

**RAYTHEON**

TECHNICAL  
INFORMATION  
SERVICE

# Technical Information

**6HJ5  
21HJ5  
30HJ5**  
BEAM PENTODES

The types 6HJ5, 21HJ5, and 30HJ5 are heater-cathode type beam pentodes for use as horizontal deflection amplifiers in television receivers. They have been designed to meet the circuit requirements of low B supply receivers and color applications where high peak plate currents and high perveance are necessary characteristics. A separate connection to grid no. 3 provides for applying positive voltage to minimize "snivets" which may occur with "below knee" operation.

Structural features of this type include a single-ended T-12 envelope and a compaction base. The large diameter internal leads to the base of this tube assure firm support for the mount structure. The design permits cool operation of both grids and additional cooling of grids #1 & #2 can be obtained by employing connections to the dual base pins. Types 21HJ5 and 30HJ5 are identical to type 6HJ5 except for heater characteristics.

## ELECTRICAL DATA

### HEATER CHARACTERISTICS:

|                                         | 6HJ5      | 21HJ5     | 30HJ5             |
|-----------------------------------------|-----------|-----------|-------------------|
| Heater voltage . . . . .                | 6.3 ± 10% | 21.5●●    | 30.0 volts ●●     |
| Heater current . . . . .                | 2.25●     | 0.6 ± 6%□ | 0.45 ± 6% amps. □ |
| Heater warm-up time . . . . .           |           | 11        | 11 sec.           |
| Maximum heater cathode voltages:        |           |           |                   |
| Heater negative with respect to cathode |           |           |                   |
| Total DC and peak. . . . .              |           | 200 volts |                   |
| Heater positive with respect to cathode |           |           |                   |
| DC component. . . . .                   |           | 100 volts |                   |
| Total DC and peak. . . . .              |           | 200 volts |                   |

### DESIGN MAXIMUM RATINGS(See EIA standard RS-239)—HORIZONTAL DEFLECTION AMPLIFIER:\*

|                                                              |            |
|--------------------------------------------------------------|------------|
| Plate voltage (boost + DC power supply) . . . . .            | 770 volts  |
| Grid #2 voltage . . . . .                                    | 220 volts  |
| Plate dissipation . . . . .                                  | 24 watts   |
| Grid #2 dissipation. . . . .                                 | 6.0 watts  |
| Grid #2 dissipation (warm up surge) + . . . . .              | 12 watts   |
| Average cathode current. . . . .                             | 280 ma     |
| Peak cathode current. . . . .                                | 1000 ma    |
| Peak positive plate voltage. . . . .                         | 7000 volts |
| Peak negative plate voltage. . . . .                         | 1500 volts |
| Peak negative grid #1 voltage. . . . .                       | 330 volts  |
| Grid #1 circuit resistance. . . . .                          | 1.0 meg.   |
| Bulb temperature (at hottest point on bulb surface). . . . . | 240 °C     |
| DC grid #3 voltage Δ . . . . .                               | 70 volts   |

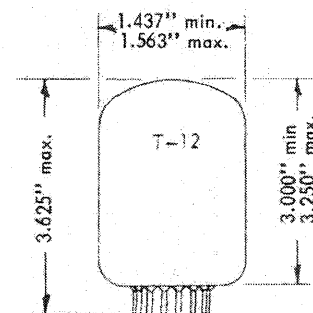
### AVERAGE CHARACTERISTICS:

|                                       |       |       |       |           |
|---------------------------------------|-------|-------|-------|-----------|
| Plate voltage . . . . .               | 20    | 40    | 60    | 135 volts |
| Grid #2 voltage . . . . .             | 110   | 110   | 135   | 135 volts |
| Grid #1 voltage . . . . .             | 0     | 0     | 0     | -22 volts |
| Grid #3 voltage . . . . .             |       |       |       | 0 volts   |
| Plate current . . . . .               | 240++ | 400++ | 540++ | 80 ma     |
| Grid #2 current . . . . .             | 160++ | 42++  | 48++  | 5.5 ma    |
| Triode amplification factor . . . . . |       |       |       | 4.2       |

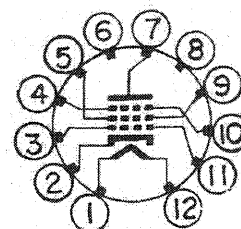
## MECHANICAL DATA

ENVELOPE. . . . . T12 glass  
BASE . . . . . 12-pin button, E12-74  
MOUNTING POSITION . . . . . any  
CATHODE. . . . . coated unipotential

## PHYSICAL DIMENSIONS



## BASING 12 ES



## BOTTOM VIEW

## TERMINAL CONNECTIONS

- Pin 1 Heater
- Pin 2 Cathode
- Pin 3 Grid #1
- Pin 4 Grid #3
- Pin 5 Grid #2
- Pin 6 No connection\*
- Pin 7 Plate
- Pin 8 No connection\*
- Pin 9 Grid #2
- Pin 10 Grid #3
- Pin 11 Grid #1
- Pin 12 Heater

\*Do not use — It is suggested that socket clips for these pins be omitted to improve insulation factor of socket.



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30HJ5

## BEAM PENTODES

### ELECTRICAL DATA (cont'd.)

#### AVERAGE CHARACTERISTICS: (cont'd.)

|                                                                       |                   |
|-----------------------------------------------------------------------|-------------------|
| Transconductance. . . . .                                             | 10,000 $\mu$ mhos |
| Plate resistance . . . . .                                            | 5000 ohms         |
| Grid #1 voltage (approx.) for $I_b = 1$ ma ( $E_p = 4.5$ KV). . . . . | -70 volts         |

\*\* 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 not to exceed 15% of a scanning cycle and its duration is limited to 10 micro seconds.

+ Surge not to exceed 15 seconds duration.

++ Instantaneous values.

● Heater current at bogie heater voltage.

●● Heater voltage at bogie heater current.

□ The equipment designer shall design equipment so that the heater voltage for the 6HJ5 and the heater current for the 21HJ5 and 30HJ5 are centered at the specified bogie value with heater supply variations restricted to maintain heater voltage (or current) within the specified tolerance.

AVERAGE PLATE CHARACTERISTICS

