Ferranti

MICRO SPOT RADAR TUBES

5/71AP
5/71PP
5/71QP

5" diameter optically flat faced Cathode Ray Tubes with a short bulb. The spot size is very small, being less than 0·0005" at the screen centre and the screen can be accurately scanned over an area greater than four inches in diameter.

The high resolution has been made possible in this series of cathode ray tubes by the use of an entirely novel design of electron gun involving two focusing elements, one only of which is electromagnetic and external to the tube in the usual way; the other is electrostatic and of fixed focal length.

FOCUS	Magnetic and Electrostatic
DEFLECTION	Magnetic 60° angle.
SCREEN	Metal Backed.

*Phosphor	Type 'A'	Type 'P'	Type 'Q'
Fluorescence	Green	Blue	Blue Violet
Persistence to 1/e	1–2 μsecs.	5–10 μsecs.	<0·1 μsecs.

PHYSICAL DETAILS.

Max. Overall Length	473 mm.
Max. Diameter	135 mm
Nom. Neck Diameter	37 mm
Min. Useful Screen Diameter	110 mm

For other dimensions see outline drawing on Page 2.

Electrode Connections	Flying Leads

ELECTRODE CONNECTIONS.

Colour Code:

Heater	Brown
Cathode	Yellow
Modulator	Green
First Anode	Orange
Final Anode	White

HEATER.

Heater Voltage	6·3 volts
Heater Current	0·3 amps

RATINGS.

Max. Final Anode Voltage	30 kV
Min. Final Anode Voltage	12 kV
Max. First Anode Voltage	2·5 kV
Min. First Anode Voltage	1 kV
V_g for visual cut-off (at Va_1=2kV)	−80 to −160 volts
Max. V_{h-k} (heater negative)	200 volts
Max. V_{h-k} (heater positive)	200 volts

TYPICAL OPERATION.

Final Anode Voltage	25 kV
First Anode Voltage	2 kV
Vg for visual cut-off	−120 volts
Resolution	>8000 lines

CAPACITANCES.

C_k–all	<8 pF
C_g–all	<8 pF

X-RAY WARNING.

When operated at an anode voltage in excess of 16kV, X-ray shielding may be required to give protection against the possible danger of injury from prolonged exposure at close range.

*Other phosphors available to special order, but resolution may suffer with other type phosphors and our recommendation for specific applications should be sought.

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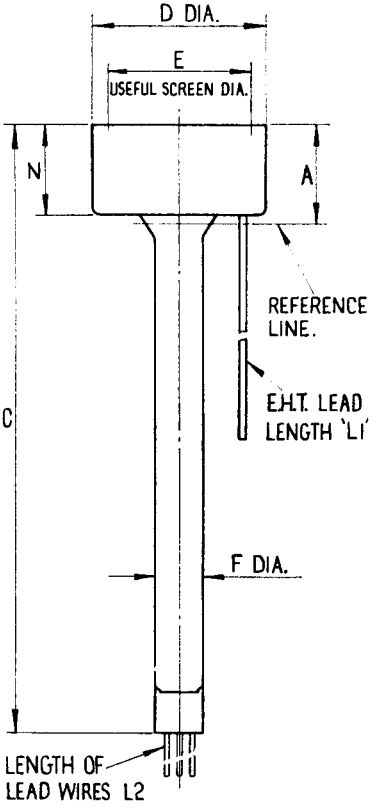

DIM.	INS.	m m.	DIM.	INS.	m m.
A	2·953 ± ·118	75 ± 3	F	1·457 $\pm^{\cdot 020}_{\cdot 035}$	37 $\pm^{0.5}_{1.5}$
C	18·228 ± ·394	463 ± 10	L1	36	914
D	5·118 ± ·079	130 ± 2	L2	36	914
E	4·330	110 MIN.	N	2·756 ± ·118	70 ± 3

NOTES ON OPERATION

SCAN COILS.

The design of deflector coils should be aimed at producing a uniform field consistent with linear angular deflection and with minimum spot size. The best design for scan coils is toroidally wound coils on a ferrite core with the connections for each winding brought out separately to permit push pull or single ended operation. The coils should be wound in segments to keep the self capacity as low as possible. Damping resistors should be provided.

Any pin-cushion distortion which may result from coil design is best corrected by small shaping magnets placed around the tube bulb between the scan coils and face.

FOCUS COILS.

The tube is intended for use with an air cored electromagnetic focus coil or a suitable astignatism-free coil, supplemented by a dynamic focus coil (focus modulation coil).

Ferranti Focus Coil Assembly Type FC5 has been designed as a thin magnetic lens to provide the highest resolution of which the tube is capable.

This Focus Coil Assembly incorporates:—

Main Focus Coil.

Alignment Coils for electrical alignment—no mechanical adjustment required.

Astigmatism Coils to produce a non astigmatic round spot.

Dynamic Focus Coil to ensure highest resolution over whole scan area.

This dynamic focus coil is supplied with a signal, the current of which is proportional to the distance of the spot from the screen centre, by this means the focal length of the combined lens decreases as the spot approaches the centre.

Further information regarding this coil will be supplied on request.

BEAM CENTRING MAGNET.

A weak permanent magnet, clamped to the base or neck of the tube a little behind the cathode can be adjusted to provide the correction necessary to allow for reasonable tolerances in the gun design and the presence of a small external field.

SETTING UP.

The centring magnet should be clipped loosely at the gun end of the neck Bias and H.T. voltages should be applied and a raster obtained. Without applying focus current, the centring magnet should be now adjusted and clamped or exact symmetry of the raster on the face of the tube. The strength of the centring magnet may be adjusted by rotation.

It is advisable to use no ferrous metal in the construction of the mount. Neither ferrous nor non-ferrous metals should be placed close to the scan coil.

It is essential that the mumetal sleeve provided should be fitted to the neck.

GENERAL.

The tube is coated, except over the screen and neck surface, with a thick layer of plastic resin. The final anode lead, insulated with a coating of irradiated polythene emerges from the rear surface of the resin, enabling the tube to be operated under adverse atmospheric conditions without danger of EHT breakdown.

The leads to the gun electrodes are also encapsulated in a manner which does not hinder the easy fitting of the scan and focus coils.

The cylindrical shape of the resin coating facilitates firm clamping of the tube in its mount.

Great care must be taken in considering the quality of EHT, scanning and focus supplies, since multiple effects due to EHT ripple, imperfect focusing and poor scanning fields can cause such enlargement of the spot that no advantage is apparent when using these tubes.

High Frequency ripple on the EHT supply can cause considerable performance loss in this type of tube. This fault can usually be recognised by a "crawl" visible on the line as seen under a microscope, more commonly observed when the EHT supply is driven by a free-running oscillator, Even locked ripple at a harmonic of the sweep speed may upset both focus and linearity. In decoupling to cure this trouble, excessive smoothing capacity should be avoided to prevent "flashover".

FERRANTI LIMITED, GEM MILL, CHADDERTON, OLDHAM, LANCS.

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TYPICAL GRID DRIVE CHARACTERISTICS.