

Magnetically focused and deflected cathode-ray display tube for radar, monitor, and display service. Its H phosphor gives orange fluorescence with very long persistence, while the second anode operates at roughly 12 kV for a sustained visible trace.

## 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. |         |

## 124054HM — 12-Inch Magnetic Focus and Deflection Radar Tube

The **124054HM** (also designated as **1240/54HM**) is a 12-inch diameter cathode ray tube (CRT) designed primarily for radar applications. It features a narrow neck and a small deflection angle, making it highly suitable for raw or synthetic radar displays as well as symbol presentation. The tube is engineered to interface with either transistor-based or vacuum-tube (valve) drive circuitry, offering flexibility in both legacy and solid-state system designs.

# Physical Construction and Dimensions

The 124054HM is constructed with a glass envelope designed to provide a large, clear viewing area while maintaining a narrow neck to minimize deflection power requirements. The physical dimensions and mechanical specifications of the tube are highly precise:

- **Maximum Overall Length:** 653 mm (with a nominal dimension of  $645 \pm 8$  mm)
- **Useful Screen Diameter:** 250 mm minimum
- **Outer Bulb Diameter (D):**  $305 \pm 2$  mm
- **Neck Diameter (F):** 23 mm nominal ( $23 \pm 1$  mm)
- **Reference Line Diameter (S):** 25 mm
- **Anode Cap:** CT8 Cavity Type
- **Base Type:** B9A/D
- **Mounting Position:** Any

The tube's faceplate contour is defined by specific radii of curvature, with a major face radius (R1) of 1000 mm, a corner radius (R2) of 426 mm, and a peripheral blend radius (R3) of 19 mm. The distance from the reference line to the front of the screen face (A) is  $322 \pm 3$  mm, while the depth of the screen's top curvature (P) is  $90 \pm 5$  mm.

For proper beam focusing, the recommended position of the external focus coil is exactly 170 mm in front of the grid.

## Heater and Base Connections

The 124054HM utilizes an indirectly heated cathode. The heater is designed for standard low-voltage operation, drawing a moderate current that is compatible with typical instrument power supplies.

### Heater Specifications

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

### Base Pinout (B9A/D)

The electrical connections are made through a 9-pin B9A/D base, viewed from the underside:

| Pin Number | Connection                 |
|------------|----------------------------|
| Pin 1      | Grid (g)                   |
| Pin 2      | Internal Connection (I.C.) |
| Pin 3      | Cathode (k)                |
| Pin 4      | Heater (h)                 |
| Pin 5      | Heater (h)                 |

| Pin Number   | Connection                 |
|--------------|----------------------------|
| Pin 6        | Internal Connection (I.C.) |
| Pin 7        | No Connection (N.C.)       |
| Pin 8        | Internal Connection (I.C.) |
| Pin 9        | First Anode (a1)           |
| Side Contact | Second Anode (a2)          |

Pins designated as Internal Connection (I.C.) must not be used for external circuit tie points, as they are connected to internal tube structures.

## Electrical Ratings and Operating Conditions

The 124054HM is rated under a system of absolute maximum and minimum values to ensure reliable operation and prevent premature degradation of the electron gun or phosphor screen.

### Absolute Maximum and Minimum Ratings

- **Maximum First Anode (a1) Voltage:** 600 V
- **Maximum Second Anode (a2) Voltage:** 15 kV
- **Minimum Second Anode (a2) Voltage:** 8 kV
- **Maximum Heater-to-Cathode Voltage (Vh-k):** 200 V
- **Maximum Grid-to-Cathode Resistance (Rg-k):** 1.5 MΩ
- **Maximum Heater-to-Cathode Resistance (Rh-k):** 1.0 MΩ

### Typical Operating Configurations

The tube can be operated in two distinct drive modes depending on the system architecture:

#### 1. Valve (Vacuum Tube) Drive

In traditional valve-driven systems, the first anode is operated at a higher potential to match the voltage swings typical of vacuum tube amplifiers:

- **First Anode (a1) Voltage:** 300 V
- **Second Anode (a2) Voltage:** 12 kV
- **Grid Voltage (Vg) for Visual Cut-off:** -30 V to -90 V

#### 2. Transistor Drive

For solid-state designs, the first anode voltage is reduced to allow control with lower-voltage transistor video amplifiers:

- **First Anode (a1) Voltage:** 100 V
- **Second Anode (a2) Voltage:** 12 kV

- **Grid Voltage (Vg) for Visual Cut-off:** -25 V

## Phosphor and Screen Characteristics

The 124054HM is equipped with a Type 'H' phosphor screen, which is specifically optimized for radar display applications requiring very long persistence.

- **Phosphor Type:** Type 'H'
- **Fluorescence Color:** Orange
- **Afterglow Color:** Orange
- **Persistence:** Very Long

## Operational Precautions

Because of the high sensitivity and long persistence of the Type 'H' phosphor, it is highly susceptible to burning if subjected to stationary or slow-moving electron beams. To prevent permanent damage to the screen, the tube must not be operated with a stationary or slow-moving spot, even when the beam current is set to a very low level. For applications where stationary symbols or slow sweeps are required, alternative phosphors (such as the Type 'L3' phosphor used in the sister model 1240/54L3M, which features long persistence and is flicker-free at 10 cycles per second) must be considered.

## Technical Summary

The **124054HM** is a specialized 12-inch magnetic focus and magnetic deflection radar CRT manufactured by Ferranti. Featuring a narrow 23 mm neck and a nominal 45-degree deflection angle, it is optimized for high-resolution raw or synthetic radar displays. With a 6.3 V, 0.3 A heater, a CT8 cavity anode cap, and a B9A/D base, it supports both 100 V transistor-driven and 300 V valve-driven first anode configurations under a 12 kV typical second anode potential. Its Type 'H' orange-fluorescing phosphor provides the very long persistence required for radar sweep retention, though it demands strict operational safeguards against phosphor burn from stationary or slow-moving spots.

## 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        | —                |
| Deflection angle  | 45 deg          | —                |
| Fluorescence      | Orange          | —                |
| Persistence       | Very long       | —                |

| CONSTRUCTION  |                 |                  |
|---------------|-----------------|------------------|
| PARAMETER     | PUBLISHED VALUE | CONDITION / NOTE |
| Phosphor type | H               | —                |

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

| OTHER                          |                 |                  |
|--------------------------------|-----------------|------------------|
| PARAMETER                      | PUBLISHED VALUE | CONDITION / NOTE |
| First-anode voltage maximum    | 600 V           | —                |
| Second-anode voltage maximum   | 15000 V         | —                |
| Second-anode voltage minimum   | 8000 V          | —                |
| Heater-cathode voltage maximum | 200 V           | —                |
| First-anode operating voltage  | 300 V           | —                |
| Second-anode operating voltage | 12000 V         | —                |
|                                |                 |                  |

| PARAMETER                        | PUBLISHED VALUE     | CONDITION / NOTE |
|----------------------------------|---------------------|------------------|
| Grid visual-cutoff voltage range | <b>-30 to -90 V</b> | —                |

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