ज्ञानेन प्रकाशते जगत्
INDUS UNIVERSITY

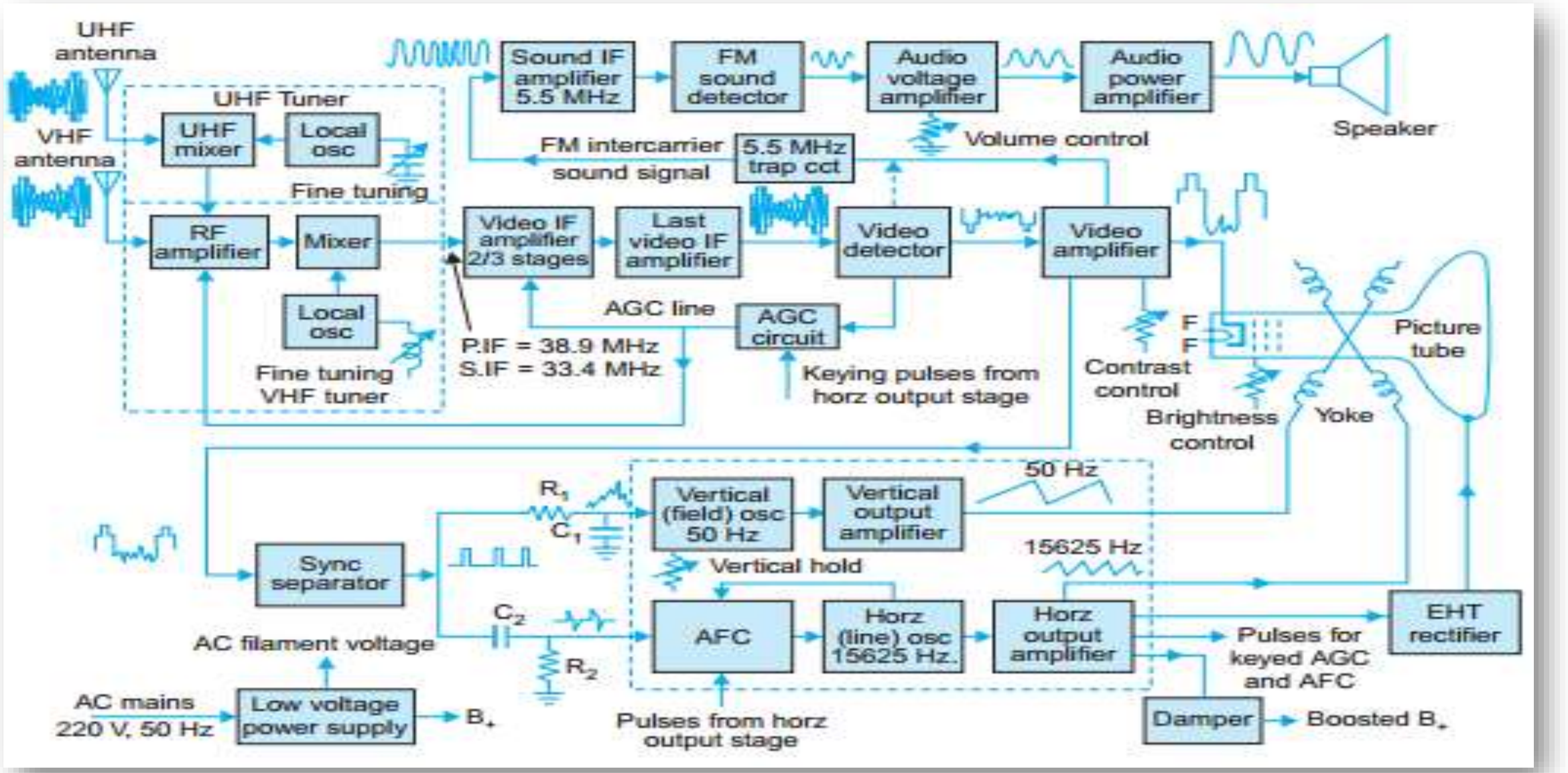
Video Engineering (EC0605)
Unit-2
B.Tech (Electronics and Communication)
Semester-VI

- **Prof. Divyangna Gandhi**

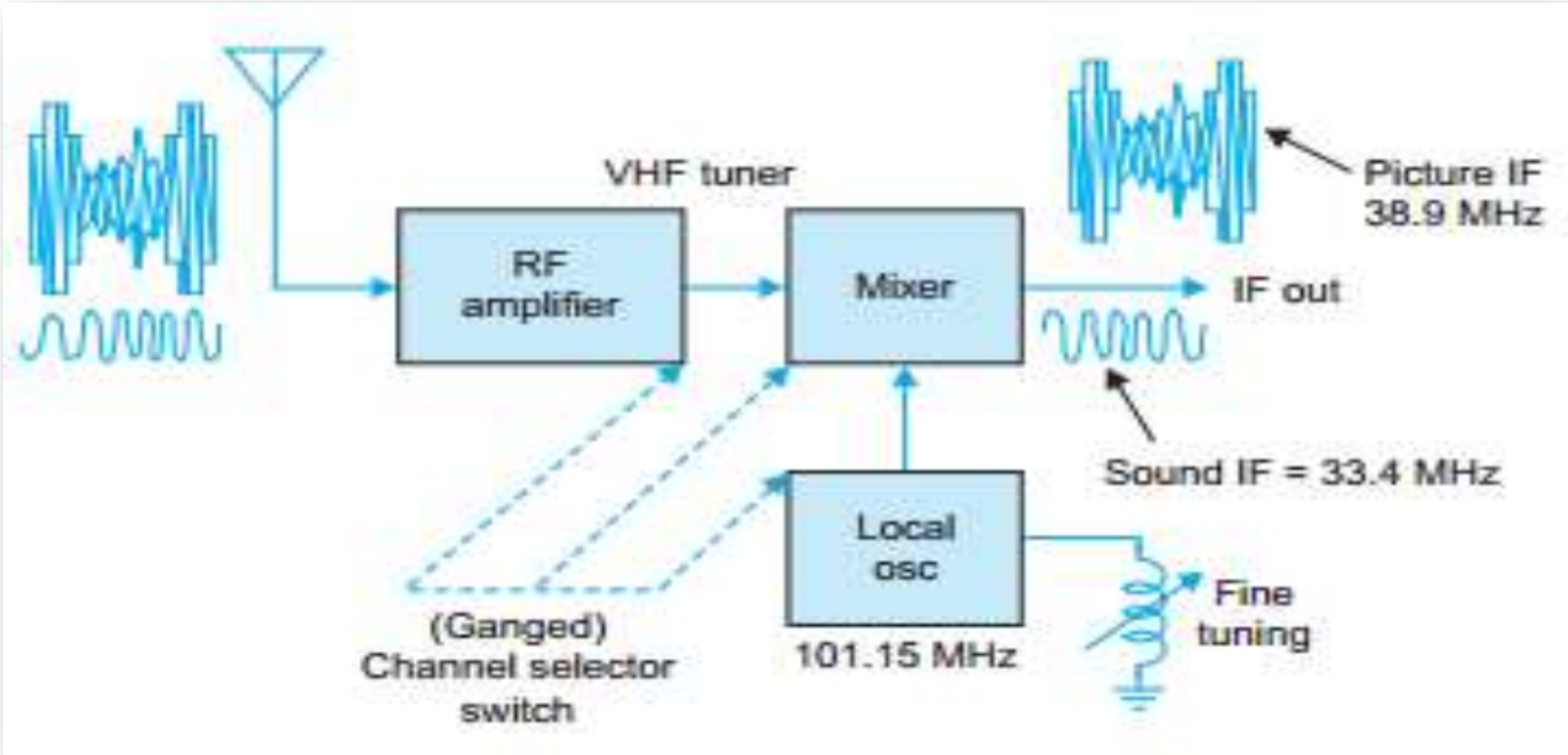
Academic Year 2019-2020

Monochrome receiver and circuits

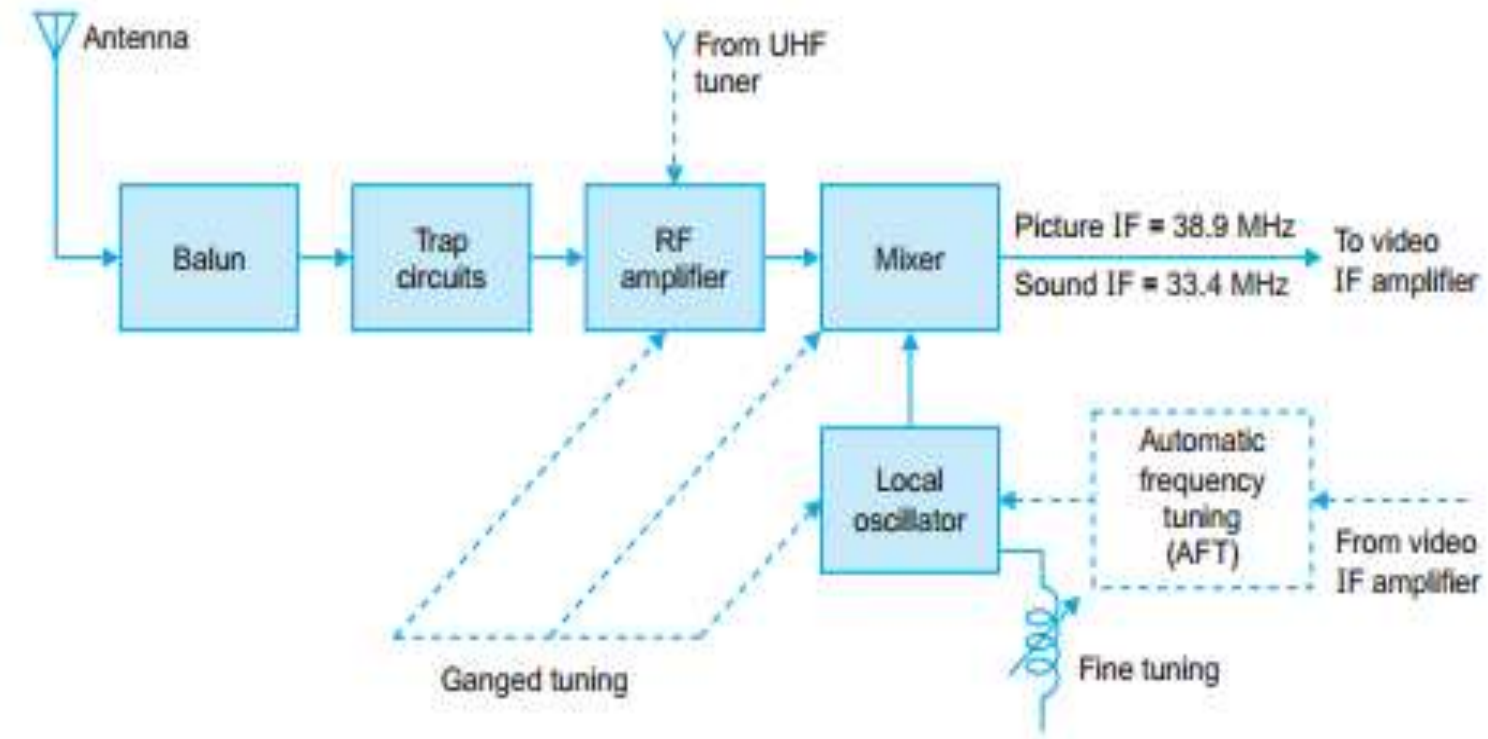
Block diagram of a monochrome television receiver



Block diagram of tuner



Block diagram of VHF tuner



Sub-section in VHF tuner

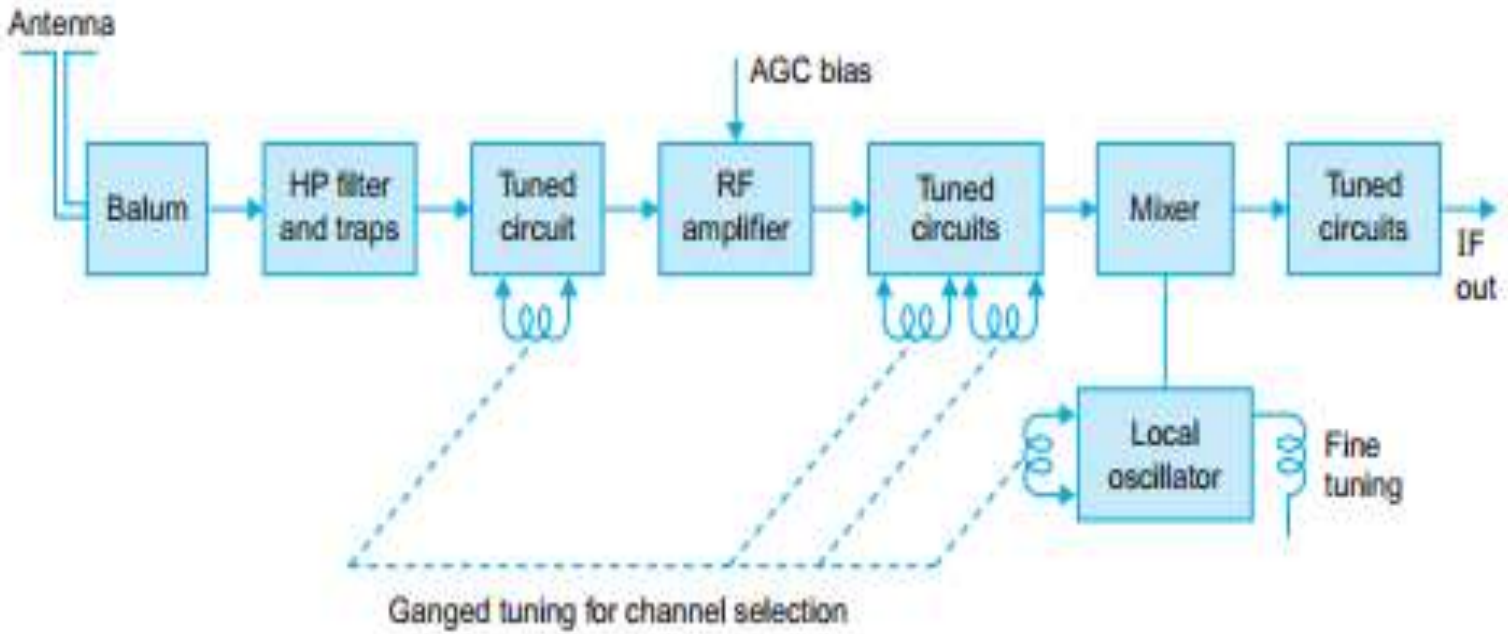
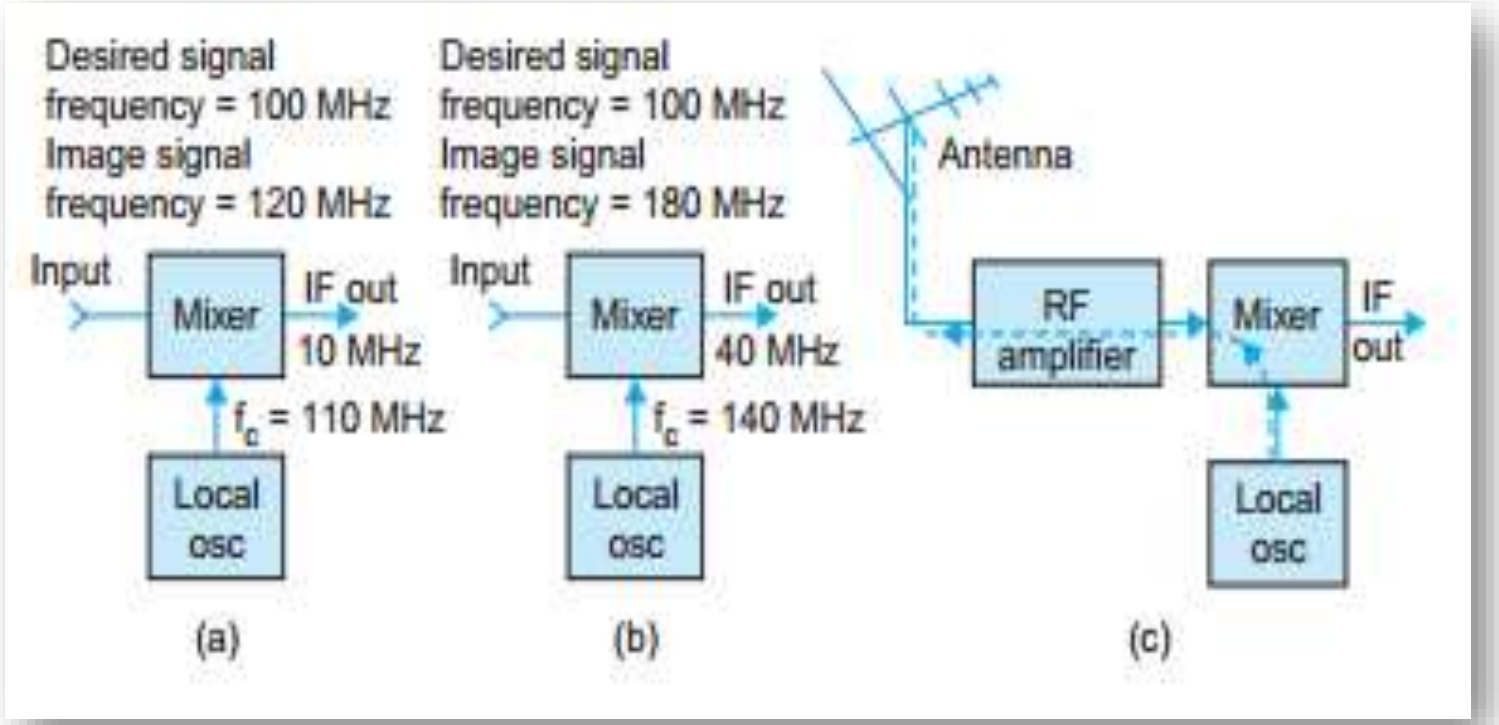
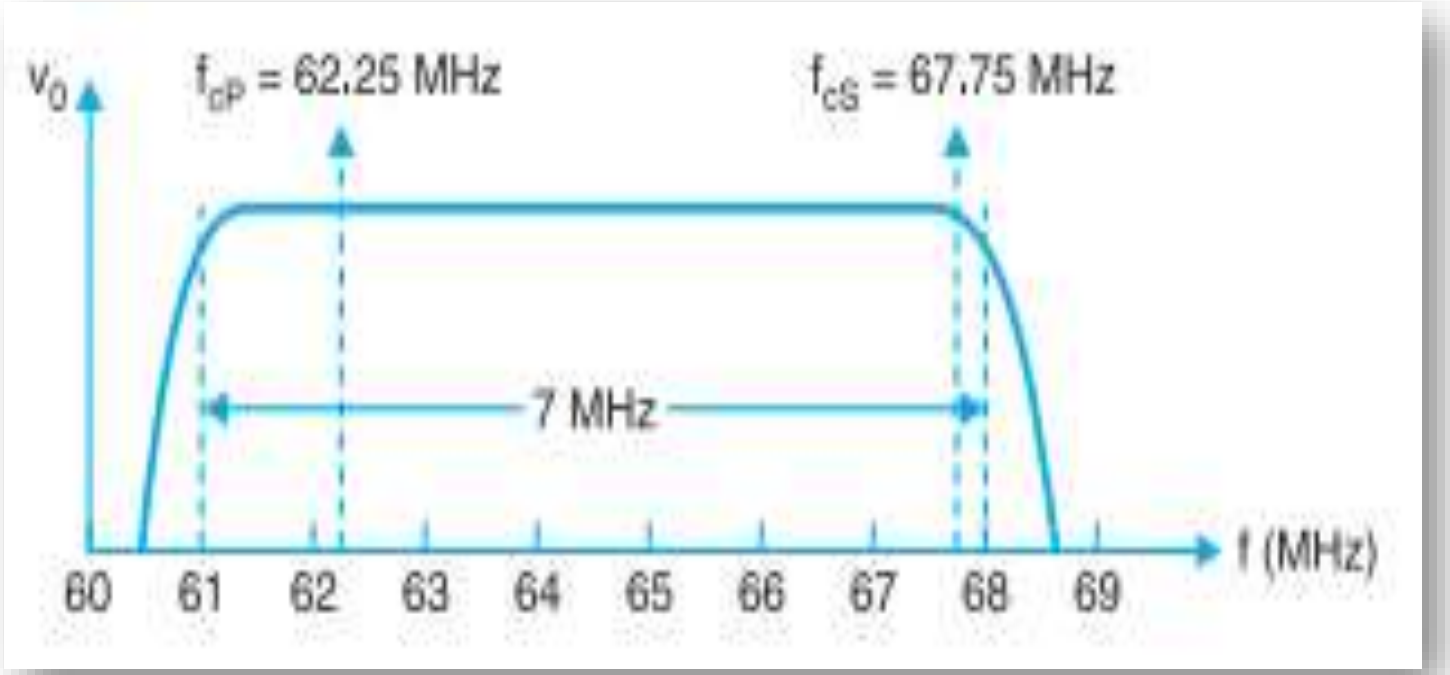


Image Rejection Ratio

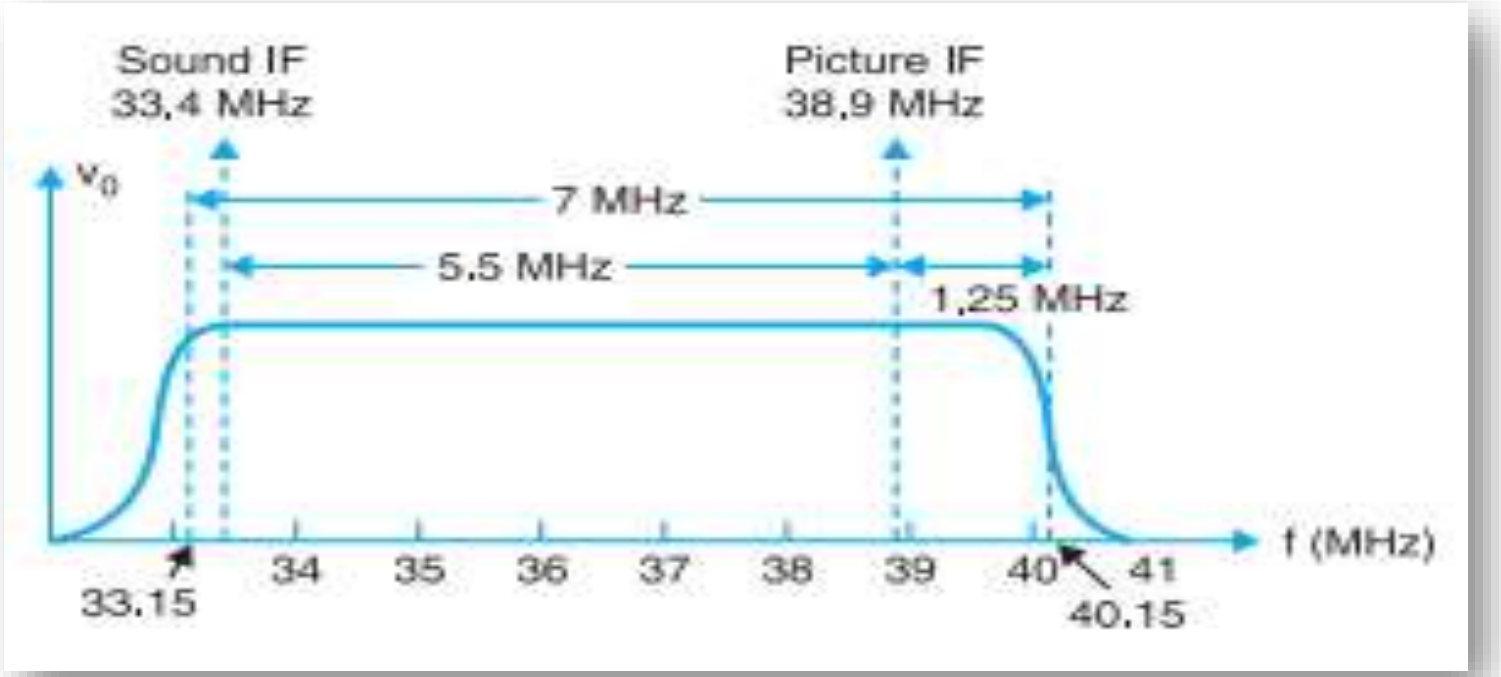


(a) and (b) Illustration of image signal interference, (c) Local oscillator signal radiation

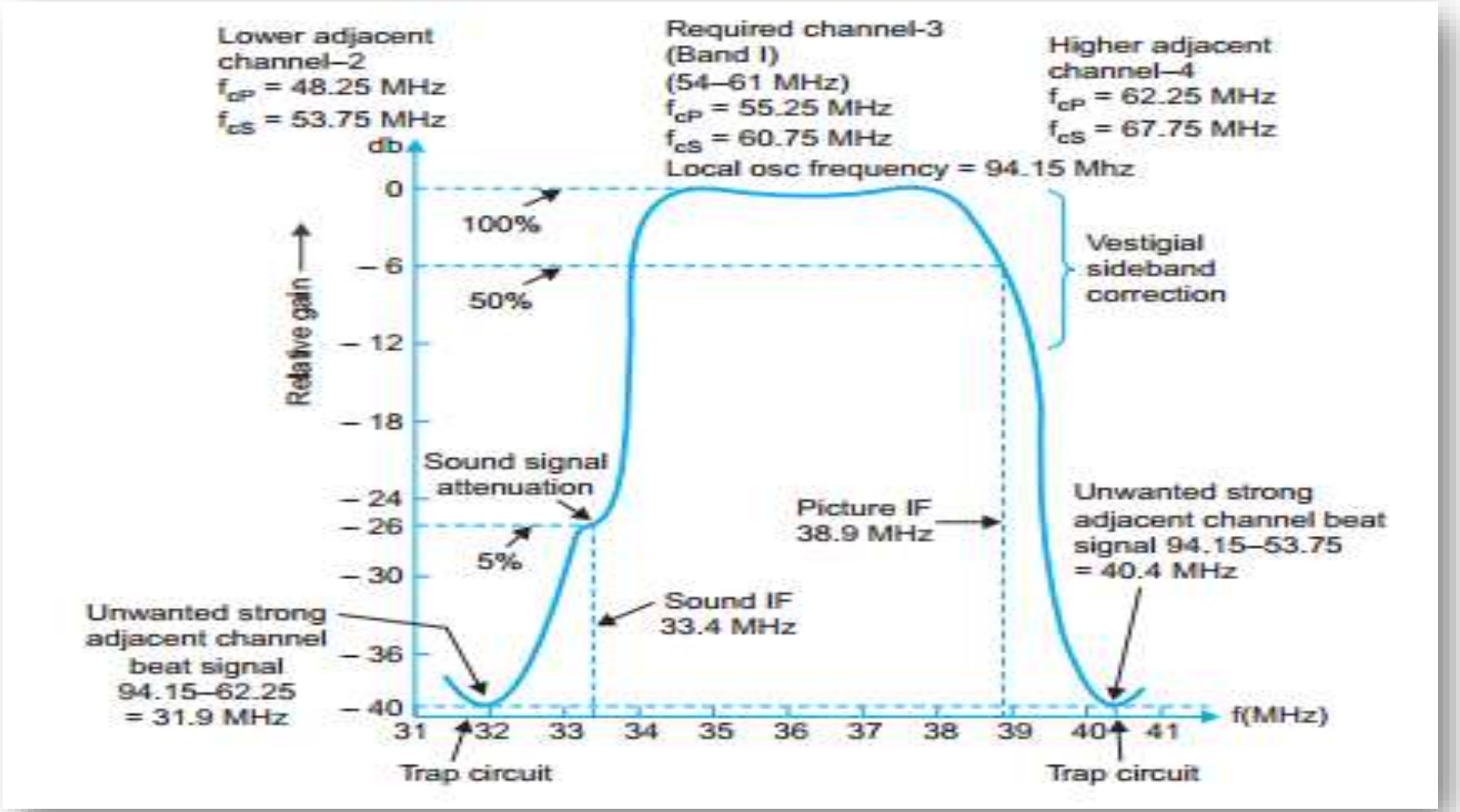
Ideal response curve of the RF amplifier when set for channel 4



Location of sound and picture IF frequencies at the output of mixer

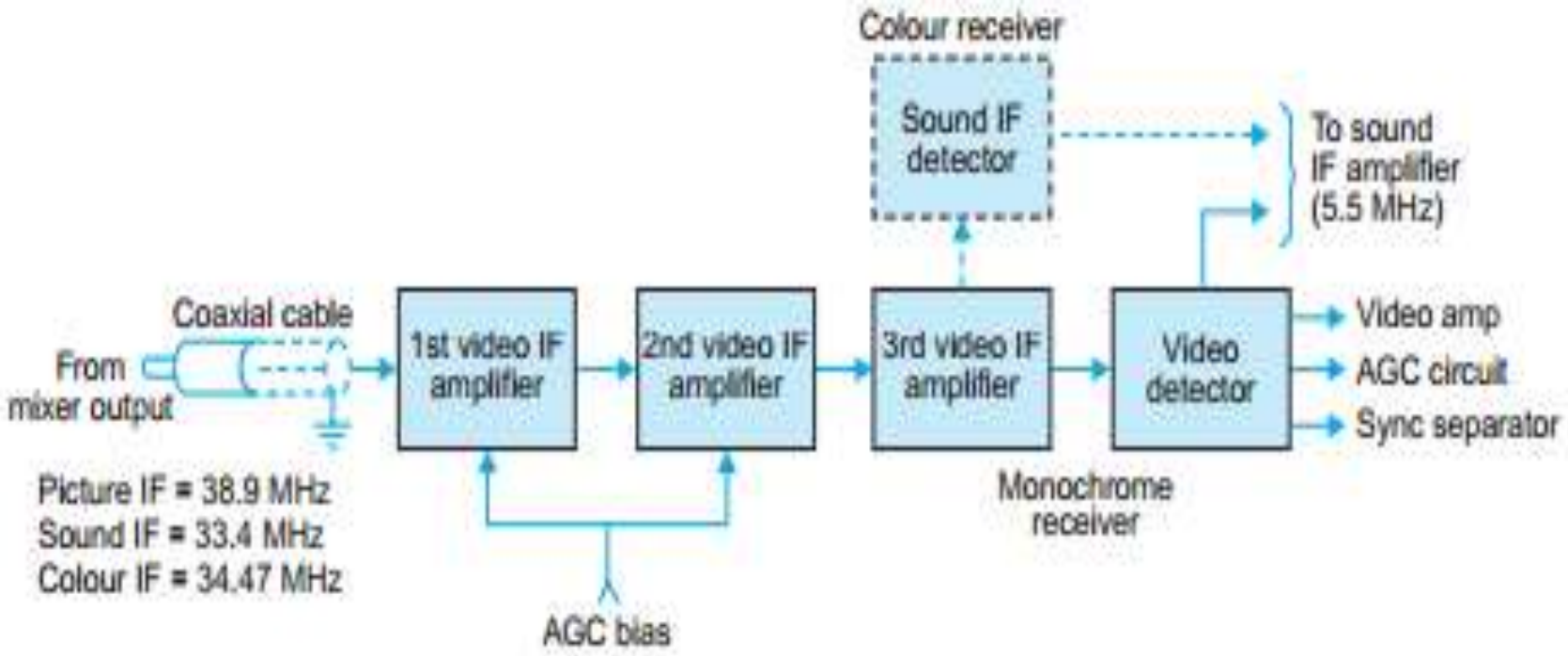


IF response curve of a receiver tuned to channel 3- (Band I)

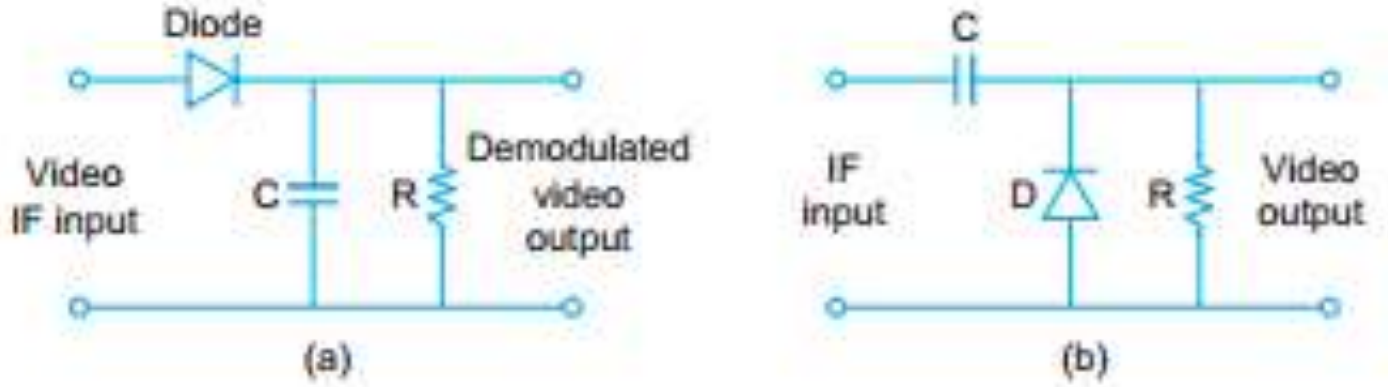


The diagram shows disposition of IF frequencies, vestigial sideband correction, sound signal attenuation and locations of unwanted adjacent channel interfering beat frequencies

IF section and sound take-off points

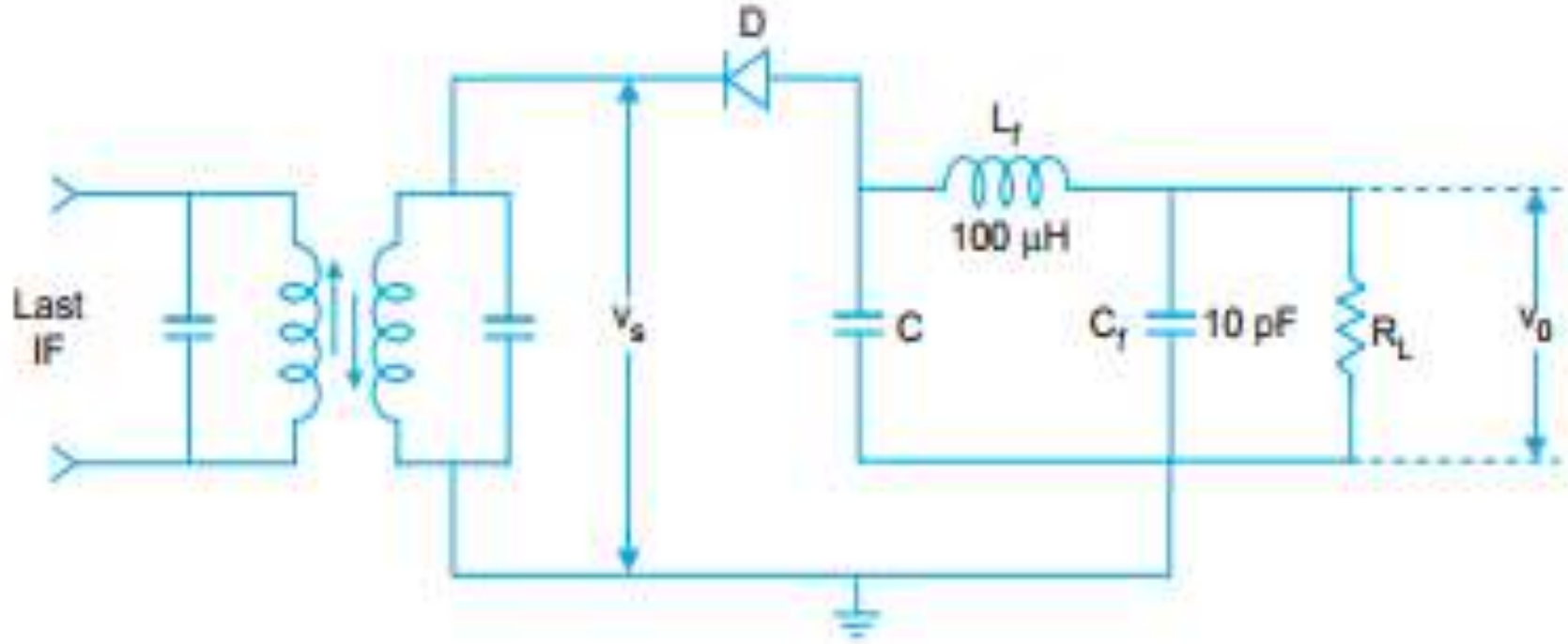


Basic detector circuits



(a) series (b) shunt.

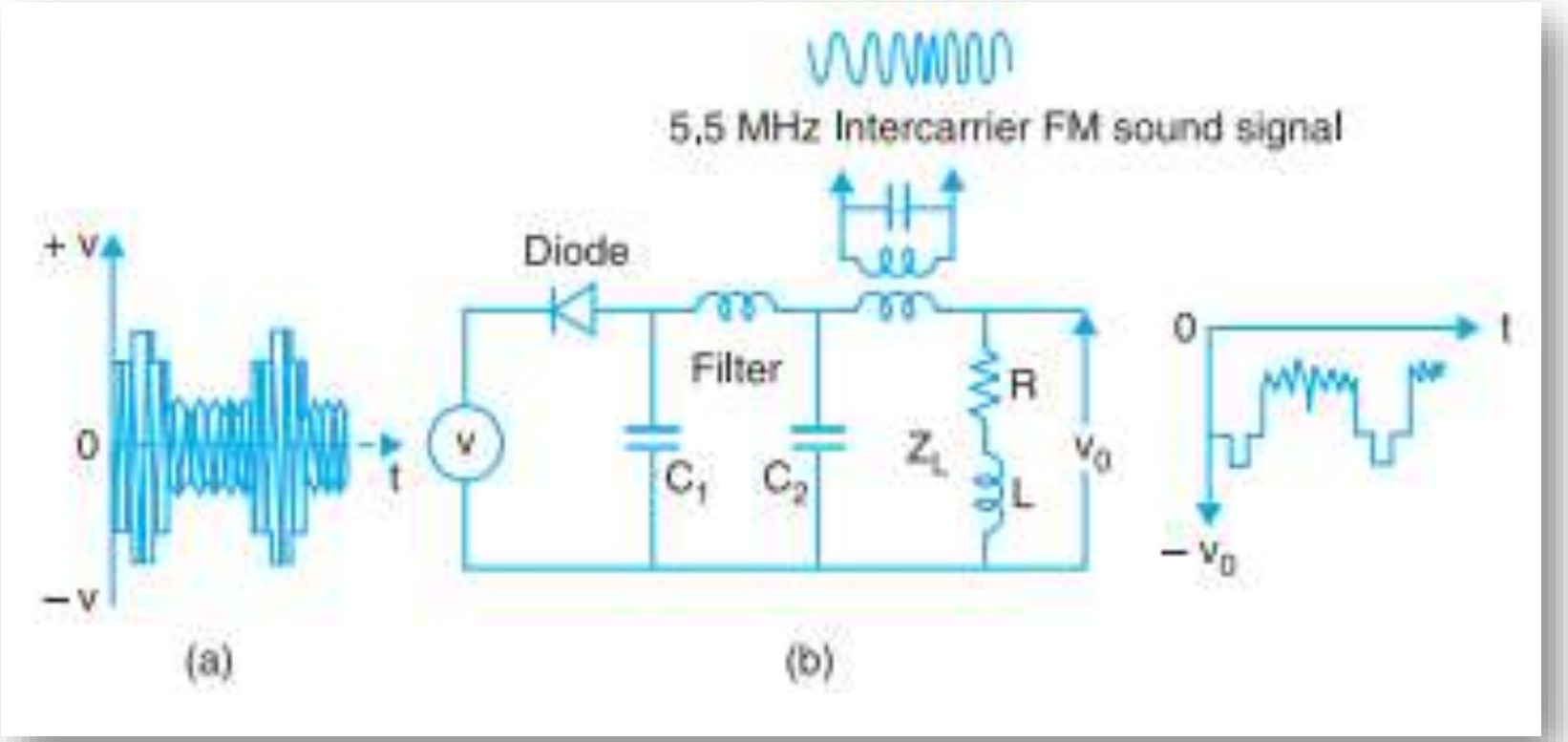
IF FILTER



VIDEO DETECTOR REQUIREMENTS

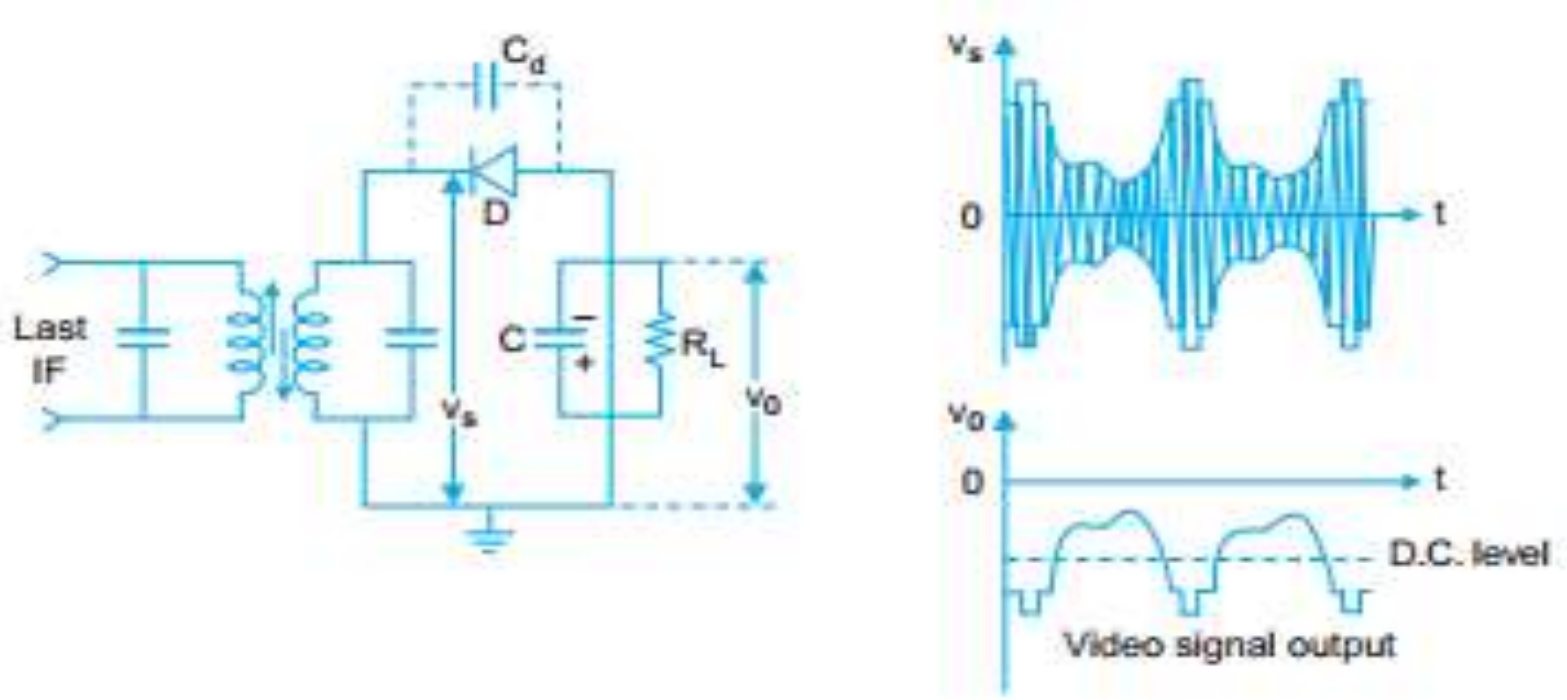
- The detector load must provide a suitable impedance as seen through the diode at input of the detector to tune and damp secondary of the last IF coupling circuit correctly
- The detector load must remove from the output, the IF content in the signal as much as possible. For this purpose the load usually includes one or two low-pass filter sections
- The detector load should have a trap circuit (a series rejector circuit) for separating the intercarrier sound signal.
- The detector load must also include a provision to boost the higher video frequencies to compensate for the loss due to input capacitance of the video amplifier

Video detector and sound signal separation circuit



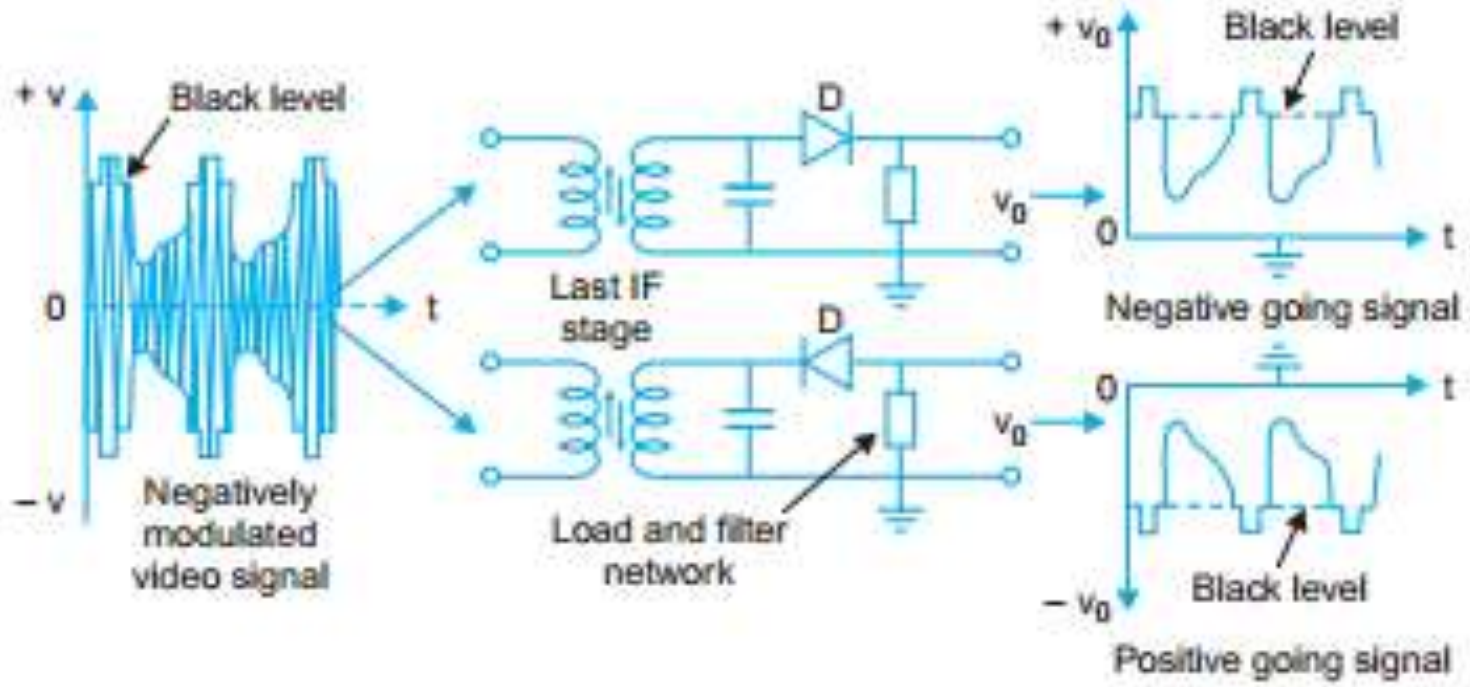
(a) Last IF amplifier output (modulated IF signal).
(b) Video detector and sound separation circuit.

BASIC VIDEO DETECTOR



A simple diode detector and filter circuit

Production of negative and positive going video signals from a negatively modulated video signal



DC COMPONENT OF THE VIDEO SIGNAL

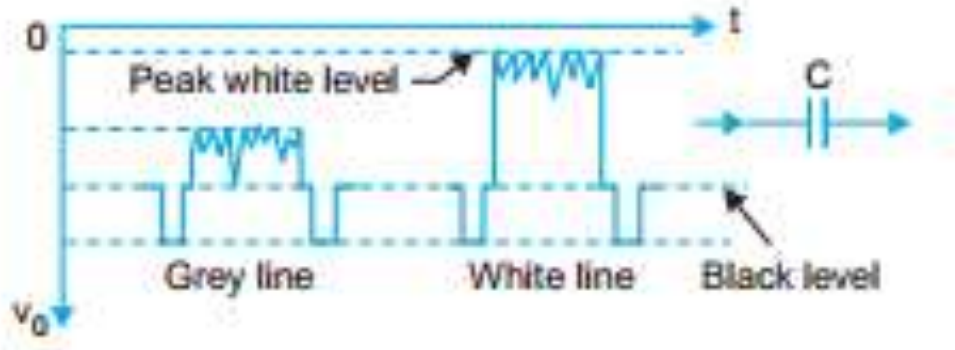


Fig. (a). Video detector output for two different lines, one grey and the other white. Note the black level is same for both the lines.

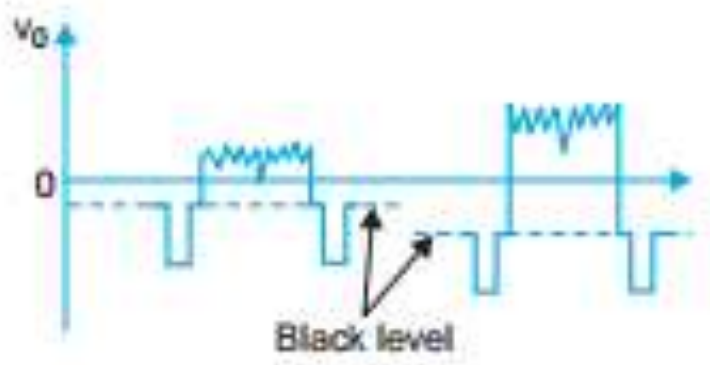
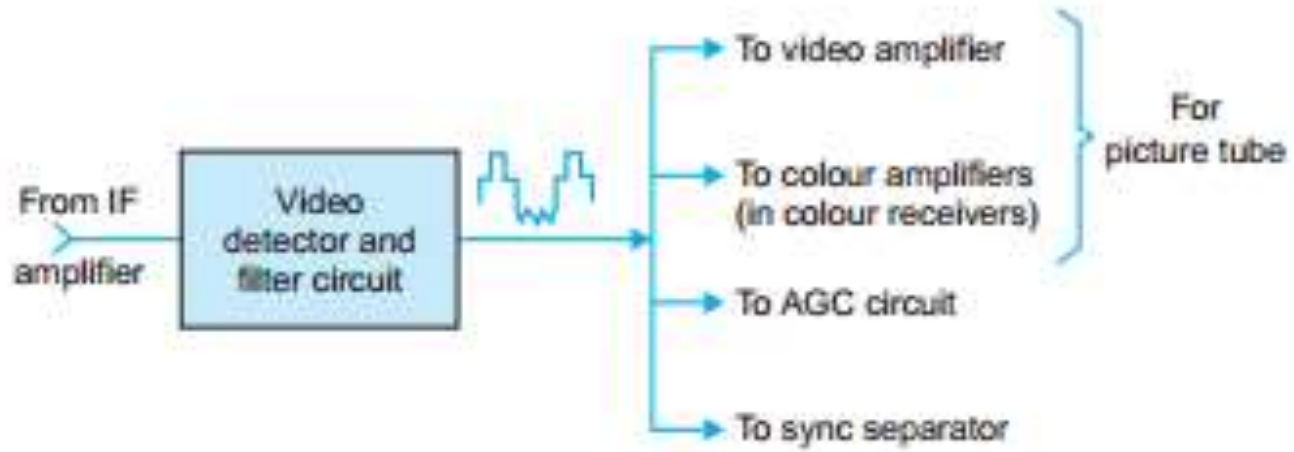
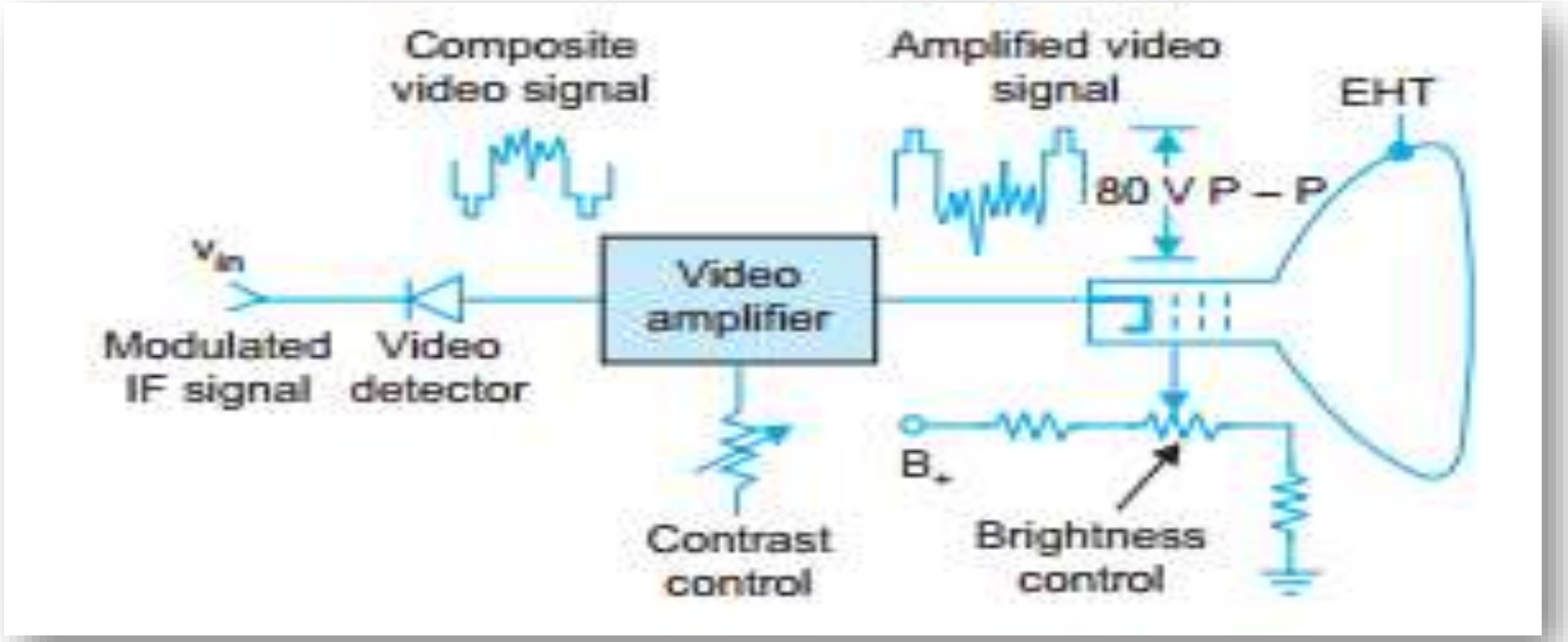


Fig.(b). Effect of a.c. coupling. The black level is now different and thus the d.c. component is lost.

FUNCTIONS OF THE COMPOSITE VIDEO SIGNAL

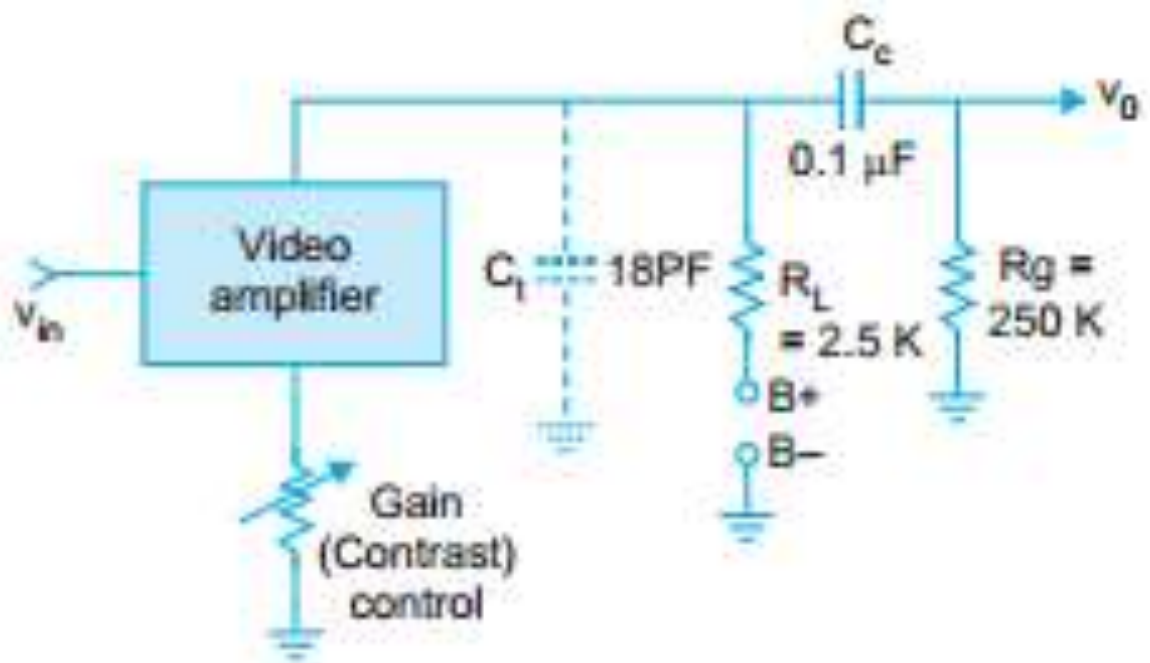


PICTURE TUBE CIRCUITRY AND CONTROLS



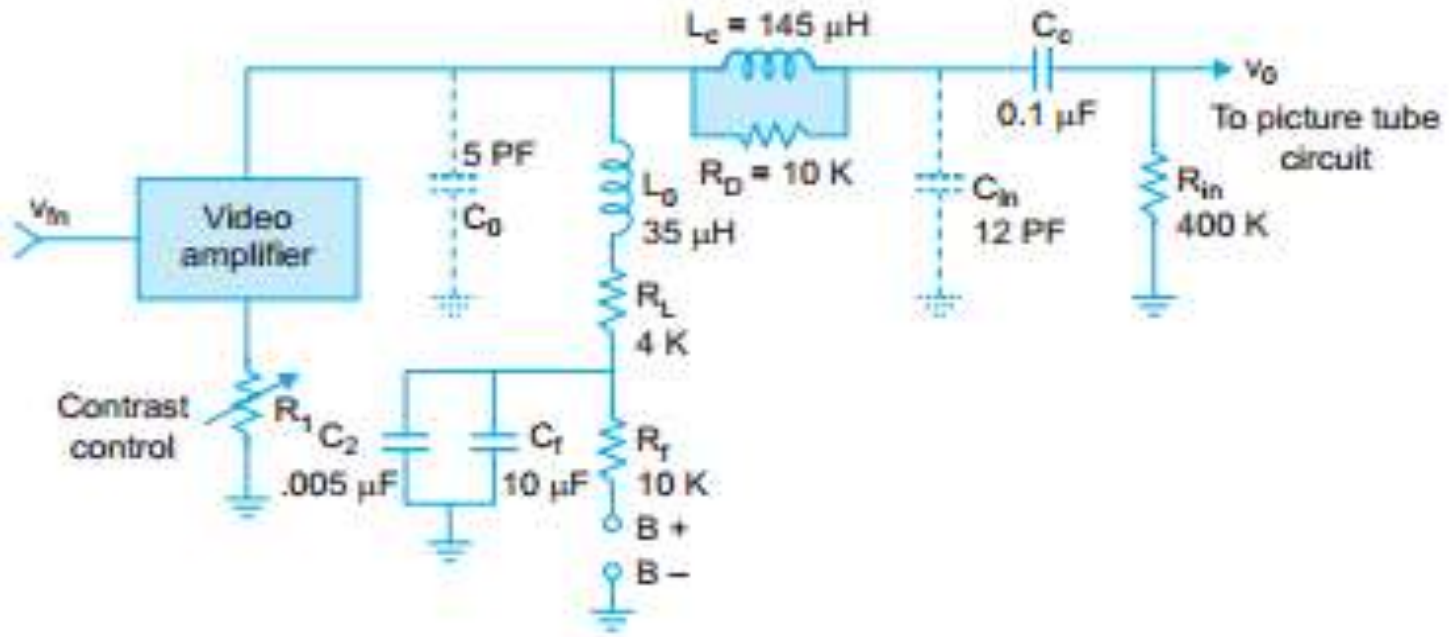
Passage of video signal from detector to picture tube

VIDEO AMPLIFIERS



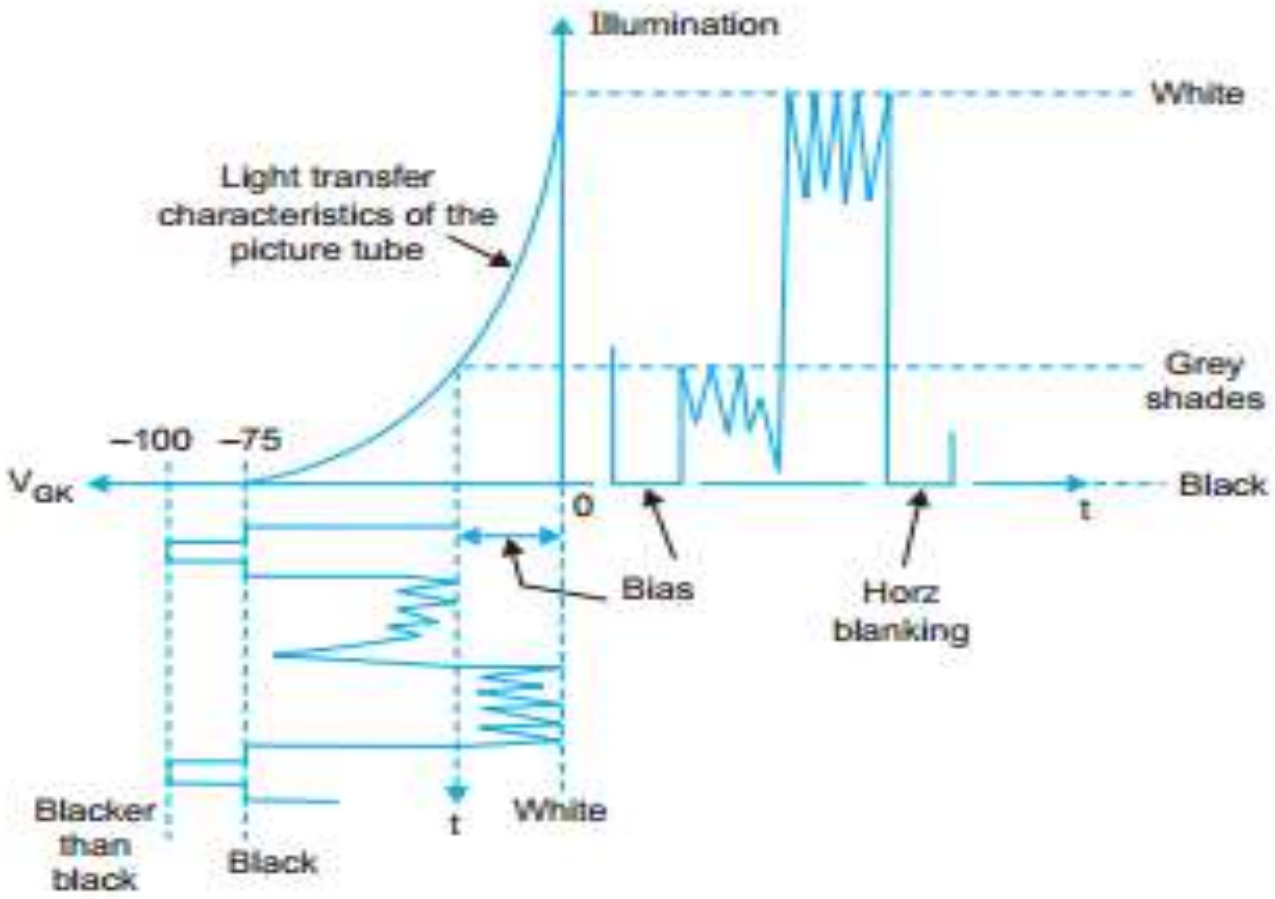
Basic R.C. coupled amplifier

Video amplifier



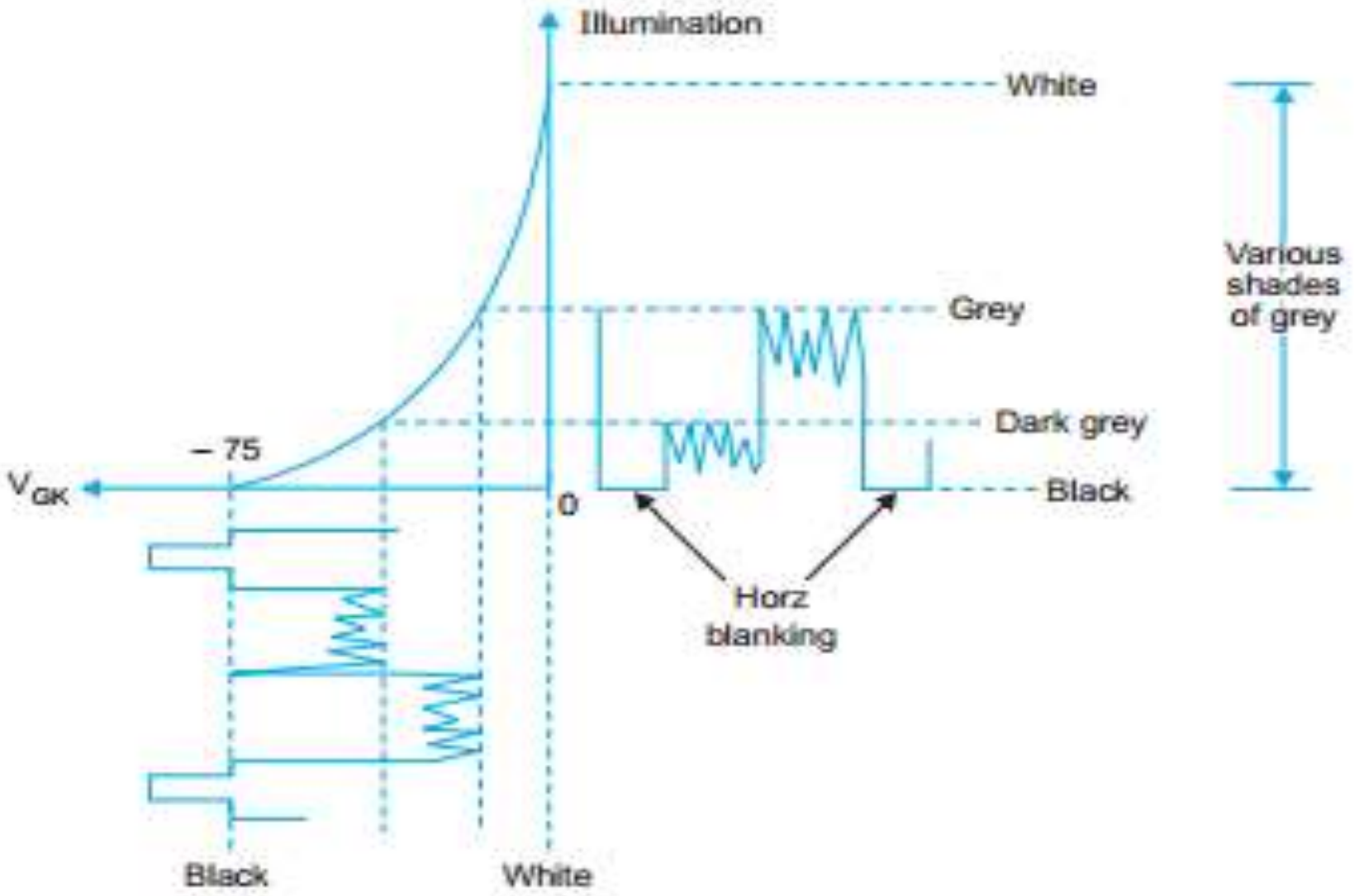
Video amplifier employing both shunt and series peaking for high frequency compensation and a special decoupling circuit to boost low frequency response

VIDEO AMPLIFIER REQUIREMENTS



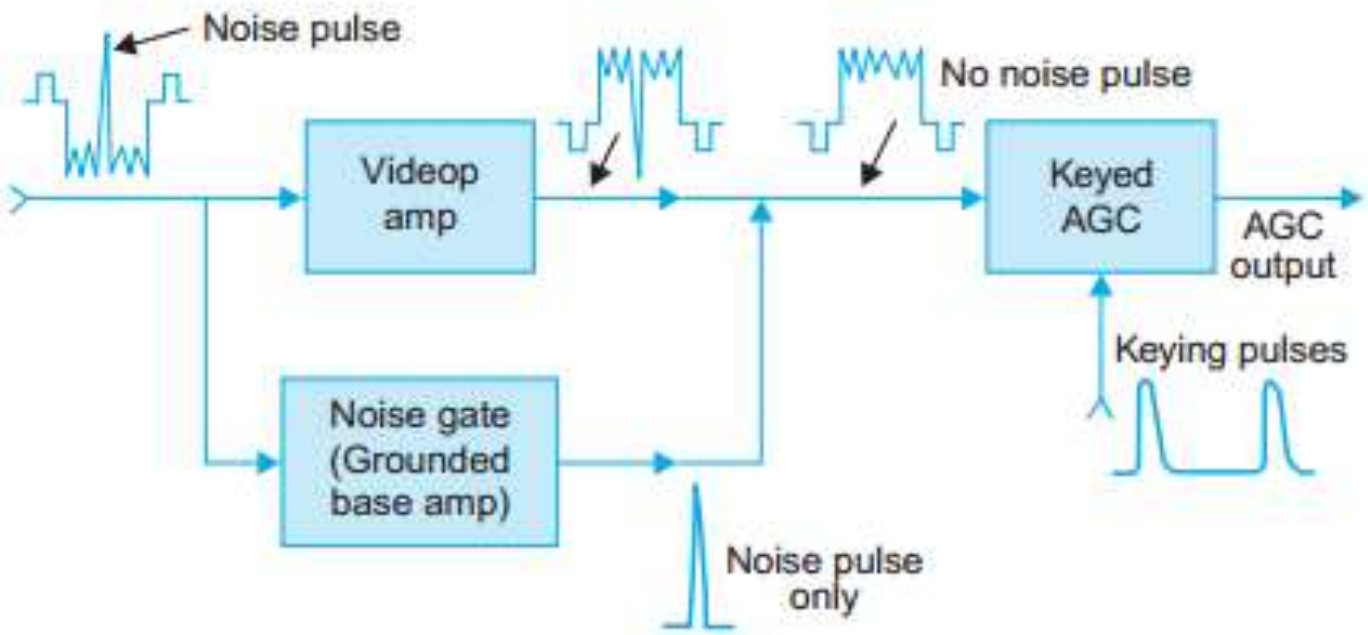
Light output with correct amplitude of the composite video signal.

VIDEO AMPLIFIER

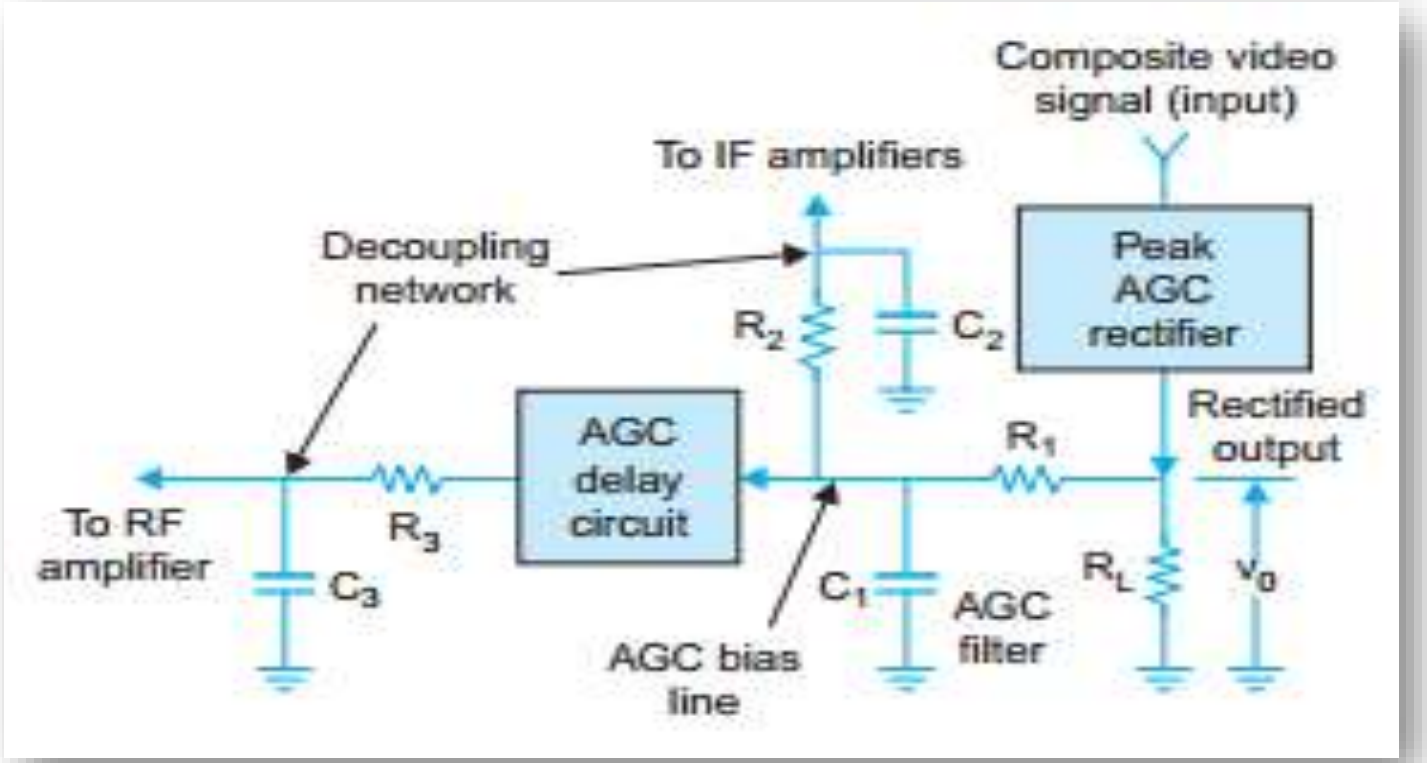


Effect of insufficient video signal amplitude on brightness variations in the picture

Noise cancellation by a separate noise gate amplifier



Block diagram of AGC system

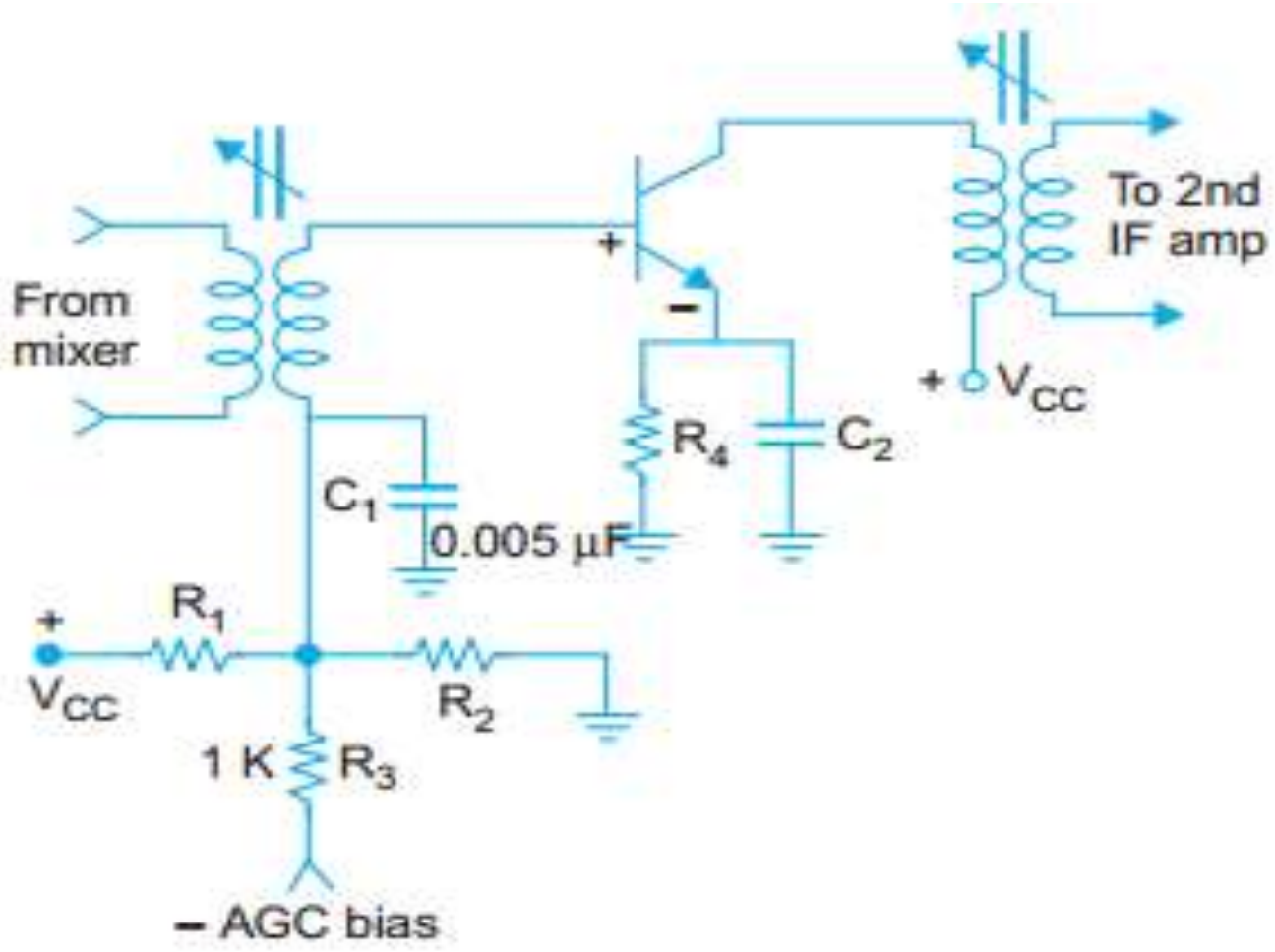


ADVANTAGES OF AGC

- Intensity and contrast of the picture, once set with manual controls, remain almost constant despite changes in the input signal strength, since the AGC circuit reduces gain of the receiver with increase in input signal strength.
- Contrast in the reproduced picture does not change much when the receiver is switched from one station to another.
- Amplitude and cross modulation distortion on strong signals is avoided due to reduction in gain.
- AGC also permits increase in gain for weak signals. This is achieved by delaying the application of AGC to the RF amplifier until the signal strength exceeds 150 µV or so. Therefore the signal to noise ratio remains large even for distant stations. This reduces snow effect in the reproduced picture.
- Flutter in the picture due to passing aeroplanes and other fading effects is reduced.
- Sound signal, being a part of the composite video signal, is also controlled by AGC and thus stays constant at the set level.
- Separation of sync pulses becomes easy since a constant amplitude video signal becomes available for the sync separator.

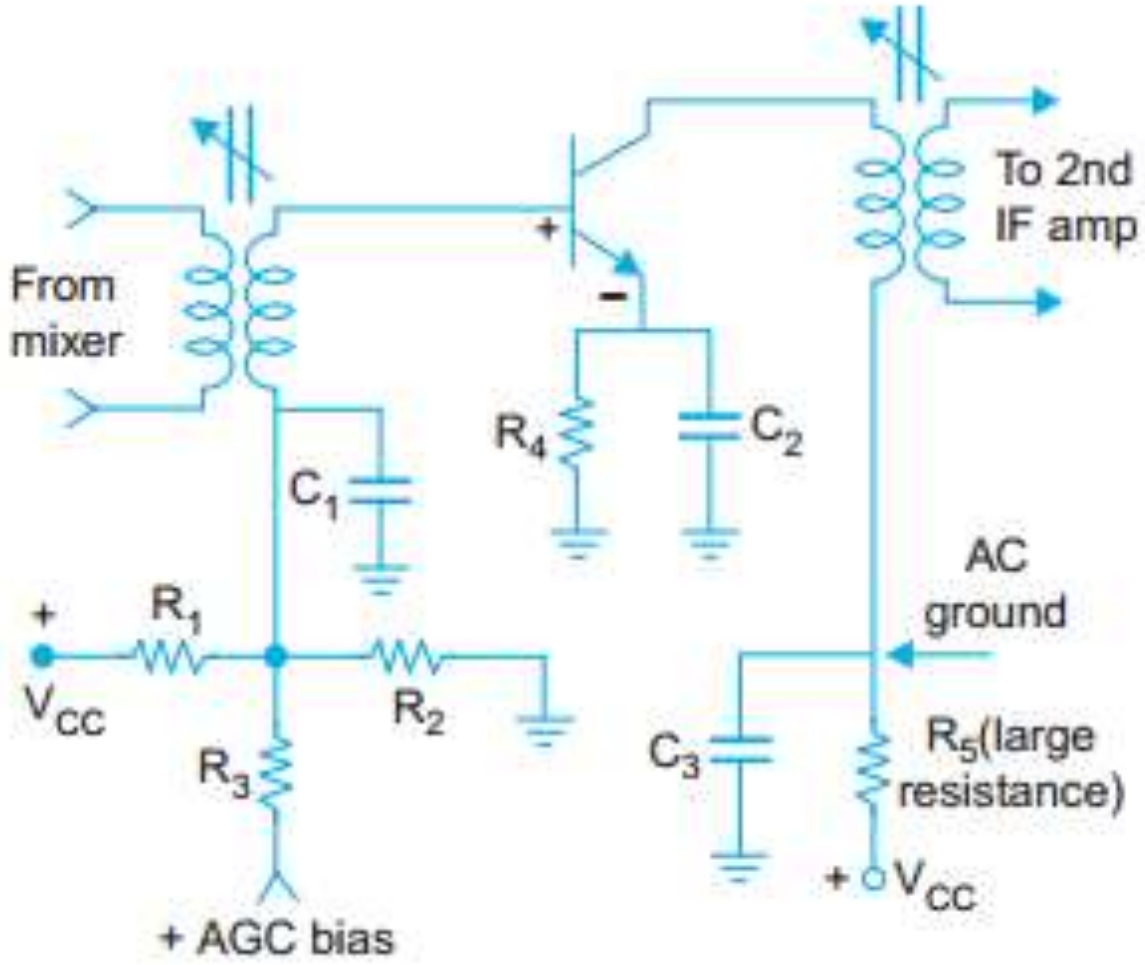
TYPES OF AGC

- ***Reverse AGC***



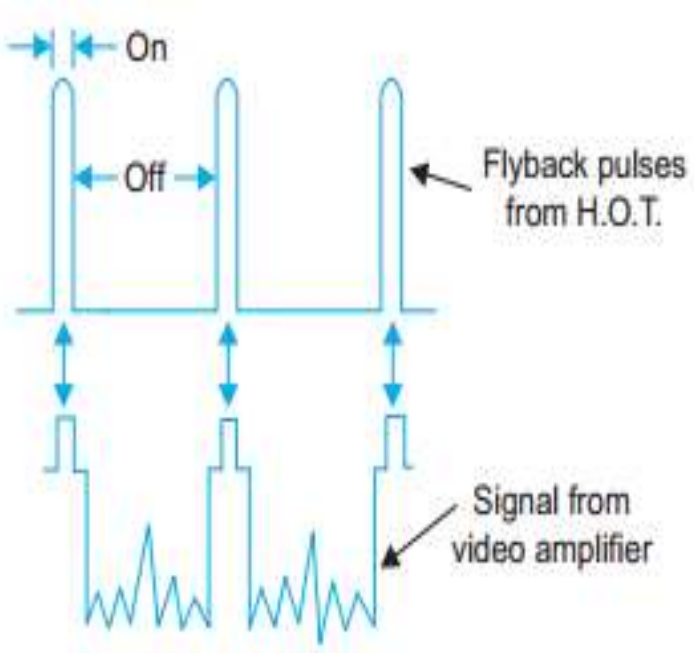
TYPES OF AGC

- ***Forward AGC***

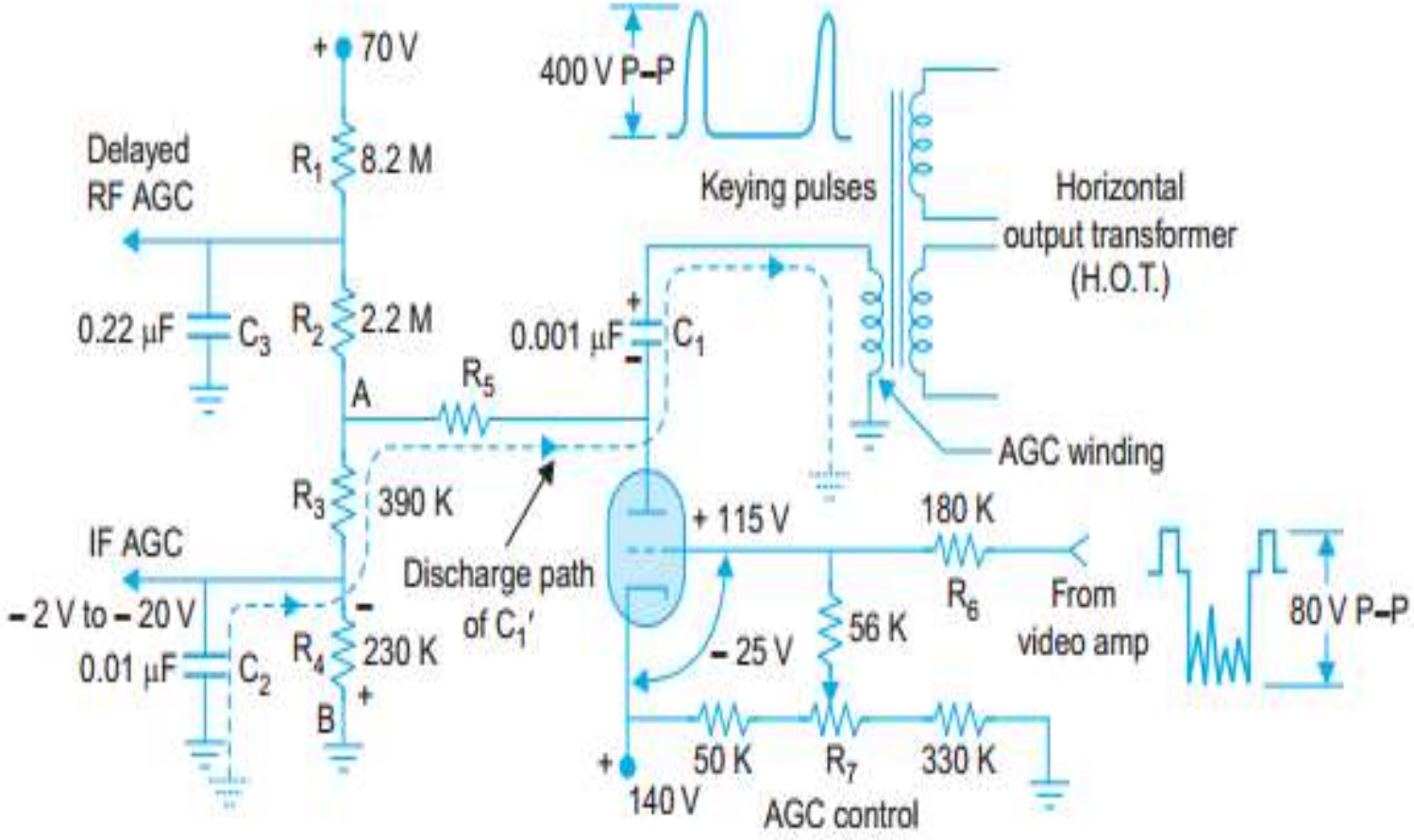


TYPES OF AGC

- ***Keyed AGC System***



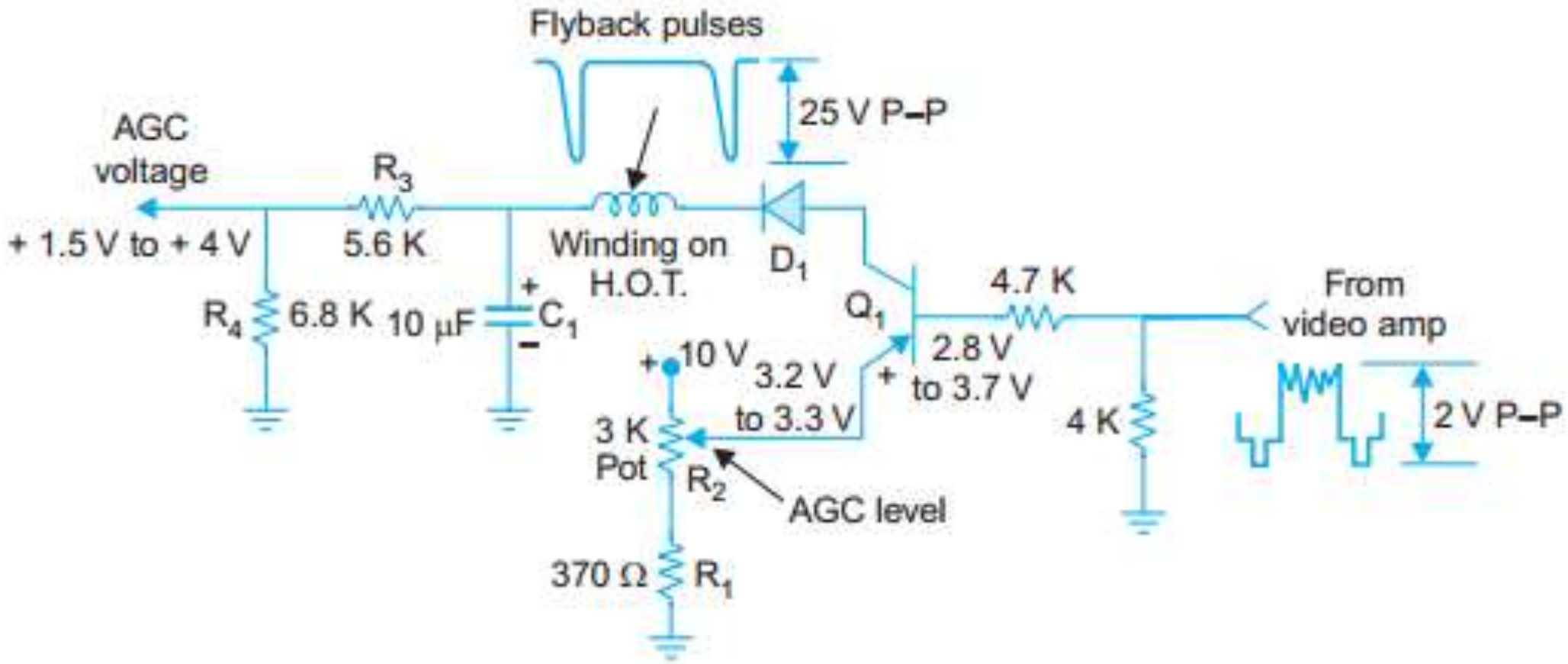
Keying pulses at horizontal sync rate for AGC circuit



Typical triode keyed AGC circuit

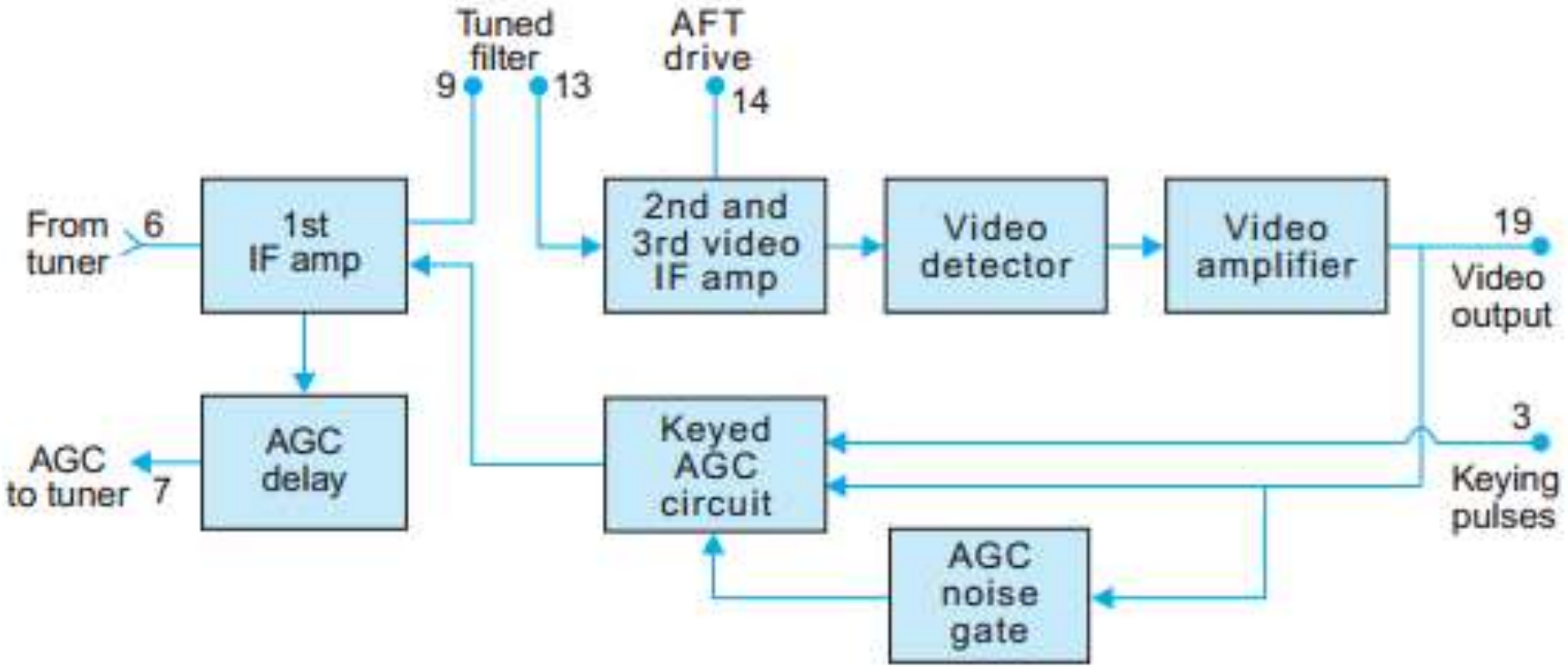
TYPES OF AGC

- ***Transistor Keyed AGC***

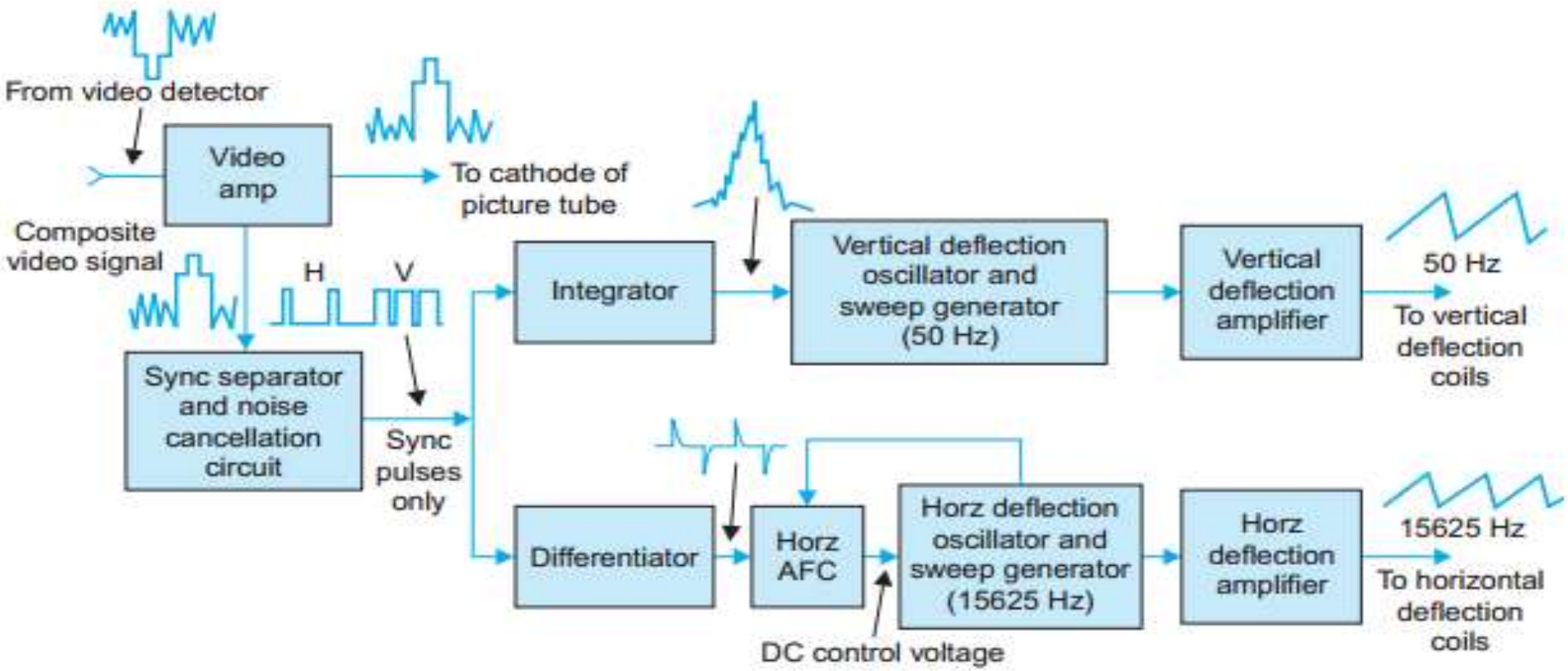


Typical transistor keyed AGC circuit

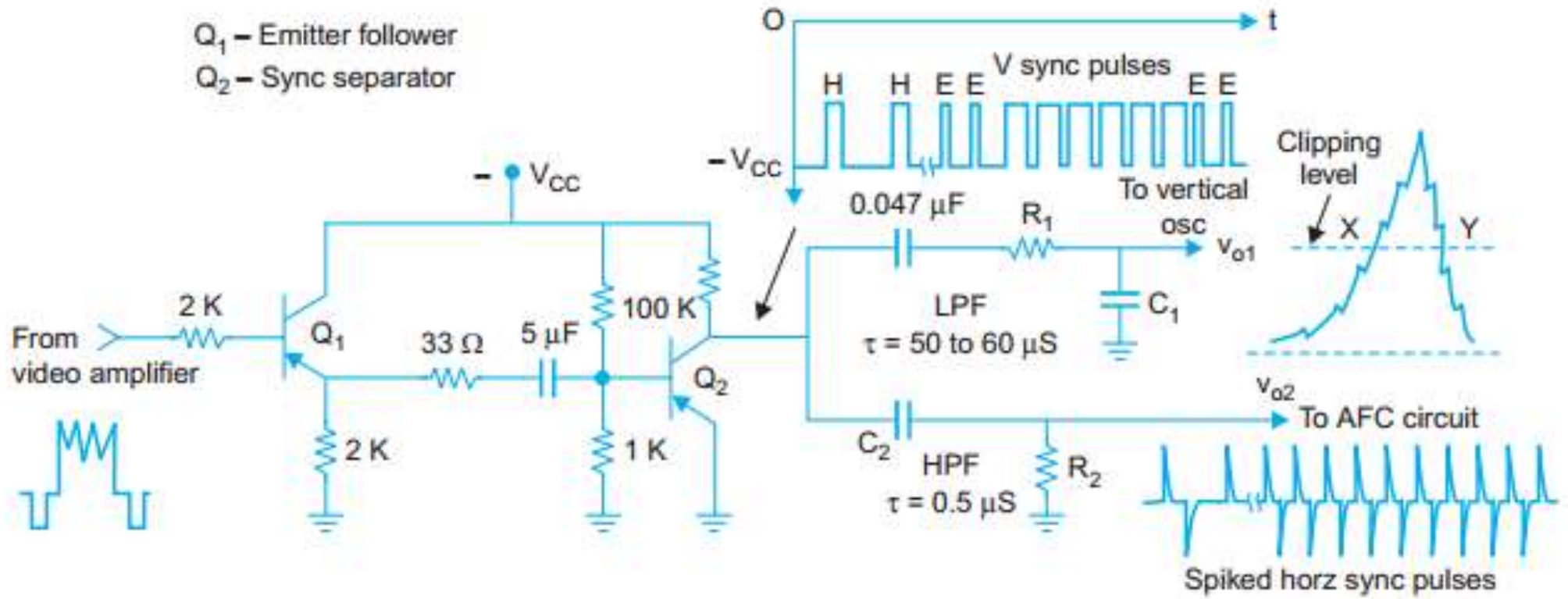
Simplified block diagram of the AGC section in IC CA3068 (BEL)



Block diagram of the sync separator and deflection circuits in a television receiver

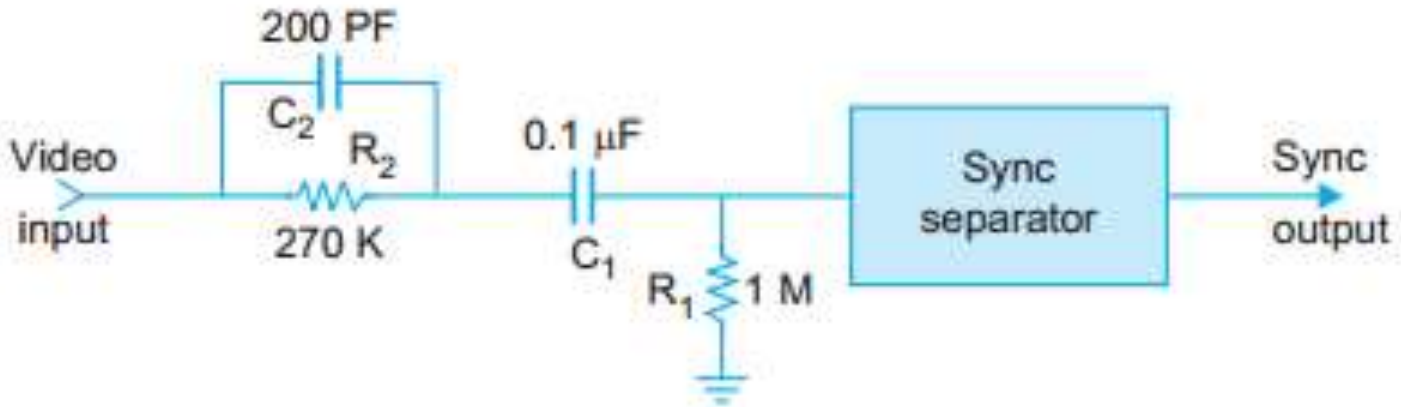


SYNC WAVEFORM SEPARATION

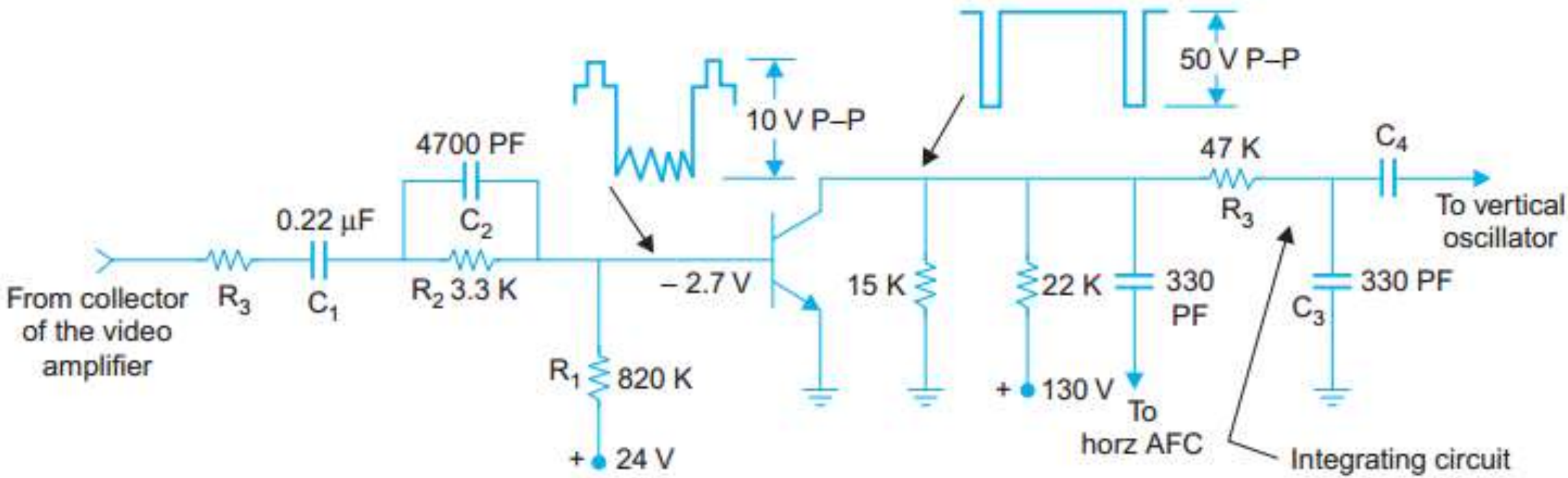


Separation of vertical and horizontal sync pulses

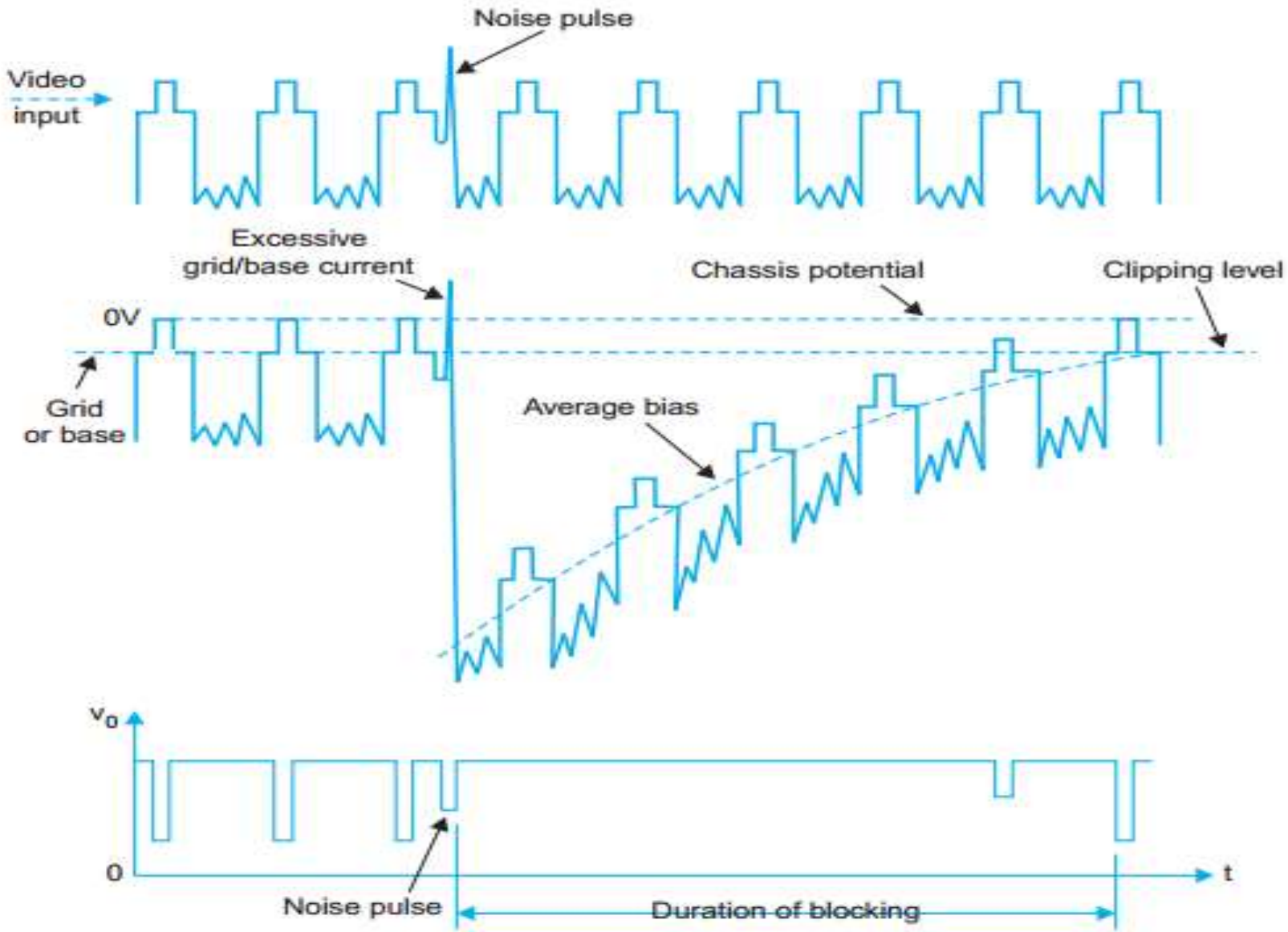
Double time-constant bias circuit at the input of a sync separator



TRANSISTOR SYNC SEPARATOR

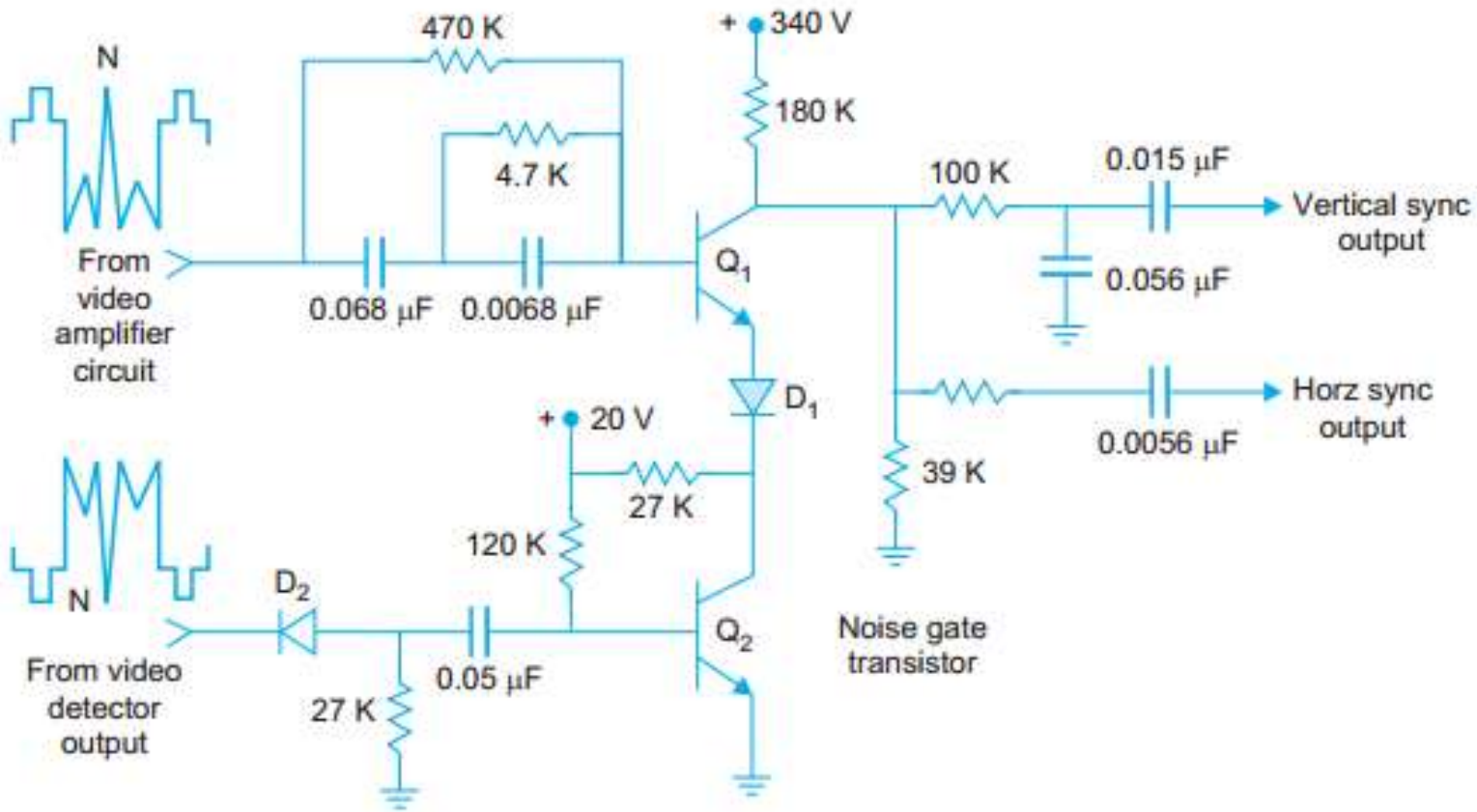


NOISE IN SYNC PULSES

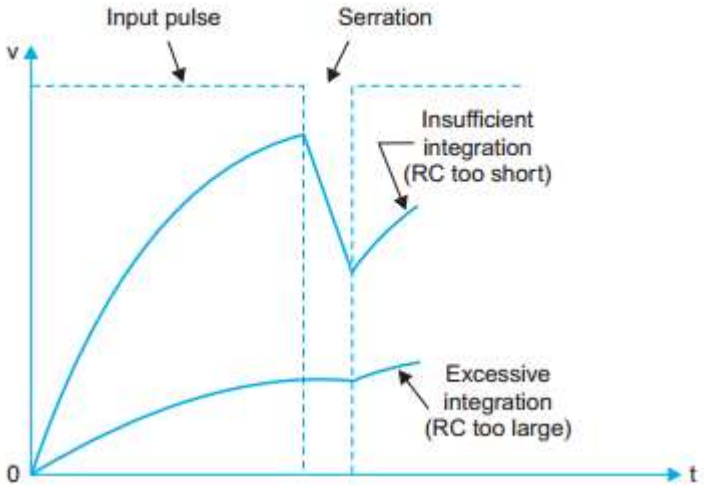


Effect of a strong noise pulse on sync output

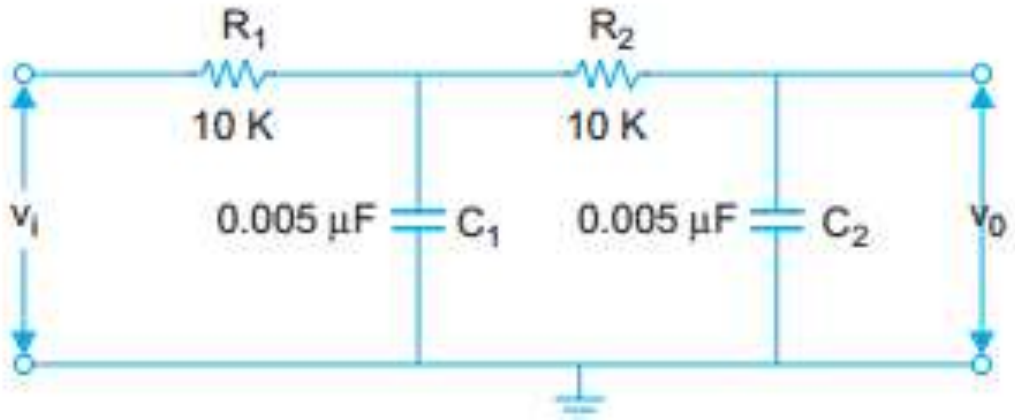
TRANSISTOR NOISE GATE SYNC SEPARATOR



Cascaded Integrator Sections

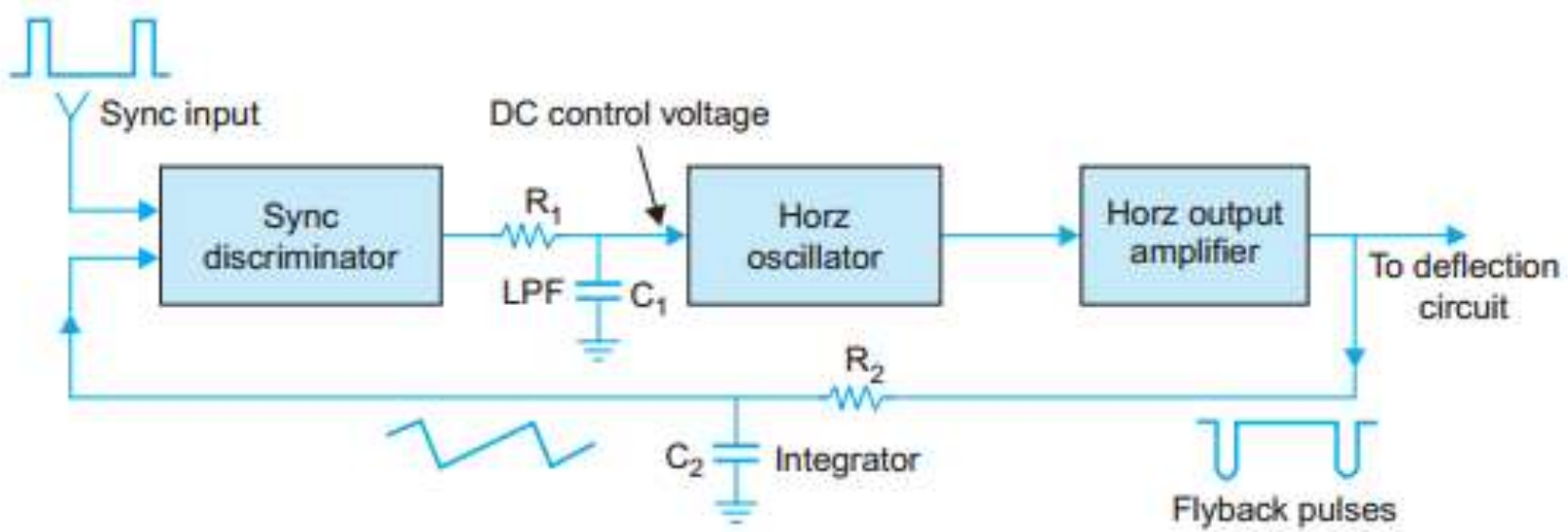


Effect of time-constant on vertical sync output



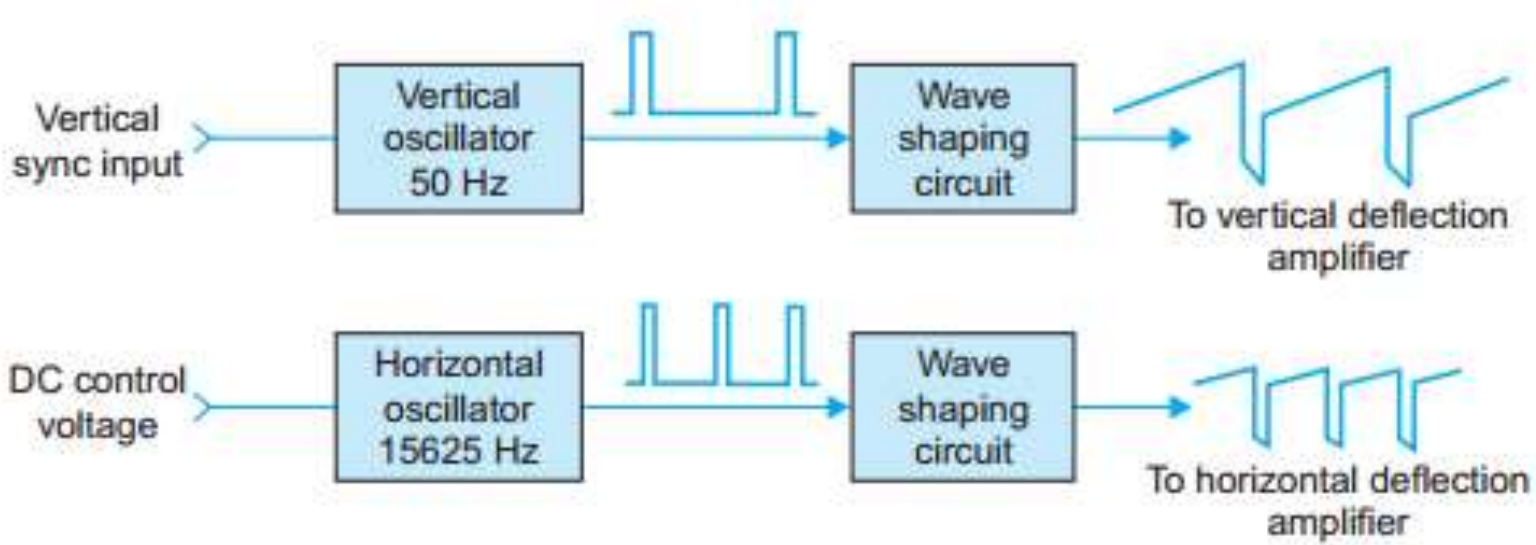
Two-section integrator for vertical sync.

HORIZONTAL SYNC SEPARATION

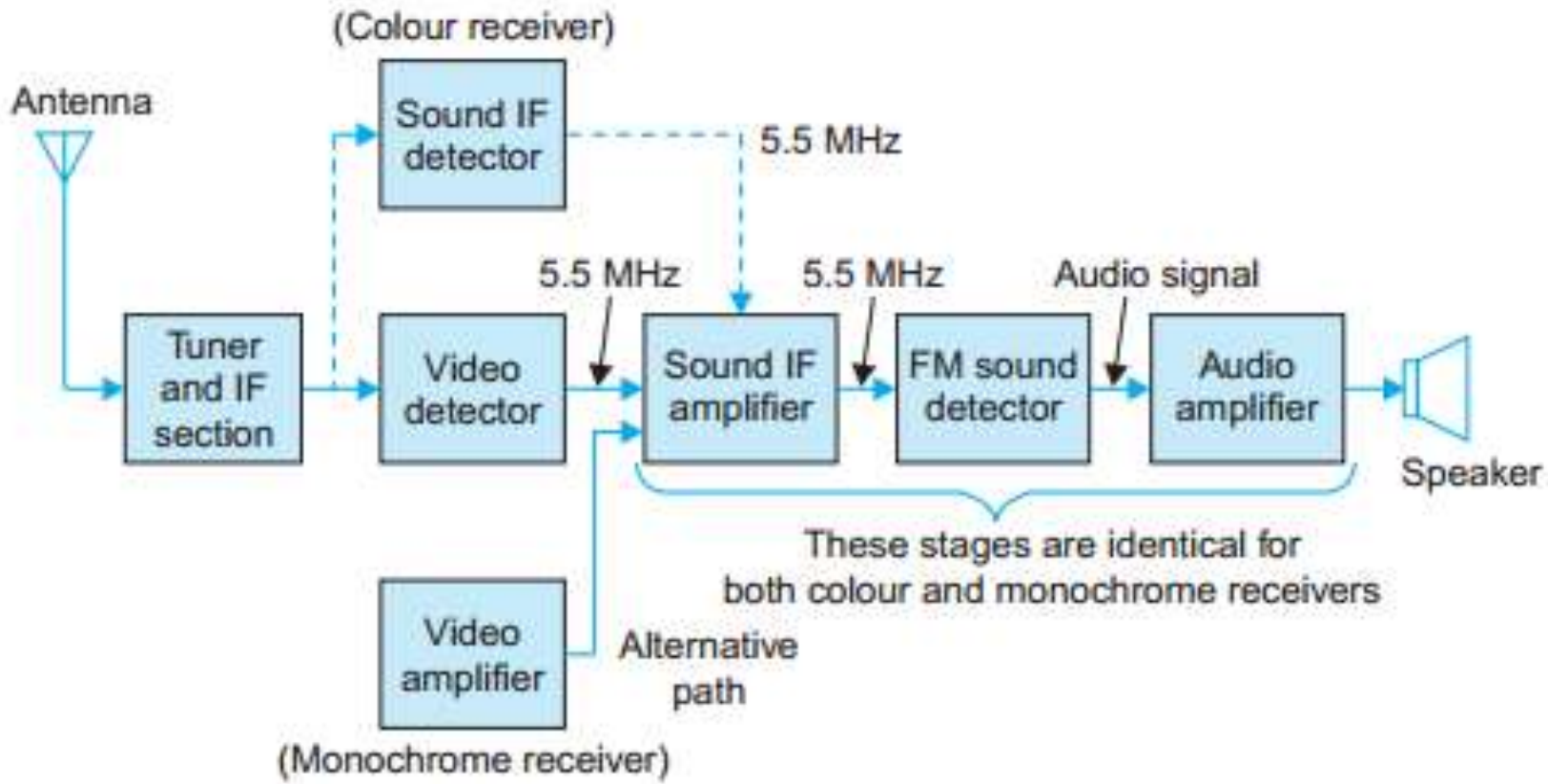


Block diagram of the horizontal AFC system

Deflection oscillators and waveshaping



Sound signal path in monochrome and colour receivers



Reference

- R.R. Gulati, “Modern Television Practice”, Third edition, New Age International Publishers