

### 3.13 ILS

At present, the ILS is the primary international non-visual precision approach system approved by ICAO.

The ILS is designed to provide an aircraft with a precision final approach with horizontal and vertical guidance to the runway. The ground equipment consists of a localizer, a glide path transmitter and an NDB along the approach path. A DME fix may replace the NDB. See Figure 3.2 for a typical ILS installation.

#### 3.13.1 Caution-Use of ILS Localizers

(a) *Localizer Coverage and Integrity*: The coverage and validity of ILS localizer signals are regularly confirmed by flight inspection within 35° of either side of a front- or back-course nominal approach path to a distance of 10 NM, and through 10° of either side of a front- or back-course nominal approach path to a distance of 18 NM (see Figure 3.1).

(b) *Low Clearance Indications*: No problems with front and back courses have been observed within 8° of the course centreline. However, it has been found that failure of certain elements of the multi-element localizer antenna array systems can cause false courses or low clearances\* beyond 8° from the front- or back-course centreline that are not detected by the localizer monitoring system. This could result in a premature cockpit indication of approaching or intercepting an on-course centreline. For this reason, a coupled approach should not be initiated until the aircraft is established on the localizer centreline. It is also essential to confirm the localizer on-course indication by reference to aircraft heading and other NAVAIDs, such as an ADF bearing, before commencing final descent. Any abnormal indications experienced within 35° of the published front- or back-course centreline of an ILS localizer should be reported immediately to the appropriate ATS facility.

\*A low clearance occurs whenever there is less than full-scale deflection of the omnibearing selector or course deviation indicator at a position where a full-scale deflection should be displayed.

(c) *Localizer False Course*: False course captures may occur when the pilot prematurely selects APPROACH MODE from either heading (HDG) or lateral navigation (LNAV) MODE. Some ILS receivers produce lower than expected course deviation outputs in the presence of high modulation levels of the localizer radiated signal. This can occur even when both the ground transmitter and the airborne receiver meet their respective performance requirements. The reduced course deviation can, in turn, trigger a false course capture in the automatic flight control system (AFCS). False course captures can occur at azimuths anywhere from 8° to 35°, but are most likely to occur in the vicinity of 8° to 12° azimuth from the published localizer course.

In order to minimize the possibility of a false course capture during an ILS approach, pilots should use raw data sources to ensure that the aircraft is on the

correct localizer course prior to initiating a coupled approach. The following cockpit procedures are recommended:

(i) APPROACH MODE should not be selected until the aircraft is within 18 NM of the threshold and the aircraft is positioned within 8° of the inbound ILS course; and

(ii) pilots should:

(A) ensure that the ADF bearing (associated with the appropriate NDB site) is monitored for correct runway orientation;

(B) be aware when the raw data indicates that the aircraft is approaching and established on the correct course; and

(C) be aware that, should a false course capture occur, it may be necessary to deselect and re-arm the APPROACH MODE in order to achieve a successful coupled approach on the correct localizer course.

**(d) Electromagnetic Interference (EMI):** The effect of EMI, particularly on ILS localizer system integrity, is becoming increasingly significant. In built-up areas, power transformer stations, industrial activity and broadcast transmitters have been known to generate interference that affects localizer receivers. The effect is difficult to quantify as the interference may be transitory, and certain localizer receivers are more susceptible than others to EMI. New ICAO standards for localizer and VOR receivers took effect on January 1, 1998. The increased immunity from FM broadcast interference may alleviate the situation once avionics are available. However, until new avionics are installed, operators may face increased interference and restricted operations in some areas, especially outside North America. In the interim, awareness by pilots and the use of compensating safety measures are necessary. Unless the interference is of unusual intensity, or a very susceptible receiver is being used, the interference is not likely to cause any erroneous readings while the aircraft is flown within the area shown in Figure 3.1. If the localizer goes off the air, the "off" flag may remain out of sight or the flag and course deviation indicator may give erratic or erroneous indications. It is even possible that normal on-course cockpit indications may continue. Under normal circumstances, ATIS will advise pilots conducting an approach if there is equipment failure.

### 3.13.2 Localizer

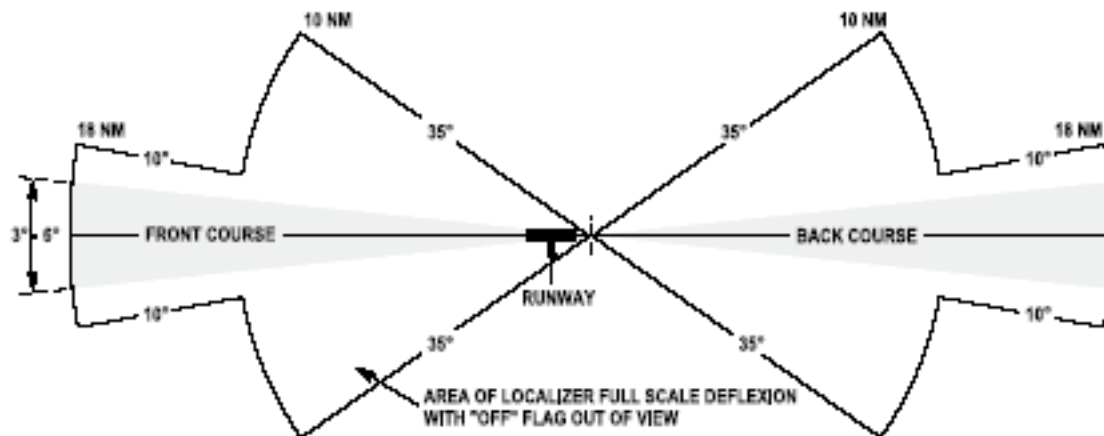
The localizer operates within the frequency range of 108.1 to 111.9 MHz and provides the pilot with course guidance to the runway centreline. When the localizer is used with the glide slope as well as the outer and middle markers, it is called the "front course." It is adjusted to provide an angular width between 3° and 6°. Normally, the width is 5°, which results in full deflection of the track bar at 2.5°. The transmitter antenna array is located at the far end of the runway from the approach. The localizer may be offset up to 3° from the runway heading; however, the amount of offset will be published as a cautionary note on the approach plate.

At many aerodromes, a localizer "back course" is also provided. This allows for a non-precision approach in the opposite direction to a front course approach

without glide path information. Note that not all ILS localizers radiate a usable back course signal.

The normal reliable coverage of ILS localizers is 18 NM within 10° of either side of the course centreline and 10 NM within 35° of the course centreline for both front and back courses.

**Figure 3.1**



Identification for both the localizer and glide path is transmitted on the localizer frequency in the form of a two-letter or letter-number indicator preceded by the letter "I" (e.g. IOW).

### 3.13.3 Glide Path

The glide path transmitter operates within the frequency range of 329.3 to 335.0 MHz. The frequency is paired with the associated localizer frequency in accordance with ICAO standards. The glide path is normally adjusted to an approach angle of 3° and a beam width of 1.4°. There is no usable back course. The antenna array is located approximately 1 000 ft from the approach end of the runway and offset approximately 400 ft from the runway centreline.

At some of the larger airports, an ILS is installed at each end of a runway. In this way, a front course approach may be made to either end of the runway. The two systems are interlocked so that only one ILS can operate at any time.

**Figure 3.2 - Typical ILS Installation**

