A-M and F-M Receivers

a. General. The only difference between the a-m superhetrodyne and the two basic types of f-m superhetrodyne receivers (fig. 18) is in the detector circuit used to recover the modulation. In the a-m system, in A, the i-f signal is rectified and filtered, leaving only the original modulationg signal. In the f-m system, the frequency variations of the signal must be transformed into amplitude variations before they can be used.

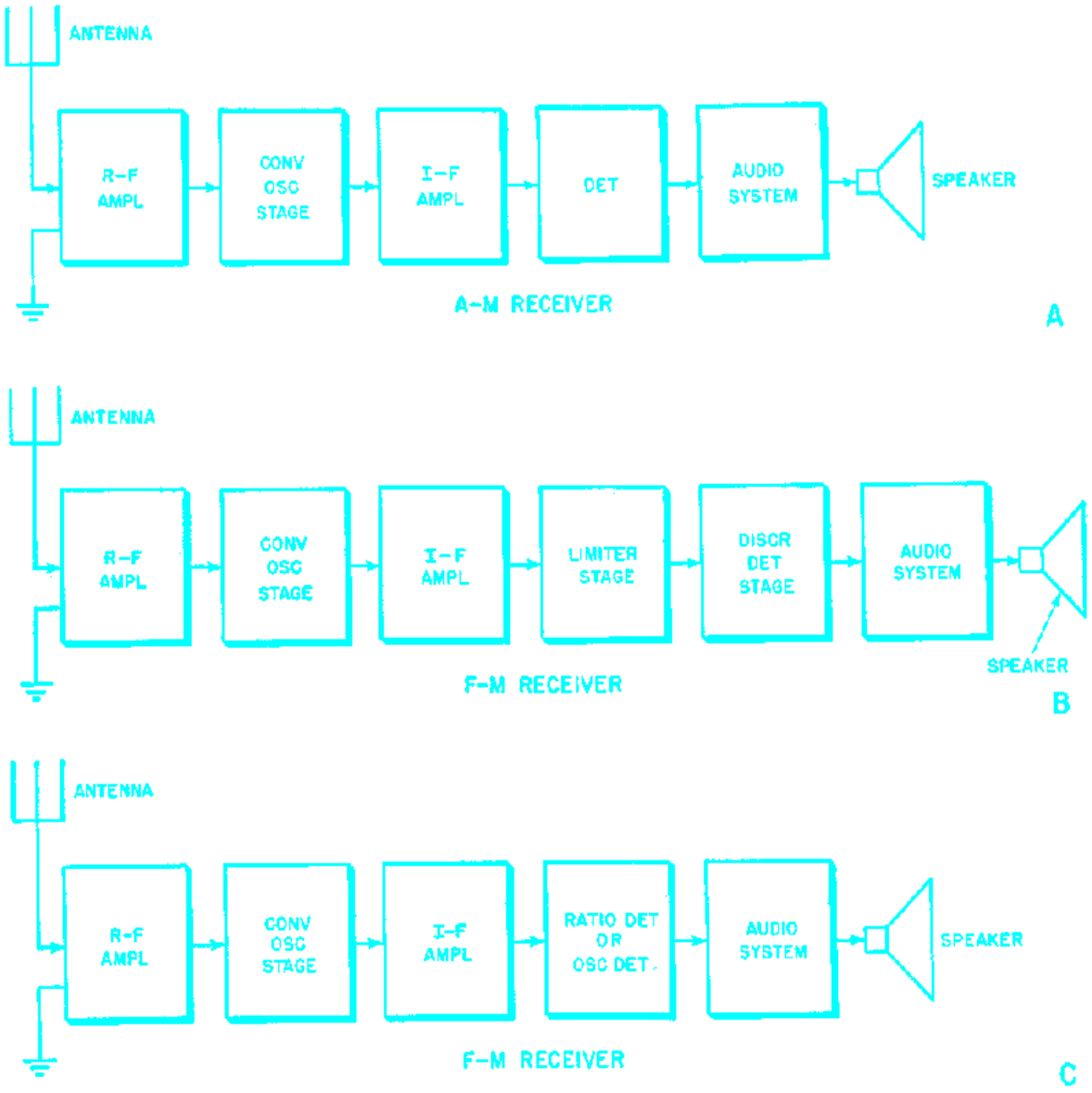

Figure 18. Basic a-m and f-m receivers.

b. F-M Receiver. In the limiter-discriminator detector, in B, the f-m signal is amplitude-limited to remove any variations caused by noise or other disturbances. This signal is then passed through a discriminator which transmorms the frequency variations to corresponding voltage amplitude variation. These voltage variations reproduce the original modulating signal. Two other types of f-m single-stage detectors in general use are the ratio detector and the oscillator detector, shown in C.

Basics of AM radio receivers :

In the early days of what is now known as early radio transmissions, say about 100 years ago, signals were generated by various means but only up to the L.F. region.

Communication was by way of morse code much in the form that a short transmission denoted a dot (dit) and a longer transmission was a dash (dah). This was the only form of radio transmission until the 1920's and only of use to the military, commercial telegraph companies and amateur experimenters.

Then it was discovered that if the amplitude (voltage levels - plus and minus about zero) could be controlled or varied by a much lower frequency such as A.F. then real intelligence could be conveyed e.g. speech and music. This process could be easily reversed by simple means at the receiving end by using diode detectors. This is called modulation and obviously in this case amplitude modulation or A.M.

This discovery spawned whole new industries and revolutionized the world of communications. Industries grew up manufacturing radio parts, receiver manufacturers, radio stations, news agencies, recording industries etc.

There are three distinct disadvantages to A.M. radio however.

Firstly because of the modulation process we generate at least two copies of the intelligence plus the carrier. For example consider a local radio station transmitting on say 900 Khz. This frequency will be very stable and held to a tight tolerance. To suit our discussion and keep it as simple as possible we will have the transmission modulated by a 1000 Hz or 1Khz tone.

At the receiving end 3 frequencies will be available. 900 Khz, 901 Khz and 899 Khz i.e. the original 900 Khz (the carrier) plus and minus the modulating frequency which are called side bands. For very simple receivers such as a cheap transistor radio we only require the original plus either one of the side bands. The other one is a total waste. For sophisticated receivers one side band can be eliminated.

The net effect is A.M. radio stations are spaced 10 Khz apart (9 kHz in Australia) e.g. 530 Khz...540 Khz...550 Khz. This spacing could be reduced and nearly twice as many stations accommodated by deleting one side band. Unfortunately the increased cost of receiver complexity forbids this but it certainly is feasible - see Single Side Band.

Basic types of radio receivers :

basic crystal set

reflex radio receivers

regenerative radio receivers

superhetrodyne radio receivers

fm radio receivers

Source : http://nprcet.org/e%20content/cse/ADC.pdf