NDB LIST 'PILOTS' CLE No. 40 8-11 August 2003

COMBINED RESULTS

(draft?)

DAYTIME RECEPTION
(Local NDBs)

For full details, please see the individual logs as posted by the listeners to the list.
An explanation of each of the following columns is given after the table.

	Listener	Cou.	St.	Location	Receiver	Aerial	Pos.	No. of NDBs	Average Distance miles	km	approx. Orientation Error (deg)	av. Bearing Error (deg)
sm	Steve McDonald	CAN	BC	Mayne Island	Sony ICF 2010	Ferrite AZ-el loop	IN	15	42	68	2	6
mf	Martin Francis	CAN	ON	N. of Toronto	Grundig YB400	Ferrite built-in	OUT	13	74	119	11	6
eb	Eike Bierwith	DEU		Leipzig	Sony ICF 7600G	Ferrite built-in	IN	11	54	87	2	5
mz	Matthias Zwoch	DEU		Arnsdorf	KWZ30	H.M.loop	IN	9	52	84	-10	5
ag	Alan Gale	ENG		Lancashire	AOR AR7030	ALA 1530	OUT	4	27	43	-1	1
b1	Brian Keyte	ENG		Cent. Surrey	AOR AR7030	4 large loops	OUT	16	36	58	-5	15
b2	Brian Keyte	ENG		Cent. Surrey	AOR AR7030	H.M.loop	OUT	16	36	58	-1	4
b3	Brian Keyte	ENG		Cent. Surrey	Domestic radio	Ferrite built-in	OUT	4	15	24	-2	3
b4	Brian Keyte	ENG		Cent. Surrey	AOR AR7030	H.M.loop	IN	16	36	58	-1	3
b5	Brian Keyte	ENG		Warwickshire	AOR AR7030	H.M.loop	OUT	14	56	90	-3	3
jj	Jean Jacquemin	FRA		Merville	AOR AR7030+	ALA 1530	IN	23	90	145	-5	8
pv	Pat Vognoud	FRA		French Alps	IC R-75	ALA-1530	IN	7	49	79	6	7
r3	Roelof Bakker	HOL		Middelburg	JRC NRD 91	H.M.loop	IN	14	66	106	1	3
r1	Roelof Bakker	HOL		Middelburg	Drake SPR-4 ##	H.M.loop	OUT	14	66	106	1	4
r4	Roelof Bakker	HOL		nr Bath village	Drake SPR-4 ##	H.M.loop	OUT	14	71	114	-1	3
r6	Roelof Bakker	HOL		Middelburg	SPM-3, etc..	H.M.loop	OUT	10	159	256	1	6
y1	Robert Connolly	NIR		Kilkeel	Sangean 803A	Ferrite built-in	IN	3	38	61	0	0
y2	Robert Connolly	NIR		Kilkeel	Cessna 172 ADF	ADF	AIR	3	38	61	-1	1
ml	Mike Silvers	USA	CA	Daly City	Icom IC-735	H.M.loop (see email)	IN	12	87	140	2	6
sr	Steve Ratzlaff	USA	OR	Elgin	AOR AR7030	H.M.ferrite loop	IN	10	101	163	-4	9
							Average:	13	Average magnitude:		**3.6**	**5.1**
									(Median magnitude:		2	5)

(Thanks also to Frank and Jack who sent us reports on their difficulties in trying to take part in the CLE)

Listener, Country/State, Location, Receiver and **Aerial** are as taken from the listeners' logs.

Position indicates whether the aerial was **IN**doors or **OUT**doors.

No. of NDBs was the number giving usable results.

Av. Distance is the average distance from the listener to the NDBs whose results were used.

Approx. Orientation Error is the average difference between the measured and the actual bearings.
This is an indication of the number of degrees that the 'reference scale' was out of alignment.

Av. Bearing Error is the average number of degrees that the readings were 'out'.
This was calculated after correcting each of the measured readings for the orientation error.

(I have used the traditional term 'error', but this in no way implies 'mistakes', of course)

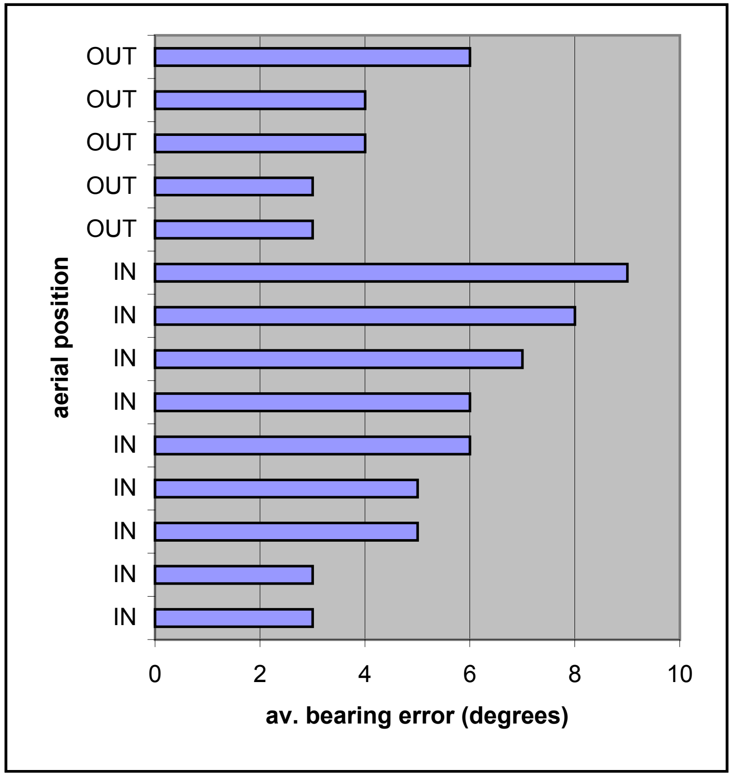
Where a listener had worked out the average bearings, I used them without checking the calculations.
Some listeners indicated where bearings were less reliable; I included them in the calculations.

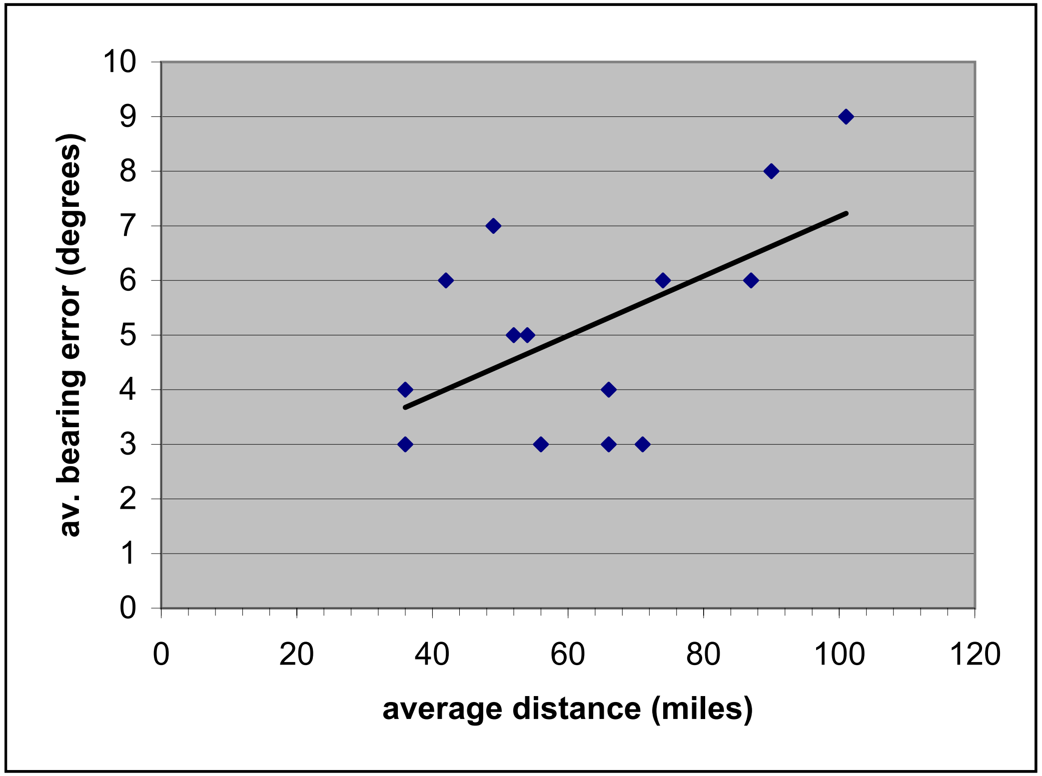
Roelof's 2nd and 5th sessions used an SPM-3, etc., but seemed to be identical in other respects to the 1st and 4th.
The results are very close - all the results were the same to within 1, so I have merged 1st with 2nd and 4th with 5th.

The entries marked in red (and results with a blue background) indicate unusual situations.
These 6 lines have been excluded from the averages and charts because they could have distorted them.
I made these decisions based solely on the unusual factors and without any reference to their actual results.

The more NDBs that a listener was able to measure, the more reliable the estimates of error tend to become
(e.g. results based on 16 NDBs are in general 4 times more reliable than ones based on only 4 NDBs)

The following diagrams show how the bearing errors varied with the position of the aerials,
with the distance to the NDBs and with the kind of aerial used.





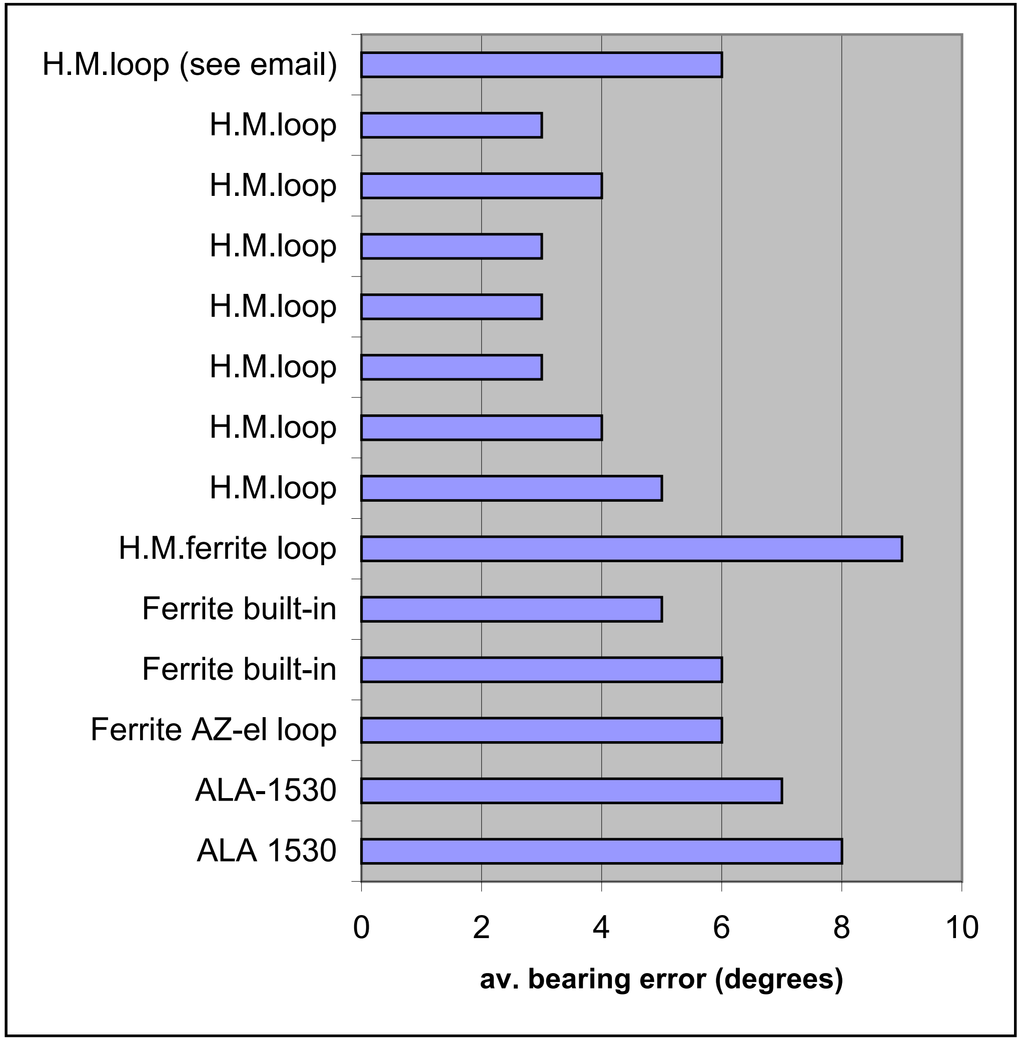
The chart above shows how the average bearing errors varied for each set of results. Whether the aerial was INdoors or OUTdoors is also shown.

The 'best' results had average errors of 3 degrees. That would mean that you could expect to be around 3 degrees out on average when measuring the bearing of a particular NDB if there were no orientation error. There is some evidence that the errors can be greater for indoor aerials - maybe up to about 10 degrees on average.

DISTANCE TO NDBs

This diagram shows how the average bearing errors varied with the average distance of the NDBs.
Each point represents a listener's set of bearings made on 7 or more NDBs.
I have added the linear trend line.

Perhaps it is no surprise to see that, in general, the further away the NDBs, the greater the bearing error. This is not a 'night effect' (all readings were by day) but it probably represents the increasing difficulty in getting a good null.



TYPES OF AERIAL

whether it was indoors or out.

It does seem to show a surprising result.

There is some evidence that the simple home made loops were outperforming most other kinds of aerial.

NIGHT-TIME RECEPTION
(Distant NDBs)

	Listener	Cou.	St.	Location	Receiver	Aerial	Pos.	No. of NDBs	Average Distance miles	km	approx orientation error (deg)	av. error magnitude (deg)
sm	Steve McDonald	CAN	BC	Mayne Island	Sony ICF 2010	Ferrite AZ-el loop	IN	15	42	68	2	5
mf	Martin Francis	CAN	ON	N. of Toronto	Grundig YB400	Ferrite built-in	OUT	12	71	114	-1	4
eb	Eike Bierwith	DEU		Leipzig	Sony ICF 7600G	Ferrite built-in	IN	9	86	138	7	8
jj	Jean Jacquemin	FRA		Merville	AOR AR7030+	ALA 1530	IN	21	77	124	-4	8
ml	Mike Silvers	USA	CA	Daly City	Icom IC-735	H.M.loop (see email)	IN	2	146	235	12	9
sr	Steve Ratzlaff	USA	OR	Elgin	AOR AR7030	H.M.ferrite loop	IN	2	468	753	-6	9
							Average:	10	Average magnitude:		**5.3**	**7.2**
									(Median magnitude:		5	8)

Nearly all listeners reported difficulties in measuring the bearings of distant NDBs at night.

The difficulties were mainly caused by the lack of strong, steady DX signals and interference from strong local beacons.
Both these things made it very hard to find even a very approximate null, especially when using an AM setting.

As a result, most listeners could only use fairly local NDBs for their measurements.
Nearly all the NDBs were well within daylight range and the 'night effect' would not have been noticeable on their signals.

Use of a narrow filter and the BFO makes things much easier, of course, including finding a null bearing for distant NDBs.
Maybe sometime in the future a non-Pilots CLE might address this aspect of direction finding.

CLE40Pilots5.xls
BK 13 August 2003