

**NATIONAL INSTITUTE OF OCEANOGRAPHY
WORMLEY, GODALMING, SURREY**

NEUTRALLY BUOYANT FLOATS

**Serial Nos. 181 - 208
June 1965 - December 1967**

TABLES AND DIAGRAMS

**G. F. CASTON
and
J. C. SWALLOW**

**N. I. O. INTERNAL REPORT No. D. 11
June 1973**

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SERIAL Nos 181 - 208
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Tables of times and positions.
Diagrams showing trajectories
and components or displacement.

G.F. CASTON
and
J.C. SWALLOW

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+ sank soon after launching

* stationary bottom pingers used for navigation

Introduction

Trajectories and depths of all the neutrally buoyant floats used by the N.I.O. during 1965-67 are given in this report. The first seven were tracked during 'Discovery' cruise 6 in the Faroe Bank Channel in June 1965, in an extension of the earlier work described by J. Crease (Ref. 1). The next eight floats were used during 'Discovery' cruise 10 in the eastern north Atlantic in March 1966. Two of these, although numbered as floats, were in fact used as bottom markers in an attempted intercomparison of currents measured with floats and current meters. The rest were tracked during 'Discovery' cruise 20 in the Bay of Biscay in Oct.-Dec., 1967. Some of this group were described by W.J. Gould (Ref. 2) and all of them were used by F. Webster (Ref. 3).

During the period covered by this report, the method of tracking evolved using first one pair, and later two pairs of hydrophones towed astern of the ship. The repetition rate of the sound sources in the floats was controlled more accurately, so that a facsimile (echo-sounder) recorder could be synchronized with each float in turn. Some of these developments were mentioned by M.J. Tucker (Ref. 4). Because of the variety of tracking methods used, depths could not be calculated by a uniform procedure and in some cases no depth determination could be made at all. In most cases however, bottom reflections were detected at least once for each trajectory, which allowed depths to be calculated. Navigation methods and accuracy varied according to area of operation, and sometimes they varied with time in the same area. For example, Decca positions were much less accurate at night than in daylight in the Bay of Biscay. The values quoted for "estimated accuracy of positions" are rough estimates of the standard deviation of the coordinates of a single fix on a float.

LIST OF FLOATS

Serial No.	Original Designation	Date and time laid
181	5	2200/10.VI.65
182	3	2145/11.VI.65
183	1 +	2205/13.VI.65
184	12	0030/14.VI.65
185	4	2355/20.VI.65
186	6	2055/26.VI.65
187	2	1155/27.VI.65
188	13 *	0705/4.III.66
189	2	1713/4.III.66
190	4	2322/4.III.66
191	8 *	0252/6.III.66
192	14	0540/22.III.66
193	9	1919/26.III.66
194	17	2013/26.III.66
195	18	2125/26.III.66
196	D	1228/25.X.67
197	F	1305/25.X.67
198	B	1401/25.X.67
199	E	1103/31.X.67
200	K	0800/8.XI.67
201	I	0848/8.XI.67
202	L	1551/8.XI.67
203	J	1726/24.XI.67
204	H	0631/25.XI.67
205	M	0705/25.XI.67
206	S	1710/12.XII.67
207	R	1754/12.XII.67
208	Q	1920/12.XII.67

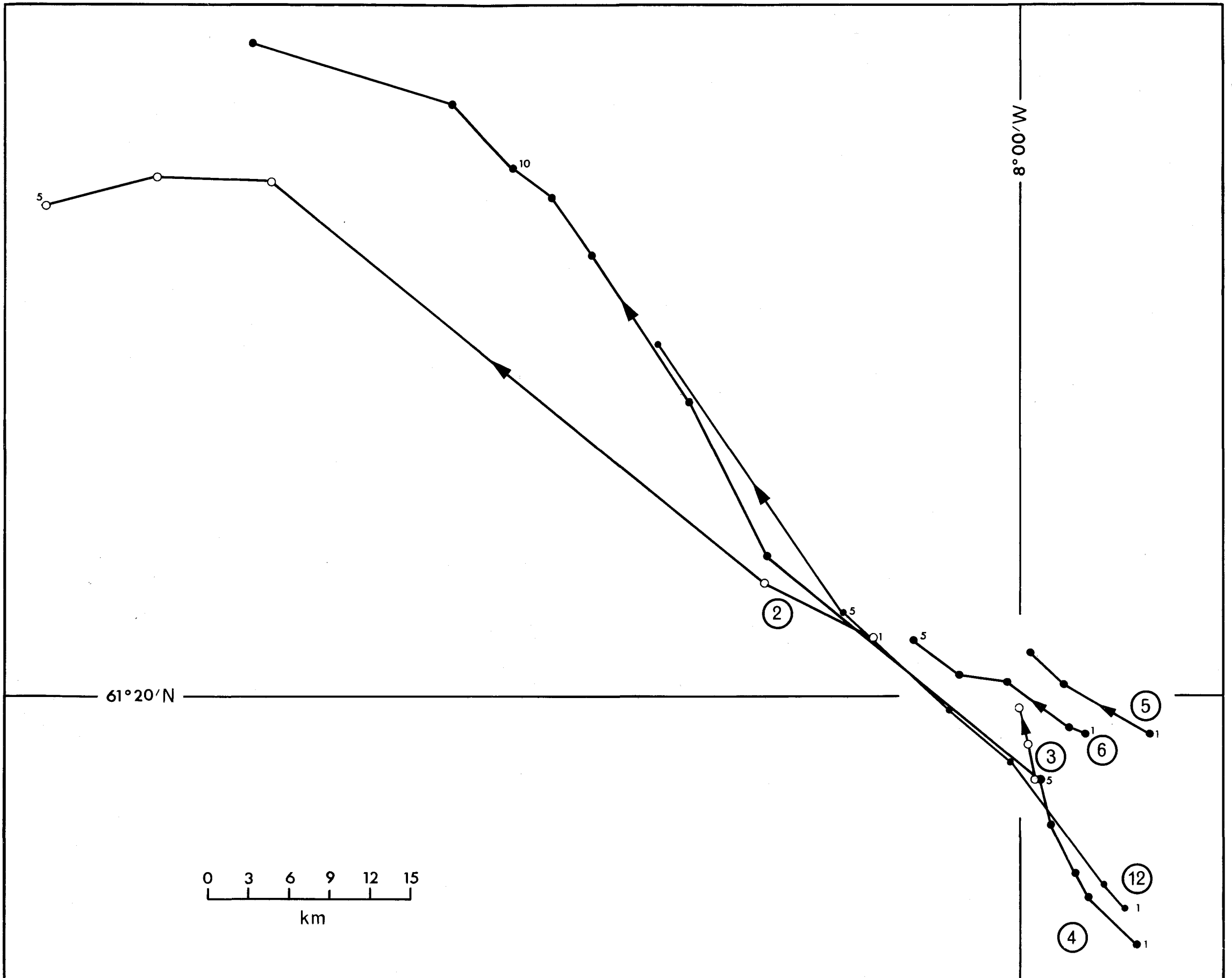
* stationary bottom pingers used for navigation

+ sank soon after launching

REFERENCES

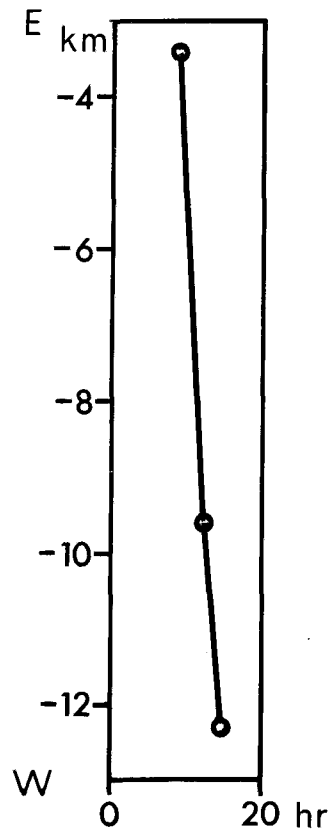
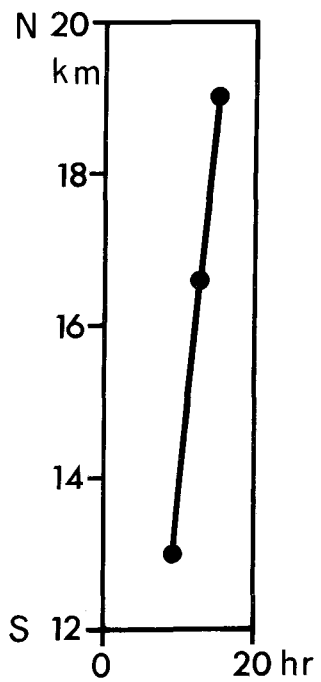
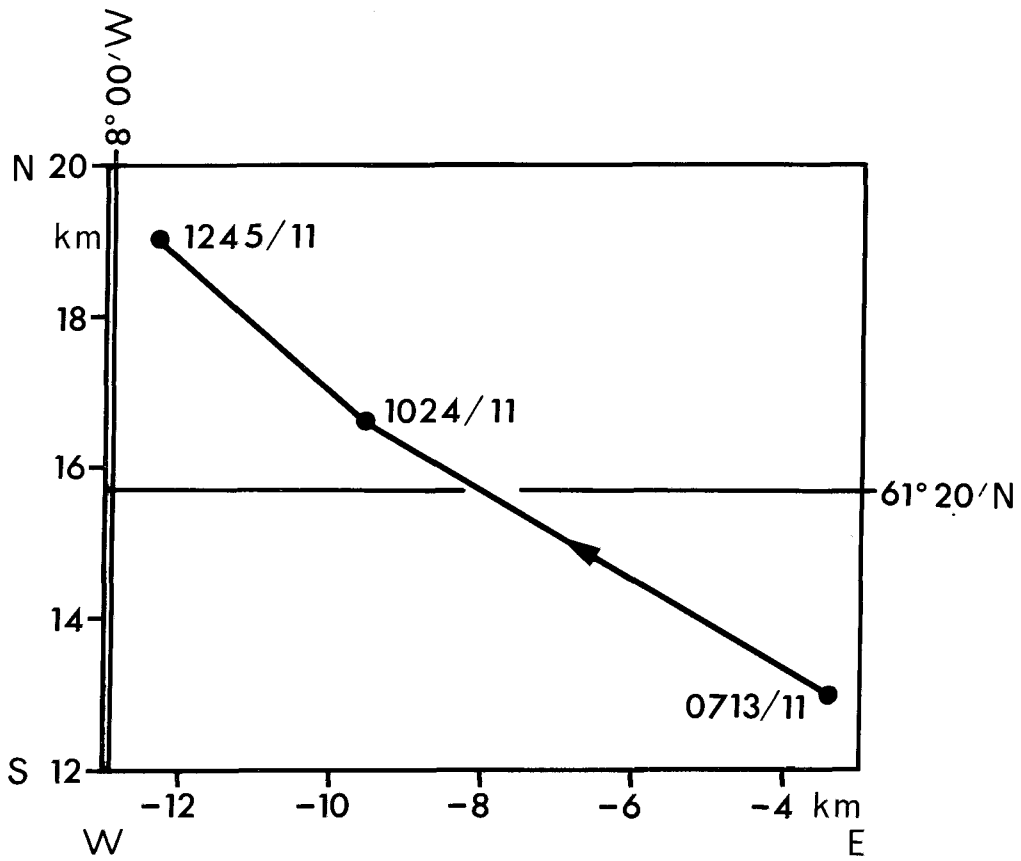
1. Crease, J., 1965. The flow of Norwegian Sea Water through the Faroe Bank Channel. Deep-Sea Research, Vol. 12, pp. 143-150.
2. Gould, W.J., 1971. Observations of an event in some current measurements in the Bay of Biscay. Deep-Sea Research, Vol. 18, pp. 35-49.
3. Webster, F., 1971. On the intensity of horizontal ocean currents. Deep-Sea Research, Vol. 18, pp. 885-893.
4. Tucker, M.J., 1969. The Potentialities of Sonar as a Research and Commercial Tool. Journal of Sound and Vibration, Vol. 9, pp. 173-180.

FLOAT DESIGNATIONS: 5(laid 2200/10.VI.65), 3(laid 2145/11.VI.65), 12(laid 0030/14.VI.65), 4(laid 2355/20.VI.65), 6(laid 2055/26.VI.65), 2(laid 1155/27.VI.65).



FLOAT DESIGNATION: 5

Date and time laid: 2200/10.VI.65



SERIAL No: 181

FLOAT DESIGNATION: 5

Date and time laid: 2200/10.VI.65

Position laid: 61° 11'·4N
7° 45'·5W

Displacement origin: 61° 11'·4N
7° 45'·5W

Navigation based on: Loran

Estimated accuracy of positions: ±1 km *

Depth(m): Nominal Observed S.D. S.D.(mean).
 750m 742m (2 observations only)

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	11.VI	0713	61°18'·5	7°49'·2	9·2	-3·4	+13·0	+0·3	0·0
2	11.VI	1024	61°20'·5	7°56'·3	12·4	-9·6	+16·6	-0·7	+0·1
3	11.VI	1245	61°21'·7	7°59'·3	14·75	-12·3	+19·0	+0·4	-0·1

Fitted lines: $x = - 1.623t + 11.2$

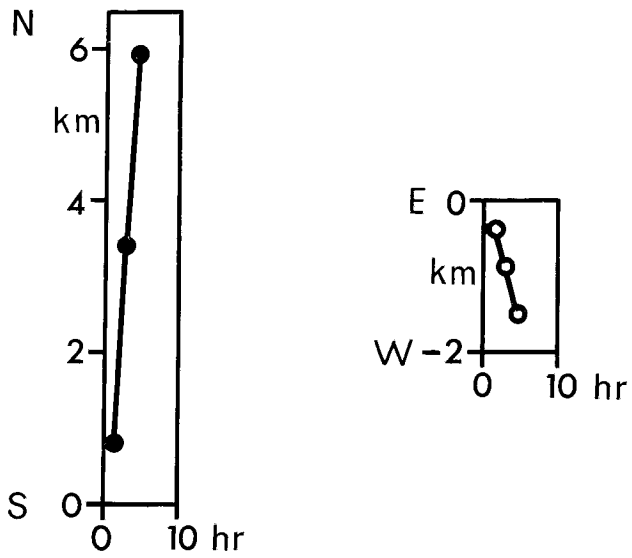
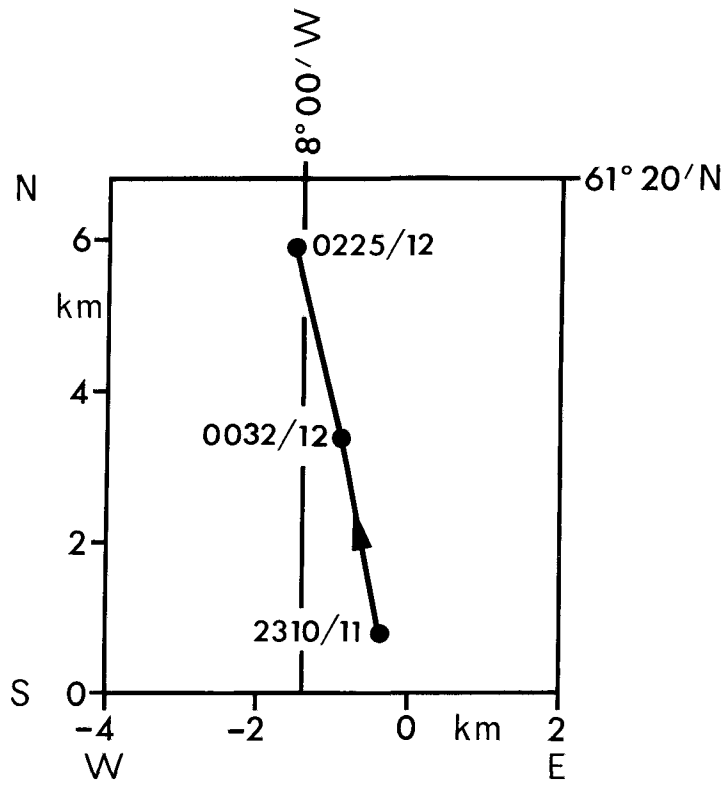
$y = + 1.084t + 3.1$

Mean velocity = 54.2(±5.1)cm/sec, 304(±4)°T

* Running fixes, of 2 bearings each.

FLOAT DESIGNATION : 3

Date and time laid : 2145/11.VI.65



SERIAL No: 182

FLOAT DESIGNATION: 3

Date and time laid: 2145/11.VI.65

Position laid: 61° 16'·3N
7° 58'·5W

Displacement origin: 61° 16'·3N
7° 58'·5W

Navigation based on: Decca

Estimated accuracy of positions: ± 1 km *

Depth(m): Nominal Observed S.D. S.D.(mean).
 - 580 (2 observations only)

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	11.VI	2310	61°16'·8	7°58'·5	1·4	-0·4	+0·8	0·0	-0·2
2	12.VI	0032	61°18'·2	7°59'·6	2·8	-0·9	+3·4	0·0	+0·3
3	12.VI	0225	61°19'·5	8°00'·2	4·65	-1·5	+5·9	0·0	-0·1

Fitted lines: $x = - 0.338t + 0.1$

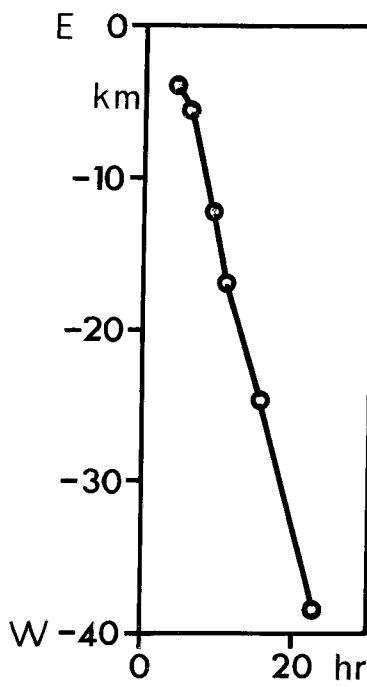
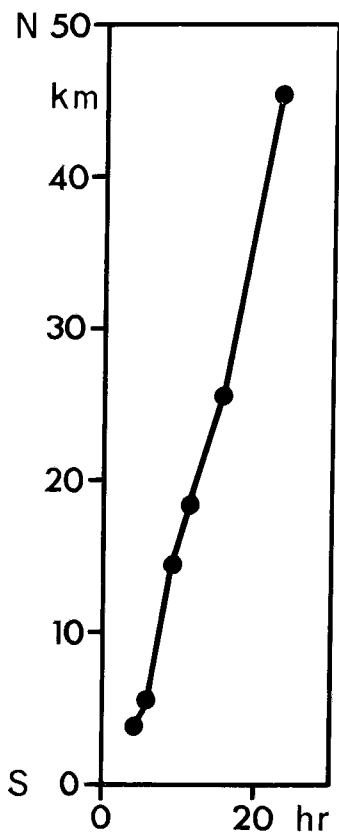
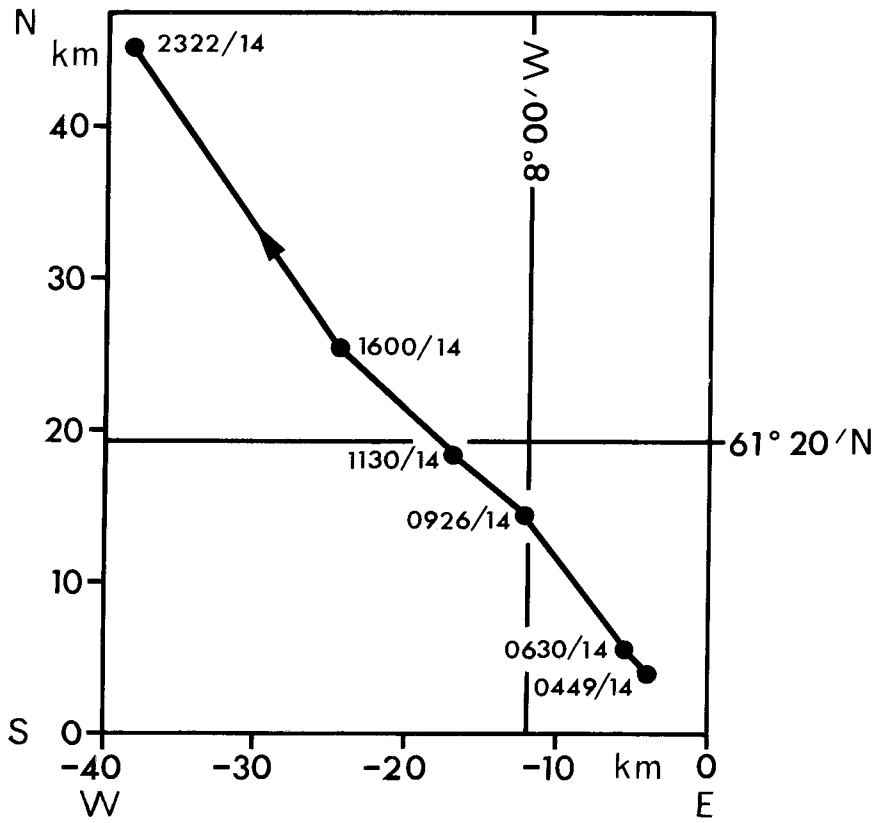
$y = + 1.558t - 1.2$

Mean velocity = 44.3(±3.9)cm/sec, 348(±1)°T

* Running fixes, of 2 bearings each.

FLOAT DESIGNATION: 12

Date and time laid: 0030/14.VI.65



SERIAL No: 184

FLOAT DESIGNATION: 12

Date and time laid: 0030/14.VI.65

Position laid: 61°09'·7N
7°46'·8W

Displacement origin: 61°09'·7N
7°46'·8W

Navigation based on: Decca

Estimated accuracy of positions: ± 1 km *

Depth(m): Nominal Observed S.D. S.D.(mean).
 - 644 (3 observations only)

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	14.VI	0449	61°11'·7	7°51'·3	4·3	-4·0	+3·8	-0·5	+0·9
2	14.VI	0630	61°12'·7	7°53'·0	6·0	-5·5	+5·5	+1·2	-1·2
3	14.VI	0926	61°17'·5	8°00'·6	8·95	-12·3	+14·4	0·0	+1·1
4	14.VI	1130	61°19'·5	8°05'·7	11·0	-16·9	+18·3	-0·8	+0·5
5	14.VI	1600	61°23'·4	8°14'·3	15·5	-24·7	+25·5	0·0	-2·3
6	14.VI	2322	61°34'·0	8°29'·8	22·85	-38·4	+45·2	+0·2	+1·1

Fitted lines: x = - 1·894t + 4·7

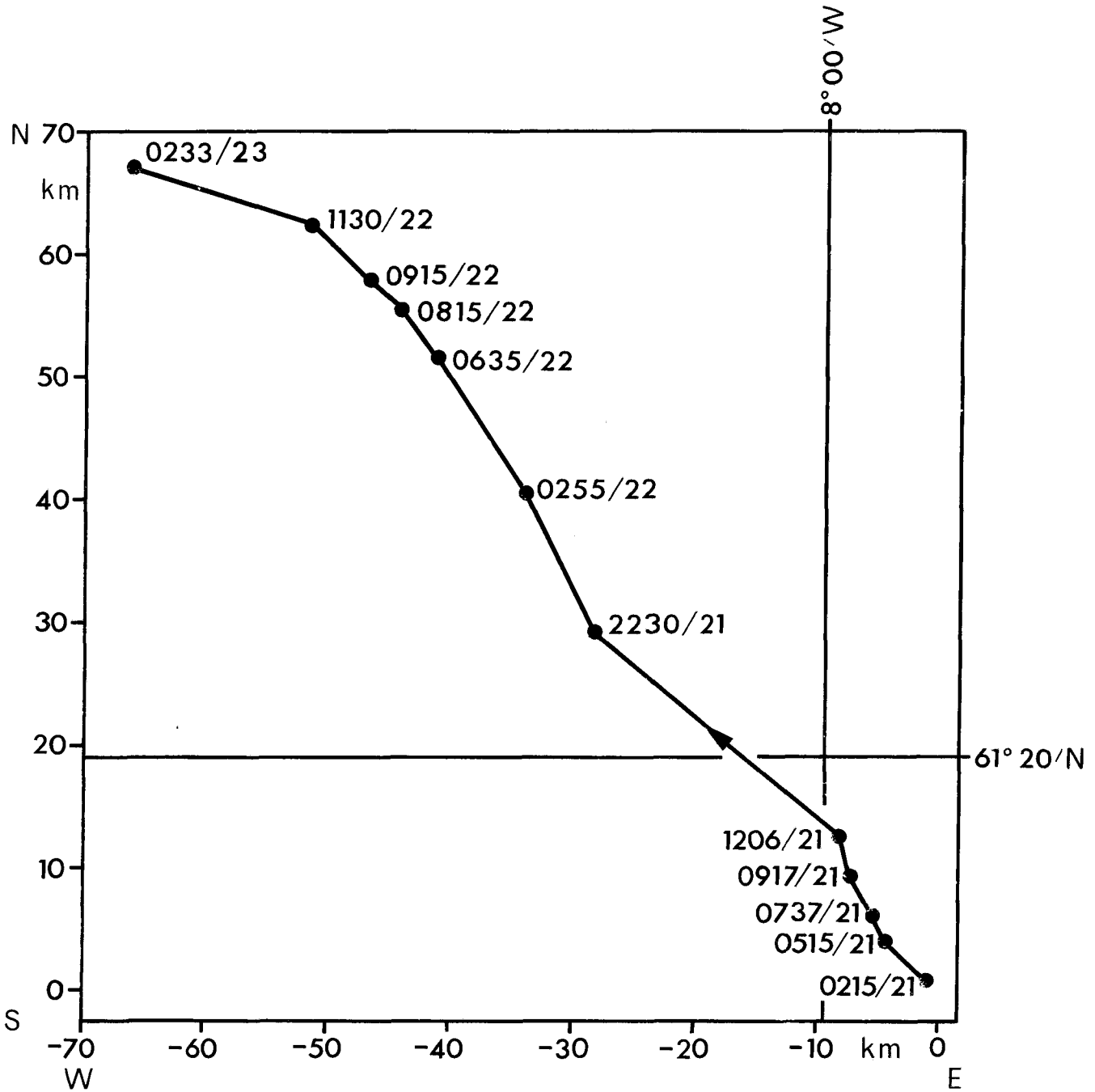
 y = + 2·222t - 6·6

Mean velocity = 81·1(±2·4)cm/sec, 320(±1)°T

* Running fixes, of 2 bearings each.

FLOAT DESIGNATION: 4

Date and time laid 2355/20.VI.65



SERIAL No: 185

FLOAT DESIGNATION: 4

Date and time laid: 2355/20.VI.65

Position laid: 61° 09'·8N 7° 49'·1W

Displacement origin: 61° 09'·8N
7° 49'·1W

Navigation based on: Loran

Estimated accuracy of positions: ± 1 km *

Depth(m):	Nominal	Observed	S.D.	S.D.(mean).
	-	687	±35	±12

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	21.VI	0215	61°10'·0	7°50'·0	2·35	-1·0	+0·6	-2·4	+0·9
2	21.VI	0515	61°12'·2	7°54'·5	5·35	-4·6	+4·1	-1·6	-0·6
3	21.VI	0737	61°13'·1	7°55'·5	7·7	-5·5	+5·9	+1·0	-2·7
4	21.VI	0917	61°15'·0	7°57'·4	9·35	-7·4	+9·4	+1·6	-1·9
5	21.VI	1206	61°16'·7	7°58'·5	12·2	-8·2	+12·6	+5·0	-3·5
6	21.VI	2230	61°25'·7	8°21'·6	22·6	-28·4	+29·1	+0·2	-4·2
7	22.VI	0255	61°31'·9	8°28'·0	27·0	-34·0	+40·5	+1·1	-0·1
8	22.VI	0635	61°37'·8	8°36'·4	30·65	-41·3	+51·5	-0·8	+4·8
9	22.VI	0815	61°40'·2	8°39'·9	32·35	-44·3	+55·6	-1·3	+6·1
10	22.VI	0915	61°41'·3	8°42'·8	33·35	-47·1	+57·9	-2·6	+6·7
11	22.VI	1130	61°43'·8	8°48'·1	35·6	-51·7	+62·4	-3·9	+7·5
12	23.VI	0233	61°46'·3	9°05'·0	50·65	-66·4	+67·0	+3·7	-12·9

Fitted lines: $x = -1.481t + 4.9$

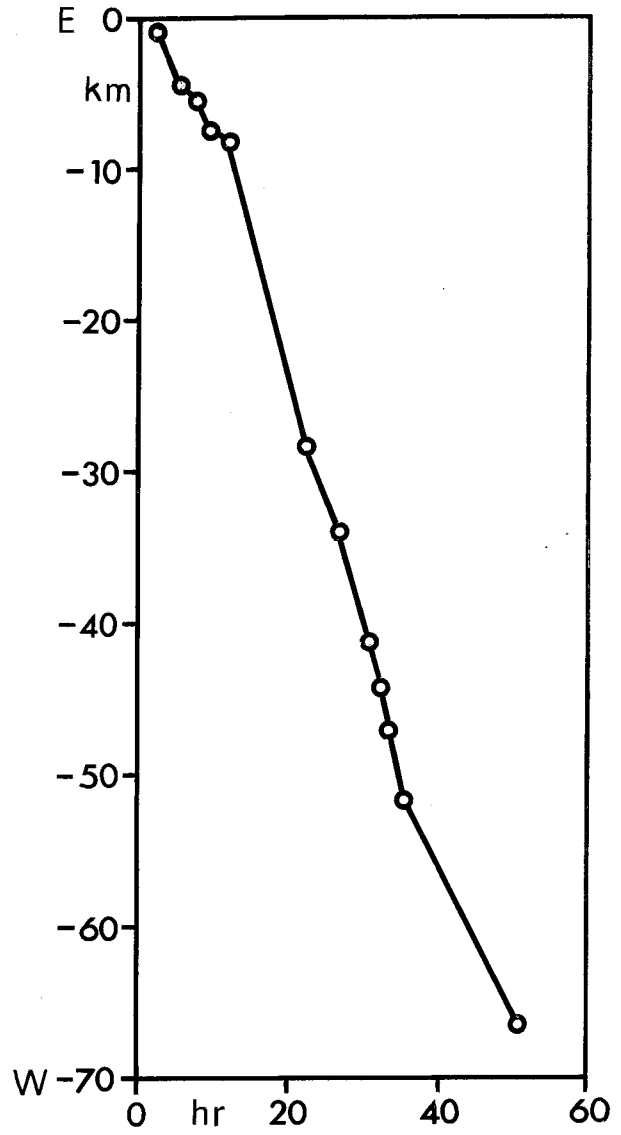
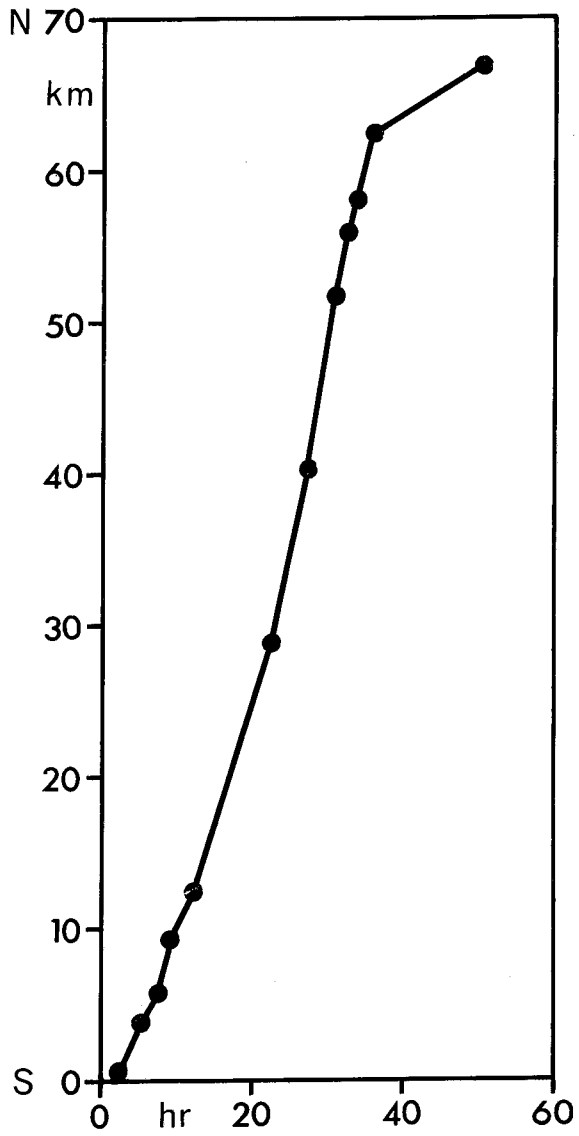
$y = +1.660t - 4.2$

Mean velocity = 61·8(±2·7) cm/sec, 318(±1·8)°T

* Running fixes, of 2 bearings each

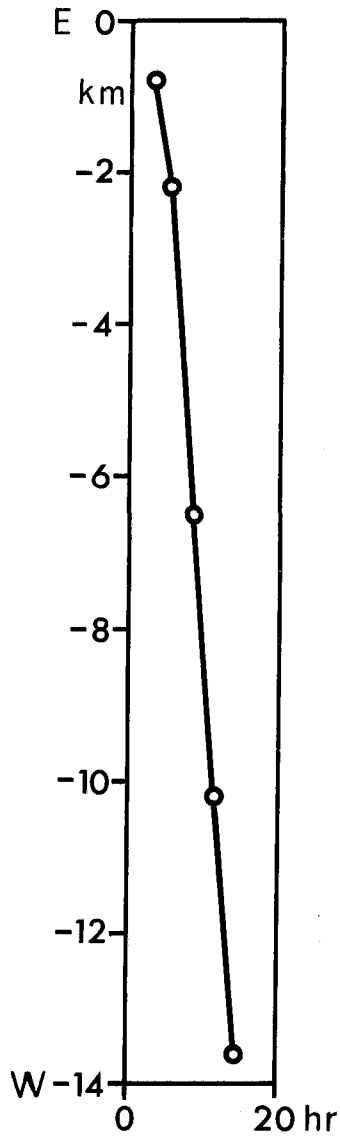
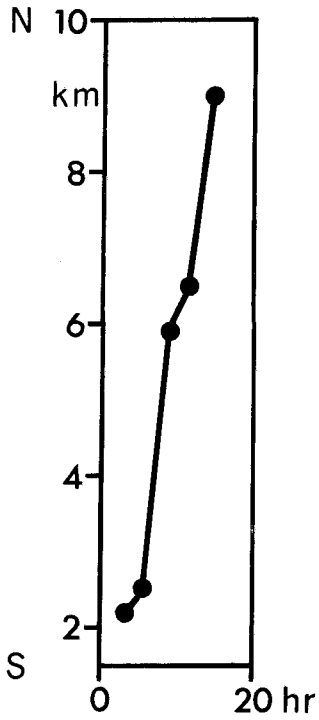
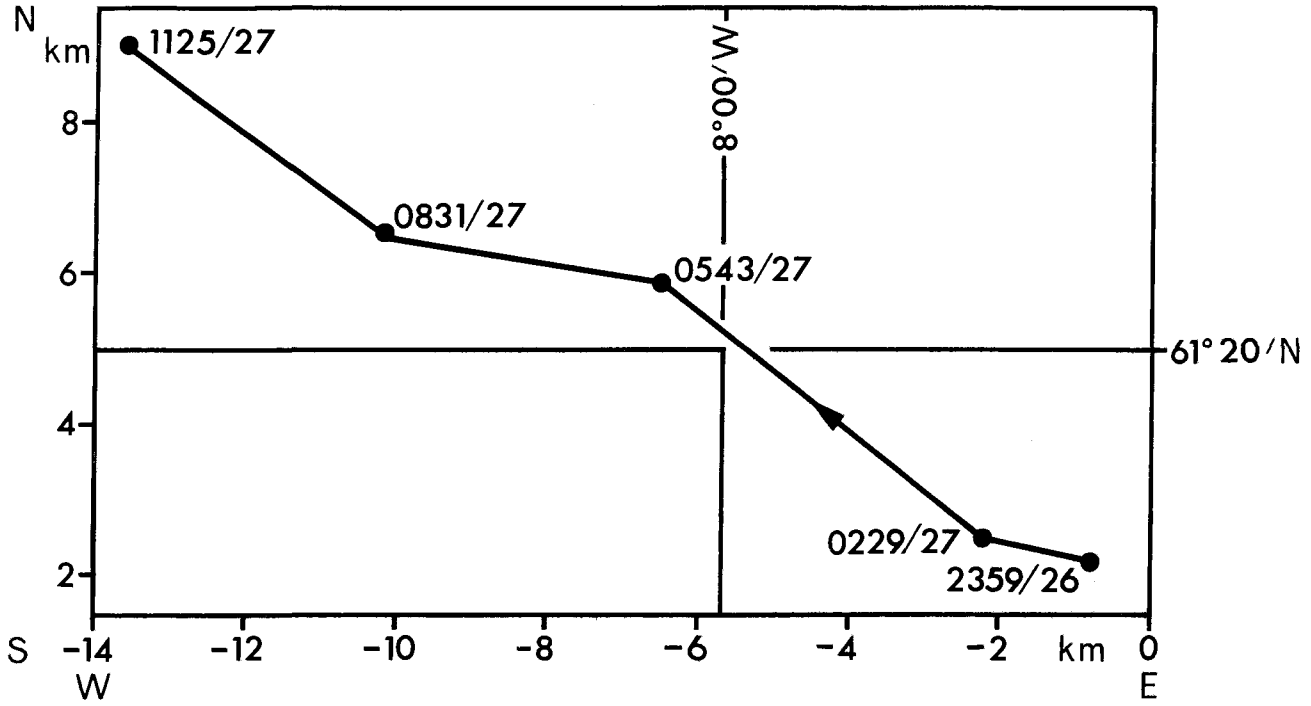
FLOAT DESIGNATION : 4

Date and time laid: 2355/20.VI.65



FLOAT DESIGNATION: 6

Date and time laid: 2055/26.VI.65



SERIAL No: 186

FLOAT DESIGNATION: 6

Date and time laid: 2055/26.VI.65

Position laid: 61° 17'·3N
7° 53'·4W

Displacement origin: 61° 17'·3N
7° 53'·4W

Navigation based on: Loran

Estimated accuracy of positions: ± 1 km *

Depth(m):	Nominal	Observed	S.D.	S.D.(mean).
	12m off	10m	±3	±1 (off bottom)
	bottom	795m	±14	±6 (from surface)

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	26.VI	2359	61°18'·4	7°54'·2	3·05	-0·8	+2·2	-0·7	+0·4
2	27.VI	0229	61°18'·7	7°55'·8	5·55	-2·2	+2·5	+0·8	-0·8
3	27.VI	0543	61°20'·5	8°00'·9	8·8	-6·5	+5·9	+0·3	+0·6
4	27.VI	0831	61°20'·9	8°05'·0	11·6	-10·2	+6·5	-0·2	-0·5
5	27.VI	1125	61°22'·3	8°08'·9	14·5	-13·6	+9·0	-0·2	+0·2

Fitted lines: $x = - 1·164t + 3·5$

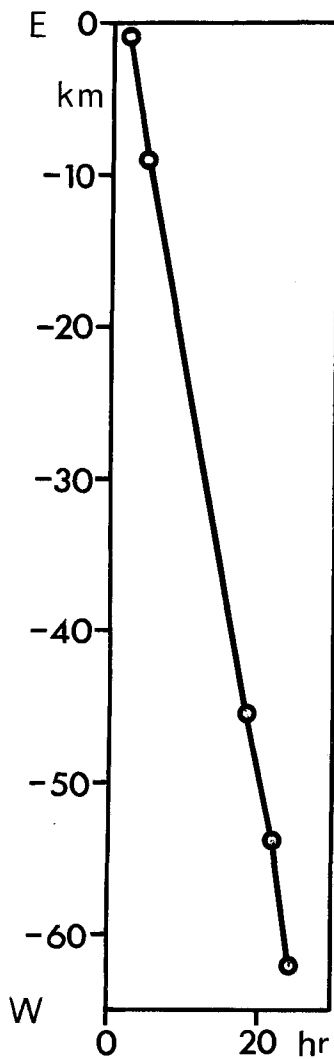
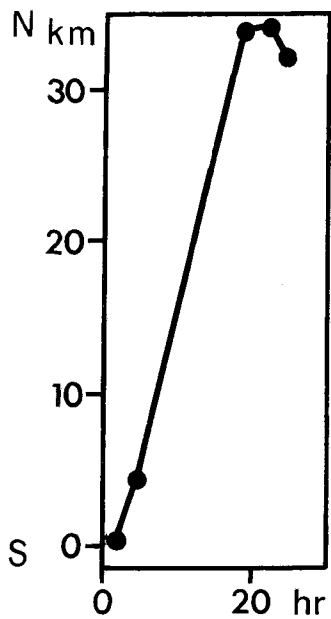
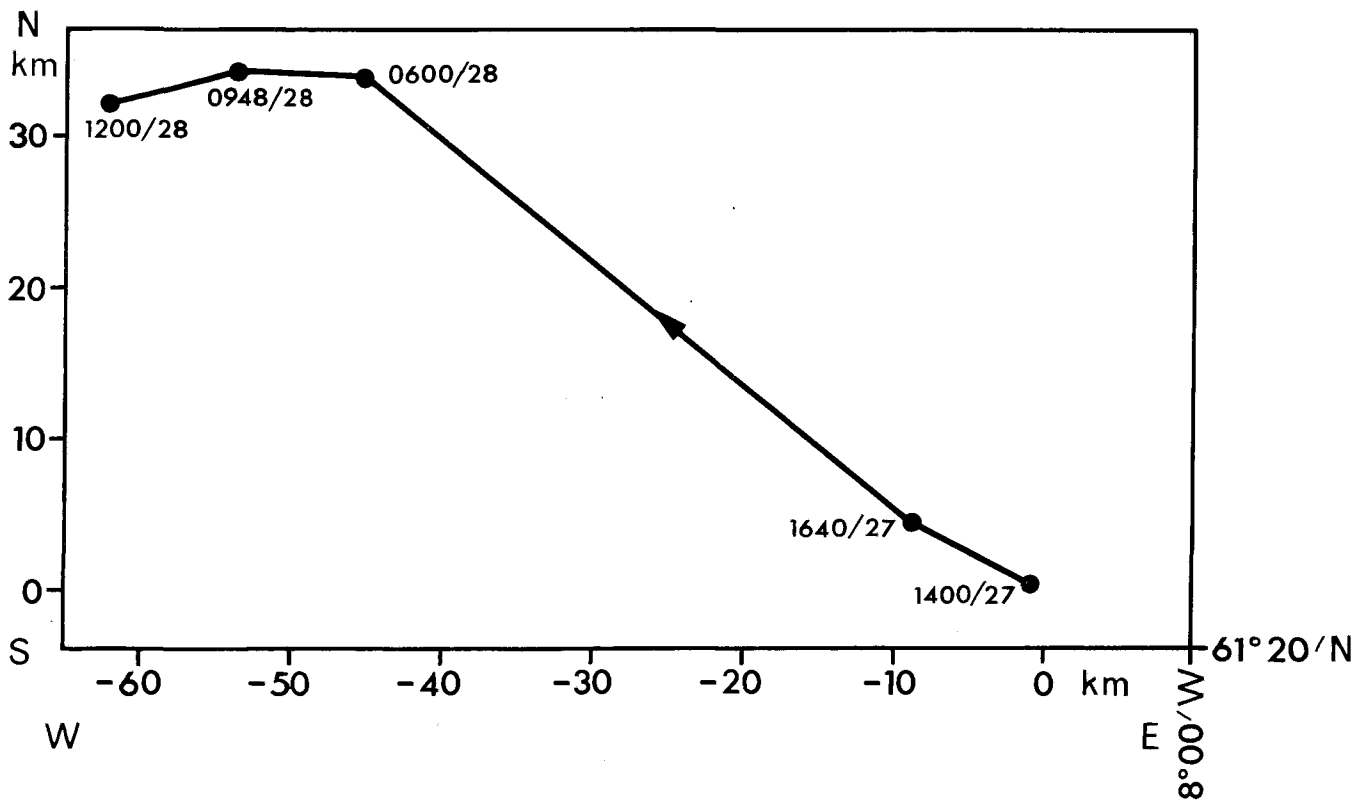
$y = + 0·612t - 0·1$

Mean Velocity = 36·5(±2)cm/sec, 298(±3)°T

* Running fixes, of 2 bearings each.

FLOAT DESIGNATION: 2

Date and time laid : 1155/27.VI.65



FLOAT DESIGNATION: 2

Date and time laid: 1155/27.VI.65

Position laid: 61° 22'.2N
8° 11'.2W

Displacement origin: 61°22'.2N
8°11'.2W

Navigation based on: Loran

Estimated accuracy of positions: ± 1 km *

Depth(m):	Nominal	Observed	S.D.	S.D.(mean).
	40m off bottom	22m off bottom	-	-
		(798m from surface)	(2 observations only)	

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	27.VI	1400	61°22'.3	8°12'.4	2.1	-1.0	+0.2	+0.4	-0.9
2	27.VI	1640	61°24'.5	8°21'.5	4.75	-9.0	+4.4	-0.4	-1.1
3	28.VI	0600	61°40'.6	9°03'.4	18.1	-45.4	+33.9	-0.4	+6.5
4	28.VI	0948	61°40'.8	9°12'.8	21.9	-53.9	+34.2	+1.4	+0.5
5	28.VI	1200	61°39'.7	9°22'.4	24.1	-62.2	+32.2	-0.9	-5.1

Fitted lines: x = - 2.725t + 4.4

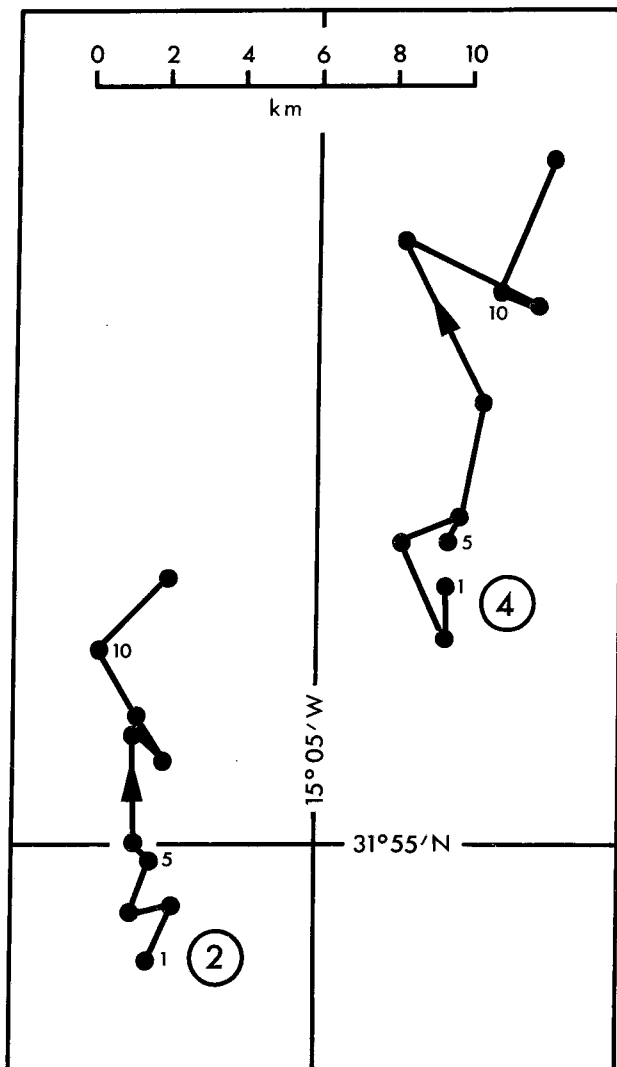
y = + 1.645t - 2.4

Mean velocity = 88.4(±3.6)cm/sec, 301(±4)°T

* Uncertain due to running fixes, of 2 bearings each.

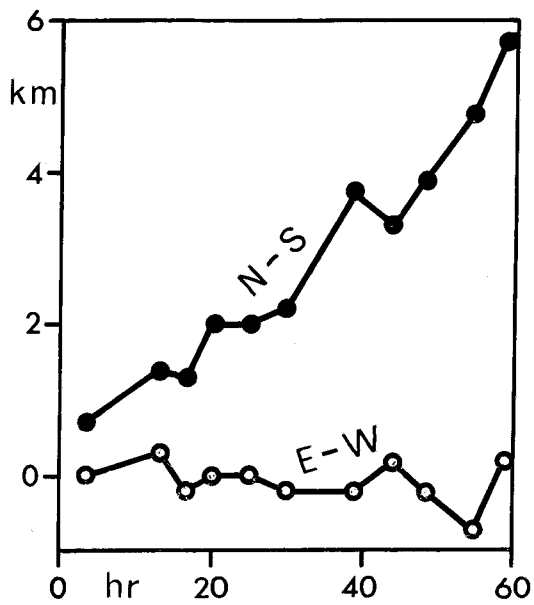
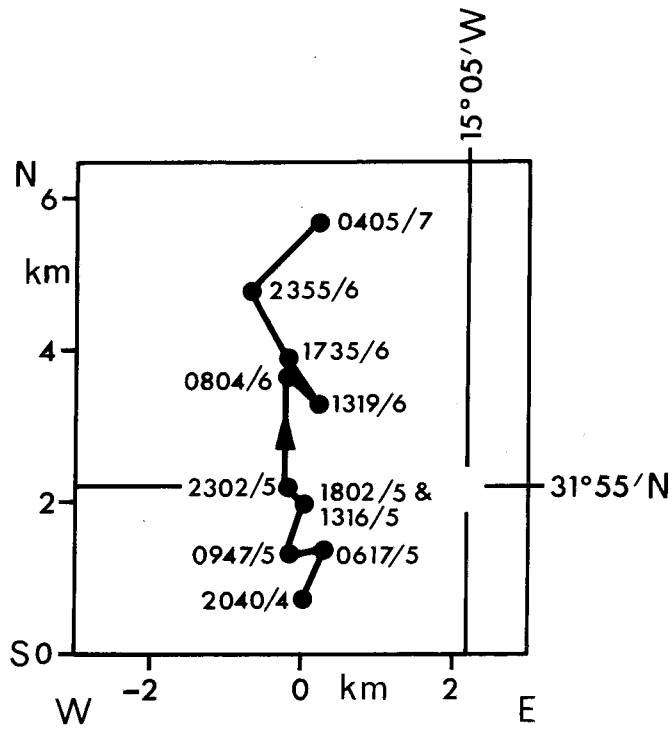
✓ 39m of nylon line and 12m of wire braid were suspended from float to trail on bottom, controlling depth.

FLOAT DESIGNATIONS: 2 (laid 1713/4.III.66), 4 (laid 2322/4.III.66)



FLOAT DESIGNATION: 2

Date and time laid: 1713/4.III.66



SERIAL No: 189

FLOAT DESIGNATION: 2

Date and time laid: 1713/4.III.66

Position laid: 31° 53'·8N
15° 06'·4W

Displacement origin: 31° 53'·8N
15° 06'·4W

Navigation based on: Radar on anchored buoy * + celestial fixes

Estimated accuracy of positions: ± 0.2km, relative, ± 2km absolute

Depth(m): Nominal Observed S.D. S.D.(mean).
 1500 1520 / - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	4.III	2040	31°54'·2	15°06'·4	3·45	0·0	+0·7	-0·1	+0·3
2	5.III	0617	31°54'·6	15°06'·2	13·05	+0·3	+1·4	+0·3	+0·2
3	5.III	0947	31°54'·5	15°06'·5	16·55	-0·2	+1·3	-0·2	-0·2
4	5.III	1316	31°54'·9	15°06'·4	20·05	0·0	+2·0	0·0	+0·2
5	5.III	1802	31°54'·9	15°06'·4	24·8	0·0	+2·0	0·0	-0·2
6	5.III	2302	31°55'·0	15°06'·5	29·8	-0·2	+2·2	-0·1	-0·4
7	6.III	0804	31°55'·8	15°06'·5	38·85	-0·2	+3·7	-0·1	+0·3
8	6.III	1319	31°55'·6	15°06'·3	44·1	+0·2	+3·3	+0·3	-0·5
9	6.III	1735	31°55'·9	15°06'·5	48·35	-0·2	+3·9	-0·1	-0·3
10	6.III	2355	31°56'·4	15°06'·9	54·7	-0·7	+4·8	-0·5	+0·1
11	7.III	0405	31°56'·9	15°06'·3	58·85	+0·2	+5·7	+0·4	+0·6

Fitted lines: $x = - 0.004t + 0.1$

$y = + 0.084t + 0.1$

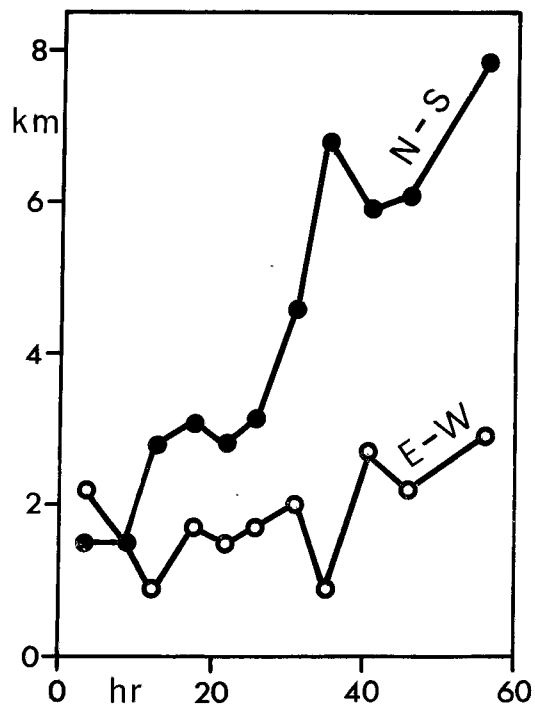
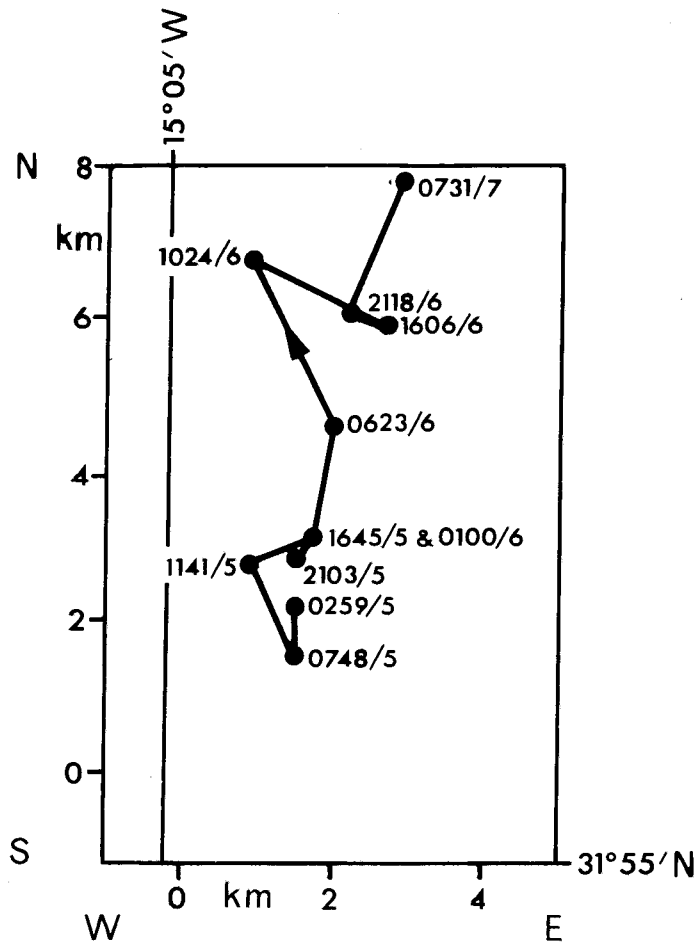
Mean velocity = $2.4(\pm 0.2)$ cm/sec, $357(\pm 3)^\circ T$

* Movement of dan buoy was checked by fixing upon stationary bottom pingers 13 and 8

/ Single observation by bottom reflection

FLOAT DESIGNATION: 4

Date and time laid : 2322 / 4, III.66



FLOAT DESIGNATION: 4

Date and time laid: 2322/4.III.66

Position laid: 31°55'·7N
15° 04'·9W

Displacement origin: 31° 55'·7N
15° 04'·9W

Navigation based on: Radar on anchored buoy* + celestial fixes

Estimated accuracy of positions: ± 0·2 km relative, ± 2 km absolute

Depth(m): Nominal Observed S.D. S.D.(mean).
 1500 1313 ↗ ±9 -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	5.III	0259	31°56'·9	15°03'·9	3·6	+1·5	+2·2	+0·4	+0·8
2	5.III	0748	31°56'·5	15°03'·9	8·45	+1·5	+1·5	+0·2	-0·5
3	5.III	1141	31°57'·2	15°04'·3	12·3	+0·9	+2·8	-0·5	+0·3
4	5.III	1645	31°57'·4	15°03'·8	17·4	+1·7	+3·1	+0·2	0·0
5	5.III	2103	31°57'·2	15°03'·9	21·7	+1·5	+2·8	-0·1	-0·8
6	6.III	0100	31°57'·4	15°03'·8	25·65	+1·7	+3·1	0·0	-1·0
7	6.III	0623	31°58'·2	15°03'·6	31·0	+2·0	+4·6	+0·1	-0·1
8	6.III	1024	31°59'·4	15°04'·3	35·05	+0·9	+6·8	-1·1	+1·6
9	6.III	1606	31°58'·9	15°03'·1	40·75	+2·7	+5·9	+0·6	0·0
10	6.III	2118	31°59'·0	15°03'·5	45·95	+2·2	+6·1	-0·1	-0·4
11	7.III	0731	31°59'·9	15°03'·0	56·15	+2·9	+7·8	+0·3	+0·1

Fitted lines: x = + 0·027t + 1·0

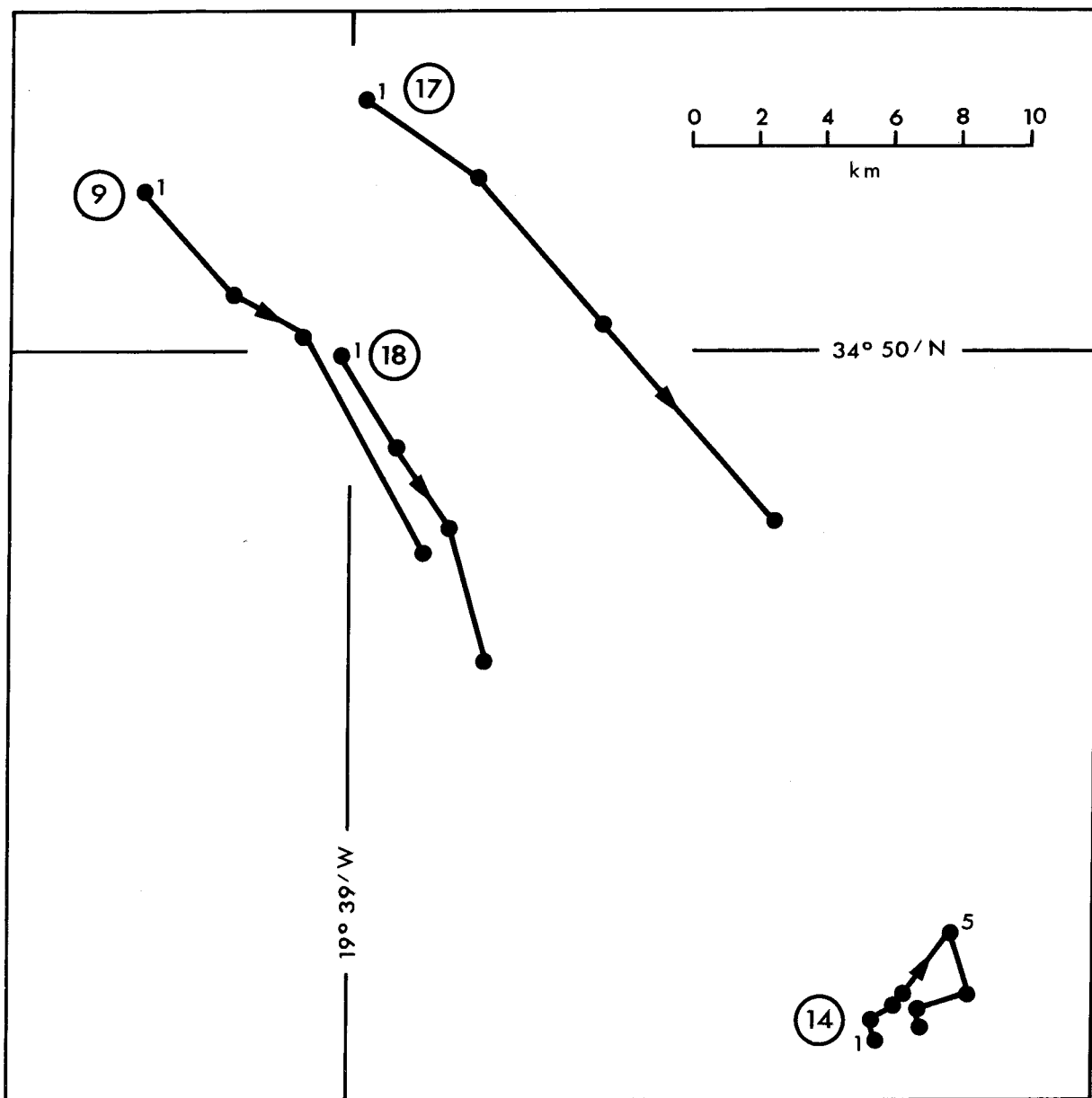
 y = + 0·120t + 1·0

Mean velocity = 3·4(±0·4)cm/sec, 013(±4)°T

* Movement of dan buoy was checked by fixing upon stationary bottom pingers 13 and 8

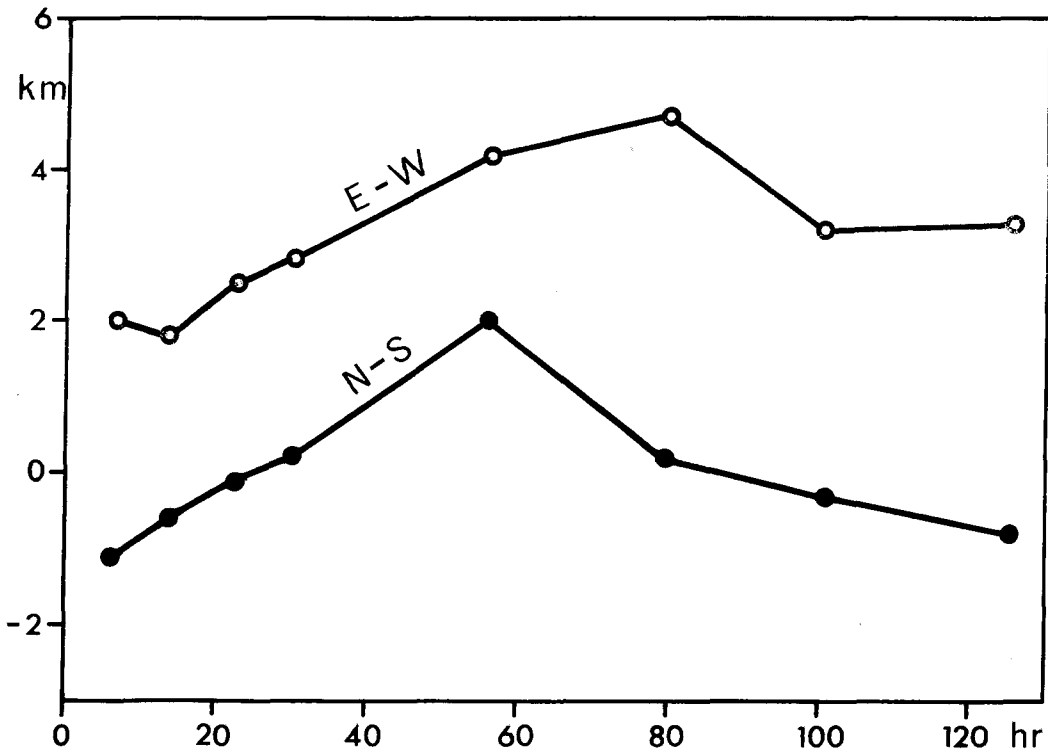
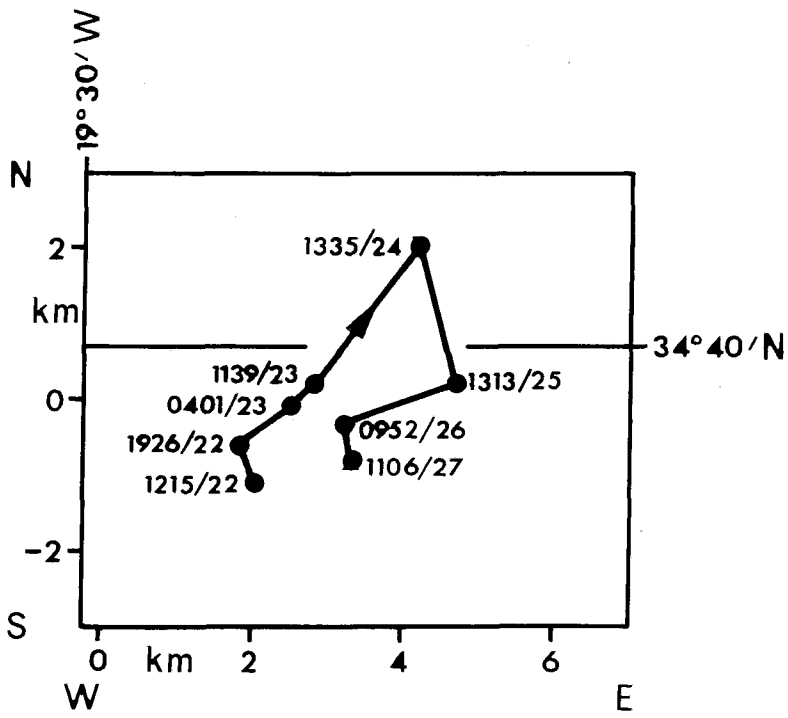
↗ mean of two observations of bottom reflections.

FLOAT DESIGNATIONS: 14 (laid 0540/22.III.66), 9 (laid 1919/26.III.66),
17 (laid 2013/26.III.66)



FLOAT DESIGNATION: 14

Date and time laid: 0540/22.III.66



SERIAL No: 192

FLOAT DESIGNATION: 14

Date and time laid: 0540/22.III.66

Position laid: 34° 39'·6N
19° 29'·8W

Displacement origin: 34° 39'·6N
19° 29'·8W

Navigation based on: Radar on anchored buoy * (fixes 1-4), + Loran (fixes 5-8)

Estimated accuracy of positions: ± 0.2 km relative ± 1 km absolute (fixes 1-4)
± 0.5 km relative (fixes 5-8)

Depth(m): Nominal Observed S.D. S.D.(mean).
 5138 5138 / - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	22.III	1215	34°39'·0	19°28'·5	6·6	+2·0	-1·1	-0·4	-1·0
2	22.III	1926	34°39'·2	19°28'·6	13·75	+1·8	-0·6	-0·7	-0·5
3	23.III	0401	34°39'·5	19°28'·2	22·35	+2·5	-0·1	-0·1	0·0
4	23.III	1139	34°39'·7	19°28'·0	30·0	+2·8	+0·2	+0·1	+0·3
5	24.III	1335	34°40'·7	19°27'·0	55·9	+4·2	+2·0	+1·1	+2·1
6	25.III	1313	34°39'·7	19°26'·8	79·55	+4·7	+0·2	+1·3	+0·2
7	26.III	0952	34°39'·4	19°27'·8	100·2	+3·2	-0·3	-0·5	-0·3
8	27.III	1106	34°39'·2	19°27'·7	125·45	+3·3	-0·8	-0·8	-0·8

Fitted lines: $x = + 0.014t + 2.3$

$y = + 0.001t - 0.1$

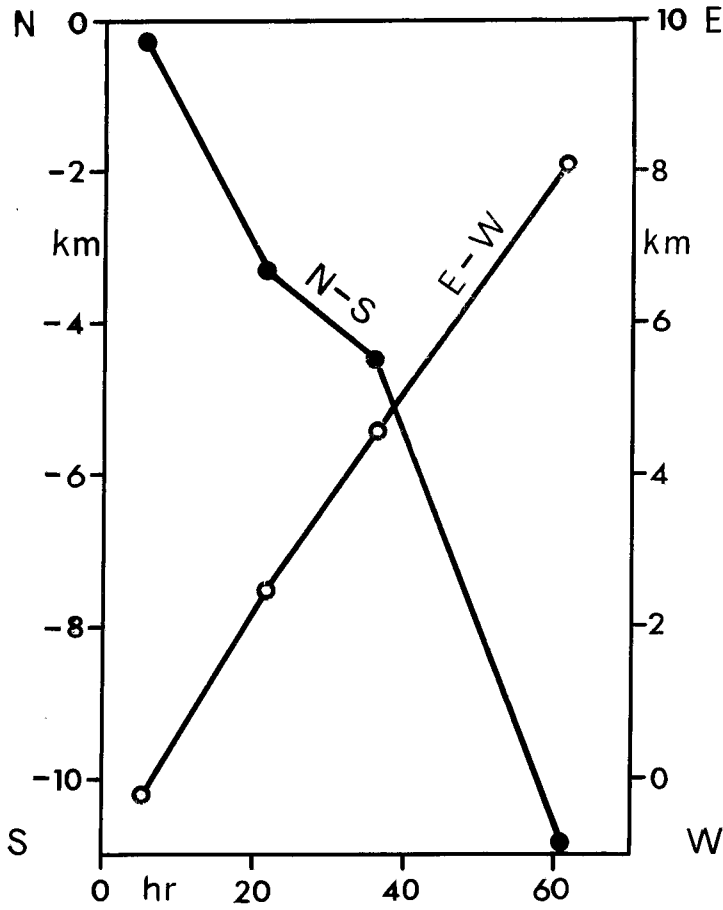
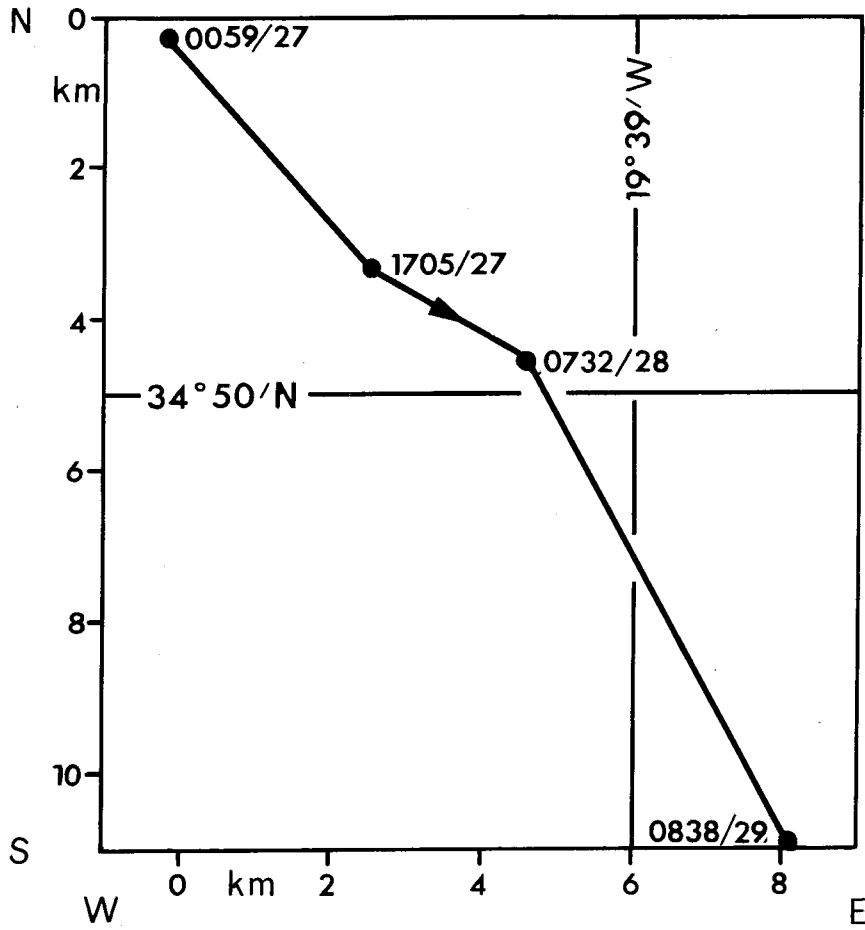
Mean velocity = $0.4(\pm 0.2)$ cm/sec, $086(\pm 35)^\circ T$

* Dan buoy was fixed in relation to bottom topography

/ Float was stabilized by trailing wire at 2m off bottom in 5140 depth.

FLOAT DESIGNATION : 9

Date and time laid : 1919/26.III.66



SERIAL No: 193

FLOAT DESIGNATION: 9

Date and time laid: 1919/26.III.66

Position laid: 34° 52'·7N
19° 43'·0W

Displacement origin: 34° 52'·7N
19° 43'·0W

Navigation based on: Radar on anchored buoy (fixes 1 and 2) + Loran

Estimated accuracy of positions: ± 0·2 km relative, ± 1 km absolute (fixes 1-2)
± 0·5 km relative (fixes 3-4)

Depth(m): Nominal Observed S.D. S.D.(mean).
 950 876 * - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	27.III	0059	34°52'·5	19°43'·2	5·65	-0·2	-0·3	-0·2	-0·3
2	27.III	1705	34°50'·9	19°41'·4	21·75	+2·5	-3·3	+0·2	-0·3
3	28.III	0732	34°50'·3	19°39'·9	36·2	+4·6	-4·5	+0·1	+1·2
4	29.III	0838	34°46'·8	19°37'·6	61·3	+8·1	-10·9	-0·1	-0·6

Fitted lines: $x = + 0·148t - 0·9$

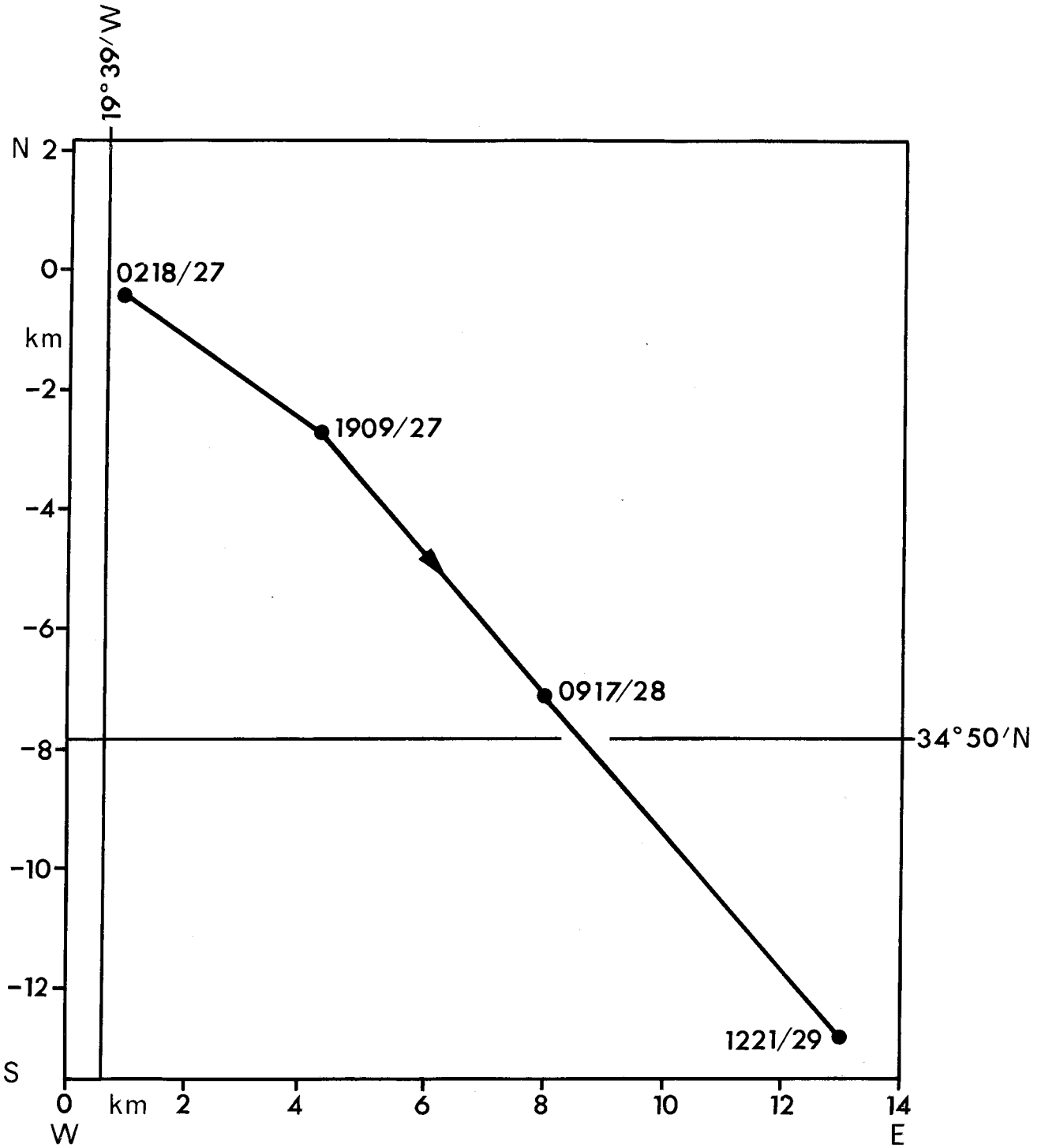
$y = - 0·186t + 1·0$

Mean velocity = 6·6(±0·5)cm/sec, 142(±3)°T

* Single observation of surface and bottom reflections.

FLOAT DESIGNATION: 17

Date and time laid: 2013/26.III.66



SERIAL No: 194

FLOAT DESIGNATION: 17

Date and time laid: 2013/26.III.66

Position laid: 34° 54'·2N
19° 39'·4W

Displacement origin: 34° 54'·2N
19° 39'·4W

Navigation based on: Radar on anchored buoy (fixes 1-2), + Loran

Estimated accuracy of positions: ± 0·2 km relative ± 1 km absolute (fixes 1-2)
± 0·5 km relative (fixes 3-4)

Depth(m): Nominal Observed S.D. S.D.(mean).
 950 930* - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	27.III	0218	34°54'·0	19°38'·8	6·1	+0·9	-0·4	0·0	-0·5
2	27.III	1909	34°52'·8	19'·36·6	22·95	+4·2	-2·7	-0·3	+0·9
3	28.III	0917	34°50'·3	19°34'·2	37·05	+8·0	-7·1	+0·5	-0·4
4	29.III	1221	34°47'·2	19°30'·9	64·15	+13·0	-12·8	-0·2	-0·1

Fitted lines: x = + 0·211t - 0·4

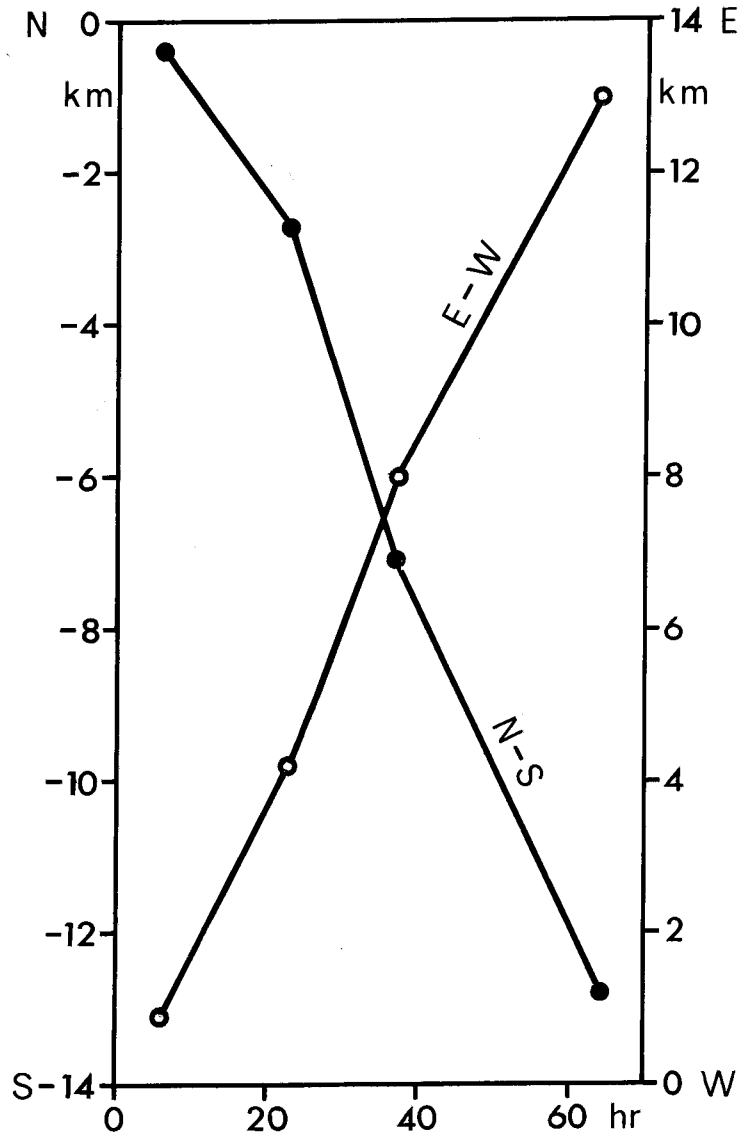
 y = - 0·221t + 1·4

Mean velocity = 8·5(±0·4)cm/sec, 136(±2)°T

* Single observation of surface and bottom reflections.

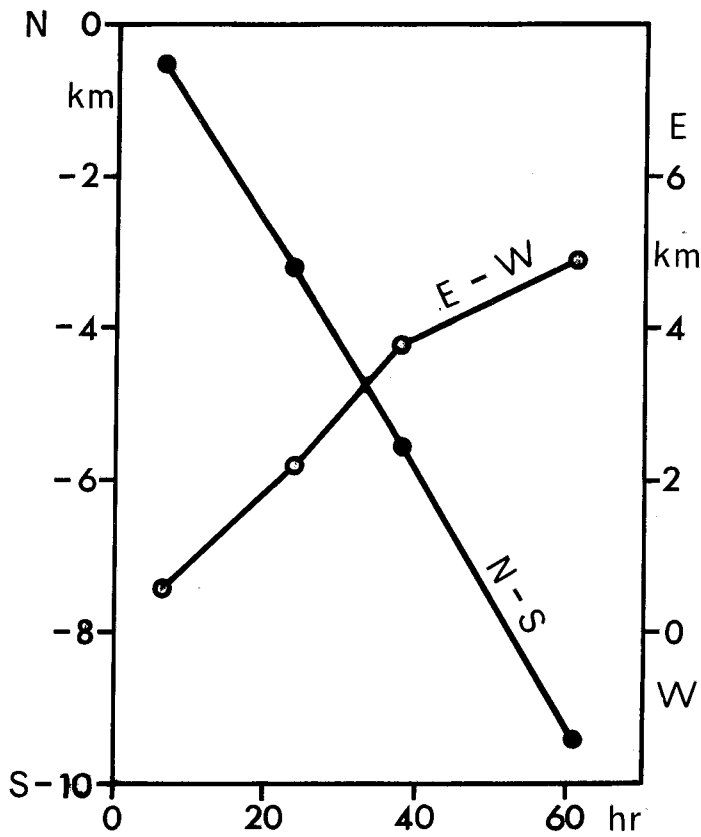
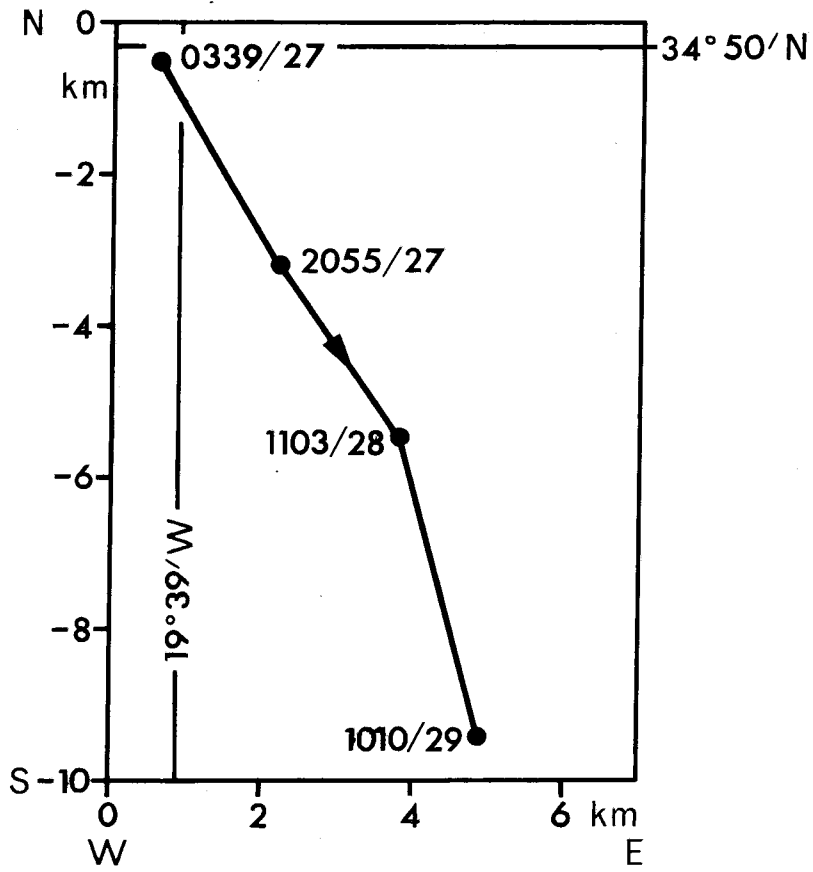
FLOAT DESIGNATION: 17

Date and time laid: 2013/26.III.66



FLOAT DESIGNATION: 18

Date and time laid: 2125/26.III.66



SERIAL No: 195

FLOAT DESIGNATION: 18

Date and time laid: 2125/26.III.66

Position laid: 34° 50'·2N
19° 39'·7W

Displacement origin: 34° 50'·2N
19° 39'·7W

Navigation based on: Radar on anchored buoy (fixes 1-2), + Loran

Estimated accuracy of positions: ± 0.2 km relative ± 1 km absolute (fixes 1-2)
± 0.5 km relative (fixes 3-4)

Depth(m): Nominal Observed S.D. S.D.(mean).
 950 995* - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	27.III	0339	34°49'·9	19°39'·2	6·25	+0·6	-0·5	-0·2	-0·1
2	27.III	2055	34°48'·4	19°38'·2	23·5	+2·2	-3·2	0·0	+0·1
3	28.III	1103	34°47'·2	19°37'·2	37·65	+3·8	-5·5	+0·5	+0·1
4	29.III	1010	34°45'·1	19°36'·4	60·75	+4·9	-9·4	-0·3	-0·1

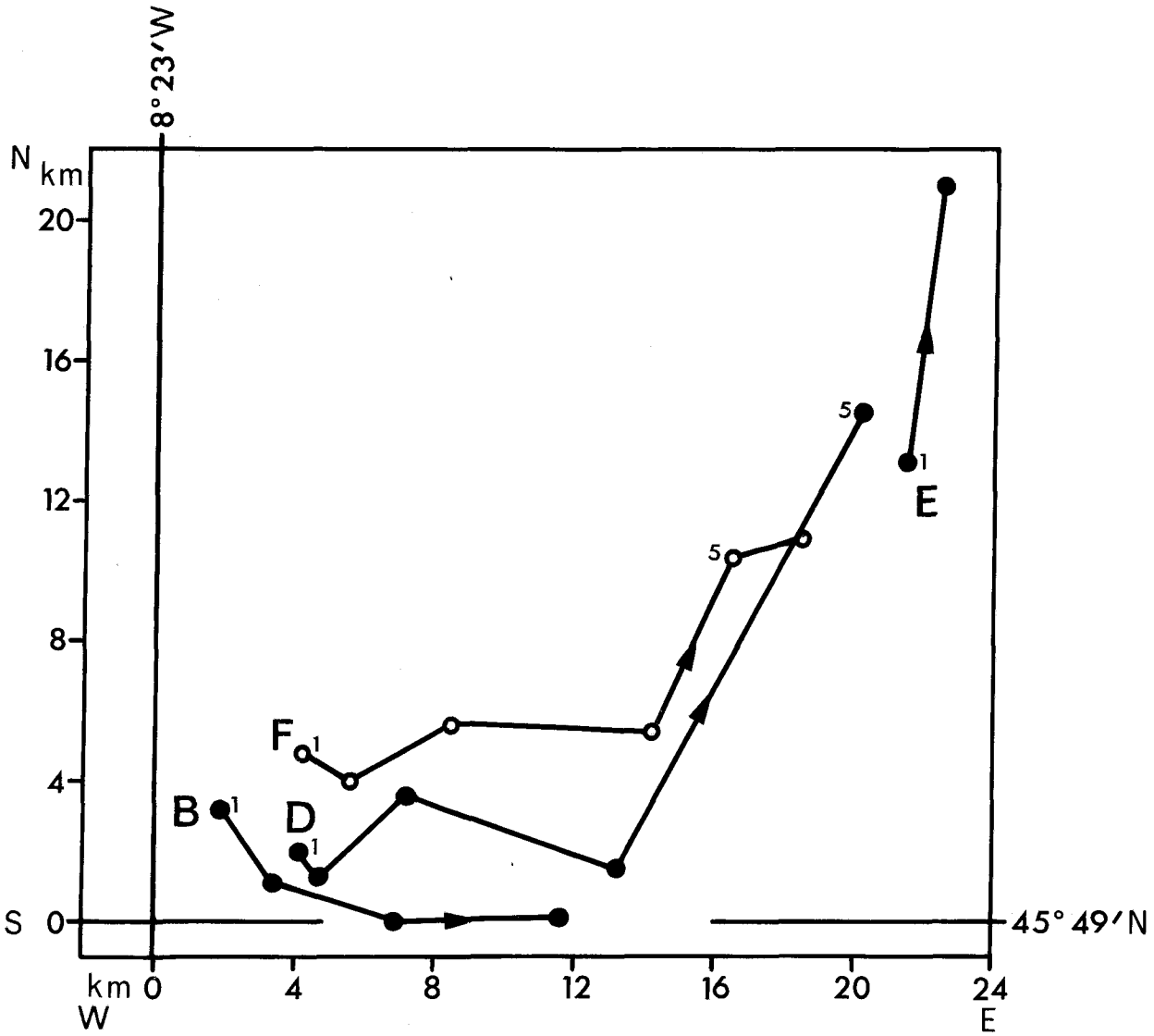
Fitted lines: $x = + 0.080t + 0.3$

$y = - 0.163t + 0.6$

Mean velocity = 5.1(±0.1)cm/sec, 154(±3)°T

* Single observation of surface and bottom reflections.

FLOAT DESIGNATIONS : D (laid 1228/25.X.67), F (laid 1305/25.X.67),
 B (laid 1401/25.X.67), E (laid 1103/31.X.67).



SERIAL No: 196

FLOAT DESIGNATION: D

Date and time laid: 1228/25.X.67

Position laid: 45° 49'·7N 8° 21'·3W
(+2·2 km E + 1·3 km N)

Displacement origin: 45° 49' N
8° 23' W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 1400 1305* - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	25.X	1903	45°50'·0	8°19'·8	6·6	+4·1	+2·0	3·8	143
2	26.X	0225	45°49'·6	8°19'·3	13·95	+4·7	+1·2	6·0	045
3	26.X	1840	45°51'·0	8°17'·3	30·2	+7·2	+3·6	12·2	109
4	27.X	0845	45°49'·8	8°13'·0	44·3	+13·2	+1·5	5·7	029
5	30.X	0927	45°56'·9	8°07'·5	117·0	+20·2	+14·5		

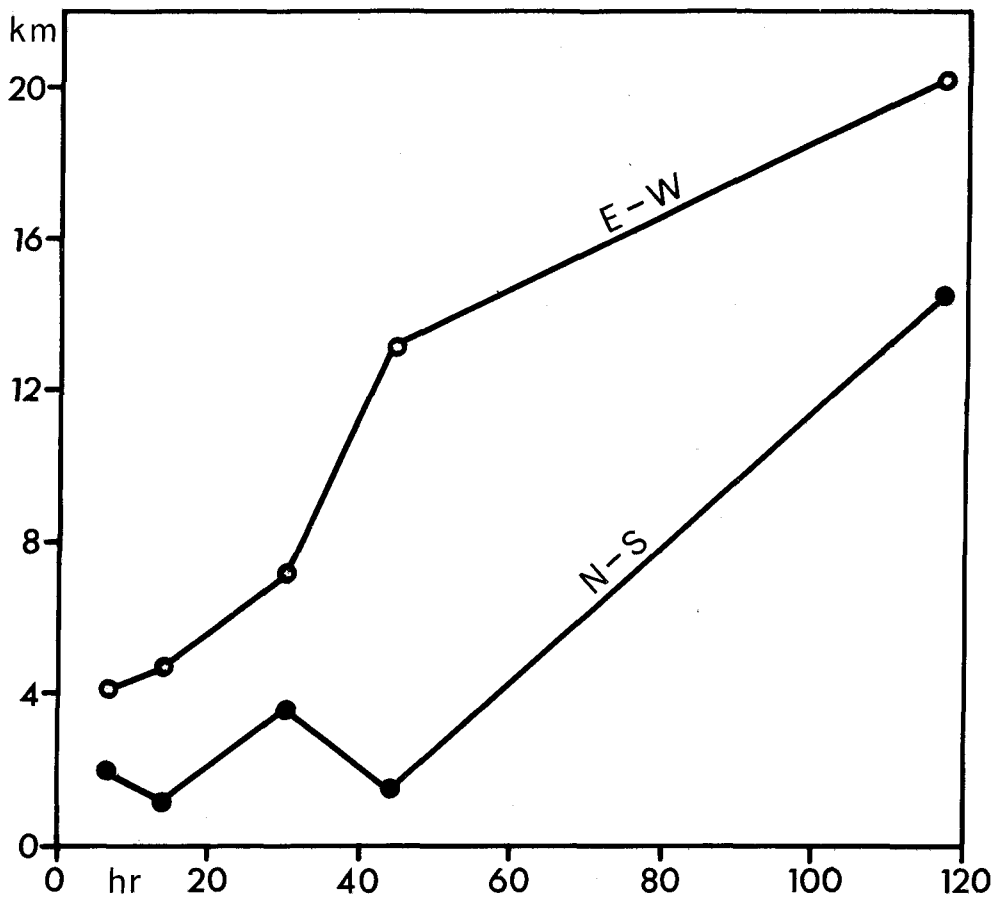
Mean speed along trajectory = 6·4 cm/sec

Mean velocity, Fix 1 - Fix 5 = 5·2 cm/sec, 052°T

* No reliable observation. This is mean value derived from other observations later.

FLOAT DESIGNATION: D

Date and time laid: 1228/25.X.67



SERIAL No: 197

FLOAT DESIGNATION: F

Date and time laid: 1305/25.X.67

Position laid: 45° 51'·1N 8° 20'·3W
(+3·5 km E, + 3·9 km N)

Displacement origin: 45° 49'N
8° 23'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 2860 2560^{*} - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	25.X	1836	45°51'·6	8°19'·7	5·5	+4·2	+4·8	5·8	119
2	26.X	0243	45°51'·2	8°18'·5	13·65	+5·6	+4·0	5·7	061
3	26.X	1853	45°52'·0	8°16'·4	29·8	+8·5	+5·6	11·0	092
4	27.X	0913	45°51'·9	8°12'·0	44·15	+14·2	+5·4	2·1	023
5	30.X	0831	45°54'·6	8°10'·4	115·45	+16·5	+10·4	1·8	076
6	31.X	1500	45°54'·9	8°08'·9	145·9	+18·5	+10·9		

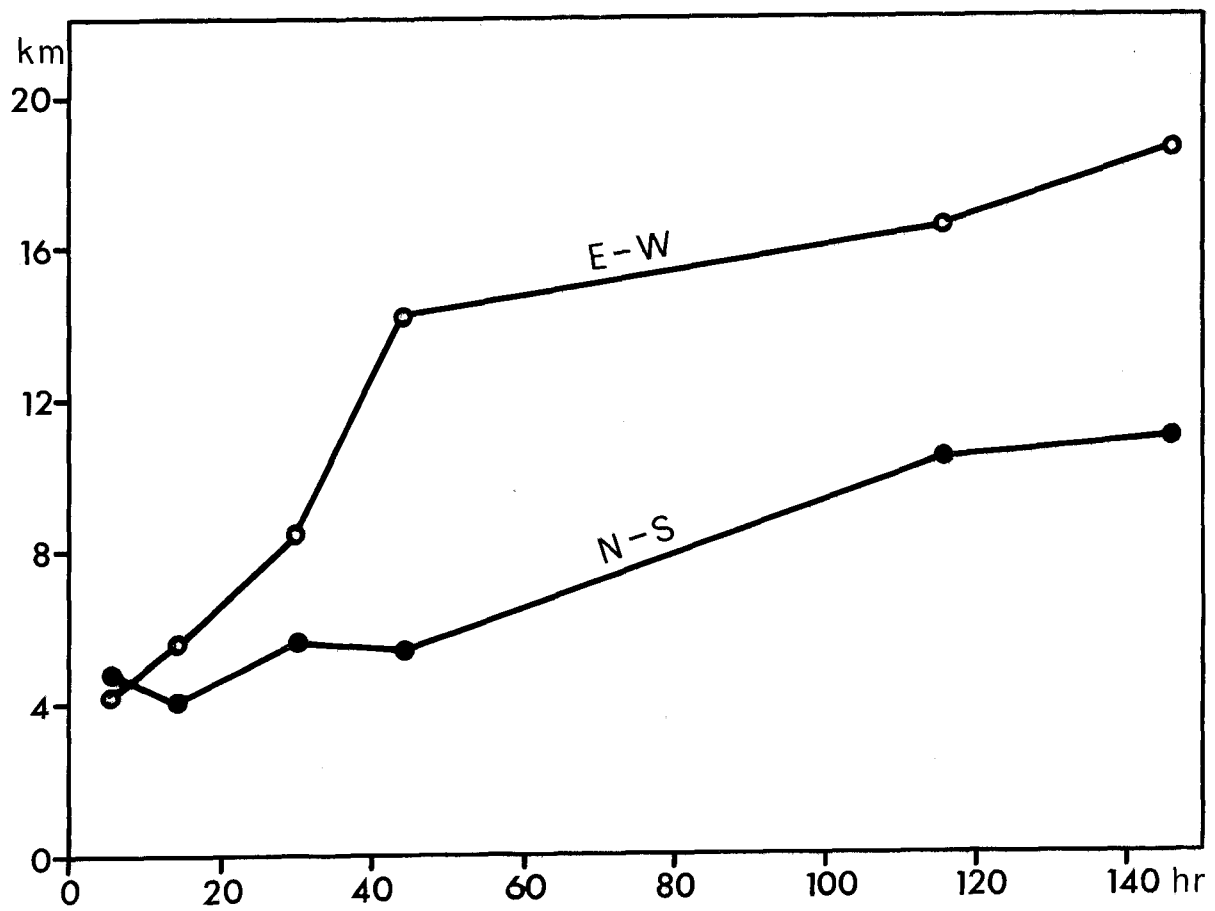
Mean speed along trajectory = 3·6 cm/sec

Mean velocity, Fix 1 - Fix 6 = 3·1 cm/sec, 067°T

* No reliable observations. This is a mean value derived from other observations later

FLOAT DESIGNATION: F

Date and time laid: 1305/25.X.67



SERIAL No: 198

FLOAT DESIGNATION: B

Date and time laid: 1401/25.X.67

Position laid: 45° 50'·4N 8° 22'·9 W
(+0·2 km E, + 2·6 km N)

Displacement origin: 45° 49'N
8° 23'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 400 425 * - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	25.X	1820	45°50'·7	8°21'·5	4·3	+1·9	+3·2	7·7	142
2	26.X	0320	45°49'·6	8°20'·3	13·3	+3·4	+1·1	6·7	109
3	26.X	1814	45°49'·0	8°17'·7	28·2	+6·9	0·0	9·2	088
4	27.X	0830	45°49'·1	8°14'·0	42·5	+11·6	+0·1		

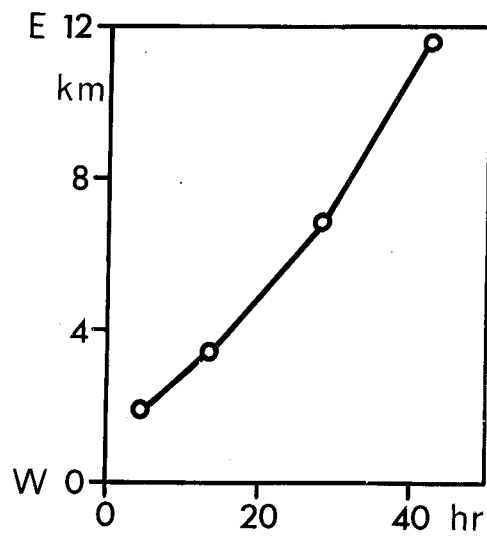
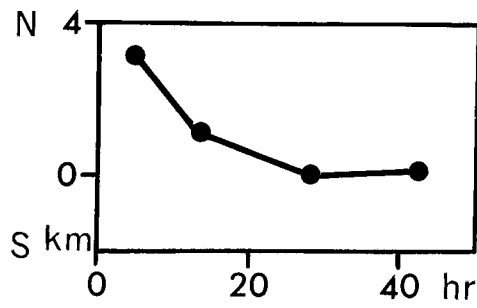
Mean speed along trajectory = 7·9 cm/sec

Mean velocity, Fix 1 - Fix 2 = 7·4 cm/sec, 108°T

* No reliable observations. This is a mean value derived from other observations later

FLOAT DESIGNATION: B

Date and time laid: 1401/25.X.67



SERIAL No: 199

FLOAT DESIGNATION: E

Date and time laid: 1103/31.X.67

Position laid: 45° 55'·4N 8° 07'·0W
(+21·0 km E, + 11·9 km N)

Displacement origin: 45° 49'N
8° 23'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 400 425 * - -

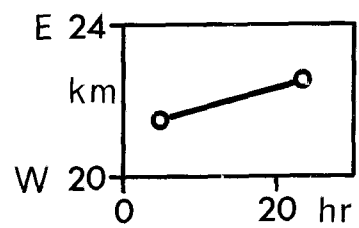
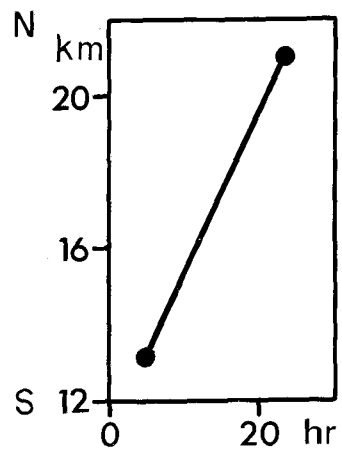
Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	31.X	1541	45°56'·1	8°06'·5	4·65	+21·5	+13·1	11·7	007
2	1.XI	1038	46°00'·4	8°05'·8	23·6	+22·5	+21·0		

Mean velocity, Fix 1 - Fix 2 = 11·7 cm/sec, 007°T

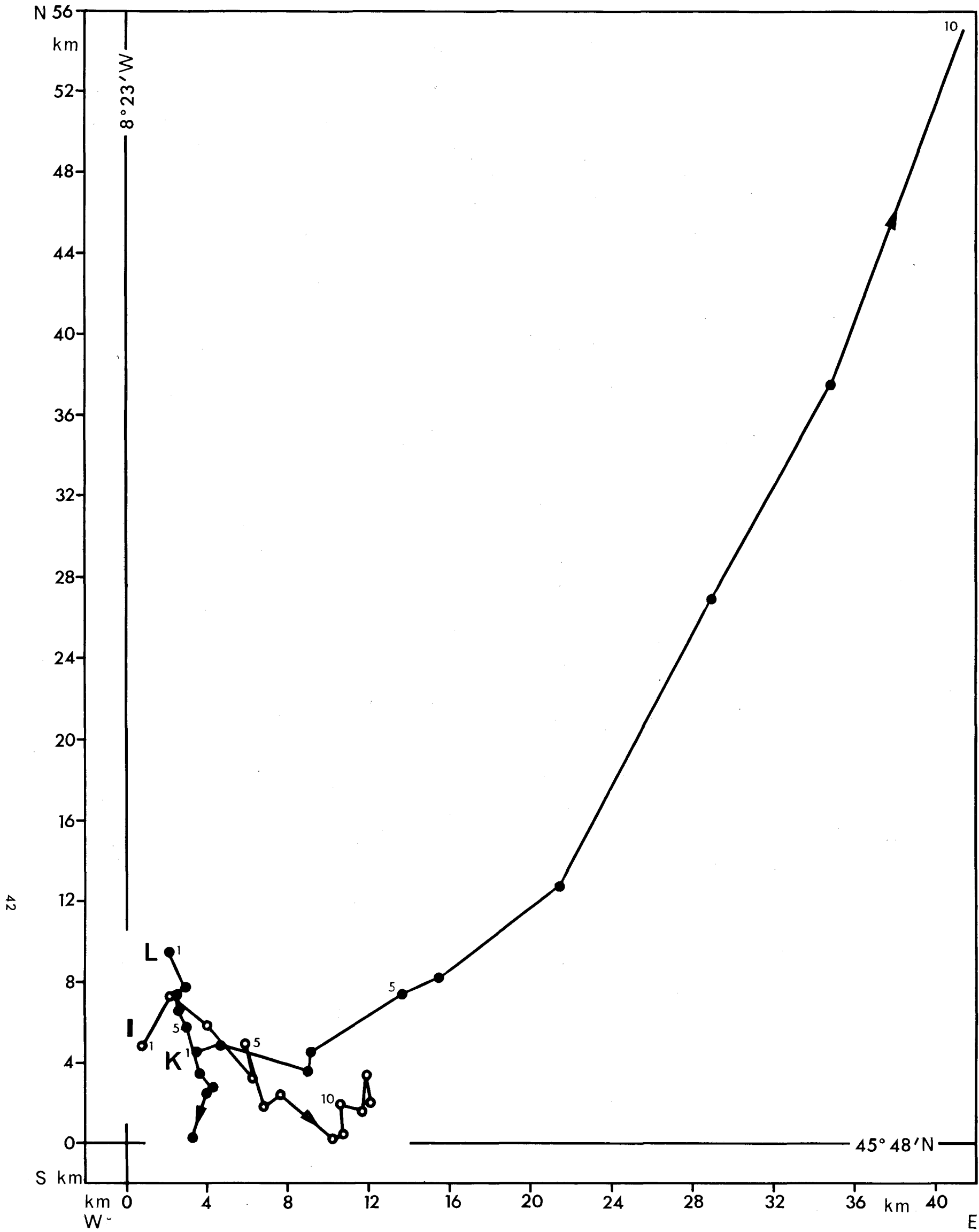
* No reliable observations. This is mean value derived from other observations later

FLOAT DESIGNATION: E

Date and time laid: 1103/31.X.67



FLOAT DESIGNATIONS: K (laid 0800/8.XI.67), I (laid 0848/8.XI.67), L (laid 1551/8.XI.67).



SERIAL NOS : 200-202

SERIAL No: 200

FLOAT DESIGNATION: K

Date and time laid: 0800/8.XI.67

Position laid: 45° 50'·0N 8° 21'·7W
(+ 1·6 km E, + 3·6 km N)

Displacement origin: 45° 48'N
8° 23'W

Navigation based on: Radar on anchored buoy, + Decca

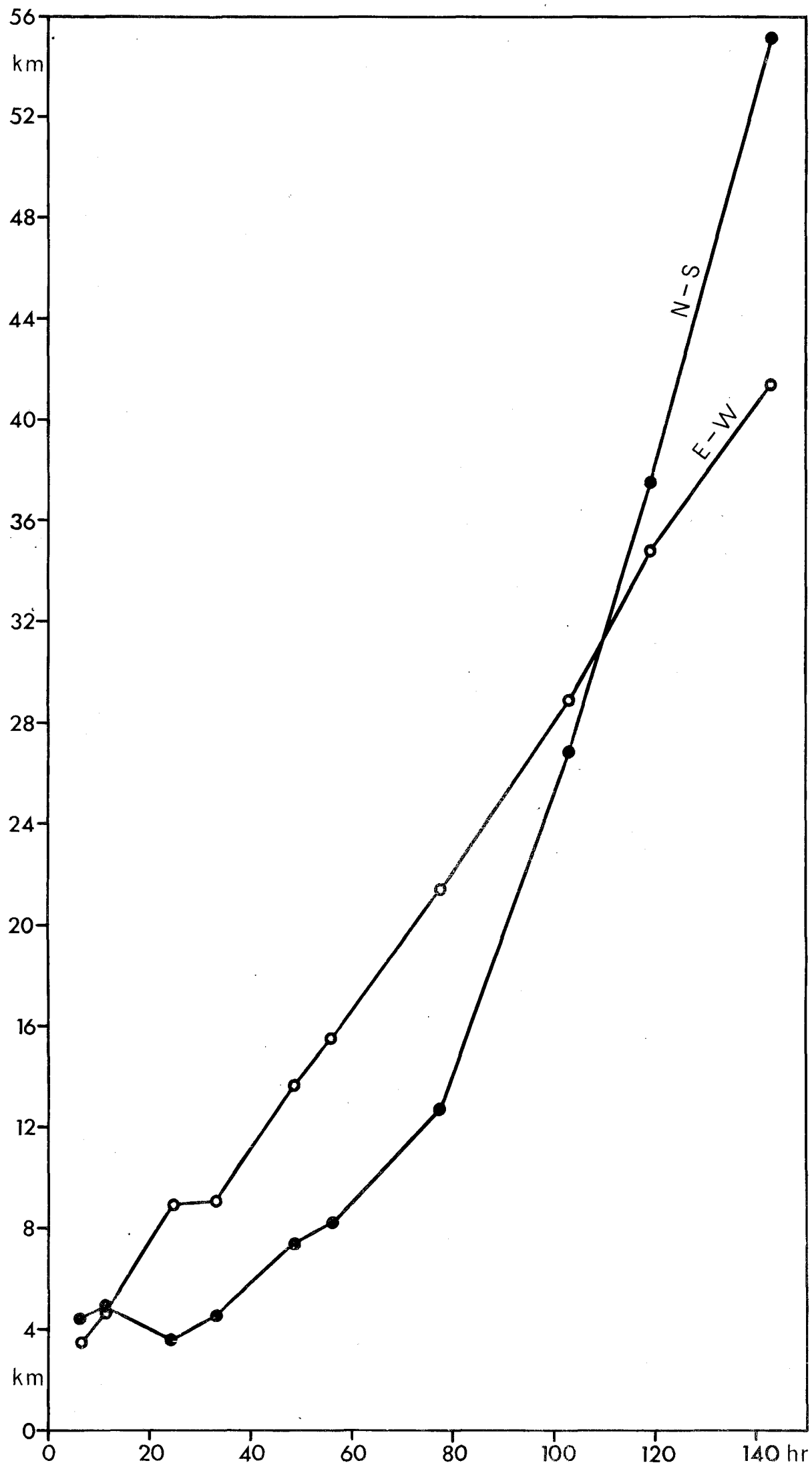
Estimated accuracy of positions: ± 1 km approx.

Depth(m):	Nominal	Observed	S.D.	S.D. (mean)
	400	457	±18	±9

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	8.XI	1423	45°50'·5	8°20'·3	6·4	+3·5	+4·5	7·5	073
2	8.XI	1910	45°50'·7	8°19'·3	11·15	+4·7	+4·9	9·5	108
3	9.XI	0822	45°49'·9	8°16'·0	24·35	+9·0	+3·6	3·2	006
4	9.XI	1703	45°50'·4	8°16'·0	33·05	+9·1	+4·5	9·6	057
5	10.XI	0838	45°52'·0	8°12'·4	48·65	+13·7	+7·4	7·2	061
6	10.XI	1555	45°52'·5	8°11'·1	55·9	+15·5	+8·2	9·5	053
7	11.XI	1331	45°54'·9	8°06'·7	77·5	+21·4	+12·7	17·4	028
8	12.XI	1505	46°02'·6	8°01'·0	103·1	+28·9	+26·9	21·1	029
9	13.XI	0701	46°08'·3	7°56'·5	119·0	+34·8	+37·5	21·7	020
10	14.XI	0705	46°17'·8	7°51'·5	143·1	+41·4	+55·2		

Mean speed along trajectory = 13·9 cm/sec

Mean velocity, Fix 1 - Fix 10 = 12·8 cm/sec, 037°T



SERIAL NO:200

FLOAT DESIGNATION: K

Date and time laid: 0800/8.XI.67

SERIAL No: 201

FLOAT DESIGNATION: I

Date and time laid: 0848/8.XI.67

Position laid: 45° 51'·2N 8° 22'·1W
(+ 1·2 km E, + 5·8 km N)

Displacement origin: 45° 48'N
8° 23'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D. (mean)
 1400 1273 ±180 ±90

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	8.XI	1445	45°50'·6	8°22'·4	5·95	+0·8	+4·8		
2	8.XI	1937	45°51'·9	8°21'·2	10·8	+2·2	+7·3	16·6	031
3	9.XI	0752	45°51'·2	8°19'·9	23·05	+4·0	+5·8	5·2	130
4	9.XI	2300	45°49'·7	8°18'·1	38·2	+6·3	+3·2	6·4	139
5	10.XI	0751	45°50'·6	8°18'·4	47·05	+5·9	+4·9	5·7	349
6	10.XI	1705	45°49'·0	8°17'·7	56·3	+6·8	+1·8	9·6	163
7	11.XI	1523	45°49'·2	8°17'·1	78·6	+7·6	+2·4	1·1	052
8	12.XI	1735	45°48'·1	8°15'·1	104·8	+10·2	+0·2	3·6	131
9	13.XI	1019	45°48'·2	8°14'·8	121·5	+10·7	+0·4	1·0	065
10	13.XI	1737	45°49'·0	8°14'·8	128·8	+10·6	+1·9	5·7	357
11	13.XI	2208	45°48'·8	8°14'·0	133·35	+11·7	+1·6	7·4	107
12	14.XI	1216	45°49'·8	8°13'·8	147·45	+11·9	+3·3	3·3	007
13	14.XI	1633	45°49'·1	8°13'·7	151·75	+12·1	+2·0	8·4	174

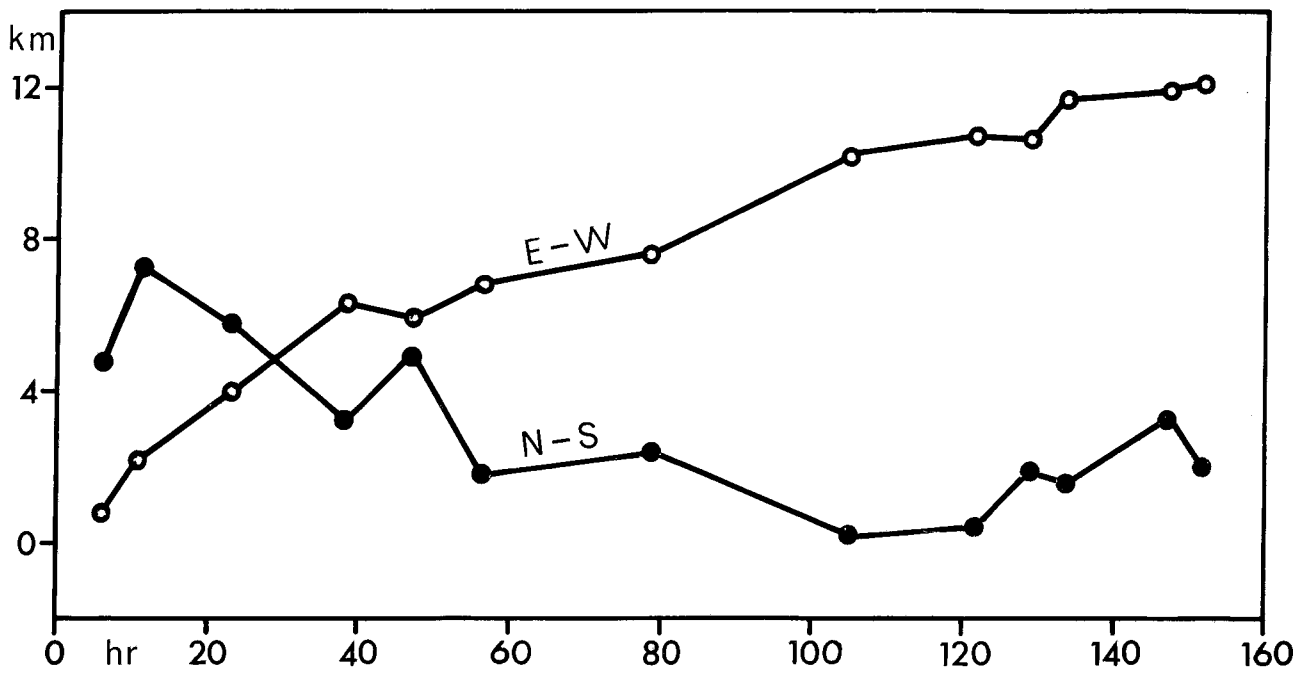
Mean speed along trajectory = 4·6 cm/sec

Mean velocity, Fix 1 - Fix 13 = 2·2 cm/sec, 104°T

SERIAL NO: 201

FLOAT DESIGNATION: I

Date and time laid: 0848/8.XI.67



SERIAL No: 202

FLOAT DESIGNATION: L

Date and time laid: 1551/8.XI.67

Position laid: 45° 52'·1N 8° 21'·5W
(+2·0 km E, + 7·6 km N)

Displacement origin: 45° 48'N
8° 23'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 2860 2554* - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	8.XI	1955	45°53'·2	8°21'·3	4·05	+2·1	+9·5	4·6	156
2	9.XI	0726	45°52'·2	8°20'·7	15·6	+2·9	+7·7	1·9	232
3	9.XI	1608	45°52'·0	8°21'·0	24·3	+2·5	+7·4	0·9	167
4	10.XI	1741	45°51'·6	8°20'·9	49·85	+2·6	+6·6	1·1	154
5	11.XI	1609	45°51'·2	8°20'·7	72·3	+3·0	+5·8	2·7	164
6	12.XI	1818	45°49'·9	8°20'·1	98·45	+3·7	+3·5	1·7	142
7	13.XI	1058	45°49'·4	8°19'·7	115·1	+4·3	+2·7	0·7	230
8	13.XI	2255	45°49'·3	8°19'·8	127·05	+4·0	+2·5	4·5	200
9	14.XI	1308	45°48'·2	8°20'·4	141·3	+3·3	+0·3		

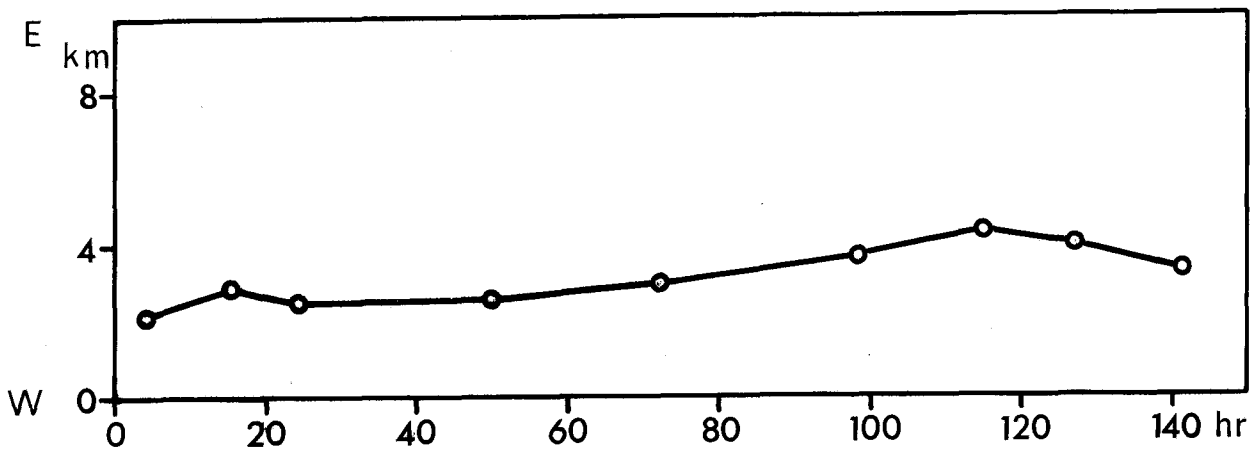
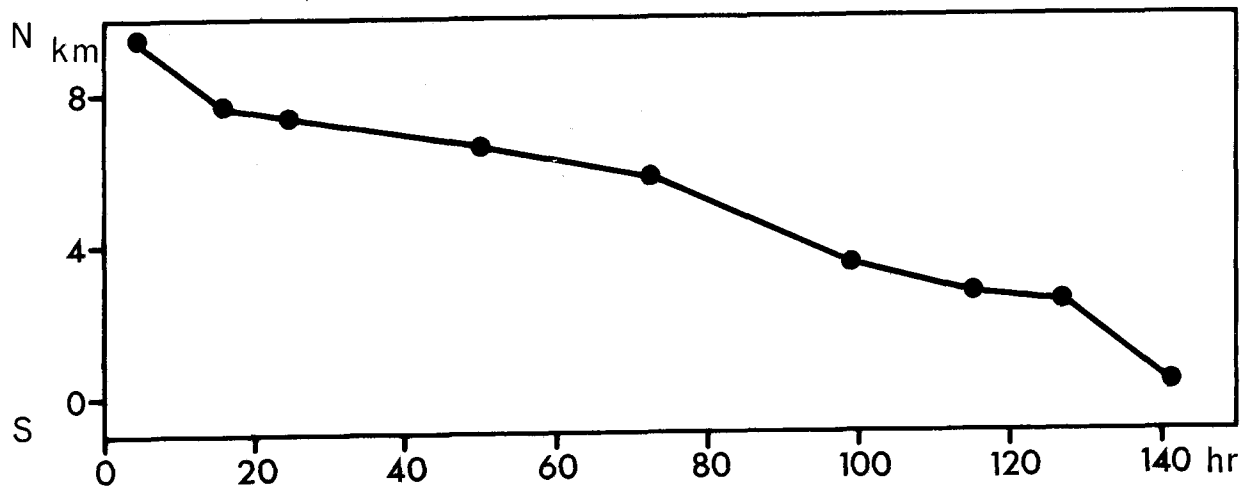
Mean speed along trajectory = 2·1 cm/sec

Mean velocity, Fix 1 - Fix 9 = 1·9 cm/sec, 173°T

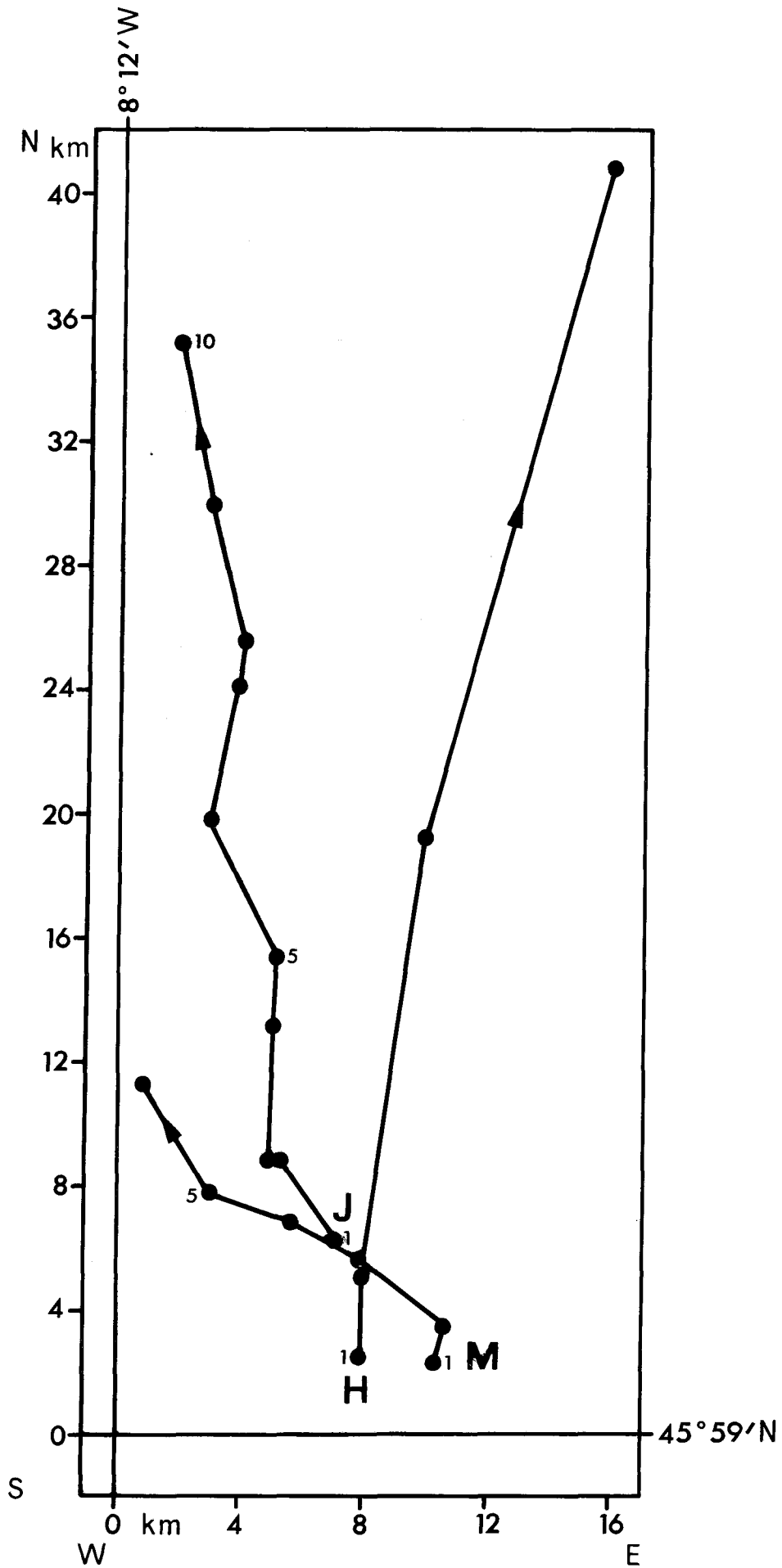
* Single observation by reflection

FLOAT DESIGNATION: L

Date and time laid : 1551/8. XI. 67



FLOAT DESIGNATIONS: J (laid 1726/24.XI.67) , H (laid 0631/25.XI.67), M (laid 0705/25.XI.67).



SERIAL No: 203

FLOAT DESIGNATION: J

Date and time laid: 1726/24.XI.67

Position laid: 46° 01'·3N 8° 07'·4W
(+6·0 km E, + 4·2 km N)

Displacement origin: 45° 59'N
8° 12'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 1400 1378 ±10* -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement (km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	24.XI	2012	46°02'·4	8°06'·5	2·75	+7·1	+6·3	7·1	324
2	25.XI	0824	46°03'·8	8°07'·9	14·95	+5·3	+8·8	3·3	268
3	25.XI	1146	46°03'·8	8°08'·2	18·35	+4·9	+8·8	7·2	002
4	26.XI	0446	46°06'·2	8°08'·1	35·35	+5·0	+13·2	14·1	002
5	26.XI	0908	46°07'·3	8°08'·0	39·7	+5·1	+15·4	5·1	333
6	27.XI	1144	46°09'·7	8°09'·8	66·3	+2·9	+19·8	12·5	013
7	27.XI	2130	46°12'·0	8°09'·0	76·05	+3·8	+24·1	3·0	008
8	28.XI	1125	46°12'·9	8°08'·9	90·0	+4·0	+25·6	5·7	345
9	29.XI	0915	46°15'·2	8°09'·8	111·8	+2·9	+30·0	6·5	350
10	30.XI	0735	46°18'·0	8°10'·5	134·15	+1·9	+35·2		

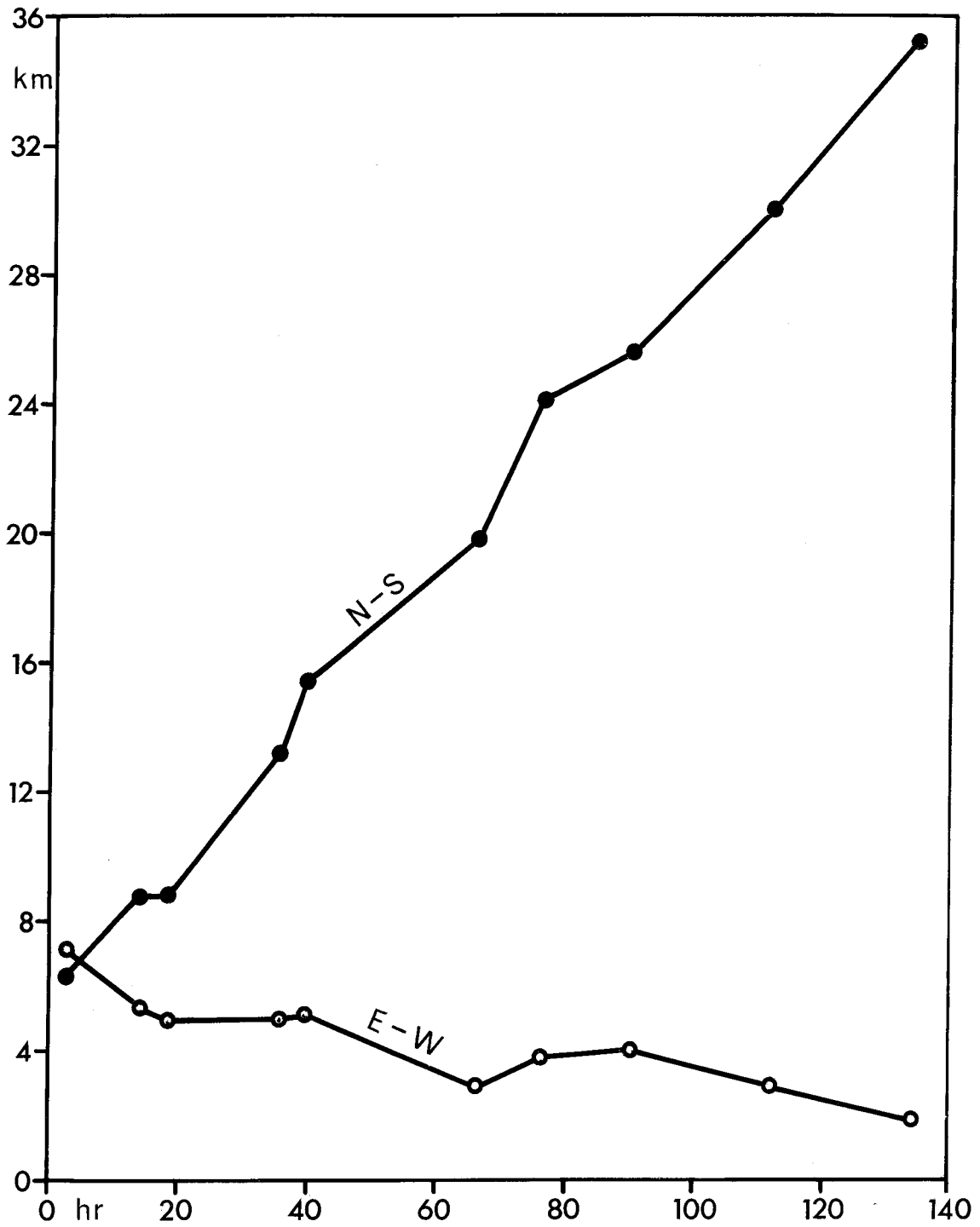
Mean speed along trajectory = 6·5 cm/sec

Mean velocity, Fix 1 - Fix 10 = 6·2 cm/sec, 350°T

* 2 observations only

FLOAT DESIGNATION : J

Date and time laid : 1726/24.XI.67



SERIAL No: 204

FLOAT DESIGNATION: H

Date and time laid: 0631/25.XI.67

Position laid: 45° 59'·2N 8° 06'·3W
(+7·4 km E, + 0·4 km N)

Displacement origin: 45° 59'N
8° 12'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 400 416 ±103 ±60

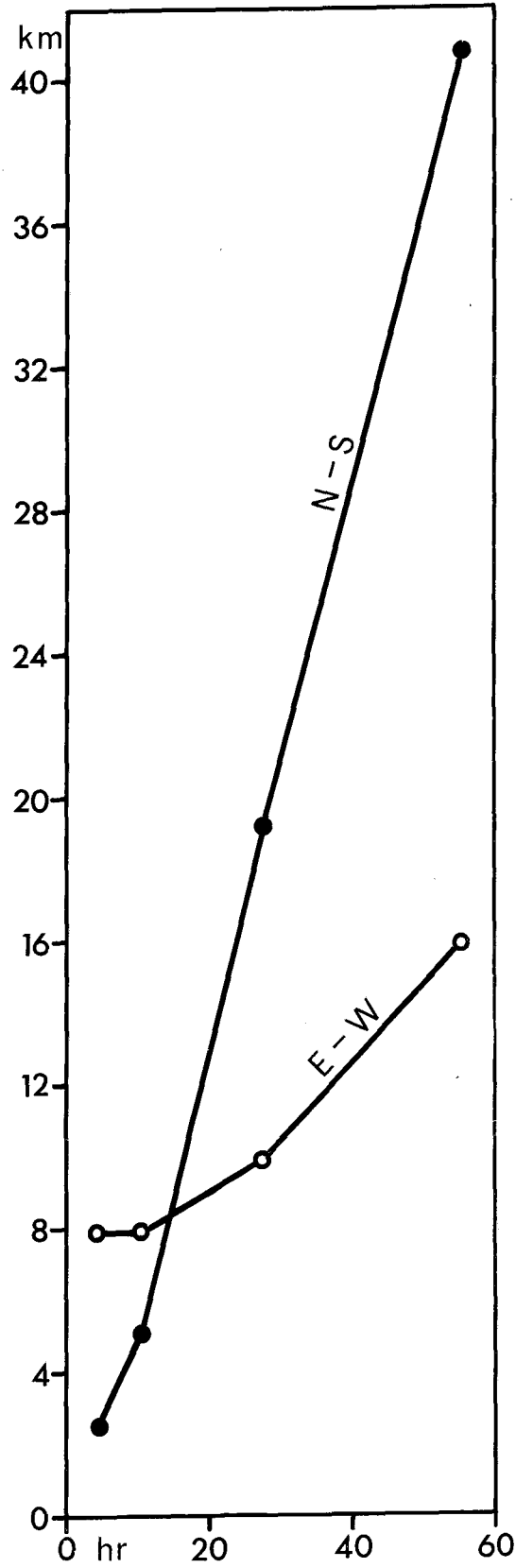
Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	25.XI	1056	46°00'·4	8°05'·9	4·4	+7·9	+2·5	11·5	360
2	25.XI	1659	46°01'·8	8°05'·9	10·45	+7·9	+5·1	23·3	008
3	26.XI	0956	46°09'·4	8°04'·4	27·4	+9·9	+19·2	22·3	016
4	27.XI	1340	46°21'·1	7°59'·8	55·15	+15·9	+40·8		

Mean speed along trajectory = 21·4 cm/sec

Mean velocity, Fix 1 - Fix 4 = 21·3 cm/sec, 012°T

FLOAT DESIGNATION: H

Date and time laid : 0631/25. XI.67



SERIAL No: 205

FLOAT DESIGNATION: M

Date and time laid: 0705/25.XI.67

Position laid: 46° 00'·0N 8° 04'·0W
(+ 10·5 km E, + 1·9 km N)

Displacement origin: 45° 59'N
8° 12'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D. (mean)
 2860 2600 * - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	25.XI	1046	46°00'·2	8°04'·1	3·7	+10·3	+2·2	6·0	014
2	25.XI	1716	46°00'·9	8°03'·9	10·2	+10·6	+3·5	5·2	307
3	26.XI	1125	46°02'·0	8°05'·9	28·35	+7·9	+5·6	3·0	298
4	27.XI	1019	46°02'·7	8°07'·7	51·25	+5·6	+6·8	3·3	290
5	28.XI	0957	46°03'·2	8°09'·7	74·85	+3·0	+7·7	4·6	328
6	29.XI	1138	46°05'·1	8°11'·4	100·55	+0·8	+11·3		

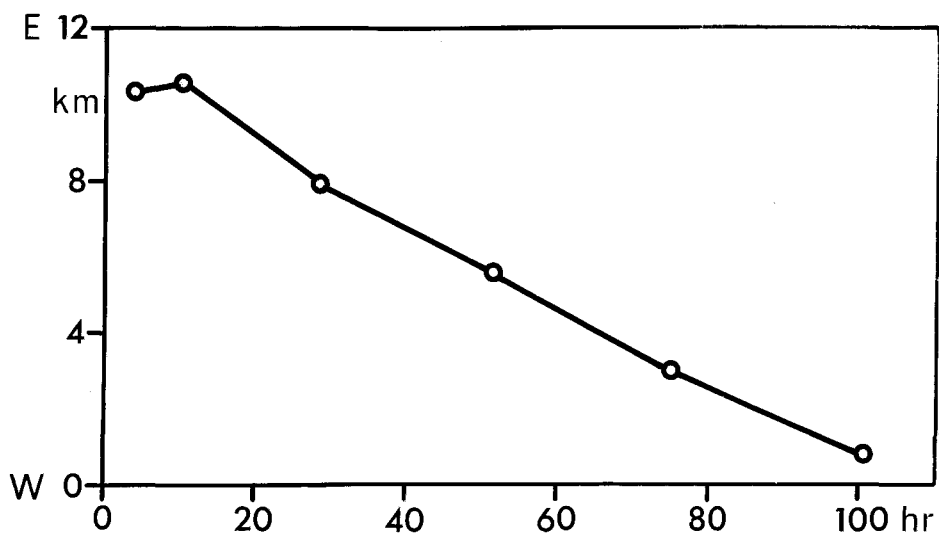
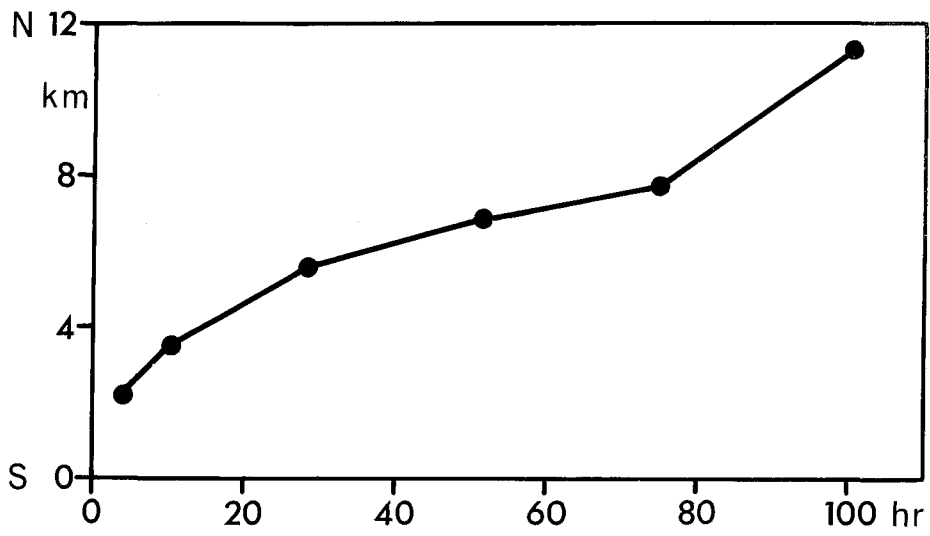
Mean speed along trajectory = 4·1 cm/sec

Mean velocity, Fix 1 - Fix 6 = 3·8 cm/sec, 314°T

* Only one usable fix.

FLOAT DESIGNATION: M

Date and time laid : 0705/25, XI.67



SERIAL No: 206

FLOAT DESIGNATION: S

Date and time laid: 1710/12.XII.67

Position laid: 45° 56'·7N 8° 19'·2W
(-3·0 km W, + 1·2 km N)

Displacement origin: 45° 56'N
8° 17'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 2860 2517 * - -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	12.XII	2255	45°56'·6	8°21'·1	5·75	-5·5	+1·0	6·3	019
2	13.XII	0840	45°57'·7	8°20'·6	15·5	-4·7	+3·1	3·5	345
3	13.XII	2030	45°58'·4	8°21'·0	27·35	-5·2	+4·5	5·3	021
4	14.XII	0244	45°59'·0	8°20'·6	33·55	-4·7	+5·5	8·2	308
5	14.XII	1033	45°59'·8	8°22'·0	41·4	-6·6	+6·9	5·0	265
6	14.XII	2111	45°59'·7	8°23'·5	52·0	-8·5	+6·7	2·8	337
7	15.XII	1157	46°00'·4	8°23'·9	66·8	-9·0	+8·1	5·3	309
8	16.XII	1200	46°02'·0	8°26'·7	90·85	-12·7	+11·1		

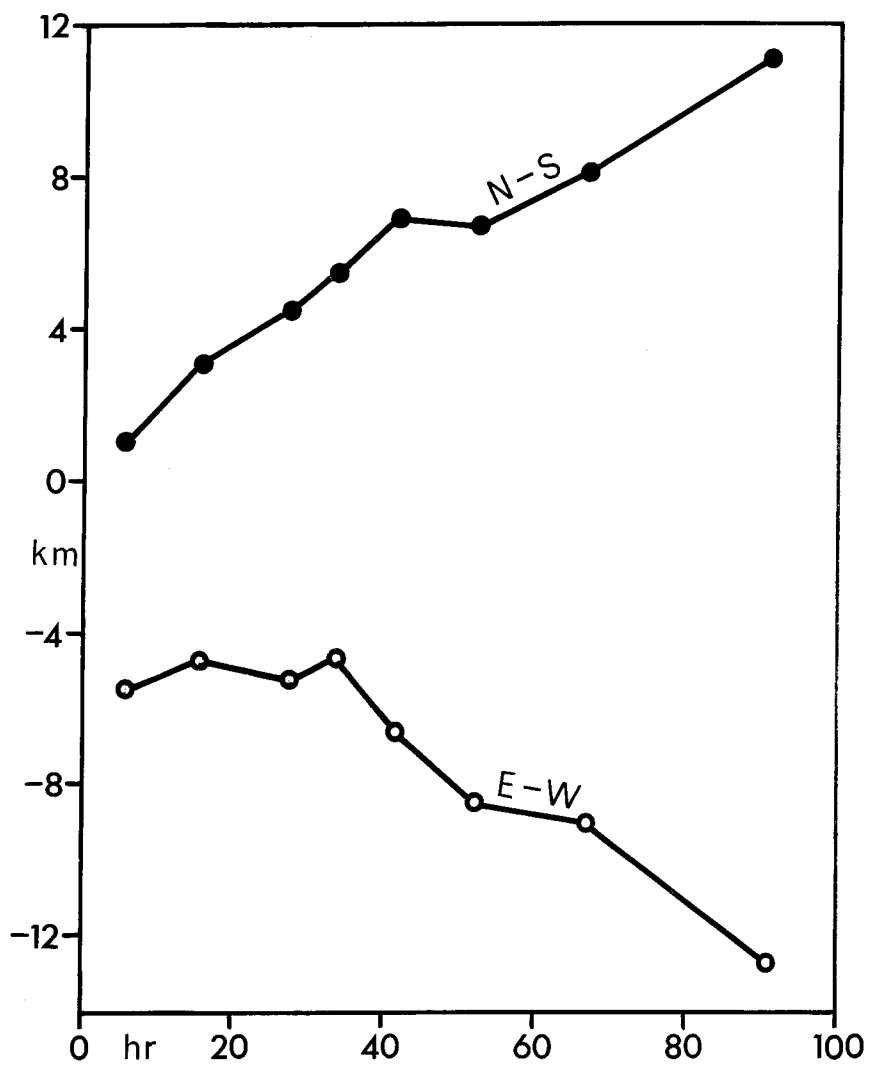
Mean speed along trajectory = 5·0 cm/sec

Mean velocity, Fix 1 - Fix 8 = 4·0 cm/sec, 324°T

* Single observation

FLOAT DESIGNATION : S

Date and time laid : 1710/12.XII.67



SERIAL No: 207

FLOAT DESIGNATION: R

Date and time laid: 1754/12.XII.67

Position laid: 45° 56'·9N 8° 19'·5W
(-3·4 km W, + 1·6 km N)

Displacement origin: 45° 56'N
8° 17'W

Navigation based on: Radar on anchored buoy , + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 1400 1265 ±10* -

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	12.XII	2319	45°58'·3	8°19'·9	5·4	-3·8	+4·1		
2	13.XII	0850	45°58'·4	8°21'·6	14·95	-5·9	+4·5	6·1	278
3	13.XII	1320	46°00'·0	8°20'·5	19·45	-4·6	+7·3	19·2	024
4	13.XII	2104	46°01'·2	8°21'·7	27·15	-6·2	+9·6	10·0	325
5	14.XII	0200	46°01'·8	8°21'·3	32·1	-5·6	+10·7	7·3	028
6	14.XII	1115	46°03'·7	8°21'·9	41·35	-6·3	+14·1	10·5	348
7	14.XII	2209	46°03'·3	8°23'·1	52·25	-8·0	+13·4	4·6	247
8	15.XII	0334	46°05'·9	8°22'·9	57·65	-7·6	+18·2	24·2	004
9	15.XII	2121	46°09'·0	8°23'·1	75·45	-8·0	+24·1	9·2	356
10	16.XII	1322	46°11'·3	8°24'·5	91·45	-9·8	+28·3	7·8	338

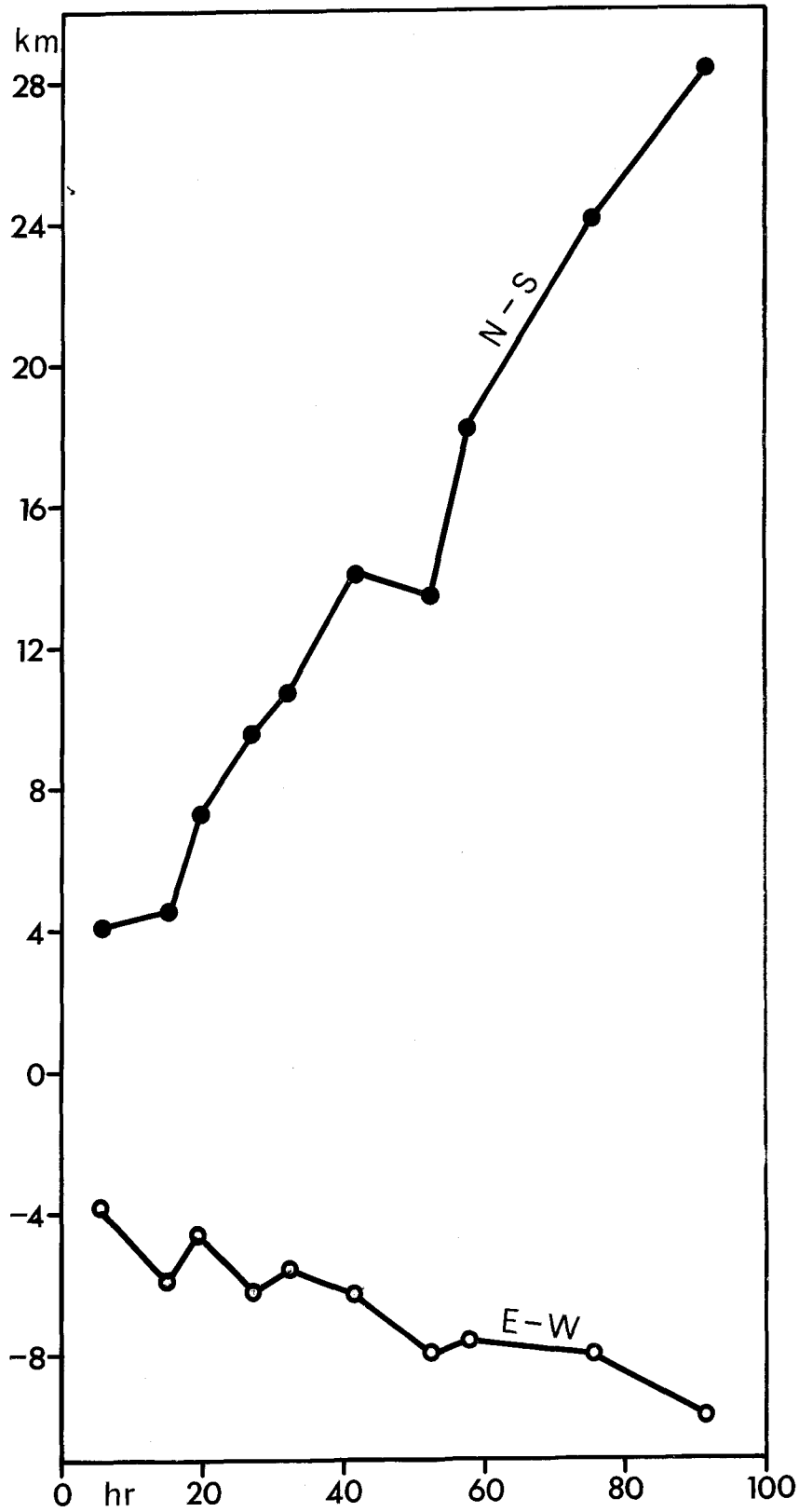
Mean speed along trajectory = 9·6 cm/sec

Mean velocity, Fix 1 - Fix 10 = 8·0 cm/sec, 346°T

* 3 observations only

FLOAT DESIGNATION : R

Date and time laid : 1745/12.XII.67



SERIAL No: 208

FLOAT DESIGNATION: Q

Date and time laid: 1920/12.XII.67

Position laid: 45° 53'·9N 8° 17'·9W
(-1·3 km W, -3·8 km S)

Displacement origin: 45° 56'N
8° 17'W

Navigation based on: Radar on anchored buoy + Decca

Estimated accuracy of positions: ± 1 km approx.

Depth(m): Nominal Observed S.D. S.D.(mean)
 400 406 ±60 ±24

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Velocities between fixes	
			Lat.N.	Long.W.		+E-W x	+N-S y	cm/sec	°T
1	12.XII	2229	45°54'·3	8°18'·6	3·15	-2·1	-3·2	10·0	003
2	13.XII	0810	45°56'·2	8°18'·4	12·85	-1·9	+0·4	11·1	355
3	13.XII	1926	45°58'·7	8°18'·7	24·1	-2·4	+4·9	12·5	355
4	14.XII	0848	46°01'·9	8°19'·2	37·45	-2·9	+10·9	5·4	333
5	14.XII	2008	46°03'·0	8°20'·0	48·8	-3·9	+12·8	15·7	359
6	15.XII	1028	46°07'·3	8°20'·0	63·3	-4·0	+21·0	15·4	015
7	16.XII	1422	46°15'·5	8°17'·0	91·05	-0·1	+36·0		

Mean speed along trajectory = 12·6 cm/sec

Mean velocity, Fix 1 - Fix 7 = 12·4 cm/sec, 003°T

FLOAT DESIGNATION: Q

Date and time laid: 1920/12.XII.67

