Institute of Engineering
JIWAJI UNIVERSITY

PRESENTATION
ON
TV & RADAR

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EL- 804

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TV FUNDAMENTALS

INTRODUCTION:

- Television means Tele + Vision, i.e., Television is used to see the picture telecast from long distance.

- In TV transmission both picture and sound are transmitted. For picture AM Modulation is used and for sound FM modulation is used.

SCANNING:

Scanning is the process used to convert the optical into electrical signal. Fastest movement of electron beam on the image is called scanning.

SCANNING PROCESS:

- Scanning process is a technique similar to reading of written information on a page starting at the top left and processing line by line downwards to the end at the bottom right.

- Scanning is done frame by frame. Each frame consists of 625 horizontal lines. Each frame is scanned at a rate of 25 frames / sec.

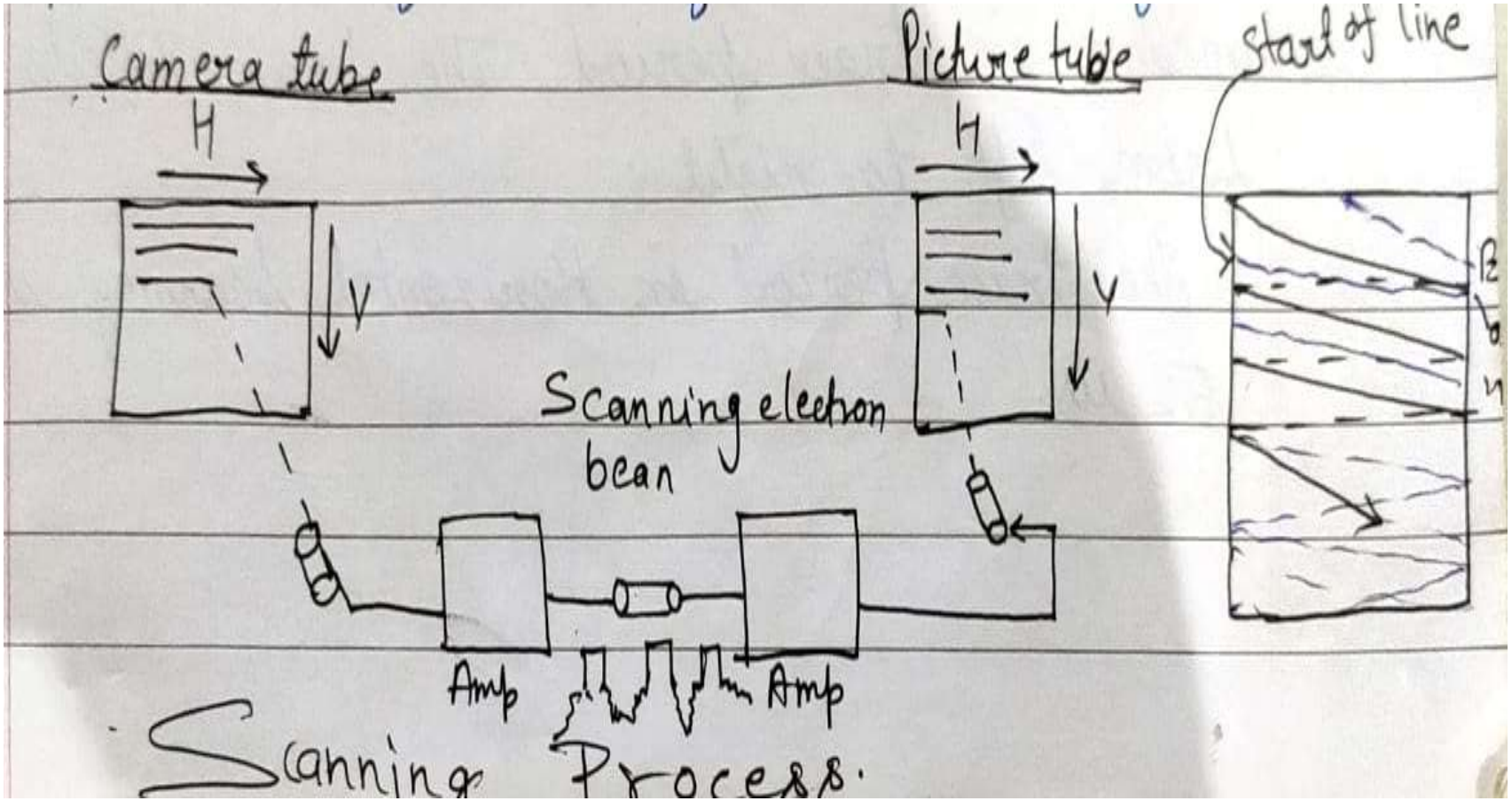


Fig-Scanning process

SCANNING TYPES

1. Horizontal Scanning

2. Vertical Scanning

3. Sequential (or) Progressive Scanning

4. Interlaced Scanning.

HORIZONTAL SCANNING (H-SCANNING)

Movement of electron beam from left to right on the screen is known as trace period. When the beam returns quickly from right to left is called retrace or fly back.

Trace and retrace period together in horizontal direction is known as HorizontalScanning.

Horizontal frequency = Number of lines in a Frame * Number of frames/sec

= 625 * 25 = 15,625 Hz

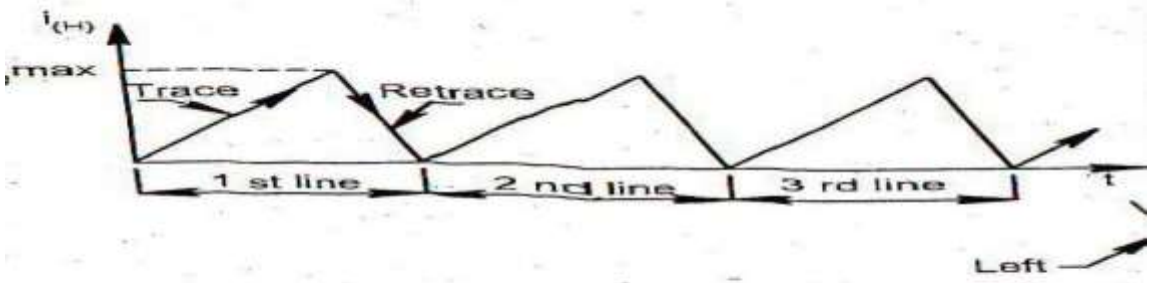


Fig. 1.3 Waveform of horizontal deflection coils.

VERTICAL SCANNING (V – SCANNING)

Movement of electron beam in vertical direction. Movement of electron beam from top to bottom is called trace. Movement of beam from bottom to top of the frame is called retrace.

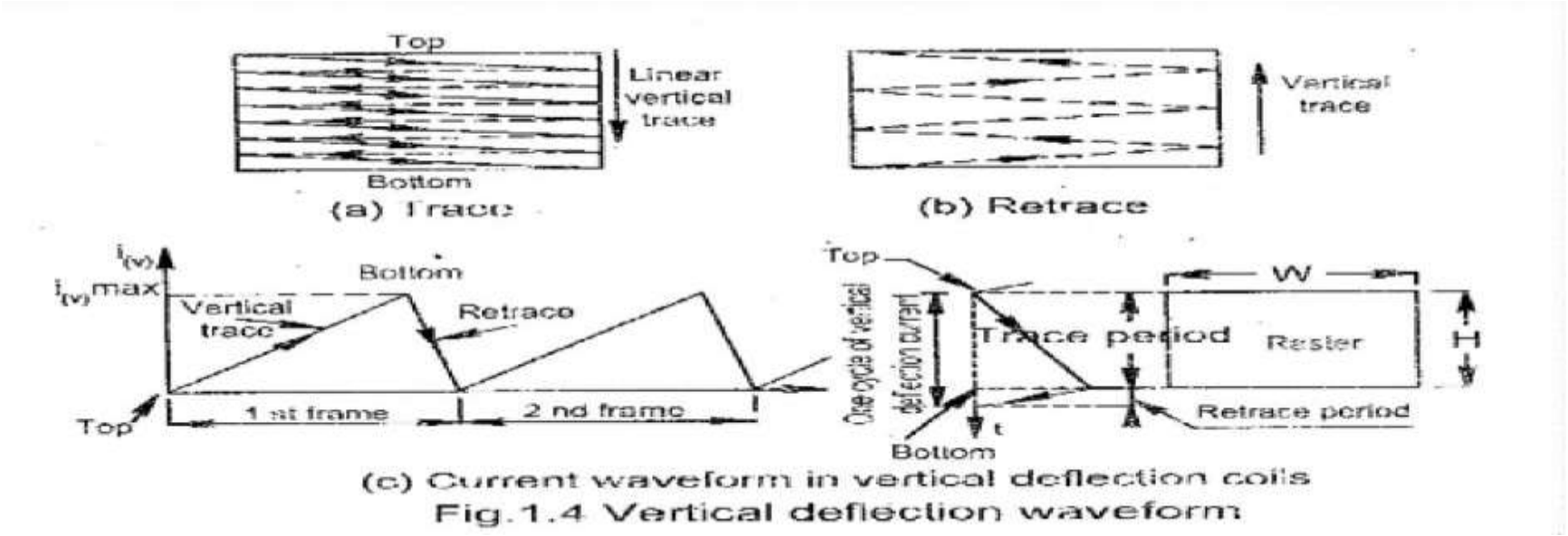


Fig.1.4 Vertical deflection waveform

SEQUENTIAL (OR) PROGRESSIVE SCANNING:

Sequential or progressive Scanning is the process in which both horizontal and vertical directions are scanned simultaneously to provide complete pictures. Horizontal lines are scanned one by one. So complete picture will be scanned through this type.

INTERLACED SCANNING:

To reduce flicker, the vertical scanning is done 50 times per second in TV system. However only 25 frames are scanned per sec.

In interlaced scanning the 625 lines are grouped into two fields. They are called as even field and odd field. Each field contains 312.5 lines. Even field contains even numbered lines and odd field contains odd numbered lines.

During first scanning line numbers 1, 3, 5 are scanned. During next scan, line numbers 2, 4, 6.... are scanned. That is alternate lines are scanned every time. So to cover each frame, scanning is done two times. Here the vertical rate of scanning is increased twice. So it will reduce flicker.

Interlaced scanning is shown. Now the vertical frequency is 50 Hz. But there is no change in horizontal frequency.

Horizontal frequency = Number of lines in a Frame * Number of frames/sec

= 312.5 * 50 = 15,625 Hz

SCANNING PERIODS:

Useful video signals are obtained during the trace period only. So the trace time is larger than the retrace time.

HORIZONTAL:

- Tracing = 52 μs
- Retracing = 12 μs
- Total time period = 64 μs

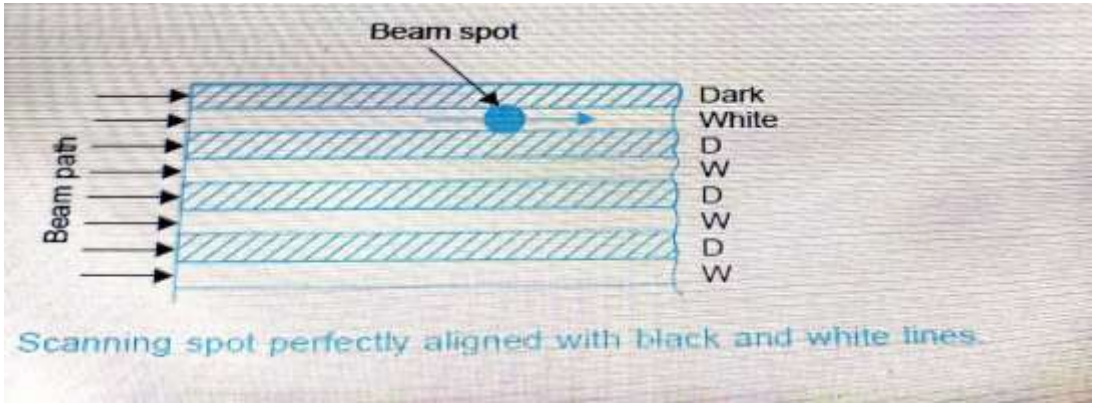
VERTICAL:

- Tracing = 18.722ms
- Retracing = 1.27ms
- Total time period = 20ms

NUMBER OF SCANNING LINES

- TO understand the necessary no of scanning lines we can consider some estimate of the no of lines necessary by the bar pattern where alternate lines are white and black

- The electrical information corresponding to the brightness of each bar will be correctly reproduced during the scanning process



The maximum number of alternate light and dark elements (lines) which can be resolved by the eye is given by

$$Nv = 1/\alpha\rho$$

where

Nv = *total number of lines (elements) to be resolved in the vertical direction*

α = minimum resolving angle of the eye expressed in radians

$\rho = D/H$ = *viewing-distance/picture height.*

THANK YOU