

**UNIT - III**  
**TELEVISION TRANSMITTER**

**3.1 TWO TYPES OF MODULATION**

**1. HIGH LEVEL MODULATION:**

In this, both the audio and video signals are amplified to the required level before modulation.

**2. LOW LEVEL MODULATION:**

In this, the signal is modulated before amplification.

- **ADVANTAGES OF LLM (Low Level Modulation)**

1. Simplicity of design.
2. Ease of operation.
3. Good linearity.
4. Superior performance.

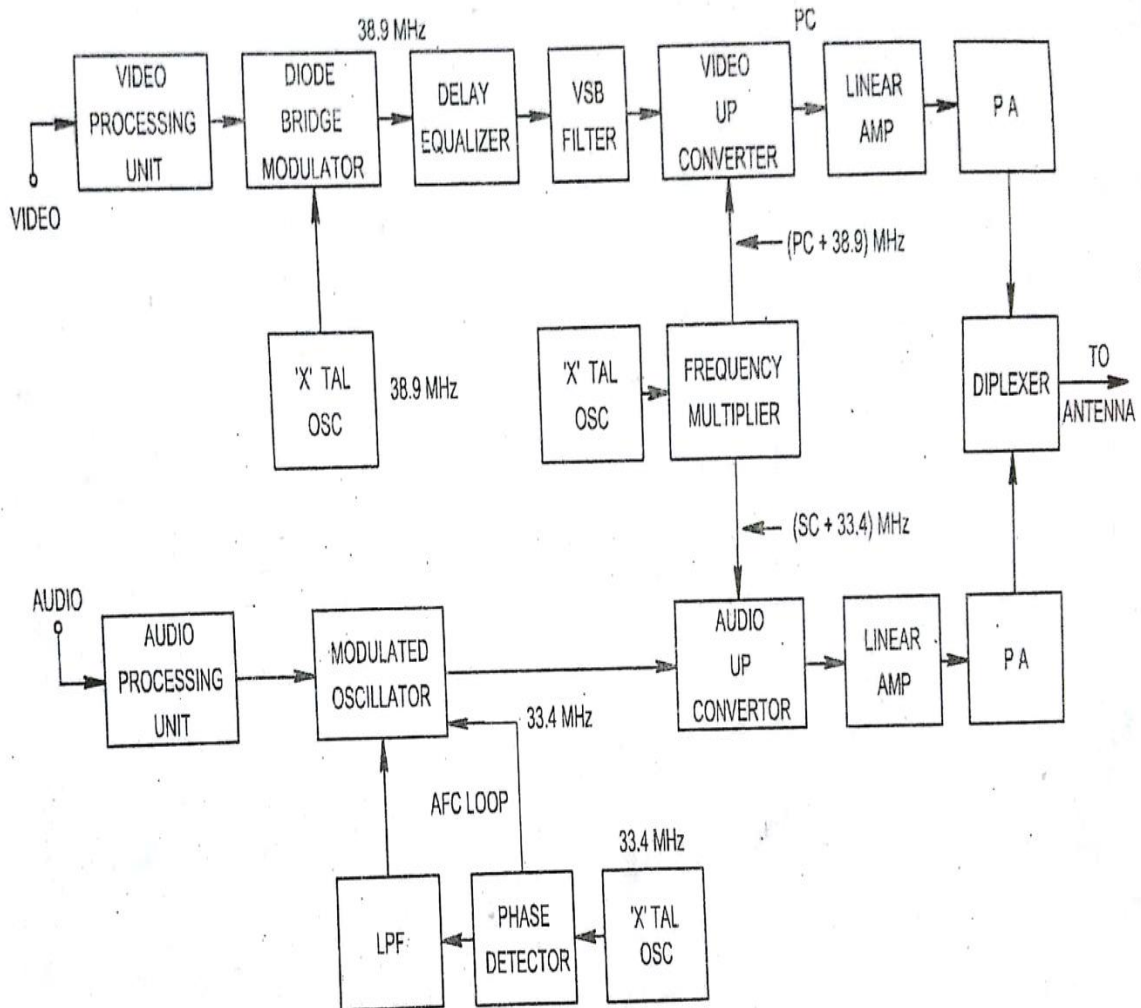
**3.2 Comparison between high level modulation and low level modulation**

<b>S.No</b>	<b>High level modulation</b>	<b>Low level modulation</b>
1	Both audio and video signals are amplified to required level before modulation	Both audio and video signals are amplified to required level after modulation
2	Transmitter power high	Transmitter power is low
3	Difficult to design and operation	Simple is design and operation

- **Principles**

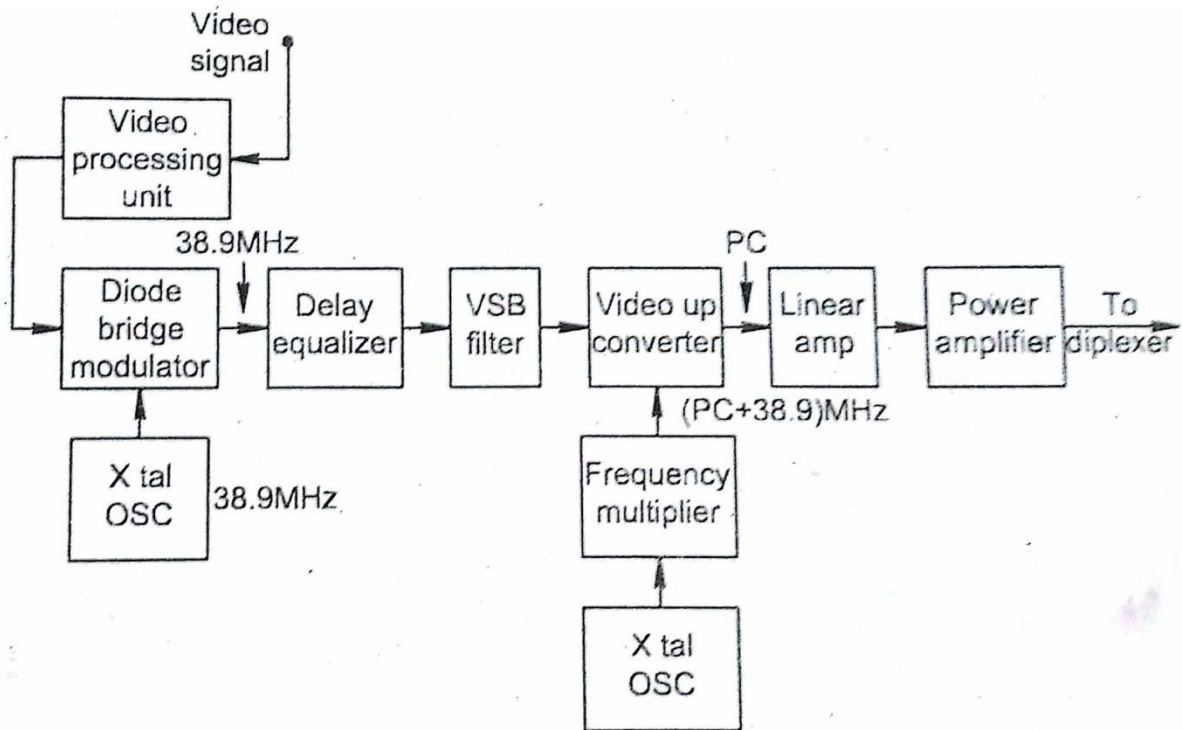
A television transmitter both audio and video signals using a channel bandwidth of 7 MHz. The two outputs, one from picture signal transmitter and the other from sound signal transmitter are combined in suitable network and then fed to a common antenna network for transmission.

### 3.3 BLOCK DIAGRAM OF LOW LEVEL IF MODULATED TV TRABSMITTER



In this video modulation is done at IF frequency of 38.9 MHz and sound modulation is done at IF frequency of 33.4 MHz. Both video and sound IF UP converted after modulation. A VSB filter is also included at lower IF power level. After up conversion they are given to lines, amplifier for power amplification and then it is connected to the diplexer unit.

### 3.4 VISUAL EXCITER:

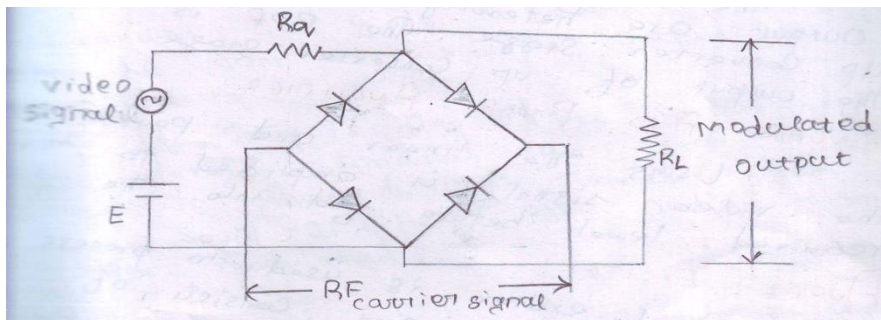


Visual exciter deals with circuits related to video signals. It consists of video processing unit, video modulator, VSB filter, Delay equalizer, Frequency up converter, Linear and power amplifier.

#### VIDEO PROCESSING UNIT:

In video processing unit, the Camera output signal having IVP-P amplitude is converted into standard form by eliminating hum and noise. Also after proper amplification sync pulses and blanking pulses are added to the Camera signal to get CVS.

#### VIDEO MODULATOR:



A bridge diode modulator or a diode balanced modulator is used for LLM.

In diode bridge modulator, the diodes are switched ON and OFF by the carrier voltage ( $E_c \cos \omega c t$ )

convert by the positive and negative half cycles. During the positive half cycle of carrier signal,  $R_L$  is short circuited. So output across  $R_L$  is zero. During negative half cycle,  $R_L$  is series with  $R_S$ . So output is proportional to the potential divider ratio formed by  $R_S$  and  $R_L$ .

Instantaneous amplitude of output voltage is,

$$e_o = \frac{R_L}{R_S + R_L} (E_o + E_m \sin \omega_m t) \cos \omega_c t$$

$$= A_o (1 + m \sin \omega_m t) \cos \omega_c t$$

From the above equation, the video signal is amplitude modulated by the carrier signal.

### **VSB FILTER:**

It consists of four sections of LPF networks. This is used to attenuate the frequencies beyond 1.5 MHz.

### **DELAY EQUALIZER:**

This is used to avoid the phase distortions.

### **FREQUENCY UP CONVERTER:**

The VSB filter output and crystal oscillator output are heterodyned in the frequency UP converter stage. The BPF is used at the output of UP converter stage.

### **LINEAR AND POWER AMPLIFIER:**

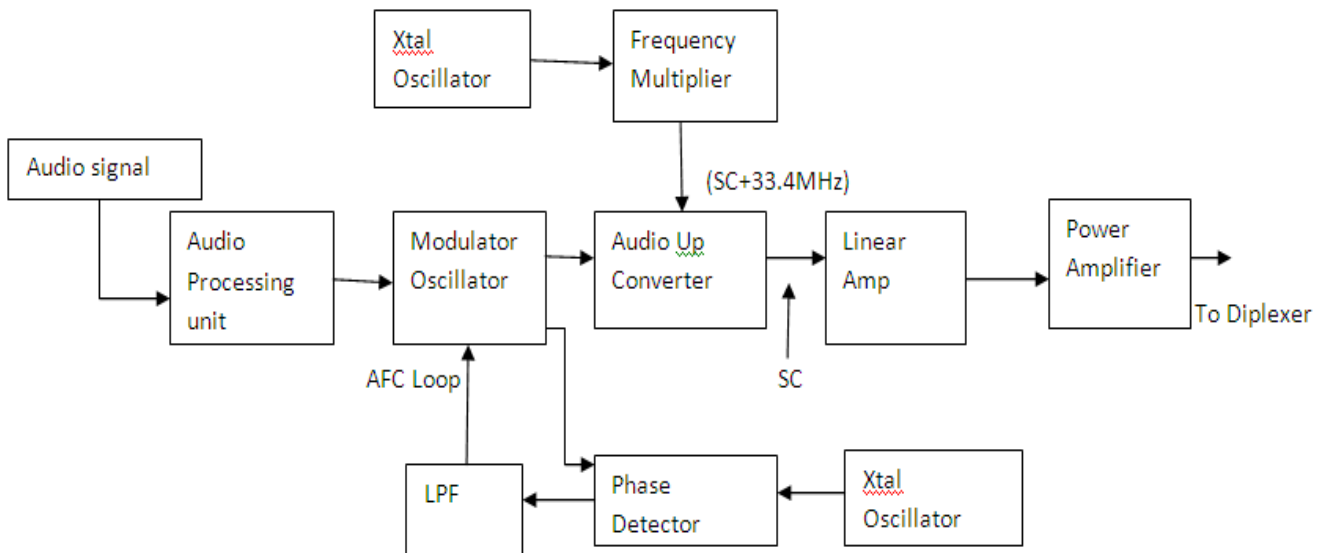
Using the linear and power amplifier, the video signal is amplified to the required level before fed into the diplexer.

### **3.5 AURAL EXCITER:**

Aural exciter is used to process the audio signal. This section consists of, Audio processing unit, Audio modulator, Audio UP converter, Linear and power amplifier.

Block diagram of aural exciter is show

## Block Diagram of Aural Exciter



### AUDIO PROCESSING UNIT:

In this section, pre emphasis circuit and amplifier are used to improve the signal to noise ratio and amplify the audio signal to the required level.

### AUDIO MODULATOR:

Audio modulator has two inputs, one is from the video processing unit and the other is from crystal oscillator. These two frequencies are given to Varactor diode in parallel with LC tank circuit. The output is sound IF of 33.4 MHz.

If there is any change in sound IF, the phase detector produces an error voltage. This voltage is given to the varactor diode to correct sound IF. Here the audio signal is frequency modulated.