

## GLOSSARY

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1. **Balanced mixer:** A mixer in which the input frequencies are cancelled and are therefore not present at the output.
2. **Bypassing:** Removal of an unwanted signal by providing a low-impedance path to ground.
3. **Capture range:** The total frequency range over which a PLL can become locked to a signal.
4. **Crystal:** A small slab of quartz with attached electrodes; used as a resonant circuit.
5. **Decouple:** To prevent the undesired passage of signals between circuits.
6. **Multiplier:** A circuit whose output is proportional to the product of the instantaneous amplitudes of two input signals.

7. **Amplitude modulation (AM):** A modulation scheme in which the amplitude of a high-frequency signal is varied in accordance with the instantaneous amplitude of an information signal.
8. **Envelope:** The curve produced by joining the tips of the individual RF cycles of a modulated wave.
9. **Modulation index:** Measure of the extent of modulation of a signal.
10. **Overmodulation:** Modulation to a greater depth than allowed (for AM, this means a modulation index greater than one).
11. **Peak envelope power (PEP):** The power measured at modulation peaks in an AM or single-sideband signal.
12. **Quadrature AM:** Transmission of two separate information signals using two amplitude-modulated carriers at the same frequency but differing in phase by  $90^\circ$ .
13. **Side frequency:** A signal component in a modulated signal, at a frequency different from that of the carrier.
14. **Sideband:** All of the side frequencies to one side of the carrier frequency.
15. **Single-sideband (SSB):** Any AM scheme in which only one of the two sidebands is transmitted.
16. **Suppressed-carrier signal:** An AM signal in which the carrier frequency component is eliminated and only one or both sidebands are transmitted.
17. **Two-tone test signal:** A signal consisting of two audio frequencies, not harmonically related, used to test single-sideband transmitters.
18. **Carrier shift:** Change of carrier amplitude with modulation in an AM transmitter.
19. **High-level modulation:** Amplitude modulation of the output element of the output stage of a transmitter.
20. **Low-level modulation:** Modulation of a transmitter at any point before the output element of the output stage.
21. **Envelope detector:** An AM demodulator that works by rectifying the signal and low-pass filtering the result.
22. **Pilot carrier:** Low-level carrier signal transmitted to facilitate regeneration of the carrier at the receiver.

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1. **Free-running frequency:** The frequency at which a VCO operates when its control voltage is zero.
2. **Frequency multiplier:** A circuit whose output frequency is a small integer multiple of the input signal frequency.
3. **Frequency synthesizer:** A device that can produce a large number of output frequencies from a smaller number of fixed-frequency oscillators.
4. **Varactor:** A reverse-biased diode used as a voltage-variable capacitor.



5. **Voltage-controlled oscillator (VCO):** An oscillator whose frequency can be controlled by changing an external control voltage.
6. **Angle modulation:** A general term that includes frequency and phase modulation.
7. **Capture effect:** The ability of an FM receiver to receive the stronger of two signals, ignoring the weaker.
8. **Carrier frequency:** The frequency of a signal before modulation is applied; in contrast to AM signals, the power transmitted at the carrier frequency varies with modulation for an FM signal.
9. **De-emphasis:** Uses of low-pass filter in a receiver to remove the effect of pre-emphasis on the frequency response.
10. **Frequency deviation:** The amount by which the frequency of an FM signal shifts to each side of the carrier frequency.
11. **Modulation index:** In FM and PM, the peak amount in radians by which the phase of a signal deviates from its resting value.
12. **Narrowband FM (NBFM):** FM with a relatively low modulation index.
13. **Pre-emphasis:** Use of a high-pass filter in an FM transmitter to improve the signal-to-noise ratio; always used with de-emphasis at the receiver.
14. **Rest frequency:** The frequency of the unmodulated carrier of an FM signal; a synonym for carrier frequency.

1. **Aliasing :** Distortion created by using too low a sampling rate when coding an analog signal for digital transmission.
2. **Digital Signal Processing (DSP) :** Filtering of signals by converting them to digital form, performing arithmetic operations on the data bits, then converting back to analog form.
3. **Flat-topped Sampling :** Sampling of an analog signal using a sample-and-hold circuit, such that the sample has the same amplitude for its whole duration.
4. **Foldover Distortion :** See aliasing
5. **Pulse-Amplitude Modulation (PAM) :** A series of pulses in which the amplitude of each pulse represents the amplitude of the information signal at a given time.
6. **Pulse-Duration Modulation (PDM) :** A series of pulses, in which the duration of each pulse represents the amplitude of the information signal at a given time.
7. **Pulse-Position Modulation (PPM) :** A series of pulses, in which the timing of each pulse represents the amplitude of the information signal at a given time.
8. **Sample and Hold Circuit :** A device that detects the amplitude of an input signal at a particular time called the sampling time and maintains its output at or near that amplitude until the next sampling time.

1. **Noise:** In electrical terms, noise may be defined as an unwanted form of energy which tend to interfere with the proper reception and reproduction of transmitted signals. For example, in



receivers, several electrical disturbances produce noise and thus modifying the required signal in an unwanted form.

2. **External Noise:** External noise may be defined as that type of noise which is generated external to a communication system i.e. whose sources are external to the communication system.
3. **Atmospheric Noise:** Atmospheric noise, which is also called static, is produced by lightning discharges in thunderstorms and other natural electrical disturbances which occur in the atmosphere.
4. **Solar Noise:** Solar noise is the electrical noise emanating from the Sun. Under steady conditions, there is a regular radiation of noise from the Sun.
5. **Industrial Noise:** The industrial noise or man-made noise is that type of noise which is produced by such sources as automobiles and aircraft ignition, electrical motors, switch gears and leakage from high voltage transmission lines and several other heavy electrical equipments.
6. **Internal Noise:** Internal noise is that type of noise which is generated internally or within the communication system or receiver. Internal noise may be treated quantitatively and can also be reduced or minimized by proper system design.
7. **Shot Noise:** Shot noise arises in active devices due to random behaviour of charge carriers. In electron tubes, shot noise is generated due to the random emission of electrons from cathodes, whereas in semiconductor devices shot noise is generated due to the random diffusion of minority carriers or simply random generation and recombination of electron-hole pairs.
8. **Partition Noise:** Partition noise is generated in a circuit when a current has to divide between two or more paths. This means that the partition noise results from the random fluctuations in the division.
9. **White Noise:** Noise in an idealized form is known as **white noise**. This means that in a communication system, the noise analysis is based on an idealized form of noise, i.e., white noise.
10. **Equivalent Noise Bandwidth :** Equivalent noise bandwidth may be defined as the bandwidth of an ideal bandpass system which produces the same noise power as the actual system does.

1. **Output Signal to Noise Ratio:** This is more useful measure of noise performance. It is denoted by  $SNR_o$  and defined as the average power of the demodulated message signal to the average power of the noise measured at the output of the demodulator.
2. **Figure of Merit:** In order to compare different CW modulation systems, we have to normalize the receiver performance by dividing the output signal to noise ratio ( $SNR_o$ ) by the channel signal to noise ratio ( $SNR_c$ ).

Hence the figure of merit for a receiver is defined as under :

$$\text{Figure of merit} = \frac{(SNR_o)}{(SNR_c)} = \frac{SNR_o}{SNR_i}$$

Figure of merit can be less than greater than or equal to 1 depending on the type of modulation.

4. **Threshold Effect:** The loss of message signal in the output of the envelope detector due to low carrier-to-noise ratio is called as threshold effect.
5. **Limiter:** In FM, only the carrier frequency is changed and the amplitude of the FM wave is supposed to remain constant. But due to noise added to the FM wave, its amplitude changes. To avoid this from happening an amplitude limiter is connected after the bandpass filter.
6. **FM Threshold Reduction:** In some applications, such as space communication using FM, we have to reduce the noise threshold. This is essential to operate the FM receiver with minimum possible signal power. Threshold reduction can be achieved by using an FM demodulator with a negative feedback. Such a demodulator is known as FMFB demodulator. Another technique to reduce the threshold is by using a phase-locked loop (PLL) demodulator.
8. **PLL Demodulator:** The PLL demodulator is also known as extended threshold demodulator.