7.7 Automatic Gain Control (AGC)

Q. *Write a short note on AGC.*

Need

- Different signals of different frequencies are received by radio stations.

- Each signal has its own strength, some are stronger comparatively and some are weaker.

- The receiver's gain is constant. Thus receiver output varies with the strength of the incoming signal.

- This is undesirable. Hence AGC circuits were introduced to vary the gain of the receiver according to the input signal so that output is not fluctuating.

Definition

- AGC is a circuit by means of which the overall gain of the receiver is varied in accordance with the strength of the received signal.

- Normally, AGC voltage is a −ve voltage that is applied at the base of transistors of IF and RF amplifiers which reduces the overall gain when the signal strength is high.

- When signal is weak, ideally there should be no AGC voltage.

Types of AGC

There are two types :

- Simple AGC

- Delayed AGC

7.7.1 Simple AGC

Q. *Discuss the merits of delayed AGC as compared to simple AGC. Sketch the circuit and explain how delayed AGC can be realized.*
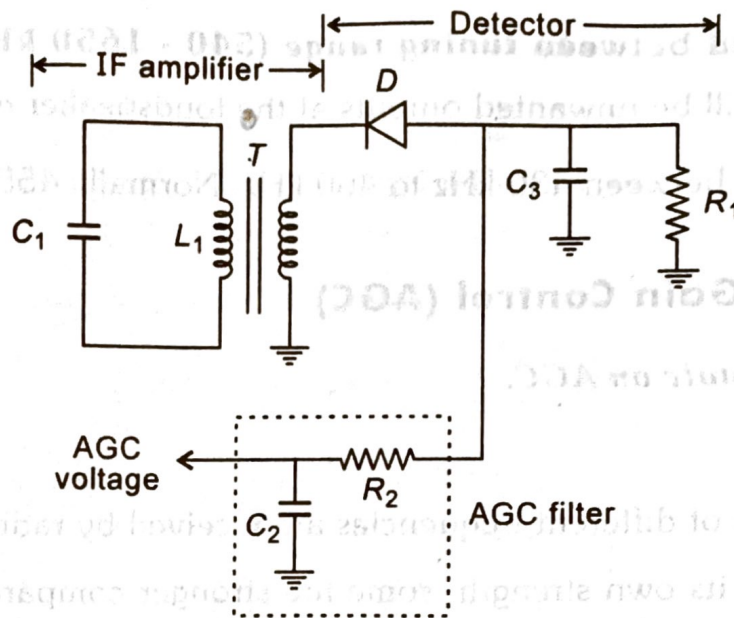
Fig. 7.12 : Circuit Diagram of a Simple AGC

- Diode D is connected such that only −ve peak of modulating signal is detected.
- The diode also produces a d.c. component and which is proportional to the strength of the received signal.
- The AGC filter passes this d.c. component and filters out the a.c. components.
- Thus a −ve AGC voltage is developed which is applied to the base of IF and RF amplifiers.
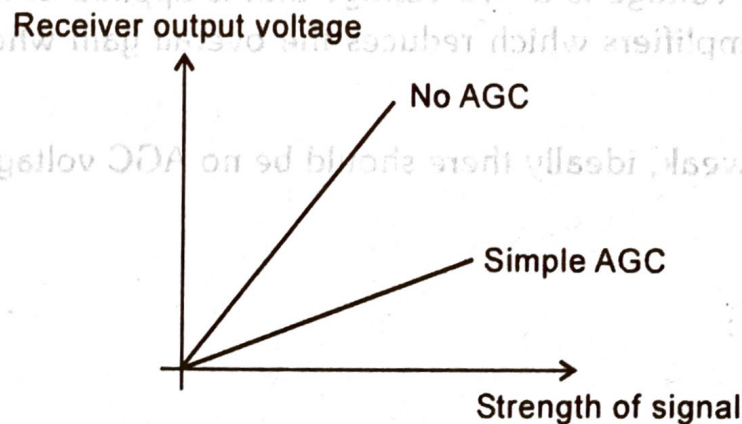- Due to this, the gain of IF and RF amplifier reduces in turn reducing the overall gain.

Fig. 7.13

Advantages

- Simple to design

Disadvantages

- Even if the signal is already weak, some amount of AGC voltage is developed reducing the gain of receiver.
- This may result in total loss of weak signals.

7.7.2 Delayed AGC

- Delayed AGC system gets activated only after the signal strength is more than a predetermined value.
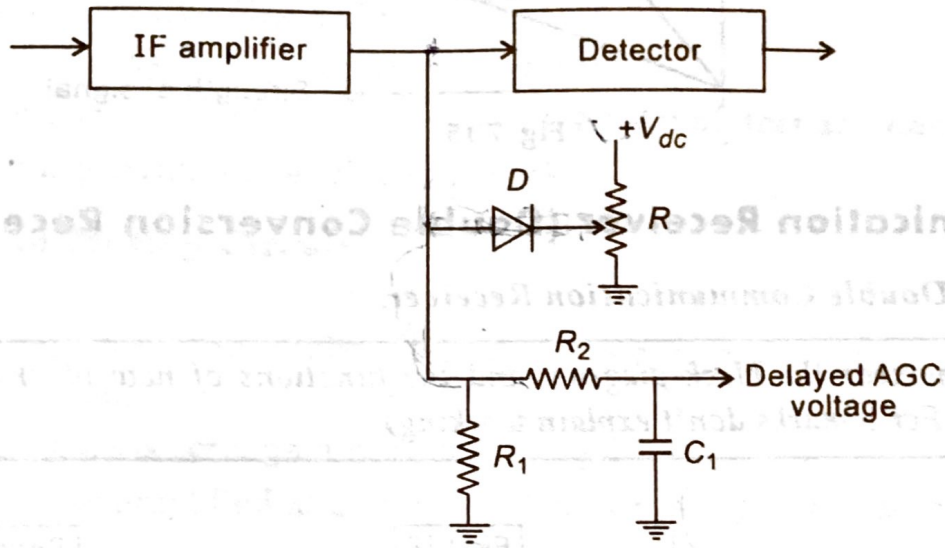- Thus it won't operate for weaker signals.

Fig. 7.14 : Circuit diagram of a delayed AGC.

Working

- The cathode of diode D is connected to $+V_{dc}$.
- Now we will consider the following two cases.

Case (i) : Signal is Weak

- If the signal is weak, i.e. less compared to V_{dc} then the diode D is reverse biased.
- Thus all the a.c. signal is by passed by capacitor C_1 to ground resulting in No AGC voltage.
- Thus gain is not affected.

Case (ii) : Signal is Strong

- If the signal is strong, i.e. more compared to V_{dc} then the diode D is forward biased during +ve cycle and reverse biased during −ve cycle.
- Now, diode D produces a d.c. component which varies according to the strength of the signal.
- The capacitor acts as an open circuit for this d.c. voltage.
- Thus a −ve voltage is developed as delayed AGC voltage.
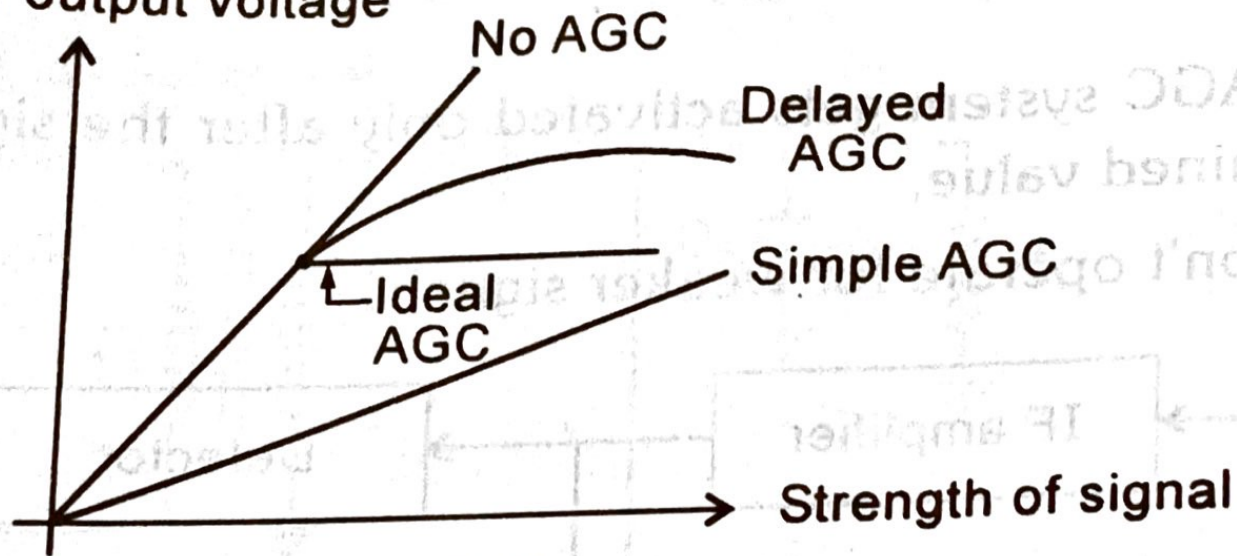- This is then connected to the IF and RF amplifiers to reduce the gain.

Fig. 7.15