

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

NEUTRALLY BUOYANT FLOATS

Serial Nos. 21 - 39

July 1957 - December 1958

TABLES AND DIAGRAMS

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

N.I.O. INTERNAL REPORT No. D. 2

March 1970

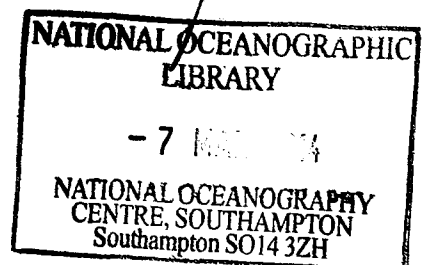
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NEUTRALLY BUOYANT FLOATS
SERIAL Nos 21 - 39
JULY 1957 - DECEMBER 1958

Tables of times and positions.
Diagrams showing trajectories
and components of displacement.

G. F. CASTON
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C O N T E N T S

	<u>Page No</u>
1. INTRODUCTION	1
2. LIST OF FLOATS	2
3. REFERENCES	2
4. FLOAT DIAGRAMS AND TABLES	
Float Serial Nos:	21
	22
	23
	24
	25
	26
	27
	28
	29
	30
	31
	32
	33
	34
	35
	36
	37
	38
	39

Introduction

This report describes in detail the results of work with neutrally buoyant floats undertaken by the N.I.O. during cruises in 1957 and 1958. It contains tables of data, diagrams of trajectories and components of displacements for each float. The construction of the floats is described in Refs. 1 and 2, and the method of tracking in Ref.3. The first four, serial Nos. 21-24, have not been described in any publication but were mentioned in an unpublished manuscript (Ref.4). The next nine floats, Nos 25-33, were described in Ref.2, and an account of the last six, Nos 34-39, will be found in Ref.5. However, in most cases the information about the float trajectories given in the above references is incomplete. The lists of times and positions given here are sufficiently detailed to enable reconstruction of the trajectories with as much accuracy as the navigation allows.

The tables are almost self-explanatory. The method of navigation and the estimated accuracy of positions are given for both relative and absolute positions, in that order. "Nominal depth" is the depth for which the float was loaded; "Observed depth" is in most cases that calculated by the method described in Ref.3; "S.D." and "S.D.(mean)" are the standard deviation of a single depth observation and the standard deviation of the mean.

North-south and east-west components of displacement are tabulated and plotted as functions of time. In most cases simple straight lines have been fitted, and combined to give mean velocities. Where it seemed more appropriate the fixes have been subdivided and two pairs of straight lines fitted. No attempt has been made to fit tidal or other oscillations to the tabulated displacements.

In the majority of cases floats were made up in batches for each cruise, and given individual identification numbers or letters. Subsequently they have been numbered in chronological order; these new serial numbers and the original designations are listed below.

LIST OF FLOATS

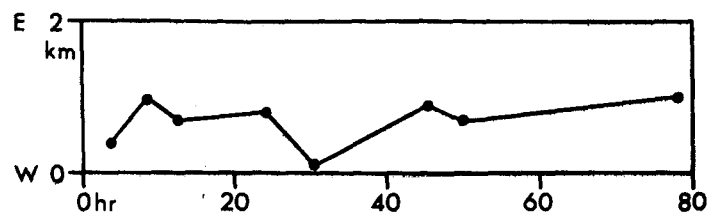
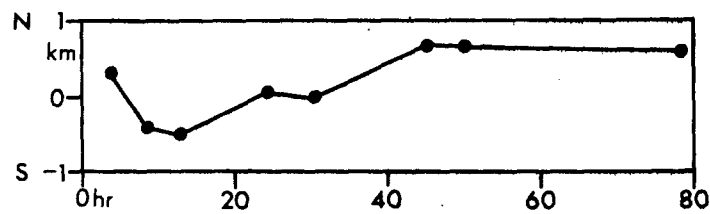
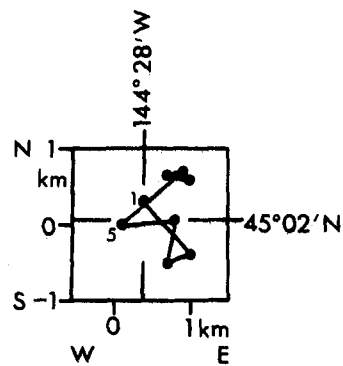
Serial No	Original Designation	Date and Time Laid
21 (4)	A	0036/19.VII.57
22 (4)	B	1537/20.VII.57
23 (4)	C	1325/26.VII.57
24 (4)	D	0825/12.VIII.57
25 (2)	B	0011/16.V.58
26 (2)	2	0425/20.V.58
27 (2)	11	0933/23.V.58
28 (2)	7	1807/23.V.58
29 (2)	D	2315/25.V.58
30 (2)	3	0625/10.VI.58
31 (2)	5	2130/10.VI.58
32 (2)	6	1241/25.VI.58
33 (2)	1	2145/9.VII.58
34 (5)	2, also 1	1610/10.XI.58
35 (5)	3, also 2	1230/22.XI.58
36 (5)	1, also 3	1902/23.XI.58
37 (5)	8, also 4	1338/28.XI.58
38 (5)	9, also 5	1127/29.XI.58
39 (5)	10, also 6	2144/30.XI.58

REFERENCES

- (1) Swallow, J.C. 1955. A neutral-buoyancy float for measuring deep currents. Deep-Sea Research, Vol.3, pp.74-81
- (2) Swallow, J.C. and B.V. Hamon, 1960. Some measurements of deep currents in the Eastern North Atlantic. Deep-Sea Research, Vol.6, pp. 155-168.
- (3) Swallow, J.C. and L.V. Worthington, 1961. An observation of a deep countercurrent in the Western North Atlantic. Deep-Sea Research Vol.8, pp. 1-19.
- (4) University of California. Scripps Institution of Oceanography Progress Report. Ref. 57-39. Oct. 1957. pp.7-9
- (5) Swallow, J.C. 1969. A deep eddy off Cape St. Vincent. Deep-Sea Research, Supplement to Vol.16, pp.285-295.

FLOAT DESIGNATION: A

Date and time laid: 0036/19.VII.57



FLOAT DESIGNATION: A

Date and time laid: 0036/19.VII.57

Position laid: 45° 02'·0N
144° 28'·4W

Displacement origin: 45° 02'·0N
144° 28'·4W

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

Estimated accuracy of positions: ± 0.5km ± 3km

Depth(m): Nominal Observed S.D. S.D.(mean)
1970 1890 ±320 ±64

Fix No.	Date	Time GMT -10	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	19.VII	0418	45°02'·1	144°28'·0	3.7	+0.4	+0.3	-0.2	+0.6
2	19.VII	0903	45°01'·7	144°27'·6	8.45	+1.0	-0.4	+0.4	-0.2
3	19.VII	1310	45°01'·7	144°27'·8	12.55	+0.7	-0.5	+0.0	-0.4
4	20.VII	0048	45°02'·0	144°27'·7	24.2	+0.8	+0.05	+0.2	-0.0
5	20.VII	0650	45°02'·0	144°28'·3	30.25	+0.1	+0.0	-0.6	-0.2
6	20.VII	2150	45°02'·3	144°27'·7	45.25	+0.9	+0.7	+0.2	+0.4
7	21.VII	0230	45°02'·3	144°27'·8	49.9	+0.7	+0.65	-0.0	+0.2
8	22.VII	0645	45°02'·25	144°27'·5	78.15	+1.0	+0.6	+0.2	-0.2

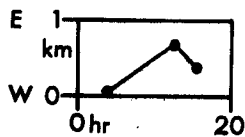
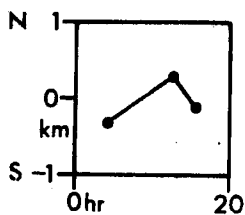
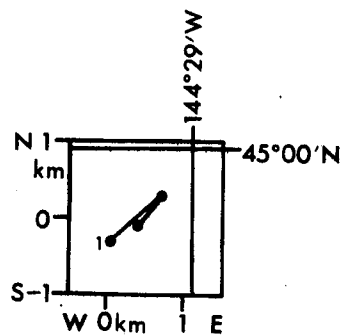
Fitted lines: x = +0.004t + 0.6

y = +0.013t - 0.3

Mean velocity = 0.4(±0.2)cm/sec, 017(±18)°T

FLOAT DESIGNATION: B

Date and time laid: 1537/20.VII.57



SERIAL No: 22

FLOAT DESIGNATION: B

Date and time laid: 1537/20.VII.57

Position laid: $44^{\circ} 59' .5N$
 $144^{\circ} 29' .8W$

Displacement origin: $44^{\circ} 59' .5N$
 $144^{\circ} 29' .8W$

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

Estimated accuracy of positions: $\pm 0.5km$ $\pm 3km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 3000 2720 ± 330 ± 100

Fix No.	Date	Time GMT -10	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	20.VII	1940	$44^{\circ} 59' .4$	$144^{\circ} 29' .8$	4.05	+0.05	-0.3	-0.0	-0.0
2	21.VII	0415	$44^{\circ} 59' .7$	$144^{\circ} 29' .3$	12.65	+0.7	+0.3	+0.2	+0.4
3	21.VII	0715	$44^{\circ} 59' .4$	$144^{\circ} 29' .5$	15.65	+0.4	-0.1	-0.2	-0.2

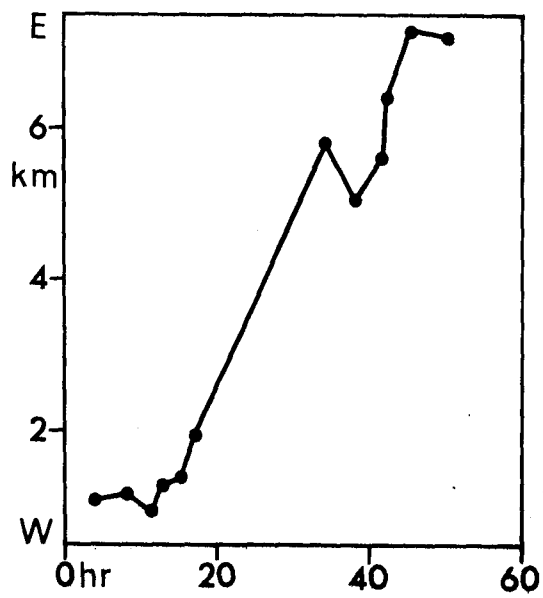
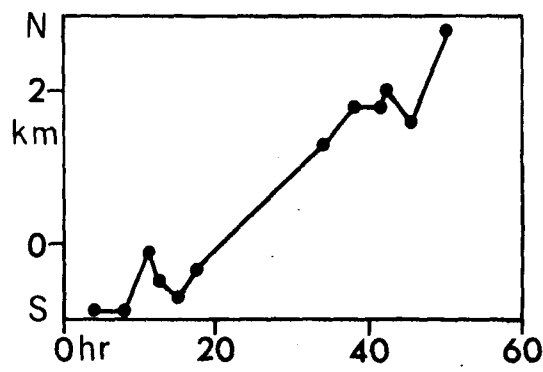
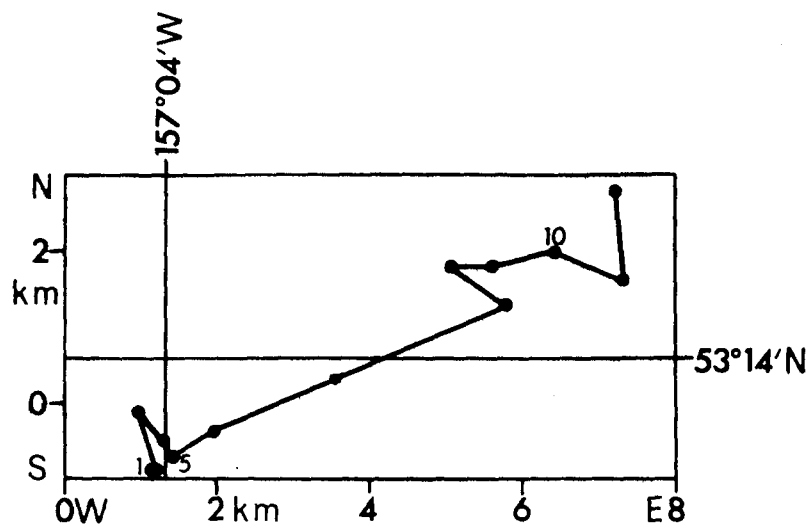
Fitted lines: $x = + 0.040t - 0.1$

$y = + 0.029t - 0.3$

Mean velocity = $1.4(\pm 1.1) \text{ cm/sec, } 054(\pm 31)^{\circ} T$

FLOAT DESIGNATION: C

Date and time laid: 1325/26.VII.57



SERIAL No: 23

FLOAT DESIGNATION: C

Date and time laid: 1325/26.VII.57

Position laid: $53^{\circ}13'.7N$
 $157^{\circ}05'.2W$

Displacement origin: $53^{\circ}13'.7N$
 $157^{\circ}05'.2W$

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

Estimated accuracy of positions: $\pm 0.5km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 700 640 ± 120 ± 32

Fix No.	Date	Time GMT -11	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	26.VII	1715	$53^{\circ}13'.2$	$157^{\circ}04'.2$	3.85	+1.1	-0.9	+0.9	+0.2
2	26.VII	2132	$53^{\circ}13'.2$	$157^{\circ}04'.1$	8.1	+1.2	-0.9	+0.4	-0.2
3	27.VII	0036	$53^{\circ}13'.6$	$157^{\circ}04'.3$	11.2	+0.95	-0.1	-0.4	+0.4
4	27.VII	0153	$53^{\circ}13'.4$	$157^{\circ}04'.0$	12.45	+1.3	-0.5	-0.4	-0.0
5	27.VII	0432	$53^{\circ}13'.3$	$157^{\circ}03'.9$	15.1	+1.4	-0.7	-0.6	-0.4
6	27.VII	0636	$53^{\circ}13'.5$	$157^{\circ}03'.4$	17.2	+1.95	-0.35	-0.4	-0.2
7	27.VII	2327	$53^{\circ}14'.4$	$156^{\circ}59'.9$	34.05	+5.8	+1.3	+0.9	+0.0
8	28.VII	0328	$53^{\circ}14'.7$	$157^{\circ}00'.6$	38.05	+5.05	+1.8	-0.6	+0.2
9	28.VII	0648	$53^{\circ}14'.7$	$157^{\circ}00'.1$	41.4	+5.6	+1.8	-0.6	-0.0
10	28.VII	0730	$53^{\circ}14'.8$	$156^{\circ}59'.4$	42.1	+6.4	+2.0	+0.2	+0.2
11	28.VII	1035	$53^{\circ}14'.6$	$156^{\circ}58'.5$	45.15	+7.3	+1.6	+0.6	-0.6
12	28.VII	1527	$53^{\circ}15'.2$	$156^{\circ}58'.6$	50.05	+7.2	+2.8	-0.2	+0.4

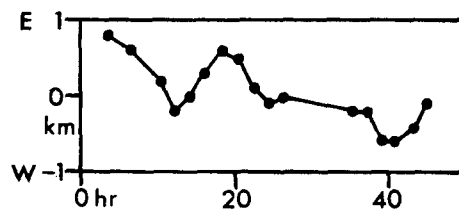
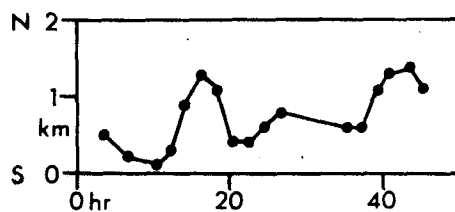
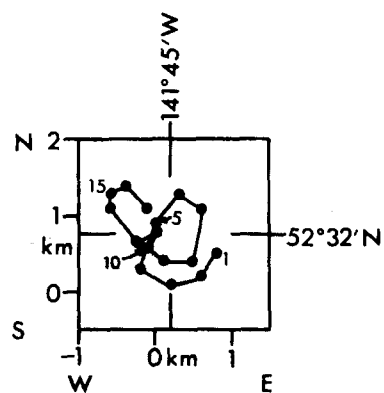
Fitted lines: $x = + 0.155t - 0.4$

$y = + 0.079t - 1.4$

Mean velocity = $4.8(\pm 0.3) \text{ cm/sec, } 063(\pm 0.6)^{\circ}T$

FLOAT DESIGNATION: D

Date and time laid: 0825/12.VIII.57



SERIAL No: 24

FLOAT DESIGNATION: D

Date and time laid: 0825/12.VIII.57

Position laid: 52° 31'.6N
141° 45'.1W

Displacement origin: 52° 31'.6N
141° 45'.1W

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

Estimated accuracy of positions: ± 0.2km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
 3000 3000 ±280 ±40

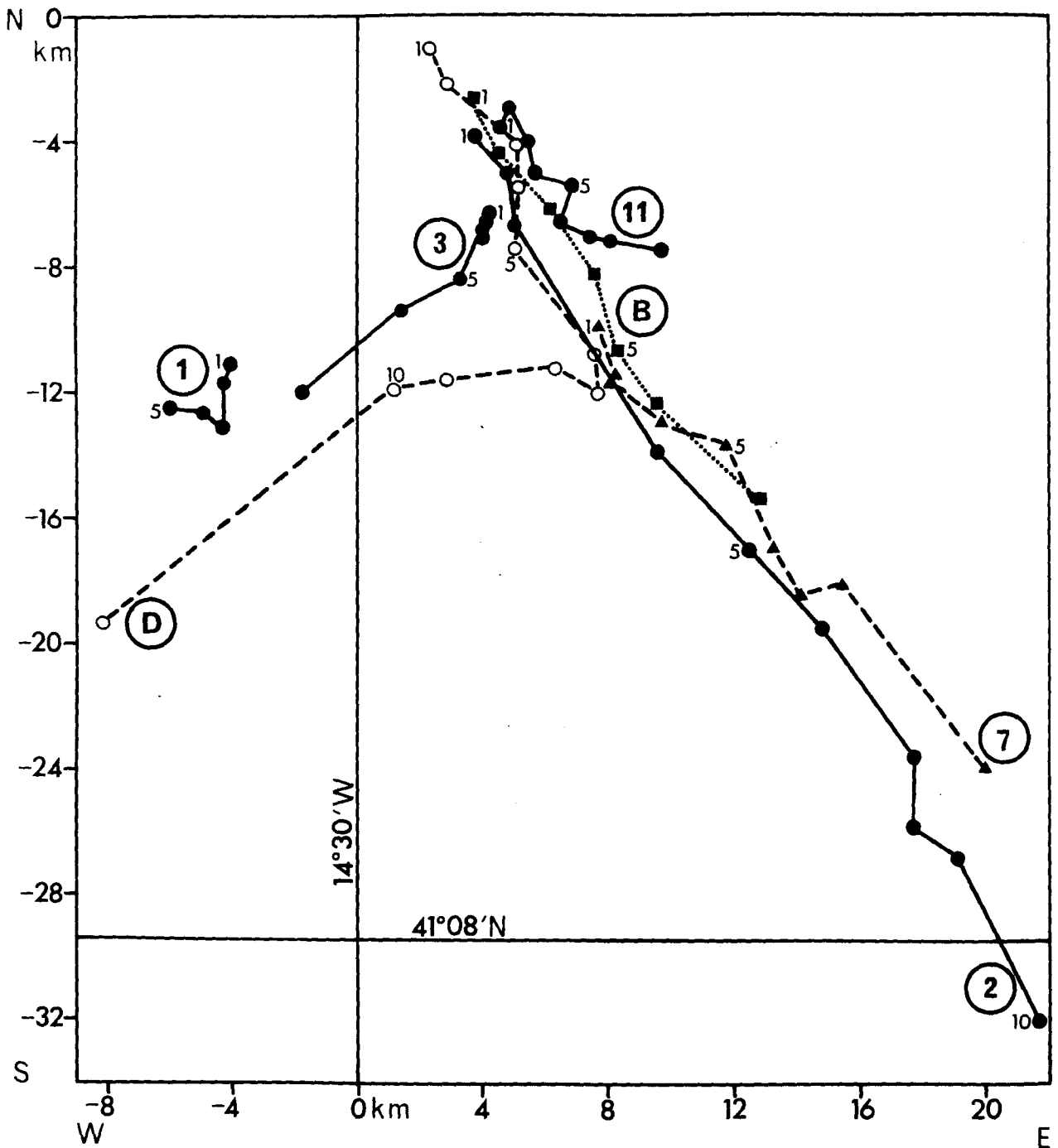
Fix No.	Date	Time GMT -9	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	12.VIII	1200	52°31'.9	141°44'.4	3.6	+0.8	+0.5	+0.2	+0.2
2	12.VIII	1513	52°31'.7	141°44'.6	6.8	+0.6	+0.2	+0.2	-0.2
3	12.VIII	1851	52°31'.7	141°45'.0	10.45	+0.2	+0.1	-0.2	-0.4
4	12.VIII	2044	52°31'.8	141°45'.3	12.3	-0.2	+0.3	-0.6	-0.2
5	12.VIII	2238	52°32'.1	141°45'.1	14.2	+0.0	+0.9	-0.4	+0.4
6	13.VIII	0036	52°32'.3	141°44'.9	16.2	+0.3	+1.3	+0.0	+0.7
7	13.VIII	0254	52°32'.2	141°44'.6	18.5	+0.6	+1.1	+0.4	+0.6
8	13.VIII	0458	52°31'.8	141°44'.7	20.55	+0.5	+0.4	+0.4	-0.2
9	13.VIII	0659	52°31'.8	141°45'.1	22.55	+0.1	+0.4	+0.0	-0.4
10	13.VIII	0909	52°31'.9	141°45'.2	24.75	-0.1	+0.6	-0.2	-0.2
11	13.VIII	1052	52°32'.0	141°45'.1	26.45	-0.0	+0.8	+0.0	+0.0
12	13.VIII	1950	52°31'.9	141°45'.3	35.4	-0.2	+0.6	+0.0	-0.4
13	13.VIII	2144	52°31'.9	141°45'.4	37.3	-0.2	+0.6	+0.0	-0.4
14	13.VIII	2349	52°32'.2	141°45'.7	39.4	-0.6	+1.1	-0.4	+0.0
15	14.VIII	0120	52°32'.3	141°45'.7	40.9	-0.6	+1.3	-0.2	+0.2
16	14.VIII	0408	52°32'.4	141°45'.5	43.7	-0.4	+1.4	+0.0	+0.4
17	14.VIII	0534	52°32'.2	141°45'.2	45.15	-0.1	+1.1	+0.4	-0.0

Fitted lines: $x = -0.024t + 0.6$

$y = +0.019t + 0.3$

Mean velocity = $0.8(\pm 0.2)$ cm/sec, $308(\pm 7)^\circ T$

FLOAT DESIGNATIONS: B(1aid 0011/16.V.58); 2(1aid 0425/20.V.58);
 11(1aid 0933/23.V.58); 7(1aid 1807/23.V.58); D(1aid 2315/25.V.58);
 3(1aid 0625/10.VI.58); 1(1aid 2145/9.VII.58).



SERIAL No: 25

FLOAT DESIGNATION: B

Date and time laid: 0011/16.V.58

Position laid: 41° 22' 08N
14° 27' 5W

Displacement origin: 42° 24' 0N
14° 30' 0W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 1km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
3120 3680 ±430 ±100

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	16.V	0217	41°22' 5	14°27' 4	2.1	+3.59	-2.69	+0.2	+0.0
2	17.V	0113	41°21' 6	14°26' 8	25.05	+4.52	-4.42	-0.2	+0.2
3	18.V	0127	41°20' 6	14°25' 6	49.25	+6.13	-6.18	+0.2	+0.2
4	19.V	0115	41°19' 4	14°24' 6	73.05	+7.58	-8.22	+0.4	+0.0
5	20.V	0145	41°18' 1	14°24' 1	97.55	+8.24	-10.65	-0.4	-0.6
6	21.V	0138	41°17' 3	14°23' 3	121.45	+9.48	-12.35	-0.4	-0.4
7	23.V	0230	41°15' 55	14°20' 8	170.3	+12.8	-15.40	+0.4	+0.4

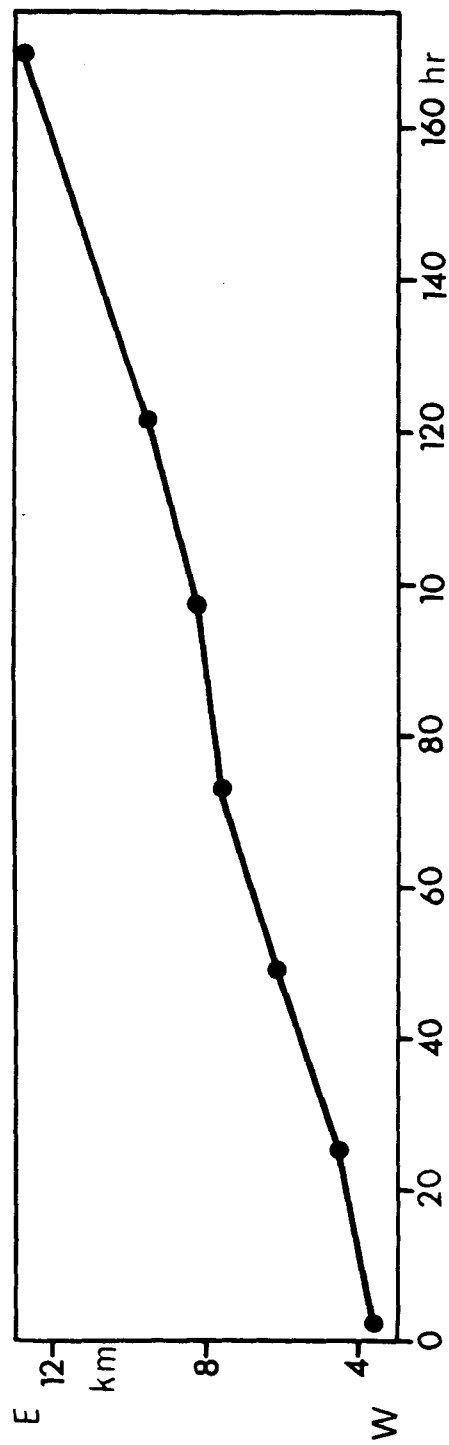
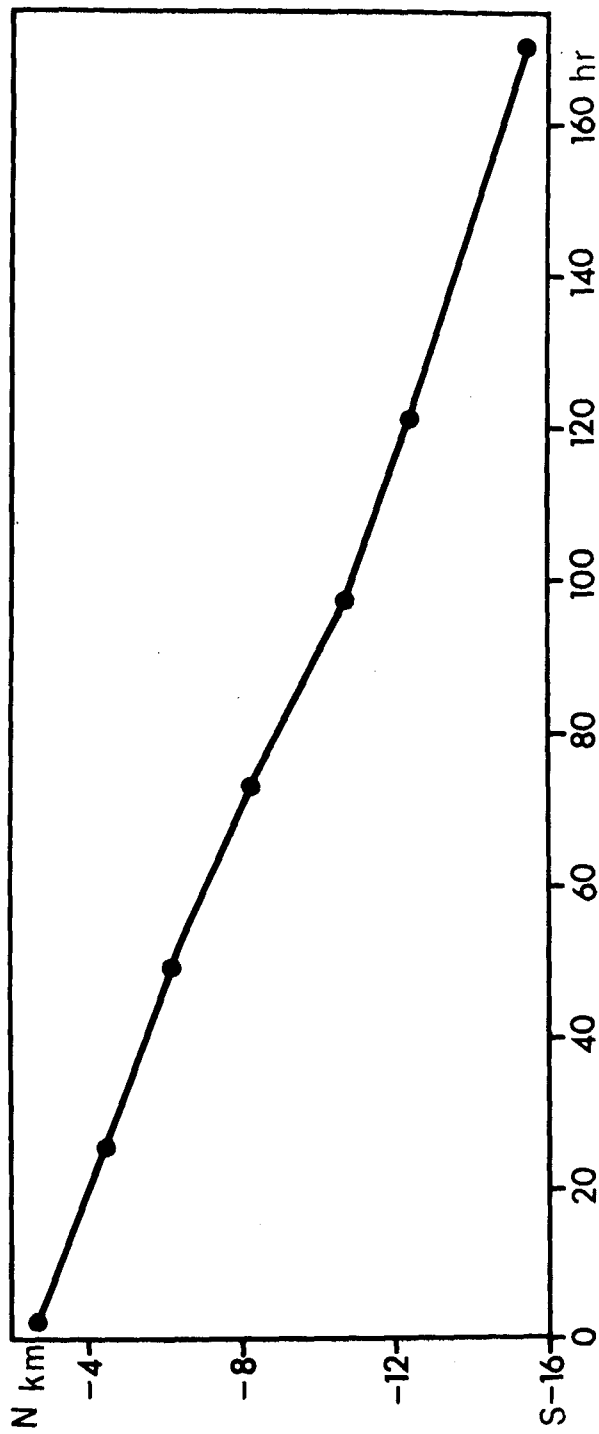
Fitted lines: $x = + 0.054t + 3.4$

$y = - 0.078t - 2.6$

Mean velocity = 2.6(±0.1)cm/sec, 145(±0.6)°T

FLOAT DESIGNATION: B

Date and time laid: 0011/16.V.58



SERIAL No: 26

FLOAT DESIGNATION: 2

Date and time laid: 0425/20.V.58

Position laid: 41° 22'.7N
14° 27'.8W

Displacement origin: 41° 24'.0N
14° 30'.0W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 1km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
 2000 2120 ±260 ±50

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	20.V	0713	41°21'.9	14°27'.3	2.8	+3.7	-3.8	-0.2	+0.4
2	20.V	1637	41°21'.25	14°26'.5	12.2	+4.8	-5.0	+0.2	+0.4
3	21.V	0539	41°20'.3	14°26'.3	25.25	+5.0	-6.7	-0.9	+0.4
4	23.V	0335	41°16'.4	14°23'.1	71.15	+9.6	-13.9	-0.4	-0.6
5	24.V	0242	41°14'.6	14°21'.0	94.3	+12.5	-17.0	+0.4	-0.6
6	25.V	0012	41°13'.4	14°19'.25	115.8	+14.8	-19.5	+0.7	-0.0
7	26.V	0517	41°11'.1	14°17'.1	144.85	+17.7	-23.6	+1.1	-0.2
8	26.V	1556	41°09'.9	14°17'.1	155.5	+17.7	-25.8	+0.2	-0.9
9	27.V	0440	41°09'.3	14°16'.2	168.25	+19.1	-26.8	+0.4	-0.2
10	29.V	0549	41°06'.6	14°14'.5	217.4	+21.7	-32.0	-1.5	+1.3

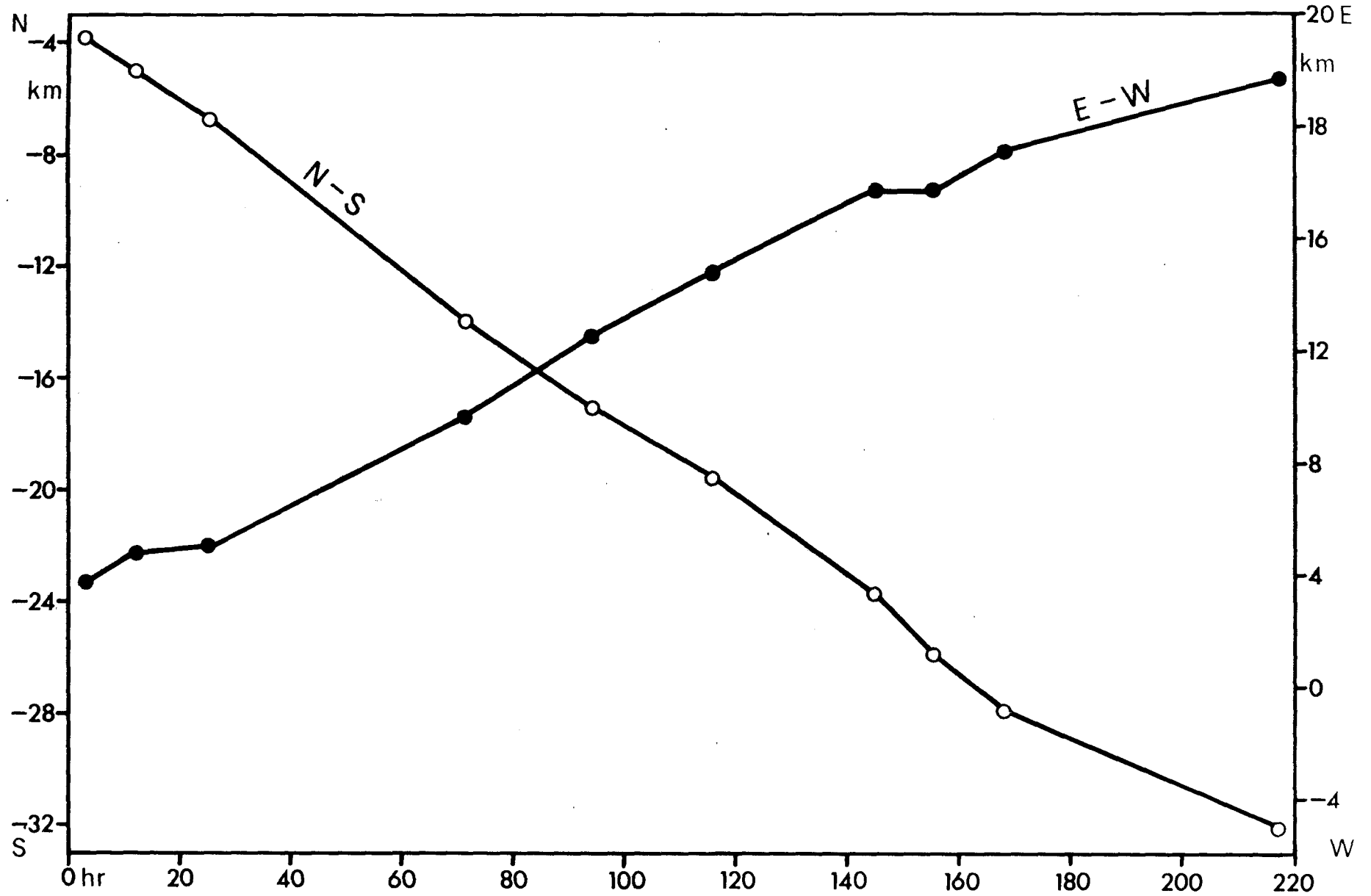
Fitted lines: $x = + 0.091t + 3.6$

$y = - 0.135t - 3.7$

Mean velocity = $4.5(\pm 0.1)$ cm/sec, $147(\pm 1.2)^\circ T$

FLOAT DESIGNATION: 2

Date and time laid: 0425/20.V.58



SERIAL No : 26

SERIAL No: 27

FLOAT DESIGNATION: 11

Date and time laid: 0933/23.V.58

Position laid: $41^{\circ} 22'.7N$
 $14^{\circ} 27'.5W$

Displacement origin: $41^{\circ} 24'.0N$
 $14^{\circ} 30'.0W$

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: $\pm 1km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 4500 4240 ± 720 ± 160

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	23.V	1350	$41^{\circ}22'.0$	$14^{\circ}26'.7$	4.3	+4.54	-3.59	-0.0	+0.2
2	23.V	1925	$41^{\circ}22'.3$	$14^{\circ}26'.5$	9.85	+4.83	-2.98	-0.0	+0.9
3	24.V	1035	$41^{\circ}21'.8$	$14^{\circ}26'.2$	25.05	+5.37	-4.02	-0.0	+0.4
4	24.V	1656	$41^{\circ}21'.2$	$14^{\circ}25'.9$	31.4	+5.63	-5.08	-0.0	-0.4
5	25.V	0913	$41^{\circ}21'.0$	$14^{\circ}25'.0$	47.65	+6.84	-5.41	+0.6	-0.0
6	25.V	1836	$41^{\circ}20'.3$	$14^{\circ}25'.3$	57.05	+6.39	-6.56	-0.4	-0.9
7	26.V	1120	$41^{\circ}20'.1$	$14^{\circ}24'.6$	73.8	+7.41	-6.99	+0.0	-0.7
8	26.V	2138	$41^{\circ}20'.0$	$14^{\circ}24'.1$	84.1	+8.06	-7.17	+0.2	-0.6
9	28.V	2348	$41^{\circ}19'.8$	$14^{\circ}23'.1$	134.25	+9.65	-7.50	-0.2	+1.1

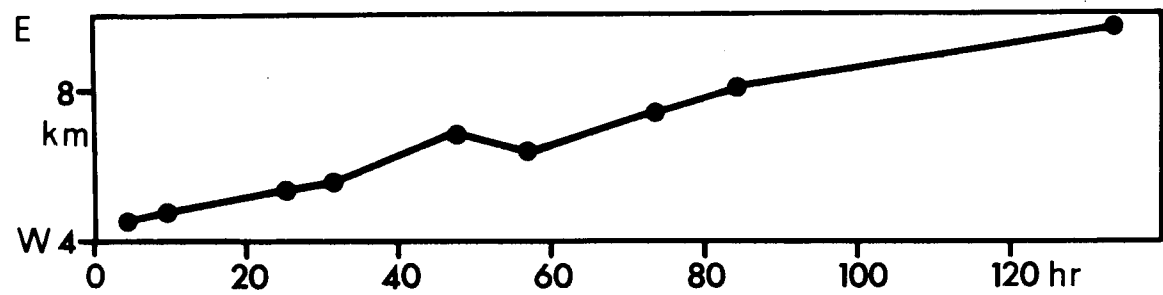
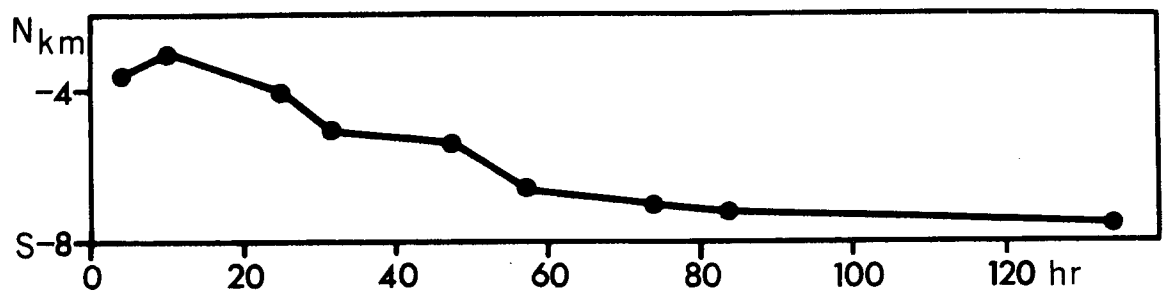
Fitted lines: $x = + 0.040t + 4.5$

$y = - 0.037t - 3.6$

Mean velocity = $1.5(\pm 0.1)cm/sec, 133(\pm 5)^{\circ}T$

FLOAT DESIGNATION: 11

Date and time laid: 0933/23.V.58



SERIAL No: 28

FLOAT DESIGNATION: 7

Date and time laid: 1807/23.V.58

Position laid: $41^{\circ} 19' .8N$
 $14^{\circ} 24' .3W$

Displacement origin: $41^{\circ} 24' .0N$
 $14^{\circ} 30' .0W$

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: $\pm 1km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 1500 1560* ± 200 ± 50

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	23.V	2235	$41^{\circ} 18' .6$	$14^{\circ} 24' .4$	4.45	+7.66	-9.87	+0.2	+0.4
2	24.V	0625	$41^{\circ} 17' .7$	$14^{\circ} 24' .1$	12.3	+8.22	-11.43	-0.0	-0.2
3	24.V	1200	$41^{\circ} 17' .5$	$14^{\circ} 24' .2$	17.9	+8.1	-11.73	-0.7	+0.0
4	24.V	1940	$41^{\circ} 16' .8$	$14^{\circ} 23' .0$	25.55	+9.7	-13.01	+0.0	-0.4
5	25.V	1130	$41^{\circ} 16' .4$	$14^{\circ} 21' .5$	41.4	+11.76	-13.72	+0.6	+0.6
6	26.V	0700	$41^{\circ} 14' .8$	$14^{\circ} 20' .5$	60.9	+13.25	-16.97	+0.0	-0.6
7	26.V	1745	$41^{\circ} 14' .0$	$14^{\circ} 19' .8$	71.65	+14.07	-18.43	-0.2	-0.7
8	27.V	0243	$41^{\circ} 14' .2$	$14^{\circ} 18' .9$	80.6	+15.42	-18.08	+0.2	+0.6
9	29.V	0431	$41^{\circ} 10' .9$	$14^{\circ} 15' .5$	130.4	+19.95	-23.95	-0.2	+0.2

Fitted lines: $x = + 0.100t + 7.0$

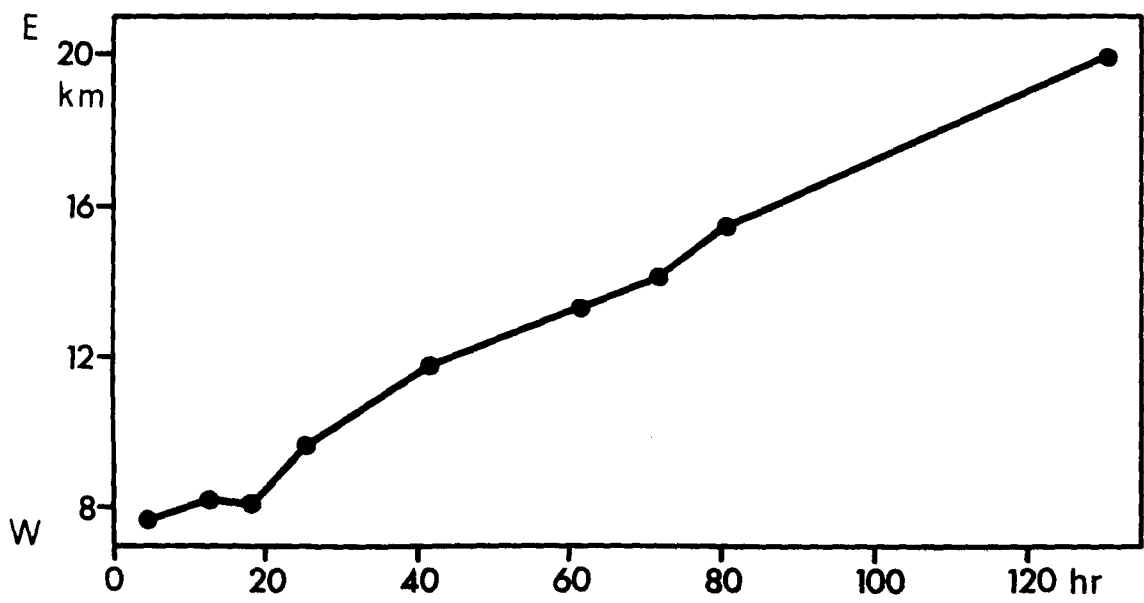
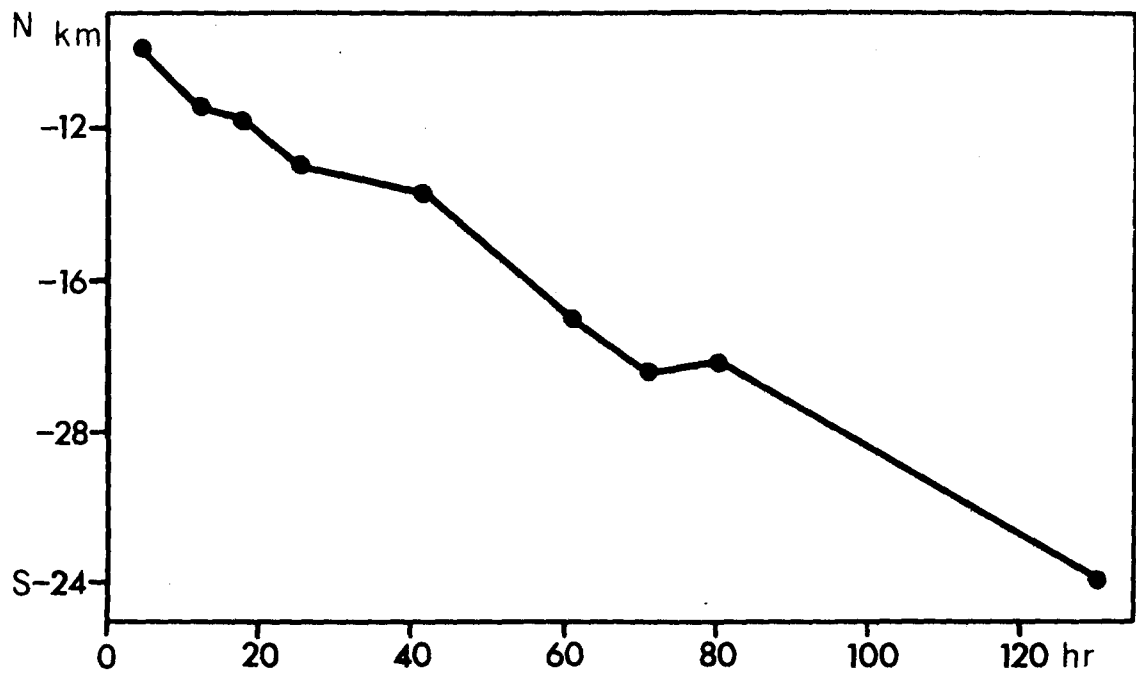
$y = - 0.109t - 9.8$

Mean velocity = $4.1(\pm 0.1)cm/sec, 137(\pm 1.2)^{\circ}T$

* This float was fitted with a prototype transponder circuit which appeared to work on one occasion giving a depth of 1420m.

FLOAT DESIGNATION: 7

Date and time laid: 1807/23.V.58



FLOAT DESIGNATION: D

Date and time laid: 23.15/25.V.58

Position laid: $41^{\circ} 23' .8N$
 $14^{\circ} 28' .3W$

Displacement origin: $41^{\circ} 24' .0N$
 $14^{\circ} 30' .0W$

Navigation based on: Radar on anchored buoys, + celestial fixes.

Estimated accuracy of positions: $\pm 1km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 2600 2940 ± 330 ± 70

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.V	0040	$41^{\circ} 23' .35$	$14^{\circ} 28' .4$	1.4	+2.3	-1.1	-1.1	+1.5
2	26.V	2320	$41^{\circ} 22' .7$	$14^{\circ} 27' .9$	24.1	+2.8	-2.2	-0.7	+0.7
3	29.V	0120	$41^{\circ} 21' .7$	$14^{\circ} 26' .3$	74.1	+5.1	-4.1	+1.1	-0.2
4	31.V	0100	$41^{\circ} 21' .0$	$14^{\circ} 26' .25$	121.75	+5.1	-5.5	+0.7	-0.7
5	1.VI	0103	$41^{\circ} 19' .8$	$14^{\circ} 26' .5$	145.8	+5.0	-7.5	+0.4	-2.2
6	13.VI	2300	$41^{\circ} 18' .1$	$14^{\circ} 24' .5$	455.75	+7.6	-10.8	+0.2	+0.2
7	17.VI	2250	$41^{\circ} 17' .4$	$14^{\circ} 24' .6$	551.6	+7.7	-12.0	-0.6	+0.6
8	21.VI	2120	$41^{\circ} 17' .9$	$14^{\circ} 25' .6$	646.1	+6.3	-11.2		
9	26.VI	2100	$41^{\circ} 17' .6$	$14^{\circ} 27' .9$	765.75	+2.9	-11.6		
10	28.VI	2026	$41^{\circ} 17' .4$	$14^{\circ} 29' .1$	813.2	+1.2	-11.9		
11	12.VII	1930	$41^{\circ} 13' .5$	$14^{\circ} 35' .7$	1148.25	-8.1	-19.3		

Fitted lines: $x = + 0.009t + 3.4$)
 $y = - 0.019t - 2.6$ } Fixes 1 - 7

Mean velocity = $0.6(\pm 0.1) \text{ cm/sec, } 154(^{\circ}T$

Mean velocity = $0.5 \text{ cm/sec, } 300^{\circ}T$ - Fixes 7-8

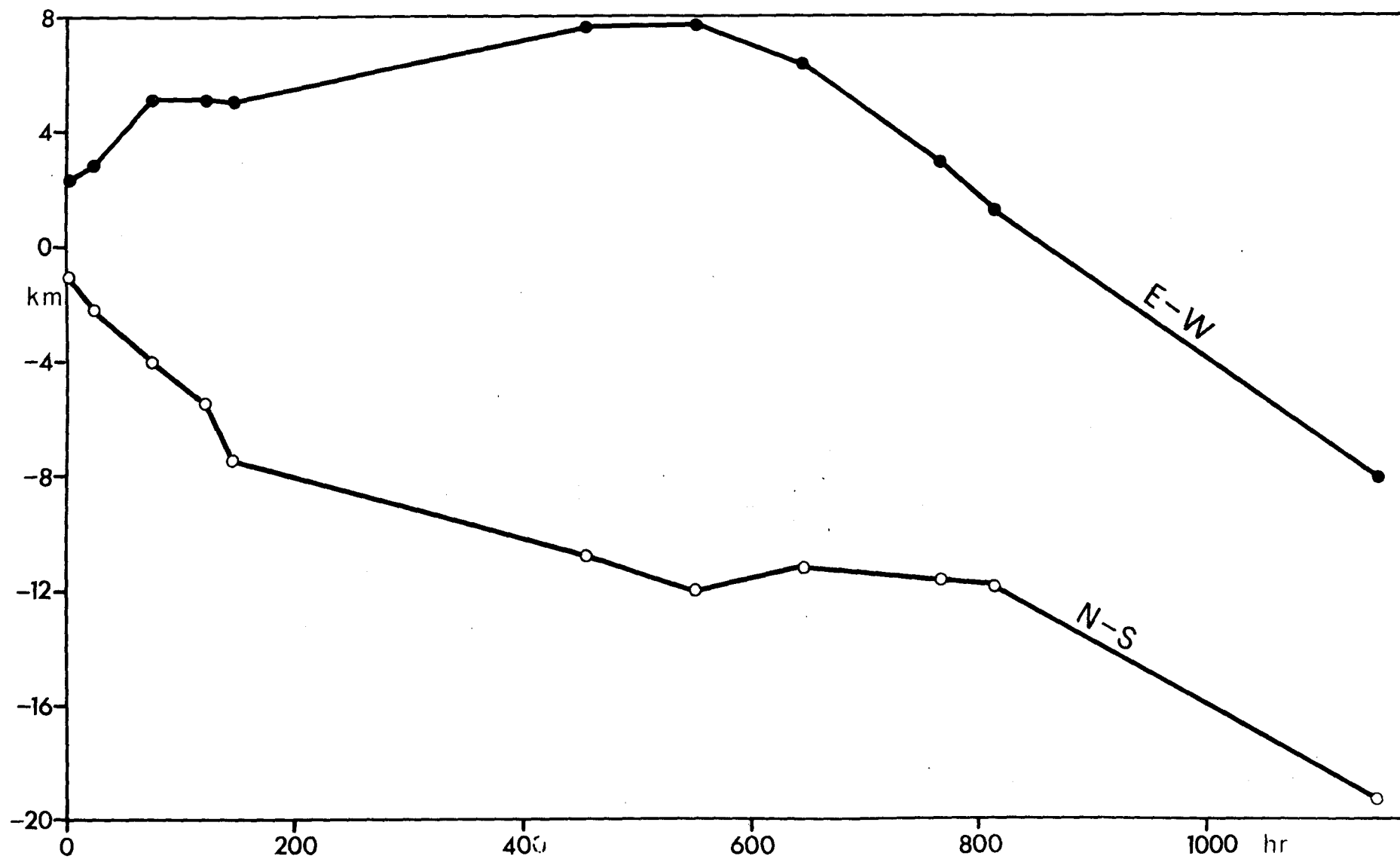
$0.8 \text{ cm/sec, } 264^{\circ}T$ - Fixes 8-9

$1.0 \text{ cm/sec, } 260^{\circ}T$ - Fixes 9-10

$1.0 \text{ cm/sec, } 232^{\circ}T$ - Fixes 10-11

FLOAT DESIGNATION: D

Date and time laid: 2315/25.V.58



SERIAL No : 29

SERIAL No: 30

FLOAT DESIGNATION: 3

Date and time laid: 0625/10.VI.58

Position laid: 41° 20'.5N
14° 27'.0W

Displacement origin: 41° 24'.0N
14° 30'.0W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 1km ± 2km

Depth (m): Nominal Observed S.D. S.D.(mean)
2600 2460 ±190 ±50

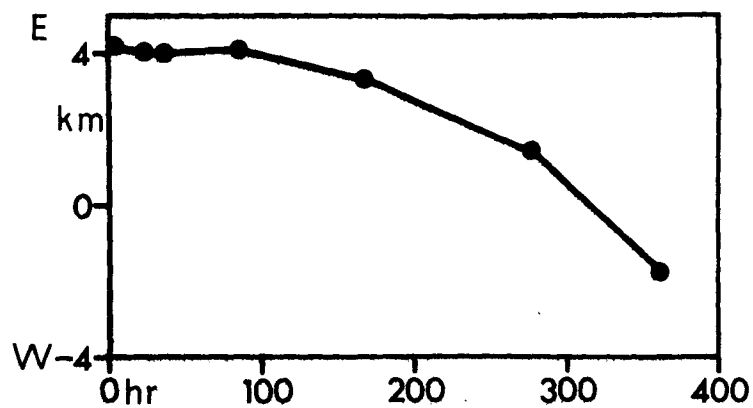
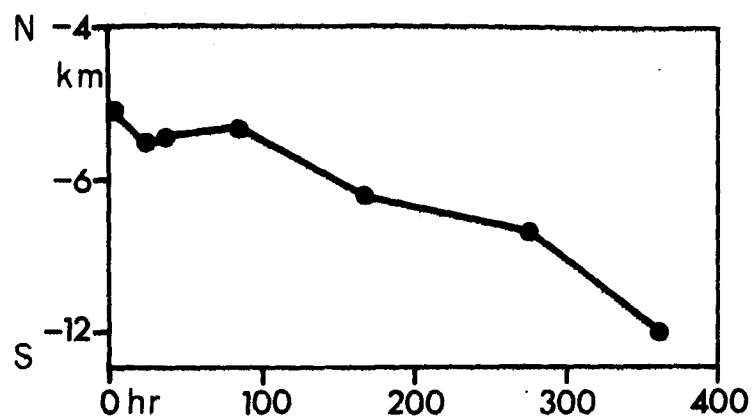
Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	10.VI	0910	41°20'.6	14°26'.8	2.75	+4.2	-6.2	-0.2	-0.0
2	11.VI	0655	41°20'.1	14°27'.0	24.5	+4.0	-7.05	-0.2	-0.6
3	11.VI	1850	41°20'.2	14°27'.0	36.4	+4.0	-6.86	-0.0	-0.2
4	13.VI	1920	41°20'.4	14°26'.9	84.9	+4.1	-6.59	+0.4	+0.7
5	17.VI	0700	41°19'.3	14°27'.6	168.6	+3.3	-8.43	+0.4	+0.2
6	21.VI	1945	41°18'.8	14°29'.0	277.35	+1.4	-9.37	-0.7	+0.7
7	25.VI	0800	41°17'.3	14°31'.4	361.6	-1.8	-12.06	+0.4	-0.7

Fitted lines: $x = -0.007t + 4.4$

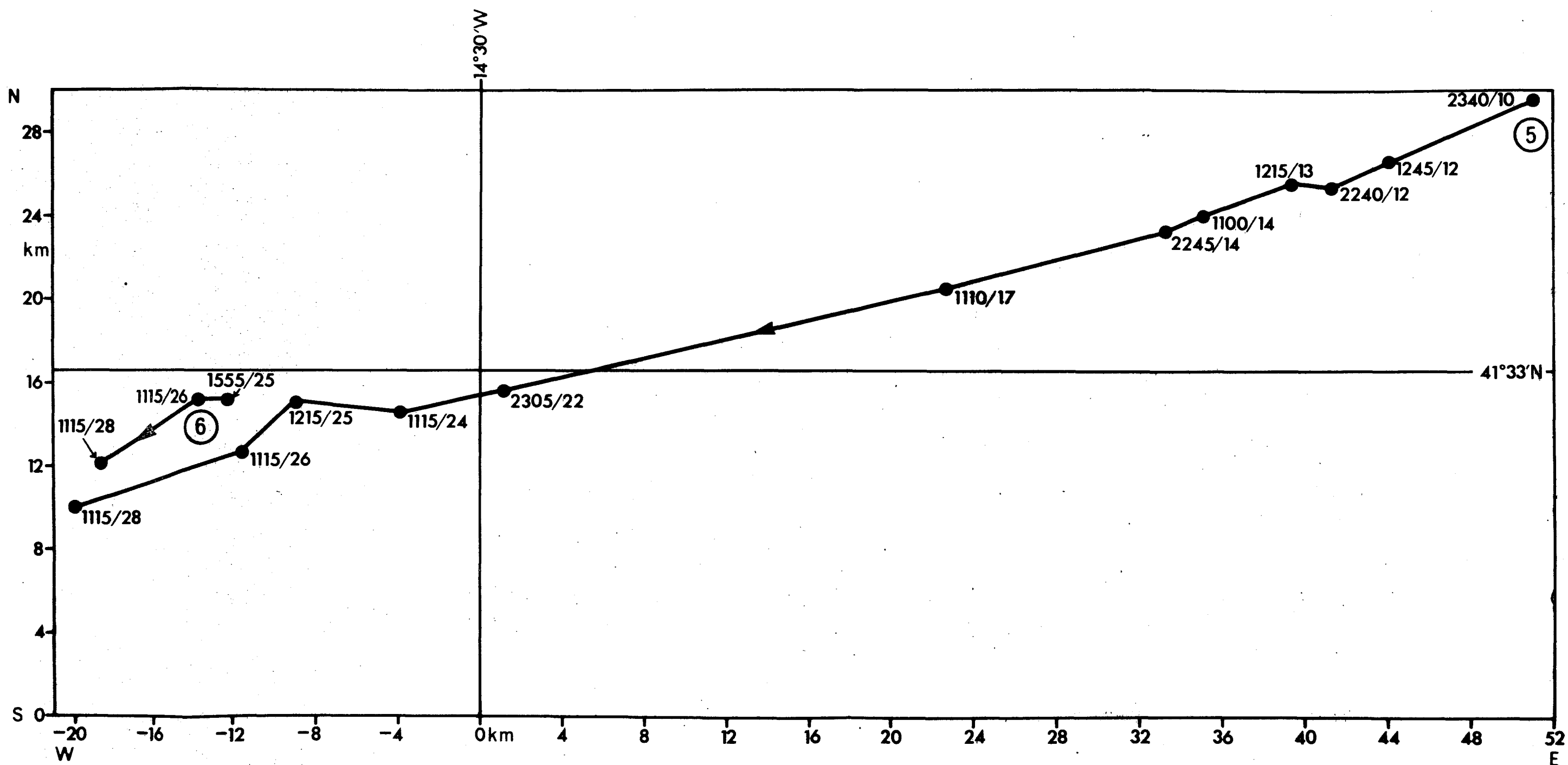
$y = -0.015t - 6.1$

Mean velocity = $0.5(\pm 0.1)$ cm/sec, $209(\pm 2)^\circ T$

FLOAT DESIGNATION: 3 Date and time laid: 0625/10.VI.58.



FLOAT DESIGNATIONS: 5(laid 2130/10.VI.58); 6(laid 1241/25.VI.58)



SERIAL No: 31

FLOAT DESIGNATION: 5

Date and time laid: 2130/10.VI.58

Position laid: 41° 39'.5N
13° 52'.6W

Displacement origin: 41° 24'.0N
14° 30'.0W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 1km ± 2km

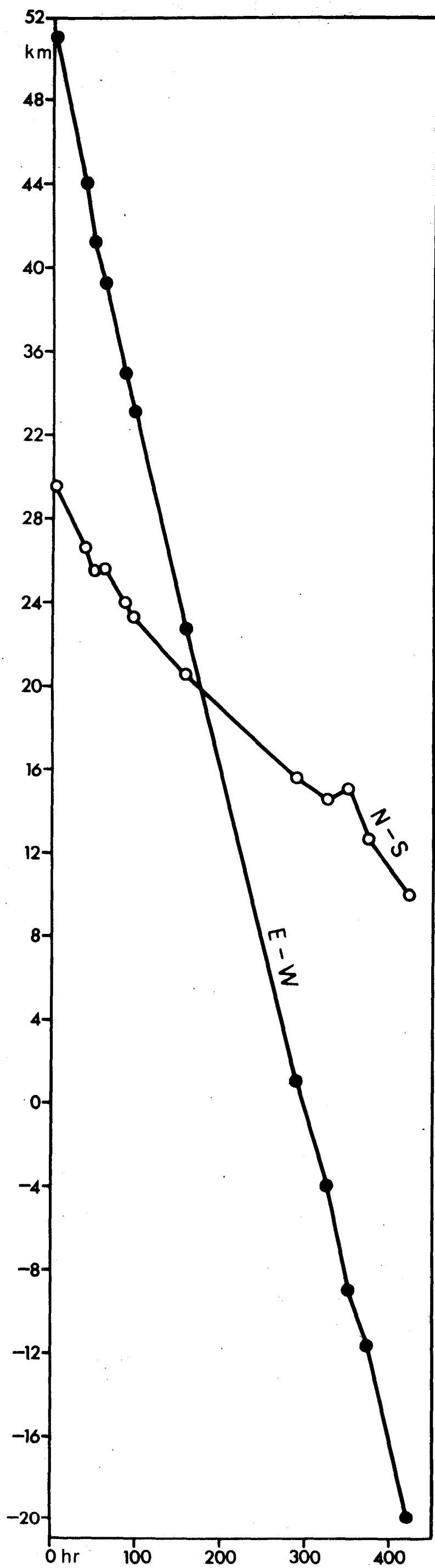
Depth(m): Nominal Observed S.D. S.D.(mean)
 2680 2590 ±370 ±70

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	10.VI	2340	41°40'.1	13°53'.0	2.15	+51.1	+29.6	+1.5	+1.7
2	12.VI	1245	41°38'.4	13°58'.0	39.25	+44.1	+26.6	+0.7	+0.2
3	12.VI	2240	41°37'.8	14°00'.1	49.15	+41.3	+25.4	-0.4	-0.6
4	13.VI	1215	41°37'.9	14°01'.5	62.75	+39.4	+25.6	-0.0	+0.2
5	14.VI	1100	41°37'.1	14°04'.6	85.5	+35.0	+24.0	-0.7	-0.6
6	14.VI	2245	41°36'.6	14°05'.8	97.25	+33.2	+23.3	-0.6	-0.7
7	17.VI	1110	41°35'.2	14°13'.6	157.65	+22.7	+20.6	-0.9	-0.9
8	22.VI	2305	41°32'.5	14°29'.1	289.6	+1.1	+15.6	-0.6	-0.4
9	24.VI	1115	41°31'.9	14°32'.7	325.75	-3.9	+14.6	+0.4	+0.0
10	25.VI	1215	41°32'.2	14°36'.3	350.75	-8.9	+15.1	-0.4	+1.7
11	26.VI	1115	41°30'.9	14°38'.3	373.75	-11.6	+12.7	+0.7	+0.2
12	28.VI	1115	41°29'.5	14°44'.5	421.75	-20.0	+10.0	+0.4	-0.6

Fitted lines: $x = -0.167t + 49.9$

$y = -0.041t + 1.0$

Mean velocity = 4.8(±0.04)cm/sec, 256(±0.6)°T



SERIAL No : 31

SERIAL No: 32

FLOAT DESIGNATION: 6

Date and time laid: 1241/25.VI.58

Position laid: $41^{\circ}33'.0N$
 $14^{\circ}37'.7W$

Displacement origin: $41^{\circ}24'.0N$
 $14^{\circ}30'.0W$

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: $\pm 1km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 2210 2430 ± 360 ± 130

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	25.VI	1555	$41^{\circ}32'.2$	$14^{\circ}38'.7$	3.25	-12.1	+15.2	-0.2	-0.4
2	26.VI	1115	$41^{\circ}32'.2$	$14^{\circ}39'.9$	22.55	-13.6	+15.2	+0.2	+0.6
3	28.VI	1115	$41^{\circ}30'.6$	$14^{\circ}43'.6$	70.55	-18.7	+12.1	-0.0	-0.2

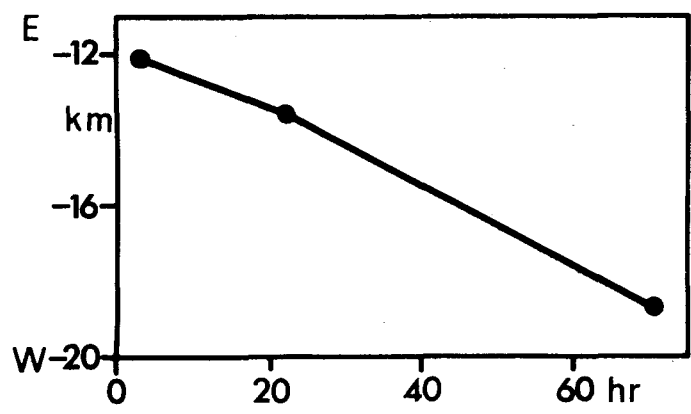
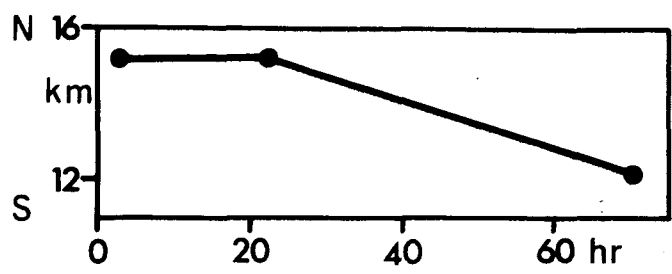
Fitted lines: $x = -0.100t - 11.6$

$y = -0.050t + 15.8$

Mean velocity = $3.1(\pm 0.2)cm/sec, 244(\pm 6)^{\circ}T$

FLOAT DESIGNATION: 6

Date and time laid: 1241/25.VI.58



SERIAL No: 33

FLOAT DESIGNATION: 1

Date and time laid: 2145/9.VII.58

Position laid: $41^{\circ}17'87''$
 $14^{\circ}32'8''W$

Displacement origin: $41^{\circ}24'0''N$
 $14^{\circ}30'0''W$

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: $\pm 1km$ $\pm 2km$

Depth (m): Nominal Observed S.D. S.D.(mean)
 2600 2760 ± 450 ± 170

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	10.VII	0040	$41^{\circ}17'9''$	$14^{\circ}32'9''$	2.9	-4.02	-11.13	-0.2	+0.4
2	10.VII	1800	$41^{\circ}17'6''$	$14^{\circ}33'1''$	20.25	-4.26	-11.69	+0.0	+0.0
3	11.VII	2300	$41^{\circ}16'8''$	$14^{\circ}33'1''$	49.25	-4.26	-13.17	+0.6	-0.9
4	12.VII	1542	$41^{\circ}17'1''$	$14^{\circ}33'6''$	65.95	-4.91	-12.61	+0.2	-0.0
5	13.VII	1232	$41^{\circ}17'15''$	$14^{\circ}34'3''$	86.8	-5.94	-12.52	-0.4	+0.6

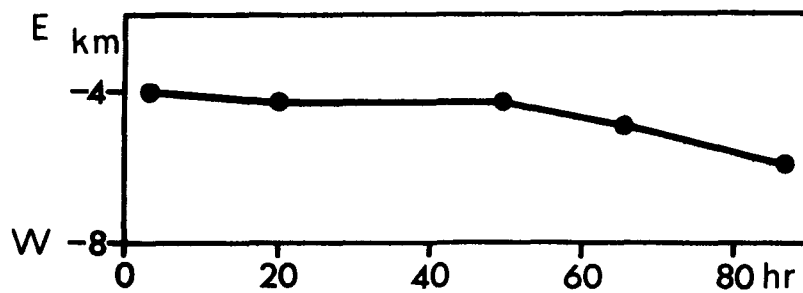
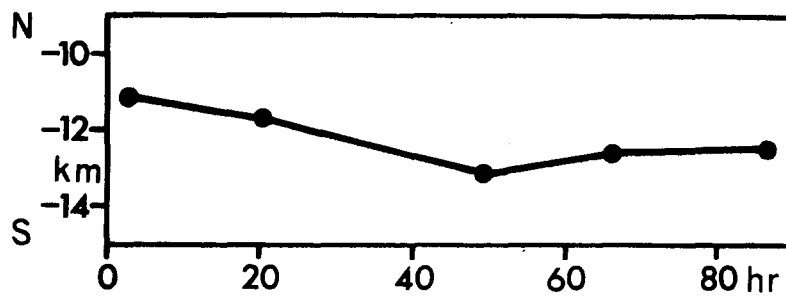
Fitted lines: $x = -0.020t - 3.8$

$y = -0.018t - 11.4$

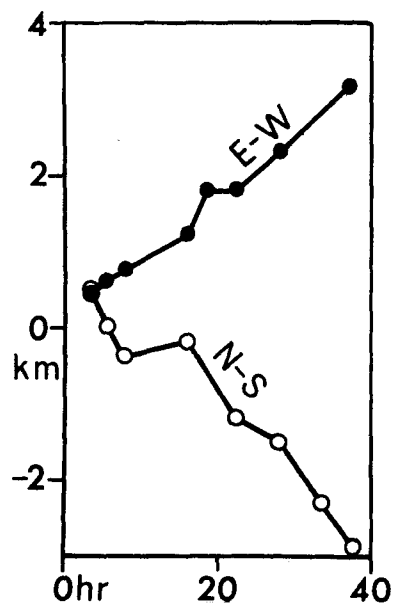
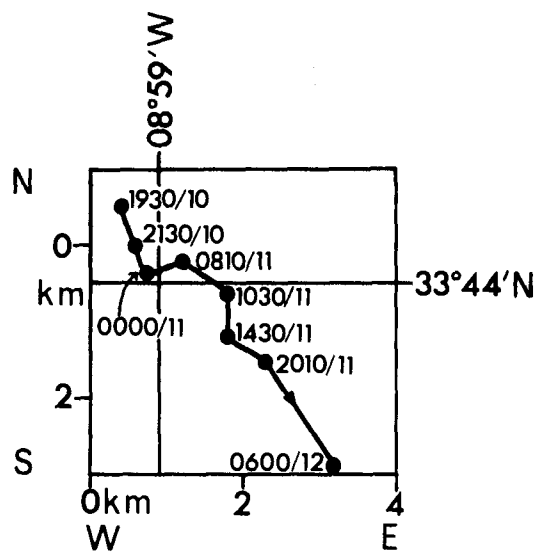
Mean velocity = $0.8(\pm 0.2) \text{ cm/sec}$, $228(\pm 11)^{\circ}T$

FLOAT DESIGNATION: 1

Date and time laid: 2145/9.VII.58



FLOAT DESIGNATION: 2, also 1 Date and time laid: 1610/10.XI.58



SERIAL No: 34

FLOAT DESIGNATION: 2, remumbered 1 Date and time laid: 1610/10.XI.58
 Position laid: 33°44'.3N Displacement origin: 33°44'.3N
 8°59'.6W 8°59'.6W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 0.5km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
 1000 997* (±20) -

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	10.XI	1930	33°44'.6	8°59'.3	3.35	+0.4	+0.5	+0.0	+0.0
2	10.XI	2130	33°44'.3	8°59'.2	5.35	+0.6	+0.0	+0.0	-0.2
3	11.XI	0000	33°44'.1	8°59'.1	7.85	+0.75	-0.4	+0.0	-0.4
4	11.XI	0810	33°44'.2	8°58'.8	16.0	+1.2	-0.2	-0.2	+0.6
5	11.XI	1030	33°43'.9	8°58'.5	18.35	+1.8	-0.6	+0.2	+0.2
6	11.XI	1430	33°43'.6	8°58'.4	22.35	+1.8	-1.2	-0.2	+0.0
7	11.XI	2010	33°43'.5	8°58'.1	28.0	+2.3	-1.5	-0.0	+0.2
8	12.XI	0600	33°42'.8	8°57'.6	37.85	+3.2	-2.9	+0.0	-0.4

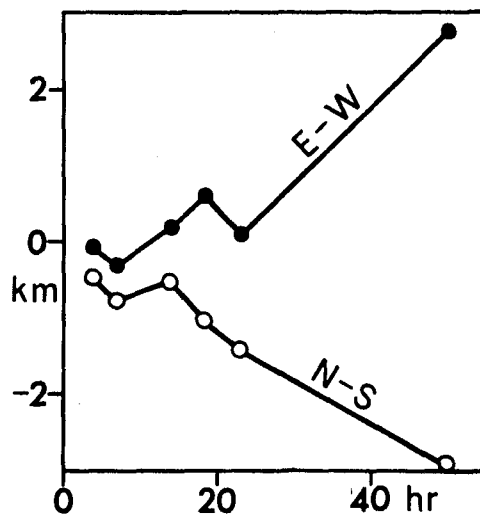
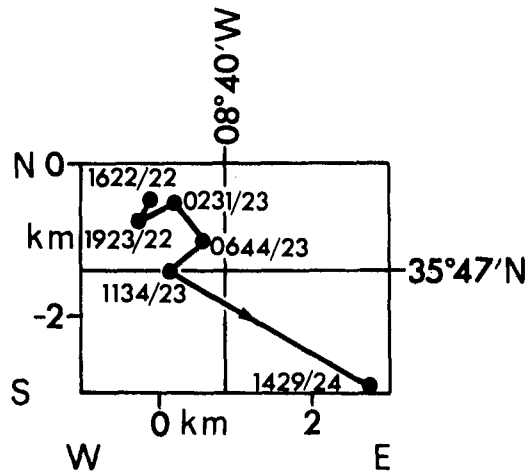
Fitted lines: $x = +0.080t + 0.1$

$y = -0.085t + 0.7$

Mean velocity = $3.2(\pm 0.2)$ cm/sec, $137(\pm 3)^{\circ}T$

* From bottom reflections. S.D. is estimated accuracy.

FLOAT DESIGNATION: 3, also 2 Date and time laid: 1230/22.XI.58



FLOAT DESIGNATION: 3 renumbered 2 Date and time laid: 1230/22.XI.58

Position laid: 35°47'.8N Displacement origin: 35°47'.8N
8°40'.6W 8°40'.6W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ±0.5km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
1250 1260 ±330 ±80

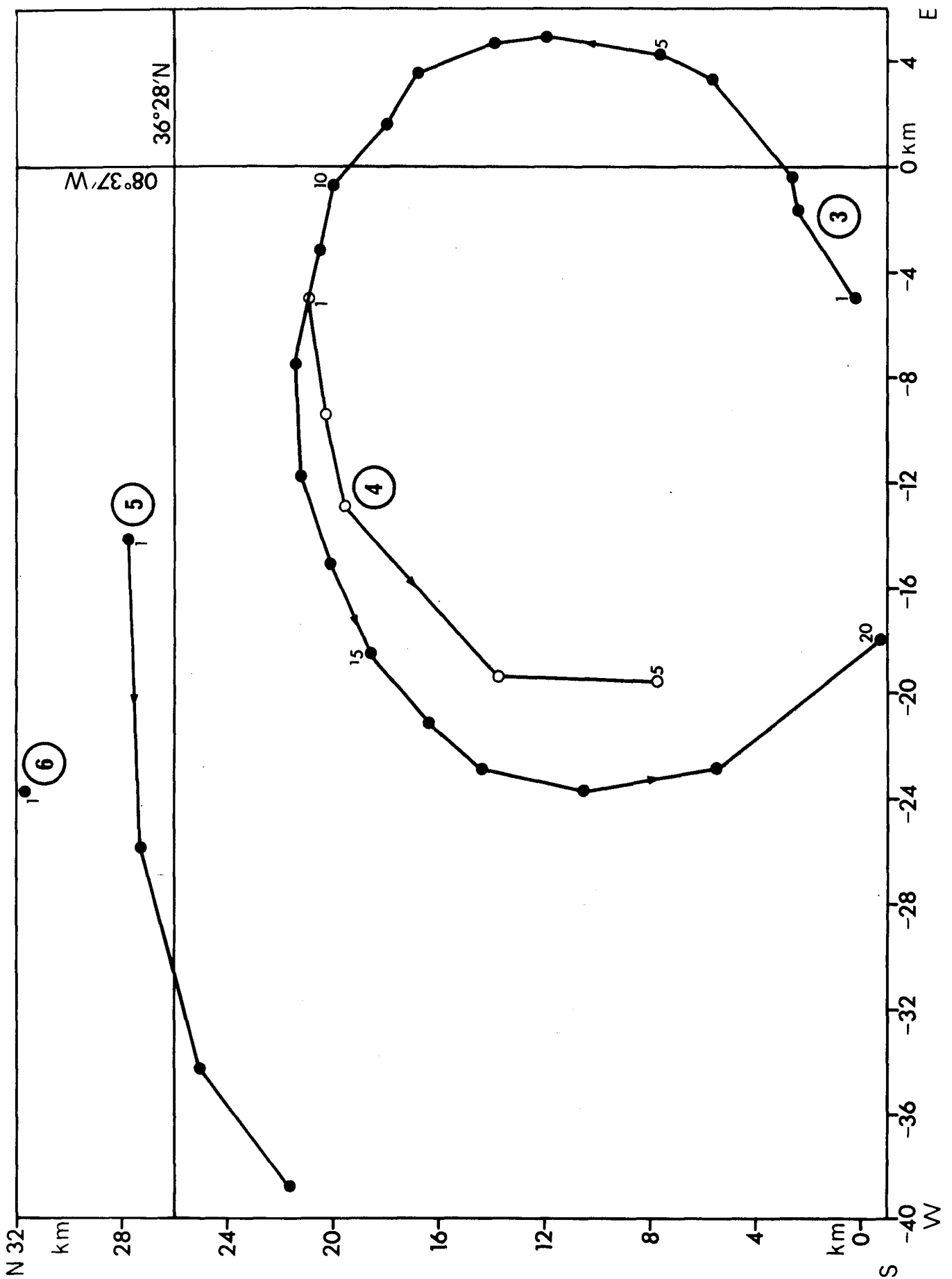
Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y		
1	22.XI	1622	35°47'.5	8°40'.7	3.85	-0.1	-0.45	+0.4	-0.2
2	22.XI	1923	35°47'.3	8°40'.8	6.9	-0.3	-0.75	-0.0	-0.2
3	23.XI	0231	35°47'.5	8°40'.5	14.0	+0.2	-0.5	+0.0	+0.4
4	23.XI	0644	35°47'.2	8°40'.2	18.25	+0.6	-1.0	+0.2	+0.2
5	23.XI	1134	35°47'.0	8°40'.5	23.05	+0.1	-1.4	-0.7	-0.0
6	24.XI	1429	35°46'.1	8°38'.7	50.0	+2.75	-2.95	+0.2	-0.2

Fitted lines: x = + 0.064t - 0.7

 y = - 0.055t - 0.1

Mean velocity = 2.3(±0.3) cm/sec, 131(±3) °T

FLOAT DESIGNATIONS; 3(1aid 1902/23.XI.58); 4(1aid 1338/28.XI.58);
 5(1aid 1127/29.XI.58); 6(1aid 2144/30.XI.58).



FLOAT DESIGNATION: 1, renumbered 3 Date and time laid: 1902/23.XI.58

Position laid: 36° 14' 1N Displacement origin: 36° 14' 0N
8° 41' 2W 8° 37' 0W

Navigation based on: Radar on anchored buoys, + celestial fixes

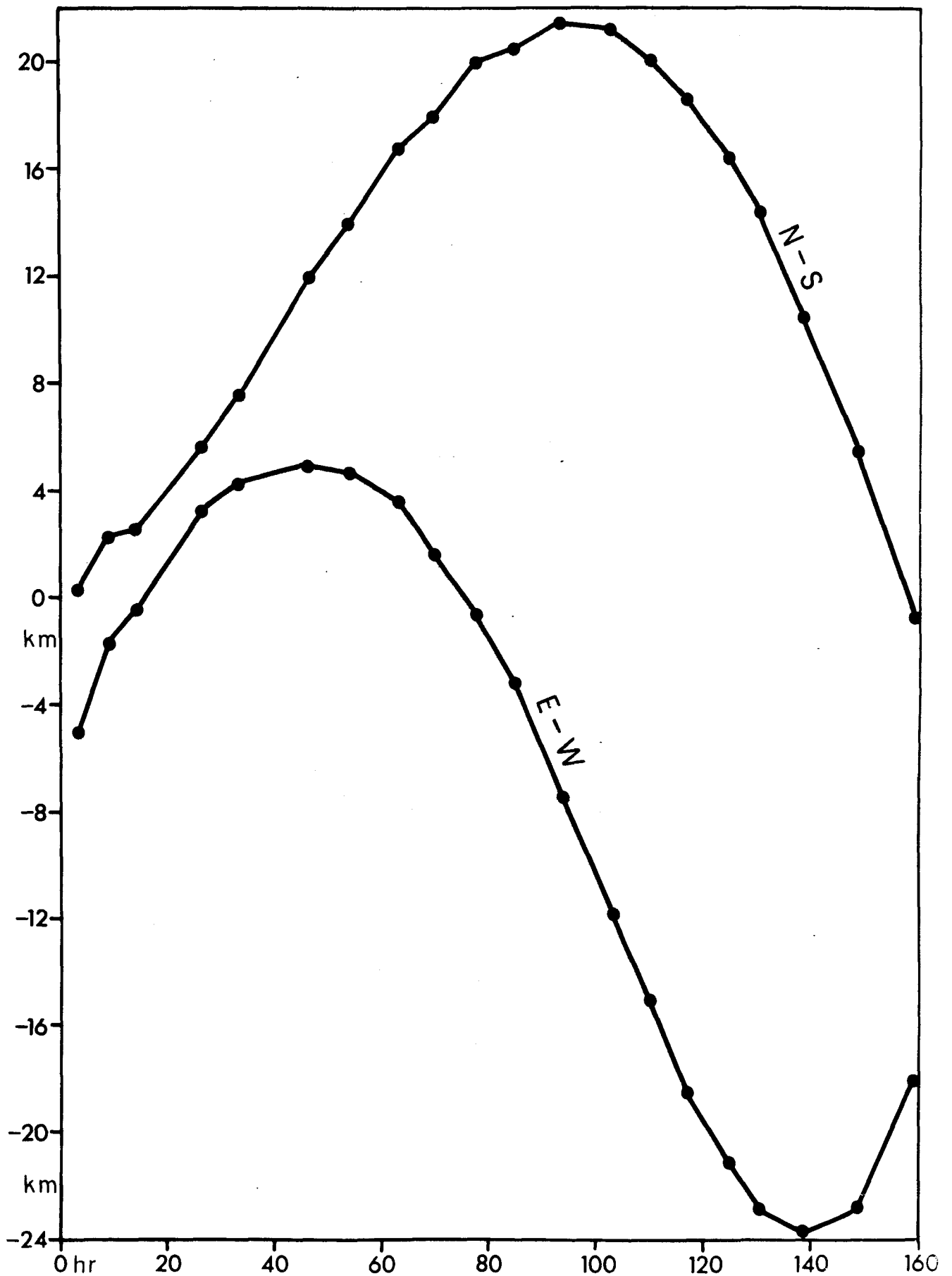
Estimated accuracy of positions: ± 0.5km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
1250 1400 ±300 ±40

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	23.XI	2224	36°14' 1	8°40' 4	3.35	-5.0	+0.25
2	24.XI	0401	36°15' 3	8°38' 2	9.0	-1.7	+2.35
3	24.XI	0924	36°15' 4	8°37' 3	14.35	-0.4	+2.55
4	24.XI	2141	36°17' 0	8°34' 8	26.65	+3.3	+5.6
5	25.XI	0441	36°18' 1	8°34' 1	33.65	+4.3	+7.6
6	25.XI	1743	36°20' 5	8°33' 7	46.7	+4.95	+11.95
7	26.XI	0058	36°21' 5	8°33' 8	53.95	+4.7	+13.9
8	26.XI	1012	36°23' 1	8°34' 7	63.15	+3.6	+16.75
9	26.XI	1649	36°23' 7	8°36' 0	69.8	+1.6	+17.95
10	27.XI	0043	36°24' 8	8°37' 5	77.7	-0.7	+19.95
11	27.XI	0740	36°25' 1	8°39' 2	84.65	-3.2	+20.45
12	27.XI	1633	36°25' 6	8°42' 1	93.5	-7.5	+21.45
13	28.XI	0148	36°25' 5	8°45' 0	102.75	-11.8	+21.2
14	28.XI	0856	36°24' 8	8°47' 2	109.9	-15.1	+20.05
15	28.XI	1602	36°24' 0	8°49' 5	117.0	-18.5	+18.55
16	28.XI	2359	36°22' 8	8°51' 2	124.95	-21.1	+16.35
17	29.XI	0529	36°21' 7	8°52' 4	130.45	-22.9	+14.35
18	29.XI	1333	36°19' 7	8°53' 0	136.5	-23.75	+10.45
19	29.XI	2346	36°17' 0	8°52' 4	148.75	-22.9	+5.45
20	30.XI	1010	36°13' 6	8°49' 2	159.15	-18.0	-0.75

See Ref. 5 for mean velocities

FLOAT DESIGNATION: 1, also 3 Date and time laid: 1902/23.XI.58



SERIAL No: 37

FLOAT DESIGNATION: 8, renumbered 4 Date and time laid: 1338/28.XI.58

Position laid: $36^{\circ}24' \cdot 8N$
 $8^{\circ}37' \cdot 8W$

Displacement origin: $36^{\circ}14' \cdot 0N$
 $8^{\circ}37' \cdot 0W$

Navigation based on: Radar on anchored buoys, + celestial fixes

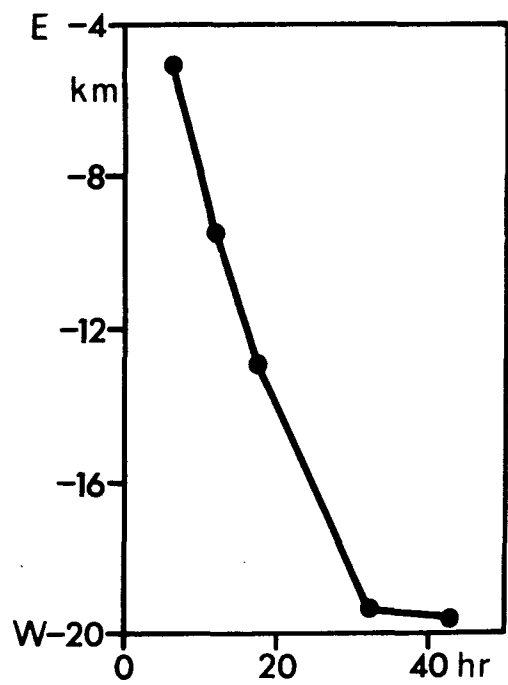
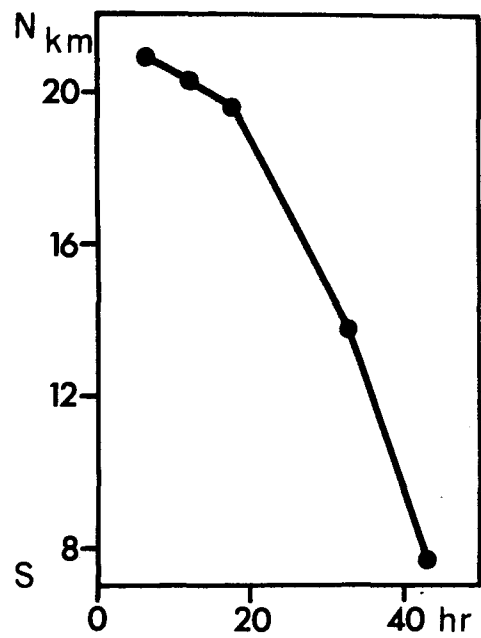
Estimated accuracy of positions: $\pm 0.5km$ $\pm 2km$

Depth(m): Nominal Observed S.D. S.D.(mean)
 1250 1560 ± 350 ± 100

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	28.XI	1959	$36^{\circ}25' \cdot 3$	$8^{\circ}40' \cdot 4$	6.35	-5.0	+20.9
2	29.XI	0149	$36^{\circ}25' \cdot 0$	$8^{\circ}43' \cdot 3$	12.2	-9.4	+20.25
3	29.XI	0714	$36^{\circ}24' \cdot 6$	$8^{\circ}45' \cdot 7$	17.6	-12.9	+19.55
4	29.XI	2213	$36^{\circ}21' \cdot 4$	$8^{\circ}50' \cdot 0$	32.6	-19.4	+13.7
5	30.XI	0837	$36^{\circ}18' \cdot 1$	$8^{\circ}50' \cdot 2$	43.0	-19.6	+7.7

See Ref. 5 for mean velocities.

FLOAT DESIGNATION: 8, also 4 Date and time laid: 1338/28.XI.58



SERIAL No: 38

FLOAT DESIGNATION: 9, renumbered 5 Date and time laid: 1127/29.XI.58

Position laid: $36^{\circ} 29'.3N$ Displacement origin: $36^{\circ} 14'.0N$
 $8^{\circ} 43'.1W$ $8^{\circ} 37'.0W$

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: $\pm 0.6km$ $\pm 2km$

Depth (m): Nominal Observed S.D. S.D.(mean)
 1150 1080 ± 260 ± 80

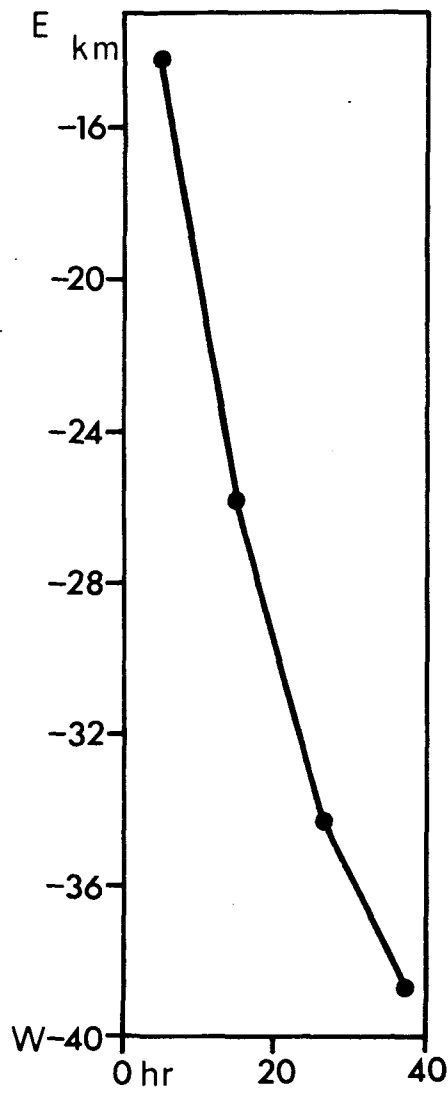
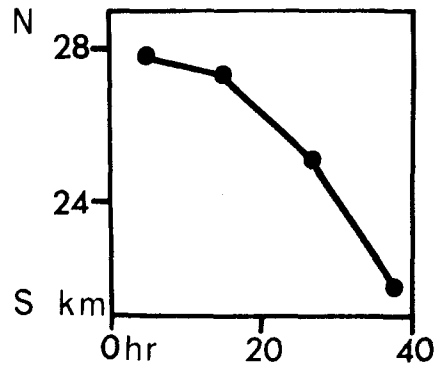
Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)		Residuals	
			Lat.N.	Long.W.		+E-W x	+N-S y	x	y
1	29.XI	1621	$36^{\circ} 29'.0$	$8^{\circ} 46'.6$	4.9	-14.2	+27.75	+2.0	-0.7
2	30.XI	0222	$36^{\circ} 28'.9$	$8^{\circ} 54'.4$	14.9	-25.9	+27.3	-2.0	+0.7
3	30.XI	1359	$36^{\circ} 27'.6$	$9^{\circ} 00'.0$	26.55	-34.3	+25.05	-1.9	+0.7
4	1.XII	0049	$36^{\circ} 25'.7$	$9^{\circ} 02'.4$	37.35	-38'.8	+21.7	+1.9	-0.7

Fitted lines: $x = -0.751t - 3.6$

$y = -0.188t + 1.2$

Mean velocity = $21.5(\pm 3.1)cm/sec, 256(\pm 2)^{\circ}T$

FLOAT DESIGNATION: 9, also 5 Date and time laid: 1127/29.XI.58



SERIAL No: 39

FLOAT DESIGNATION: 10, renumbered 6 Date and time laid: 2144/30.XI.58

Position laid: 36° 31'.9N
8° 50'.3W

Displacement origin: 36° 14'.0N
8° 37'.0W

Navigation based on: Radar on anchored buoys, + celestial fixes

Estimated accuracy of positions: ± 0.5km ± 2km

Depth(m): Nominal Observed S.D. S.D.(mean)
 1150 1290 ±80 ±50

Fix No.	Date	Time GMT	Fix Position		Hours Since Laid (t)	Displacement(km)	
			Lat.N.	Long.W.		+E-W x	+N-S y
1	1.XII	0254	36°31'.2	8°53'.0	5.15	-23.8	-31.7

Mean velocity from laid position to Fix 1 = 22.0cm/sec, 252°T

