The Global NDB Handbook

2004 edition

by Michael Oexner

Personalized for Martin Francis

Introduction

Non-directional Beacons (NDBs) are usually to be found transmitting on longwave frequencies and are used for maritime and aeronautical navigation purposes. Although more modern and more advanced means of navigation have become available over the years, the number of active NDBs is still very large.

Generally an NDB transmits its call sign consisting of one, two, or three alphanumeric characters in slow Morse code using a relatively low-powered transmitter (typically 25 W to 400 W). The designated operating range is often well below 60 miles. Depending on propagation conditions and receiving setup, however, you might be able to receive NDBs over much greater distances, such as 1000 miles and more. What makes NDB DXing interesting and rewarding is that there are so many beacons to listen to and that listening results will vary from season to season and from night to night.

The North American NDB Handbook (aka NANDBH) contains data of more than 5000 NDBs located in North, Central and South America, the Caribbean and the Pacific; moreover some transatlantic NDBs have been included, as well as NDBs operating from offshore installations such as oil platforms. As this list is meant to be of help to active NDB DXers, the call signs of widely reported unidentified beacons and beacons that produce negative keying have also been included.

Part 1 of the list shows the entries sorted by alphabetical order of the call sign, with part 2 sorted in frequency order, and part 3 in country order. Part 4 contains decommissioned NDBs or NDBs whose operational status is not known.

As a special benefit to the user of this list, the distance and Great Circle bearing have been calculated for your individual listening location. To give newcomers an easy start you'll find enclosed a table showing those NDBs that are nearest to your location. And for those who are unfamiliar with Morse code, a reference table is also included.

The entries in this list have been taken from various official sources, DX magazines, direct input from active NDB DXers, and of course from personal observations. Quite a large effort went into checking the validity of the data and keeping everything as up to date as possible.

As with most publications of this kind this list won't be completely free of outdated information, typing errors or other mistakes. This will certainly not affect radio listeners, but for navigation purposes mariners or pilots should consult official publications, such as charts, En Route Supplements and NOTAMs. Please let me have your comments and observations for future editions.

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To receive the latest news on NDBs, you should join the NDBLIST electronic mailing list. This is a private e-mail reflector for active DXers, which was formed by the UK NDB DXer Alan Gale to provide a place where people with an interest in NDBs can meet and discuss. To get more information please ask: alan.gale@clara.co.uk

Good NDB DX!

Explanatory Notes

The format used for the entries in part 1 is best illustrated by the following example:

Call	kHz	Hz	T	Station	S/P	ITU	Lat.	Long.	km	mi	°
CLB	216.0	1020	civ	Wilmington/Carolina Beach	NC	USA	N34 06 23	W077 57 42	1122	697	141
YHR	276.0	400	civ	Chevery	QC	CAN	N50 27 53	W059 38 04	2179	1354	56

The columns contain the following NDB data (from left to right):

- Call sign
- Carrier frequency in kHz
- Modulation frequency in Hz
- Type of the NDB
- Name of the NDB
- State or province
- Country in ITU country code
- Geographic latitude
- Geographic longitude
- Distance between your listening post and the NDB's location in kilometers or miles
- Great circle bearing of the NDB's location in respect to your listening post

The following abbreviations are used in the type column ("T"):

- calcalibration beacon
- civ   civilian airport beacon
- enr   enroute beacon
- iw   offshore beacon
- joi   joint civilian/military beacon

- mar   maritime beacon
- milmilitary airport beacon
- neg   negative keying
- pri   private airport beacon

In the above example, CLB is the call sign of an aeronautical NDB operating on 216 kHz. The transmitter's carrier frequency is modulated with a tone frequency of 1020 Hz. Its geographic coordinates are 34º06'23'' North, 77º57'42'' West. The distance from the listening location in this case is 1122 kilometers or 697 miles and the Great Circle bearing 141 degrees.

YHR is an aeronautical beacon transmitting on a frequency of 276 kHz. The transmitter's carrier frequency is modulated with a tone frequency of 400 Hz. The corresponding geographic coordinates are 50º27'53'' North, 59º38'04'' West. The distance from the listening location is 2179 kilometers or 1354 miles and the Great Circle bearing 56 degrees.

Some NDBs have been observed with varying modulation frequencies, e. g. changing between 400 Hz and 1020 Hz. In the lists this is indicated by an asterisk after the modulation frequency, e. g. 400*.

Modulation Offsets

The NDB frequencies shown in the NANDBH are the carrier frequencies of the NDBs. Most US aeronautical NDBs modulate the carrier frequency (cf) with an audio frequency (af) of 1020 Hz, only a few use 400 Hz. Most often the signal will be standard AM modulation, i. e. the Morse code identification (call sign) of the NDB should be found on two spots on your receiver's dial:

- on cf + af (that would be the upper side band)
- on cf - af   (that would be the lower side band)

As examples teach you more than a thousand words, let's have a look at a guinea pig: let's assume your local beacon with callsign YLB is listed on 434 kHz, i. e. cf = 434 kHz and uses a modulation frequency of 1020 Hz, i. e. af = 1.02 kHz.

Now for some arithmetic:

- cf + af = 434 kHz + 1.02 kHz = 435.02 kHz
- cf - af = 434 kHz - 1.02 kHz = 432.98 kHz

What does this mean in "real" life?

1. Switch on your receiver, set it to CW mode, and use as narrow a filter setting as possible (500 Hz would be okay, 250 Hz or narrower even better).

2. Tune to 432.98 kHz and you'll receive the YLB identification of the NDB (i. e. on the LSB side of the carrier frequency).

3. If you tune even higher in frequency you'll lose the identification.

4. On the carrier frequency itself you shouldn't hear the identification at all, but only the trans-mitted carrier.

5. When you tune to 435.02 kHz you should hear the YLB identification again (this time on the USB side).

So if you encounter the signal of an NDB and want to measure its offset, you should do the following:

1. cf. above

2. Try to find the "other" frequency where you can hear the NDB's Morse code identification again.

3. Where could that other frequency be? Please bear in mind that you should consider the following cases: af = 400 Hz or af = 1020 Hz or af = 0 Hz or af = any other offset in Hz. The current tuned frequency (tf) of your RX plus or minus twice the (assumed or known) modula-tion frequency (af), i. e. tf + 2*af or tf - 2*af.

4. If you have found the other frequency, you can easily determine the carrier frequency of the NDB by adding the two observed frequencies and dividing the result by 2:
   cf = (tf1 + tf2)/2 or in our example:
   cf = (432.98 kHz + 435.02 kHz)/2 = 868 kHz/2 = 434 kHz.

QED, as the mathematicians would say :-)

This procedure should work pretty well for local or semi-local NDBs. In the case of weak DX NDBs, sometimes (more often than not) you won't be able to catch both side bands of the transmission for mainly two reasons:

- The "other" frequency might be dominated by a stronger or more local NDB.
- The NDB is transmitting only one sideband (most often the upper sideband) - standard procedure for Canadian aeronautical NDBs.

Negative Keying

The term "negative keying" describes a strange situation where the Morse code identification of an NDB becomes "inverted". This can produce some strange sounding IDs, and can often be characterized by uneven spacing, or a very long dash, which appears between the callsigns.

"Negative keying" actually results from a drop (reduction) of the NDB transmitter's carrier level (amplitude) during the time when the transmitter is being keyed, i. e. transmitting the NDB's Morse code identification. Hence the most likely spot to find negative keying is to tune directly to the NDB's carrier frequency and operating the receiver in narrow CW mode.

If you want to translate between positive and negative callsigns (or vice versa), you might want to try the following procedure:

- Inside each Morse code character, the short period of silence between two adjacent **"dits"** or **"dahs"** or **"dit-dahs"** or **"dah-dits"** becomes a **"dit"**.

- A **"dah"** becomes a character separator.

- The long period of silence (character separator) between two Morse code characters becomes a **"dah"**.

- The very long silence between two consecutive IDs of the NDB becomes a very long dash.

Below I've tried to sketch a little graphical representation for some NDBs that have been reported with negative keying. The vertical line **|** indicates a character separator. Please have a look at the following examples:

```
F        X         Y
. . - .|- . . -|- . - -
|. .|. -|. . .|-|. .|.|
  I    A    S      T I   E


O      R       C
- - -|. - .|- . - .
|.|.|- .|. -|. .|.
  E EN    A    I    E


S     Y        W
. . .|- . - -|. - -
|. . -|. .|.|- .|.|
  U      I    EN    E
```

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Nearest NDBs

Call	kHz	Hz	T	Station	S/P	ITU	Lat	Long	Loc	km	mi	°
U	**201.0**	1020	civ	London/Uniform	ON	CAN	N42 58 56	W081 05 18	EN92KX	167	104	233
ZXU	**201.0**	1020	civ	London/Thames	ON	CAN	N42 58 56	W081 05 18	EN92KX	167	104	233
GB	**204.0**	1020	civ	Buffalo/Plazz	NY	USA	N42 52 26	W078 48 59	FN02OU	125	78	155
FD	**207.0**	400		Brantford	ON	CAN	N43 04 24	W080 24 58	EN93TB	120	75	221
6S	**215.0**			Burlington	ON	CAN	N43 26 00	W079 51 00	FN03BK	60	38	212
YTR	**215.0**	980	mil	Trenton (RCAF)	ON	CAN	N44 11 37	W077 24 12	FN14HE	168	104	78
HM	**221.0**	400	civ	Hamilton	ON	CAN	N43 07 16	W080 00 24	EN93XC	97	60	208
BU	**231.0**	1020	civ	Buffalo/Klump/Clarence	NY	USA	N43 00 01	W078 39 03	FN03QA	119	74	146
ZLB	**236.0**	400	civ	Toronto/Britannia	ON	CAN	N43 36 58	W079 41 18	FN03DO	36	23	211
KZ	**248.0**	400	civ	Buttonville Muni/Toronto	ON	CAN	N43 56 01	W079 19 45	FN03IW	11	7	68
TZ	**257.0**	400	civ	Toronto/Gibraltar Point	ON	CAN	N43 36 46	W079 23 08	FN03HO	32	20	170
ORJ	**258.0**	1020	civ	Corry	PA	USA	N41 54 45	W079 38 54	FN01EV	221	137	184
GD	**261.0**	400		Goderich	ON	CAN	N43 44 47	W081 43 50	EN93DR	184	114	266
YGK	**263.0**	400	civ	Kingston	ON	CAN	N44 17 48	W076 36 20	FN14QH	233	145	78
B	**266.0**	400	civ	Hamilton/Bravo	ON	CAN	N43 08 39	W079 47 38	FN03CD	88	55	198
ZHM	**266.0**	400	civ	Hamilton/Binbrook	ON	CAN	N43 08 39	W079 47 38	FN03CD	88	55	198
S7	**268.0**	1020	civ	Hanover	ON	CAN	N44 09 44	W081 03 37	EN94LD	132	82	284
EL	**269.0**	1020	civ	Wellsville/Halos	NY	USA	N42 06 36	W077 54 54	FN12BC	235	146	147
YQA	**272.0**	400	civ	Muskoka	ON	CAN	N45 02 21	W079 16 58	FN05IA	128	79	6
6M	**283.0**			Belleville	ON	CAN	N44 11 42	W077 18 30	FN14IE	176	109	78
1L	**300.0**		mar	Dutkewych Point	ON	CAN	N44 20 14	W079 31 58	FN04FI	49	31	353
ZZR	**317.0**	1020	mil	Severn/Trenton (RCAF)	ON	CAN	N44 03 10	W077 37 36	FN14EB	148	92	83
VV	**326.0**	400	civ	Wiarton	ON	CAN	N44 41 53	W081 10 46	EN94JQ	164	102	304
IA	**329.0**	1020	civ	Niagara Falls/Kathi	NY	USA	N43 06 33	W078 50 18	FN03NC	101	63	150
K	**335.0**	400	civ	Kitchener/Kilo/Waterloo Regional	ON	CAN	N43 29 35	W080 17 13	EN93UL	80	50	237
ZKF	**335.0**	400	civ	Kitchener/Waterloo Regional/Wellington	ON	CAN	N43 29 33	W080 17 13	EN93UL	81	50	236
ZLP	**341.0**	400	civ	Toronto/Meadowvale	ON	CAN	N43 37 40	W079 43 52	FN03DP	37	23	217
AVN	**344.0**	1020	civ	Rochester/Avon	NY	USA	N43 00 36	W077 46 09	FN13CA	168	105	125
ER	**349.0**	1020	civ	Erie/Esmer	PA	USA	N42 02 19	W080 15 19	EN92UA	216	134	198
D7	**350.0**	400		Kincardine	ON	CAN	N44 12 12	W081 36 11	EN94EE	175	109	282
F7	**353.0**	400		Parry Sound/Georgian Bay	ON	CAN	N45 16 08	W079 50 12	FN05BG	156	97	349
LYS	**360.0**	1020	civ	Lyndon/Olean	NY	USA	N42 17 01	W078 20 06	FN02TG	201	125	153
ZYZ	**368.0**	400	civ	Toronto/Queensway	ON	CAN	N43 37 10	W079 32 52	FN03FO	32	20	193
CQD	**372.0**	1020	civ	Erie/Cascade	PA	USA	N42 07 09	W080 06 17	EN92WC	204	127	195
2R	**373.0**	400		Tyendinaga	ON	CAN	N44 10 48	W077 06 46	FN14KE	191	118	80
7B	**375.0**	1020		Saint Thomas	ON	CAN	N42 46 15	W081 06 20	EN92KS	183	114	228
YPQ	**379.0**	400	civ	Peterborough	ON	CAN	N44 12 47	W078 27 29	FN04SF	88	54	66
XU	**382.0**	400	civ	London	ON	CAN	N43 05 29	W081 13 06	EN93JC	168	105	239
D9	**383.0**	400		Huntsville/Deerhurst Resort	ON	CAN	N45 21 15	W079 08 44	FN05KI	164	102	9
ZDH	**385.0**	400	civ	Toronto/Rexdale	ON	CAN	N43 44 17	W079 34 17	FN03FR	20	12	208
OO	**391.0**	400	civ	Oshawa	ON	CAN	N43 55 15	W078 54 01	FN03NW	45	28	86
A	**397.0**	400	civ	Hamilton/Alfa	ON	CAN	N43 11 50	W080 01 43	EN93XE	90	56	211
ZHA	**397.0**	400	civ	Hamilton/Ancaster	ON	CAN	N43 11 50	W080 01 43	EN93XE	90	56	211
RO	**400.0**	1020	civ	Rochester/Breit	NY	USA	N43 07 35	W077 33 14	FN13FD	176	109	118
ZTO	**403.0**	400	civ	Toronto/Woodhill	ON	CAN	N43 44 18	W079 42 11	FN03DR	26	16	229
SN	**408.0**	400	civ	St Catherines	ON	CAN	N43 08 49	W079 15 17	FN03ID	85	53	169

Morse Code

Character	Morse Code	Remarks
0	-----	
1	.----	
2	..---	
3	...--	
4	....-	
5	.....	
6	-....	
7	--...	
8	---..	
9	----.	
A	.-	
Á	.--.-	Spanish
Ä	.-.-	German or Scandinavian
Å	.--.-	Scandinavian
Æ	.-.-	Scandinavian
B	-...	
C	-.-.	
Ch	----	German or Spanish
Ch	---.	Russian
D	-..	
E	.	
É	..-..	French
È	..-..	French
F	..-.	
G	--.	
H	....	
I	..	
J	.---	
K	-.-	
L	.-..	
M	--	
N	-.	
Ñ	--.--	Spanish
O	---	
Ö	---.	German or Scandinavian
Ø	---.	Scandinavian
P	.--.	
Q	--.-	
R	.-.	
S	...	
Sh	----	Russian
T	-	
U	..-	
Ü	..--	German
V	...-	
W	.--	
X	-..-	
Y	-.--	
Ya	.-.-	Russian
Yu	..--	Russian
Z	--..	

ITU Country Codes

AIA	Anguilla		**FJI**	Fiji
ALB	Albania		**FLK**	Falkland Islands
ALG	Algeria		**FRO**	Faroe Islands
ARG	Argentina		**FSM**	Micronesia
ARM	Armenia		**G**	Great Britain
ARS	Saudi Arabia		**GDL**	Guadeloupe
ASC	Ascension Island		**GEO**	Georgia
ATA	Antarctica		**GMB**	Gambia
ATG	Antigua & Barbuda		**GRC**	Greece
ATN	Netherlands Antilles		**GRD**	Grenada
AUT	Austria		**GRL**	Greenland
AZE	Azerbaijan		**GTM**	Guatemala
AZR	Azores		**GUF**	French Guyana
B	Brazil		**GUM**	Guam
BAH	Bahamas		**GUY**	Guyana
BEL	Belgium		**HAO**	Hao Atoll
BER	Bermuda		**HND**	Honduras
BHR	Bahrain		**HNG**	Hungary
BIH	Bosnia-Hercegovina		**HOL**	Netherlands
BLR	Belarus		**HRV**	Croatia
BLZ	Belize		**HTI**	Haiti
BOL	Bolivia		**I**	Italy
BRB	Barbados		**IRL**	Ireland
BUL	Bulgaria		**IRN**	Iran
CAN	Canada		**IRQ**	Iraq
CEU	Ceuta		**ISL**	Iceland
CHL	Chile		**ISR**	Israel
CKH	Cook Island		**IW**	International Waters
CLM	Colombia		**J**	Japan
CNR	Canary Islands		**JMC**	Jamaica
CPV	Cape Verde Islands		**JMY**	Jan Mayen
CTI	Ivory Coast		**JON**	Johnston Atoll
CTR	Costa Rica		**JOR**	Jordan
CUB	Cuba		**KAL**	Kaliningrad
CYM	Cayman Islands		**KAZ**	Kazakhstan
CYP	Cyprus		**KGZ**	Kyrgystan
CZE	Czech Republic		**KWT**	Kuwait
D	Germany		**LBN**	Lebanon
DJI	Djibouti		**LBY**	Libya
DMA	Dominica		**LCA**	Saint Lucia
DNK	Denmark		**LTU**	Lithuania
DOM	Dominican Republic		**LUX**	Luxembourg
E	Spain		**LVA**	Latvia
EGY	Egypt		**MDA**	Moldova
EQA	Ecuador		**MDR**	Madeira
ERI	Eritrea		**MDW**	Midway Island
EST	Estonia		**MEL**	Melilla
ETH	Ethiopia		**MEX**	Mexico
F	France		**MHL**	Marshall Islands
FIN	Finland		**MKD**	Macedonia

MLI	Mali	**TUV**	Tuvalu
MLT	Malta	**UAE**	United Arab Emirates
MNG	Mongolia	**UKR**	Ukraine
MRA	Northern Marianas	**URG**	Uruguay
MRC	Morocco	**USA**	United States of America
MRT	Martinique	**UZB**	Uzbekistan
MTN	Mauritania	**VCT**	Saint Vincent & Grenadines
NCG	Nicaragua	**VEN**	Venezuela
NFK	Norfolk Island	**VIR**	US Virgin Islands
NGR	Niger	**VRG**	British Virgin Islands
NIU	Niue	**VUT**	Vanuatu
NOR	Norway	**WAL**	Wallis & Futuna
NRU	Nauru	**YEM**	Yemen
OCE	French Polynesia		
OMA	Oman		
PAL	Palestine		
PAQ	Easter Island		
PLW	Palau		
PNR	Panama		
POL	Poland		
POR	Portugal		
PRG	Paraguay		
PRU	Peru		
PTR	Puerto Rico		
QAT	Qatar		
ROU	Roumania		
RUS	Russian Federation		
S	Sweden		
SCG	Serbia & Montenegro		
SCN	Saint Kitts & Nevis		
SDN	Sudan		
SEN	Senegal		
SLM	Solomon		
SLV	El Salvador		
SMA	American Samoa		
SMO	Western Samoa		
SOM	Somalia		
SPM	St. Pierre & Miquelon		
SUI	Switzerland		
SUR	Suriname		
SVB	Svalbard		
SVK	Slovakia		
SVN	Slovenia		
SYR	Syria		
TCA	Turks & Caicos Islands		
TCD	Tchad		
TJK	Tadjikistan		
TKL	Tokelau		
TKM	Turkmenistan		
TON	Tonga		
TRD	Trinidad & Tobago		
TUN	Tunisia		
TUR	Turkey		