

Elements of a Television System:

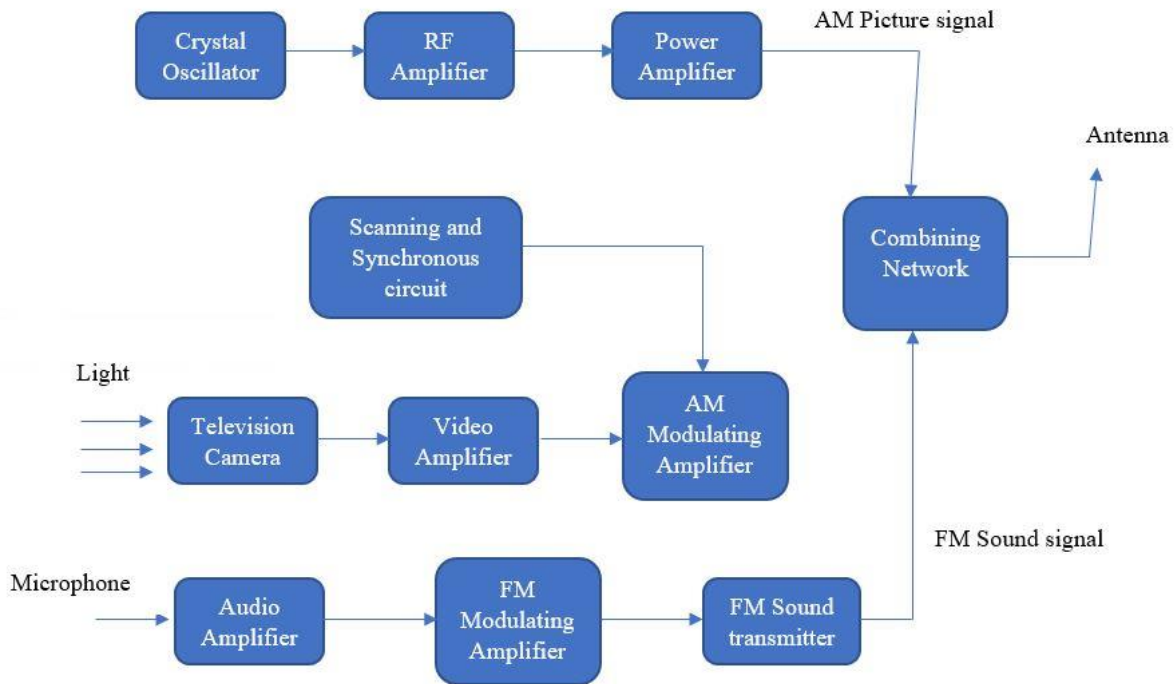
In India, we have adopted the CCIR 625 line system.

TV Transmission:

It consists of 2 parts:

a) Picture Transmission:

the picture signal is amplitude modulated before transmission.



b) Sound Transmission:

the sound signal is frequency modulated before transmission.

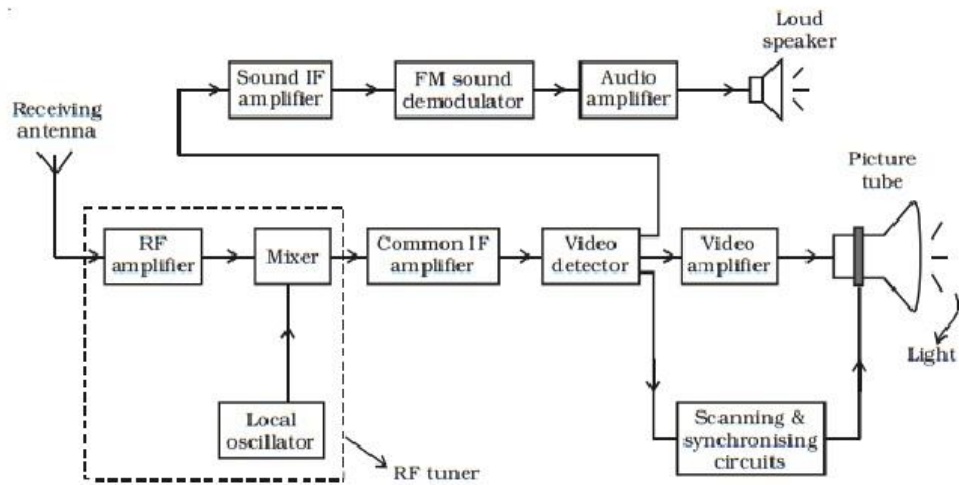


Fig Elementary block diagram of a monochrome TV receiver

Microphone: A microphone is a device that converts voice signal into electric signal.

Types of microphones:

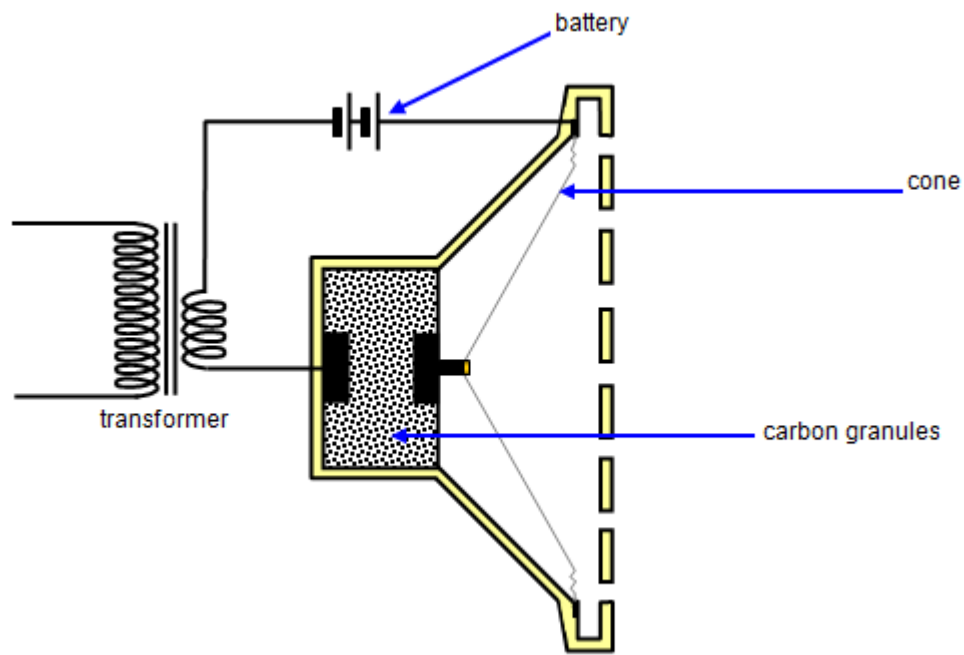
- a) Carbon Microphone
- b) Condenser Microphone
- c) Cordless Microphone

a) Carbon Microphone:

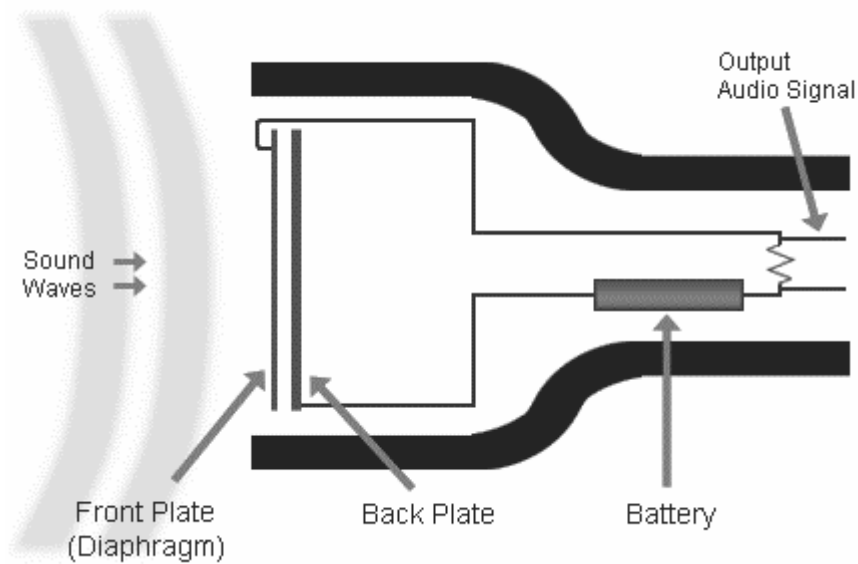
when a person speaks, the voice signal makes diaphragm move in and out.

So, the distance between carbon granules changes which further changes resistance of the circuit. Also, the current changes according to the input voice signal.

So, the voice signal is converted into electric signal(current).



b) Condenser Microphone:



Two metal plates are set apart.

Front plate acts as a diaphragm.

Back plate is fixed.

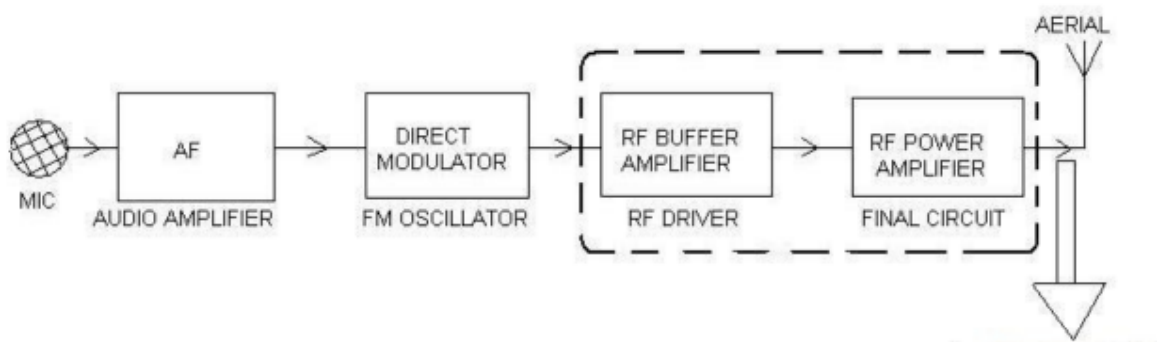
Sound waves make front plate vibrate.

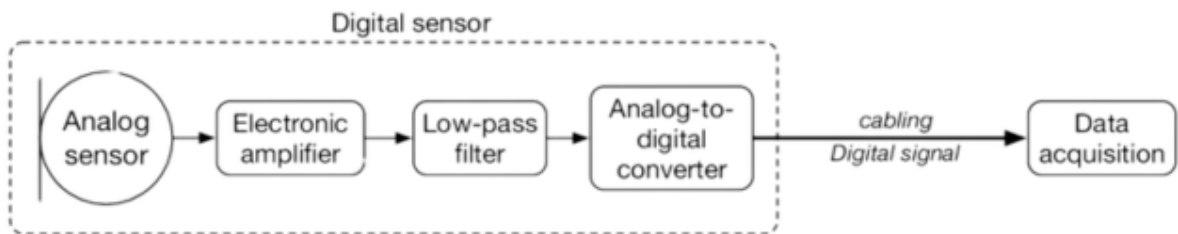
So, the current varies according to the input voice.

$$C = \frac{keA}{d}$$

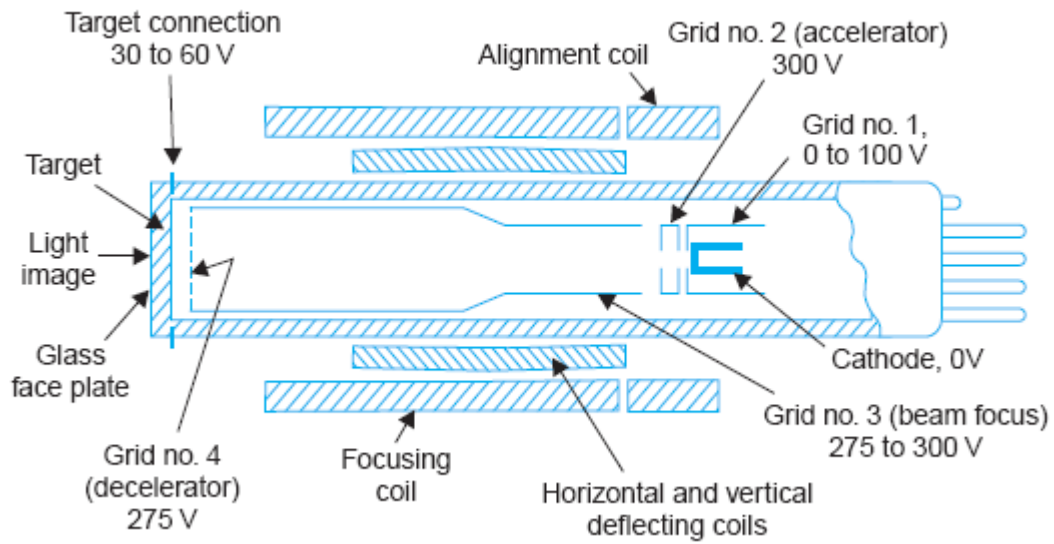
c) Cordless Microphone:

voice signal is converted into electrical signal.

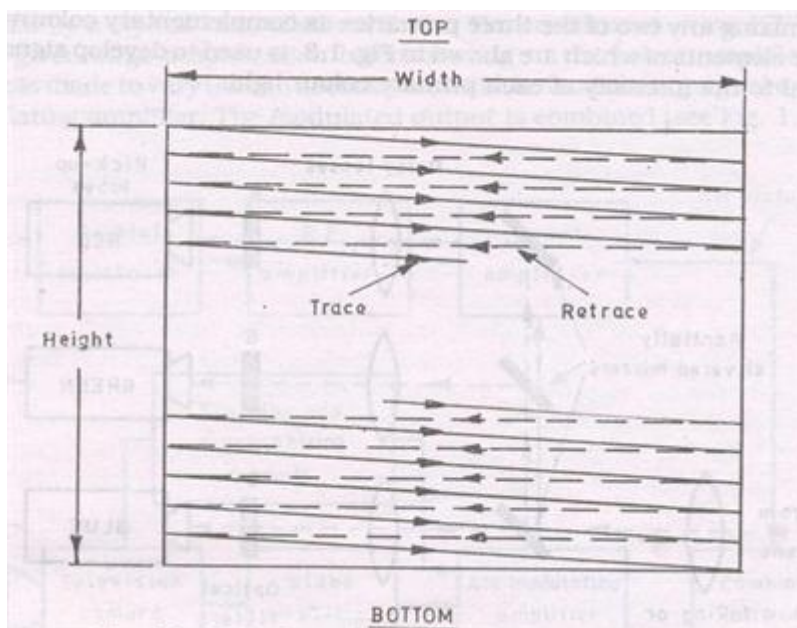




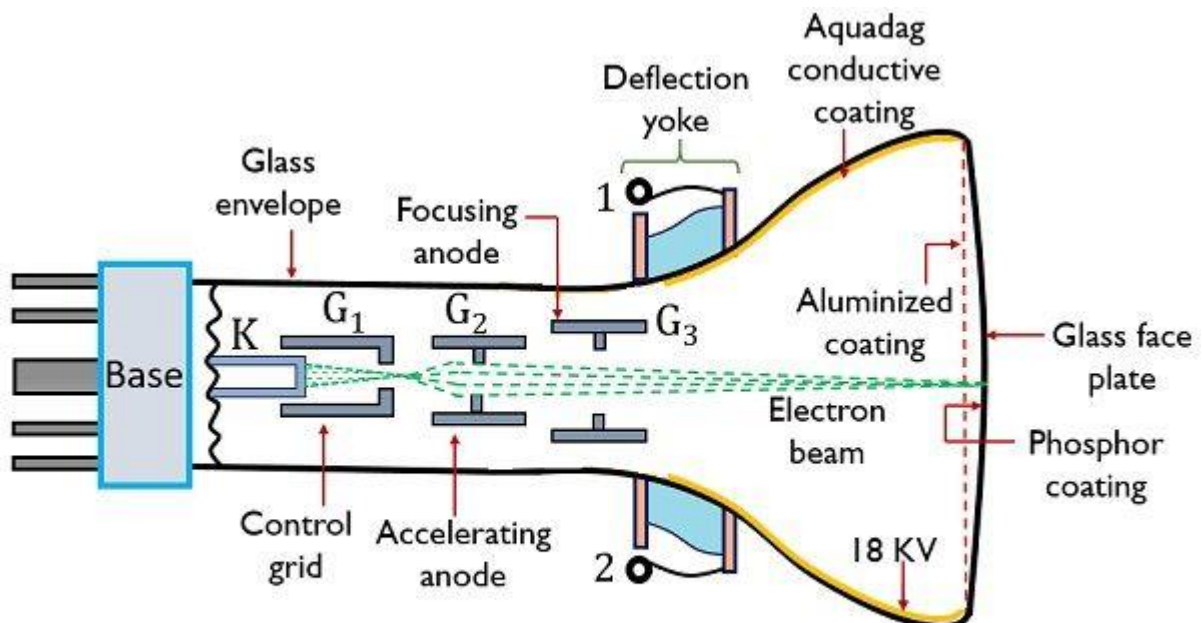
Monochrome Television



Cross-sectional view of Vidicon tv camera tube



Picture Reception:



Elements of a Picture Tube

Electronics Desk

The output from last IF stage is demodulated to recover video signal.

This picture information signal is amplified and coupled to picture tube which converts electrical signal back into picture elements of black & white.

The video signal is fed to the cathode of the picture tube.

Sound Reception:

The FM audio signal is demodulated. The audio output from FM detector is amplified before feeding to the loudspeaker.

Synchronization:

It is essential that same coordinates be scanned at any instant both at the camera tube target plate & at the raster of the picture tube.

Need for sync pulses:

To ensure perfect synchronization, sync pulses are transmitted during retrace.

Receiver Controls:

Channel Selector

Vertical Hold

Fine Tuning

Contrast

Brightness

Volume & On-Off

Tone

Analysis and Synthesis of TV Pictures

a) Gross Structure:

Geometric Form and Aspect Ratio of the picture

b) Image Continuity:

Scanning and its Sequence

c) Number of Scanning Lines:

Resolution of picture details

d) Flicker:

Interlaced Scanning

e) Fine Structure:

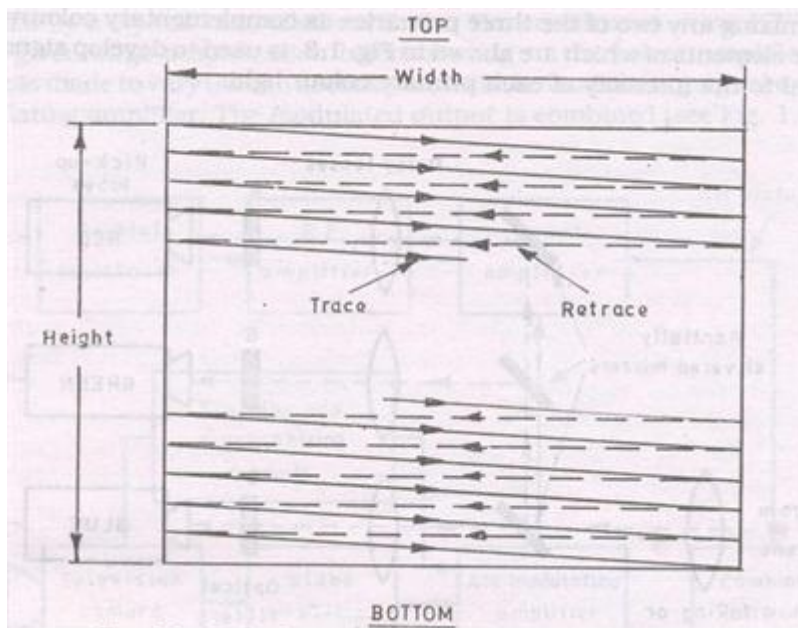
Vertical and Horizontal Resolution

f) Tonal Gradation:

Picture brightness characteristics

a) Gross Structure:

Frame adopted in all TV systems is rectangular.



Aspect Ratio=Width/Height=4/3

b) Image Continuity:

it is achieved by 'persistence of vision' of human eye.

If the picture scanning rate is greater than 16, the view appears to be continuous to the human eye.

So, scanning rate in motion pictures=24 frames/s

scanning rate in motion pictures=25 frames/s

Scanning:

a) Horizontal Scanning:

The movement of electron beam spot from left to right and back to start a new line in the same direction is termed as horizontal scanning. Horizontal scanning frequency is defined as the number of lines scanned per second.

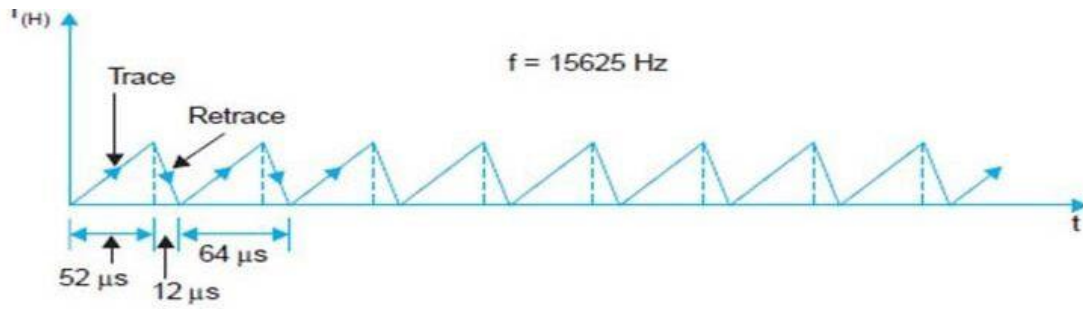
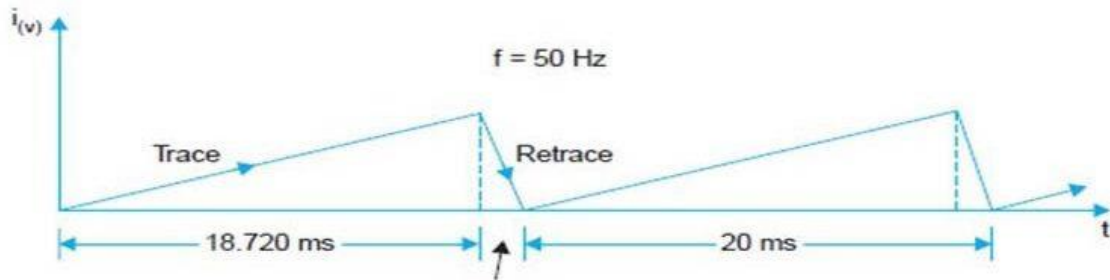


Fig. 2.5 (a) Horizontal deflection current.



b) Vertical Scanning:

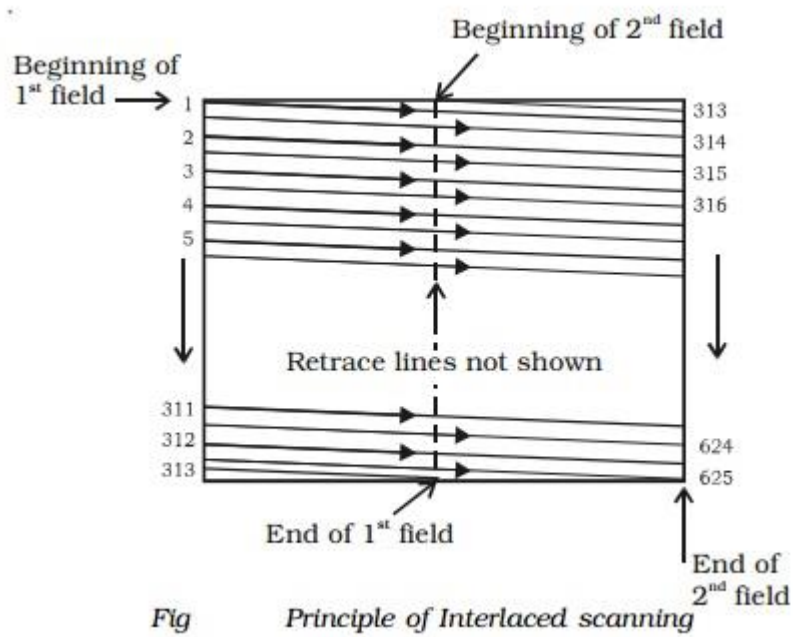
Vertical scanning is the movement of the electron beam spot in the vertical direction.

Flicker:

Frame rate of 25 frames per second is sufficient for illusion of continuity but the brightness of one frame does not blend into the next frame and screen is blanked for some time. This blankness is known as flicker.

How to remove flicker:

To remove flicker, interlaced scanning is used.



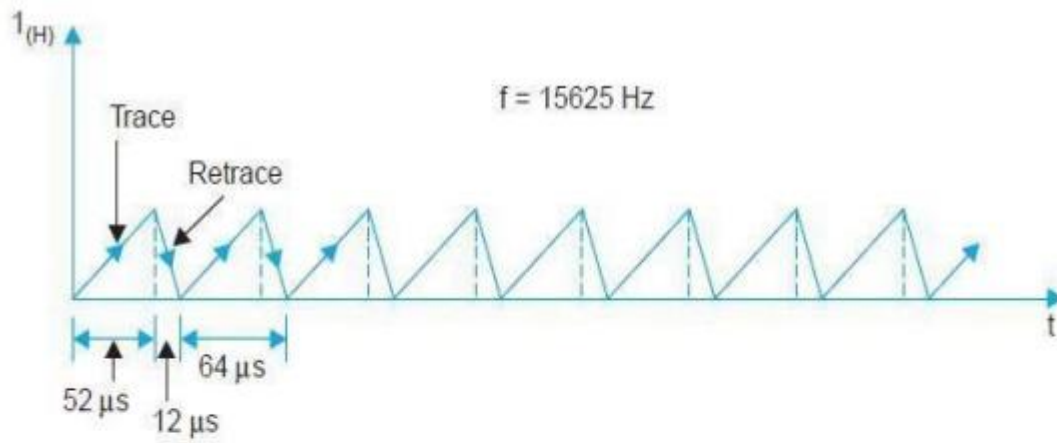


Figure. Horizontal deflection current

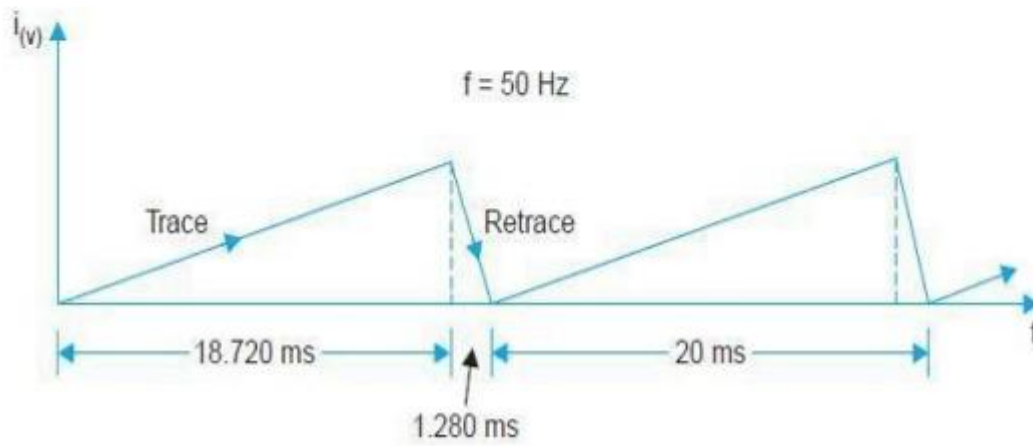


Figure. Vertical deflection current

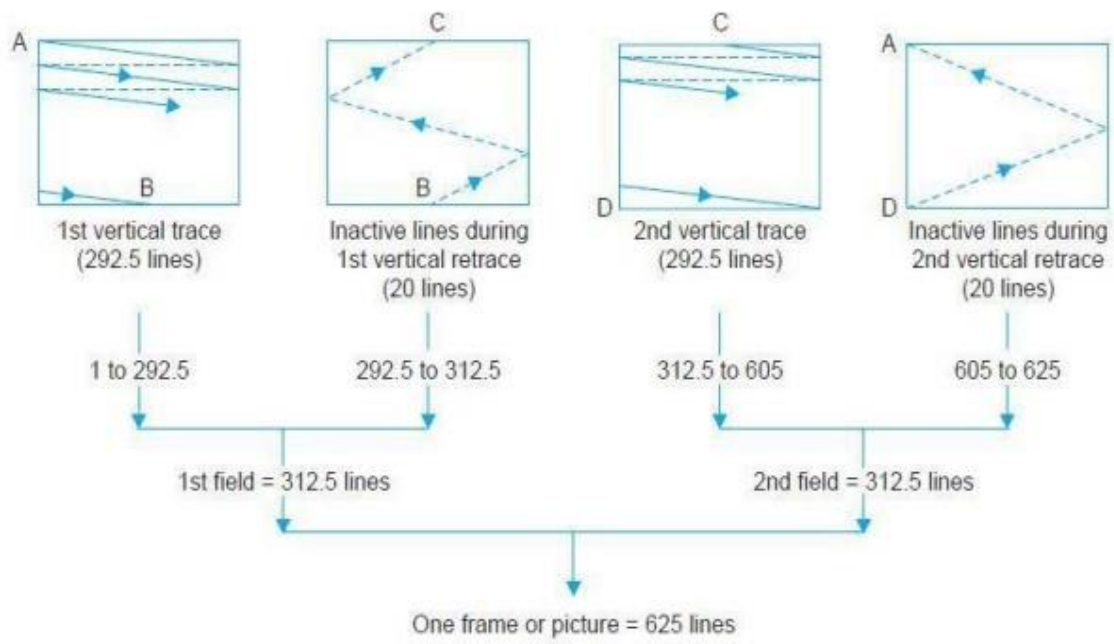
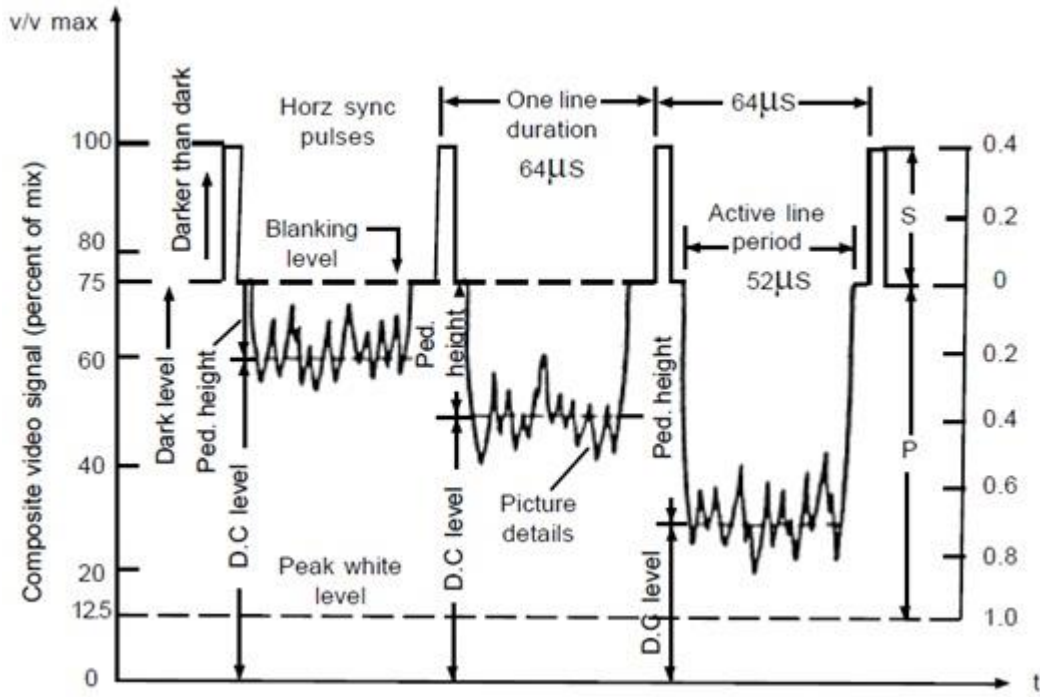
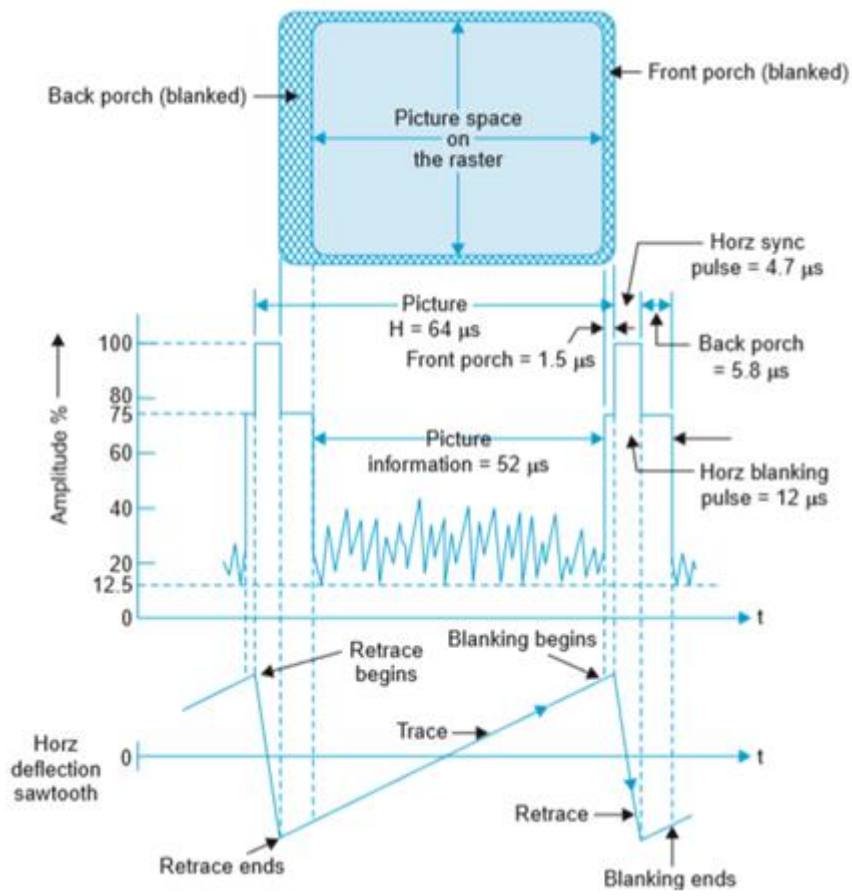


Figure. Odd line interlaced scanning procedure.



Horizontal Sync Details



Vertical Sync Details

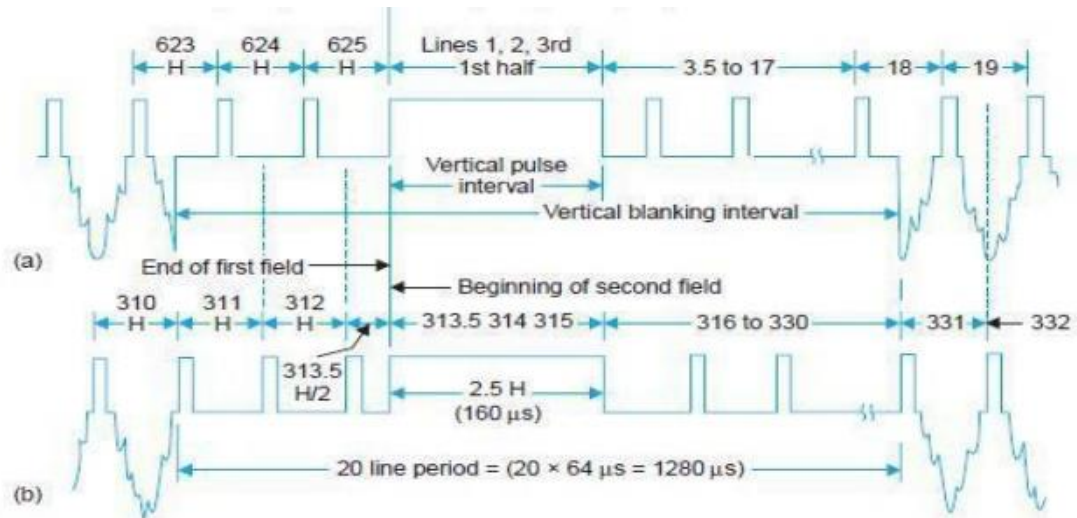


Figure. Composite video waveforms showing horizontal and basic vertical sync pulses at the end of (a) second (even) field, (b) first (odd) field. Note, the widths of horizontal blanking intervals and sync pulses are exaggerated.