

# Instrument Landing System

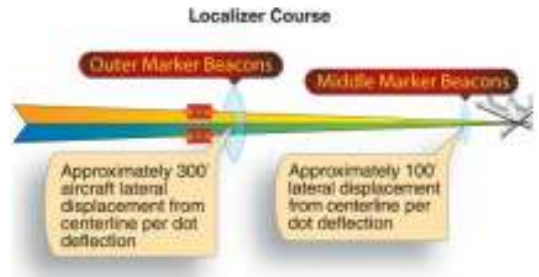
(Pertains to Jeppesen Ch.8 and AIM Ch.1)

## General

Instrument Landing System (ILS) approaches are \_\_\_\_\_ approaches, which means that they give vertical guidance (glide slope) in addition to horizontal guidance (localizer).

There are three parts:

- \_\_\_\_\_ info: localizer, glide slope
- \_\_\_\_\_ info: marker beacon, DME
- \_\_\_\_\_ info: lights



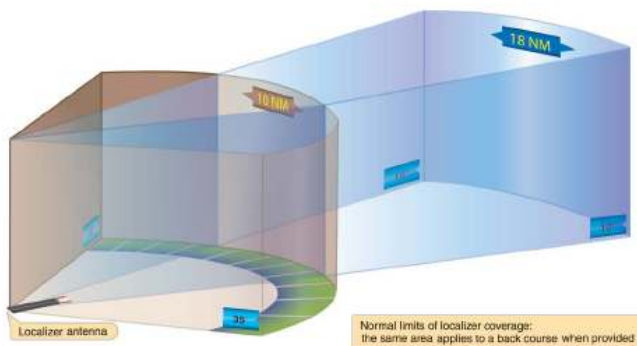
## The Localizer (LOC)

The localizer operates within the frequency range of 108.10 to 111.95 MHz. It has \_\_\_\_\_ times the sensitivity of a VOR. The three-letter Morse Code identifier is preceded by the letter “\_\_\_\_\_” (●●).



The antennae are located 1000 feet from the departure end of the runway. The signal width varies between 3° and 6° in order to provide a course width of \_\_\_\_\_ feet at the runway threshold.

The localizer sends out two VHF signals at \_\_\_\_\_ Hz and \_\_\_\_\_ Hz. The aircraft is centered on the localizer when it receives each signal at equal strength.



## Localizer Accuracy

\_\_\_\_\_° along a radius of \_\_\_\_\_ NM  
 \_\_\_\_\_° along a radius of \_\_\_\_\_ NM

## The Glide Slope



The glide slope operates on UHF frequencies of 329.15 -335.0 MHz and is paired to the LOC frequency. It also sends out VHF signals at \_\_\_\_\_ Hz & \_\_\_\_\_ Hz.

The antenna is located between \_\_\_\_\_ & \_\_\_\_\_ feet from the approach end of the runway and offset 250 to 650 feet from the runway centerline.

It transmits a glide path beam \_\_\_\_\_ degrees wide (vertically). The projection angle is normally adjusted to \_\_\_\_\_ degrees above horizontal.

The normal glide slope range is \_\_\_\_\_ NM.

It is possible to receive a \_\_\_\_\_ glide slope. This occurs when receiving the glide slope at significantly higher altitudes than published. Pilots must verify their height above the \_\_\_\_\_ to confirm that they are on the correct glide path.

14 CFR 91.129: Pilots should stay at or above the glide slope, as indicated by the ILS or VASI.

The published glide slope \_\_\_\_\_ (TCH) represents the height above the runway threshold that an aircraft's \_\_\_\_\_ should be. Actual wheel crossing height is closer to 20-30 feet, depending on the type of aircraft.

## Marker Beacons

ILS marker beacons provide \_\_\_\_\_ and \_\_\_\_\_ cues to alert pilots that an action is needed. All marker beacons operate on a frequency of 75 MHz.

Ordinarily, there are two marker beacons associated with an ILS, the \_\_\_\_\_ (OM) and the \_\_\_\_\_ (MM).

Some airports have stopped maintaining MMs. Airports with Category II approaches are also required to have \_\_\_\_\_ (IMs). Back course beacons are frequently used, as well.

When crossing marker beacons, pilots can expect to hear Morse Code signals and see colored lights flashing on their avionics stacks.

### Marker Passage Indications

Marker	Code	Light
OM	- - -	BLUE
MM	• - • -	AMBER
IM	• • • •	WHITE
BC	• • • •	WHITE

The OM is usually located 4-7 miles from the runway threshold. This is located near the glide slope \_\_\_\_\_ when flying at published altitudes.

The MM indicates a position approximately 3,500 feet from the landing threshold and \_\_\_\_\_ feet above TDZE. This is the \_\_\_\_\_ on a normal ILS approach.

The IM is located 1000 feet from the runway threshold. It indicates the DH for a Category II approach.

A back course marker normally indicates the \_\_\_\_\_ for the back course approach.

### **Compass Locators**

Compass locators are still in wide use by airline pilots. They are weak \_\_\_\_\_s that can be collocated with MMs and OMs. They operate on less than 25 watts and transmit at 190-535 kHz. Their range is \_\_\_\_\_ miles.

Compass locators transmit in two letter identification groups. The Locator Outer Marker (LOM) transmits the \_\_\_\_\_ letters of the Morse Code, and the Locator Middle Marker (LMM) transmits the \_\_\_\_\_.

### **ILS Minimums**

General aviation pilots use minimums for Category I approaches:

Decision Height	_____ feet
Runway Visual Range	_____ feet (1,800' with appropriate lighting)

Category II and III approaches require special authorization and equipment. Category IIIc is so precise that it does not have minimums!

### **Localizer Approaches**

If a glide slope is inoperative, a pilot can still be cleared for an ILS approach. The pilot will then use the non-precision localizer approach.

Timing tables and higher minimums for the LOC approach can be found on the ILS approach plate. If \_\_\_\_\_ is in the title there will be no timing table.

Many pilots will start timers over the FAF in case they lose the glide slope during the ILS approach. Pilots are advised to go missed if they have uncertainty or if they lose the glide slope below the MDA and above the DA.

## **Localizer Back Course Approaches**

A signal from the localizer antenna can be received in the reverse direction of the main course. This “back course” leads to \_\_\_\_\_ needle sensing.

Because the antenna for the approach is in front of the runway threshold, the back course sensitivity is \_\_\_\_\_ times higher than the front course and \_\_\_\_\_ times higher than a VOR. The approach requires precision flying at its best.

Some aircraft have \_\_\_\_\_ (HSIs) that can eliminate the perception of reverse sensing.

## **Signal Interference**

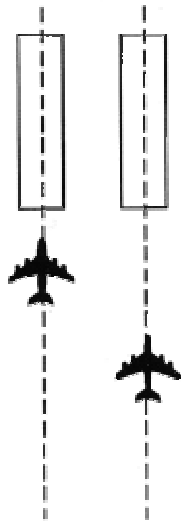
Due to interference with the ILS signal, only one aircraft can use an ILS at a time. This enables about 20 approaches per hour. If the ceiling is less than 200 feet and/or the visibility is RVR 2,000 or less, vehicles and aircraft are not authorized in or over the \_\_\_\_\_ Area when an arriving aircraft is between the FAF and the airport.

Where a complete ILS system is installed on each end of a runway; (i.e., the approach end of Runway 4 and the approach end of Runway 22) the ILS systems cannot be in service simultaneously.

## Parallel ILS Approaches

### DEPENDENT PARALLEL ILS APPROACHES

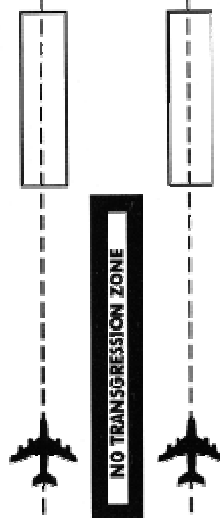
- RUNWAY CENTERLINES SPACE 2500' OR greater
- STAGGERED Approaches
- Final Monitor Controller NOT required



### INDEPENDENT PARALLEL ILS APPROACHES

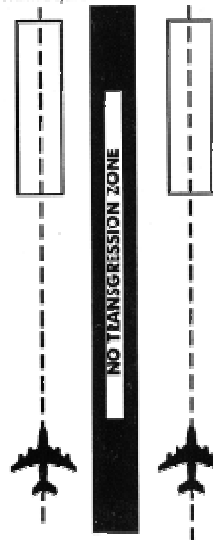
#### SIMULTANEOUS PARALLEL ILS APPROACHES

- Runway centerlines spaced 4300' or greater (Duals & Trips)
- Final Monitor Controllers required

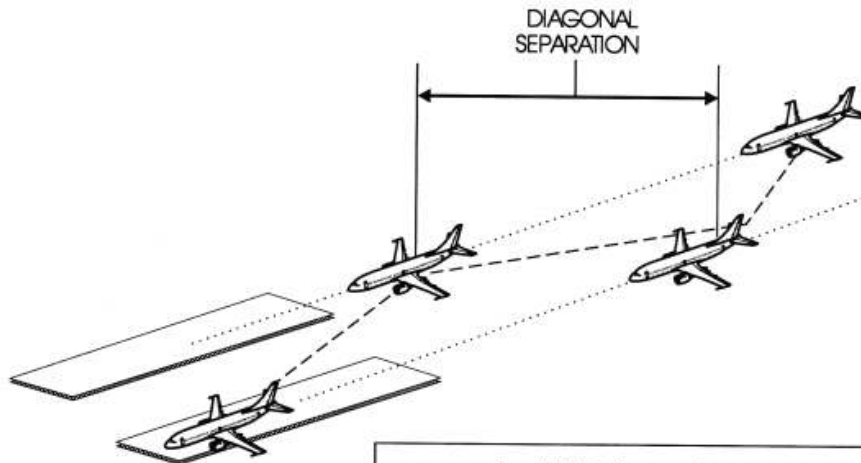


#### ILS PRM APPROACHES (SIMULTANEOUS CLOSE PARALLEL)

- Runway centerlines spaced less than 4300'. (Duals & Trips)
- Final Monitor Controllers required
- PRM required



## Staggered ILS Approaches



Parallel ILS Approaches  
Runway centerlines spaced 2500' or greater.  
Radar monitoring not required.  
Staggered Approaches.