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A COMPILATION OF MOORED CURRENT METER OBSERVATIONS

Volume II

by

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TECHNICAL REPORT

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Approved for Distribution

Paul M. Fye, Director

ABSTRACT

Summaries of current measurements made with Richardson current meters at a group of moored stations near Bermuda, and at a single station south of Bermuda are presented. Averaged quantities are presented in the form of computer-plotted curves.

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PREFACE

This volume is a continuation in a series of data reports intended as a means for presenting summaries of measurements collected from moored ocean stations.

As with the observations described in Volume I, the data here clearly show limitations in the method. Many of the shortcomings of the data presented here have now been overcome. Some others are still troubling us.

It is hoped that a distribution of these results will provide a stimulus to the formulation of new oceanographic experiments.

As before, suggestions and advice are welcome.

INTRODUCTION

This volume completes the presentation of current meter measurements collected in the Bermuda area during 1963-64 which was begun in Volume I of this series. (Webster and Fofonoff, 63). The chart on page xi shows the location of the stations.

In addition, some measurements collected at a station in the Sargasso Sea about 200 miles south of Bermuda are presented. These data have been the object of some study, the results of which have been given by Day and Webster (1965).

At the time these experiments were carried out, it was thought that year-round field operations with moored buoy stations might be established in the Bermuda area. It was found that there were logistic problems involved in trying to carry out preliminary experiments a long way from Woods Hole. Early in 1965, a program of experimental moorings was begun much closer to Woods Hole. These have proven more successful, and it is hoped that summaries of the data collected can be included in future volumes of this series.

The Bermuda-area experiments carried out in May, 1964, were intended to study several problems: to compare the effects of the float on the current measurements; to estimate the coherence in the velocity field over spacings of one and five kilometers; to compare the results of different types of current meters by pairing instruments; to study the properties of mooring motions by optically tracking surface floats. Although many of these experiments were not completed as planned, the overall technique of collecting measurements from moored instruments was improved by this work.

Much was learned even from those experiments which failed. The easiest explanation for the failures is that the mechanical system was not well enough designed. A study of the record would

seem to re-inforce this explanation: one-quarter of the instruments were lost through mooring failures; a large percentage of the instruments which were recovered did not operate as intended. However, the explanation of the experimental failures in terms of mechanical design is perhaps superficial. A more meaningful explanation may be that too many new things were tried simultaneously. Besides continued changes in the design of instruments and moorings, the operations were carried out too far from the base of operations at Woods Hole, and flexibility in operations inevitably was reduced. On the basis of the results from the Bermuda-area experiments, later work using moored instruments has been carried out closer to home, on a fairly small scale, and with a concentration on only a few problems at a time.

In retrospect, the aims of the 1964 Bermuda experiments were worthy, and some of those aims are still worth pursuing today.

References:

- Day, C. G., and F. Webster (1965) Some current measurements in the Sargasso Sea, Deep-Sea Research, 12, pp. 805-814.
- Webster, F., and N. P. Fofonoff (1965) A compilation of moored current meter observations, Vol I., WHOI Technical Report, 65-44, 111 pp. (Unpublished manuscript).

Location of moored stations near Bermuda.

Station No. 141

<u>32° 12'.7 N</u>	Set:	<u>1208</u>	<u>6</u>	<u>XII</u>	<u>63</u>
latitude		hour	day	month	year

<u>64° 32'.8 W</u>	Retrieved:	<u>1830</u>	<u>10</u>	<u>XII</u>	<u>63</u>
longitude		hour	day	month	year

Set by: Garrett Ship: Panulirus

MOORING:

Surface toroid float with single-line mooring of plaited nylon. Nine current meters were shackled together in three groups of three, for comparison. The upper and lower instruments of each triad had a vane-follower damping viscosity of 15 centistokes; the middle instrument had 150 centistoke vane-follower damping viscosity.

PURPOSE OF STATION:

- (1) To test the effects of high viscosity vane-follower damping and low sampling rates on the quality of the current measurements, by matching current meter of differing characteristics.
- (2) To discover the feasibility of setting and retrieving moorings from the R/V Panulirus, of the Bermuda Biological Station for Research.
- (3) To study mooring motions by optically tracking the surface float.

COMMENTS ON RESULTS:

Mooring line parted. Float and upper three instruments drifted onto rocks near Bermuda, and were recovered in 100 m of water. Six current meters were lost. Line apparently parted at weak link above anchor; deeper instruments were lost when mooring drifted onto rocks in shallow water.

Optical tracking observations were too infrequent, and over too short a time span to be useful.

Film No. 1411

C.M.	Film	Duration
No. <u>H 531</u>	begins <u>1444 Z: 6: XII : 63</u>	of film <u>: 45 : 33</u>
	hour day month year	days hours min

C.M. Water Magnetic Sampling
depth 60 m. depth 2560 m. variation 14°W interval 1.02725
sec

COMMENTS ON RESULTS:

The upper three instruments on mooring 141 were shackled together, end-to-end, at a depth of about 60 meters. The middle instrument had a highly viscous vane-follower and a slower sampling rate than the other two. One purpose of the experiment was to compare the quality (particularly with respect to high frequency aliasing) of data collected by an instrument having a slow sampling rate combined with some mechanical damping.

Because of mechanical failures in the middle instrument, the experiment was somewhat inconclusive. However, some high-frequency "eyeball" readings of film 1412 (which are not shown here) indicated that the damped, slower-sampling instrument was capable of providing a record from which a reconstruction of the currents could be made which was comparable in quality to those obtained with the rapid sampling rate.

See description of Film 1412 for further comments.

*****	513	0
*****	519	3
*****	562	6
*****	584	8
*****	597	11
*****	669	14
*****	689	17
*****	735	20
*****	760	23
*****	867	25
*****	1005	28
*****	980	31
*****	1063	34
*****	1154	37
*****	1256	39
*****	1285	42
*****	1321	45
*****	1393	48
*****	1413	51
*****	1501	53
*****	1597	56
*****	1765	59
*****	1848	62
*****	2011	65
*****	2060	68
*****	2144	70
*****	2192	73
*****	2269	76
*****	2270	79
*****	2319	82
*****	2246	84
*****	2027	87
*****	1993	90
*****	1878	93
*****	1713	96
*****	1659	98
*****	1508	101
*****	1417	104
*****	1292	107
*****	1177	110
*****	1005	113
*****	959	115
*****	877	118
*****	836	121
*****	776	124
*****	734	127
*****	749	129
*****	682	132
*****	711	135
*****	764	138
*****	716	141
*****	741	143
*****	756	146
*****	771	149
*****	784	152
*****	754	155
*****	735	158
*****	747	160
*****	797	163
*****	738	166
*****	775	169
*****	735	172
*****	783	174
*****	785	177
*****	831	180
*****	809	183
*****	825	186
*****	851	188
*****	838	191
*****	867	194
*****	854	197
*****	878	200
*****	885	203
*****	920	205
*****	985	208
*****	920	211
*****	983	214
*****	947	217
*****	1058	219
*****	996	222
*****	982	225
*****	1006	228
*****	962	231
*****	947	233
*****	932	236
*****	886	239
*****	879	242
*****	934	245
*****	938	248
*****	1017	250
*****	1075	253
*****	1252	256
*****	1450	259
*****	1680	262
*****	1884	264
*****	2188	267
*****	2384	270
*****	2712	273
*****	2911	276
*****	3263	278
*****	3223	281
*****	3114	284
*****	3115	287
*****	3154	290
*****	2814	293
*****	2668	295
*****	2299	298
*****	2044	301
*****	1954	304
*****	1652	307
*****	1419	309
*****	1318	312
*****	1136	315
*****	986	318
*****	916	321
*****	886	323
*****	807	326
*****	722	329
*****	657	332
*****	627	335
*****	623	338
*****	580	340
*****	582	343
*****	498	346
*****	535	349
*****	519	352
*****	514	354
*****	548	357

	NO.	SPD
*	5	1
*	0	2
*	0	3
*	0	4
*	21	5
*	96	6
*****	510	7
*****	1692	8
*****	3511	9
*****	4999	10
*****	6808	11
*****	7864	12
*****	9417	13
*****	8948	14
*****	9299	15
*****	9033	16
*****	10097	17
*****	9200	18
*****	7963	19
*****	8406	20
*****	8863	21
*****	6643	22
*****	6855	23
*****	4360	24
*****	6648	25
*****	4143	26
*****	3909	27
*****	3569	28
*****	3385	29
*****	2980	30
*****	1256	31
*****	2313	32
*****	977	33
*****	1707	34
*****	678	35
*****	646	36
*****	555	37
*****	420	38
*****	361	39
*****	384	40
*****	283	41
*****	206	42
*****	156	43
*****	134	44
*****	60	45
*****	75	46
*****	50	47
*****	8	48
*****	31	49
*****	9	50
*****	16	51
*****	6	52
*****	0	53
*****	5	54
*****	0	55
*****	1	56
*****	0	57
*****	2	58
*****	0	59
*****	14	60
*****	6	61
*****	0	62
*****	0	63
*****	6	64
*****	1	65
*****	0	66
*****	0	67
*****	0	68
*****	0	69
*****	6	70
*****	0	71
*****	0	72
*****	0	73
*****	0	74
*****	0	75
*****	0	76
*****	0	77
*****	0	78
*****	0	79
*****	0	80
*****	0	81
*****	0	82
*****	0	83
*****	0	84
*****	0	85
*****	0	86
*****	0	87
*****	4	88
*****	0	89
*****	0	90
*****	0	91
*****	0	92
*****	0	93
*****	0	94
*****	0	95
*****	0	96
*****	0	97
*****	0	98
*****	0	99
*****	0	100
*****	0	101
*****	0	102
*****	0	103
*****	0	104
*****	0	105
*****	0	106
*****	0	107
*****	0	108
*****	0	109
*****	0	110
*****	0	111
*****	0	112
*****	0	113
*****	0	114
*****	0	115
*****	0	116
*****	0	117
*****	0	118
*****	0	119
*****	0	120
*****	0	121
*****	0	122
*****	0	123
*****	0	124
*****	0	125
*****	0	126
*****	0	127
*****	0	128
*****	0	129
*****	0	130
*****	0	131
*****	0	132
*****	0	133
*****	0	134
*****	0	135
*****	0	136
*****	0	137
*****	0	138
*****	0	139
*****	0	140
*****	0	141
*****	0	142
*****	0	143
*****	0	144
*****	0	145
*****	0	146
*****	0	147
*****	0	148
*****	0	149
*****	0	150

CURRENT METER FILM NO. 101411

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

X	*	
-78	144	600
-135	135	1800
-174	149	3000
-113	130	4200
-147	79	5400
-272	79	6600
-174	81	7800
-38	94	9000
56	103	10200
67	83	11400
67	85	12600
53	79	13800
37	86	15000
64	94	16200
85	95	17400
94	48	18600
94	31	19800
88	43	21000
103	21	22200
126	26	23400
119	13	24600
121	29	25800
148	55	27000
186	69	28200
207	73	29400
184	51	30600
179	-7	31800
102	26	33000
45	27	34200
55	58	35400
83	80	36600
99	53	37800
102	70	39000
125	76	40200
113	100	41400
101	70	42600
117	72	43800
144	59	45000
147	88	46200
184	-7	47400
218	-4	48600
247	-4	49800
257	27	51000
251	70	52200
271	71	53400
269	54	54600
294	33	55800
308	5	57000
282	-60	58200
258	-58	59400
209	-80	60600
190	-56	61800
207	-64	63000
189	-79	64200
166	-129	65400
134	-173	66600
98	-178	67800
61	-179	69000
45	-146	70200
-2	-156	71400
18	-123	72600
8	-147	73800
6	-166	75000
5	-169	76200
-50	-185	77400
-45	-122	78600
-58	-133	79800
-69	-150	81000
-62	-130	82200
-118	-102	83400
-119	-124	84600
-117	-128	85800
-146	-89	87000
-116	-80	88200
-138	-29	89400
-175	45	90600
-176	43	91800
-182	60	93000
-151	76	94200
-153	62	95400
-161	68	96600
-165	106	97800
-161	108	99000
-150	100	100200
-183	73	101400
-156	36	102600
-172	37	103800
-183	36	105000
-230	38	106200
-236	43	107400
-262	67	108600
-242	50	109800
-259	36	111000
-265	52	112200
-258	46	113400
-245	55	114600
-231	49	115800
-228	48	117000
-232	16	118200
-209	6	119400
-197	18	120600
-202	1	121800
-202	-18	123000
-195	46	124200
-170	42	125400
-166	43	126600
-163	46	127800
-148	56	129000
-119	103	130200
-111	81	131400
-97	66	132600
-59	13	133800
-15	23	135000
-28	16	136200
-9	58	137400
-7	38	138600
14	47	139800
16	40	141000
17	29	142200
33	-26	143400
28	-39	144600
26	-40	145800
18	-36	147000
3	-40	148200
-15	-34	149400
-17	-30	150600
-9	-30	151800
-5	-31	153000
-12	-23	154200
-33	-52	155400
-39	-64	156600
-68	-87	157800
-93	-89	159000

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM 101411

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 129600

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

Film No. 1412

C.M.	Film	Duration
No. <u>H 514</u>	begins <u>1620Z: 6: XII : 63</u>	of film <u>: 87 : 17</u>
	hour day month year	days hours min

C.M. depth	60 m.	Water depth	2560 m.	Magnetic variation	14°W	Sampling interval	see notes
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PURPOSE:

High vane-follower viscosity, low sampling rate.

COMMENTS ON RESULTS:

1412 was designed to sample at 5-second intervals. Due to a malfunction in the film-advance mechanism, the film could not be automatically machine-read. The data presented here are from "eyeball" readout, at twenty-minute intervals.

The malfunction in the film-advance mechanism makes the times uncertain. A comparison between the progressive vector diagrams for films 1411, 1412, and 1413 shows 1412 distorted with respect to the other two. It is probably misleading to interpret this distortion as related to the ocean current pattern. It is most likely due to an irregular time advance on the original film record. Certainly some features can be discerned on the 1412 progressive vector diagram which can be related to the adjacent measurements.

Film 1412 is longer than 1411 and 1413 because a slower sampling rate (and hence a slower film advance rate) was used.

See description of film 1411 for further comments.

*****	241	0
*****	225	3
*****	227	6
*****	220	8
*****	232	11
*****	243	14
*****	230	17
*****	238	20
*****	222	23
*****	253	25
*****	262	28
*****	229	31
*****	309	34
*****	303	37
*****	296	39
*****	324	42
*****	335	45
*****	351	48
*****	358	51
*****	340	53
*****	406	56
*****	437	59
*****	453	62
*****	514	65
*****	518	68
*****	517	70
*****	599	73
*****	618	76
*****	655	79
*****	657	82
*****	663	84
*****	701	87
*****	690	90
*****	712	93
*****	654	96
*****	682	98
*****	598	101
*****	635	104
*****	501	107
*****	464	110
*****	451	113
*****	430	115
*****	359	118
*****	368	121
*****	318	124
*****	329	127
*****	329	129
*****	307	132
*****	315	135
*****	259	138
*****	281	141
*****	291	143
*****	274	146
*****	268	149
*****	292	152
*****	332	155
*****	293	158
*****	308	160
*****	329	163
*****	325	166
*****	377	169
*****	384	172
*****	370	174
*****	444	177
*****	431	180
*****	501	183
*****	548	186
*****	531	188
*****	613	191
*****	691	194
*****	674	197
*****	710	200
*****	843	203
*****	835	205
*****	830	208
*****	800	211
*****	857	214
*****	814	217
*****	821	219
*****	807	222
*****	747	225
*****	698	228
*****	657	231
*****	629	233
*****	616	236
*****	555	239
*****	550	242
*****	513	245
*****	517	248
*****	557	250
*****	539	253
*****	559	256
*****	634	259
*****	611	262
*****	705	264
*****	716	267
*****	742	270
*****	776	273
*****	758	276
*****	784	278
*****	820	281
*****	777	284
*****	799	287
*****	848	290
*****	747	293
*****	721	295
*****	669	298
*****	685	301
*****	612	304
*****	563	307
*****	555	309
*****	456	312
*****	472	315
*****	446	318
*****	410	321
*****	373	323
*****	379	326
*****	353	329
*****	347	332
*****	350	335
*****	317	338
*****	318	340
*****	303	343
*****	267	346
*****	291	349
*****	247	352
*****	244	354
*****	227	357

	NO.	SPD
*	2	1
*	0	2
*	0	3
*	0	4
*	0	5
*	13	6
*	11	7
*	80	8
*	171	9
*****	968	10
*****	3045	11
*	0	12
*****	7086	13
*	0	14
*	0	15
*****	12610	16
*	0	17
*	0	18
*****	15864	19
*	0	20
*	0	21
*	0	22
*	0	23
*	0	24
*	0	25
*****	19322	26
*	0	27
*	0	28
*	0	29
*	0	30
*	0	31
*	0	32
*	0	33
*	0	34
*	0	35
*	0	36
*	0	37
*****	3678	38
*	0	39
*	0	40
*	0	41
*	0	42
*	0	43
*	0	44
*	0	45
*	0	46
*	0	47
*	0	48
*	0	49
*	0	50
*	0	51
*	0	52
*	0	53
*	0	54
*	0	55
*	0	56
*	0	57
*	0	58
*	0	59
*	0	60
*	0	61
*	0	62
*	0	63
*	0	64
*	0	65
*	0	66
*	0	67
*	0	68
*	0	69
*	0	70
*	0	71
*	0	72
*	0	73
*	0	74
*	0	75
*	0	76
*	0	77
*	0	78
*	0	79
*	0	80
*	0	81
*	0	82
*	0	83
*	0	84
*	0	85
*	0	86
*	0	87
*	0	88
*	0	89
*	0	90
*	0	91
*	0	92
*	0	93
*	0	94
*	0	95
*	0	96
*	0	97
*	0	98
*	0	99
*	0	100
*	0	101
*	0	102
*	0	103
*	0	104
*	0	105
*	0	106
*	0	107
*	0	108
*	0	109
*	0	110
*	0	111
*	0	112
*	0	113
*	0	114
*	0	115
*	0	116
*	0	117
*	0	118
*	0	119
*	0	120
*	0	121
*	0	122
*	0	123
*	0	124
*	0	125
*	0	126
*	0	127
*	0	128
*	0	129
*	0	130
*	0	131
*	0	132
*	0	133
*	0	134
*	0	135
*	0	136
*	0	137
*	0	138
*	0	139
*	0	140
*	0	141
*	0	142
*	0	143
*	0	144
*	0	145
*	0	146
*	0	147
*	0	148
*	0	149
*	0	150

VECTOR AVERAGED VALUES 240 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101412

FIRST INPUT CYCLE NO. 1

FINAL INPUT CYCLE NO. 02850

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Film No. 1413

C.M. Film Duration
No. H-534 begins 1452Z: 6: XII : 63 of film: : 46 :55
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 63 m. depth 2560 m. variation 14°W interval 1.0129
sec

COMMENTS ON RESULTS:

The measurements recorded on film 1413 compare well with those recorded on film 1411, at approximately the same depth and with the same sampling procedure. The progressive vector diagrams indicate a broad circular motion. The period of this motion is about thirty-seven hours.

Further comments on this experiment are given in the descriptions of films 1411 and 1413.

*****	721	0
*****	677	3
*****	786	6
*****	877	8
*****	884	11
*****	880	14
*****	955	17
*****	1138	20
*****	1150	23
*****	1137	25
*****	1275	28
*****	1438	31
*****	1482	34
*****	1412	37
*****	1489	39
*****	1801	42
*****	1682	45
*****	1760	48
*****	1756	51
*****	1859	53
*****	1837	56
*****	1689	59
*****	1768	62
*****	1921	65
*****	1941	68
*****	1801	70
*****	1974	73
*****	2121	76
*****	2084	79
*****	2099	82
*****	2028	84
*****	2262	87
*****	1968	90
*****	1785	93
*****	1810	96
*****	1684	98
*****	1431	101
*****	1235	104
*****	1168	107
*****	1190	110
*****	1033	113
*****	888	115
*****	913	118
*****	938	121
*****	884	124
*****	795	127
*****	807	129
*****	867	132
*****	795	135
*****	722	138
*****	781	141
*****	802	143
*****	805	146
*****	766	149
*****	810	152
*****	861	155
*****	783	158
*****	767	160
*****	813	163
*****	832	166
*****	788	169
*****	779	172
*****	833	174
*****	873	177
*****	892	180
*****	793	183
*****	851	186
*****	965	188
*****	947	191
*****	908	194
*****	970	197
*****	1024	200
*****	1049	203
*****	990	205
*****	1055	208
*****	1113	211
*****	1113	214
*****	1062	217
*****	1131	219
*****	1261	222
*****	1162	225
*****	1081	228
*****	1232	231
*****	1228	233
*****	1265	236
*****	1168	239
*****	1172	242
*****	1329	245
*****	1316	248
*****	1369	250
*****	1509	253
*****	1725	256
*****	1947	259
*****	2089	262
*****	2332	264
*****	2738	267
*****	2722	270
*****	2747	273
*****	2791	276
*****	2963	278
*****	2665	281
*****	2594	284
*****	2380	287
*****	2345	290
*****	2180	293
*****	1801	295
*****	1628	298
*****	1556	301
*****	1400	304
*****	1232	307
*****	1050	309
*****	1091	312
*****	904	315
*****	820	318
*****	781	321
*****	814	323
*****	653	326
*****	588	329
*****	608	332
*****	676	335
*****	618	338
*****	534	340
*****	620	343
*****	630	346
*****	606	349
*****	600	352
*****	655	354
*****	816	357

	NO.	SPD
*	8	1
*	0	2
*	0	3
*	0	4
*	17	5
***	247	6
*****	637	7
*****	1916	8
*****	3635	9
*****	5679	10
*****	6904	11
*****	8783	12
*****	8256	13
*****	10438	14
*****	8927	15
*****	10495	16
*****	9916	17
*****	10923	18
*****	9364	19
*****	7539	20
*****	7525	21
*****	7667	22
*****	7894	23
*****	7721	24
*****	5108	25
*****	4734	26
*****	4457	27
*****	3825	28
*****	1831	29
*****	3027	30
*****	1335	31
*****	2106	32
*****	870	33
*****	787	34
*****	641	35
*****	827	36
*****	397	37
*****	240	38
*	49	39
**	218	40
**	171	41
**	120	42
*	80	43
*	24	44
*	58	45
*	89	46
*	1	47
*	29	48
*	34	49
*	7	50
*	16	51
*	12	52
*	40	53
*	7	54
*	13	55
*	23	56
*	4	57
*	11	58
*	5	59
*	16	60
*	6	61
*	0	62
*	2	63
*	11	64
*	0	65
*	0	66
*	0	67
*	6	68
*	1	69
*	6	70
*	6	71
*	0	72
*	0	73
*	0	74
*	0	75
*	1	76
*	0	77
*	0	78
*	0	79
*	0	80
*	0	81
*	0	82
*	0	83
*	0	84
*	0	85
*	0	86
*	0	87
*	0	88
*	0	89
*	0	90
*	0	91
*	2	92
*	0	93
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*	0	96
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*	0	116
*	0	117
*	0	118
*	0	119
*	0	120
*	0	121
*	0	122
*	0	123
*	0	124
*	0	125
*	0	126
*	0	127
*	0	128
*	0	129
*	0	130
*	0	131
*	0	132
*	0	133
*	0	134
*	0	135
*	0	136
*	0	137
*	0	138
*	0	139
*	0	140
*	0	141
*	0	142
*	0	143
*	0	144
*	0	145
*	0	146
*	0	147
*	0	148
*	0	149
*	0	150

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

EAST	NORTH	SEQ NO
-45	124	600
-62	131	1800
-48	143	3000
-84	141	4200
-222	82	5400
-206	88	6600
-114	96	7800
21	119	9000
60	118	10200
58	97	11400
64	95	12600
43	91	13800
51	96	15000
74	110	16200
84	88	17400
86	64	18600
84	67	19800
85	52	21000
112	43	22200
116	30	23400
115	47	24600
125	40	25800
164	70	27000
187	73	28200
177	71	29400
184	48	30600
141	37	31800
68	61	33000
61	70	34200
71	105	35400
88	84	36600
88	85	37800
94	114	39000
97	120	40200
77	107	41400
102	99	42600
106	83	43800
137	90	45000
145	42	46200
170	-6	47400
208	-7	48600
237	12	49800
228	67	51000
253	52	52200
256	42	53400
261	36	54600
274	22	55800
272	-35	57000
243	-20	58200
203	-47	59400
177	-18	60600
196	-27	61800
185	-25	63000
163	-81	64200
152	-132	65400
123	-140	66600
91	-136	67800
70	-115	69000
35	-130	70200
57	-94	71400
40	-133	72600
44	-145	73800
46	-153	75000
9	-174	76200
-3	-121	77400
-15	-133	78600
-21	-150	79800
-12	-133	81000
-82	-112	82200
-76	-137	83400
-74	-136	84600
-112	-109	85800
-93	-88	87000
-122	-41	88200
-174	27	89400
-155	29	90600
-165	23	91800
-138	36	93000
-97	55	94200
-166	47	95400
-176	88	96600
-177	82	97800
-165	74	99000
-189	39	100200
-167	15	101400
-184	12	102600
-191	15	103800
-228	12	105000
-237	17	106200
-254	39	107400
-242	23	108600
-254	4	109800
-247	23	111000
-244	31	112200
-233	28	113400
-217	25	114600
-215	13	115800
-209	-3	117000
-192	-14	118200
-187	1	119400
-183	-28	120600
-186	-2	121800
-175	24	123000
-158	39	124200
-158	25	125400
-149	36	126600
-131	68	127800
-107	88	129000
-102	61	130200
-92	41	131400
-39	18	132600
-21	21	133800
-10	18	135000
-10	58	136200
-3	22	137400
5	49	138600
8	35	139800
38	12	141000
57	-22	142200
59	-28	143400
72	-10	144600
46	-29	145800
5	-19	147000
-13	-27	148200
17	-24	149400
14	-9	150600
2	-27	151800
-19	-37	153000
-35	-54	154200
-45	-90	155400
-70	-91	156600
-64	-106	157800
-63	-86	159000
-67	-91	160200
-112	-93	161400
-133	-99	162600
-100	-82	163800
-146	-59	165000

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101413

FIRST INPUT CYCLE NO. 1

FINAL INPUT CYCLE NO. 165644

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

Station No. 146

32° 13'.2 N
latitude

Set: 09470 16 II 64
hour day month year

64° 36'.2 W
longitude

Retrieved: 0930Q 18 II 64
hour day month year

Set by: Garrett

Ship: Crawford

MOORING:

Single-line plaited nylon, with surface toroid.
1500-lb anchor, with 12-thread manila and poly-vinyl alcohol
weak link.

PURPOSE OF STATION:

- (1) To obtain additional information about the character of currents near Bermuda.

- (2) To study the behaviour of mooring motions by optical tracking of surface float from Bermuda.

- (3) To compare the effects of mechanical filtering and sampling rate in current meters by pairing instruments with different characteristics.

COMMENTS ON RESULTS:

Mooring line parted at 800 m. Station was recovered
adrift, at 32° 20' N, 64° 07' W.

Line parted at 1550Q/16-II-64, too soon to permit optical tracking experiment to begin. Time of break estimated from evidence in current meter data. Two current meters below 800 m. depth were lost.

Film No. 1461

C.M. Film Duration
No. H 514 begins 0839Q: 16 : II : 64 of film: : 48 : 15
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 60 m. depth 2480 m. variation 15°W interval 4.9071
sec

PURPOSE:

1461, with 150 centistoke vane-follower viscosity and 5-second sampling rate (high viscosity, low sampling) was matched with 1462 (low viscosity, high sampling) for comparison.

COMMENTS ON RESULTS:

The mooring line parted about seven hours after the beginning of this record. Most of the data shown here was thus collected from a drifting mooring.

There is some gross similarity with film 1462, but there is a severe discrepancy between directions recorded at the two instruments. No satisfactory explanation has been presented for this discrepancy.

*****	351	0
*****	293	3
*****	309	6
*****	279	8
*****	303	11
*****	259	14
*****	243	17
*****	274	20
*****	278	23
*****	259	25
*****	269	28
*****	284	31
*****	301	34
*****	297	37
*****	309	39
*****	327	42
*****	336	45
*****	316	48
*****	309	51
*****	338	53
*****	291	56
*****	256	59
*****	248	62
*****	264	65
*****	257	68
*****	217	70
*****	235	73
*****	266	76
*****	259	79
*****	253	82
*****	263	84
*****	273	87
*****	258	90
*****	244	93
*****	214	96
*****	211	98
*****	177	101
*****	143	104
*****	152	107
*****	155	110
*****	137	113
*****	131	115
*****	105	118
*****	114	121
*****	99	124
*****	98	127
*****	91	129
*****	108	132
*****	79	135
*****	89	138
*****	83	141
*****	83	143
*****	78	146
*****	74	149
*****	71	152
*****	79	155
*****	91	158
*****	92	160
*****	87	163
*****	87	166
*****	91	169
*****	115	172
*****	99	174
*****	124	177
*****	117	180
*****	154	183
*****	116	186
*****	146	188
*****	157	191
*****	195	194
*****	195	197
*****	207	200
*****	230	203
*****	255	205
*****	276	208
*****	309	211
*****	321	214
*****	328	217
*****	329	219
*****	348	222
*****	378	225
*****	413	228
*****	433	231
*****	404	233
*****	443	236
*****	394	239
*****	409	242
*****	388	245
*****	349	248
*****	387	250
*****	366	253
*****	363	256
*****	407	259
*****	435	262
*****	362	264
*****	391	267
*****	403	270
*****	399	273
*****	380	276
*****	394	278
*****	360	281
*****	338	284
*****	398	287
*****	402	290
*****	375	293
*****	360	295
*****	342	298
*****	324	301
*****	356	304
*****	320	307
*****	354	309
*****	372	312
*****	393	315
*****	407	318
*****	433	321
*****	399	323
*****	412	326
*****	479	329
*****	441	332
*****	457	335
*****	494	338
*****	440	340
*****	465	343
*****	396	346
*****	376	349
*****	363	352
*****	362	354
*****	319	357

1783

DISTRIBUTION OF SPEEDS, 1 CM/SEC INTERVALS, FILM No. 101461

NO.	SPD
1	1
0	2
0	3
0	4
0	5
0	6
0	7
0	8
0	9
7	10
34	11
64	12
183	13
375	14
554	15
1018	16
1483	17
1609	18
2069	19
1984	20
2995	21
2544	22
3131	23
2866	24
2894	25
2658	26
1844	27
1652	28
1499	29
903	30
992	31
620	32
432	33
222	34
283	35
121	36
86	37
69	38
33	39
11	40
18	41
4	42
6	43
3	44
5	45
9	46
4	47
0	48
1	49
3	50
8	51
4	52
9	53
4	54
2	55
9	56
4	57
4	58
0	59
0	60
9	61
6	62
6	63
0	64
0	65
6	66
9	67
0	68
3	69
8	70
0	71
10	72
0	73
10	74
0	75
14	76
4	77
0	78
6	79
0	80
0	81
12	82
0	83
4	84
0	85
0	86
2	87
0	88
6	89
0	90
1	91
0	92
0	93
2	94
0	95
0	96
2	97
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0	113
0	114
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0	116
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0	127
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0	129
0	130
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0	133
0	134
0	135
0	136
0	137
0	138
0	139
0	140
0	141
0	142
0	143
0	144
0	145
0	146
0	147
0	148
0	149
0	150

1783904

GRAPHIC BY NBS 1123

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Film No. 1462

C.M.	Film	Duration
No. <u>H 522</u>	begins <u>0839Q : 16: II : 64</u>	of film: <u> : 45 : 2</u>
	hour day month year	days hours min

C.M.	Water	Magnetic	Sampling
depth <u>60 m.</u>	depth <u>2480 m.</u>	variation <u>15°W</u>	interval <u>1.00623</u>
			sec

PURPOSE:

1462, having 15-centistoke vane-follower viscosity, and 1-second sampling rate (low viscosity, high sampling) was paired, for comparison, with 1461 (high viscosity, low sampling), having 150-centistoke vane-follower viscosity and 5-second sampling rate.

COMMENTS ON RESULTS:

Although there is severe disagreement between the directions recorded on film 1461 and those on 1462, the record at 1461 did not show signs of serious high-frequency aliasing.

As a result of this experiment and others (e.g., station 141), a 5-sec. sampling interval, with a vane-follower damping somewhat higher than had been used, was established as a standard for later work.

*****	1257	0
*****	1354	3
*****	1423	6
*****	1392	8
*****	1351	11
*****	1386	14
*****	1290	17
*****	1296	20
*****	1342	23
*****	1313	25
*****	1361	28
*****	1279	31
*****	1255	34
*****	1251	37
*****	1218	39
*****	1328	42
*****	1222	45
*****	1273	48
*****	1262	51
*****	1255	53
*****	1298	56
*****	1238	59
*****	1160	62
*****	1177	65
*****	1083	68
*****	1114	70
*****	1051	73
*****	940	76
*****	902	79
*****	1000	82
*****	832	84
*****	912	87
*****	802	90
*****	800	93
*****	828	96
*****	800	98
*****	848	101
*****	859	104
*****	794	107
*****	812	110
*****	889	113
*****	816	115
*****	837	118
*****	807	121
*****	963	124
*****	901	127
*****	812	129
*****	837	132
*****	899	135
*****	874	138
*****	845	141
*****	904	143
*****	941	146
*****	931	149
*****	977	152
*****	919	155
*****	1024	158
*****	956	160
*****	1050	163
*****	991	166
*****	1047	169
*****	1096	172
*****	1185	174
*****	1155	177
*****	1190	180
*****	1264	183
*****	1303	186
*****	1328	188
*****	1285	191
*****	1438	194
*****	1392	197
*****	1417	200
*****	1469	203
*****	1458	205
*****	1567	208
*****	1479	211
*****	1457	214
*****	1520	217
*****	1470	219
*****	1504	222
*****	1523	225
*****	1581	228
*****	1610	231
*****	1563	233
*****	1503	236
*****	1559	239
*****	1523	242
*****	1490	245
*****	1365	248
*****	1526	250
*****	1474	253
*****	1387	256
*****	1503	259
*****	1469	262
*****	1583	264
*****	1568	267
*****	1613	270
*****	1621	273
*****	1718	276
*****	1641	278
*****	1697	281
*****	1722	284
*****	1720	287
*****	1694	290
*****	1749	293
*****	1715	295
*****	1786	298
*****	1718	301
*****	1703	304
*****	1645	307
*****	1571	309
*****	1481	312
*****	1493	315
*****	1441	318
*****	1397	321
*****	1285	323
*****	1285	326
*****	1265	329
*****	1194	332
*****	1106	335
*****	1062	338
*****	1134	340
*****	1120	343
*****	1105	346
*****	1100	349
*****	1132	352
*****	1130	354
*****	1265	357

*	1	1
*	0	2
*	0	3
*	3	4
*	77	5
*	24	6
*	0	7
*	70	8
*	98	9
*	88	10
*	96	11
***	244	12
*****	527	13
*****	660	14
*****	916	15
*****	1590	16
*****	1700	17
*****	2429	18
*****	3412	19
*****	2832	20
*****	4006	21
*****	3485	22
*****	4327	23
*****	4560	24
*****	3383	25
*****	5670	26
*****	4091	27
*****	4390	28
*****	4632	29
*****	2949	30
*****	4922	31
*****	5523	32
*****	3702	33
*****	4248	34
*****	7152	35
*****	5796	36
*****	5727	37
*****	6269	38
*****	6691	39
*****	6177	40
*****	7136	41
*****	5402	42
*****	5763	43
*****	3468	44
*****	4212	45
*****	4132	46
*****	3336	47
*****	1812	48
*****	2704	49
*****	1064	50
*****	2036	51
*****	1804	52
*****	456	53
*****	1361	54
*****	243	55
*****	1029	56
*****	122	57
*****	863	58
*****	58	59
*****	44	60
*****	609	61
*****	12	62
*****	492	63
*****	12	64
*****	23	65
*****	405	66
*****	16	67
*****	7	68
*****	181	69
*****	17	70
*****	6	71
*****	83	72
*****	10	73
*****	15	74
*****	4	75
*****	33	76
*****	5	77
*****	5	78
*****	16	79
*****	4	80
*****	0	81
*****	0	82
*****	5	83
*****	21	84
*****	9	85
*****	0	86
*****	0	87
*****	0	88
*****	8	89
*****	0	90
*****	0	91
*****	0	92
*****	0	93
*****	7	94
*****	0	95
*****	0	96
*****	0	97
*****	0	98
*****	0	99
*****	0	100
*****	4	101
*****	0	102
*****	0	103
*****	0	104
*****	0	105
*****	0	106
*****	0	107
*****	3	108
*****	0	109
*****	0	110
*****	0	111
*****	0	112
*****	0	113
*****	0	114
*****	0	115
*****	4	116
*****	0	117
*****	0	118
*****	0	119
*****	0	120
*****	0	121
*****	0	122
*****	0	123
*****	0	124
*****	0	125
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*****	0	127
*****	0	128
*****	0	129
*****	0	130
*****	0	131
*****	0	132
*****	0	133
*****	0	134
*****	0	135
*****	0	136
*****	1	137
*****	0	138
*****	0	139
*****	0	140
*****	0	141
*****	0	142
*****	0	143
*****	0	144
*****	0	145
*****	0	146
*****	0	147
*****	0	148
*****	0	149
*****	0	150

CURRENT METER FILM NO. 101462

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

EAST	NORTH	SEQ NO
-6	-191	600
57	-27	1800
5	137	3000
27	210	4200
13	325	5400
-28	211	6600
-19	202	7800
-18	198	9000
-6	218	10200
20	231	11400
42	246	12600
59	255	13800
87	246	15000
108	272	16200
117	242	17400
110	234	18600
127	212	19800
129	220	21000
110	206	22200
177	197	23400
296	185	24600
185	-24	25800
134	-192	27000
115	-175	28200
91	-184	29400
109	-197	30600
104	-159	31800
105	-177	33000
97	-184	34200
66	-178	35400
50	-189	36600
43	-168	37800
72	-166	39000
61	-175	40200
65	-119	41400
41	-148	42600
10	-117	43800
20	-68	45000
52	-161	46200
31	-105	47400
17	-157	48600
51	-167	49800
22	-136	51000
15	-152	52200
-113	-106	53400
-110	-88	54600
-32	-124	55800
-8	-77	57000
-46	-149	58200
8	-139	59400
-27	-184	60600
12	-182	61800
-12	-189	63000
21	-187	64200
-2	-222	65400
-9	-229	66600
14	-210	67800
-53	-204	69000
-32	-208	70200
-38	-210	71400
-42	-172	72600
-34	-182	73800
-49	-143	75000
-56	-182	76200
-62	-163	77400
-47	-167	78600
-63	-161	79800
-72	-146	81000
-98	-119	82200
-85	-110	83400
-84	-83	84600
-118	-56	85800
-124	-59	87000
-92	-151	88200
-122	-98	89400
-115	-91	90600
-147	-42	91800
-126	-34	93000
-169	-39	94200
-188	-28	95400
-202	53	96600
-191	10	97800
-185	67	99000
-173	15	100200
-161	46	101400
-177	35	102600
-172	-38	103800
-155	-50	105000
-184	-20	106200
-174	46	107400
-176	110	108600
-193	134	109800
-210	145	111000
-210	101	112200
-217	89	113400
-238	76	114600
-223	117	115800
-201	134	117000
-193	129	118200
-212	109	119400
-208	127	120600
-177	150	121800
-197	124	123000
-193	117	124200
-186	112	125400
-169	135	126600
-183	122	127800
-199	129	129000
-173	123	130200
-150	91	131400
-141	102	132600
-129	54	133800
-161	76	135000
-110	85	136200
-98	60	137400
-85	120	138600
-96	73	139800
-48	83	141000
-89	84	142200
-104	50	143400
-29	54	144600
-6	8	145800
68	-19	147000
44	23	148200
-1	43	149400
-5	28	150600
56	-6	151800
35	25	153000
15	-40	154200
67	-111	155400
70	-62	156600
10	-61	157800
-11	-50	159000
-1	-140	160200

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101462

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. =160990

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

Film No. 1463

C.M. Film Duration
No. H 518 begins 1006Q : 16 : II : 64 of film : 42 : 25
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 560 m. depth 2480 m. variation 14°W interval 1.00593
sec

PURPOSE:

To collect measurements at mid-depth to compare with those collected near the surface.

COMMENTS ON RESULTS:

The mooring line parted about five hours after the beginning of film 1463. The data are thus mostly collected from a drifting mooring. The speeds are higher than would be expected at 560 m. depth, probably because the mooring was being dragged along by faster currents near the surface.

Because of the mooring break, comparison of the 1463 data with near-surface measurements is not meaningful.

*****	690	0
*****	545	3
*****	503	6
*****	404	8
*****	310	11
*****	268	14
*****	253	17
*****	261	20
*****	204	23
*****	195	25
*****	229	28
*****	197	31
*****	197	34
*****	162	37
*****	177	39
*****	161	42
*****	143	45
*****	168	48
*****	136	51
*****	140	53
*****	111	56
*****	129	59
*****	140	62
*****	147	65
*****	133	68
*****	99	70
*****	106	73
*****	120	76
*****	106	79
*****	90	82
*****	99	84
*****	99	87
*****	89	90
*****	88	93
*****	87	96
*****	95	98
*****	83	101
*****	72	104
*****	73	107
*****	96	110
*****	86	113
*****	94	115
*****	78	118
*****	116	121
*****	96	124
*****	110	127
*****	94	129
*****	141	132
*****	127	135
*****	104	138
*****	136	141
*****	145	143
*****	148	146
*****	173	149
*****	144	152
*****	190	155
*****	209	158
*****	238	160
*****	285	163
*****	338	166
*****	354	169
*****	424	172
*****	460	174
*****	516	177
*****	506	180
*****	556	183
*****	521	186
*****	544	188
*****	504	191
*****	523	194
*****	476	197
*****	489	200
*****	457	203
*****	527	205
*****	629	208
*****	730	211
*****	800	214
*****	946	217
*****	1144	219
*****	1278	222
*****	1352	225
*****	1536	228
*****	1739	231
*****	2039	233
*****	2153	236
*****	2237	239
*****	2455	242
*****	3035	245
*****	3167	248
*****	3430	250
*****	3639	253
*****	4221	256
*****	4227	259
*****	3989	262
*****	3385	264
*****	3375	267
*****	2857	270
*****	2726	273
*****	2577	276
*****	2519	278
*****	2453	281
*****	2558	284
*****	2791	287
*****	2770	290
*****	2716	293
*****	2684	295
*****	2694	298
*****	2831	301
*****	2640	304
*****	2771	307
*****	2972	309
*****	3185	312
*****	3046	315
*****	3163	318
*****	3500	321
*****	3468	323
*****	3247	326
*****	2956	329
*****	2902	332
*****	2843	335
*****	2617	338
*****	2355	340
*****	2175	343
*****	2026	346
*****	1666	349
*****	1357	352
*****	1026	354
*****	915	357

*	1	1
*	0	2
***	169	3
*****	773	4
*****	1622	5
*****	2241	6
*****	2135	7
*****	2452	8
*****	3087	9
*****	3424	10
*****	4693	11
*****	5206	12
*****	5095	13
*****	6092	14
*****	5528	15
*****	5190	16
*****	5883	17
*****	5298	18
*****	4501	19
*****	4845	20
*****	5392	21
*****	4110	22
*****	4489	23
*****	5107	24
*****	3261	25
*****	3581	26
*****	5660	27
*****	3797	28
*****	1980	29
*****	4137	30
*****	4157	31
*****	2086	32
*****	4292	33
*****	2318	34
*****	2576	35
*****	4650	36
*****	2769	37
*****	2709	38
*****	2561	39
*****	2326	40
*****	2021	41
*****	1805	42
*****	210	43
*****	1389	44
*****	1281	45
*****	1169	46
*	0	47
*****	1160	48
*****	1018	49
*	0	50
*****	737	51
*	0	52
*****	467	53
*****	229	54
*	0	55
*	99	56
*	0	57
*	0	58
*	43	59
*	0	60
*	15	61
*	5	62
*	7	63
*	6	64
*	0	65
*	4	66
*	0	67
*	0	68
*	3	69
*	0	70
*	0	71
*	1	72
*	0	73
*	0	74
*	0	75
*	0	76
*	0	77
*	0	78
*	0	79
*	0	80
*	0	81
*	0	82
*	0	83
*	0	84
*	4	85
*	0	86
*	0	87
*	0	88
*	0	89
*	0	90
*	0	91
*	0	92
*	0	93
*	0	94
*	0	95
*	0	96
*	0	97
*	0	98
*	0	99
*	0	100
*	0	101
*	0	102
*	0	103
*	0	104
*	0	105
*	0	106
*	0	107
*	0	108
*	0	109
*	0	110
*	0	111
*	0	112
*	0	113
*	0	114
*	0	115
*	0	116
*	0	117
*	0	118
*	0	119
*	0	120
*	0	121
*	0	122
*	0	123
*	0	124
*	0	125
*	0	126
*	0	127
*	0	128
*	0	129
*	0	130
*	0	131
*	0	132
*	0	133
*	0	134
*	0	135
*	0	136
*	0	137
*	0	138
*	0	139
*	0	140
*	0	141
*	0	142
*	0	143
*	0	144
*	0	145
*	0	146
*	0	147
*	0	148
*	0	149
*	0	150

VECTON AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST	NORTH	SEQ NO
X	*	
-82	-53	600
-12	-91	1800
15	-96	3000
-9	-95	4200
-13	-42	5400
7	-11	6600
-10	-16	7800
-39	-10	9000
-40	-26	10200
-74	-7	11400
-89	14	12600
-81	58	13800
-59	98	15000
-61	115	16200
-27	121	17400
-19	68	18600
-39	59	19800
-153	-22	21000
-318	-69	22200
-367	-74	23400
-366	-89	24600
-375	-86	25800
-370	-80	27000
-361	-94	28200
-339	-126	29400
-317	-144	30600
-307	-165	31800
-291	-175	33000
-297	-169	34200
-310	-146	35400
-328	-134	36600
-320	-126	37800
-317	-121	39000
-332	-87	40200
-327	-65	41400
-302	-14	42600
-264	6	43800
-238	-28	45000
-259	-55	46200
-242	-60	47400
-230	-30	48600
-249	12	49800
-231	34	51000
-241	7	52200
-225	62	53400
-235	89	54600
-211	100	55800
-204	97	57000
-217	90	58200
-224	89	59400
-219	107	60600
-231	106	61800
-229	120	63000
-216	154	64200
-194	155	65400
-194	143	66600
-198	187	67800
-258	206	69000
-274	205	70200
-282	206	71400
-211	215	72600
-161	203	73800
-205	203	75000
-245	208	76200
-260	180	77400
-216	203	78600
-195	193	79800
-166	222	81000
-159	237	82200
-159	209	83400
-167	208	84600
-151	196	85800
-118	206	87000
-141	202	88200
-111	218	89400
-78	200	90600
-61	173	91800
-78	194	93000
-62	190	94200
-36	171	95400
-11	165	96600
-27	169	97800
-40	149	99000
-20	97	100200
6	32	101400
-5	-28	102600
-26	-60	103800
-29	-122	105000
-57	-133	106200
-117	-110	107400
-110	-109	108600
-98	-134	109800
-131	-114	111000
-166	-102	112200
-162	-118	113400
-162	-104	114600
-180	-85	115800
-184	-76	117000
-154	-77	118200
-147	-85	119400
-179	-67	120600
-178	-74	121800
-213	-58	123000
-230	-40	124200
-190	-21	125400
-167	-27	126600
-139	-34	127800
-138	-10	129000
-138	-7	130200
-169	40	131400
-190	31	132600
-174	37	133800
-169	42	135000
-173	41	136200
-184	78	137400
-163	136	138600
-141	143	139800
-145	133	141000
-125	140	142200
-93	179	143400
-81	176	144600
-104	155	145800
-84	166	147000
-47	162	148200
-61	165	149400
-58	152	150600

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101463

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 151/26

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Station No. 147

<u>32° 11' N</u>	Set:	<u>1410Q</u>	<u>25</u>	<u>II</u>	<u>64</u>
latitude		hour	day	month	year

<u>64° 38' W</u>	Retrieved:	<u>0630Q</u>	<u>27</u>	<u>II</u>	<u>64</u>
longitude		hour	day	month	year

Set by: Walden Ship: Crawford

MOORING:

Four-foot diameter subsurface steel sphere used for buoyancy. Polyethelene-coated steel target tow cable (.26 in. outside diameter) used for single line. Small auxiliary floats and beacon transmitter were intended to be on surface. Mooring set in deeper water than planned, and these surface floats were towed under. A single current meter was used shackled directly below the subsurface float. A pressure recorder was shackled below the current meter.

PURPOSE OF STATION:

(1) To try setting and retrieving a mooring with major buoyant element below the surface.

(2) To examine the mooring-noise level on current measurements from a mooring with no float at the surface.

COMMENTS ON RESULTS:

Mooring was set and retrieved successfully. It was found that exact knowledge of bottom depths is necessary to avoid setting subsurface floats too deep.

After setting, directional noise level in current meter was less than one-tenth the noise level in comparable instruments with surface float.

About 14 hours after setting, the mooring returned to the surface on a timed release mechanism.

Film No. 1471

C.M. Film Duration
No. H 532 begins 1857Z : 27 : II : 64 of film : 42 : 38
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 220 m. depth 2268 m. variation 14°W interval 1.0
sec

PURPOSE:

To collect current measurements with an instrument suspended on a mooring with a subsurface buoy.

COMMENTS ON RESULTS:

Current meter records from instruments moored below surface floats generally indicate a rotary oscillation of the system induced by the action of surface waves on the mooring. Such oscillations characteristically have a period of from five to twenty seconds, and an amplitude of from 20 to 60 degrees side-to-side. Film 1471 did not show such an oscillation or, if it was present, its amplitude was less than 3°, the smallest change in direction recorded by the instrument. The lack of case oscillation indicated by film 1471 is the basis for the statement that the surface wave noise level is reduced by at least a factor of ten through the use of a subsurface float in place of a surface float.

After about fourteen hours, the mooring was released and the float came to the surface. From this point on, the record was very noisy.

The time of release can be clearly seen on the progressive vector diagram.

*****	681	0
*****	746	3
*****	728	6
*****	907	8
*****	1748	11
*****	2767	14
*****	3657	17
*****	3996	20
*****	1930	23
*****	1658	25
*****	1784	28
*****	1709	31
*****	1502	34
*****	1539	37
*****	1759	39
*****	1639	42
*****	1354	45
*****	1404	48
*****	1705	51
*****	1818	53
*****	1831	56
*****	1973	59
*****	3198	62
*****	4266	65
*****	4514	68
*****	4320	70
*****	5585	73
*****	7235	76
*****	6314	79
*****	4538	82
*****	3246	84
*****	2810	87
*****	2387	90
*****	1863	93
*****	1678	96
*****	1430	98
*****	1220	101
*****	1082	104
*****	1049	107
*****	946	110
*****	848	113
*****	851	115
*****	843	118
*****	810	121
*****	800	124
*****	809	127
*****	806	129
*****	831	132
*****	733	135
*****	670	138
*****	636	141
*****	652	143
*****	581	146
*****	525	149
*****	551	152
*****	518	155
*****	528	158
*****	464	160
*****	496	163
*****	506	166
*****	441	169
*****	504	172
*****	501	174
*****	506	177
*****	495	180
*****	434	183
*****	464	186
*****	494	188
*****	463	191
*****	440	194
*****	451	197
*****	478	200
*****	404	203
*****	450	205
*****	487	208
*****	515	211
*****	499	214
*****	479	217
*****	515	219
*****	512	222
*****	518	225
*****	532	228
*****	477	231
*****	551	233
*****	572	236
*****	545	239
*****	554	242
*****	551	245
*****	563	248
*****	525	250
*****	528	253
*****	681	256
*****	590	259
*****	591	262
*****	658	264
*****	724	267
*****	666	270
*****	726	273
*****	727	276
*****	830	278
*****	736	281
*****	683	284
*****	664	287
*****	689	290
*****	742	293
*****	597	295
*****	569	298
*****	618	301
*****	556	304
*****	573	307
*****	609	309
*****	690	312
*****	656	315
*****	570	318
*****	588	321
*****	651	323
*****	666	326
*****	832	329
*****	962	332
*****	1071	335
*****	1292	338
*****	1117	340
*****	1135	343
*****	1059	346
*****	999	349
*****	909	352
*****	853	354
*****	813	357

*****	788	1
*****	5810	2
*****	4775	3
*****	4686	4
*****	2244	5
*****	3843	6
*****	3080	7
*****	4374	8
*****	4773	9
*****	1772	10
*****	2072	11
*****	2395	12
*****	2533	13
*****	2415	14
*****	2337	15
*****	2448	16
*****	2125	17
*****	1043	18
*****	2658	19
*****	3174	20
*****	4922	21
*****	3508	22
*****	4024	23
*****	3154	24
*****	3231	25
*****	1241	26
*****	915	27
*****	614	28
*****	475	29
*****	240	30
*****	535	31
*****	559	32
*****	769	33
*****	1082	34
*****	1210	35
*****	1637	36
*****	2411	37
*****	2809	38
*****	2656	39
*****	3109	40
*****	3528	41
*****	4015	42
*****	3963	43
*****	3545	44
*****	3391	45
*****	3700	46
*****	3357	47
*****	2842	48
*****	3435	49
*****	2594	50
*****	2592	51
*****	2361	52
*****	1838	53
*****	1711	54
*****	1434	55
*****	1209	56
*****	1285	57
*****	876	58
*****	714	59
*****	625	60
*****	588	61
*****	453	62
*****	375	63
*****	211	64
*****	246	65
*****	208	66
*****	162	67
*****	97	68
*****	120	69
*****	66	70
*****	87	71
*****	84	72
*****	65	73
*****	52	74
*****	46	75
*****	49	76
*****	20	77
*****	15	78
*****	29	79
*****	33	80
*****	49	81
*****	23	82
*****	36	83
*****	61	84
*****	82	85
*****	49	86
*****	52	87
*****	90	88
*****	81	89
*****	40	90
*****	120	91
*****	155	92
*****	151	93
*****	96	94
*****	101	95
*****	98	96
*****	128	97
*****	175	98
*****	79	99
*****	51	100
*****	145	101
*****	66	102
*****	108	103
*****	33	104
*****	40	105
*****	94	106
*****	23	107
*****	35	108
*****	34	109
*****	92	110
*****	12	111
*****	26	112
*****	29	113
*****	19	114
*****	6	115
*****	3	116
*****	27	117
*****	7	118
*****	11	119
*****	16	120
*****	22	121
*****	20	122
*****	18	123
*****	15	124
*****	19	125
*****	29	126
*****	3	127
*****	22	128
*****	19	129
*****	3	130
*****	12	131
*****	0	132
*****	6	133
*****	11	134
*****	12	135
*****	18	136
*****	0	137
*****	15	138
*****	17	139
*****	15	140
*****	0	141
*****	12	142
*****	6	143
*****	0	144
*****	23	145
*****	10	146
*****	15	147
*****	0	148
*****	7	149
*****	0	150

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

CURRENT METER FILM NO. 101471

AVERAGED VALUES, 1200TERMS PER VALUE

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES.

FILM101471

127 OUTPUT CYCLES.

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. =153414

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

VALUE EXCEEDS RANGE
VALUE EXCEEDS RANGE

EAST	NORTH	SEQ NO
360	84	600
246	32	1800
131	-65	3000
563	-72	4200
875	-294	5400
677	-552	6600
588	-464	7800
55	43	9000
78	81	10200
48	106	11400
41	117	12600
48	136	13800
48	152	15000
43	145	16200
35	136	17400
38	154	18600
52	185	19800
83	210	21000
123	197	22200
139	179	23400
153	161	24600
169	136	25800
160	119	27000
164	97	28200
173	76	29400
178	89	30600
179	96	31800
205	89	33000
235	87	34200
241	75	35400
241	70	36600
229	62	37800
225	53	39000
217	51	40200
198	44	41400
195	29	42600
203	42	43800
192	44	45000
133	27	46200
108	20	47400
86	14	48600
47	-3	49800
9	-7	51000
-10	0	52200
-18	5	53400
-14	14	54600
-6	13	55800
-6	18	57000
-4	14	58200
9	21	59400
17	28	60600
15	30	61800
-5	24	63000
-6	35	64200
15	27	65400
38	18	66600
53	13	67800
60	2	69000
72	19	70200
55	16	71400
63	21	72600
73	8	73800
79	29	75000
73	24	76200
67	16	77400
82	33	78600
77	29	79800
62	14	81000
80	14	82200
84	18	83400
143	0	84600
140	-14	85800
125	9	87000
184	-36	88200
197	-78	89400
202	-84	90600
190	-81	91800
188	-90	93000
179	-92	94200
162	-93	95400
140	-66	96600
139	-104	97800
134	-52	99000
156	-84	100200
142	-84	101400
109	-51	102600
107	-54	103800
106	-73	105000
66	-25	106200
46	-46	107400
75	-76	108600
45	-64	109800
28	-64	111000
45	-37	112200
49	-57	113400
-7	-32	114600
7	16	115800
28	-6	117000
19	-41	118200
-15	1	119400
-13	7	120600
-5	9	121800
-33	30	123000
-31	42	124200
-59	48	125400
-22	40	126600
-53	57	127800
-83	46	129000
-62	56	130200
-95	74	131400
-79	51	132600
-68	36	133800
-94	71	135000
-111	71	136200
-115	92	137400
-97	95	138600
-83	116	139800
-66	100	141000
-79	92	142200
-75	116	143400
-64	96	144600
-42	104	145800
-48	107	147000
-41	120	148200
-28	143	149400
-17	112	150600
-53	105	151800

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101471

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 123414

Station No. 159

<u>32° 14.8 N</u>	Set:	<u>1154Q</u>	<u>10</u>	<u>V</u>	<u>64</u>
latitude		hour	day	month	year

<u>64° 35'.1 W</u>	Retrieved:	<u>1302Q</u>	<u>16</u>	<u>V</u>	<u>64</u>
longitude		hour	day	month	year

Set by: <u>Fofonoff</u>	Ship: <u>Crawford</u>	Cruise: <u>107</u>
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MOORING:

Subsurface sphere, 110 m. below surface. Single-line mooring, of 2023 m., 1/8 in. polyethelene-jacketed steel cable.

PURPOSE OF STATION:

(1) To compare measurements from a mooring with sub-surface float with those from a nearby surface-float mooring. (Station 160).

(2) To compare rapid-sampled, underdamped current meters with slowly-sampled, highly damped current meters by pairing instruments.

COMMENTS ON RESULTS:

Station successfully recovered

Films loaded improperly in 1592, 1593, 1594, and did not run through cameras.

Film No. 1591

C.M. Film Duration
No. H 522 begins 09020: 10 : V : 64 of film : 27 : 59
days hours min

C.M. Water Magnetic Sampling
depth 260 m. depth 2140 m. variation 14°W interval 1
sec

PURPOSE:

1591 was intended for comparison with 1603, a similar record from a mooring with surface float, and with 1612, from a subsurface mooring separated by five kilometers.

COMMENTS ON RESULTS:

The film was damaged during development, producing several light-struck lengths on the film. The automatic film reader was spaced over at least one of these damaged areas. Since the film was without clock pulses, the time of occurrence and the duration of the breaks is uncertain.

The results of this film as a whole are therefore of poor quality. Shorter sections of the film, and particularly the entire second half of the film are of good quality. In the absence of clock pulses, the sampling interval has been assumed to be the nominal one of one second.

This is the only current meter data recovered from Station 159.

There is no apparent similarity with the measurements from 1603, although the period of comparison (less than 24 hours) may be too short to give a fair indication.

There was no overlap in the period of operation of 1591 and 1612.

Compass noise level about $\pm 10^\circ$.

Vane noise level about $\pm 25^\circ$. Vane readings (and consequently the resultant directions) are unreliable during the final half of the record because a light pipe in the current meter was too dim to be read.

Resultant directions noise level about $\pm 15^\circ$.

After this station was launched, the record from 1591 indicated that the system rotated on the mooring line. The initial rate of rotation was once every 45 seconds. This rate slackened off but rotation continued throughout the first 17 hours of the record. Note that if the current meter is operating properly, this rotation should be cancelled out in the compass and vane and should not show up in the resultant directions.

****	110	0
****	128	3
****	115	6
****	137	8
****	149	11
****	155	14
****	162	17
****	164	20
****	149	23
****	173	25
****	186	28
****	245	31
****	362	34
****	716	37
****	738	39
****	891	42
****	1545	45
****	1887	48
****	1829	51
****	2014	53
****	1934	56
****	1916	59
****	1749	62
****	1692	65
****	1812	68
****	1868	70
****	1435	73
****	1670	76
****	1638	79
****	1200	82
****	1019	84
****	911	87
****	1246	90
****	1546	93
****	1742	96
****	2046	98
****	2676	101
****	2790	104
****	2199	107
****	2103	110
****	1863	113
****	1388	115
****	1178	118
****	1240	121
****	1347	124
****	1454	127
****	1630	129
****	1811	132
****	2014	135
****	2132	138
****	1773	141
****	1516	143
****	1356	146
****	1399	149
****	1203	152
****	1257	155
****	1413	158
****	1765	160
****	1751	163
****	1652	166
****	1577	169
****	1744	172
****	1687	174
****	1420	177
****	1161	180
****	972	183
****	834	186
****	665	188
****	538	191
****	423	194
****	271	197
****	275	200
****	261	203
****	365	205
****	414	208
****	522	211
****	648	214
****	726	217
****	745	219
****	749	222
****	738	225
****	602	228
****	435	231
****	321	233
****	283	236
****	224	239
****	148	242
****	97	245
****	88	248
****	90	250
****	81	253
****	72	256
****	88	259
****	92	262
****	82	264
****	90	267
****	83	270
****	86	273
****	75	276
****	78	278
****	104	281
****	90	284
****	66	287
****	77	290
****	85	293
****	95	295
****	89	298
****	85	301
****	74	304
****	108	307
****	104	309
****	79	312
****	91	315
****	87	318
****	89	321
****	97	323
****	87	326
****	111	329
****	97	332
****	100	335
****	101	338
****	91	340
****	97	343
****	122	346
****	93	349
****	132	352
****	126	354
****	125	357

	NO.	SPD
***	463	1
*****	2877	2
*****	974	3
*****	3366	4
*****	6988	5
*****	8399	6
*****	9874	7
*****	10753	8
*****	18950	9
*****	13050	10
*****	9320	11
*****	4161	12
*****	3347	13
*****	2266	14
*****	2199	15
*****	1688	16
*****	1445	17
***	474	18
*	65	19
*	20	20
*	3	21
*	0	22
*	0	23
*	0	24
*	0	25
*	0	26
*	0	27
*	0	28
*	13	29
*	0	30
*	0	31
*	1	32
*	0	33
*	11	34
*	0	35
*	0	36
*	0	37
*	0	38
*	9	39
*	0	40
*	0	41
*	0	42
*	0	43
*	0	44
*	0	45
*	0	46
*	0	47
*	0	48
*	5	49
*	0	50
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*	7	55
*	7	56
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*	0	63
*	0	64
*	0	65
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*	0	67
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*	0	109
*	0	110
*	0	111
*	0	112
*	0	113
*	0	114
*	0	115
*	0	116
*	0	117
*	0	118
*	3	119
*	0	120
*	0	121
*	0	122
*	0	123
*	0	124
*	0	125
*	0	126
*	0	127
*	3	128
*	0	129
*	0	130
*	0	131
*	0	132
*	0	133
*	0	134
*	0	135
*	0	136
*	0	137
*	0	138
*	0	139
*	0	140
*	0	141
*	0	142
*	0	143
*	0	144
*	0	145
*	0	146
*	0	147
*	0	148
*	0	149
*	0	150

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST	NORTH	SEQ NO
x	*	
-38	-30	600
-26	-37	1800
-31	-34	3000
-24	-37	4200
-27	-32	5400
7	-31	6600
33	-50	7800
54	-69	9000
48	-57	10200
41	-43	11400
72	-75	12600
65	-58	13800
74	-51	15000
70	-73	16200
52	-82	17400
32	-90	18600
19	-75	19800
13	-71	21000
15	-63	22200
25	-80	23400
34	-117	24600
50	-105	25800
35	-68	27000
18	-58	28200
4	-86	29400
4	-74	30600
7	-64	31800
9	-59	33000
3	-52	34200
3	-46	35400
13	-45	36600
26	-44	37800
6	-38	39000
15	-31	40200
25	-23	41400
27	-12	42600
29	-8	43800
25	-16	45000
32	-15	46200
42	-11	47400
51	-7	48600
45	-17	49800
40	-34	51000
40	-29	52200
53	-27	53400
46	-11	54600
55	-7	55800
86	-13	57000
92	-16	58200
93	-23	59400
106	-22	60600
119	-32	61800
110	-27	63000
105	-24	64200
103	-16	65400
102	-18	66600
94	-19	67800
81	-11	69000
63	-8	70200
54	-14	71400
53	-12	72600
22	-7	73800
13	-5	75000
12	-2	76200
25	11	77400
33	18	78600
31	21	79800
44	33	81000
50	38	82200
48	46	83400
46	48	84600
37	44	85800
35	41	87000
48	38	88200
61	43	89400
66	46	90600
69	53	91800
86	45	93000
126	43	94200
136	48	95400
141	55	96600
159	40	97800
155	34	99000

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM 1591
FIRST INPUT CYCLE NO. = 1
FINAL INPUT CYCLE NO. = 100740

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Station No. 158

<u>32° 13'.1 N</u>	Set:	<u>1152Q</u>	<u>8</u>	<u>V</u>	<u>64</u>
latitude		hour	day	month	year

<u>64° 34'.1 W</u>	Retrieved:	<u>1340Q</u>	<u>15</u>	<u>V</u>	<u>64</u>
longitude		hour	day	month	year

Set by: Fofonoff Ship: Crawford Cruise: 107

MOORING:

Single-line mooring. Upper 1590 m. consisted of plastic-coated polypropylene. Lower 800 m. of plaited nylon.

No current meters were used on this mooring.

Water depth 2615 m.

PURPOSE OF STATION:

(1) To provide a navigational reference mark for setting subsurface moorings in the area.

(2) To study mooring motions by optical tracking from Bermuda.

(3) To study the effects of biological attack on the mooring cable.

COMMENTS ON RESULTS:

Station recovered complete.

Biological attack was noted on the mooring cable. This has been described by P. B. Stimson, 1965 "Synthetic-fiber deep-sea mooring cables: Their life expectancy and susceptibility to biological attack", Deep-Sea Research, Vol. 12, No. 1, 1-8.

Mooring motion studies, based in part on optical observations of this station are being prepared for publication by N. P. Fofonoff and J. F. Garrett.

Station No. 160

<u>32° 14'.6 N</u>	Set:	<u>1300</u>	<u>10</u>	<u>V</u>	<u>64</u>
latitude		hour	day	month	year

<u>64° 36'.3 W</u>	Retrieved:	<u>1415</u>	<u>16</u>	<u>V</u>	<u>64</u>
longitude		hour	day	month	year

Set by: Fofonoff Ship: Crawford Cruise: 107

MOORING:

Toroidal surface float, single-line mooring of 9/16" plaited nylon. 4 strobing Richardson current meters, one Braincon histogram current meter (paired with Richardson meter) and one tension-speed recorder (1601)

PURPOSE OF STATION:

(1) To compare measurements collected from a mooring with surface float with those collected nearby from sub-surface float mooring.

(2) To measure tension in mooring system.

(3) To compare histogram-type current meter with standard type

(4) To study mooring motions by optically tracking surface float.

COMMENTS ON RESULTS:

Mooring line parted on 15-V-64. Two Richardson meters and Braincon meter were lost.

Before the mooring line break, the position of the surface float was optically tracked from Bermuda. An analysis of the observations of the float movement has been made by Fofonoff and Garrett.

Film No. 1603

C.M. Film Duration
No. H 518 begins 1324 Q:10 : V : 64 of film: : 45 : 20
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 260 m. depth 2103 m. variation 14° W interval 1.01
sec

PURPOSE:

1603, from a surface-float mooring, was intended to be compared with 1591 and 1612, from subsurface float moorings.

COMMENTS ON RESULTS:

This is the only current meter record obtained from Station 160.

There is no apparent coherence between the record from 1603 or those from 1591 or 1612 during the intervals in which they were simultaneously recording. This period of common operations is only a few hours in both cases, and may be too short to give a fair test.

Other current meters on moorings 159, 160, and 161 were set with long duration, slow sampling rates. Had these records been obtained, a clearer answer might have been obtained to the question of the scale of lateral coherence in the velocity field.

Compass scatter is about $\pm 6^\circ$.

Vane scatter is about $\pm 15^\circ$.

*	1	1
*	13	2
*	28	3
*****	709	4
*****	2930	5
*****	5190	6
*****	7270	7
*****	8551	8
*****	9411	9
*****	11457	10
*****	11410	11
*****	9893	12
*****	8155	13
*****	7956	14
*****	6963	15
*****	7735	16
*****	10627	17
*****	8595	18
*****	11959	19
*****	9616	20
*****	7058	21
*****	7428	22
*****	2831	23
*****	3153	24
*****	1873	25
*****	784	26
*****	453	27
*****	236	28
*****	190	29
*****	81	30
*****	43	31
*****	35	32
*****	21	33
*****	31	34
*****	21	35
*****	11	36
*****	1	37
*****	2	38
*****	30	39
*****	21	40
*****	37	41
*****	12	42
*****	19	43
*****	9	44
*****	24	45
*****	25	46
*****	17	47
*****	40	48
*****	22	49
*****	30	50
*****	31	51
*****	23	52
*****	0	53
*****	27	54
*****	14	55
*****	25	56
*****	13	57
*****	20	58
*****	13	59
*****	12	60
*****	6	61
*****	6	62
*****	0	63
*****	0	64
*****	0	65
*****	0	66
*****	0	67
*****	0	68
*****	0	69
*****	0	70
*****	0	71
*****	0	72
*****	0	73
*****	0	74
*****	0	75
*****	0	76
*****	0	77
*****	1	78
*****	0	79
*****	0	80
*****	0	81
*****	0	82
*****	0	83
*****	0	84
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*****	0	130
*****	0	131
*****	0	132
*****	0	133
*****	0	134
*****	0	135
*****	0	136
*****	0	137
*****	0	138
*****	0	139
*****	0	140
*****	0	141
*****	0	142
*****	0	143
*****	0	144
*****	0	145
*****	0	146
*****	0	147
*****	0	148
*****	0	149
*****	0	150

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST	NORTH	SEQ NO
X	X	0
-131	89	600
-74	121	1800
-60	71	3000
133	118	4200
213	-11	5400
22	-68	6600
16	-72	7800
-5	-81	9000
6	-105	10200
27	-109	11400
28	-106	12600
40	-99	13800
73	-89	15000
85	-77	16200
74	-81	17400
42	-96	18600
37	-103	19800
30	-89	21000
61	-82	22200
68	-86	23400
76	-83	24600
58	-104	25800
62	-100	27000
48	-104	28200
4	-102	29400
-17	-97	30600
-10	-91	31800
8	-84	33000
14	-75	34200
-1	-74	35400
16	-73	36600
23	-74	37800
68	-79	39000
60	-93	40200
26	-71	41400
32	-38	42600
41	-59	43800
75	-76	45000
95	-58	46200
117	-55	47400
153	-39	48600
152	-50	49800
150	-75	51000
148	-67	52200
105	-68	53400
98	-73	54600
76	-80	55800
77	-82	57000
79	-79	58200
63	-66	59400
67	-65	60600
51	-67	61800
43	-67	63000
40	-72	64200
47	-60	65400
58	-29	66600
43	-33	67800
46	-18	69000
53	-2	70200
57	15	71400
56	10	72600
53	0	73800
57	-10	75000
45	-14	76200
52	-8	77400
54	-26	78600
75	9	79800
95	8	81000
92	-19	82200
86	-40	83400
111	-32	84600
119	-15	85800
122	-6	87000
150	5	88200
171	23	89400
178	9	90600
183	11	91800
210	24	93000
206	9	94200
214	5	95400
212	12	96600
237	20	97800
226	17	99000
195	12	100200
189	4	101400
211	-18	102600
205	-31	103800
196	-33	105000
195	-32	106200
197	-39	107400
202	-53	108600
176	-70	109800
175	-75	111000
160	-75	112200
170	-67	113400
174	-56	114600
169	-48	115800
165	-31	117000
161	-44	118200
149	-67	119400
149	-65	120600
141	-53	121800
130	-49	123000
120	-35	124200
119	-24	125400
106	-11	126600
122	0	127800
138	12	129000
162	41	130200
172	52	131400
191	58	132600
199	50	133800
208	44	135000
215	32	136200
207	26	137400
193	33	138600
193	42	139800
204	40	141000
207	37	142200
194	23	143400
193	11	144600
192	4	145800
194	6	147000
188	15	148200
172	26	149400
171	15	150600
171	24	151800
173	35	153000
174	46	154200
171	51	155400
162	61	156600
154	73	157800
145	78	159000
156	89	160200
146	86	161400
149	89	162600

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101603

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 163105

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Station No. 161

<u>32° 15'.4 N</u>	Set:	<u>1520Q</u>	<u>11</u>	<u>V</u>	<u>64</u>
latitude		hour	day	month	year

<u>64° 31'.8 W</u>	Retrieved:	<u>11470</u>	<u>14</u>	<u>V</u>	<u>64</u>
longitude		hour	day	month	year

Set by: <u>Fofonoff</u>	Ship: <u>Crawford</u>	Cruise: <u>107</u>
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MOORING:

4 ft. diameter subsurface sphere, with 1/8" tow cable. Release with 2500 ft. of 1/4" nylon line and parallel timed releases. 1-1500 lb, and 1-800 lb. anchor were used. A pressure recorder was mounted directly beneath the buoyant sphere.

PURPOSE OF STATION:

To collect simultaneous measurements from current meters on subsurface-float moorings separated laterally by five kilometers. Station 161 was moored about five kilometers east of stations 159 and 160.

COMMENTS ON RESULTS:

Station came to the surface on schedule and was fully recovered.

Film did not run through camera on current meter at 994m. depth (1613).

Pressure record indicated that the float depth was 344 meters.

Film No. 1612

C.M. Film Duration
No. H 534 begins 16160: 11 : V : 64 of film : 45 : 13
hour day month year days hours min

C.M. Water Magnetic Sampling
depth 494 m. depth 2285 m. variation 14° W interval 1.02
sec

PURPOSE:

1612 was intended to be compared with 1591, about five kilometers to the west.

COMMENTS ON RESULTS:

The current meter appeared to function properly. A fair comparison with 1591 could not be made because 1612 was at a depth of 494 meters - deeper than had been intended. (The depth of 1591 was 260 meters)

An interesting feature of the record is the apparent instability of the instrument when the current speed exceeds a critical value. At speeds below 22 cm/sec., the noise level was:

compass: + 3°
vane: + 3°
resultant: + 6°
—

When the current speed rose above 22 cm/sec, and thereafter until it dropped below 20 cm/sec., the noise level was:

compass: + 25°
vane: + 25°
resultant: + 10°
—

The "noise" here referred to is a regular oscillatory swinging of the instrument case, about 25° on either side of a steady position. Not all the amplitude is cancelled out by compensatory motion of the compass and vane.

The instability may be explained as the action of a Karman vortex street shed from the cylindrical current meter case. Alternate vortices would act on the thin stabilizing fin to produce a regular swinging of the instrument.

After studying the record from 1612, the decision was made to abandon the use of a fin for instrument stabilization.

*	12	0
*	7	3
*	7	6
*	12	8
*	13	11
*	30	14
***	288	17
*****	1602	20
*****	3332	23
*****	3436	25
*****	3703	28
*****	6361	31
*****	6933	34
*****	6465	37
*****	8059	39
*****	8946	42
*****	6662	45
*****	2990	48
*****	1967	51
*****	1221	53
*****	615	56
*****	511	59
*****	451	62
*****	516	65
*****	700	68
*****	1080	70
*****	1612	73
*****	1472	76
*****	1167	79
*****	1663	82
*****	2255	84
*****	2782	87
*****	2493	90
*****	2434	93
*****	2072	96
*****	1919	98
*****	2201	101
*****	2628	104
*****	3248	107
*****	3950	110
*****	5029	113
*****	5237	115
*****	6081	118
*****	6026	121
*****	3945	124
*****	2484	127
*****	2328	129
*****	2033	132
*****	1991	135
*****	1898	138
*****	1941	141
*****	1801	143
*****	1350	146
*****	858	149
*****	385	152
***	201	155
***	207	158
***	305	160
*****	542	163
*****	858	166
*****	924	169
*****	890	172
*****	754	174
*****	714	177
*****	691	180
*****	682	183
*****	642	186
*****	586	188
*****	415	191
*****	386	194
*****	466	197
*****	444	200
*****	503	203
*****	494	205
*****	559	208
*****	660	211
*****	630	214
*****	613	217
*****	629	219
*****	570	222
*****	563	225
*****	516	228
*****	485	231
*****	526	233
*****	556	236
*****	584	239
*****	511	242
*****	418	245
*****	293	248
***	251	250
***	220	253
***	219	256
***	150	259
***	139	262
***	122	264
***	104	267
***	111	270
***	107	273
***	119	276
***	180	278
***	167	281
***	134	284
***	113	287
***	78	290
***	71	293
***	71	295
***	57	298
***	49	301
***	45	304
***	44	307
***	12	309
***	24	312
***	17	315
***	23	318
***	10	321
***	16	323
***	8	326
***	16	329
***	16	332
***	15	335
***	11	338
***	11	340
***	12	343
***	9	346
***	15	349
***	13	352
***	8	354
***	12	357

*****	2514	1
*****	1498	2
*****	2709	3
*****	3463	4
*****	4410	5
*****	6127	6
*****	9400	7
*****	9268	8
*****	9374	9
*****	13344	10
*****	12862	11
*****	7903	12
*****	5010	13
*****	5114	14
*****	5271	15
*****	7120	16
*****	8866	17
*****	5990	18
*****	6104	19
*****	4330	20
*****	3408	21
*****	4605	22
*****	2442	23
*****	3751	24
*****	4036	25
*****	2392	26
*****	2018	27
*****	1562	28
*****	1112	29
*****	762	30
*****	251	31
*****	378	32
*****	157	33
*****	146	34
*****	80	35
*****	71	36
*****	119	37
*****	119	38
*****	127	39
*****	134	40
*****	145	41
*****	160	42
*****	207	43
*****	152	44
*****	258	45
*****	233	46
*****	210	47
*****	209	48
*****	159	49
*****	118	50
*****	88	51
*****	128	52
*****	49	53
*****	136	54
*****	113	55
*****	107	56
*****	93	57
*****	112	58
*****	77	59
*****	93	60
*****	85	61
*****	85	62
*****	106	63
*****	104	64
*****	95	65
*****	87	66
*****	47	67
*****	60	68
*****	67	69
*****	56	70
*****	63	71
*****	38	72
*****	40	73
*****	29	74
*****	10	75
*****	28	76
*****	37	77
*****	24	78
*****	18	79
*****	47	80
*****	19	81
*****	19	82
*****	5	83
*****	16	84
*****	25	85
*****	23	86
*****	17	87
*****	21	88
*****	20	89
*****	19	90
*****	8	91
*****	25	92
*****	23	93
*****	7	94
*****	30	95
*****	22	96
*****	4	97
*****	16	98
*****	16	99
*****	24	100
*****	15	101
*****	25	102
*****	19	103
*****	4	104
*****	10	105
*****	8	106
*****	30	107
*****	9	108
*****	6	109
*****	8	110
*****	0	111
*****	0	112
*****	0	113
*****	4	114
*****	0	115
*****	0	116
*****	0	117
*****	0	118
*****	0	119
*****	0	120
*****	0	121
*****	0	122
*****	0	123
*****	0	124
*****	0	125
*****	0	126
*****	0	127
*****	0	128
*****	0	129
*****	0	130
*****	0	131
*****	0	132
*****	0	133
*****	0	134
*****	0	135
*****	0	136
*****	0	137
*****	0	138
*****	0	139
*****	0	140
*****	0	141
*****	0	142
*****	0	143
*****	0	144
*****	0	145
*****	0	146
*****	0	147
*****	0	148
*****	0	149
*****	0	150

CURRENT METER FILM NO. 101612

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

VALUE EXCEEDS RANGE
VALUE EXCEEDS RANGE
VALUE EXCEEDS RANGE
X

EAST	NORTH	SEQ NO
X	*	
-129	-159	600
-227	-347	1800
-451	-147	3000
-481	-587	4200
-270	36	5400
-19	-71	6600
22	-92	7800
13	-88	9000
12	-85	10200
17	-86	11400
3	-64	12600
-8	-60	13800
-14	-40	15000
-33	-44	16200
-34	-32	17400
-32	-19	18600
-21	-21	19800
-11	-15	21000
2	0	22200
13	8	23400
6	-4	24600
22	-14	25800
29	-7	27000
45	-7	28200
52	-24	29400
85	-33	30600
99	-45	31800
108	-43	33000
109	-69	34200
84	-54	35400
85	-48	36600
77	-46	37800
82	-53	39000
89	-50	40200
95	-51	41400
99	-53	42600
67	-40	43800
49	-46	45000
55	-34	46200
75	-21	47400
81	-25	48600
70	-36	49800
55	-33	51000
56	-28	52200
41	-22	53400
46	-20	54600
57	-9	55800
60	-2	57000
72	7	58200
92	16	59400
98	34	60600
106	24	61800
99	6	63000
95	-2	64200
88	7	65400
81	-6	66600
78	1	67800
74	-7	69000
67	-17	70200
82	-30	71400
85	-40	72600
93	-27	73800
97	-39	75000
75	-32	76200
64	-21	77400
67	-10	78600
80	11	79800
96	29	81000
101	55	82200
82	72	83400
78	70	84600
78	90	85800
73	86	87000
68	74	88200
80	84	89400
86	93	90600
90	105	91800
109	111	93000
111	124	94200
89	117	95400
90	119	96600
92	141	97800
90	144	99000
99	157	100200
105	162	101400
104	178	102600
131	187	103800
155	187	105000
142	181	106200
136	193	107400
142	177	108600
130	162	109800
103	146	111000
84	131	112200
84	138	113400
71	146	114600
56	132	115800
68	159	117000
87	154	118200
92	169	119400
75	162	120600
63	163	121800
69	165	123000
87	189	124200
89	184	125400
81	144	126600
86	119	127800
96	120	129000
92	107	130200
124	113	131400
123	110	132600
105	124	133800
129	145	135000
147	157	136200
158	163	137400
149	163	138600
117	129	139800
101	116	141000
88	92	142200
78	95	143400
91	48	144600
138	8	145800
150	-15	147000
150	-72	148200
153	-102	149400
169	-140	150600
181	-170	151800
164	-175	153000
152	-182	154200
171	-191	155400
177	-195	156600
191	-214	157800
183	-215	159000
151	-197	160200
142	-213	161400

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101612

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 162718

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

Film No. 1614

C.M.	Film	Duration
No. <u>H 524</u>	begins <u>1630Q : 11 : V : 64</u> of film	<u> : 45 : 11</u>
	hour day month year	days hours min

C.M.	Water	Magnetic	Sampling
depth <u>1594 m.</u>	depth <u>2285 m.</u>	variation <u>14° W</u>	interval <u>1</u>
			sec

PURPOSE:

This current meter was intended to provide information for an investigation into coherence between adjacent stations in the set of moorings 159, 160 and 161.

COMMENTS ON RESULTS:

Directions are untrustworthy. One compass light-pipe was broken or too dim to be read.

Speeds are very slow. One rotor pulse had a length of 34 film frames (17 minutes). In the early part of the record. spinning of the instrument case exceeds the rate of rotor rotation, giving repeated rotor pulses.

No current meter records were collected at this great a depth from other moorings of the series. As a consequence, the questions concerning spatial coherence remained unanswered.

Average speed is about 3 cm/sec.

*****	1248	0
*****	1414	3
*****	1494	6
*****	1219	8
*****	1077	11
*****	1168	14
*****	1505	17
*****	1838	20
*****	1753	23
*****	2135	25
*****	2470	28
*****	2888	31
*****	4471	34
*****	4722	37
*****	3840	39
*****	4894	42
*****	5125	45
*****	4940	48
*****	4607	51
*****	4465	53
*****	4190	56
*****	3336	59
*****	3508	62
*****	3792	65
*****	3871	68
*****	3104	70
*****	2623	73
*****	2971	76
*****	2604	79
*****	1434	82
*****	994	84
*****	985	87
*****	1132	90
*****	1499	93
*****	1664	96
*****	1633	98
*****	1689	101
*****	1617	104
*****	1724	107
*****	2090	110
*****	2617	113
*****	2553	115
*****	1784	118
*****	1186	121
*****	798	124
*****	498	127
*****	519	129
*****	468	132
*****	410	135
*****	369	138
*****	394	141
*****	406	143
*****	457	146
*****	360	149
*****	357	152
*****	318	155
*****	279	158
*****	389	160
*****	425	163
*****	527	166
*****	462	169
*****	521	172
*****	769	174
*****	1004	177
*****	726	180
*****	518	183
*****	481	186
*****	575	188
*****	547	191
*****	485	194
*****	549	197
*****	390	200
*****	415	203
*****	450	205
*****	415	208
*****	384	211
*****	383	214
*****	308	217
*****	335	219
*****	512	222
*****	549	225
*****	614	228
*****	545	231
*****	724	233
*****	874	236
*****	812	239
*****	787	242
*****	808	245
*****	724	248
*****	670	250
*****	742	253
*****	711	256
*****	784	259
*****	728	262
*****	506	264
*****	615	267
*****	545	270
*****	553	273
*****	630	276
*****	529	278
*****	488	281
*****	427	284
*****	426	287
*****	431	290
*****	453	293
*****	448	295
*****	612	298
*****	519	301
*****	400	304
*****	461	307
*****	464	309
*****	474	312
*****	546	315
*****	614	318
*****	539	321
*****	494	323
*****	574	326
*****	718	329
*****	923	332
*****	1063	335
*****	889	338
*****	842	340
*****	935	343
*****	1110	346
*****	1196	349
*****	1174	352
*****	1311	354
*****	1594	357

*****	29173	1
*****	35010	2
*****	20490	3
*****	30485	4
*****	18988	5
*****	11333	6
*****	7049	7
*****	6846	8
*****	1098	9
*****	273	10
*****	122	11
*****	163	12
*****	89	13
*****	118	14
*****	143	15
*****	122	16
*****	206	17
*****	0	18
*****	104	19
*****	0	20
*****	78	21
*****	0	22
*****	62	23
*****	0	24
*****	0	25
*****	69	26
*****	0	27
*****	0	28
*****	38	29
*****	0	30
*****	0	31
*****	0	32
*****	0	33
*****	27	34
*****	0	35
*****	0	36
*****	0	37
*****	10	38
*****	0	39
*****	0	40
*****	21	41
*****	0	42
*****	9	43
*****	7	44
*****	12	45
*****	0	46
*****	9	47
*****	0	48
*****	0	49
*****	0	50
*****	19	51
*****	8	52
*****	0	53
*****	0	54
*****	0	55
*****	7	56
*****	0	57
*****	8	58
*****	0	59
*****	0	60
*****	13	61
*****	0	62
*****	4	63
*****	0	64
*****	22	65
*****	0	66
*****	129	67
*****	0	68
*****	45	69
*****	0	70
*****	0	71
*****	36	72
*****	0	73
*****	0	74
*****	53	75
*****	0	76
*****	18	77
*****	0	78
*****	0	79
*****	0	80
*****	10	81
*****	0	82
*****	0	83
*****	27	84
*****	0	85
*****	0	86
*****	43	87
*****	0	88
*****	0	89
*****	0	90
*****	19	91
*****	0	92
*****	0	93
*****	0	94
*****	0	95
*****	17	96
*****	0	97
*****	0	98
*****	0	99
*****	0	100
*****	15	101
*****	0	102
*****	0	103
*****	0	104
*****	0	105
*****	0	106
*****	0	107
*****	0	108
*****	0	109
*****	0	110
*****	0	111
*****	4	112
*****	0	113
*****	0	114
*****	0	115
*****	0	116
*****	0	117
*****	0	118
*****	0	119
*****	0	120
*****	0	121
*****	0	122
*****	0	123
*****	0	124
*****	0	125
*****	0	126
*****	0	127
*****	0	128
*****	0	129
*****	0	130
*****	0	131
*****	0	132
*****	0	133
*****	0	134
*****	0	135
*****	0	136
*****	0	137
*****	0	138
*****	0	139
*****	0	140
*****	0	141
*****	0	142
*****	0	143
*****	0	144
*****	0	145
*****	0	146
*****	0	147
*****	0	148
*****	0	149
*****	0	150

VECTOR AVERAGED VALUES 1200 TERMS PER VALUE.

NORTH AND EAST COMPONENTS
 VALUE EXCEEDS RANGE
 VALUE EXCEEDS RANGE

EAST	NORTH	SEQ NO
308	-91	600
11	102	1800
33	60	3000
40	56	4200
45	50	5400
43	38	6600
45	41	7800
39	35	9000
38	29	10200
43	14	11400
36	5	12600
19	0	13800
7	-3	15000
8	-5	16200
11	-3	17400
4	0	18600
1	0	19800
3	-2	21000
3	-9	22200
2	-16	23400
2	-16	24600
-4	-6	25800
-1	-3	27000
0	-5	28200
-1	-5	29400
-5	-4	30600
-10	-7	31800
-7	-22	33000
4	-26	34200
-4	-21	35400
-5	-11	36600
-3	-9	37800
10	-7	39000
12	3	40200
13	12	41400
8	27	42600
-3	23	43800
-1	26	45000
5	29	46200
13	13	47400
17	6	48600
31	4	49800
39	-2	51000
37	-5	52200
34	-11	53400
40	-13	54600
27	-4	55800
32	-9	57000
47	-16	58200
33	-13	59400
15	1	60600
5	1	61800
0	0	63000
3	0	64200
9	-2	65400
8	1	66600
7	-3	67800
9	-6	69000
6	-9	70200
10	-8	71400
11	-7	72600
10	-8	73800
10	-8	75000
8	-5	76200
8	-1	77400
13	1	78600
20	4	79800
11	-1	81000
16	2	82200
25	11	83400
30	14	84600
30	14	85800
32	18	87000
29	9	88200
10	-8	89400
3	-4	90600
6	-9	91800
9	-12	93000
11	-10	94200
13	-8	95400
17	-6	96600
21	-6	97800
26	-6	99000
26	-4	100200
23	-4	101400
26	-6	102600
32	-9	103800
36	-5	105000
34	-3	106200
35	-6	107400
42	-4	108600
47	0	109800
46	1	111000
45	5	112200
50	16	113400
40	11	114600
28	0	115800
17	-7	117000
3	-3	118200
1	-1	119400
0	0	120600
1	-2	121800
0	0	123000
5	-6	124200
3	-4	125400
3	-4	126600
5	-4	127800
10	-6	129000
14	-7	130200
15	-7	131400
14	-7	132600
21	-6	133800
29	-3	135000
30	0	136200
29	-1	137400
33	3	138600
38	4	139800
38	8	141000
46	12	142200
48	14	143400
56	16	144600
67	19	145800
70	11	147000
73	1	148200
68	-2	149400
70	-13	150600
68	-21	151800
61	-12	153000
58	-13	154200
51	-9	155400
47	-5	156600
50	-10	157800
40	-11	159000
29	-13	160200
24	-10	161400
17	-3	162600
20	-4	163800

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101614

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 164500

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

Station No. 101

<u>28° 07' N</u>	Set:	<u>09050</u>	<u>30</u>	<u>IX</u>	<u>62</u>
latitude		hour	day	month	year

<u>65° 02' W</u>	Retrieved	<u>16150</u>	<u>27</u>	<u>I</u>	<u>63</u>
longitude		hour	day	month	year

Set by: <u>Day</u>	Ship: <u>Chain</u>	Cruise: <u>35</u>
--------------------	--------------------	-------------------

MOORING:

Surface toroid float, with 9/16-in. polypropylene line.
1500-lb anchor with hydrostatic weak link.

PURPOSE OF STATION:

This station was set at one of six sites along the 65° W meridian between Bermuda and latitude 20° N. The purpose of the experiment and the general results have been described by Day:

Day C. G., (1963) Current Measurements in the Western North Atlantic. Woods Hole Oceanographic Institution Research Report No. 63-44 (Unpublished Manuscript), 8 pp.

COMMENTS ON RESULTS:

The two upper-most current meters, at depths of 50 and 100 meters were recovered. Although the data were subject to a high noise level, principally due to the surface float motion, they were of long duration. (The instrument at 100 m depth provided a record of 109 days length.) The data have been extensively examined. The results are published in:

Day, C. G. and F. Webster (1965) Some current measurements in the Sargasso Sea. Deep-Sea Research, Vol. 12, No. 6, pp 805-814.

Film No. 1011

C.M. Film Duration
No. G 149 begins 0420 Z : 10 X 62 of film 85 : 1 : 0
 hour day month year days hours min

C.M. Water Magnetic Sampling
depth 50 m. depth 5250 m. variation 11°W interval 20 min

COMMENTS ON RESULTS:

Eightyfive days of measurements were collected. After that time, the rotor apparently became fouled, and velocities were no longer available.

See references for a discussion of results.

*****	38	0
*****	84	3
*****	80	6
*****	32	8
*****	114	11
*****	195	14
*****	71	17
*****	25	20
*****	71	23
*****	76	25
*****	23	28
*****	14	31
*****	60	34
*****	102	37
*****	60	39
*****	22	42
*****	30	45
*****	48	48
*****	51	51
*****	14	53
*****	88	56
*****	126	59
*****	65	62
*****	11	65
*****	29	68
*****	51	70
*****	12	73
*****	13	76
*****	47	79
*****	81	82
*****	30	84
*****	10	87
*****	14	90
*****	28	93
*****	35	96
*****	13	98
*****	50	101
*****	63	104
*****	53	107
*****	19	110
*****	31	113
*****	46	115
*****	20	118
*****	10	121
*****	29	124
*****	39	127
*****	38	129
*****	14	132
*****	19	135
*****	36	138
*****	27	141
*****	13	143
*****	36	146
*****	58	149
*****	52	152
*****	12	155
*****	17	158
*****	40	160
*****	18	163
*****	18	166
*****	31	169
*****	45	172
*****	22	174
*****	12	177
*****	19	180
*****	25	183
*****	19	186
*****	17	188
*****	33	191
*****	62	194
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*****	11	208
*****	9	211
*****	18	214
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*****	33	236
*****	98	239
*****	55	242
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*****	15	253
*****	20	256
*****	53	259
*****	80	262
*****	35	264
*****	23	267
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*****	44	273
*****	53	276
*****	13	278
*****	70	281
*****	145	284
*****	119	287
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*****	27	298
*****	13	301
*****	70	304
*****	122	307
*****	101	309
*****	30	312
*****	37	315
*****	72	318
*****	107	321
*****	26	323
*****	120	326
*****	278	329
*****	165	332
*****	28	335
*****	82	338
*****	114	340
*****	39	343
*****	24	346
*****	101	349
*****	120	352
*****	79	354
*****	33	357

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*****	557	21
*****	267	22
*****	202	23
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*****	107	28
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*****	0	149
*****	0	150

NUMBER EXCEEDING 150 CM/SEC = 0

CURRENT METER FILM NO. 101011

VECTOR AVERAGED VALUES 72 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

EAST	NORTH	SEQ NO
-3	11	36
-22	15	108
-45	22	180
-20	67	252
-42	58	324
-51	42	396
-59	90	468
-62	42	540
-74	86	612
-46	88	684
-72	65	756
-73	92	828
-58	89	900
-28	76	972
-1	77	1044
-37	65	1116
-16	80	1188
-7	86	1260
21	126	1332
-16	78	1404
-52	54	1476
-41	54	1548
42	77	1620
-14	113	1692
-41	110	1764
-12	128	1836
-53	73	1908
-18	83	1980
2	80	2052
34	58	2124
-99	132	2196
-103	119	2268
-73	107	2340
-88	115	2412
-62	114	2484
-81	141	2556
-103	161	2628
-95	90	2700
-7	83	2772
-10	74	2844
-7	100	2916
-37	70	2988
-72	103	3060
-43	99	3132
-66	93	3204
5	169	3276
-60	169	3348
-77	162	3420
-43	184	3492
-32	153	3564
-6	126	3636
-15	84	3708
-18	88	3780
-35	90	3852
-28	59	3924
-9	50	3996
-28	69	4068
-4	50	4140
-3	82	4212
-9	80	4284
5	74	4356
14	29	4428
16	64	4500
-27	57	4572
-8	53	4644
26	24	4716
5	9	4788
14	29	4860
-6	43	4932
-7	43	5004
9	30	5076
-33	-43	5148
-52	44	5220
-13	-2	5292
-60	-54	5364
19	-44	5436
49	-99	5508
102	-67	5580
60	-51	5652
76	4	5724
37	35	5796
74	103	5868
1	25	5940
-43	86	6012
13	115	6084

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM 101011

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 6120

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

Film No. 1012

C.M.	Film					Duration				
No. <u>G 175</u>	begins	<u>0420</u>	<u>Z</u>	<u>10</u>	<u>10</u>	<u>62</u>	of film	<u>109</u>	<u>:</u>	<u>0</u>
		hour		day	month	year		days	hours	min

C.M.		Water		Magnetic		Sampling	
depth <u>100</u>	m.	depth <u>5250</u>	m.	variation <u>11°W</u>		interval <u>20</u>	min

COMMENTS ON RESULTS:

One-hundred and nine days of measurements were collected.

See references for a discussion of the results.

*****	46	0
*****	126	3
*****	82	6
*****	41	8
*****	225	11
*****	408	14
*****	203	17
***	17	20
*****	77	23
*****	83	25
***	20	28
***	20	31
*****	99	34
*****	139	37
*****	79	39
***	22	42
***	13	45
*****	49	48
*****	40	51
***	16	53
*****	159	56
*****	187	59
*****	117	62
***	12	65
*****	26	68
*****	33	70
**	8	73
**	8	76
*****	44	79
*****	91	82
*****	41	84
**	9	87
**	9	90
*****	23	93
*****	25	96
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*****	63	101
*****	154	104
*****	97	107
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*****	11	166
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*	4	180
*****	22	183
*****	32	186
**	7	188
*****	43	191
*****	114	194
*****	86	197
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*****	21	203
*****	23	205
**	7	208
*	3	211
*****	25	214
*****	58	217
*****	42	219
**	7	222
**	8	225
*****	16	228
*****	25	231
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*****	42	236
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*****	43	264
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*****	66	281
*****	124	284
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*****	32	293
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*****	19	301
*****	76	304
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*****	133	309
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*****	52	357

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*	0	146
*	0	147
*	0	148
*	0	149
*	0	150

NUMBER EXCEEDING 150 CM/SEC = 0

CURRENT METER FILM NO. 101012

VECTOR AVERAGED VALUES 74 TERMS PER VALUE.

NORTH AND EAST COMPONENTS

EAST NORTH SEQ NO

VALUE EXCEEDS RANGE
VALUE EXCEEDS RANGE

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

FILM101012

FIRST INPUT CYCLE NO. = 1

FINAL INPUT CYCLE NO. = 7640

X	*	
-19	2	36
-20	7	108
-32	21	180
-15	25	252
-55	31	324
-44	37	396
-28	63	468
-43	68	540
-52	84	612
-48	86	684
-16	96	756
-23	94	828
-13	66	900
-29	91	972
-32	89	1044
-39	108	1116
-52	132	1188
-41	134	1260
-47	134	1332
-59	136	1404
-56	109	1476
-71	100	1548
-76	118	1620
-31	102	1692
-30	97	1764
-36	106	1836
-32	122	1908
3	124	1980
-25	102	2052
-39	87	2124
-74	115	2196
-67	121	2268
-94	155	2340
-71	119	2412
-70	113	2484
-34	144	2556
8	157	2628
-9	119	2700
-32	148	2772
-15	105	2844
-39	107	2916
-34	112	2988
-60	105	3060
-43	96	3132
-58	119	3204
-71	139	3276
-48	152	3348
-47	136	3420
-21	110	3492
-25	112	3564
-11	89	3636
-6	79	3708
-11	79	3780
-40	103	3852
-11	105	3924
-38	92	3996
-66	77	4068
-25	54	4140
1	96	4212
-20	109	4284
-10	97	4356
1	99	4428
36	77	4500
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14	108	4716
7	66	4788
17	23	4860
5	67	4932
2	63	5004
34	85	5076
2	70	5148
-22	67	5220
-15	53	5292
-20	61	5364
-21	53	5436
41	64	5508
-8	37	5580
12	42	5652
40	25	5724
102	55	5796
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63	37	6300
58	98	6372
130	55	6444
87	-56	6516
135	-3	6588
127	12	6660
156	-15	6732
145	-67	6804
131	-183	6876
181	-93	6948
126	-146	7020
115	-49	7092
65	-127	7164
61	-199	7236
92	-258	7308
96	-286	7380
-35	-177	7452
-111	-211	7524
-104	-185	7596
-161	-222	7668
-51	-159	7740
-47	-128	7812

CURRENT METER LISTING AND PLOT, FILM NO. 101012

SLOW STROKE, /2 TERMS BETWEEN STROKES

RESULTANT SPEED AND DIRECTION, MAGNETIC VARIATION INCLUDED

MAGNETIC VARIATION OF 0 DEGREES APPLIED.

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