Westinghouse®

2HA5
3HA5
4HA5
6HA5

April 1, 1964

SHARP–CUTOFF TRIODE TYPES 2HA5, 3HA5, 4HA5 AND 6HA5

The 2HA5, 3HA5, 4HA5 and 6HA5 are sharp-cutoff, seven-pin miniature triode types designed particularly for service in V.H.F. television tuners as grounded cathode r-f amplifiers.

The 2HA5, 3HA5 and 4HA5 have been designed for use in receivers which employ series connected heaters, especially in television receivers where the picture-tube heater is in series with other heaters. When each is employed in this type of circuit with other tubes similarly designed having the same heater current rating, heater voltage surges across individual tubes are minimized inasmuch as heater warm-up characteristic is controlled.

ELECTRICAL

Heater Characteristics:	2HA5	3HA5	4HA5	6HA5	
Voltage (ac or dc)	2.4	2.9	4.0	6.3	Volts
Current	0.60	0.45	0.30	0.185	Ampere
Warm-up Time (Note 1)	11	11	11	–	Seconds

Direct Interelectrode Capacitance: (Shielded) (Note 2)

Grid 1 to Plate	0.34 max.	pf
Input	4.5	pf
Output	3.0	pf
Heater to Cathode	2.5	pf

MECHANICAL

Cathode	Coated Unipotential
Bulb	T-5½
Base	Miniature 7-Pin (JEDEC E7-1)
Outline	5-1
Basing	7GM
Mounting Position	Any

CHARACTERISTICS & TYPICAL OPERATION

Plate Voltage	120	135	Volts
Grid Voltage	0	–1	Volts
Grid Resistance	100000	–	Ohms
Transconductance	18000	14500	μmhos
Grid Cutoff Bias	(Note 3)	(Note 4)	–
Plate Current	15	12.5	Ma.
Amplification Factor	82	78	–
Hot Input Resistance (Note 5)	–	1000	Ohms
Hot Input Capacitance (Note 5)	–	8.5	pf
Noise Figure (Note 6)	4.0	4.2	db

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 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.
2. With JEDEC shield No. 316 connected to Pin 2.
3. Grid volts = –5.1 for transconductance of 150 micromhos.
4. Grid Volts for gm = 150 μmhos: –4.2
   Grid Volts for gm = 1500 μmhos: –2.5
5. Measured at 200 Mc. with plate at signal ground.
6. In a 200 Mc. noise-matched, optimized, neutralized, grounded-cathode triode amplifier stage.

RATINGS

Design Maximum Values

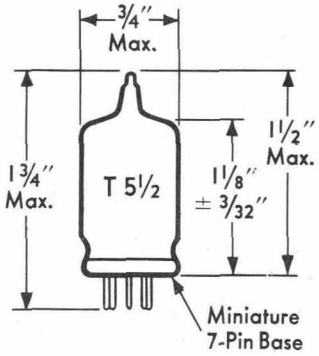
Plate Voltage	200 max.	Volts
Plate Dissipation	2.6 max.	Watts
Grid Voltage:		
Negative Value	50 max.	Volts
Cathode Current	20 max.	Ma.
Grid Circuit Resistance (Self Bias)	1.0 max.	Megohm

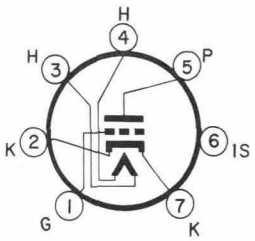
Heater Ratings:

Allowable Heater Voltage:	2HA5	3HA5	4HA5	6HA5		
Maximum	–	–	–	6.9	max.	Volts
Minimum	–	–	–	5.7	min.	Volts
Allowable Heater Current:						
Maximum	640	480	320	–	max.	Ma.
Minimum	560	420	280	–	min.	Ma.

Heater-Cathode Voltage:

Heater Negative with Respect to Cathode DC	100	100	100	100	max.	Volts
Heater Positive with Respect to Cathode DC	100	100	100	100	max.	Volts



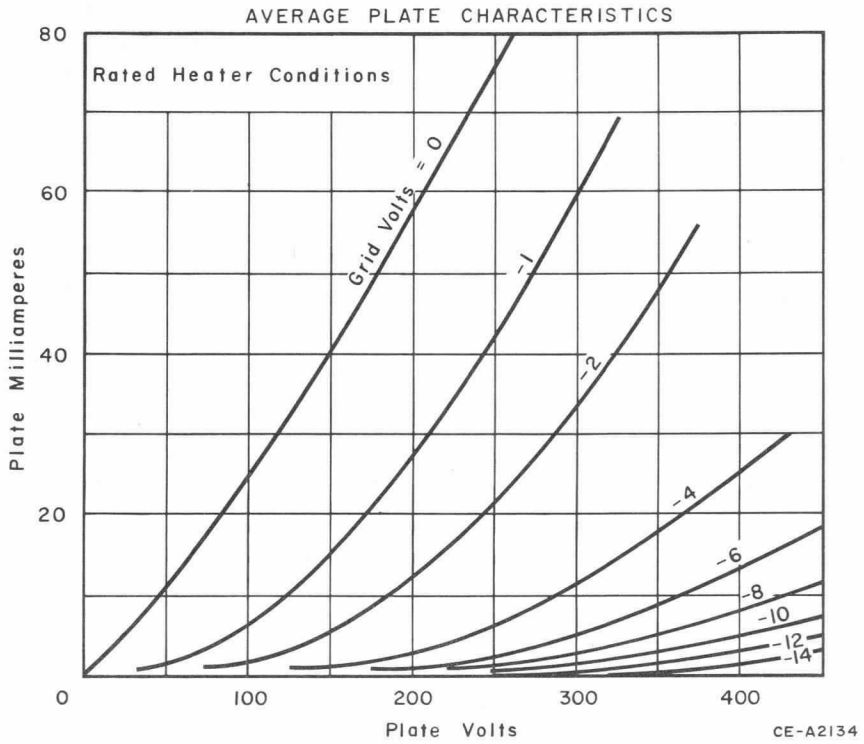


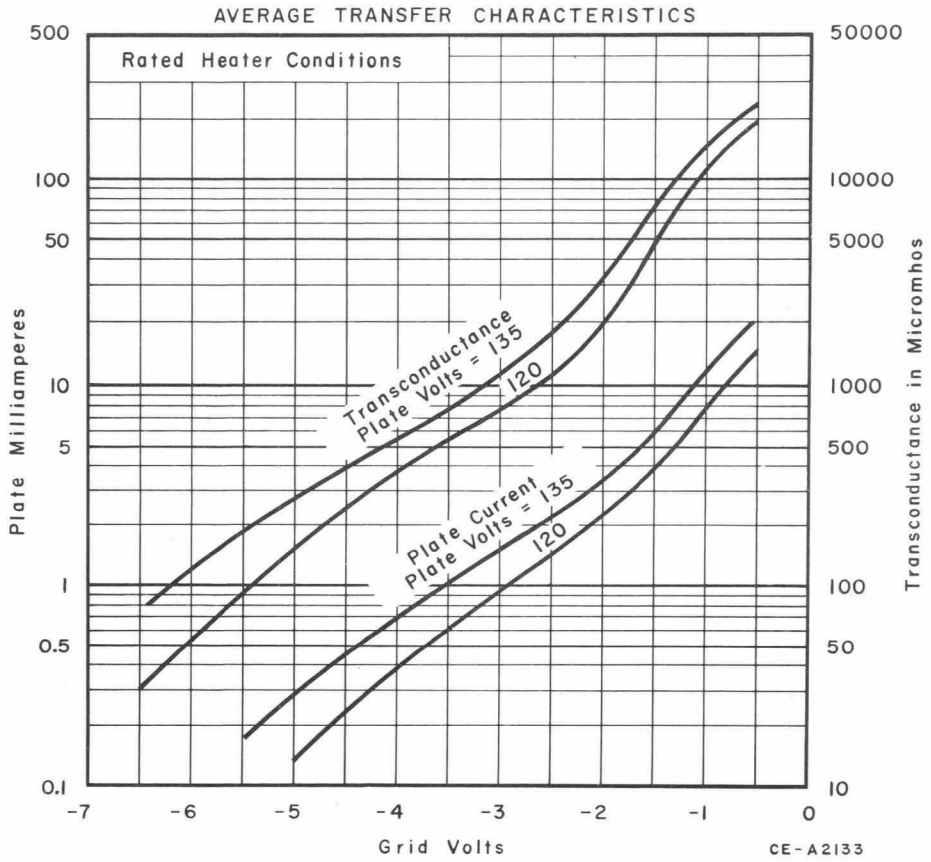
7GM

PRINTED IN U.S.A.

Receiving Tube

The information contained herein is supplied without assuming responsibility for infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Westinghouse Electric Corporation.


AVERAGE PLATE CHARACTERISTICS
Rated Heater Conditions
Grid Volts = 0
-1
-2
-4
-6
-8
-10
-12
-14
Plate Milliamperes
80
60
40
20
0
100
200
300
400
Plate Volts
CE-A2134


AVERAGE TRANSFER CHARACTERISTICS
Rated Heater Conditions
Transconductance
Plate Volts = 135
120
Plate Current
Plate Volts = 135
120
Plate Milliamperes
500
100
50
10
5
1
0.5
0.1
50000
10000
5000
1000
500
100
50
10
Transconductance in Micromhos
-7
-6
-5
-4
-3
-2
-1
0
Grid Volts
CE-A2133