



ELECTRONIC TUBE REFERENCE

1403TB

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Fourteen-inch rectangular television monitor CRT with low-voltage electrostatic focus and magnetic deflection. Its white short-persistence T-type screen and high-voltage operation, up to about 15 kV, suit direct-view monitor and television display service.

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

SECTION 1 Cathode Ray**MAXIMUM PLATE VOLTAGE** 15000 V

Published Ferranti ratings, capacitances, and typical operating data promoted where applicable; additional electrical values retained as parameters.

1403TB — Electrostatic-Focus Television Monitor Tube

The **1403TB** (also designated as **14/03TB**) is a 14-inch diagonal rectangular cathode-ray tube designed by Ferranti for use in television monitoring equipment. It features a metal-backed screen, an external conductive coating, low-voltage electrostatic focusing, and magnetic deflection. The tube is constructed with a rectangular glass envelope, a Duodecal base, and a cavity-type anode cap.

A closely related variant, the **14/04TB**, shares many physical and electrical characteristics but utilizes magnetic focusing instead of electrostatic focusing, resulting in differences in overall length, base pin connections, and typical operating parameters.

Physical Construction and Dimensions

The 1403TB is built with a rectangular bulb shape, providing a nominal 14-inch diagonal screen. The physical dimensions of the tube are precisely specified:

- **Maximum Overall Length:** 420 mm (with a nominal dimension of 410 ± 10 mm).
- **Bulb Dimensions:** The face of the tube measures 318 ± 3 mm in width and 247 ± 3 mm in height.
- **Useful Screen Area:** The minimum useful screen dimensions are 292 mm horizontally and 218 mm vertically, with a minimum useful diagonal of 323 mm. The overall diagonal of the faceplate is 348 ± 3 mm.
- **Faceplate Radius:** The external screen surface has a radius of curvature of 686 mm.
- **Neck Diameter:** The nominal neck diameter is 37 mm (specified as 36.5 ± 1.5 mm in mechanical drawings).
- **Anode Connection:** High voltage is applied via a side contact cavity cap, designated as Type CT8.
- **External Coating:** The tube features an external conductive coating. This coating, in combination with the internal conductive coating, forms a capacitance (approximately 1100 pF) that can be utilized for Extra High Tension (E.H.T.) smoothing in the power supply circuit.
- **Mounting Position:** The tube can be mounted in any position.

Screen and Phosphor Characteristics

The standard 1403TB is equipped with a Type "T" phosphor screen, which is metal-backed to improve brightness and prevent ion burn. The Type "T" phosphor exhibits white fluorescence and has a short persistence, making it highly suitable for television monitoring applications where rapid motion must be resolved without trailing. Ferranti also offered the tube with alternative screen phosphors upon request.

Heater and Base Connections

The 1403TB is equipped with an indirectly heated cathode. The heater is designed for either parallel or series operation:

- **Heater Voltage:** 6.3 V
- **Heater Current:** 0.3 A

For series-string receiver designs, the surge heater voltage must not exceed 9.5 V r.m.s. A current-limiting device must be incorporated in the heater circuit to restrict the switching surge current.

Base and Pin Configuration

The tube utilizes a **B12A (Duodecal)** base. The underside view of the base reveals the following pin assignments:

Pin	Connection
Pin 1	Heater
Pin 2	Grid

Pin	Connection
Pin 3	No Pin
Pin 4	No Pin
Pin 5	No Pin
Pin 6	3rd Anode (Focus Electrode)
Pin 7	No Connection
Pin 8	No Pin
Pin 9	No Pin
Pin 10	1st Anode
Pin 11	Cathode
Pin 12	Heater
Side Contact	2nd Anode, 4th Anode

In contrast, the magnetically focused **14/04TB** does not require an electrostatic focus electrode on Pin 6, leaving Pin 6 as a "No Connection" and utilizing an external magnetic focus coil instead.

Electrical Ratings and Operating Conditions

The electrical ratings of the 1403TB define the absolute limits for safe and reliable operation, while the typical operating points represent the recommended conditions for optimal performance.

Absolute Maximum and Minimum Ratings

The limiting values for the 1403TB electrodes are as follows:

- **First Anode (A_1) Voltage:** Maximum 500 V, Minimum 200 V.
- **Second and Fourth Anode ($A_2 + A_4$) Voltage:** Maximum 15 kV, Minimum 8 kV.
- **Third Anode (A_3) Voltage (Focus):** Maximum Positive +500 V, Maximum Negative -500 V.
- **Heater-to-Cathode Voltage (V_{h-k}):** Maximum 200 V.
- **Grid-to-Cathode Resistance (R_{g-k}):** Maximum 1.5 M Ω .
- **Heater-to-Cathode Resistance (R_{h-k}):** Maximum 1.0 M Ω .

Typical Operating Points

Under typical operating conditions, the voltages applied to the electrodes are:

- **First Anode (A_1) Voltage:** 300 V
- **Second and Fourth Anode ($A_2 + A_4$) Voltage:** 12 kV

- **Third Anode (A_3) Voltage for Focus:** Adjustable from -300 V to +300 V. The point of optimum focus lies between these values, allowing low-voltage electrostatic focusing.
- **Grid Voltage (V_g) for Visual Cut-off:** -30 V to -70 V.

The grid must never be allowed to become positive with respect to the cathode, except immediately after switching off the equipment, during which period it may rise to a maximum of +1 V.

Interelectrode Capacitances

The direct interelectrode capacitances of the 1403TB are:

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

Comparison with the 14/04TB

The 14/04TB is a companion television monitor tube that differs primarily in its focusing method and physical length:

- **Focusing Method:** The 1403TB uses low-voltage electrostatic focusing (via the 3rd Anode on Pin 6), whereas the 14/04TB uses magnetic focusing. For the 14/04TB, the recommended center of the magnetic length of the focus unit is approximately 100 mm from the reference line.
- **Physical Length:** The 14/04TB is longer, with a maximum overall length of 457 mm (nominal 447 ± 10 mm) compared to the 1403TB's 420 mm (nominal 410 ± 10 mm).
- **Anode Ratings:** The 14/04TB has a maximum A_2 voltage rating of 16 kV (compared to 15 kV for the 1403TB's $A_2 + A_4$). Additionally, the 14/04TB specifies that the product of the second anode voltage (V_{a2}) and the average second anode current (I_{a2}) must not exceed 6 watts average for the whole screen.
- **Impedance Limits:** The 14/04TB specifies a maximum A_1 supply impedance of 1.5 MΩ. It also defines a maximum 50 Hz impedance between earth and cathode (Z_k) of 100 kΩ when the heater is in a series chain or earthed.

Technical Summary

The **1403TB** is a specialized 14-inch rectangular cathode-ray tube designed for high-quality television monitoring. By combining magnetic deflection with low-voltage electrostatic focusing, it simplifies circuit design by eliminating the need for a high-voltage focusing supply or bulky magnetic focusing assemblies. Its metal-backed Type "T" white-phosphor screen ensures bright, high-contrast displays with short persistence to prevent motion blur. Operating with a standard 6.3 V, 0.3 A heater and a Duodecal base, the 1403TB provides a reliable and compact display solution for professional monitoring applications.

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	Electrostatic	—
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/fourth-anode voltage maximum	15000 V	—
Third-anode positive voltage maximum	500 V	—
Third-anode negative voltage maximum	-500 V	—
First-anode operating voltage	300 V	—
Third-anode focus voltage minimum	-300 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Third-anode focus voltage maximum	300 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	—

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