NDB and ADF in aeronautical navigation

A Non-Directional Beacon (NDB) is a simple radio transmitter operating slightly below the AM broadcast band, or in the Long-wave band. It sends out a continuous signal, a "carrier," which is often modulated with the station's identification, in Morse code. In this case, the identification is LHI, or dit-dah-dit-dit dit-dit-dit-dit dit-dit (.-.. .... ..). This code helps the pilots confirm that they are tuned to the right frequency. The pilots have on their flight deck an instrument called the ADF or Automatic Direction Finder, which simply consists of a needle which points toward the NDB. Thus, the pilots can locate and track towards one. This is very useful for a place, which during inclement weather can often be very hard to visually pinpoint.

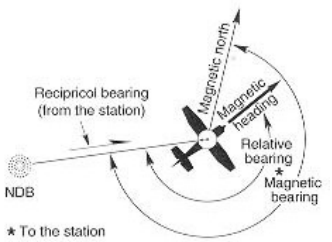
The NDB transmits medium frequency band (190-540 kHz). It can be said that NDB is a ***Homing Device***. By plotting lines of position from two NDBs, the pilots could find their direction. Using this information along with the magnetic compass and the NDB receiver, the pilot could determine the aircraft's bearing from the NDB.

The range of the beacon will depend on the type of antenna used, the location of the installation; the RF power supplied to the antenna, and the operating frequency and ground conductivity. Effective coverage also varies according to the time of day and the season of the year

A NDB is classed according to its power output and usage:

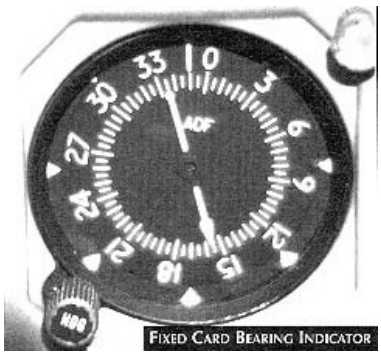
1. The Low power radio beacon has a power of less than 50 watts (W),
2. The Medium power radio beacon has a power of 50 watts up to 2,000 W;
3. The High power radio beacon has a power output of 2,000 W or more;

Navigation is defined as the science of getting from one place to another by continually determining position, course, and distance covered. Of all the tasks the pilot has to perform during a flight, navigation should be the least of concerns. Fortunately, today's pilot can rely on NAVigational AIDS. NAVAIDS relieve the pilot of the navigation workload by providing navigational data. NAVAIDS range from satellite positioning systems such as Global Positioning Systems (GPS), to sophisticated Very high frequency Omni Range (VOR), to the basic and most widely used NAVAID, the Automatic Direction Finder/Non-Directional Radio Beacon (ADF/NDB) systems.



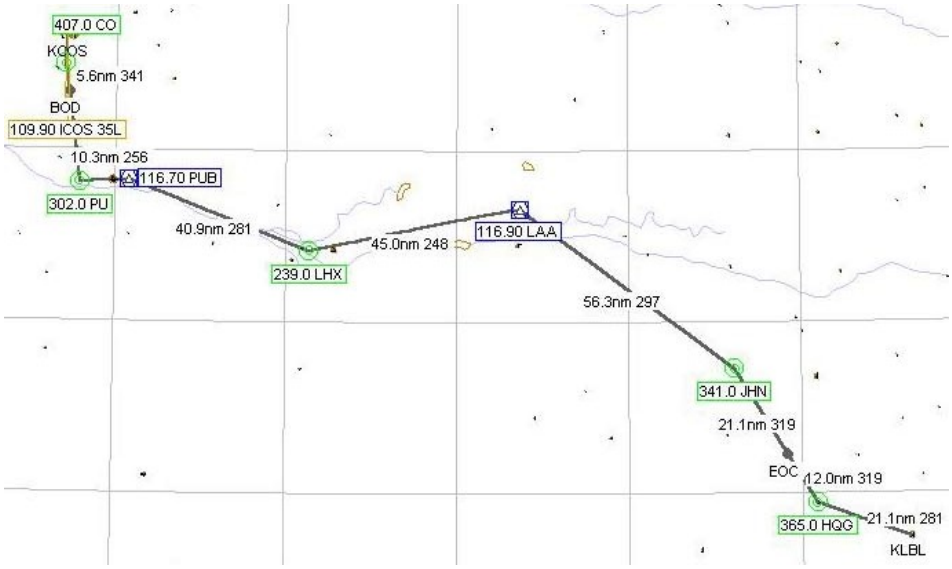
NDB Bearings

An ADF/NDB system consists of two subsystems. The first is the Automatic Direction Finder set. The ADF set is used in an aircraft, or sometimes in a ground vehicle and consists of a receiver that will pick up a radio signal in the 190 KHz to 1800 KHz radio band. The ADF receiver utilizes two antennas to intercept the radio signal and determine the direction of that signal. This directional information is displayed on an instrument that points to a compass heading indicating the direction from the receiver to the source of the radio signal.



The second subsystem of the ADF/NDB NAVAID is the Non-Directional radio Beacon transmitter station. The NDB produces the radio signal to which the ADF points. The radio signal is broadcast in every direction at once, hence it's name, non-directional beacon.

Pilots can find out from an aeronautical chart what radio station they should tune to in a particular area. They can then tune their radio navigation equipment to a signal from this station. A needle on the navigation equipment tells the pilot where they are flying to or from station, on course or not. Below is a sample of a pre-flight plan chart detail.



Aircraft: Cessna Skylane RG

	Cruise	Climb	Descent	Touch Down
Altitude [ft]:	10000			
TAS [kts]:	142	95		70
Rate [fpm]:		550	600	
Fuel flow [Gal/h]:	10	14	5	

Id	Location	Type	Freq	Head	TAS	VSpeed	Altitude	Distance	ETE	Fuel [Lbs]
KLBL	Liberal Mun	Airport		-	-	-	2881	0.0	00 00' 00"	0.0
HQG	HUGOTON	NDB	365.0	281	120	497	8324	21.1	00 10' 57"	17.4
	End of Climb	EOC		319	139	319	10000	12.0	00 05' 15"	8.3
JHN	BEAR CREEK (JOHNSON)	NDB	341.0	319	142	0	10000	21.1	00 08' 55"	10.1
LAA	LAMAR	VORTAC	116.90	297	142	0	10000	56.3	00 23' 47"	27.0
LHX	LA JUNTA	NDB	239.0	248	142	0	10000	45.0	00 19' 00"	21.5
PUB	PUEBLO	VORTAC	116.70	281	142	0	10000	40.9	00 17' 16"	19.6
PU	PU	NDB	302.0	256	142	0	10000	10.3	00 04' 20"	4.9
	Beginning of Descent	BOD		341	142	0	10000	19.2	00 08' 07"	9.2
CO	CO	NDB	407.0	341	130	-599	8468	5.6	00 02' 33"	1.5
35L	City Of Colorado Springs Mun - ILS/GS: IC	Runway	109.90	349	92	-600	6181	6.0	00 03' 48"	2.2
KCOS	City Of Colorado Springs Mun	Airport		-	-	-	6181	0.0	00 00' 00"	0.0
							TOTAL :	237.5	01 44' 01"	121.7

ASHCOM Systems Ltd.

19 Apex Business Centre, Boscombe Road, Dunstable, Beds LU5 4SB
United Kingdom

Tel: +44 (0)1582 475555, Fax: +44 (0)1582 475553
Email: sales@ashcomsys.com
www.ashcomsys.com