f
Output: p to (k+h+g3+g2)	8.5 μ f

MAXIMUM RATINGS (Design Center Values—Except as Noted)²

	Vertical Deflection Amp.	Class A ₁ Power Amp.
D C Plate Voltage	315	350 Volts
Peak Positive Plate Voltage (Abs. Max.)	2200 ³	Volts
D C Grid No. 2 Voltage	285	285 Volts
Peak Negative Grid No. 1 Voltage	250	Volts
Plate Dissipation	10	12 Watts
Grid No. 2 Input	2	2 Watts
Average Cathode Current	40	Ma
Peak Cathode Current	140	Ma
Grid No. 1 Circuit Resistance		
Fixed Bias	0.5	0.1 Megohm
Cathode Bias	1	1 Megohm
Bulb Temperature (At Hottest Point)	250	250 Degrees C

CHARACTERISTICS

Plate Voltage	250 Volts
Grid No. 2 Voltage	250 Volts
Grid No. 1 Voltage	-14 Volts
Plate Current	46 Ma
Grid No. 2 Current	4.6 Ma
Transconductance	4800 μ mhos
Plate Resistance (approx.)	73,000 Ohms
Grid No. 1 Voltage for I _b = 100 μ a (approx.)	-35 Volts
Instantaneous Plate Knee Values	
E _b = 70 Volts, E _{c2} = 250 Volts, E _{c1} = 0 Volts	
I _b = 130 Ma, I _{c2} = 16 Ma	

TYPICAL OPERATION

AF Power Amplifier	Single Tube Class A ₁	Push Pull Class AB ₁
Plate Voltage	250	350 Volts
Grid No. 2 Voltage	250	280 Volts
Grid No. 1 Voltage	-14	-23.5 Volts
Peak AF Grid No. 1 Voltage	13	Volts
Peak AF Grid to Grid Voltage ^{4,5}		47 Volts
Zero Signal Plate Current	46	46 Ma
Maximum Signal Plate Current	48	103 Ma
Zero Signal Grid No. 2 Current	4.6	3 Ma
Maximum Signal Grid No. 2 Current	8	13 Ma
Transconductance	4800	μ mhos
Load Resistance	5000	Ohms
Load Resistance (Plate to Plate)		7500 Ohms
Power Output	5.4	21.5 Watts
Total Harmonic Distortion	10	1 Percent

6CZ5 (Cont'd)

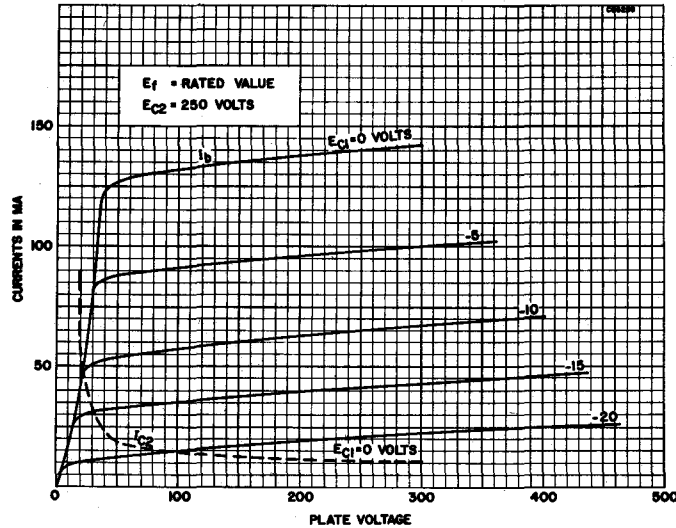
NOTES:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. For operation in a 525-line, 30-frame system as described in "Standards of Good Engineering Practice for Television Broadcast Stations; Federal Communications Commission," the duty cycle of the pulse must not exceed 15% of one scanning cycle.
3. Under no circumstances should this absolute value be exceeded.
4. No Grid No. 1 Current should flow during any part of the input cycle.
5. Low resistance is required by the Grid No. 1 circuit such as transformer or impedance coupling devices.

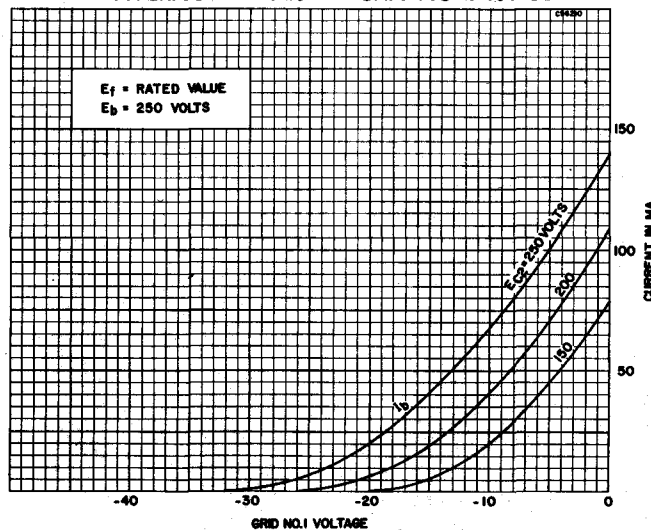
APPLICATION

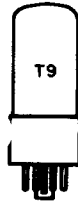
The Sylvania Type 6CZ5 is a miniature, beam pentode intended primarily for use as a vertical deflection amplifier or audio amplifier. The 6CZ5 has controlled heater warm-up time for series string operation.

AVERAGE PLATE CHARACTERISTICS

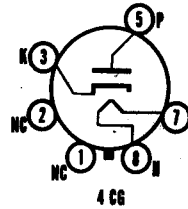


AVERAGE TRANSFER CHARACTERISTICS





**SYLVANIA TYPE 6DA4
12D4
17D4**



MECHANICAL DATA

Bulb.....	T-9
Base.....	B5-82 Intermediate Shell Octal 5-Pin B6-8 Intermediate Shell Octal 6-Pin B5-85 Short Intermediate Shell Octal 5-Pin B6-60 Short Intermediate Shell Octal 6-Pin
Outline.....	9-11 or 9-41
Basing ¹	4CG
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DA4	12D4	17D4	
Heater Voltage.....	6.3	12.6	16.8	Volts
Heater Current.....	1.2	0.60	0.45	Ampères
Heater Warm-up Time ²		11	11	Seconds
Heater-Cathode Voltage (Design Maximum Values)				
Heater Negative with Respect to Cathode				
D C.....	900	900	900	Volts Max.
Total D C and Peak.....	4400	4400	4400	Volts Max.
Heater Positive with Respect to Cathode				
D C.....	100	100	100	Volts Max.
Total D C and Peak.....	300	300	300	Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Approx.)

Heater to Cathode.....	3.0 μf
Plate to Cathode and Heater.....	6.0 μf
Cathode to Plate and Heater.....	8.0 μf

RATINGS (Design Maximum System)³

Damper Service⁴		
Peak Inverse Plate Voltage.....	4400	Volts Max.
Plate Dissipation.....	5.5	Watts Max.
Steady State Peak Current.....	900	Ma Max.
D C Plate Current.....	155	Ma Max.
D C Plate Current (Design Center System).....	145	Ma Max.

CHARACTERISTICS

Tube Voltage Drop for $I_b = 250 \text{ Ma}$	22	Volts
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NOTES:

1. Pins 1, 2, 4 and 6 should not be used as tie points.
2. Heater Warm-up Time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
3. Design-Maximum Ratings are the limiting values expressed with respect to bogey tubes at which satisfactory tube life can be expected to occur. To obtain satisfactory circuit performance, therefore, the equipment designer must establish the circuit design so that no design-maximum value is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, and environmental conditions.
4. For operation in a 525 line, 30 framesystem as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." The duty cycle of the voltage pulse not to exceed 15% of a scanning cycle.

APPLICATION NOTES:

The Sylvania Types 6DA4, 12D4, and 17D4 are indirectly heated half-wave rectifiers designed for service as damping diodes in direct-drive sweep circuits in television receivers. The 12D4 and 17D4 have controlled heater warm-up time for series string operation.

SYLVANIA ELECTRONIC TUBES

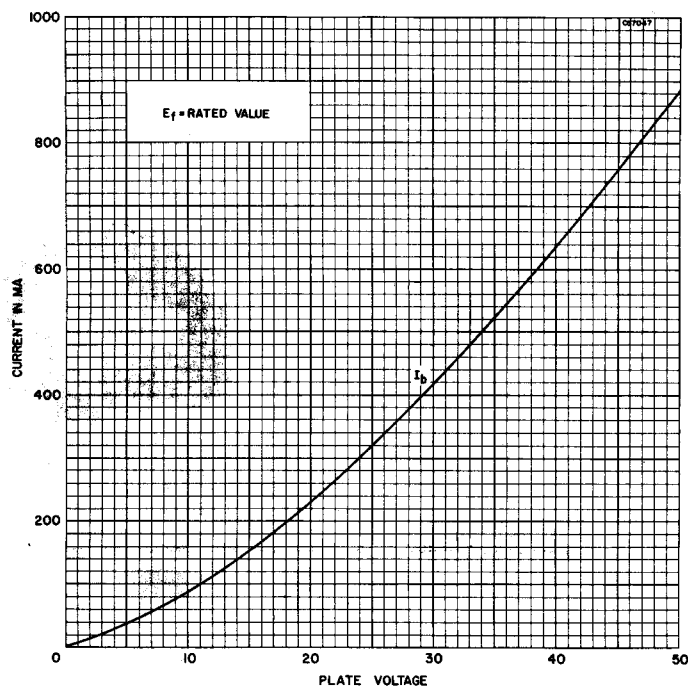
Issued as a supplement to the manual in Sylvania News for February 1958

6DA4 (Cont'd)

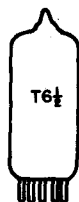
12D4

17D4

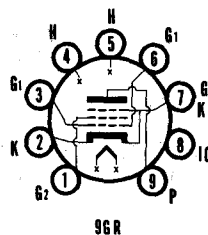
AVERAGE CHARACTERISTICS



SYLVANIA ELECTRONIC TUBES



**SYLVANIA TYPE 6DB5
12DB5**
BEAM PENTODE AMPLIFIER



MECHANICAL DATA

Bulb	T-6 1/2
Base	E9-1, Miniature Button, 9-Pin
Basing	9GR
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DB5	12DB5
Heater Voltage	6.3	12.6 Volts
Heater Current	1.200	0.600 Amperes
Heater Warm-up Time ¹		11 Seconds
Heater-Cathode Voltage (Design Center Values)		
Heater Negative with Respect to Cathode		200 Volts Max.
Total D C and Peak		
Heater Positive with Respect to Cathode		100 Volts Max.
D C		200 Volts Max.
Total D C and Peak		

DIRECT INTERELECTRODE CAPACITANCES

Grid No. 1 to Plate	0.5 μ f Max.
Input: g1 to (k+h+B.P.+g2)	15 μ f
Output: p to (k+h+B.P.+g2)	9 μ f

MAXIMUM RATINGS (Design Center Values—Except as Noted)²

**Vertical Deflection
Amplifier Service**

D C Plate Voltage	300 Volts
Peak Positive Plate Voltage (Abs. Max.)	2000 ³ Volts
D C Grid No. 2 Voltage	150 Volts
Peak Negative Grid No. 1 Voltage	250 Volts
Plate Dissipation	10 Watts
Grid No. 2 Dissipation	1.25 Watts
Average Cathode Current	55 Ma
Peak Cathode Current	200 Ma
Grid No. 1 Circuit Resistance	
Fixed Bias	0.1 Megohm
Cathode Bias (R _k = 100 Ohms, Min.)	2.2 Megohms
Bulb Temperature (At Hottest Point)	250 Degrees C

TYPICAL OPERATION

AF Power Amplifier

	Triode Connected	Class A ₁ Amplifier	
Plate Voltage	225	110	200 Volts
Grid No. 2 Voltage		110	125 Volts
Grid No. 1 Voltage	-30	-7.5	Volts
Cathode Bias Resistor			180 Ohms
Peak AF Grid No. 1 Voltage		7.5	8.5 Volts
Zero Signal Plate Current		49	46 Ma
Max. Signal Plate Current		50	47 Ma
Zero Signal Grid No. 2 Current		4	2.2 Ma
Max. Signal Grid No. 2 Current		10	8.5 Ma
Plate Resistance	1500	13,000	28,000 Ohms
Transconductance	3800	8000	8000 μ mhos
Load Resistance		2000	4000 Ohms
Power Output		2.1	3.8 Watts
Total Harmonic Distortion		10	10 Percent

NOTES:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. For operation in a 525-line, 30-frame system as described in "Standards of Good Engineering Practice for Television Broadcast Stations; Federal Communications Commission," the duty cycle of the pulse must not exceed 15% of one scanning cycle.
3. Under no circumstances should this absolute value be exceeded.
4. No Grid No. 1 Current should flow during any part of the input cycle.

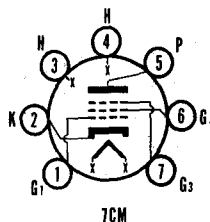
6DB5, 12DB5 (Cont'd)

APPLICATION

The Sylvania Types 6DB5 and 12DB5 are miniature, beam pentodes intended primarily for use as a vertical deflection amplifier or audio amplifier. The 12DB5 has controlled heater warm-up time for series string operation.



**SYLVANIA TYPE 6DE6
4DE6**
SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb	T-5½
Base	E7-1, Miniature Button 7-Pin
Outline	5-2
Basing	7CM
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DE6	4DE6
Heater Voltage	6.3	4.2 Volts
Heater Current	300	450 Ma
Heater Warm-up Time ¹		11 Seconds
Heater-Cathode Voltage (Design Center Values)		
Heater Negative with Respect to Cathode		200 Volts Max.
Total D C and Peak		
Heater Positive with Respect to Cathode		100 Volts Max.
D C		200 Volts Max.
Total D C and Peak		

DIRECT INTERELECTRODE CAPACITANCES

	Shielded	Unshielded
Grid No. 1 to Plate015	025 μf Max.
Input: g1 to (h+k+g2+g3+I.S.)	6.5	6.5 μf
Output: p to (h+k+g2+g3+I.S.)	3.0	2.0 μf

MAXIMUM RATINGS (Design-Maximum Values)²

Class A ₁ Amplifier	
Plate Voltage	330 Volts
Grid No. 2 Supply Voltage	330 Volts
Grid No. 2 Voltage	See 6AM8 Rating Chart
Plate Dissipation	2.3 Watts
Grid No. 2 Input	0.55 Watt
Positive Grid No. 1 Voltage	0 Volts

CHARACTERISTICS AND TYPICAL OPERATION

Class A ₁ Amplifier	
Plate Voltage	125 Volts
Grid No. 3 Voltage	Connected to Cathode at Socket
Grid No. 2 Voltage	125 Volts
Cathode Bias Resistor	56 Ohms
Plate Current	15.5 Ma
Grid No. 2 Current	4.2 Ma
Transconductance	8000 μmhos
Plate Resistance (approx.)	0.25 Megohm
Transconductance with E _{c1} = -5.5, R _K = 0	700 μmhos
E _{c1} for I _b = 20 μa	-9 Volts

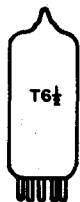
NOTES:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. Design-maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.
The device manufacturer chooses these values to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics.
The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, and environmental conditions.

APPLICATION

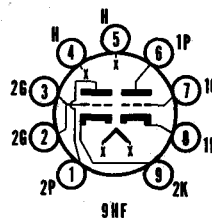
The Sylvania 6DE6 and 4DE6 are sharp cutoff pentodes intended for service as an automatic gain controlled i f amplifier in television receivers. The 4DE6 has controlled heater warm-up time for series string operation.

SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE

6DE7
10DE7
13DE7



MECHANICAL DATA

Bulb	T-6½
Base	E9-1, Miniature Button 9-Pin
Outline	6-3
Basing	9HF
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DE7	10DE7	13DE7
Heater Voltage	6.3	9.7	13.0 Volts
Heater Current	900	600	450 Ma
Heater Warm-up Time ¹	—	11	11 Seconds
Heater-Cathode Voltage (Design Maximum Values) ²			
Heater Negative with Respect to Cathode	200 Volts Max.		
Total DC and Peak	200 Volts Max.		
Heater Positive with Respect to Cathode	100 Volts Max.		
DC	200 Volts Max.		
Total DC and Peak	200 Volts Max.		

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

	Triode No. 1	Triode No. 2
Grid to Plate	4.0	8.5 μmf
Input: g to (h + k)	2.2	5.5 μmf
Output: p to (h + k)	0.52	1.0 μmf

RATINGS² (Design Maximum Values—Except as Noted)

Vertical Deflection Oscillator and Amplifier³

	Triode No. 1 Oscillator	Triode No. 2 Amplifier
DC Plate Voltage	330	275 Volts Max.
Peak Positive Pulse Plate Voltage (Abs. Max.)	—	1500 Volts
Peak Negative Pulse Grid Voltage	400	250 Volts Max.
Plate Dissipation ⁴	1.5	7.0 Watts Max.
Average Cathode Current	22	50 Ma Max.
Peak Cathode Current	77	175 Ma Max.
Grid Circuit Resistance	—	—
Self Bias	2.2	2.2 Megohms

AVERAGE CHARACTERISTICS

	Triode No. 1	Triode No. 2
Plate Voltage	250	150 Volts
Grid No. 1 Voltage	-11	-17.5 Volts
Plate Current	5.5	35 Ma
Transconductance	2000	6500 μmhos
Amplification Factor	17.5	6.0
Plate Resistance (approx.)	8750	925 Ohms
Grid Voltage for $I_b = 10 \mu\text{a}$	-20	< - Ohms
Grid Voltage for $I_b = 50 \mu\text{a}$	—	-44 Volts
Plate Current at $E_c = -24 \text{ Vdc}$	—	10 Ma
Plate Knee Characteristics		
$E_b = 60 \text{ V}; E_c = 0$ (Instantaneous Values)	—	80 Ma

NOTES:

1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of the rated heater voltage after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times the rated heater voltage divided by the rated heater current.
2. Design Maximum Ratings are the limiting values expressed with respect to bogy tubes at which satisfactory tube life can be expected to occur. To obtain satisfactory circuit performance, therefore, the equipment designed must establish the circuit design so that no design-maximum value is exceeded with a bogy tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, and environmental conditions.
3. For operation in a 525 line, 30 frame system as described in "Standards of Good Engineering Practice for Television Stations; Federal Communications Commission." The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
4. In stages operating with grid leak bias, an adequate bias resistor or other suitable means is required to protect the tube in the absence of excitation.

SYLVANIA ELECTRONIC TUBES

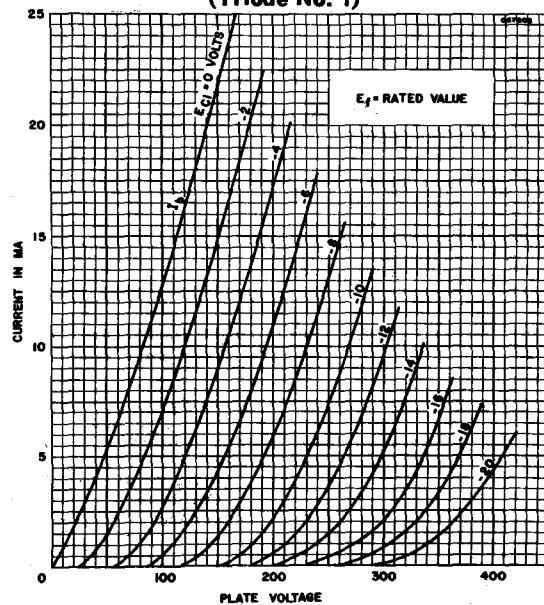
Issued as a supplement to the manual in Sylvania News for Nov.-Dec. 1957

SYLVANIA TYPE 6DE7, 10DE7, 13DE7 (Cont'd)

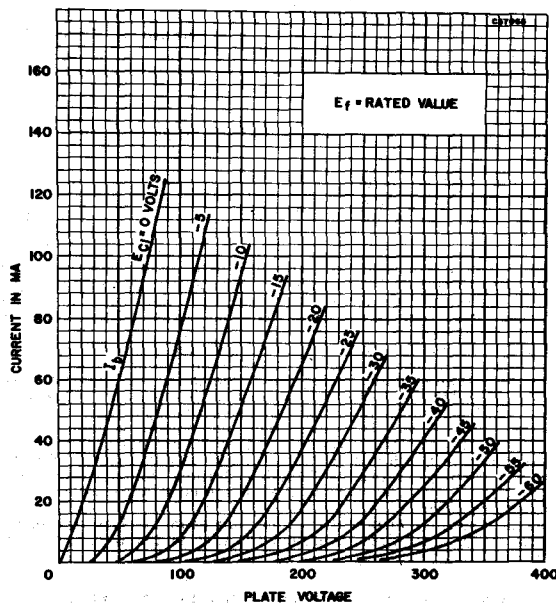
APPLICATION NOTES

The Sylvania Types 6DE7, 10DE7, and 13DE7 have dissimilar double triodes contained in a miniature envelope. Triode No. 1 is intended for use as a Vertical Deflection Oscillator and Triode No. 2 is intended for use as a Vertical Deflection Amplifier. Types 10DE7 and 13DE7 have controlled heater warm-up time for series string operation.

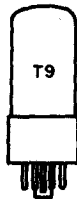
AVERAGE PLATE CHARACTERISTICS (Triode No. 1)



AVERAGE PLATE CHARACTERISTICS (Triode No. 2)

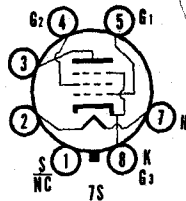


SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6DG6GT

PENTODE POWER AMPLIFIER



MECHANICAL DATA

Bulb.....	T-9
Base ¹	B6-81 or B7-7 Intermediate Shell Octal or B6-84 or B7-59 Short Intermediate Shell Octal
Outline.....	9-11 or 9-41
Basing.....	7S
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	1.2 Amperes
Heater-Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode	
Total D C and Peak.....	200 Volts Max.
Heater Positive with Respect to Cathode	
D C.....	100 Volts Max.
Total D C and Peak.....	200 Volts Max.

MAXIMUM RATINGS (Design Center Values)

Class A₁ Amplifier	
Plate Voltage.....	200 Volts
Grid No. 2 Voltage.....	125 Volts
Plate Dissipation.....	10 Watts
Grid No. 2 Dissipation.....	1.25 Watts
Grid No. 1 Circuit Resistance	
Fixed Bias.....	0.1 Megohm
Cathode Bias.....	0.5 Megohm

CHARACTERISTICS AND TYPICAL OPERATION (Single Tube)

Class A₁ Amplifier		
Plate Voltage.....	110	200 Volts
Grid No. 2 Voltage.....	110	125 Volts
Grid No. 1 Voltage.....	-7.5	Volts
Cathode Bias Resistor.....		180 Ohms
Peak AF Grid No. 1 Voltage.....	7.5	8.5 Volts
Zero-Signal Plate Current.....	49	46 Ma
Maximum-Signal Plate Current.....	50	47 Ma
Zero-Signal Grid No. 2 Current.....	4.0	2.2 Ma
Maximum-Signal Grid No. 2 Current.....	10	8.5 Ma
Plate Resistance (approx.).....	13,000	28,000 Ohms
Transconductance.....	8000	8000 μ mhos
Load Resistance.....	2000	4000 Ohms
Maximum-Signal Power Output.....	2.1	3.8 Watts
Total Harmonic Distortion (approx.).....	10	10 Percent

NOTE:

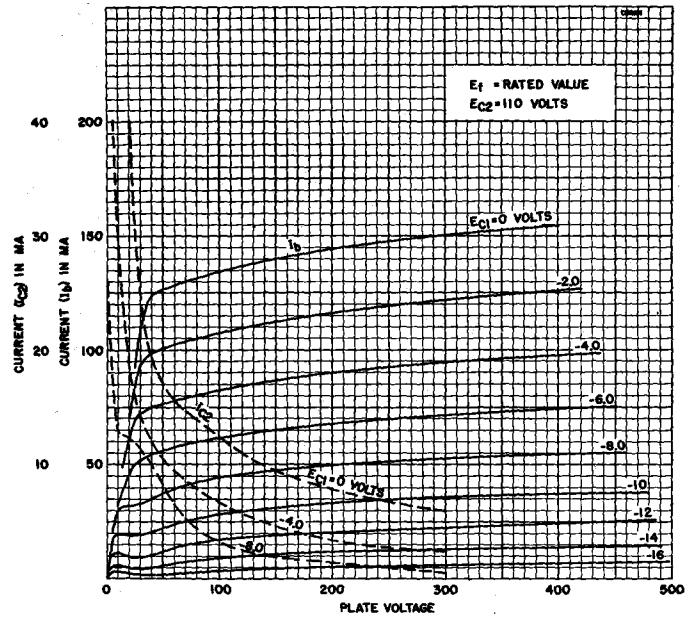
1. Pin No. 1 omitted on bases B6-81 and B6-84.

APPLICATION

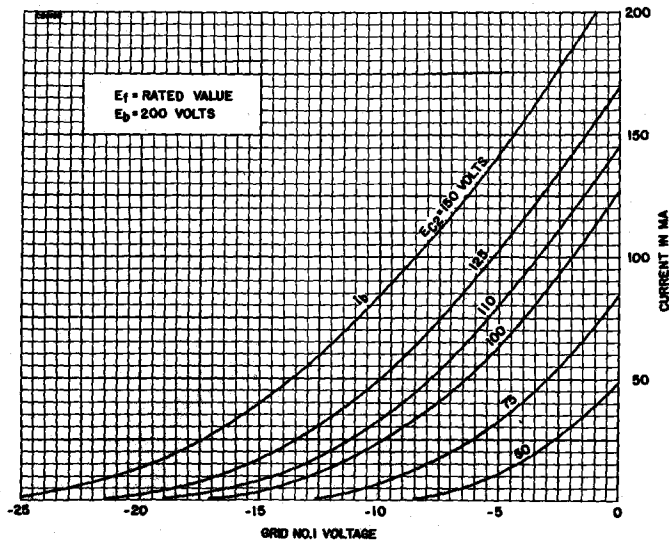
The Sylvania Type 6DG6GT is a beam power pentode intended for service as an audio power amplifier. Electrical characteristics of the 6DG6GT are identical to those of the 6W6GT.

6DG6GT (Cont'd)

AVERAGE PLATE CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS

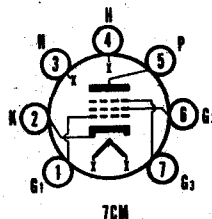


SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6DK6
3DK6
4DK6

SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb.....	T-5 1/2
Base.....	E7-1, Miniature Button 7-Pin
Outline.....	5-2
Basing.....	7CM
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	3DK6	4DK6	6DK6
Heater Voltage.....	3.15	4.2	6.3 Volts
Heater Current.....	600	450	300 Ma
Heater Warm-up Time ¹	11	11	Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Negative with Respect to Cathode			
Total D C and Peak.....			300 Volts Max.
Heater Positive with Respect to Cathode			
D C.....			100 Volts Max.
Total D C and Peak.....			200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Grid No. 1 to Plate.....	0.02 μf
Input.....	6.3 μf
Output.....	1.9 μf

MAXIMUM RATINGS (Design Center Values)

Plate Voltage.....	300 Volts
Grid No. 2 Voltage.....	150 Volts
Plate Dissipation.....	2.0 Watts
Grid No. 2 Dissipation.....	0.5 Watts

TYPICAL OPERATION AND CHARACTERISTICS

Plate Voltage.....	125 Volts
Grid No. 3.....	Connected to Cathode at Socket
Grid No. 2 Voltage.....	125 Volts
Cathode Bias Resistor.....	56 Ohms
Plate Current.....	12.0 Ma
Grid No. 2 Current.....	3.8 Ma
Transconductance.....	9800 μmhos
Grid No. 1 Bias for Ib of 20 μa (approx.).....	-6.5 Volts

NOTE:

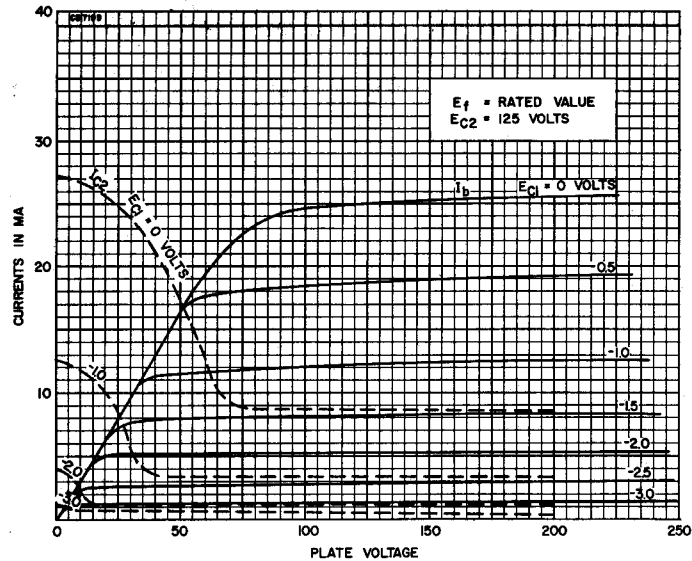
1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.

APPLICATION

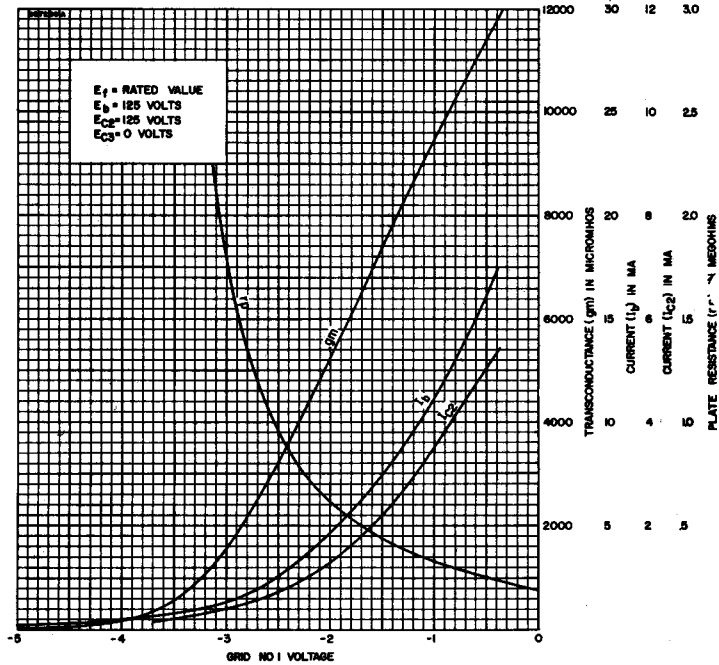
The Sylvania Types 3DK6, 4DK6 and 6DK6 are miniature sharp cutoff pentodes designed for service as if amplifiers in television receivers. Types 3DK6 and 4DK6 have controlled heater warm-up time for series string operation.

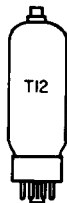
6DK6, 3DK6, 4DK6, (Cont'd)

AVERAGE PLATE CHARACTERISTICS



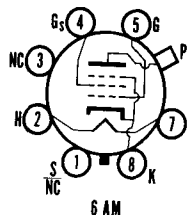
AVERAGE TRANSFER CHARACTERISTICS





SYLVANIA TYPE **6DQ6**
12DQ6
25DQ6

BEAM POWER AMPLIFIER



MECHANICAL DATA

Bulb.....	T-12
Base.....	B7-119, Short Medium Shell Octal, 7-Pin
Outline.....	12-105
Basing.....	6AM
Top Cap.....	C1-3 or C1-33 Skirted Miniature
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DQ6	12DQ6	25DQ6
Heater Voltage.....	6.3	12.6	25 Volts
Heater Current.....	1.2	0.6	0.3 Amperes
Heater Warm-up Time (See Appendix)		11	Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Neg. with Respect to Cathode			
Total D C and Peak.....	200	200	200 Volts Max.
Heater Pos. with Respect to Cathode			
D C.....	100	100	100 Volts Max.
Total D C and Peak.....	200	200	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Approximate)

Grid No. 1 to Plate.....	0.55 μ f
Input.....	15.0 μ f
Output.....	7.0 μ f

RATINGS (Design Center Values—Except as Noted)

Horizontal Deflection Amplifier¹

D C Plate Supply Voltage (Boost + D C Power Supply)	550 Volts Max.
Peak Positive Pulse Plate Voltage (Abs. Max.)	6000 Volts
Peak Negative Pulse Plate Voltage	1375 Volts Max.
Plate Dissipation ²	15 Watts Max.
Peak Negative Grid No. 1 Voltage	300 Volts Max.
D C Grid No. 2 Voltage	175 Volts Max.
Grid No. 2 Dissipation	2.5 Watts Max.
Average Cathode Current	120 Ma Max.
Peak Cathode Current	440 Ma Max.
Grid No. 1 Circuit Resistance	0.47 Megohm Max.
Bulb Temperature (At Hottest Point)	220 Deg. C. Max.

AVERAGE CHARACTERISTICS

Pentode Operation: With $E_b = 250$ V, $E_{c2} = 150$ V and $E_{c1} = 22.5$ V	
Plate Current.....	75 Ma
Grid No. 2 Current.....	2.4 Ma
Transconductance.....	6000 μ mhos
Plate Resistance (Approx.).....	20,000 Ohms
Zero Bias: With $E_b = 60$ V, $E_{c2} = 150$ V and $E_{c1} = 0$ V (Instantaneous Values)	
Plate Current.....	300 Ma
Grid No. 2 Current.....	27 Ma
Cutoff: For $I_b = 1.0$ Ma with $E_b = 250$ V and $E_{c2} = 150$ V	
Grid No. 1 Voltage (Approx.).....	-50 Volts
Triode Amplification Factor:	
With $E_b = E_{c2} = 150$ V and $E_{c1} = -22.5$ V.....	4.1

NOTES:

- For operation in a 525 line, 30 frame system as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
- 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.

APPLICATIONS

The Sylvania Types 6DQ6, 12DQ6 and 25DQ6 are beam pentodes designed for service as horizontal deflection amplifiers. The 12DQ6 features a 600 Ma heater and controlled heater warm-up time for service in television receivers employing a series heater string. Other than heater characteristics, the three types are identical.

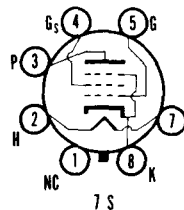
TYPES 6E5, 6E6, 6F5, 6FSG, GT

(See Condensed Data Section)



SYLVANIA TYPE 6F6 6F6G 6F6GT

PENTODE POWER AMPLIFIER



MECHANICAL DATA

	6F6	6F6G	6F6GT
Bulb.....	Metal, Outline 8-6	ST-14, Outline 14-3	T-9, Outline 9-15
Base.....	Small Wafer Octal 7-Pin	Medium Octal 7-Pin	Intermediate Octal 7-Pin
Basing.....	7S	7S	7S
Mounting Position.....	Any	Any	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	700 Ma

TYPICAL OPERATION

	Pentode		Triode
Class A Amplifier (Single Tube)			
Plate Voltage.....	250	285	250 Volts
Grid No. 2 Voltage.....	250	285	Plate Volts
Grid No. 1 Voltage ¹	-16.5	-20	-20 Volts
Peak A F Grid Voltage.....	16.5	20	20 Volts
Plate Current (Zero Signal).....	34	38	31 Ma
Plate Current (Maximum Signal).....	36	40	34 Ma
Grid No. 2 Current (Zero Signal).....	6.5	7.0	Ma
Grid No. 2 Current (Maximum Signal).....	10.5	13	Ma
Transconductance.....	2500	2550	2600 μ mhos
Amplification Factor.....			6.8
Plate Resistance (approx.).....	80000	78000	2600 Ohms
Load Resistance.....	7000	7000	4000 Ohms
Power Output.....	3.2	4.8	0.85 Watts
Total Harmonic Distortion.....	8.0	9.0	6.5 Percent
	Class A₁ Pentode	Class AB₂ Pentode	Triode
Push-Pull Amplifier			
Plate Voltage.....	315	375	350 Volts
Grid No. 2 Voltage.....	285	250	Plate Volts
Grid No. 1 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
Grid No. 2 Current (Zero Signal).....	12	5	Ma
Grid No. 2 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.....	4.0	3.5	2.0 Percent

NOTE:

- Maximum Grid No. 1 Circuit Resistance
Fixed Bias 0.1 Megohm
Cathode Bias 0.5 Megohm

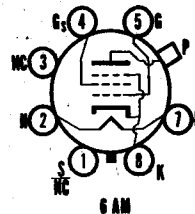
TYPES 6F7, 6F7S, 6F8G, 6G5/6H5, 6G6G, 6H4GT, 6H5

(See Condensed Data Section)



**SYLVANIA TYPE 6DQ6
12DQ6
25DQ6**

BEAM POWER AMPLIFIER



MECHANICAL DATA

Bulb	T-12
Base	B7-119, Short Medium Shell Octal, 7-Pin
Outline	12-105
Basing	6AM
Top Cap	C1-3 or C1-33 Skirted Miniature
Cathode	Coated Unipotential
Mounting Position	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	6DQ6	12DQ6	25DQ6
Heater Voltage	6.3	12.6	25 Volts
Heater Current	1.2	0.6	0.3 Amperes
Heater Warm-up Time (See Appendix)		11	Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Neg. with Respect to Cathode			
Total D C and Peak	200	200	200 Volts Max.
Heater Pos. with Respect to Cathode			
D C	100	100	100 Volts Max.
Total D C and Peak	200	200	200 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Approximate)

Grid No. 1 to Plate	0.55 μ pf
Input	15.0 μ pf
Output	7.0 μ pf

SETTINGS (Design Center Values—Except as Noted)

Horizontal Deflection Amplifier¹

D C Plate Supply Voltage (Boost + D C Power Supply)	550 Volts Max.
Peak Positive Pulse Plate Voltage (Abs. Max.)	6000 Volts
Peak Negative Pulse Plate Voltage	1375 Volts Max.
Plate Dissipation ²	15 Watts Max.
Peak Negative Grid No. 1 Voltage	300 Volts Max.
D C Grid No. 2 Voltage	175 Volts Max.
Grid No. 2 Dissipation	2.5 Watts Max.
Average Cathode Current	120 Ma Max.
Peak Cathode Current	440 Ma Max.
Grid No. 1 Circuit Resistance	0.47 Megohm Max.
Bulb Temperature (At Hottest Point)	220 Deg. C. Max.

AVERAGE CHARACTERISTICS

Pentode Operation: With $E_b = 250$ V, $E_{c2} = 150$ V and $E_{c1} = -22.5$ V	
Plate Current	75 Ma
Grid No. 2 Current	2.4 Ma
Transconductance	6000 μ mhos
Plate Resistance (Approx.)	20,000 Ohms
Zero Bias: With $E_b = 60$ V, $E_{c2} = 150$ V and $E_{c1} = 0$ V (Instantaneous Values)	
Plate Current	300 Ma
Grid No. 2 Current	27 Ma
Cutoff: For $I_b = 1.0$ Ma with $E_b = 250$ V and $E_{c2} = 150$ V	
Grid No. 1 Voltage (Approx.)	-50 Volts
Triode Amplification Factor:	
With $E_b = E_{c2} = 150$ V and $E_{c1} = -22.5$ V	4.1

NOTES:

- For operation in a 525 line, 30 frame system as described in "Standards of Good Engineering Practice for Television Broadcasting Stations; Federal Communications Commission." The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.
- 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.

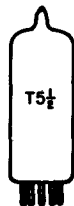
APPLICATIONS

The Sylvania Types 6DQ6, 12DQ6 and 25DQ6 are beam pentodes designed for service as horizontal deflection amplifiers. The 12DQ6 features a 600 Ma heater and controlled heater warm-up time for service in television receivers employing a series heater string. Other than heater characteristics, the three types are identical.

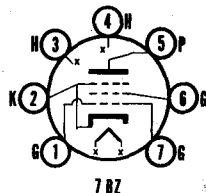
SYLVANIA ELECTRONIC TUBES

Issued as a supplement to the manual in Sylvania News for May-June 1956

SYLVANIA ELECTRONIC TUBES



SYLVANIA TYPE 6DS5
BEAM POWER PENTODE



MECHANICAL DATA

Bulb.....	T-5 $\frac{1}{2}$
Base.....	E7-1, Miniature Button 7-Pin
Outline.....	5-3
Basing.....	7BZ
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage.....	6.3 Volts
Heater Current.....	800 Ma
Heater Cathode Voltage (Design Center Values)	
Heater Negative with Respect to Cathode.....	90 Volts Max.
Heater Positive with Respect to Cathode.....	90 Volts Max.

DIRECT INTERELECTRODE CAPACITANCES (Unshielded)

Grid No. 1 to Plate.....	0.19 $\mu\mu\text{f}$
Input: g1 to (h+k+g2+g3).....	9.5 $\mu\mu\text{f}$
Output: p to (h+k+g2+g3).....	6.3 $\mu\mu\text{f}$

MAXIMUM RATINGS (Design Center Values—Except as Noted)

Class A₁ Amplifier

Plate Voltage.....	250 Volts.
Grid No. 2 Voltage.....	250 Volts
Plate Dissipation.....	8 Watts
Grid No. 2 Input.....	2 Watts
Grid No. 1 Circuit Resistance	
Fixed Bias.....	0.1 Megohm
Cathode Bias.....	1.0 Megohm
Bulb Temperature (At Any Point).....	250 Degrees C

CHARACTERISTICS AND TYPICAL OPERATION (Single Tube)

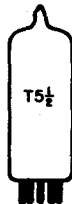
Class A₁ Amplifier

Plate Voltage.....	200	250 Volts
Grid No. 2 Voltage.....	200	200 Volts
Cathode Bias Resistor.....	180	270 Ohms
Peak AF Grid No. 1 Voltage.....	7.5	9.2 Volts
Zero-Signal Plate Current.....	34.5	27 Ma
Maximum Signal Plate Current.....	32.5	25 Ma
Zero-Signal Grid No. 2 Current.....	3.5	3 Ma
Maximum Signal Grid No. 2 Current.....	9	9 Ma
Plate Resistance (approx.).....	28,000	28,000 Ohms
Transconductance.....	6000	5800 μmhos
Load Resistance.....	6000	8000 Ohms
Maximum Signal Power Output.....	2.8	3.6 Watts
Total Harmonic Distortion (approx.).....	10	10 Percent

APPLICATION

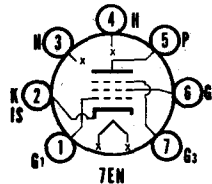
The Sylvania Type 6DS5 is a miniature beam power pentode intended for service as a high efficiency and high power sensitivity audio power amplifier.





**SYLVANIA TYPE 6DT6
4DT6
3DT6**

SHARP CUTOFF PENTODE



MECHANICAL DATA

Bulb.....	T-5 1/2
Base.....	E7-1, Miniature Button 7-Pin
Outline.....	5-2
Basing.....	7EN
Cathode.....	Coated Unipotential
Mounting Position.....	Any

ELECTRICAL DATA

HEATER CHARACTERISTICS

	3DT6	4DT6	6DT6
Heater Voltage.....	3.15	4.2	6.3 Volts
Heater Current.....	600	450	300 Ma
Heater Warm-up Time ¹	11	11	Seconds
Heater-Cathode Voltage (Design Center Values)			
Heater Negative with Respect to Cathode			
Total D C and Peak.....	200 Volts Max.		
Heater Positive with Respect to Cathode			
D C.....	100 Volts Max.		
Total D C and Peak.....	200 Volts Max.		

DIRECT INTERELECTRODE CAPACITANCES (Shielded)²

Grid No. 1 to Plate.....	0.02 μ f
Grid No. 1 to Grid No. 3.....	0.1 μ f
Grid No. 3 to All Other Electrodes.....	6.1 μ f
Grid No. 1 to Grid No. 2, Grid No. 3, Heater, and Internal Shield and Cathode.....	5.8 μ f
Grid No. 3 to Plate.....	1.4 μ f

MAXIMUM RATINGS (Design Center Values)

Plate Voltage.....	300 Volts
Grid No. 3 Voltage.....	25 Volts
Grid No. 2 Supply Voltage.....	300 Volts
Grid No. 2 Voltage.....	See 6AM8 Rating Chart
Positive Grid No. 1 Voltage.....	0 Volts
Positive Plate Dissipation.....	1.5 Watts
Grid No. 2 Input:	
For E_{c2} up to 150 Volts.....	1.0 Watt
For E_{c2} between 150 and 300 Volts.....	See 6AM8 Rating Chart
Grid No. 1 Circuit Resistance	
Fixed Bias.....	0.25 Megohm
Cathode Bias.....	0.5 Megohm

CHARACTERISTICS

Class A₁ Amplifier	
Plate Supply Voltage.....	150 Volts
Grid No. 3 Supply Voltage.....	0 Volts
Grid No. 2 Supply Voltage.....	100 Volts
Cathode Bias Resistor.....	560 Ohms
Plate Current.....	1.1 Ma
Grid No. 2 Current.....	2.1 Ma
Transconductance	
Grid No. 1 to Plate.....	800 μ mhos
Grid No. 3 to Plate.....	515 μ mhos
Plate Resistance (approx.).....	0.15 Megohms
Grid No. 1 Voltage for $I_b = 10 \mu$ a (approx.).....	-4.5 Volts
Grid No. 3 Voltage for $I_b = 10 \mu$ a (approx.).....	-3.5 Volts

TYPICAL OPERATIONAL CHARACTERISTICS

Input Signal to Grid of Driver Tube.....	15	200	500 mv RMS
Plate Supply Voltage.....	250	250	250 Volts
Grid No. 3 Voltage ³	-5	-6	-6.4 Volts
Grid No. 2 Supply Voltage.....	100	100	100 Volts
Cathode Resistor.....	560	560	560 Ohms
Plate Load Resistor.....	0.27	0.27	0.27 Megohm
Plate Current.....	0.23	0.22	0.21 Ma
Grid No. 2 Current.....	3.4	5.5	6 Ma
Grid No. 1 Current.....	0.013	0.6	0.8 Ma
Bandwidth:			
For a Total Harmonic Dist. of 10%.....	65	120	118 kc
AM Rejection (approx.) ⁴	33	29	28 db
RMS Audio Output (approx.):			
With ± 7.5 kc of 4.5 Mc.....	5.5	6.5	7.5 Volts
With ± 25 kc of 4.5 Mc.....	17	21	23 Volts
Total Harmonic Distortion:			
With ± 25 kc of 4.5 Mc.....	2	3	4 Percent
Sensitivity:			
With ± 7.5 kc of 4.5 Mc.....	5 ⁵ Millivolts		
With ± 25 kc of 4.5 Mc.....	15 ⁵ Millivolts		

SYLVANIA ELECTRONIC TUBES

6DT6, 4DT6, 3DT6 (Cont'd)

NOTES:

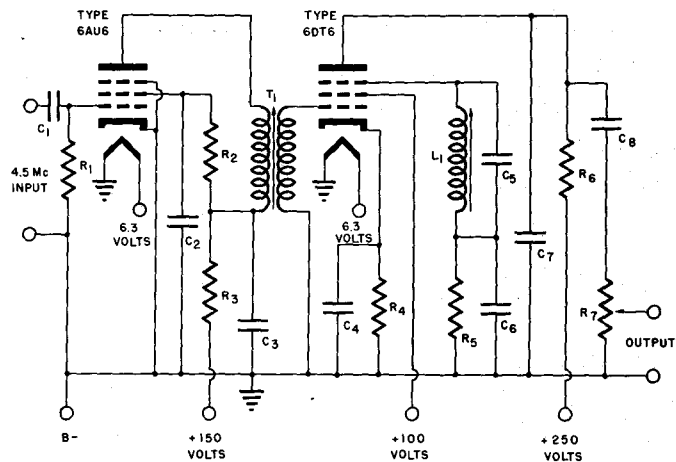
1. Heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value after applying four (4) times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to three (3) times rated heater voltage divided by rated heater current.
2. External shield No. 316 connected to cathode.
3. Bias developed across the 560,000 ohms resistor by means of grid rectification obtained from the Locked Oscillator.
4. Ratio of the audio output voltage produced by 30% amplitude modulation of the 4.5 Mc carrier frequency to the audio output produced by ± 25 kc deviation from the 4.5 Mc carrier frequency, with a modulating frequency of 400 cycles in both cases.
5. Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 Mc, before distortion occurs.

APPLICATION DATA

Types 3DT6, 4DT6 and 6DT6 are sharp cutoff pentodes contained in a miniature envelope. These types are especially suitable for use in the Locked-Oscillator, Quadrature-Grid FM detector circuit because of the sharp cutoff characteristics of Grid No. 3. They are also desirable for applications where a sharp cutoff Grid No. 3 and Grid No. 1 are required, such as in delay circuits, gain controlled amplifier circuits and mixer circuits.

Types 3DT6 and 4DT6 have controlled heater warm-up time for series string operation.

TYPICAL LOCKED-OSCILLATOR, QUADRATURE-GRID FM DETECTOR CIRCUIT



C1—47 μf
 C2, C3, C4, C8—0.01 μf
 C5—18 μf
 C6—0.05 μf
 C7—100 to 1000 μf

R1—100 K Ohms
 R2—12K Ohms
 R3—1 K Ohm
 R4—560 Ohms
 R5—560 K Ohms
 R6—270 K Ohms
 R7—0.5 Megohm Pot.

L1—Slug-tuned inductor with a Q of 50, and tunable to 4.5 Mc.
 T1—Slug-tuned bifilar wound 4.5 Mc IF transformer with ratio of 1 to 1.5 and a Q greater than 60.