

INSTRUMENT LANDING SYSTEM (ILS)

OBJECTIVE-

Understanding the basic principle, working, Installation and testing of ILS.

TERMS-

PAR-Precision Approach Radar

DH- Decision height

RVR- Runway visibility Range

DDM:- Deference in Depth of Modulation

ICAO VISIBILITY CATEGORIES-

SL. NO.	CATEGORY	D.H.	R.V.R.
1	I	60 m (200 ft)	800 m (2600 ft)
2	II	30 m (100 ft)	400 m (1200 ft)
3	IIIA	-	200 m (700 ft)
4	IIIB	-	30 m (150 ft)
5	IIIC	-	ZERO

VFR-

- Without any indication from the Instrument.
- At least 3 miles horizontal visibility with ceiling not less than 1000 ft.

ICAO VISIBILITY CATEGORIES-

- All categories are detailed in ICAO Annex 14.
- Category IIIA & B are called 'see to land' and 'see to taxi'.

CLASSIFICATION OF ILS-

ILS



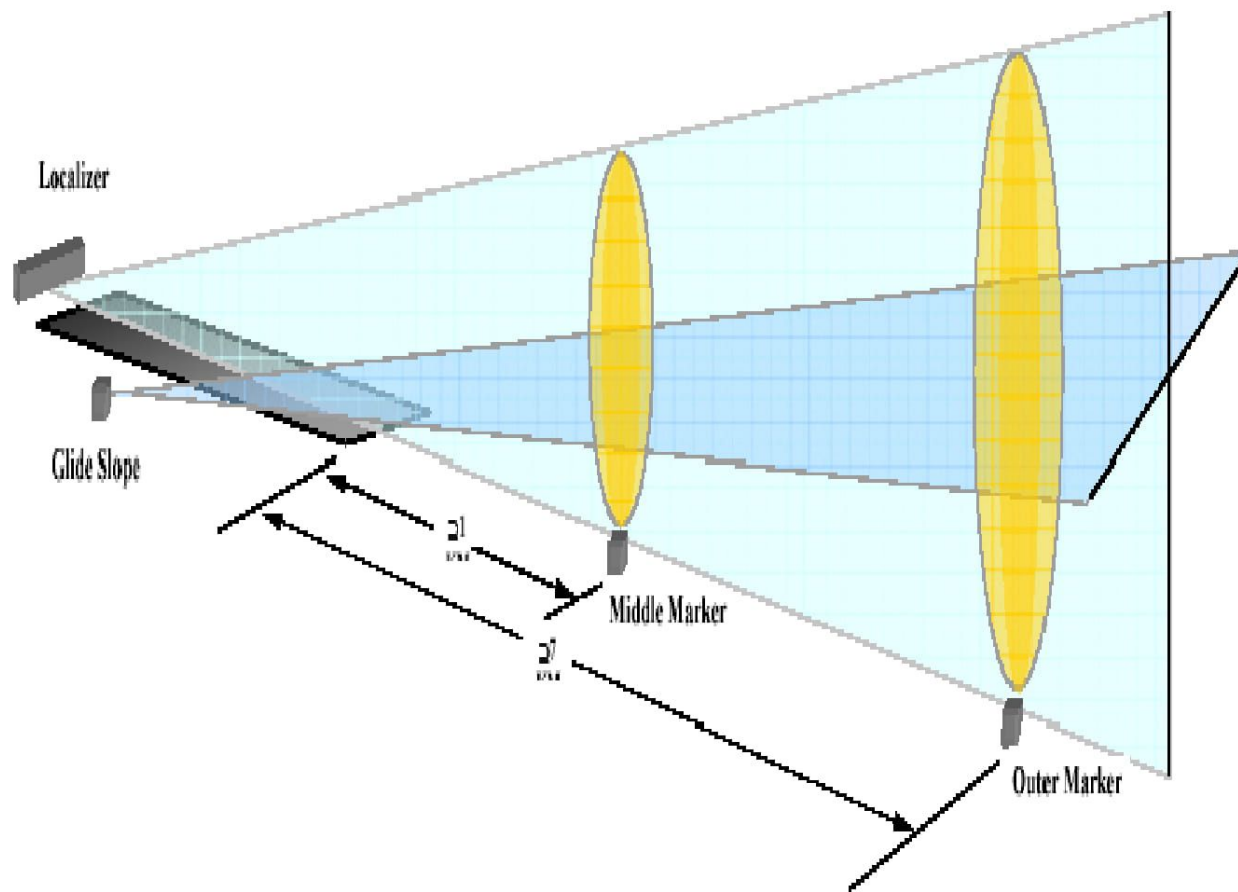
- Localizer
- Glide slope
- Marker Beacon

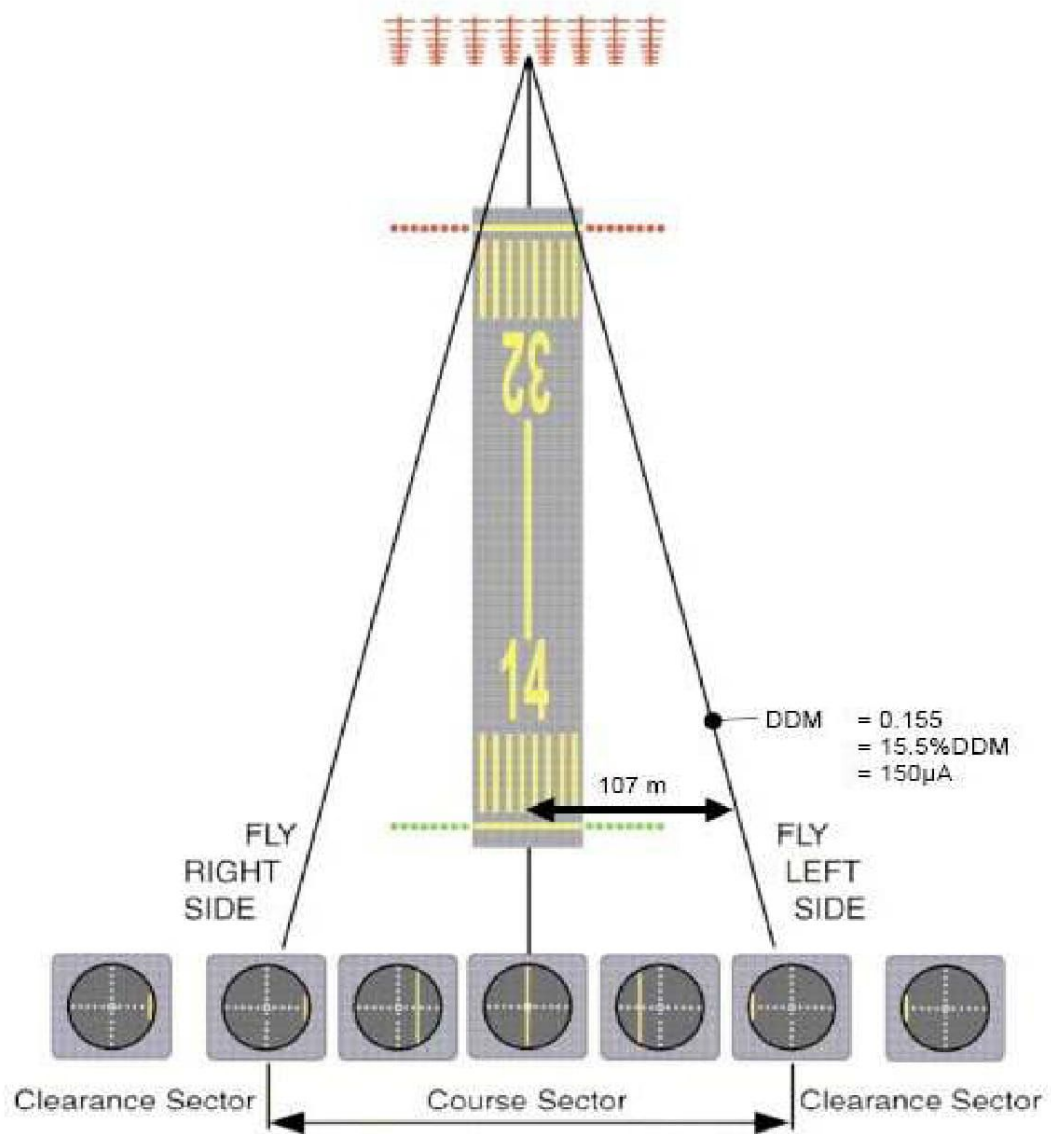
BASIC PRINCIPLES-

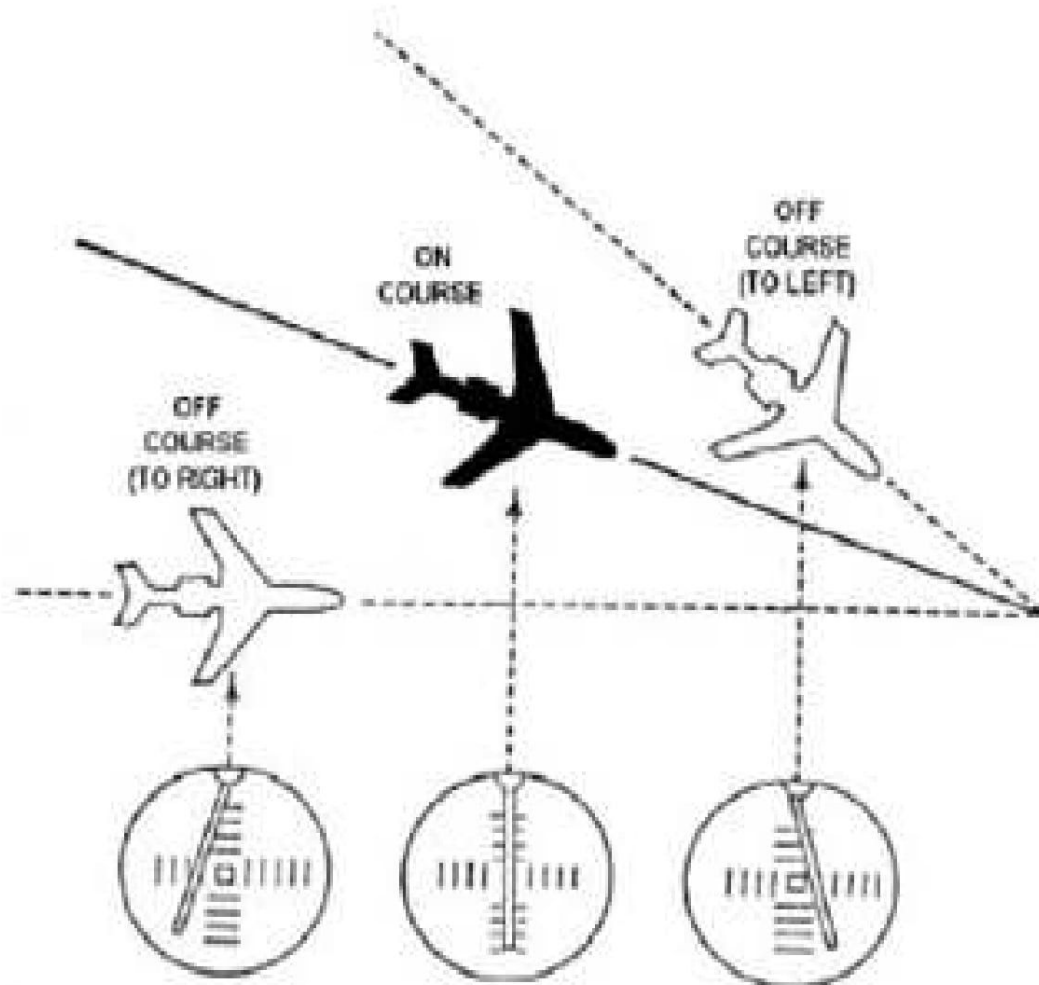
- Directional radio beams, modulated so as to enable airborne equipment to identify the beam centers, define the correct approach path to a particular runway.
- Lateral steering is provided by the localizer for both front and back course approaches.
- The glide slope provides vertical steering for the front course only.
- Marker beacon gives the distance check.

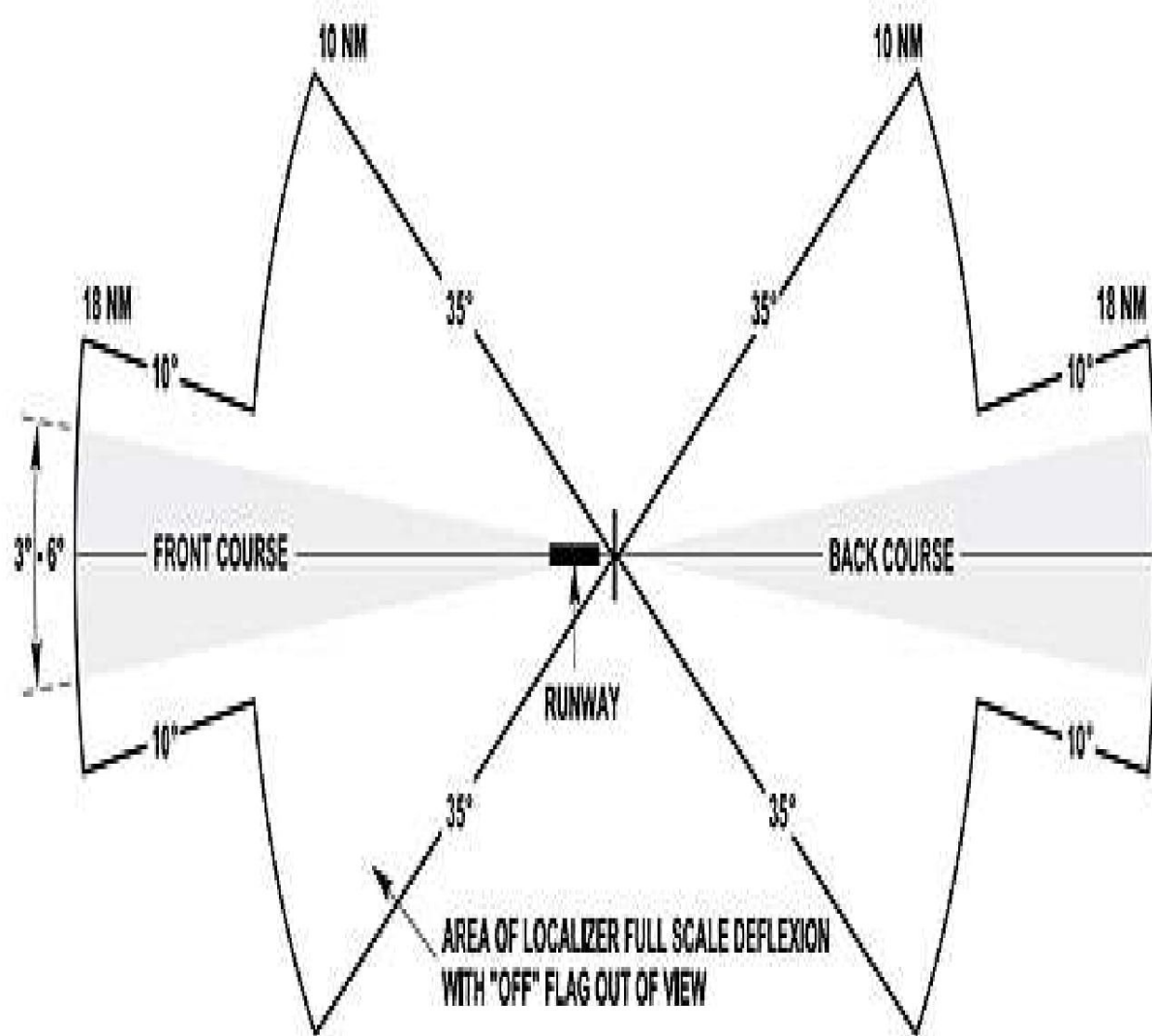
LOCALIZER-

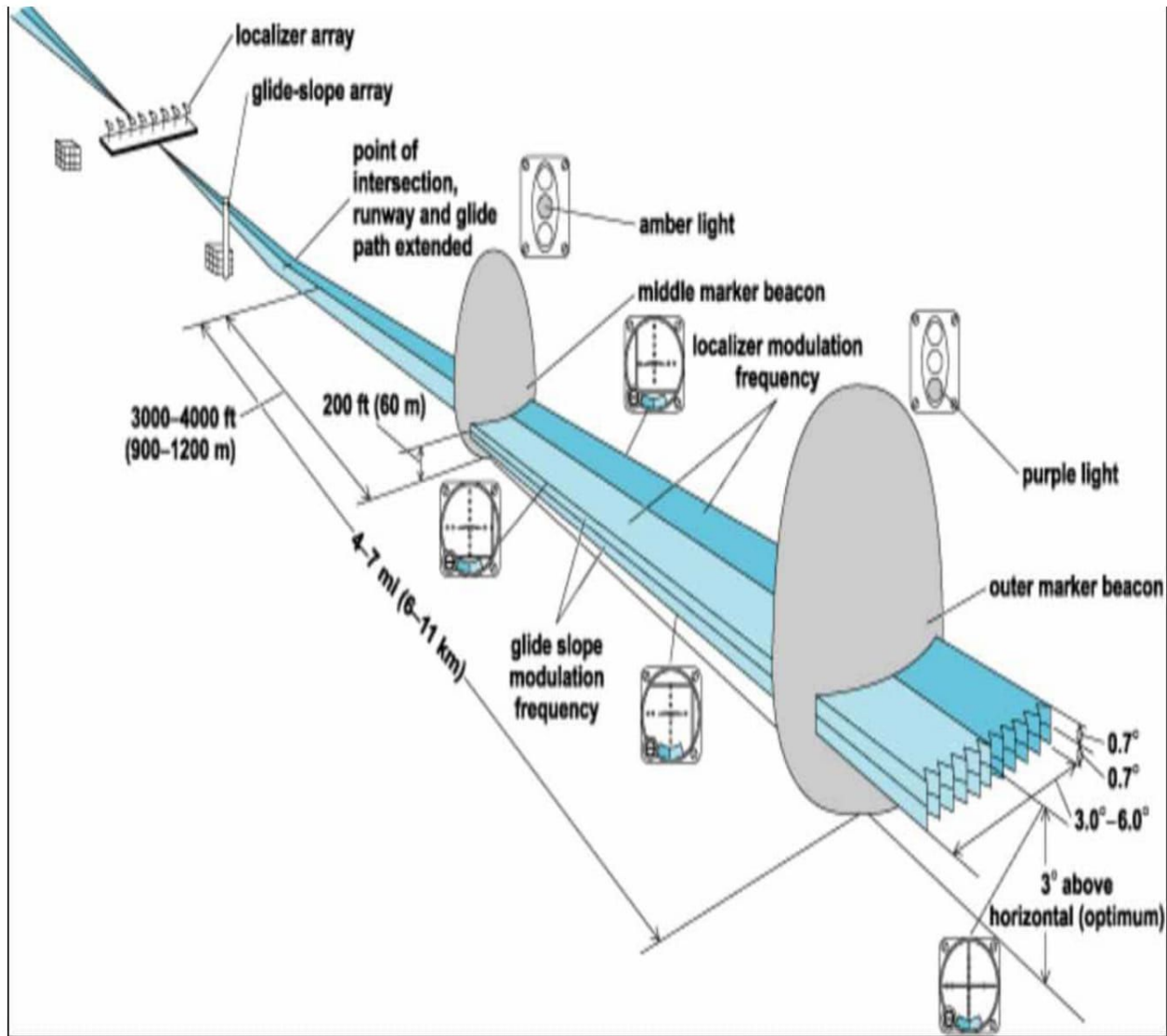
- No. of channels are 40.
- Spacing between channels is 50 KHz.
- Operating frequency is 108.10 to 111.95 MHz
- Allotted frequencies of localizer-tenth of megacycle count is odd, for example 108.10 & 108.15.
- Remaining even(tenth of megacycle frequencies) are allotted to VOR. For examples 108.20 & 108.25.

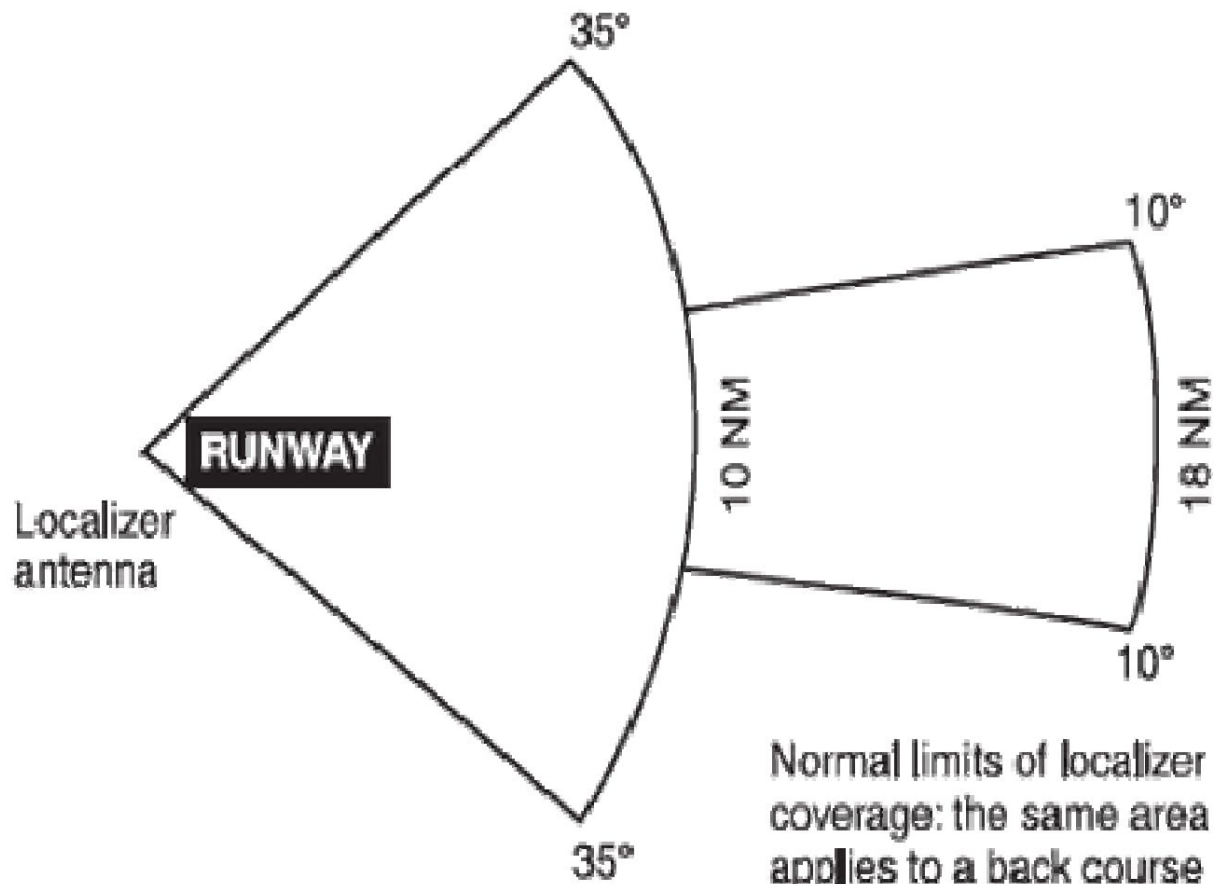




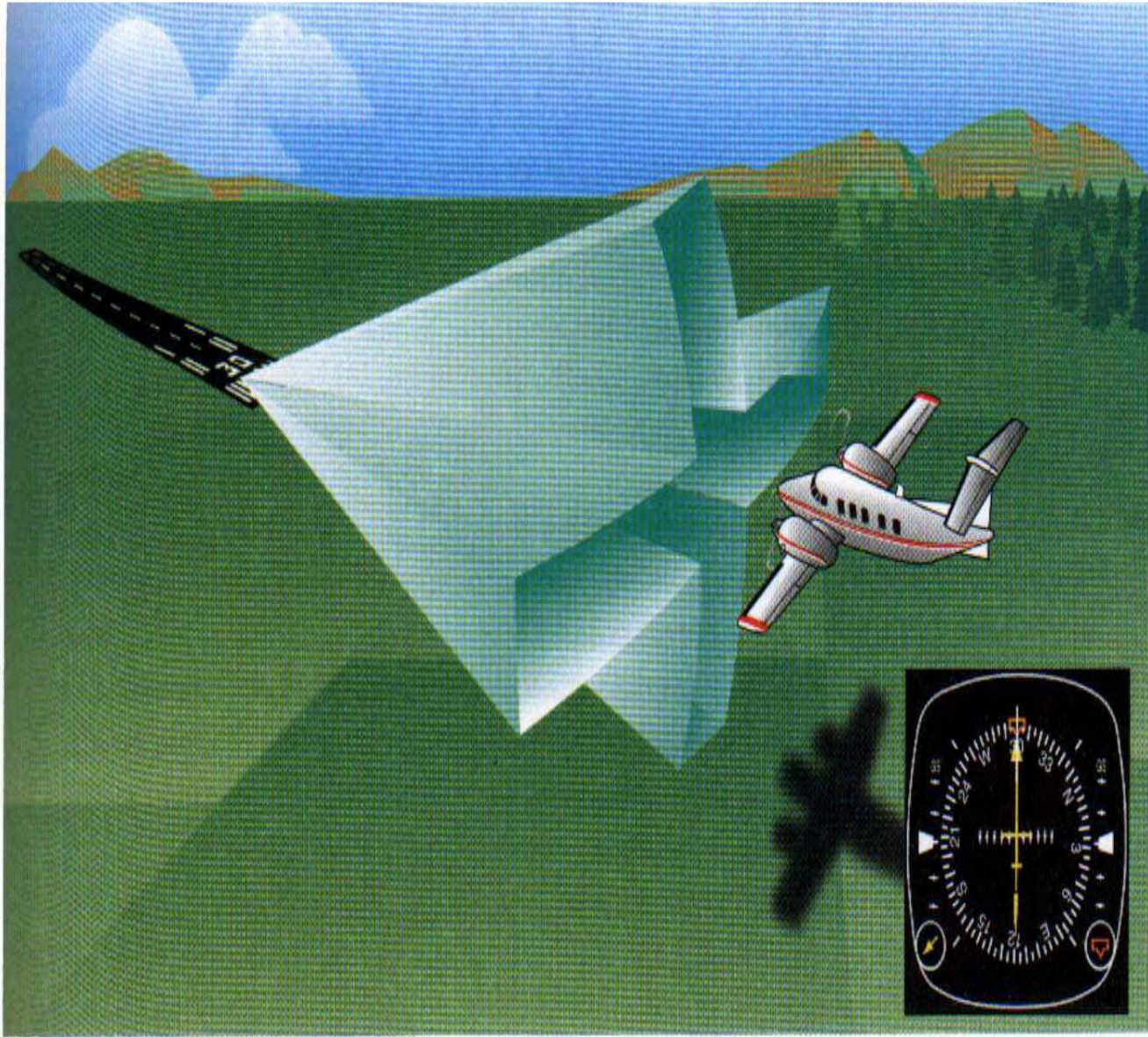


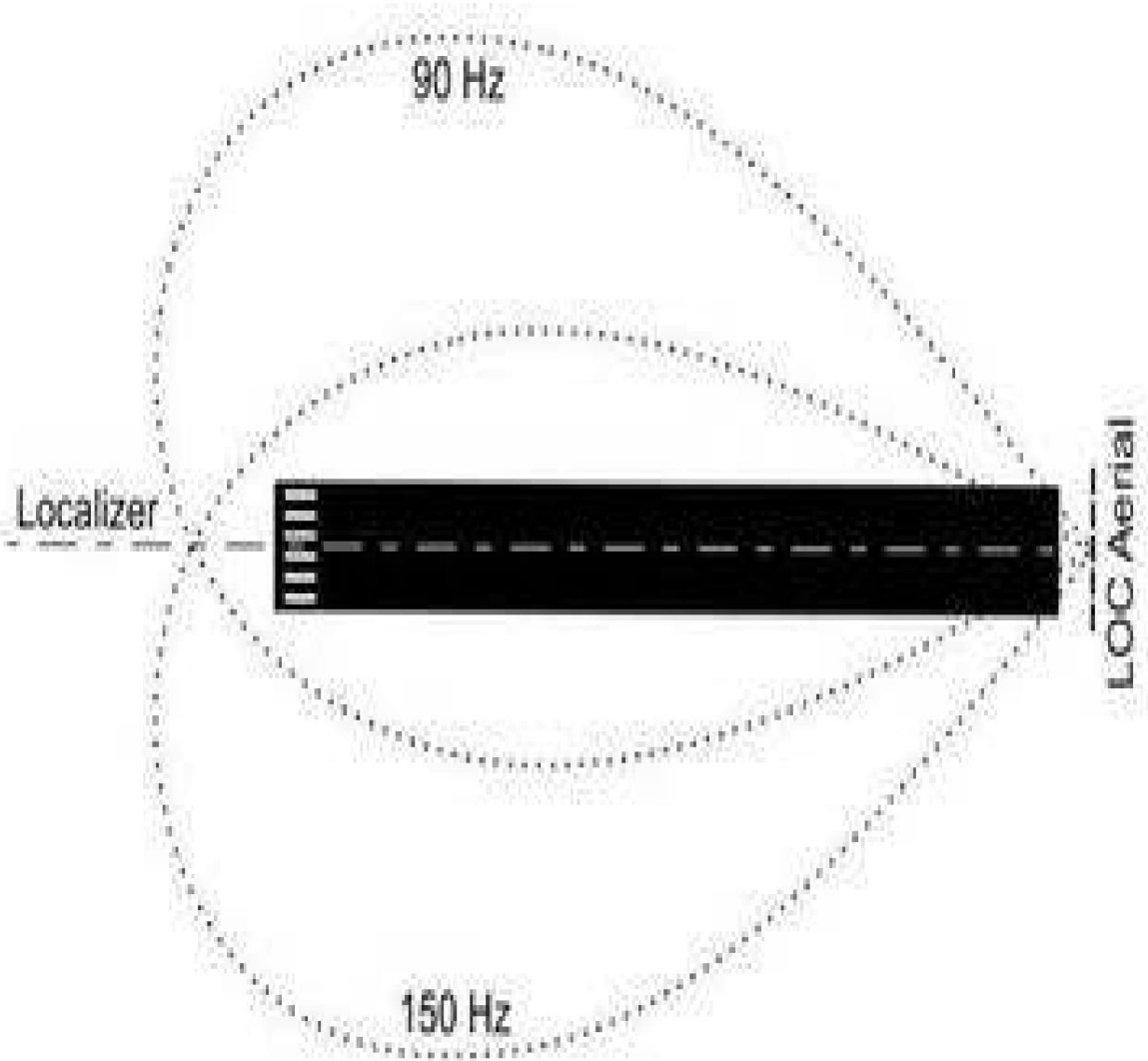






Normal limits of localizer coverage: the same area applies to a back course when provided





LOCALIZER-

- Localizer Coverage(Azimuth)
 - At $\pm 10^\circ$ -----25 NM and may reduced to 18 NM.
 - At $\pm 25^\circ$ beyond the $\pm 10^\circ$ -----10 NM.
- Localizer Coverage(Elevation)
 - Elevation is 1000' or 2000'
 - Coverage sector 7°

LOCALIZER-

- The horizontally polarized radiated carrier is modulated by tones of 90 and 150 Hz.
- Aircraft is left of extended center line if 90Hz modulation predominates. Or $150 \text{ Hz} < 90 \text{ Hz}$.
- Aircraft is right of extended center line if 150Hz modulation predominates. Or $150 \text{ Hz} > 90 \text{ Hz}$.
- Deviation from the center line is given in DDM.
- Carrier is modulated to a depth of 20 percent.

LOCALIZER-

- DDM—the percentage modulation of the larger signal minus the percentage modulation of the smaller signal divided by 100.
- Localizer Course Sector---is defined as that sector in the horizontal plane containing the course line(extended center line) and limited by the lines on which there is a DDM of 0.155.
- The change in DDM is linear for $\pm 105\text{m}$ along the line perpendicular to the course line and passing through the ILS datum point on the runway threshold.

LOCALIZER-

- Course sector is less than 6° .
- Outside the course sector, the DDM is not less than 0.155.
- The air born equipment detects the 90 and 150 Hz tones and hence causes a deviation indicator to show fly left or fly right command.
- Full scale deflection is achieved when the DDM is 0.155 i.e. aircraft is $2-3^\circ$ off course.
- 1020 Hz identification tone in the form of 2 or 3 letter morse code is used.
- the identification transmitted not less than 6 times per minute if localizer is operational.

GLIDESLOPE-

- Channels are in UHF band.
- Frequency Range 328.6 to 335.4 MHz.
- No. of channels are 40 and paired with localizer channels.
- If localizer frequency is tuned, GS is automatically tuned with GS for a particular runway.
- Examples , if 108.10 localizer frequency is tuned by pilot the GS frequency 334.70 for a required runway is automatically tuned as GS frequency coupled with localizer frequency.