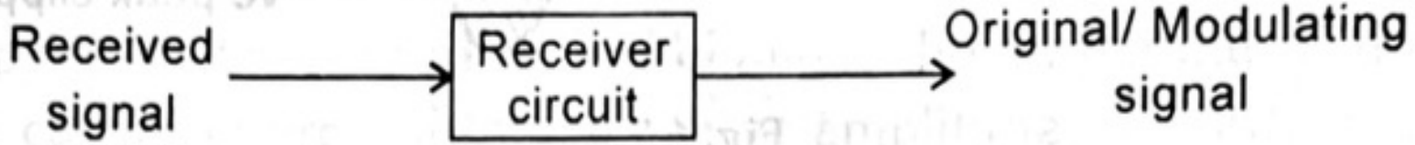
The main function of the receiver is to regenerate the original signal from the received signal.



According to our syllabus, we have to study two receiver circuits :

(i) TRF Receiver

(ii) SHR Receiver

7.1 Tuned Radio Frequency (TRF) Receiver

Q. Sketch the block diagram of a TRF radio receiver and briefly describe its working. Explain its predominant disadvantages.

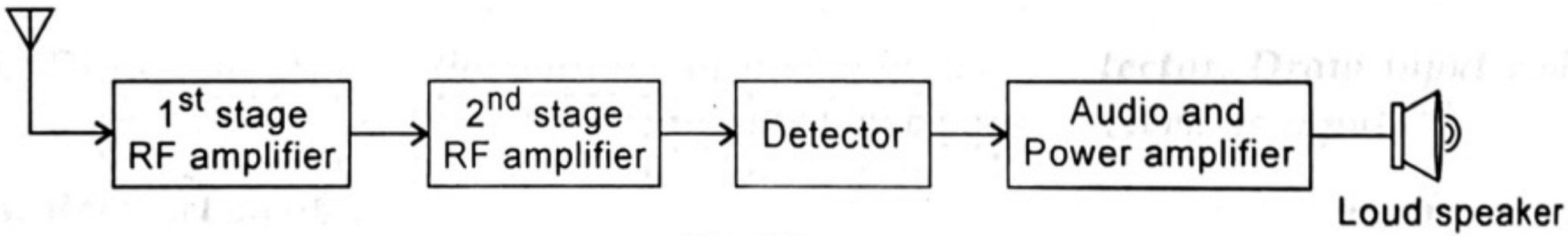


Fig. 7.1

Working

Figure 7.1 shows the block diagram of TRF receiver. The functions of different blocks are

(i) RF Amplifier

- Two or three RF amplifiers are used to select the desired frequency signal and reject all other frequencies.
- Also after selecting the signal, the signal is amplified.

(ii) Detector

- It consists of the detector circuit.
- Original signal is detected here.

(iii) Audio and Power Amplifier

- Used to amplify the detected signal.

Advantages

- Simple in design.

Disadvantages

(i) Instability

- The overall gain of RF amplifiers is extremely high.
- So, a small feedback from the output can make the RF amplifier work as an oscillator.

(ii) Variation in Bandwidth

- For better selectivity, the bandwidth of the receiver should always remain constant. But, in TRF bandwidth changes with the incoming frequency.

> **Note :** *Selectivity is a characteristic of a receiver covered in the later part of this chapter.*

- Normally, bandwidth, $B.W. = \frac{f_r}{Q}$

f_r = Frequency of received signal

B.W = Bandwidth

Q = Quality factor of the circuit

Now, Q is constant.

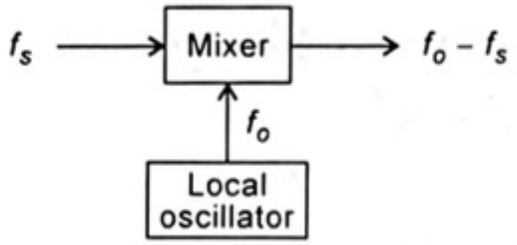
Thus, when the frequency of received signal changes, the bandwidth also changes. This drawback is overcome in SHR with the concept of intermediate frequency.

(iii) Poor Selectivity

- As bandwidth varies with the variation in incoming frequency the selectivity degrades.

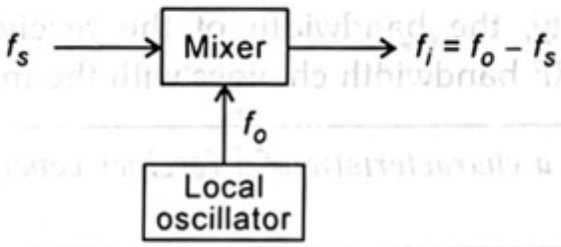
7.2 Concept of Intermediate Frequency in SHR Receiver

- The main drawback of TRF receiver is its variation in BW due to variation in frequency.
- SHR overcomes this drawback by converting every received signal frequency to a constant intermediate frequency called the *IF frequency* or (f_i).
- This is done with the help of a local oscillator and a mixer.
- *Local oscillator* is a circuit which is used to generate signals of a particular frequency.
- *Mixer*



Mixer just gives the difference of the two input frequencies.

7.2.1 How Does Local Oscillator and Mixer Work



f_s = Incoming frequency
f_o = Oscillator frequency
f_i = Intermediate frequency

- Our main aim is to keep the output i.e. f_i at a constant value.

Working

- As f_s changes, if f_o is also changed then, the difference will be constant.
- Hence, f_o is always changed with f_s using ganged tuning.

Note : *The mixer circuit in practice gives many frequencies at its output but only the difference frequency is selected for the next stages.*