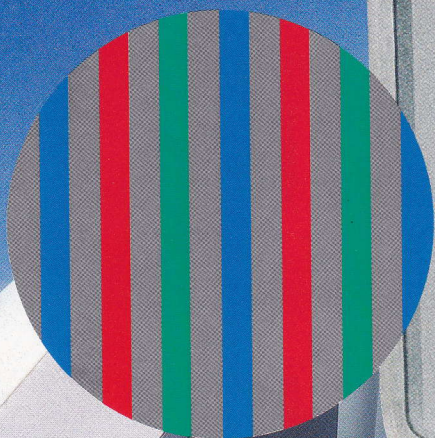


BEAM INDEX CRTs



THE COLOR
SOLUTION
TO AVIONICS
DISPLAYS

 **THOMSON TUBES ELECTRONIQUES**



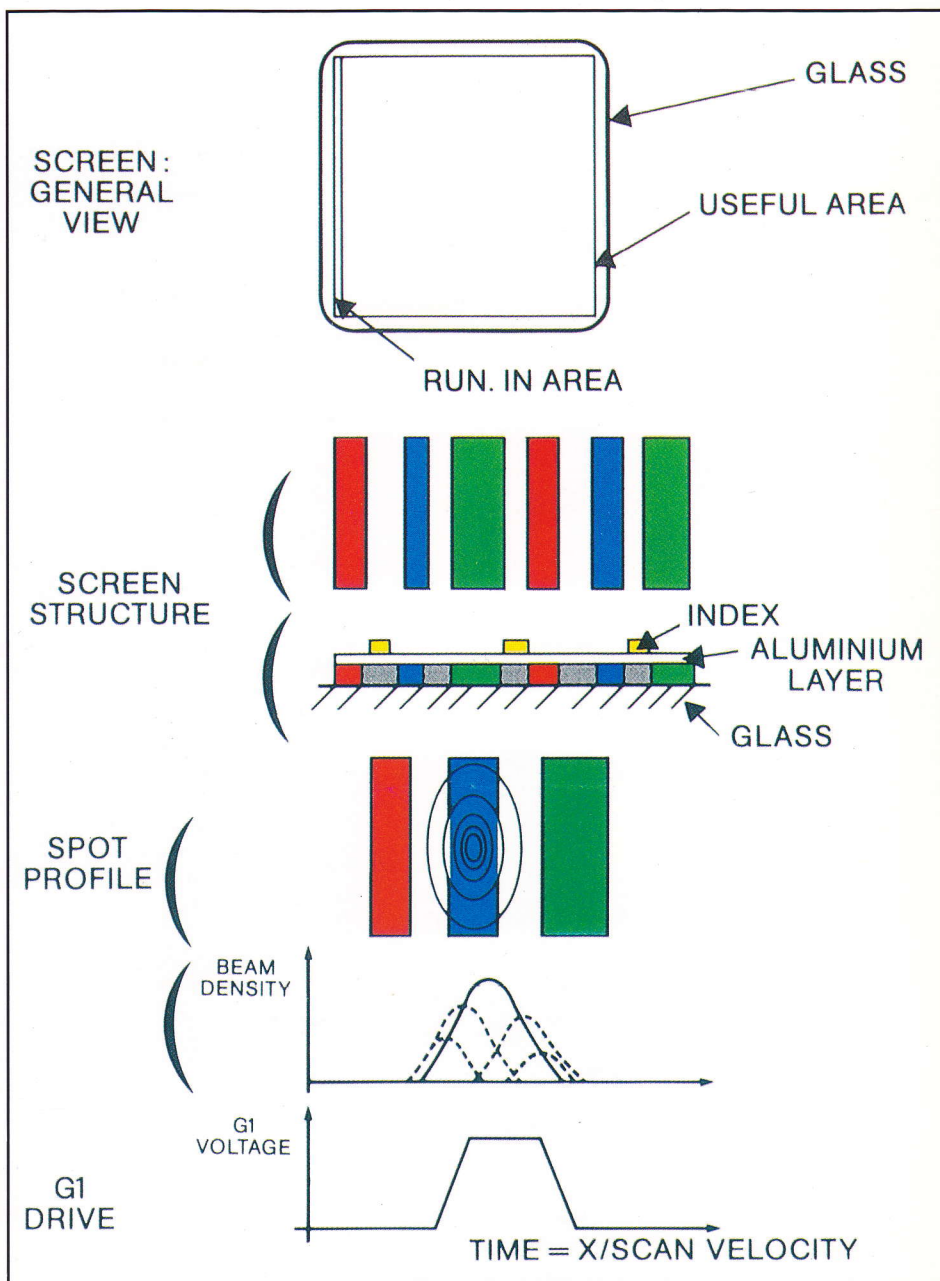
When planning your avionics program, think beam index - the affordable solution to a bright and ruggedized color display in a compact, customized package.

AVIONICS COLOR DISPLAYS

A pilot must make split-second decisions based on the data at his disposal. Essential to this rapidity is the presentation of critical data in color. Beam-index CRTs offer this color in a format as adaptable and inherently rugged as monochrome CRTs, making color displays an affordable option for new or retrofit programs. The benefits of color displays in terms of quantities of data that can be displayed and speed of

reduced development times and costs, and is of particular interest to programs involving small series of displays.

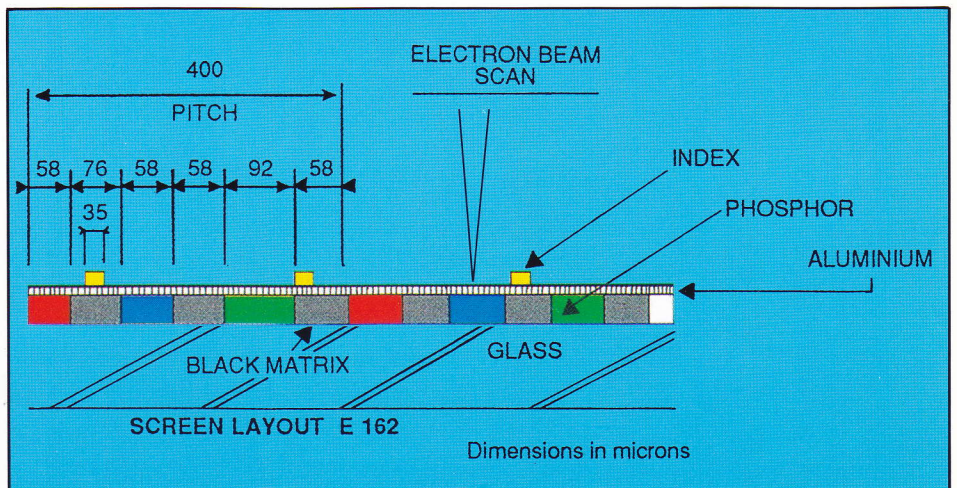
This is particularly true of retrofit programs, where the initial monochrome-tube location imposes a predetermined display format and dimensions. Here, too, the adaptability of beam-index displays to custom formats provides the solution.



data recognition have no longer to be proved. However, the high ambient light levels and severe vibrations of the aircraft environment present a challenge for color technologies. This is where the simple structure of beam-index CRTs comes in.

Color is obtained by simply modulating the electron beam over a special phosphor screen. This technique requires only a single electron gun and no shadow mask - hence the ruggedness. Beam-index tubes also eliminate the costly and often delicate redesign process required for non-standard shadow-mask tubes. This results in

Beam-index CRTs offer other benefits as well as ruggedness and ease of development. In a shadow-mask tube, the mask absorbs over 80 percent of the beam energy, so that only about 20 percent actually reaches the phosphor. In a beam-index CRT, 70 percent of the beam energy can be used to energize the screen phosphor. Beam-index technology thus offers brighter color images on many HDD formats, and at equal brightness it gives a higher resolution. Furthermore, there is also no color shift from the heating up of a shadow mask.

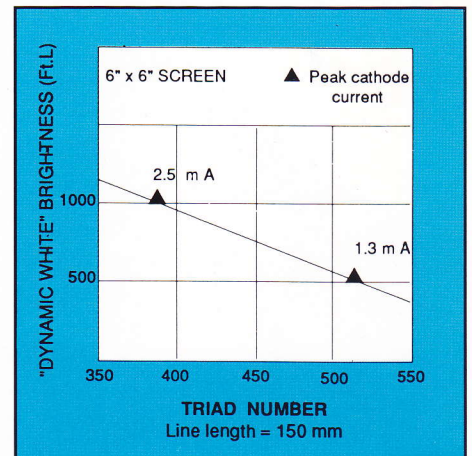


HOW IT WORKS

The principle of beam-index CRTs is simple. In fact, it was first proposed in the late 40's for color television, but the electronics of the day were not advanced enough to make the drive circuits feasible. Today's fast integrated circuits have changed that.

The screen consists of an array of parallel red, green and blue phosphor stripes deposited on a black matrix. The spot scans this in a standard TV raster mode, but as it crosses each phosphor stripe it is modulated to give the correct color weighting.

"Index" stripes are printed on the side of the screen facing the electron gun. These indices emit light when excited by the beam, and an external photosensitive device detects this. The index signal is used to synchronize the video signal and the beam location (color purity) through a feedback circuit.



The curve shows an example of brightness versus triad density for the TH 8139 6-inch square tube.

BRIGHTNESS

The brightness of a beam-index CRT depends on :

- scanned area.

As for any CRT at a given beam current, the brightness varies inversely with this area.

- triad density.

The narrower the color stripes, the thinner the electron beam must be to keep color purity. A smaller spot size is unavoidably linked to a somewhat lower beam current, although progress in electron optics has considerably reduced this effect.

- video chopper rise and fall times.

These must be as short as possible for the beam to be on as long as possible as it passes over the color stripe, but no longer. Switching times of 5 ns are now available, and this is adequate.

Technologies, such as the dispenser cathodes developed for spaceborne microwave tubes, ensure sufficient brightness for airborne applications. These cathodes provide a high current from the smallest possible area, and so reconcile brightness and resolution. Furthermore, the spot profile is elongated along the phosphor stripes, and this also optimizes brightness.

THOMSON TUBES ELECTRONIQUES : AN EXPERIENCED PARTNER

The exigencies of an avionics display require close collaboration between the parties concerned. The St Egrève plant of Thomson Tubes Electroniques is committed to customized production of displays, and is well adapted to the interactive contact required. Furthermore, this research and production center is qualified to military standards RAQ1 (NATO AQAP 1).

Whether it is a standard model or a fully customized one, our highly qualified staff will work with you to produce the beam-index tube you require. This collaboration ensures the best adapted tube is defined from the different options available.

Various screen structures are possible, with green enhancement, for instance, or different index periodicities to match the feedback circuit design.

The tube may be integrated into an easily maintainable unit with electrical interconnections by connector, trim-board, etc.. This assembly is fully qualified to environmental standards in vibrations, climate (-55° C to +85° C, for example) and electromagnetic compatibility.

Such a unit can offer, for example :

- electromagnetic shielding,
- mechanical mountings,
- contrast, antiimplosion and EMI filters,
- various adjusted electromagnetic yokes,
- integrated index-signal detectors,
- potted HV cables and flying leads fitted with connectors.

Beam-index CRTs are robust and compact color displays that can be readily customized to any format. They are thus the ideal choice for avionics programs, where they offer the brightness and resolution required of HDDs. Furthermore, their ruggedness makes their integration into any position on the airborne platform possible, whatever the vibrational environment.

For further information, please contact Thomson Tubes Electroniques.



FRANCE

THOMSON TUBES ELECTRONIQUES
13, avenue Morane Saulnier - Bâtiment Chavez
Vélizy Espace - BP 121 / F-78148 VELIZY CEDEX
Tél. : (33-1) 30 70 35 00 / Télex : THOMTUB 699407F
Fax : (33-1) 30 70 35 35

ASIA - SINGAPORE

THOMSON CSF SINGAPORE PTE. Ltd
105 Cecil Street-Octagon Building 11-01
SINGAPORE 0106
Tél. : (65) 227 83 20 / Télex : THOMSEA RS 23014
Fax : (65) 227 80 96

BRASIL

THOMSON COMPONENTES DO BRASIL Ltda
Avenida Roque JR NR 1464 BROOKLIN
04707 SAO PAULO
Tél. : (55-11) 542 47 22 / Télex : (11) 24226 TCSF BR
Fax : (55-11) 61 50 18

DEUTSCHLAND

THOMSON BAUELEMENTE GmbH
Perchtinger Straße 3 - Postfach 701909
D-8000 MÜNCHEN 70
Tél. : (49.89) 78.79.0 / Télex : 522916 CSF D
Fax : (49.89) 78.79.145

ESPAÑA

THOMSON COMPONENTES TUBOS S.A.
Calle Principe de Veraga 204 1° B
E-28002 MADRID
Tél. : (34.1) 564 02 72
Fax : (34.1) 564 19 40

INDIA

THOMSON TUBES ELECTRONIQUES
M 26 Commercial Complex
Greater Kailash Part II
NEW DEHLI 110 048
Tél. : (91-11) 644 78 83 / Télex : 31 71443 BCS IN
Fax : (91-11) 645 33 57

ITALIA

THOMSON COMPONENTI Spa
Via Sergio 1°, 32
I-00165 ROMA
Tél. : (39.6) 639.02.48 / Télex : 620683 THOMTE I
Fax : (39.6) 639.02.07

JAPAN

THOMSON JAPAN K.K.
TBR Building 701 Kojimachi 5-7 - Chiyoda-Ku
TOKYO 102
Tél. : (81.3) 3264.63.46 / Télex : 2324241 THCSF J
Fax : (81.3) 3264.66.96

SVERIGE

THOMSON COMPONENTS AB
Radiövägen 1 A - Box 631
S-135 26 TYRESÖ
Tél. : (46.8) 742.02.10
Fax : (46.8) 742.80.20

UNITED-KINGDOM

THOMSON ELECTRONIC COMPONENTS Ltd.
Unit 4 - Cartel Business Centre / Stroudley Road
GB-BASINGSTOKE, HANTS RG 24 OUG
Tél. : (44-256) 84.33.23 / Télex : 858121 TECLUK G
Fax : (44.256) 84.29.71

U.S.A.

THOMSON COMPONENTS AND TUBES CORPORATION
40 G Commerce Way P.O. Box 540
TOTOWA, New Jersey 07511
Tél. : (1.201) 812.9000
Fax : (1.201) 812.9050

For all other countries, please contact FRANCE.