6DT6 - 3DT6 - 4DT6
PENTODE
FOR FM DETECTOR APPLICATIONS

DESCRIPTION AND RATING

The 6DT6 is a miniature sharp-cutoff dual-control pentode primarily intended for use as an FM detector in television receivers. It is also suitable for use in delay circuits, gain-controlled amplifier circuits, and mixer circuits.

As an FM detector, the 6DT6 performs the combined functions of limiter and detector when used in conjunction with suitable circuitry. It also exhibits high sensitivity, and is capable of providing high audio output voltage.

Except for heater ratings, the 3DT6 and 4DT6 are identical to the 6DT6. In addition, they incorporate a controlled heater warm-up characteristic, which makes them especially suited for use in television receivers that employ series-connected heaters.

GENERAL

ELECTRICAL

Cathode—Coated Unipotential
Heater Voltage, AC or DC 3.15 4.2 6.3 Volts
Heater Current 0.6 0.45 0.3 Amperes
Heater Warm-up Time* 11 11 ... Seconds
Direct Inter-electrode Capacitances, approximate†
Grid-Number 1 to Plate ..... 0.02 μF
Grid-Number 3 to Plate ..... 1.4 μF
Grid-Number 1 to All Except Plate ..... 5.8 μF
Grid-Number 3 to All ..... 6.1 μF
Grid-Number 1 to Grid-Number 3 ..... 0.1 μF

MECHANICAL

Mounting Position—Any
Envelope—T-5½, Glass
Base—E7-1, Miniature Button 7-Pin

MAXIMUM RATINGS

FM DETECTOR SERVICE—DESIGN-CENTER VALUES

Plate Voltage ........................................ 300 Volts
Suppressor Voltage ............................... 25 Volts
Screen-Supply Voltage .......................... 300 Volts
Screen Voltage—See Screen Rating Chart
Positive DC Grid-Number 1 Voltage .......................... 0 Volts
Plate Dissipation ................................ 1.5 Watts
Screen Dissipation ................................ 1.0 Watts
Heater-Cathode Voltage
Heater Positive with Respect to Cathode
DC Component .................................. 100 Volts
Total DC and Peak .......................... 200 Volts
Heater Negative with Respect to Cathode
Total DC and Peak .......................... 200 Volts
Grid-Number 1 Circuit Resistance
With Fixed Bias ................................ 0.25 Megohms
With Cathode Bias ............................... 0.5 Megohms

PHYSICAL DIMENSIONS

Supersedes ET-T1313, dated 2-56
CHARACTERISTICS AND TYPICAL OPERATION

CLASS A1 AMPLIFIER
Plate Voltage ........................................ 150 Volts
Suppressor Voltage ................................... 0 Volts
Screen Voltage ........................................ 100 Volts
Cathode-Bias Resistor ................................ 560 Ohms
Plate Resistance, approximate ...................... 0.15 Megohms
Grid-Number 1 Transconductance ................. 800 Micromhos
Grid-Number 3 Transconductance ................. 515 Micromhos
Plate Current ........................................ 1.1 Milliamperes
Screen Current ....................................... 2.1 Milliamperes
Grid-Number 1 Voltage, approximate
  $I_b = 10$ Microamperes .......................... $-4.5$ Volts
Grid-Number 3 Voltage, approximate
  $I_b = 10$ Microamperes .......................... $-3.5$ Volts

4.5-Megacycle FM Detector—See Circuit Diagram

RMS Input Signal to Grid to Driver Tube .......... 0.15 200 500 Millivolts

Plate Supply Voltage ................................ 250 250 250 Volts
Suppressor Voltage (Obtained from a 560,000-ohm resistor) ....... $-5.0$ $-6.0$ $-6.4$ Volts
Screen Voltage ....................................... 100 100 100 Volts
Cathode-Bias Resistor ................................ 560 560 560 Ohms
Plate Load Resistor .................................. 0.27 0.27 0.27 Megohms
Plate Current ........................................ 0.23 0.22 0.21 Milliamperes
Screen Current ....................................... 3.4 5.5 6.0 Milliamperes
Grid-Number 1 Current .............................. 0.013 0.6 0.8 Milliamperes

Bandwidth
  For a Total Harmonic Distortion of 10 Percent ....... 0.65 120 118 Kilocycles
AM Rejection‡, approximate .......................... 0.33 29 28 Decibels
RMS Audio Output Voltage, approximate
  With $\pm 7.5$-kc Deviation from Mean Value of 4.5 Megacycles .......... 5.5 6.5 7.5 Volts
  With $\pm 25$-kc Deviation from Mean Value of 4.5 Megacycles .......... 17 21 23 Volts
Total Harmonic Distortion, approximate
  With $\pm 25$-kc Deviation from Mean Value of 4.5 Megacycles .......... 2 3 4 Percent

Sensitivity
  With $\pm 7.5$-kc Deviation from Mean Value of 4.5 Megacycles .......... 0.5§ Millivolts
  With $\pm 25$-kc Deviation from Mean Value of 4.5 Megacycles .......... 15§ Millivolts

* The time required for the voltage across the heater to reach 80 percent of its rated value after applying 4 times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to 3 times the rated heater voltage divided by the rated heater current.
† With external shield (RETMA 316) connected to cathode.
‡ Ratio of the audio output voltage produced by 30-percent amplitude modulation of the 4.5-megacycle carrier frequency to the audio output voltage produced by $\pm 25$-kilocycle deviation from the 4.5-megacycle carrier frequency, with a modulating frequency of 400 cps in both cases.
§ Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 megacycles before distortion occurs.
**RECOMMENDED ALIGNMENT PROCEDURE**

1. Feed a 500-millivolt, 4.5-mc, 400-cps FM-modulated \(\pm 25\text{-kc deviation}\) signal to the input of the driver tube.

2. Adjust \(L_1\) for maximum undistorted sound output. Since several maxima may occur during this adjustment, it is important to select the proper one. This is the higher frequency peak and coincides with maximum voltage drop across \(R_5\).

3. Reduce the level of the 4.5-mc signal to 5 millivolts RMS.

4. Using an oscilloscope, adjust \(T_1\) for a centered discriminator characteristic with oscillation beats at the edges. Alternatively, \(T_1\) may be adjusted for maximum d-c voltage across \(R_5\).

5. Repeat steps 1 through 4 as necessary to assure accurate alignment.
**AVERAGE TRANSFER CHARACTERISTICS**

\[ E_f = \text{RATED VALUE} \]
\[ E_b = 150 \text{ VOLTS} \]
\[ E_{c3} = 0 \text{ VOLTS} \]

**GRID-NUMBER 1 VOLTAGE IN VOLTS**

**PLATE CURRENT IN MILLIAMPERES**

\[ E_c = 125 \text{ VOLTS} \]

**AVERAGE TRANSFER CHARACTERISTICS**

**SCREEN CURRENT IN MILLIAMPERES**

**GRID-NUMBER 1 VOLTAGE IN VOLTS**