

ELECTRONIC TUBE REFERENCE

1248HM

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Magnetically focused and deflected cathode-ray display tube intended for radar, monitor, and display service. It uses H phosphor with orange, very-long-persistence fluorescence and operates with a high-voltage second anode, typically around 15 kV.

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	15500 V
MAXIMUM CATHODE CURRENT	0.15 mA
Published Ferranti ratings, capacitances, and typical operating data promoted where applicable; additional electrical values retained as parameters.	

1248HM Radar Tube

The **1248HM** (also designated as the 12/48HM) is a 12-inch diameter, flat-faced cathode ray tube designed specifically for radar applications requiring fine symbol presentation and high resolution. It utilizes magnetic focus and magnetic deflection systems to achieve precise beam control. The tube is characterized by its specialized orange-fluorescing phosphor screen and its robust physical construction, making it suitable for demanding display systems.

Screen and Phosphor Characteristics

The 1248HM features a metal-backed screen utilizing a **Type 'H'** phosphor. This configuration is optimized for radar display applications with specific visual persistence requirements:

- **Fluorescence:** Orange
- **Afterglow:** Orange
- **Persistence:** Very long

Because of the high-persistence characteristics of the Type 'H' phosphor, the screen is susceptible to damage under certain operating conditions. The phosphor is liable to burn even at low values of beam current if operated with a stationary or slow-moving spot.

The 1248HM is closely related to the 12/48L3M, which differs primarily in its screen characteristics. The 12/48L3M uses a Type 'L3' phosphor with orange fluorescence, orange afterglow, and long persistence. This alternative phosphor is designed to enable flicker-free images at repetition frequencies down to 10 cycles per second, while curtailing the persistence of moving targets compared to the 'H' phosphor.

Physical Dimensions and Mechanical Construction

The mechanical design of the 1248HM incorporates a flat faceplate and a precise glass envelope. The tube uses a **B12A (Duodecal)** base and a **CT8 cavity-type** recessed anode cap for the high-voltage second anode connection.

The physical dimensions of the tube are highly specified to ensure proper alignment within radar display consoles:

Dimension Parameter	Value (Metric)	Value (Imperial)
Maximum Overall Length	640 mm	25.20 in
Nominal Neck Diameter	35 mm	1.378 in
Minimum Useful Screen Diameter	250 mm	9.84 in
Reference Line Diameter (S)	36 mm	1.417 in
Reference Line to Faceplate (A)	272 ± 3.5 mm	10.710 ± 0.138 in
Overall Length (C)	636 ± 4 mm	25.040 ± 0.157 in
Overall Diameter (D)	305 ± 2 mm	12.000 ± 0.079 in
Reference Line to Anode Cap (P)	180 ± 5 mm	7.087 ± 0.197 in
Faceplate Radius (<u>R1</u>)	1000 mm	39.370 in
Cone Radius (<u>R2</u>)	426 mm	16.772 in

Dimension Parameter	Value (Metric)	Value (Imperial)
Corner Radius (<u>R3</u>)	19 ± 2 mm	0.748 ± 0.079 in

The nominal neck diameter is 35 mm, with a tolerance of +1.5 mm and -1.0 mm (1.378 +0.020 / -0.039 inches).

Electrical Connections and Pinout

The B12A Duodecal base provides electrical connections to the heater, cathode, control grid, and first anode. The second anode is connected via the side-mounted CT8 cavity cap. The pin configuration, viewed from the underside of the base, is as follows:

- **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
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Side Cap:** 2nd Anode

Heater and Maximum Ratings

The 1248HM operates with an indirectly heated cathode. The electrical limits and ratings represent absolute thresholds that must not be exceeded during operation.

Heater Specifications

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

Absolute Maximum and Minimum Ratings

- **Maximum First Anode Voltage:** 600 V
- **Minimum First Anode Voltage:** 250 V
- **Maximum Second Anode Voltage:** 15.5 kV
- **Minimum Second Anode Voltage:** 9.0 kV
- **Maximum Cathode Current:** 150 µA

- **Maximum Heater-to-Cathode Voltage (V_{h-k}):** 200 V
- **Maximum Heater-to-Cathode Resistance (R_{h-k}):** 1.0 M Ω
- **Maximum Grid-to-Cathode Resistance (R_{g-k}):** 1.5 M Ω

Typical Operating Conditions and Focusing

Under typical operating conditions, the 1248HM is configured to balance brightness, focus, and resolution. The typical operating parameters are defined as follows:

- **First Anode Voltage:** 300 V
- **Second Anode Voltage:** 15 kV
- **Grid Voltage (V_g) for Visual Cut-off:** -90 V
- **Average Grid Drive (for $I_b = 50 \mu\text{A}$):** 30 V
- **Line Width (at $I_b = 50 \mu\text{A}$):** 0.25 mm

Focusing System Alignment

To achieve the specified high resolution and a line width of 0.25 mm, the external magnetic focus coil must be precisely positioned. The focus coil should be placed so that the center of its gap is approximately 220 mm from the reference line, which is established at the 36 mm Ring Gauge Position.

Interelectrode Capacitances

The internal capacitances of the tube electrodes relative to all other connected elements are kept low to maintain signal integrity:

- **Cathode to all other electrodes (C_{k-all}):** < 8.0 pF
- **Grid to all other electrodes (C_{g-all}):** < 8.0 pF

Technical Summary

The **1248HM** is a specialized 12-inch flat-faced radar cathode ray tube featuring magnetic focus, magnetic deflection, and a very long persistence Type 'H' orange phosphor screen. Operating with a 6.3 V, 0.3 A heater, the tube is designed for high-resolution symbol and target presentation. It requires a first anode voltage of 300 V and a second anode voltage of 15 kV under typical operating conditions, delivering a narrow 0.25 mm line width. Proper operation requires careful positioning of the focus coil and precautions against phosphor burning during stationary or slow-moving spot conditions.

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	Orange	—
Persistence	Very long	—
Line width at 50 uA beam current	0.25 mm	—

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	—
First-anode voltage minimum	250 V	—
Second-anode voltage maximum	15500 V	—
Second-anode voltage minimum	9000 V	—
Cathode current maximum	150 uA	—
Heater-cathode voltage maximum	200 V	—
First-anode operating voltage	300 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Second-anode operating voltage	15000 V	—
Grid visual-cutoff voltage	-90 V	—
Average grid drive at 50 uA beam current	30 V	—

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

TUBE TINKER

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