



ELECTRONIC TUBE REFERENCE

12QP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch P4 cathode-ray display tube using a conventional 6.3 V, 0.6 A heater. The available Tung-Sol source is sparse, so the description remains conservative and does not infer undocumented television or instrumentation service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Cathode Ray*No fixed ratings recorded.*

12QP4 — Cathode Ray Picture Tube

A glass-envelope, magnetic-deflection and magnetic-focus direct-view picture tube designed for television receivers, featuring a 12-inch screen and an external single-magnet ion-trap.

Overview

The **12QP4** is a specialized cathode ray tube (CRT) designed for direct-view television display applications. It provides a rectangular raster size of 7 1/2" by 10" on a screen with a nominal diameter of 12 7/16 inches. The tube utilizes magnetic deflection and magnetic focusing, with a nominal deflection angle of approximately 55 degrees. To prevent the formation of ion-spot blemishes on the phosphor screen, the electron gun is designed to operate with an external, single-field magnetic ion-trap.

Construction and Physical Specifications

The 12QP4 is constructed with a glass bulb envelope and a small shell duodecal 7-pin base. The screen is coated with a phosphor that exhibits white fluorescence and phosphorescence with medium persistence, providing a clear image suitable for television broadcast reproduction.

Mechanical Dimensions

The physical layout of the tube requires specific clearance for mounting and the installation of external magnetic components:

- **Overall Length:** $17 \frac{1}{2}'' \pm \frac{3}{8}''$
- **Screen Diameter:** $12 \frac{7}{16}'' \pm \frac{1}{8}''$
- **Minimum Useful Screen Diameter:** 11"
- **Neck Diameter:** $1 \frac{7}{16}'' \pm \frac{1}{16}''$
- **Neck Length:** A minimum of $4 \frac{1}{4}''$ of straight neck space must be kept clear to accommodate the external single-field ion-trap magnet.
- **Anode Terminal Position:** The recessed small cavity cap for the high-voltage anode connection is located on the side of the glass cone, positioned $7 \frac{1}{2}'' \pm \frac{1}{4}''$ from the faceplate.
- **Cone Height:** $10 \frac{1}{2}'' \pm \frac{3}{16}''$ from the faceplate to the neck transition.

The tube is designed to operate in any mounting position, allowing flexibility in receiver chassis design.

Base and Pin Connections

The electrical connections to the electron gun are made through a small shell duodecal 7-pin base at the end of the neck, while the high-voltage anode connection is made via a recessed small cavity cap on the bulb. The pinout configuration, viewed from the bottom of the base, is as follows:

Pin Number	Connection
1	Heater
2	Grid No. 1
6	No Connection
7	No Connection
10	No Connection
11	Cathode
12	Heater
Cap	Anode

Heater and Interelectrode Capacitances

The 12QP4 incorporates an indirectly heated, coated unipotential cathode. The heater is designed for operation on either alternating current (AC) or direct current (DC).

Heater Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	0.6 A

The direct interelectrode capacitances of the tube, measured approximately without external shielding, are:

- **Grid No. 1 to all other electrodes:** 7 μF
- **Cathode to all other electrodes:** 5 μF

Maximum Ratings

The maximum ratings for the 12QP4 are established under the RMA Standard M8-210. These ratings represent the absolute limits within which the tube must be operated to prevent damage and ensure reliable service.

Parameter	Maximum Rating
Anode Voltage	12,000 V
Grid No. 2 Voltage	410 V
Grid No. 1 Negative Bias Voltage	125 V
Grid No. 1 Positive Bias Voltage	0 V
Grid No. 1 Positive Peak Voltage	2 V
Grid No. 1 Circuit Resistance	1.5 M Ω

Heater-Cathode Voltage Limits

The insulation between the heater and the cathode is rated to withstand specific peak voltages depending on the operating state and polarity:

- **Heater negative with respect to cathode:**
 - *During equipment warm-up period (not exceeding 15 seconds):* 410 V maximum
 - *After equipment warm-up period:* 140 V maximum
- **Heater positive with respect to cathode:** 140 V maximum

These limits prevent breakdown of the heater-cathode insulation during the initial power-on phase and during steady-state operation.

Typical Operating Conditions and Characteristics

In typical television receiver applications, the 12QP4 is operated under the following conditions:

- **Anode Voltage:** 10,000 V
- **Grid No. 2 Voltage:** 250 V
- **Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -27 V to -63 V
- **Focusing Coil Current (approximate):** 135 mA
- **Ion-Trap Current (approximate):** 80 mA

The focusing coil current of approximately 135 mA is required to focus the electron beam into a sharp spot on the screen. The ion-trap current of approximately 80 mA applies to a standard single-field ion-trap magnet, which must be physically adjusted on the neck of the tube to align the electron beam and eliminate ion-spot blemishes.

Technical Summary

The **12QP4** is a **12-inch magnetic-deflection and magnetic-focus cathode ray picture tube** featuring a **6.3 V, 0.6 A heater**, a **coated unipotential cathode**, and a **small shell duodecal 7-pin base**. It is designed to provide a **7 1/2" x 10" picture** with a white, medium-persistence phosphor screen. The tube operates at a typical anode voltage of **10,000 V** (with a maximum rating of **12,000 V**) and requires an external **single-field magnetic ion-trap** drawing approximately **80 mA** to protect the screen from ion damage. With its flexible mounting position and standard electrical characteristics, the 12QP4 serves as a robust display solution for vintage television receiver designs.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1961 TUNG SOL

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	Nominal
Heater current	600 mA	Nominal