

ELECTRONIC TUBE REFERENCE

1404TB

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Fourteen-inch television monitor cathode-ray tube with magnetic focusing and magnetic deflection. A metal-backed white short-persistence T-type screen and roughly 14 kV typical anode operation provide a bright direct-view monitor display.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	16000 V
Published Ferranti ratings, capacitances, and typical operating data promoted where applicable; additional electrical values retained as parameters.	

1404TB — Television Monitor Cathode-Ray Tube

The **1404TB** (also referenced as **14/04TB**) is a professional-grade, 14-inch diagonal rectangular cathode-ray tube (CRT) manufactured by Ferranti. It is designed specifically for use in television monitoring equipment. The tube features magnetic focus and magnetic deflection, a metal-backed screen with a short-persistence white phosphor, and an external conductive coating that can be utilized for Extra High Tension (E.H.T.) smoothing.

Physical Construction and Screen Characteristics

The 1404TB is constructed with a rectangular glass envelope and a specialized screen structure optimized for high-quality television monitoring.

- **Screen and Phosphor:** The screen is metal-backed to enhance brightness and prevent ion burn. The standard configuration utilizes a Type 'T' phosphor, which exhibits white fluorescence and short persistence. The tube can also be supplied with alternative screen phosphors to suit specific monitoring requirements.
- **External Conductive Coating:** An external conductive coating is applied to the bulb. When grounded, this coating forms a capacitor with the internal conductive coating (connected to the second anode), providing a capacitance of approximately 1100 pF. This capacitance is highly effective for filtering and smoothing the E.H.T. anode supply.
- **Physical Dimensions:**
 - **Maximum Overall Length:** 457 mm (nominally 447 ± 10 mm).
 - **Nominal Neck Diameter:** 37 mm (specified as 36.5 ± 1.5 mm).
 - **Faceplate Dimensions:** 318 ± 3 mm width by 247 ± 3 mm height, with a diagonal of 348 ± 3 mm.
 - **Useful Screen Area:** Minimum dimensions of 292 mm width, 218 mm height, and 323 mm diagonal.
 - **Faceplate Curvature:** Spherical radius of 686 mm (S.P. RAD).
- **Mounting Position:** The tube is designed to operate reliably in any mounting position.

Heater and Base Connections

The 1404TB features an indirectly heated cathode designed for flexible power supply configurations, supporting both parallel and series heater operation.

Heater Characteristics

Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	0.3 A
Maximum Surge Heater Voltage (Series Operation)	9.5 V r.m.s.

When the heater is used in a series chain, a current-limiting device must be incorporated in the circuit to restrict the switching surge. Additionally, if the heater is operated in a series chain or earthed, the 50 Hz impedance between earth and cathode (Z_k) must not exceed 100 k Ω .

Base and Pin Configuration

The tube utilizes a **B12A (Duodecal)** base. The electrical connections, viewed from the underside of the base, are assigned as follows:

Pin	Connection
Pin 1	Heater
Pin 2	Grid
Pin 3	No Pin
Pin 4	No Pin
Pin 5	No Pin
Pin 6	No Connection
Pin 7	No Connection
Pin 8	No Pin
Pin 9	No Pin
Pin 10	1st Anode (a_1)
Pin 11	Cathode
Pin 12	Heater
Side Contact	2nd Anode (a_2)

The second anode connection is made via a **CT8 (Cavity Type)** anode cap located on the side of the bulb.

Electrical Ratings and Operating Limits

To ensure the longevity of the electron gun and the phosphor screen, the operating parameters of the 1404TB must be maintained within the manufacturer's specified limits.

Absolute Maximum and Minimum Ratings

Parameter	Minimum	Maximum
First Anode (a_1) Voltage	200 V	500 V
Second Anode (a_2) Voltage	8 kV	16 kV
Heater-to-Cathode Voltage (V_{h-k})	—	200 V
Grid-to-Cathode Resistance (R_{g-k})	—	1.5 M Ω
Heater-to-Cathode Resistance (R_{h-k})*	—	1.0 M Ω

Parameter	Minimum	Maximum
First Anode Supply Impedance	—	1.5 MΩ

Screen Dissipation Limit

The average power dissipated on the screen must be carefully controlled to prevent thermal damage to the phosphor. The product of the second anode voltage (V_{a2}) and the average second anode current (I_{a2}) must not exceed **6 watts** across the entire screen area:

$$V_{a2} \times I_{a2} \leq 6 \text{ W}$$

Typical Operating Conditions

For standard television monitoring service, the recommended operating parameters are as follows:

- **First Anode Voltage (V_{a1}):** 300 V
- **Second and Fourth Anode Voltage (V_{a2}, V_{a4}):** 14 kV
- **Grid Voltage for Visual Cut-off (V_g):** −30 V to −70 V
- **Grid Bias Restriction:** The grid must never be allowed to become positive with respect to the cathode, except during the brief period immediately following equipment power-off, when it may rise to a maximum of +1 V.

Focusing and Deflection

The 1404TB relies on external magnetic fields for both beam focusing and deflection.

- **Focusing Unit Alignment:** The focus coil must be positioned such that the recommended center of the magnetic length of the focus unit is approximately 100 mm from the Reference Line of the tube.

Interelectrode Capacitances

The direct interelectrode capacitances of the tube are low, minimizing coupling between the control grid, cathode, and external circuitry:

- **Cathode to all other electrodes ($C_{k-\text{all}}$):** < 8 pF
- **Grid to all other electrodes ($C_{g-\text{all}}$):** < 8 pF
- **Anode to external conductive coating ($C_{a-\text{ext. coating}}$):** Approximately 1100 pF

Technical Summary

The **1404TB** is a highly specialized 14-inch rectangular television monitor tube designed by Ferranti for professional monitoring applications. Featuring magnetic focus and deflection, a B12A Duodecal base, and a CT8 cavity-type anode cap, it operates with a 6.3 V, 0.3 A heater. The tube is optimized for high-voltage operation, typically running at a second anode potential of 14 kV (with a maximum limit of 16 kV). Its

metal-backed Type 'T' white phosphor screen provides short persistence, while the integrated 1100 pF external conductive coating capacitance simplifies E.H.T. power supply filtering.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Ferranti

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

1963 FERRANTI

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	Magnetic	—
Deflection method	Magnetic	—
Fluorescence	White	—
Persistence	Short	—

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor type	T	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Radar / monitor / display CRT	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
First-anode voltage maximum	500 V	—
Second-anode voltage maximum	16000 V	—
Heater-cathode voltage maximum	200 V	—
First-anode operating voltage	300 V	—
Second/fourth-anode operating voltage	14000 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode-to-all capacitance maximum	8 pF	—
Grid-to-all capacitance maximum	8 pF	—
External-coating capacitance approximate	1100 pF	—