

TELEVISION

Camera Tube

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Out line

Camera tubes:

Principle of operation

Types:-

Image Orthicon,

Vidicon,

Plumbicon.

A TV camera tube may be called the eye of a TV system.

Some of the **more important functions** must be,

(i) **Sensitivity** to visible light,

(ii) **Wide dynamic range** with respect to light intensity, and

(iii) ability to resolve details while **viewing a multi-element scene.**

Most types developed have suffered to a **greater or lesser** extent from

- (i) Poor sensitivity,
- (ii) Poor resolution,
- (iii) High noise level,
- (iv) Undesirable spectral response,
- (v) Instability,
- (vi) Poor contrast range and
- (vii) Difficulties of processing.

BASIC PRINCIPLE

- A picture are taken into account, any picture appears to be composed *of small elementary areas of light or shade*, which are known as picture elements.
- The elements thus contain the **visual image** of the scene.
- The purpose of a TV pick-up tube is to sense each element independently and develop a signal in **electrical form proportional to the brightness of each element**.

OPERATION

- Light from the scene is focused on a photosensitive surface known as **the image plate**, and
- The optical image thus formed **with a lens system** represents light intensity variations of the scene.
- The **photoelectric properties of the image plate** then *convert different light intensities* into corresponding *electrical variations*.

OPERATION

Cont...

- An electron beam moves across the image plate :

Line by line, and

Field by field

- to provide signal variations in a successive order.

This scanning process divides the image into its basic picture elements.

WORKING

- The two photoelectric effects used for *converting variations of light intensity* into *electrical variations* are
 - (i) Photoemission and
 - (ii) Photoconductivity.

Cesium-silver or **bismuth-silver-cesium oxides** are preferred as photo emissive surfaces



- The conductivity or resistivity of the photosensitive surface varies *in proportion to the intensity of light focused on it*.
- Selenium, tellurium and lead with their oxides have this property known as photoconductivity.

Production of Video signal

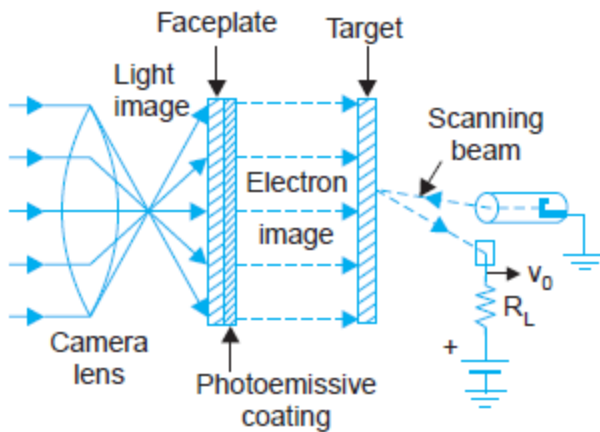
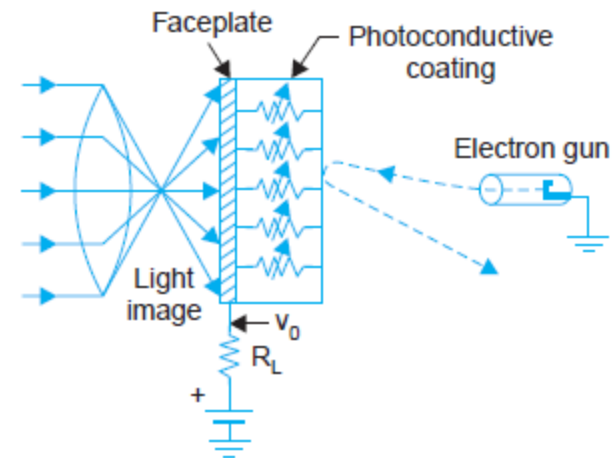
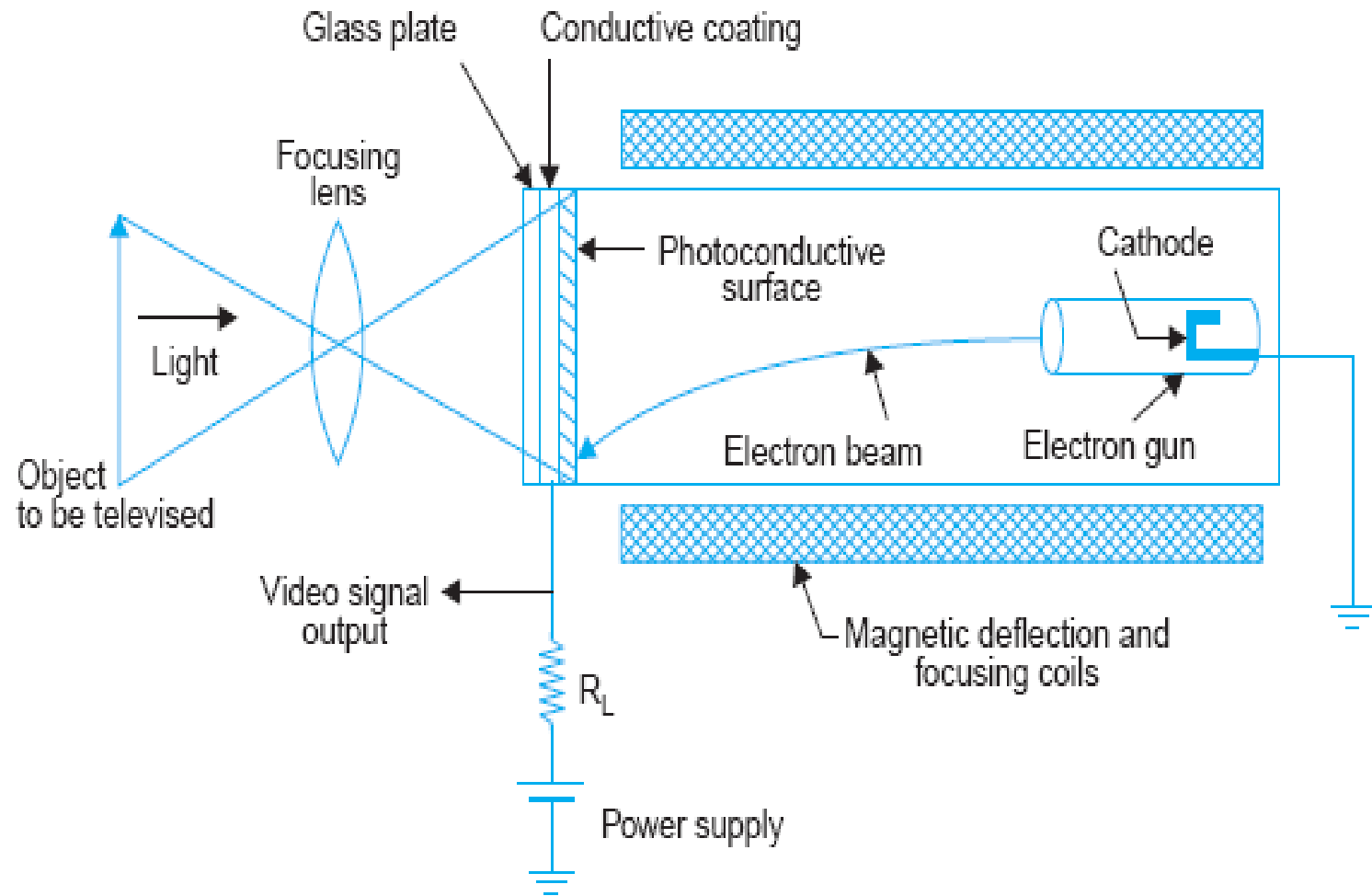


Photo emissive



Photoconductive

TV camera tube



Characteristics

- **Light transfer characteristics:-**

Plot of output current vs illumination on a log-log scale.

- **Sensitivity:-**

Output photo-signal current per lumen.

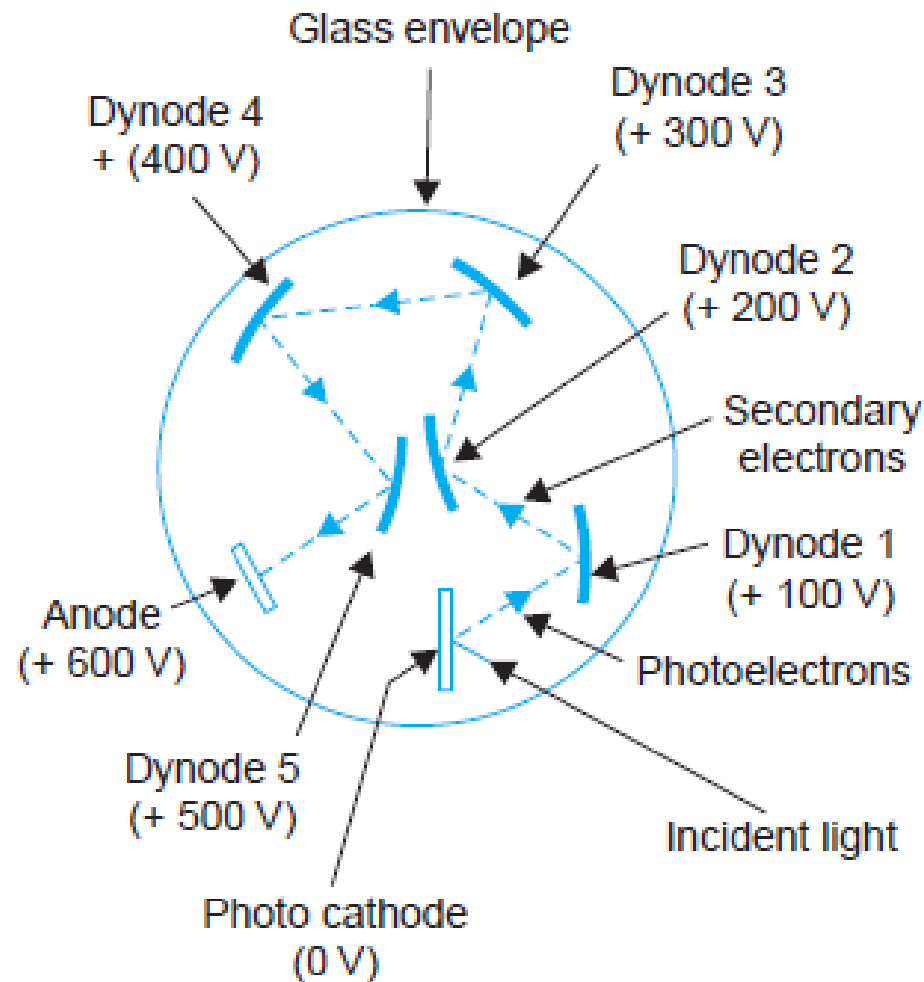
- **Dark current:-**

Small amount of signal current flows in camera tube.

- **Spectral response:-**

Should be in human eye.

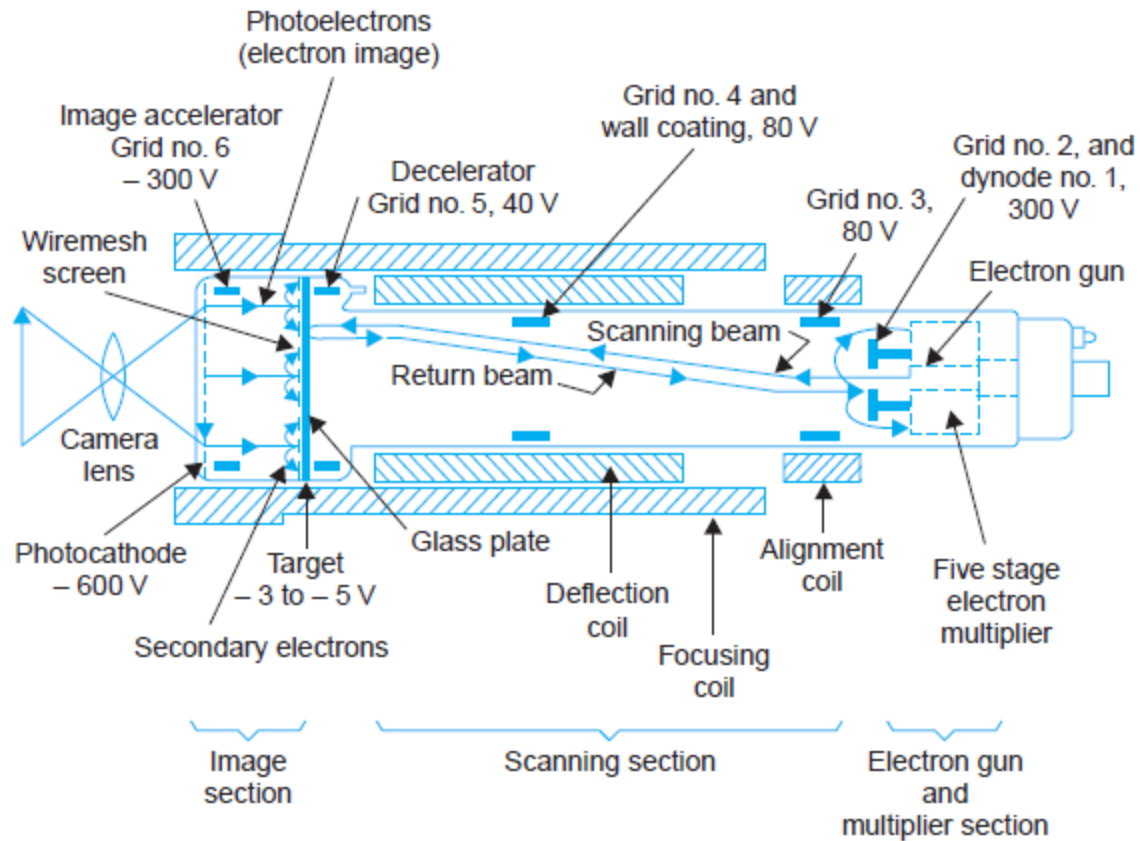
Electron Multiplier Tube



Next...

Image Orthicon...

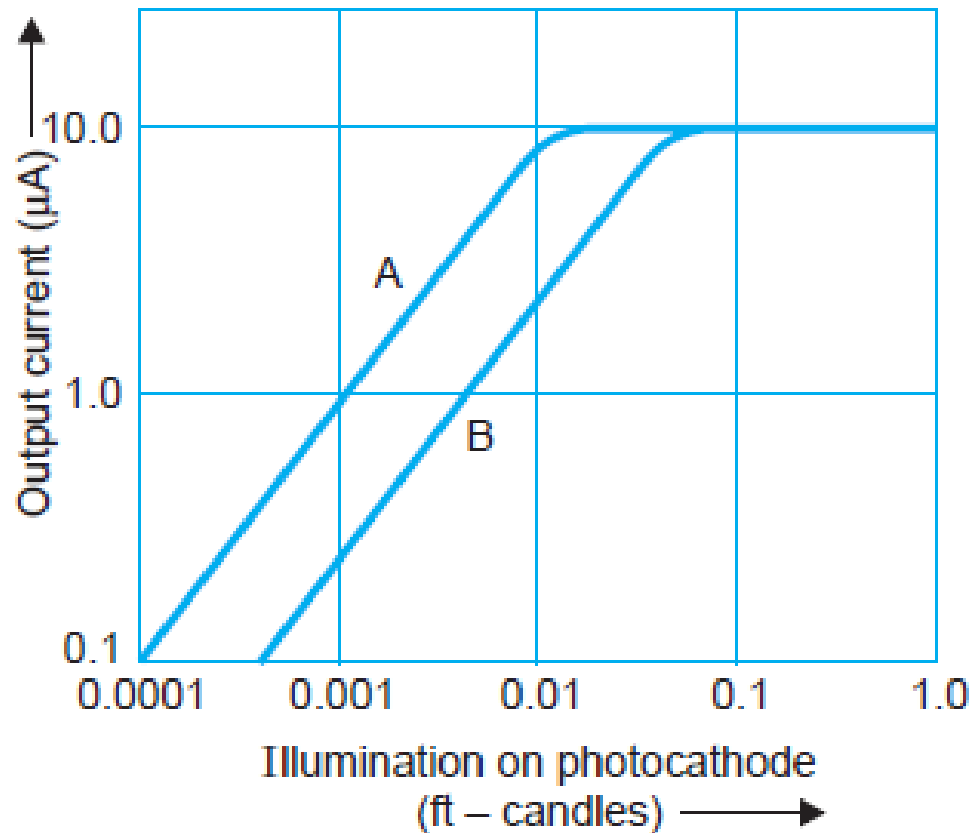
Principle of IO



Sections of IO

- Image Section
- Scanning Section
- Electron Multiplier Tube

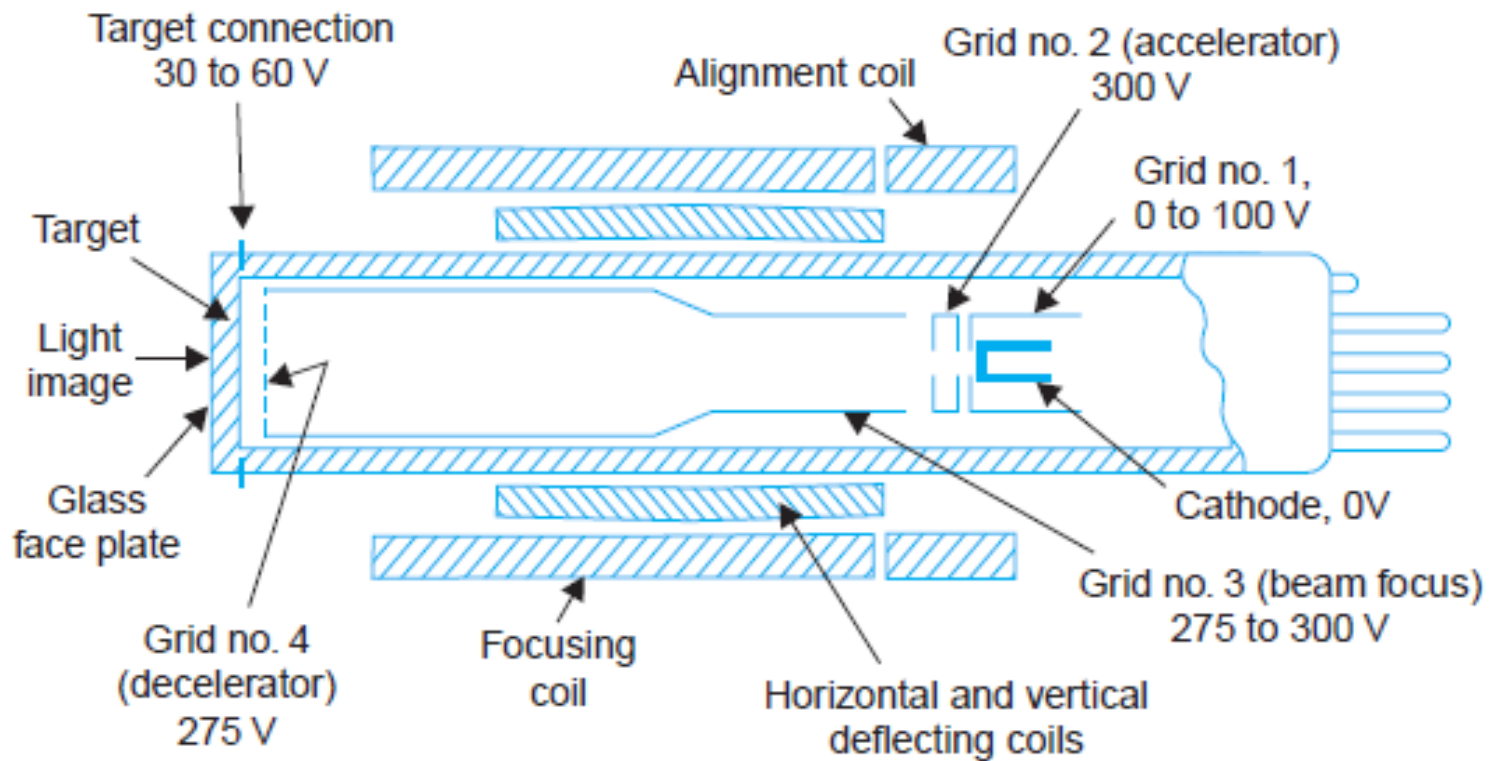
Light Transfer Characteristics



Next...

Vidicon...

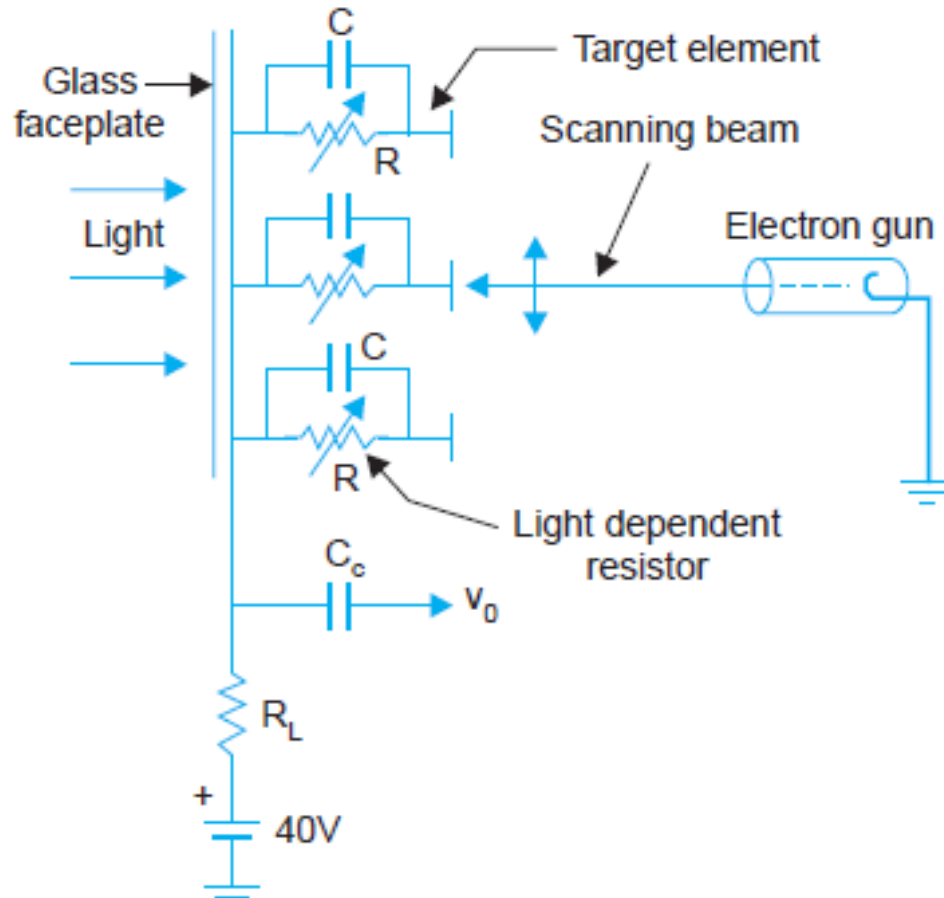
Principle of Vidicon



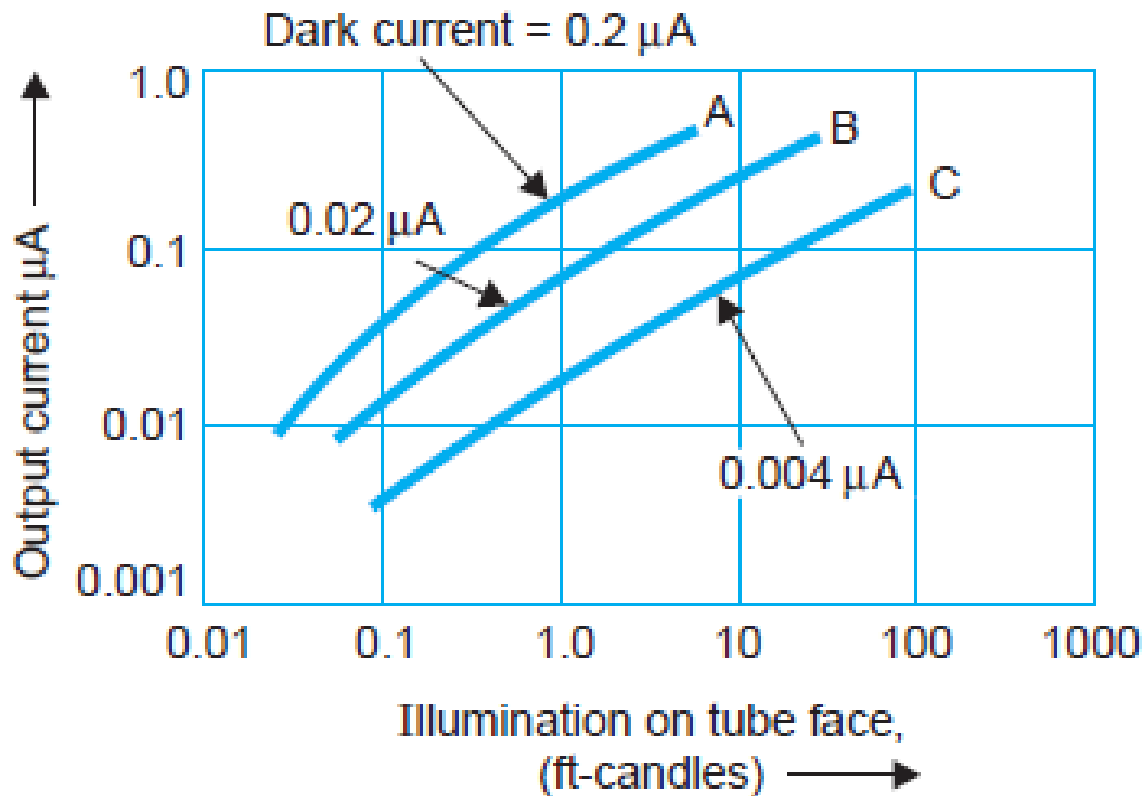
Sections of Vidicon

- Charge Image
- Storage Action
- Signal Current
- Leaky Kitchen Concept

Schematic representation of a Vidicon target area.



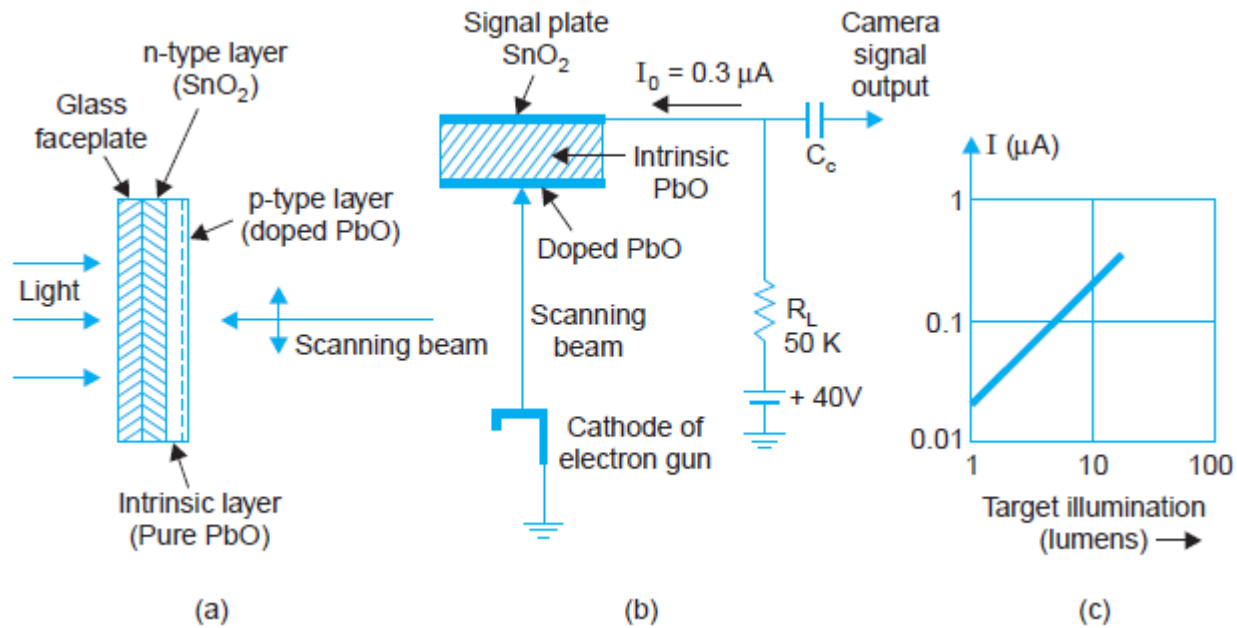
Light Transfer Characteristics



Next...

Plumbicon...

Principle of Plumbicon



Target plate

Signal Current

Characteristics

THANK YOU...

References:

1. Monochrome & Colour Television by R. R. Gulati
2. Television and Video Engineering” by Arvind Dhake