

ELECTRONIC TUBE REFERENCE

12TO3A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch radar cathode-ray display tube with magnetic focusing and deflection. Cintel documentation provides operating and capacitance data for its electron-gun system, identifying it as a specialized radar display rather than a television picture tube.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
CRT operating ratings and direct interelectrode capacitances are published in the approved datasheet.

12TO3A — Radar Cathode-Ray Tube

Overview

The **12TO3A** is a specialized cathode-ray tube designed primarily for radar display applications. It features a nominal screen diameter of 12 inches, utilizing magnetic focusing and magnetic deflection systems. The tube is constructed with an aluminum-backed screen that exhibits orange fluorescence and a long-persistence orange afterglow, making it highly suitable for Plan Position Indicator (PPI) radar displays where target traces must remain visible between antenna sweeps.

Physical Construction and Dimensions

The 12TO3A is housed in a glass bulb with a maximum overall length of 488 ± 7 mm and a greatest bulb diameter of 306.5 mm (with the physical drawing specifying a nominal diameter of 305 mm with a tolerance of +1.5 mm and -2.0 mm). The minimum useful screen diameter is 265 mm. The neck of the tube has a minimum diameter of 34.0 mm and a maximum diameter of 35.5 mm. The physical reference line of the envelope is determined by the position where a gauge with an internal diameter of 36 mm and a length of 50 mm rests on the bulb cone.

The tube can be mounted in any position. The final anode connection is made via a cavity cap conforming to BSS448/CT8, located on the side of the bulb cone. The plane passing through the tube axis and Pin 5 (the modulator) is aligned with the anode terminal on the same side of the tube, with an allowable angular tolerance of 10° measured about the tube axis.

Heater, Base, and Pin Connections

The 12TO3A is equipped with an indirectly heated cathode. The heater can be operated from either an AC or DC supply.

Heater Specifications

- **Heater Voltage:** 6.3 V (AC or DC)
- **Heater Current:** 0.6 A

Base and Pinout Configuration

The tube uses an International Octal base. The electrical connections are assigned as follows:

- **Pin 1:** No connection
- **Pin 2:** Heater
- **Pin 3:** Anode 1
- **Pin 4:** No connection
- **Pin 5:** Modulator
- **Pin 6:** No connection
- **Pin 7:** Cathode
- **Pin 8:** Heater
- **Cap:** Final Anode

Direct Inter-electrode Capacitances

The direct capacitances between the control electrodes and all other electrodes connected together are:

- **Modulator to all other electrodes:** 9.0 pF
- **Anode 1 to all other electrodes:** 6.0 pF
- **Cathode to all other electrodes:** 8.0 pF

Focusing and Deflection Systems

Both focusing and deflection are achieved magnetically.

- **Focusing Coil Alignment:** The focusing coil must be positioned such that the center line of its air gap is approximately 100 mm from the reference line established on the bulb cone.
- **Spot Position:** Under typical operating conditions, the center of the undeflected, focused spot will fall within a circle of 12 mm radius concentric with the physical center of the tube face.

Operating Points and Maximum Ratings

The operating limits and typical conditions must be strictly observed to ensure proper performance and prevent damage to the screen or electron gun.

Maximum Ratings (Absolute Values)

- **Final Anode Voltage:** 15,000 V
- **Anode 1 Voltage:** 850 V
- **Modulator Voltage (Negative bias value):** 140 V
- **Modulator Voltage (Positive bias value):** 0 V
- **Peak Heater-Cathode Voltage (Heater negative with respect to cathode):** 150 V
- **Peak Heater-Cathode Voltage (Heater positive with respect to cathode):** 150 V

Typical Operating Conditions

- **Final Anode Voltage:** 10,000 V
- **Anode 1 Voltage:** 700 V
- **Modulator Voltage for Cut-off:** -50 V to -115 V
- **Focusing-Coil Current:** 700 Ampere-Turns (A.T.)

Technical Summary

The **12TO3A** is a 12-inch nominal diameter radar cathode-ray tube designed for magnetic focus and magnetic deflection. It features an aluminum-backed screen with orange fluorescence and a long-persistence orange afterglow. Operating with a standard 6.3 V, 0.6 A heater, the tube utilizes an International Octal base and a BSS448/CT8 cavity cap for the final anode. Under typical operating conditions, it runs with a final anode voltage of 10,000 V and an Anode 1 voltage of 700 V, requiring a focusing-coil strength of 700 Ampere-Turns and a modulator cut-off bias between -50 V and -115 V.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Cathode Ray

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	Nominal published value
Heater Current	600 mA	Nominal published value
Cathode to all other electrodes	8 pF	Published direct interelectrode capacitance

CONSTRUCTION

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing Method	Magnetic	Published focusing method
Deflecting Method	Magnetic	Published deflection method

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