Instrument Landing System
Instrument Landing System

- History of IFR landing procedures before development if ILS
- What’s it used for?
- How it works
- Why it’s so important
- Future plans for ILS system
History of IFR Landing Procedures

- Until the mid-1950’s, only visual landing procedures were possible
- 1958-First IFR landing system developed
- 1966-First ILS system developed and tested at Edwards AFB in Mojave, CA
History of IFR Landing Procedures

- 1968-First ILS applications installed at major airports
- 1974-ILS systems mandated by FAA for at least two major runways at all Regional, and International Airports.
What It’s Used For
What It’s Used For

• Aid aircraft to a runway touchdown point in IFR conditions
• Aid larger aircraft (ex. Boeing 747, 777) to land on a designated runway touchdown point (VFR, IFR)
• Allow for use of new Autoland systems!
How does it work?

- VHF Frequency transmits radar signal and intensity data to ILS Signal Deciphering and Display Computer
- Localizer signal transmitted in direction opposite of runway to horizontally guide aircraft to touchdown point

On-board ILS gauge from a Boeing 747-400 aircraft
How does it work?

- Glide-Slope signal transmitted at an angle of 7.5-10 degrees into sky to define vertical descent path to runway touchdown point.
- On-board antenna system located in aircraft radome receives radar and VHF signals and sends it to on-board ILS computer.

On-board ILS gauge from a Boeing 747-400 aircraft.
How does it work?

- Signal data is then displayed on instrument panel gauge which maps the directional, and descent path to the runway

On-board ILS gauge from a Boeing 747-400 aircraft
ILS

- Instrument Landing Systems (ILS) are designed to guide an aircraft in its final approach and landing.
- Three distinct subsystems are used:
  - Localiser
  - Glide Slope
  - Markers.
ILS Components

• Localizer –indicates alignment w/ runway
• Glide slope –indicates correct descent path
• Outer Marker –Final Approach Fix
• Middle Marker –Missed Approach Point
Localizer

• Aids the pilot in lining his/her aircraft in the up proper azimuth approach to the runway.
• Consists of a group of transmitters and antennas positioned at the far end of the runway.
Localizer

• The antenna radiation pattern has a 5° beamwidth, centered along the runway.
• The VHF frequencies used for the localizer are in the range 108.1 to 111.9 MHz. The useful range of the system is about 40 km.
Localizer Plan

Runway

Localiser Tx

(108.1 - 111.9 MHz)

DIRECTION OF APPROACH

90 Hz

150 Hz

5°
Needle indicates direction of runway.

Centered Needle = Correct Alignment
Glide Slope

- Aids the pilot in making his/her approach at the proper elevation angle to the runway.
- Consists of a group of transmitters and antennas positioned beside the runway.
Glide Slope

• The antenna radiation pattern has a 1° beamwidth, and elevated about 2.5° to 2.75° in the direction of approach.

• The VHF frequencies used for the glide slope are in the range 329.3 to 335.0 MHz.

• The useful range of the system is about 40 km.
Glide Slope

1° 90 Hz

150 Hz

2.5° - 2.75°

DIRECTION OF APPROACH

(side view)
VHF Glide Slope Antenna's
Frequency Arrangement
Glide Slope

Needle indicates above/below glidepath.

Centered Needle = Correct Glidepath
Marker Beacon

- Markers are transmitters that radiate continuous narrow vertical radio beams.
- The carrier frequency is 75 MHz modulated by special tones.
## Marker Beacon Characteristics

<table>
<thead>
<tr>
<th>Marker Beacon</th>
<th>Pilot Alert</th>
<th>Distance to Threshold</th>
<th>Modulated Frequency</th>
<th>Audio Keying</th>
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</thead>
<tbody>
<tr>
<td>Outer</td>
<td>Glide Path Intercept</td>
<td>4 to 7 nm</td>
<td>400 Hz</td>
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<tr>
<td>Middle</td>
<td>Category I Decision Height</td>
<td>3500 feet</td>
<td>1300 Hz</td>
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<tr>
<td>Inner</td>
<td>Category II Decision Height</td>
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<td>3000 Hz</td>
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END OF PRESENTATION