



ELECTRONIC TUBE REFERENCE

1208HM

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

CATHODERAY

Twelve-inch Ferranti radar, monitor, and display CRT using magnetic focusing and deflection. Its H-type orange long-persistence screen and second-anode capability to about 15.5 kV are tailored to persistent radar and monitoring presentations.

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

1208HM — Flat-Faced Radar Display Tube

The **12/08 HM** (also designated as **1208HM**) is a 12-inch diameter, flat-faced cathode-ray tube designed primarily for Plan Position Indicator (P.P.I.) radar display applications. It is engineered as an improved, higher-resolution successor to the CV.429 industrial standard. The tube utilizes magnetic focusing and magnetic deflection to control its electron beam, delivering high-precision line widths suitable for detailed radar imaging.

Screen and Phosphor Characteristics

The 12/08HM features a metal-backed screen utilizing a **Type 'H'** phosphor. This phosphor is characterized by:

- **Fluorescence:** Orange
- **Afterglow:** Orange
- **Persistence:** Long

The Type 'H' screen is composed of magnesium fluoride. Because of the chemical and physical properties of this material, the screen is highly susceptible to burning. Screen burn can occur even at very low values of beam current if the electron beam spot remains stationary or is allowed to move slowly across the face. Consequently, scanning failure protection and beam-blanking circuits are critical design requirements when operating this tube.

The 12/08HM is closely related to the **12/08 JM**, which is identical in its mechanical and electrical specifications but employs a **Type 'J'** phosphor. The Type 'J' screen exhibits blue fluorescence, a yellow afterglow, and long persistence, but does not share the same extreme vulnerability to low-current stationary spot burns associated with the magnesium fluoride Type 'H' screen.

Physical Dimensions and Mechanical Construction

The tube is constructed with a large-diameter bulb, a flat faceplate, and a narrow neck designed to accommodate external magnetic deflection and focusing coils.

The key physical dimensions of the envelope are:

- **Maximum Overall Length:** 520 mm (with a nominal dimension of 513 ± 7 mm)
- **Nominal Neck Diameter:** 35 mm (specifically 35 mm +0.5/-1.0 mm)
- **Nominal Face Diameter (D):** 305 ± 2 mm (12.000 ± 0.079 inches)
- **Minimum Useful Screen Diameter (E):** 250 mm (9.842 inches)
- **Faceplate Spherical Radius (R1):** 1000 mm (39.370 inches)
- **Anode Cap:** Recessed cavity type, conforming to the CT8 standard.
- **Base:** B12A Duodecal base.

The reference line is established at a diameter of 36 mm (1.417 inches), which corresponds to the 36 mm Ring Gauge Position.

Base Connections and Pinout

The B12A Duodecal base provides electrical connections to the internal gun structure. The pin configuration, viewed from the underside of the base, is detailed below:

Pin Number	Connection
Pin 1	Heater

Pin Number	Connection
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 Electrical Ratings

The 12/08HM contains an indirectly heated cathode. The heater is designed for AC or DC operation.

Heater Specifications

- **Heater Voltage:** 6.3 V
- **Heater Current:** 0.3 A
- **Calculated Heater Power:** 1.89 W

Absolute Maximum and Minimum Ratings

To ensure reliable operation and prevent premature degradation of the cathode and screen, the operating parameters must be maintained within the following limits:

Parameter	Minimum Limit	Maximum Limit
1st Anode Voltage (V_{a1})	250 V	600 V
2nd Anode Voltage (V_{a2})	9.0 kV	15.5 kV
Cathode Current (I_k)	—	150 μ A

Parameter	Minimum Limit	Maximum Limit
Heater-to-Cathode Voltage (V_{h-k})	—	200 V
Heater-to-Cathode Resistance (R_{h-k})	—	1.0 MΩ
Grid-to-Cathode Resistance (R_{g-k})	—	1.5 MΩ

Typical Operating Conditions

Under typical operating conditions, the tube is configured to balance brightness, focus quality, and resolution. The standard operating parameters are:

- **1st Anode Voltage (V_{a1}):** 300 V
- **2nd Anode Voltage (V_{a2}):** 15 kV
- **Grid Voltage (V_g) for Visual Cut-off:** -60 V
- **Average Grid Drive for 50 μA Beam Current:** 20 V
- **Line Width (at $I_b = 50 \mu\text{A}$):** 0.25 mm

Focusing Coil Requirements

Focusing is achieved via an external magnetic focus coil. Under typical operating conditions, the focus coil must provide approximately **640 ampere-turns**.

For optimum focus quality, the focus coil must be positioned precisely along the neck. The center of the focus coil gap should be located approximately 120 mm from the reference line (which is defined by the 36 mm Ring Gauge Position).

Interelectrode Capacitances

The internal electrode capacitances are kept low to prevent signal distortion and ensure responsive grid modulation:

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

Technical Summary

The **12/08 HM** is a specialized **12-inch flat-faced radar display tube** featuring **magnetic focus**, **magnetic deflection**, and a **B12A Duodecal base**. It operates with a **6.3 V, 0.3 A heater** and is optimized for high-resolution P.P.I. applications. The tube features a **Type 'H' magnesium fluoride screen** with orange fluorescence and long-persistence orange afterglow, which requires careful circuit design to prevent screen burn. With a typical operating second anode voltage of **15 kV** and a first anode

voltage of **300 V**, it achieves a narrow line width of **0.25 mm** at a beam current of 50 μA , utilizing an external focus coil of approximately **640 ampere-turns**.

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	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	—
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	—
Second-anode operating voltage	15000 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid visual-cutoff voltage	-60 V	—
Average modulation drive at 50 uA beam current	20 V	—
Focus coil excitation	640 ampere-turn	—

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