

AD A09071A

OBSERVATIONS OF POSITION, OCEAN DEPTHS, AND GRAVITY TAKEN FROM THE FRAM II AND CAMP I DRIFTING ICE STATIONS

5

by B. Allen, J. Ardal, K. Hunkins, T. Lee, T. O. Manley and W. Tiemann

LEVEL II

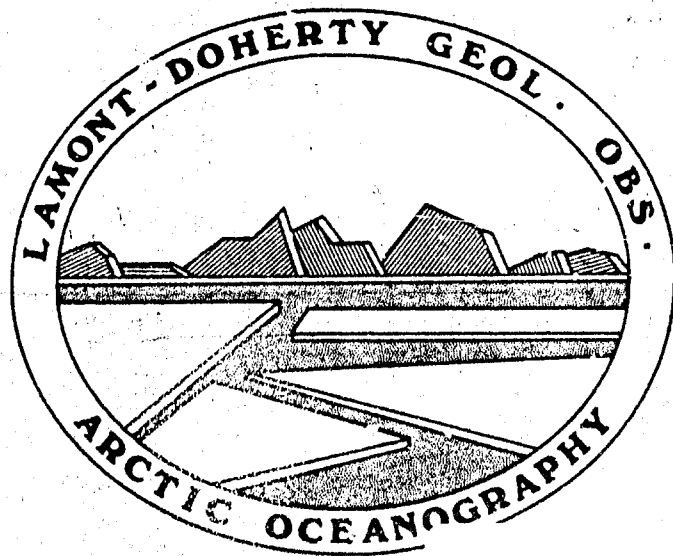
CU-13-80 TECHNICAL REPORT No. 13

Department of the Navy
Office of Naval Research
Contract N00014-76-C-0004

A077063

August 1980

DTIC
ELECTE
OCT 23 1980
E



DDC FILE COPY

Approved for public release: distribution unlimited

00 10 01 102

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

19. 662

11 Sep 80

6
OBSERVATIONS OF POSITION, OCEAN DEPTHS,
AND GRAVITY TAKEN FROM THE
FRAM II AND CAMP I DRIFTING ICE STATIONS.

prepared by

10
B. Allen, J. Ardai, K. Hunkins, T. Lee, T. O. Manley and W. Tiemann

9
CU-13-80, Technical Report No. 13

Department of the Navy
Office of Naval Research
15) Contract N00014-76-C-0004

14) LDGO-22-13-80, TR-13

Approved for public release; distribution unlimited

Lamont-Doherty Geological Observatory of Columbia University
New York, N. Y. 10964

September, 1980

11/11/80 JLL

ABSTRACT

→ This report contains geophysical data collected by the Lamont group at the FRAM II and Camp I drifting stations. These data include station positions determined by satellite navigation, echo soundings, ice floe azimuths, magnetic declination and gravity readings. ←

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist.	Avail and/or special
A	23 JH

TABLE OF CONTENTS

	Page
ABSTRACT	
INTRODUCTION	1
NAVIGATION	1
LOCATIONS OF FRAM II AND CAMP I DRIFTING STATION (Figure 1)	2
POSITIONS OF THE FRAM II DRIFTING STATION DETERMINED BY THE MX 1502 SATELLITE NAVIGATION SET	4
FRAM II DRIFT TRACK (1502 DATA)	5
FRAM II 1502 NAVIGATION DATA	6
KALMAN FILTERING OF POSITION DATA	15
SMOOTHED HOURLY POSITIONS AND ICE VELOCITIES OF THE FRAM II DRIFTING STATION	16
FRAM II DRIFT TRACK (KALMAN DATA)	17
FRAM II FILTERED NAVIGATION DATA	18
POSITIONS OF THE DRIFTING STATION CAMP I AS DETERMINED BY CELESTIAL NAVIGATION	38
CAMP I DRIFT TRACK	39
CAMP I ICE FLOE AZIMUTH, GRID AZIMUTH AND MAGNETIC DECLINATION	40
CAMP I AZIMUTH AND DECLINATION	41
DEPTH SOUNDINGS	42
OCEAN DEPTHS AT FRAM II	43
BATHYMETRIC PROFILE	44
FRAM II DEPTH DATA	45
GRAVITY	55
GRAVITY OBSERVATIONS AT FRAM II	57
GRAVITY DATA	58
REFERENCES	60

Introduction

FRAM II was a research station established on drifting pack ice to carry out underwater acoustic, geophysical, and oceanographic studies in the Arctic Ocean with primary financial support from the Office of Naval Research. Aircraft for establishing and maintaining the station were based at Nord, Greenland through cooperation of the Danish government and the Commission for Scientific Research in Greenland. FRAM II was established March 19, 1980 at $86^{\circ}51'N$ $023^{\circ}12'W$ and the scientific program began on March 31st after the camp had been relocated following ice breakup at the initial site. The program continued until May 4th when the camp was at $85^{\circ}46'N$ $023^{\circ}39'W$. Camp I was established later about 300 km north of FRAM II as a satellite station (fig. 1).

Investigators from Lamont-Doherty Geological Observatory carried out observations of position by satellite navigation, ocean depth and the earth's gravity field at FRAM II. Position by celestial navigation, and floe azimuth were observed at Camp I. These observations are reported here in the form of tables and figures. In order to make it available quickly, only the data are reported without detailed analysis or interpretation.

The Lamont group also conducted acoustic and oceanographic measurements which will be reported separately. The observations at FRAM II were made by Jay Ardai, Charles Monjo and Tai Lee. The measurements at Camp I were made by Barry Allen.

Navigation

All positions at FRAM II were determined with the U. S. Navy Transit satellite navigation system. Transit satellites circle the earth in 107-minute polar orbits at an altitude of approximately 100 km.

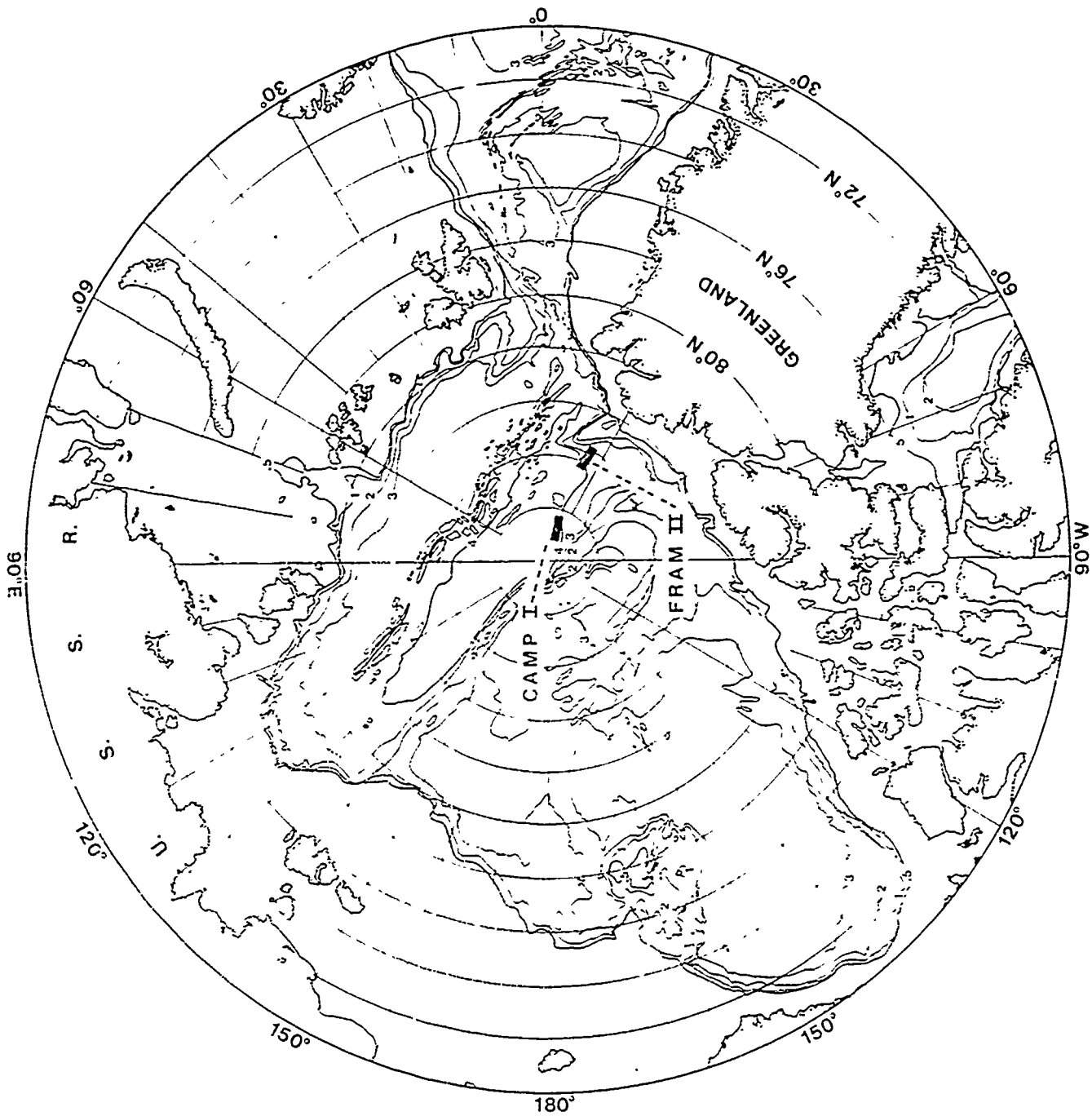


Figure 1. Locations of Fram II and Camp I Drifting Stations

Each satellite continuously transmits position data as a function of time. By measuring the change in the Doppler frequency of the received signals as the satellite approaches, passes, and recedes, the position of the station relative to the satellites path can be determined with great precision. The number of satellite passes at a given site over a given time will be greatest at the poles. In the Arctic the interval between fixes is therefore short.

The fixes at FRAM II were determined with a Magnavox MX 1502 satellite navigation set. The MX 1502 system was introduced in 1977 and is a rugged, portable, nearly automatic navigation system. The fixes and associated information are stored on magnetic tape. These data are also displayed visually and they were logged manually as often as possible in case the tape should malfunction.

Fixes calculated with the MX 1502 sets are based on the World Geodetic System-1972 coordinates. "Standard deviations" in latitude and longitude based on Doppler data residuals are calculated automatically by the 1502 for each fix. All fixes with "standard deviations" greater than 90 m in latitude and 136 m in longitude were eliminated from the data set. These cutoff values were arrived at by calculating the mean and standard deviation of the "standard deviations" for all fixes of each instrument separately. All fixes with "standard deviations" greater than the mean plus one standard deviation were eliminated in two successive trials.

Although it had been intended to fix the positions of Camp I also with satellite navigation, no reliable fixes were obtained with the Magnavox 706 set used there and only celestial navigation was obtained. Sun shots were taken with a Wild T-2 theodolite on a daily basis when cloud cover permitted. The errors are estimated to be \pm 1 km for these sun fixes.

POSITIONS OF THE FRAM II DRIFTING STATION
DETERMINED BY THE MX1502 SATELLITE NAVIGATION SET

Key to Column Headings:

SN Serial number of satellite receiver unit

DY Day

MON Month

YEAR Year

GMT Greenwich mean time

LATITUDE North latitude in decimal degrees

LONGITUDE Longitude in decimal degrees, (negative implies west longitude)

EL Maximum elevation of satellite above horizon in degrees

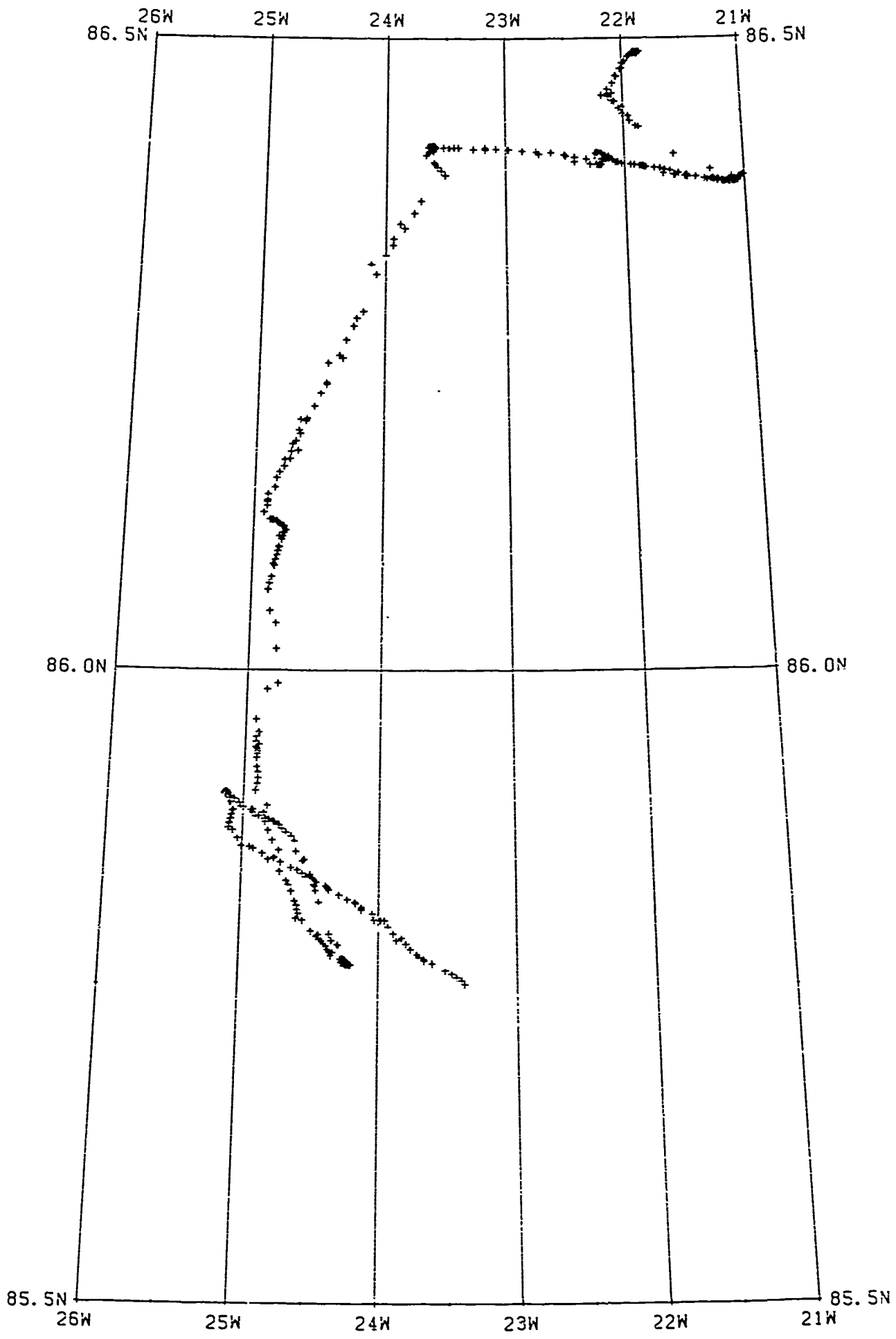
I Number of iterations in the computation

DP Number of 23/28 - second Doppler counts

SAT Last three digits of satellite identification number

STDY Standard deviation of latitude in meters

STDX Standard deviation of longitude in meters



FRAM 2

NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GHT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	8	APR	1980	1419	80.404968	-22.224712	70	3	32	190	61.0	36.0
30	8	APR	1980	1524	80.405258	-22.218170	66	3	32	200	77.0	23.0
30	8	APR	1980	1545	80.404724	-22.207981	68	3	36	110	49.0	24.0
30	8	APR	1980	1606	80.405151	-22.226074	76	3	30	190	51.0	62.0
30	8	APR	1980	1651	80.407379	-22.236729	70	3	30	140	90.0	93.0
30	8	APR	1980	1837	80.405334	-22.218830	64	3	31	140	65.0	53.0
30	8	APR	1980	1854	80.404724	-22.237537	74	3	28	200	86.0	95.0
30	8	APR	1980	2024	80.404922	-22.214836	62	3	26	140	59.0	22.0
30	8	APR	1980	2210	80.405752	-22.216770	65	3	31	140	62.0	39.0
30	8	APR	1980	2356	80.405243	-22.227966	72	3	29	140	53.0	75.0
30	9	APR	1980	11	80.405363	-22.192245	74	3	23	200	59.0	84.0
30	9	APR	1980	100	80.404709	-22.212330	69	3	28	190	85.0	27.0
30	9	APR	1980	157	80.406281	-22.218128	68	3	22	200	75.0	48.0
30	9	APR	1980	246	80.405197	-22.217522	72	3	23	190	70.0	53.0
30	9	APR	1980	517	80.404572	-22.195885	77	3	31	140	56.0	50.0
30	9	APR	1980	704	80.403931	-22.205799	72	4	23	140	59.0	26.0
30	9	APR	1980	807	80.404449	-22.200069	80	3	24	190	47.0	110.0
30	9	APR	1980	851	80.404190	-22.207420	72	3	29	140	62.0	23.0
30	9	APR	1980	954	80.404236	-22.209904	72	3	27	190	63.0	50.0
30	9	APR	1980	1038	80.403961	-22.215225	70	3	32	140	55.0	42.0
30	9	APR	1980	1142	80.403915	-22.207756	68	3	33	190	50.0	23.0
30	9	APR	1980	1310	80.403534	-22.176655	77	3	36	110	50.0	83.0
30	9	APR	1980	1330	80.403412	-22.212524	68	3	27	190	70.0	32.0
30	9	APR	1980	1643	80.403198	-22.209442	60	3	35	110	51.0	16.0
30	9	APR	1980	1932	80.403122	-22.201714	63	3	14	140	74.0	44.0
30	9	APR	1980	2016	80.402542	-22.225075	73	3	34	110	45.0	46.0
30	9	APR	1980	2038	80.402679	-22.188545	78	4	24	190	80.0	119.0
30	9	APR	1980	2225	80.402654	-22.200466	71	3	36	190	78.0	48.0
30	10	APR	1980	12	80.402328	-22.205868	69	4	29	190	60.0	22.0
30	10	APR	1980	137	80.402393	-22.197210	70	3	36	110	39.0	48.0
30	10	APR	1980	158	80.402557	-22.211929	71	3	37	190	59.0	28.0
30	10	APR	1980	325	80.402374	-22.208195	69	3	36	110	37.0	21.0
30	10	APR	1980	344	80.401590	-22.219475	70	3	26	190	68.0	71.0
30	10	APR	1980	422	80.401325	-22.211689	66	3	29	200	60.0	25.0
30	10	APR	1980	900	80.400646	-22.208127	75	3	38	190	49.0	55.0
30	10	APR	1980	1053	80.400391	-22.211487	69	3	25	190	61.0	30.0
30	10	APR	1980	1134	80.400833	-22.225611	70	3	25	140	72.0	85.0
30	10	APR	1980	1240	80.400236	-22.215917	67	3	28	190	61.0	29.0
30	10	APR	1980	1408	80.400757	-22.199860	72	3	33	110	51.0	48.0
30	10	APR	1980	1424	80.400452	-22.222937	70	3	34	190	47.0	31.0
30	10	APR	1980	1615	80.401031	-22.224916	77	3	28	190	54.0	72.0
30	10	APR	1980	1854	80.400344	-22.208912	69	3	28	140	60.0	59.0
30	10	APR	1980	1741	80.400574	-22.213970	70	3	33	110	49.0	17.0
30	10	APR	1980	1830	80.400533	-22.212280	64	3	33	140	53.0	25.0
30	10	APR	1980	1928	80.400452	-22.222580	70	3	35	110	40.0	34.0
30	10	APR	1980	2028	80.400526	-22.214828	63	3	32	140	40.0	16.0
30	10	APR	1980	2114	80.400192	-22.237793	78	3	32	110	59.0	105.0
30	10	APR	1980	2130	80.400330	-22.195793	74	3	32	190	88.0	69.0
30	10	APR	1980	2213	80.400757	-22.217140	60	3	32	140	50.0	35.0
30	10	APR	1980	2322	80.400299	-22.204550	69	3	38	190	66.0	23.0
30	10	APR	1980	2359	80.401001	-22.222057	73	3	28	140	59.0	94.0
30	11	APR	1980	109	80.400294	-22.218014	69	3	28	190	53.0	18.0
30	11	APR	1980	250	80.400772	-22.224281	74	3	31	190	63.0	51.0
30	11	APR	1980	423	80.400223	-22.211159	68	3	32	110	58.0	22.0
30	11	APR	1980	500	80.400520	-22.216150	67	3	33	200	57.0	29.0
30	11	APR	1980	520	80.400421	-22.201302	70	3	35	140	52.0	43.0
30	11	APR	1980	810	80.400909	-22.190842	73	3	24	190	45.0	80.0
30	11	APR	1980	854	80.401077	-22.213264	72	3	31	140	67.0	20.0
30	11	APR	1980	1004	80.400554	-22.206573	71	3	33	190	48.0	34.0
30	11	APR	1980	1042	80.400452	-22.222822	70	3	30	140	63.0	51.0
30	11	APR	1980	1151	80.400360	-22.217670	67	3	29	190	50.0	25.0
30	11	APR	1980	1520	80.400452	-22.224480	74	3	36	190	51.0	52.0
30	11	APR	1980	1692	80.399555	-22.190487	73	3	25	140	70.0	80.0
30	11	APR	1980	1802	80.400244	-22.211590	68	3	35	110	47.0	14.0
30	11	APR	1980	1748	80.401093	-22.211746	66	3	23	140	56.0	29.0
30	11	APR	1980	1830	80.400341	-22.217567	68	3	35	110	48.0	24.0
30	12	APR	1980	428	80.400543	-22.201954	80	3	31	140	68.0	83.0
30	12	APR	1980	814	80.400140	-22.213306	73	3	29	140	64.0	43.0

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	12	APR	1980	802	80.400253	-22.212875	71	3	23	140	81.0	34.0
30	12	APR	1980	1136	80.400955	-22.234055	80	3	26	140	65.0	83.0
30	12	APR	1980	1249	80.400620	-22.219509	67	3	33	190	47.0	18.0
30	12	APR	1980	1510	80.401123	-22.186779	77	4	28	140	48.0	108.0
30	12	APR	1980	1604	80.400925	-22.208660	67	3	34	110	62.0	22.0
30	12	APR	1980	1624	80.401109	-22.225094	78	3	33	190	56.0	95.0
30	12	APR	1980	1656	80.400833	-22.193958	58	3	32	140	51.0	46.0
30	12	APR	1980	1843	80.400421	-22.206715	63	3	35	140	44.0	19.0
30	12	APR	1980	2029	80.400543	-22.213943	63	3	29	140	39.0	17.0
30	12	APR	1980	2124	80.400345	-22.234436	79	3	31	110	60.0	132.0
30	12	APR	1980	2215	80.400140	-22.220341	67	3	28	140	54.0	41.0
30	12	APR	1980	2331	80.400513	-22.192571	69	3	38	190	72.0	22.0
30	13	APR	1980	2	80.400345	-22.233501	74	3	28	140	48.0	83.0
30	13	APR	1980	522	80.400101	-22.199078	76	3	29	140	60.0	51.0
30	13	APR	1980	710	80.400720	-22.206894	72	3	23	140	58.0	27.0
30	13	APR	1980	825	80.401902	-22.224789	77	3	28	190	67.0	90.0
30	13	APR	1980	857	80.400140	-22.212070	72	3	30	140	59.0	24.0
30	13	APR	1980	1012	80.400177	-22.203423	70	3	31	190	52.0	33.0
30	13	APR	1980	1044	80.400223	-22.218540	78	3	26	140	60.0	57.0
30	13	APR	1980	1200	80.400803	-22.206409	67	3	31	190	43.0	18.0
30	13	APR	1980	1503	80.400085	-22.210171	66	3	29	200	73.0	24.0
30	13	APR	1980	1604	80.400300	-22.200291	72	3	33	140	45.0	60.0
30	13	APR	1980	1646	80.400421	-22.217697	67	3	25	200	78.0	41.0
30	13	APR	1980	1751	80.400605	-22.210888	65	3	23	140	64.0	34.0
30	13	APR	1980	1833	80.400391	-22.225399	74	3	32	200	78.0	82.0
30	13	APR	1980	1937	80.400140	-22.209087	63	3	21	140	81.0	18.0
30	13	APR	1980	2124	80.400284	-22.215691	64	3	31	140	49.0	27.0
30	13	APR	1980	2242	80.400620	-22.206188	70	3	28	190	65.0	33.0
30	13	APR	1980	2310	80.400421	-22.223228	70	3	35	140	52.0	61.0
30	13	APR	1980	2350	80.401031	-22.195484	74	3	31	200	49.0	64.0
30	14	APR	1980	135	80.400742	-22.204514	67	3	24	200	65.0	43.0
30	14	APR	1980	322	80.400528	-22.209641	65	3	29	200	61.0	28.0
30	14	APR	1980	402	80.400341	-22.225739	79	3	29	190	83.0	136.0
30	14	APR	1980	430	80.400209	-22.198532	79	3	30	140	60.0	72.0
30	14	APR	1980	508	80.400330	-22.216740	67	3	34	200	67.0	40.0
30	14	APR	1980	617	80.400209	-22.210686	73	3	35	140	56.0	28.0
30	14	APR	1980	654	80.400848	-22.222126	74	3	31	200	56.0	67.0
30	14	APR	1980	604	80.400370	-22.207710	71	3	35	140	54.0	18.0
30	14	APR	1980	952	80.400345	-22.214104	74	3	29	140	83.0	45.0
30	14	APR	1980	1110	80.401031	-22.211429	57	3	22	190	84.0	41.0
30	14	APR	1980	1139	80.400345	-22.234880	52	3	30	140	67.0	97.0
30	14	APR	1980	1210	80.401010	-22.192812	73	3	28	200	67.0	69.0
30	14	APR	1980	1253	80.400555	-22.213488	57	3	33	140	61.0	24.0
30	14	APR	1980	1445	80.400772	-22.218311	72	3	34	140	58.0	47.0
30	14	APR	1980	1512	80.400574	-22.187820	75	3	29	140	59.0	117.0
30	14	APR	1980	1540	80.400555	-22.208767	66	3	33	200	77.0	24.0
30	14	APR	1980	1632	80.400925	-22.220986	80	3	24	190	53.0	114.0
30	14	APR	1980	1754	80.400690	-22.205235	68	3	30	140	56.0	45.0
30	14	APR	1980	1726	80.400299	-22.216427	69	3	24	200	68.0	46.0
30	14	APR	1980	1815	80.400421	-22.209747	63	3	35	140	50.0	21.0
30	14	APR	1980	1911	80.400040	-22.228359	77	3	32	200	89.0	131.0
30	14	APR	1980	1940	80.400238	-22.230309	72	3	34	110	64.0	61.0
30	14	APR	1980	2032	80.400742	-22.223362	63	3	35	140	51.0	20.0
30	14	APR	1980	2153	80.401031	-22.216213	72	3	32	140	77.0	49.0
30	14	APR	1980	2218	80.401031	-22.236022	67	3	30	140	47.0	39.0
30	14	APR	1980	2340	80.400940	-22.236858	59	3	29	190	42.0	30.0
30	15	APR	1980	4	80.401541	-22.267712	75	4	34	140	47.0	93.0
30	15	APR	1980	28	80.400503	-22.233974	70	3	31	200	82.0	75.0
30	15	APR	1980	120	80.400253	-22.288967	70	3	35	190	65.0	29.0
30	15	APR	1980	214	80.404419	-22.321507	65	3	23	200	75.0	41.0
30	15	APR	1980	312	80.402252	-22.421249	75	3	34	190	87.0	91.0
30	15	APR	1980	400	80.400120	-22.422298	65	3	24	200	86.0	44.0
30	15	APR	1980	525	80.407190	-22.495331	75	3	33	140	60.0	46.0
30	15	APR	1980	540	80.408005	-22.508961	69	3	23	200	81.0	60.0
30	15	APR	1980	712	80.404775	-22.621052	71	3	32	140	53.0	20.0
30	15	APR	1980	834	80.408537	-22.721512	75	3	25	190	73.0	81.0
30	15	APR	1980	900	80.410401	-22.744203	72	3	34	140	59.0	28.0
30	15	APR	1980	1021	80.410343	-22.562610	69	3	33	190	52.0	32.0

SM	OY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	15	APR	1980	1208	85.412170	-22.979729	67	3	30	190	56.0	25.0
30	15	APR	1980	1356	85.412537	-23.082081	69	3	33	190	63.0	35.0
30	15	APR	1980	1543	85.413331	-23.175941	70	3	31	190	54.0	66.0
30	15	APR	1980	1607	85.411895	-23.173828	71	3	30	140	36.0	45.0
30	15	APR	1980	1754	85.412521	-23.273876	65	3	28	140	56.0	34.0
30	15	APR	1980	2044	85.413696	-23.439281	77	4	27	110	69.0	115.0
30	15	APR	1980	2104	85.413301	-23.398582	75	3	35	190	85.0	84.0
30	15	APR	1980	2250	85.413132	-23.477612	70	3	27	190	72.0	29.0
30	15	APR	1980	2312	85.413081	-23.522644	71	3	28	140	47.0	63.0
30	16	APR	1980	37	85.412979	-23.604609	69	3	23	190	84.0	30.0
30	16	APR	1980	224	85.413660	-23.593147	72	3	24	190	77.0	59.0
30	16	APR	1980	620	85.413895	-23.595039	72	3	17	140	75.0	60.0
30	16	APR	1980	744	85.414503	-23.592777	79	3	30	190	47.0	92.0
30	16	APR	1980	932	85.414027	-23.605059	71	3	33	190	46.0	37.0
30	16	APR	1980	1306	85.414642	-23.6206121	68	3	37	190	57.0	25.0
30	16	APR	1980	1454	85.414307	-23.621212	72	3	35	190	51.0	50.0
30	16	APR	1980	1511	85.414078	-23.6204790	66	3	20	200	77.0	24.0
30	16	APR	1980	1641	85.414764	-23.629314	81	3	26	190	66.0	135.0
30	16	APR	1980	1702	85.413690	-23.592175	68	3	29	140	56.0	43.0
30	16	APR	1980	1848	85.414734	-23.608097	63	3	22	140	55.0	22.0
30	16	APR	1980	2034	85.414308	-23.629185	63	3	27	140	75.0	29.0
30	16	APR	1980	2220	85.414642	-23.639885	68	3	23	140	75.0	71.0
30	16	APR	1980	2348	85.413209	-23.629086	69	3	29	190	77.0	26.0
30	17	APR	1980	7	85.413090	-23.653820	76	3	32	140	51.0	118.0
30	17	APR	1980	340	85.410614	-23.607063	83	3	30	140	72.0	122.0
30	17	APR	1980	528	85.411118	-23.635326	75	3	27	140	84.0	51.0
30	17	APR	1980	715	85.410233	-23.648808	71	3	27	140	82.0	33.0
30	17	APR	1980	902	85.409607	-23.648144	73	3	25	140	65.0	39.0
30	17	APR	1980	1049	85.407394	-23.668873	79	3	27	140	77.0	77.0
30	17	APR	1980	1210	85.401581	-23.599850	71	3	31	140	52.0	59.0
30	17	APR	1980	1756	85.400421	-23.592316	65	3	33	140	52.0	28.0
30	17	APR	1980	1942	85.398056	-23.570576	62	3	31	140	47.0	18.0
30	17	APR	1980	2129	85.395137	-23.540146	65	3	24	140	49.0	31.0
30	17	APR	1980	2315	85.391074	-23.509254	72	3	22	140	58.0	83.0
30	18	APR	1980	435	85.371124	-23.709824	77	3	31	140	58.0	59.0
30	18	APR	1980	622	85.361518	-23.707792	72	3	31	140	78.0	35.0
30	18	APR	1980	753	85.353333	-23.880460	76	3	31	190	53.0	89.0
30	18	APR	1980	810	85.349945	-23.842545	71	3	32	140	56.0	18.0
30	18	APR	1980	940	85.341432	-23.934025	70	3	34	190	57.0	38.0
30	18	APR	1980	957	85.330563	-23.939377	75	3	35	140	52.0	41.0
30	18	APR	1980	1128	85.328079	-24.000557	68	3	35	190	62.0	27.0
30	18	APR	1980	1144	85.321148	-24.118492	63	4	24	140	83.0	132.0
30	18	APR	1980	1315	85.313243	-24.0733154	67	3	33	190	65.0	32.0
30	18	APR	1980	1704	85.283800	-24.170126	50	3	27	140	60.0	39.0
30	18	APR	1980	1811	85.278700	-24.227032	71	4	32	200	78.0	72.0
30	18	APR	1980	1850	85.272014	-24.251320	62	3	24	140	70.0	17.0
30	18	APR	1980	2037	85.261398	-24.300665	63	3	23	140	74.0	37.0
30	18	APR	1980	2210	85.247070	-24.334603	70	4	35	190	78.0	42.0
30	18	APR	1980	2223	85.249374	-24.350053	67	4	22	140	63.0	66.0
30	18	APR	1980	2328	85.243332	-24.451214	74	3	22	200	72.0	131.0
30	19	APR	1980	114	85.227707	-24.457390	66	3	34	200	66.0	40.0
30	19	APR	1980	143	85.220304	-24.456650	64	4	21	190	86.0	48.0
30	19	APR	1980	300	85.219204	-24.503540	63	3	29	200	61.0	25.0
30	19	APR	1980	440	85.208934	-24.553009	65	3	30	200	47.0	25.0
30	19	APR	1980	632	85.199310	-24.610352	72	4	27	200	67.0	63.0
30	19	APR	1980	703	85.198502	-24.6057721	82	4	31	190	48.0	123.0
30	19	APR	1980	718	85.197342	-24.610559	70	4	27	140	61.0	19.0
30	19	APR	1980	850	85.190048	-24.607023	72	3	78	190	88.0	50.0
30	19	APR	1980	905	85.187144	-24.6057403	72	4	22	140	77.0	26.0
30	19	APR	1980	1038	85.181503	-24.6090533	67	3	26	190	73.0	52.0
30	19	APR	1980	1052	85.174988	-24.7150664	78	4	24	140	72.0	66.0
30	19	APR	1980	1143	85.173474	-24.671272	72	4	29	200	80.0	81.0
30	19	APR	1980	1220	85.173000	-24.723022	66	3	35	190	62.0	24.0
30	19	APR	1980	1334	85.167230	-24.732956	65	4	33	200	60.0	29.0
30	19	APR	1980	1413	85.166540	-24.773427	69	4	34	190	62.0	44.0
30	19	APR	1980	1518	85.151270	-24.775528	64	4	27	200	65.0	21.0
30	19	APR	1980	1704	85.130017	-24.811172	68	4	30	200	64.0	37.0
30	19	APR	1980	1849	85.131170	-24.833103	74	4	22	200	81.0	108.0

SN	DY	MCM	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDY
30	19	APR	1980	2121	86.144440	-24.843090	71	4	27	190	90.0	64.0
30	20	APR	1980	6	86.139160	-24.896343	70	4	31	200	48.0	43.0
30	20	APR	1980	152	86.134644	-24.897793	63	4	30	200	44.0	22.0
30	20	APR	1980	240	86.133072	-24.900146	72	4	29	190	69.0	80.0
30	20	APR	1980	338	86.130173	-24.900627	63	4	32	200	65.0	24.0
30	20	APR	1980	710	86.124969	-24.923019	75	4	30	200	48.0	70.0
30	20	APR	1980	1323	86.119522	-24.8471510	67	4	31	190	64.0	30.0
30	20	APR	1980	1411	86.119171	-24.849266	64	3	26	200	61.0	23.0
30	20	APR	1980	1556	86.118973	-24.853607	64	4	27	200	60.0	19.0
30	20	APR	1980	1741	86.118973	-24.846935	69	4	28	200	63.0	52.0
30	20	APR	1980	2258	86.118011	-24.821983	76	4	28	200	47.0	75.0
30	21	APR	1980	4	86.117561	-24.820023	66	4	27	190	43.0	28.0
30	21	APR	1980	44	86.117111	-24.816063	66	3	29	200	43.0	30.0
30	21	APR	1980	230	86.116028	-24.801323	62	3	28	200	49.0	22.0
30	21	APR	1980	748	86.114273	-24.751158	79	4	26	200	57.0	108.0
30	21	APR	1980	859	86.113968	-24.7563058	71	3	27	190	49.0	53.0
30	21	APR	1980	1046	86.113358	-24.763788	66	3	28	190	54.0	29.0
30	21	APR	1980	1234	86.111115	-24.758381	65	4	32	190	86.0	38.0
30	21	APR	1980	1304	86.110809	-24.747982	66	4	33	200	61.0	35.0
30	21	APR	1980	1421	86.109085	-24.763276	70	4	31	190	56.0	47.0
30	21	APR	1980	1449	86.108612	-24.761271	63	4	31	200	62.0	20.0
30	21	APR	1980	1608	86.105891	-24.797169	78	4	28	190	54.0	90.0
30	21	APR	1980	1634	86.105442	-24.770222	65	4	32	200	69.0	33.0
30	21	APR	1980	1819	86.103516	-24.779282	72	4	33	200	58.0	60.0
30	21	APR	1980	2256	86.097556	-24.797398	63	4	28	130	47.0	17.0
30	21	APR	1980	2336	86.097108	-24.798473	71	4	31	200	46.0	51.0
30	22	APR	1980	102	86.094208	-24.806271	68	4	33	190	86.0	37.0
30	22	APR	1980	122	86.094254	-24.807068	64	4	31	200	57.0	31.0
30	22	APR	1980	308	86.090790	-24.812637	62	4	33	200	50.0	19.0
30	22	APR	1980	454	86.087296	-24.824417	65	4	32	200	48.0	28.0
30	22	APR	1980	640	86.084122	-24.840130	73	4	27	200	58.0	63.0
30	22	APR	1980	751	86.082541	-24.824876	73	4	22	130	54.0	41.0
30	22	APR	1980	1145	86.073715	-24.848267	64	4	28	190	66.0	31.0
30	22	APR	1980	1332	86.069695	-24.8863014	67	4	30	190	53.0	29.0
30	22	APR	1980	1520	86.063690	-24.871867	71	4	33	190	65.0	76.0
30	22	APR	1980	2728	86.048297	-24.850758	78	4	25	200	55.0	96.0
30	23	APR	1980	40	86.037277	-24.802448	70	4	32	130	54.0	52.0
30	23	APR	1980	844	86.016491	-24.791023	63	4	22	130	54.0	33.0
30	23	APR	1980	1745	86.984624	-24.771381	73	5	25	130	59.0	116.0
30	23	APR	1980	1950	86.964894	-24.844499	60	4	26	140	51.0	21.0
30	24	APR	1980	610	86.951009	-24.823876	70	4	20	200	49.0	47.0
30	24	APR	1980	1117	86.930989	-24.900276	72	4	30	200	48.0	52.0
30	24	APR	1980	1312	86.947311	-24.891221	74	4	32	200	57.0	28.0
30	24	APR	1980	1457	86.943151	-24.892796	62	4	32	200	62.0	20.0
30	24	APR	1980	1526	86.941277	-24.897484	71	4	23	140	72.0	57.0
30	24	APR	1980	1842	86.939265	-24.918747	65	4	24	200	58.0	37.0
30	24	APR	1980	1712	86.937729	-24.912186	63	4	27	140	52.0	29.0
30	24	APR	1980	1827	86.935604	-24.908245	73	4	32	200	70.0	81.0
30	24	APR	1980	1953	86.933635	-24.906065	60	4	28	140	57.0	23.0
30	24	APR	1980	2044	86.930573	-24.911419	62	4	14	140	81.0	46.0
30	24	APR	1980	2344	86.923452	-24.906998	69	4	29	200	45.0	42.0
30	25	APR	1980	130	86.919312	-24.847460	62	4	30	200	48.0	23.0
30	25	APR	1980	316	86.914516	-24.894757	61	4	29	200	46.0	18.0
30	25	APR	1980	962	86.910172	-24.8901123	55	4	23	200	71.0	37.0
30	25	APR	1980	1046	86.904724	-24.910443	74	4	26	200	36.0	52.0
30	25	APR	1980	1019	86.893042	-24.923227	74	5	26	200	79.0	125.0
30	25	APR	1980	1100	86.884004	-24.927846	79	5	24	140	68.0	76.0
30	25	APR	1980	1204	86.883720	-24.946214	64	4	30	200	64.0	45.0
30	25	APR	1980	1349	86.880173	-24.935281	62	4	31	200	53.0	20.0
30	25	APR	1980	1534	86.873322	-24.912008	62	4	32	200	55.0	20.0
30	25	APR	1980	1719	86.865677	-24.778804	67	4	24	200	60.0	42.0
30	25	APR	1980	1904	86.857727	-24.726142	17	5	30	200	67.0	113.0
30	25	APR	1980	2236	86.849473	-24.718651	75	4	26	200	62.0	62.0
30	26	APR	1980	22	86.833601	-24.869933	65	4	26	200	47.0	33.0
30	26	APR	1980	195	86.830536	-24.8552916	72	4	20	110	63.0	88.0
30	26	APR	1980	208	86.825577	-24.836079	60	4	23	200	42.0	20.0
30	26	APR	1980	354	86.817027	-24.800314	61	4	26	200	44.0	18.0
30	26	APR	1980	440	86.814331	-24.8589136	64	4	21	110	77.0	17.0

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	26	APR	1980	540	85.810806	-24.587158	67	4	27	200	33.0	25.0
30	26	APR	1980	628	85.807724	-24.576530	68	4	22	110	53.0	24.0
30	26	APR	1980	726	85.804531	-24.591995	79	5	22	200	57.0	94.0
30	26	APR	1980	815	85.802567	-24.546093	77	5	21	110	72.0	90.0
30	26	APR	1980	1056	85.793961	-24.483604	72	4	31	200	59.0	71.0
30	26	APR	1980	1149	85.791260	-24.430588	77	5	22	110	76.0	122.0
30	26	APR	1980	1242	85.789581	-24.445057	64	4	28	200	38.0	22.0
30	26	APR	1980	1336	85.787628	-24.422512	68	4	23	110	71.0	40.0
30	26	APR	1980	1427	85.786163	-24.406994	61	4	22	200	56.0	19.0
30	26	APR	1980	1522	85.784042	-24.390221	63	4	25	110	66.0	17.0
30	26	APR	1980	1612	85.782150	-24.373051	62	4	30	200	59.0	27.0
30	26	APR	1980	1709	85.779526	-24.363293	63	4	25	110	63.0	26.0
30	26	APR	1980	1757	85.777719	-24.352016	70	4	31	200	63.0	58.0
30	26	APR	1980	1856	85.777206	-24.325111	69	4	23	110	82.0	70.0
30	26	APR	1980	1942	85.774597	-24.336609	81	7	24	200	59.0	129.0
30	26	APR	1980	2229	85.771667	-24.268227	87	8	25	110	41.0	42.0
30	27	APR	1980	100	85.769470	-24.256096	62	4	29	200	53.0	29.0
30	27	APR	1980	204	85.769531	-24.246319	67	4	22	110	41.0	27.0
30	27	APR	1980	246	85.768537	-24.243713	59	4	24	200	55.0	23.0
30	27	APR	1980	351	85.768372	-24.236427	64	4	24	110	46.0	18.0
30	27	APR	1980	432	85.767975	-24.239456	62	4	19	200	71.0	29.0
30	27	APR	1980	534	85.767426	-24.230198	65	4	21	110	50.0	23.0
30	27	APR	1980	618	85.767670	-24.229355	71	4	32	200	44.0	50.0
30	27	APR	1980	726	85.767303	-24.224472	73	4	26	110	45.0	45.0
30	27	APR	1980	1135	85.767365	-24.193863	68	4	28	200	63.0	49.0
30	27	APR	1980	1320	85.767593	-24.201916	61	4	31	200	51.0	21.0
30	27	APR	1980	1434	85.767258	-24.197483	65	4	26	110	70.0	26.0
30	27	APR	1980	1621	85.767334	-24.210339	63	4	25	110	56.0	20.0
30	27	APR	1980	1650	85.767776	-24.222336	64	4	18	200	56.0	40.0
30	27	APR	1980	1835	85.768921	-24.229698	74	5	20	200	64.0	99.0
30	28	APR	1980	303	85.768875	-24.245770	64	4	28	110	41.0	20.0
30	28	APR	1980	638	85.768333	-24.255215	69	4	30	110	42.0	30.0
30	28	APR	1980	825	85.769394	-24.265137	79	4	35	110	40.0	67.0
30	28	APR	1980	836	85.770630	-24.246761	66	6	13	190	65.0	70.0
30	28	APR	1980	1159	85.770676	-24.233696	76	5	31	110	45.0	67.0
30	28	APR	1980	1212	85.770036	-24.238453	65	4	19	200	65.0	40.0
30	28	APR	1980	1345	85.771362	-24.240780	77	5	23	190	88.0	123.0
30	28	APR	1980	1714	85.772544	-24.254265	64	4	34	110	54.0	21.0
30	28	APR	1980	2106	85.783371	-24.279971	67	4	31	190	75.0	42.0
30	28	APR	1980	2236	85.786743	-24.334877	70	4	30	190	55.0	68.0
30	28	APR	1980	34	85.791309	-24.351597	65	4	25	190	63.0	35.0
30	28	APR	1980	731	85.810456	-24.430369	68	4	23	190	72.0	28.0
30	28	APR	1980	1121	85.826233	-24.456836	62	4	30	190	59.0	22.0
30	28	APR	1980	1256	85.824446	-24.465088	63	4	16	200	67.0	33.0
30	28	APR	1980	1304	85.831314	-24.471619	65	4	29	190	65.0	32.0
30	28	APR	1980	1450	85.835642	-24.483456	73	4	31	190	62.0	68.0
30	28	APR	1980	1625	85.838446	-24.496409	64	4	24	190	45.0	33.0
30	28	APR	1980	2144	85.859921	-24.553661	66	4	21	190	43.0	34.0
30	28	APR	1980	2203	85.851044	-24.540314	65	4	27	190	81.0	33.0
30	30	APR	1980	136	85.857407	-24.603725	69	4	28	190	90.0	53.0
30	30	APR	1980	451	85.855756	-24.617401	71	4	20	190	75.0	37.0
30	30	APR	1980	657	85.869263	-24.639847	77	4	17	190	69.0	133.0
30	30	APR	1980	844	85.872104	-24.680595	68	4	35	190	52.0	36.0
30	30	APR	1980	1032	85.875275	-24.713837	63	4	25	190	83.0	36.0
30	30	APR	1980	1159	85.877476	-24.732903	69	4	20	130	45.0	25.0
30	30	APR	1980	1219	85.878250	-24.739990	63	4	33	190	58.0	24.0
30	30	APR	1980	1406	85.886026	-24.759989	69	4	31	190	60.0	47.0
30	30	APR	1980	1532	85.881073	-24.781601	67	4	19	190	79.0	58.0
30	30	APR	1980	1554	85.882946	-24.808041	79	4	34	190	56.0	123.0
30	30	APR	1980	1658	85.882531	-24.839245	66	4	22	200	59.0	43.0
30	30	APR	1980	1718	85.883484	-24.835419	61	4	19	190	61.0	35.0
30	30	APR	1980	1843	85.884427	-24.905361	76	5	28	200	56.0	93.0
30	30	APR	1980	1906	85.885223	-24.882156	60	4	26	190	54.0	21.0
30	30	APR	1980	2114	85.888162	-24.924890	67	4	28	190	73.0	37.0
30	30	APR	1980	2214	85.889601	-24.940411	75	4	26	200	38.0	65.0
30	1	MAY	1980	0	85.8941876	-24.949016	66	4	23	200	31.0	29.0
30	1	MAY	1980	47	85.8942197	-25.019970	66	4	25	190	87.0	41.0
30	1	MAY	1980	146	85.895366	-25.032555	60	4	24	200	34.0	16.0

FRAM 2

NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDZ
30	1	MAY	1980	332	45.8984483	-25.0662665	61	4	29	200	43.0	19.0
30	1	MAY	1980	518	45.9005574	-25.0978881	67	4	27	200	33.0	27.0
30	1	MAY	1980	704	45.9021130	-25.1228803	78	4	29	200	26.0	53.0
30	1	MAY	1980	922	45.9037332	-25.1257855	66	4	18	130	69.0	26.0
30	1	MAY	1980	942	45.9032290	-25.1281113	64	4	27	190	61.0	35.0
30	1	MAY	1980	1035	45.903854	-25.1192444	73	4	26	200	54.0	78.0
30	1	MAY	1980	1220	45.9038835	-25.125130	64	4	31	200	63.0	36.0
30	1	MAY	1980	1317	45.9039331	-25.137310	66	4	31	190	53.0	33.0
30	1	MAY	1980	1405	45.9038225	-25.125034	61	4	23	200	48.0	16.0
30	1	MAY	1980	1441	45.902512	-25.109104	72	4	30	140	56.0	71.0
30	1	MAY	1980	1504	45.902725	-25.140793	74	4	32	190	57.0	75.0
30	1	MAY	1980	1520	45.902344	-25.123104	62	4	30	200	45.0	20.0
30	1	MAY	1980	1628	45.901398	-25.115551	64	4	24	140	53.0	32.0
30	1	MAY	1980	1736	45.900467	-25.110062	69	4	29	200	62.0	56.0
30	1	MAY	1980	1814	45.8985449	-25.106712	60	4	23	140	65.0	33.0
30	1	MAY	1980	2000	45.895355	-25.091576	61	4	27	140	54.0	21.0
30	1	MAY	1980	2212	45.889533	-25.070244	65	4	27	190	69.0	24.0
30	1	MAY	1980	2252	45.888977	-25.076778	70	4	29	200	43.0	50.0
30	1	MAY	1980	2358	45.885834	-25.080994	65	4	26	190	72.0	29.0
30	2	MAY	1980	38	45.885590	-25.082321	62	4	29	200	41.0	22.0
30	2	MAY	1980	224	45.882757	-25.0982254	60	4	30	200	39.0	15.0
30	2	MAY	1980	306	45.882401	-25.0923316	79	5	18	140	88.0	130.0
30	2	MAY	1980	410	45.879544	-25.097542	62	4	31	200	47.0	25.0
30	2	MAY	1980	454	45.878677	-25.096096	71	4	24	140	69.0	49.0
30	2	MAY	1980	556	45.875519	-25.102184	71	4	30	200	31.0	35.0
30	2	MAY	1980	641	45.873459	-25.070049	68	4	22	140	72.0	23.0
30	2	MAY	1980	828	45.867142	-25.032784	70	4	36	140	52.0	27.0
30	2	MAY	1980	1015	45.860401	-25.003113	78	4	22	140	71.0	72.0
30	2	MAY	1980	1040	45.860321	-24.942459	62	4	24	190	67.0	26.0
30	2	MAY	1980	1113	45.859100	-24.913364	69	4	25	200	46.0	40.0
30	2	MAY	1980	1252	45.855299	-24.848213	61	4	29	200	40.0	17.0
30	2	MAY	1980	1349	45.852145	-24.762959	77	5	26	140	66.0	117.0
30	2	MAY	1980	1415	45.850525	-24.805630	70	4	24	190	67.0	46.0
30	2	MAY	1980	1443	45.851700	-24.765816	60	4	29	200	47.0	15.0
30	2	MAY	1980	1536	45.848541	-24.713131	67	4	29	140	37.0	32.0
30	2	MAY	1980	1722	45.844101	-24.635555	61	4	31	140	42.0	17.0
30	2	MAY	1980	1813	45.842331	-24.557074	74	5	25	200	72.0	101.0
30	2	MAY	1980	1908	45.839447	-24.551331	60	4	31	140	45.0	17.0
30	2	MAY	1980	1938	45.837400	-24.523285	73	4	27	190	71.0	71.0
30	2	MAY	1980	2054	45.834157	-24.456431	64	4	30	140	57.0	41.0
30	2	MAY	1980	2123	45.832444	-24.449780	60	4	31	190	64.0	24.0
30	2	MAY	1980	2241	45.824773	-24.380505	72	4	24	140	42.0	63.0
30	2	MAY	1980	2309	45.822673	-24.371355	63	4	33	190	68.0	20.0
30	2	MAY	1980	2330	45.820534	-24.359203	60	4	20	200	52.0	56.0
30	2	MAY	1980	116	45.822413	-24.283657	60	4	31	200	32.0	13.0
30	3	MAY	1980	302	45.814771	-24.222350	60	4	28	200	45.0	14.0
30	3	MAY	1980	401	45.810711	-24.160466	73	4	23	140	82.0	75.0
30	3	MAY	1980	448	45.810674	-24.163128	65	4	19	200	51.0	36.0
30	3	MAY	1980	543	45.812592	-24.120331	70	4	26	140	61.0	37.0
30	3	MAY	1980	634	45.810337	-24.122219	75	4	28	200	37.0	59.0
30	3	MAY	1980	803	45.807663	-24.039513	69	4	26	140	56.0	55.0
30	3	MAY	1980	923	45.802411	-24.028698	75	4	30	140	80.0	58.0
30	3	MAY	1980	930	45.802564	-25.098188	63	4	29	190	66.0	32.0
30	3	MAY	1980	1005	45.802277	-23.953552	75	5	20	200	65.0	20.0
30	3	MAY	1980	1138	45.797450	-23.930060	62	4	32	190	59.0	23.0
30	3	MAY	1980	1320	45.792221	-23.887694	70	4	27	190	82.0	36.0
30	3	MAY	1980	1414	45.785581	-23.828175	70	4	30	140	60.0	65.0
30	3	MAY	1980	1513	45.780404	-23.866730	76	4	32	190	55.0	27.0
30	3	MAY	1980	1630	45.774407	-23.797407	62	4	34	140	46.0	25.0
30	3	MAY	1980	1715	45.779353	-23.760350	69	4	30	140	55.0	16.0
30	3	MAY	1980	2002	45.775737	-23.720474	61	4	33	140	49.0	24.0
30	3	MAY	1980	2034	45.773544	-23.706534	68	4	32	190	76.0	43.0
30	3	MAY	1980	2149	45.771240	-23.669273	63	4	24	140	48.0	48.0
30	3	MAY	1980	2220	45.770554	-23.667698	63	4	26	190	79.0	32.0
30	3	MAY	1980	2335	45.768942	-23.608303	79	5	33	140	38.0	125.0
30	4	MAY	1980	309	45.763240	-23.513618	76	4	34	140	57.0	59.0
30	4	MAY	1980	456	45.760370	-23.469201	60	4	29	140	52.0	26.0
30	4	MAY	1980	644	45.757570	-23.434052	67	4	27	140	59.0	16.0

FRAM 2

NAVIGATION - ORIGINAL

SN	DY	MON	YEAR	GMT	LATITUDE	LONGITUDE	EL	I	DP	SAT	STDY	STDX
30	4	MAY	1980	831	85.755060	-23.398399	71	4	30	140	57.0	30.0
30	4	MAY	1980	1018	85.751968	-23.375206	90	5	33	140	65.0	83.0

Kalman Filtering of Position Data

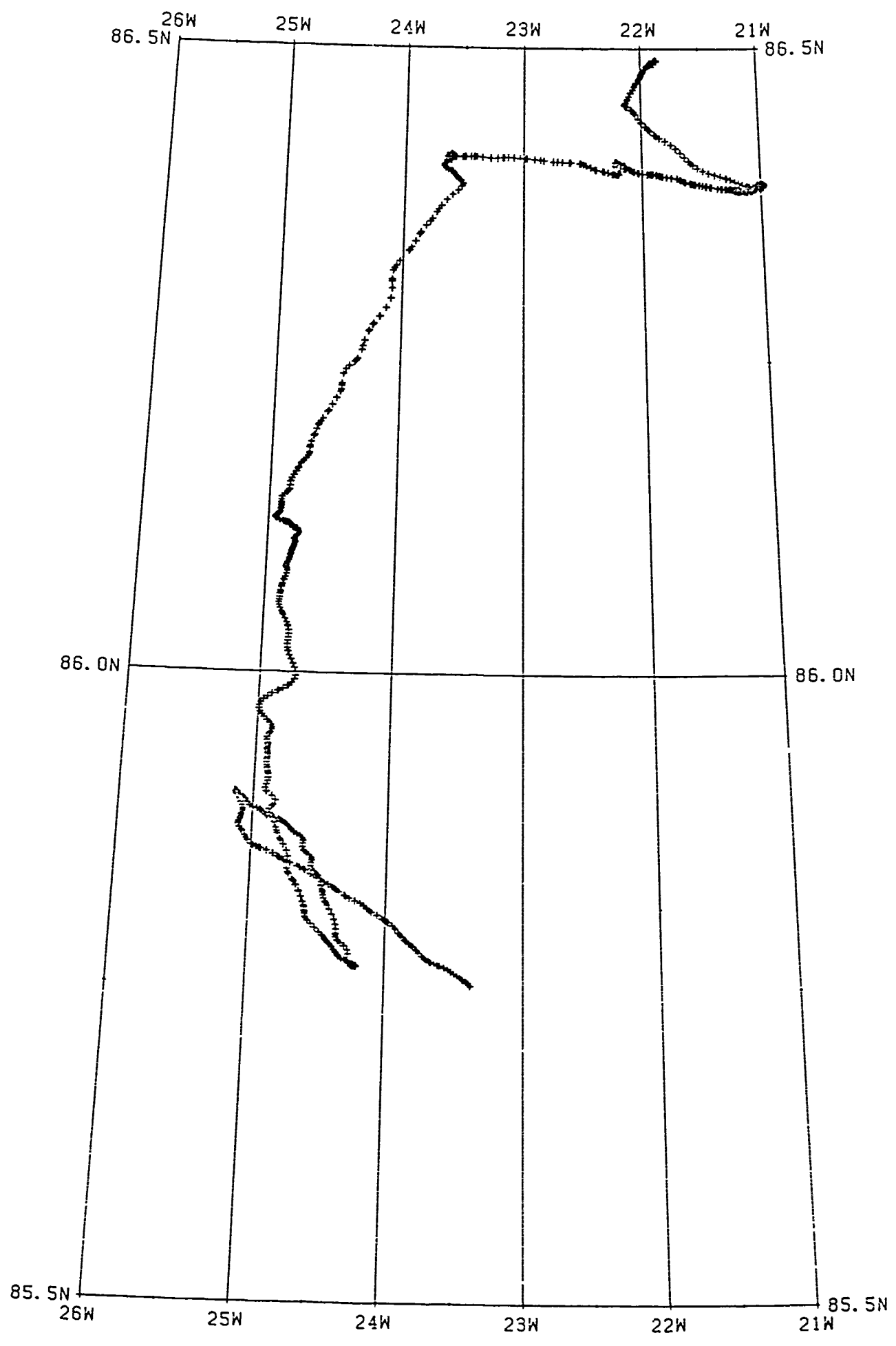
A Kalman filtering technique was used on the FRAM II navigation data set. At FRAM II the density of the fixes ranged from 7 to 29 per day. The main purpose of the filter was to smooth the track and provide fixes at evenly-spaced time intervals of one hour. In addition, ice velocities were computed at the same evenly-spaced intervals. More detail on the Kalman filtering techniques for irregularly-spaced data sets is given in Thorndike and Manley (1980). Removal of oscillations in the ice motion with periods greater than that of the inertial period was estimated to be less than 5%.

SMOOTHED HOURLY POSITIONS AND ICE VELOCITIES OF THE FRAM II DRIFTING STATION

Key to column headings

DY	Day
MON	Month
YEAR	Year
GMT	Greenwich mean time
JULDAY	Relative Julian Day, Day 1 = Jan 01, 1980
LATITUDE	North latitude in decimal degrees
LONGITUDE	Longitude in decimal degrees, (negative implies west longitude)
N-VEL	North-South component of ice velocity (cm/sec) positive values indicate north velocity negative values indicate south velocity
E-VEL	East-West component of ice velocity (cm/sec) positive values indicate east velocity negative values indicate west velocity

Note that along with the evenly spaced data is the filtered original data with associated ice velocity.



FRA 4 2 NAVIGATION - KAUMAN

DY	MON	YEAR	GHT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
1	APR	1980	1215	92.510414	80.489861	-21.8633552	0.0	-0.1
1	APR	1980	1255	92.538200	80.489868	-21.8640440	0.1	-0.2
1	APR	1980	1300	92.541604	80.489868	-21.864128	0.1	-0.2
1	APR	1980	1400	92.583330	80.489975	-21.865515	0.5	-0.3
1	APR	1980	1500	92.625000	80.490196	-21.866909	0.8	-0.3
1	APR	1980	1600	92.666664	80.490448	-21.868843	0.7	-0.5
1	APR	1980	1700	92.708336	80.490570	-21.872696	0.0	-1.5
1	APR	1980	1800	92.750000	80.490410	-21.879305	-1.0	-1.5
1	APR	1980	1900	92.791664	80.489952	-21.887589	-1.8	-1.5
1	APR	1980	1922	92.806940	80.489731	-21.890377	-2.0	-1.3
1	APR	1980	2000	92.833330	80.489311	-21.894093	-2.0	-0.8
1	APR	1980	2100	92.875000	80.488754	-21.8935607	-1.2	0.2
1	APR	1980	2108	92.880554	80.488708	-21.895451	-1.0	0.3
1	APR	1980	2125	92.892365	80.488640	-21.894918	-0.5	0.4
1	APR	1980	2151	92.910423	80.488617	-21.893978	0.2	0.3
1	APR	1980	2200	92.916664	80.488632	-21.893787	0.4	0.2
1	APR	1980	2254	92.954163	80.488831	-21.893911	0.6	0.0
1	APR	1980	2300	92.958330	80.488845	-21.893996	0.5	0.0
2	APR	1980	0	93.000000	80.488823	-21.8942279	-0.7	0.6
2	APR	1980	41	93.023473	80.488609	-21.890369	-1.2	0.2
2	APR	1980	100	93.041664	80.488480	-21.890451	-1.3	-0.4
2	APR	1980	100	93.041664	80.488480	-21.890451	-1.3	-0.4
2	APR	1980	124	93.058327	80.488297	-21.892197	-1.4	-1.3
2	APR	1980	200	93.083330	80.487991	-21.898684	-1.8	-2.3
2	APR	1980	247	93.115974	80.487488	-21.912905	-2.1	-3.8
2	APR	1980	300	93.125000	80.487343	-21.917255	-2.0	-3.8
2	APR	1980	310	93.131950	80.487236	-21.920582	-2.0	-3.7
2	APR	1980	400	93.155664	80.486771	-21.935047	-1.3	-2.5
2	APR	1980	500	93.208330	80.486389	-21.943544	-1.5	-1.0
2	APR	1980	600	93.250000	80.485497	-21.950182	-4.3	-1.0
2	APR	1980	602	93.251396	80.485451	-21.950525	-4.5	-2.0
2	APR	1980	700	93.241664	80.483551	-21.965629	-7.3	-3.5
2	APR	1980	748	93.325005	80.481502	-21.986520	-8.1	-3.5
2	APR	1980	800	93.333330	80.481003	-21.984137	-8.6	-3.3
2	APR	1980	809	93.334577	80.480666	-21.985692	-8.0	-3.3
2	APR	1980	831	93.354358	80.479652	-21.992361	-8.0	-2.7
2	APR	1980	900	93.375000	80.478388	-21.998875	-8.1	-2.5
2	APR	1980	936	93.400002	80.476768	-22.007435	-8.0	-3.1
2	APR	1980	1000	93.416664	80.475724	-22.014843	-8.0	-3.6
2	APR	1980	1014	93.424166	80.474709	-22.021484	-9.0	-4.5
2	APR	1980	1100	93.455330	80.472481	-22.038750	-9.7	-4.5
2	APR	1980	1123	93.471304	80.471313	-22.047960	-9.0	-4.7
2	APR	1980	1200	93.500000	80.469624	-22.057117	-8.0	-2.7
2	APR	1980	1270	93.534173	80.468260	-22.056535	-7.4	-2.6
2	APR	1980	1300	93.541664	80.467068	-22.070693	-7.4	-2.6
2	APR	1980	1353	93.573507	80.464745	-22.086753	-5.5	-3.7
2	APR	1980	1400	93.583330	80.464417	-22.089066	-5.5	-3.8
2	APR	1980	1500	93.625000	80.461563	-22.107941	-9.1	-3.0
2	APR	1980	1541	93.653473	80.459541	-22.117062	-9.1	-2.2
2	APR	1980	1600	93.666664	80.458618	-22.120687	-8.5	-2.3
2	APR	1980	1644	93.697227	80.458083	-22.130297	-7.1	-2.8
2	APR	1980	1700	93.708330	80.456116	-22.134251	-7.0	-2.8
2	APR	1980	1704	93.711113	80.455985	-22.135731	-5.9	-2.8
2	APR	1980	1723	93.727770	80.455315	-22.140276	-4.5	-1.4
2	APR	1980	1800	93.750000	80.454059	-22.141582	-3.3	1.0
2	APR	1980	1830	93.770830	80.454109	-22.135389	-3.7	1.3
2	APR	1980	1850	93.78721	80.453659	-22.127880	-4.0	1.1
2	APR	1980	1900	93.791664	80.453392	-22.123232	-5.2	1.5
2	APR	1980	2000	93.833330	80.451050	-22.066666	-5.3	1.7
2	APR	1980	2016	93.844444	80.450184	-22.075059	-10.5	1.7
2	APR	1980	2037	93.854032	80.449444	-22.062193	-11.5	1.3
2	APR	1980	2100	93.875000	80.447487	-22.048744	-11.7	1.0
2	APR	1980	2101	93.875004	80.447420	-22.048529	-11.7	1.0
2	APR	1980	2200	93.900004	80.443810	-22.024757	-10.0	1.3
2	APR	1980	2202	93.915006	80.443687	-22.023477	-10.4	1.4
2	APR	1980	2244	93.950000	80.441071	-22.003477	-10.2	1.5
2	APR	1980	2300	93.953330	80.440414	-21.997126	-10.0	1.5
2	APR	1980	2344	93.982303	80.437775	-21.988329	-10.2	1.5

FRA 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
3	APR	1980	0	94.000000	80.437164	-21.961967	-10.4	6.6
3	APR	1980	35	94.024300	80.435188	-21.942602	-10.3	6.3
3	APR	1980	100	94.041664	80.433823	-21.928900	-9.8	6.4
3	APR	1980	158	94.081940	80.430992	-21.894011	-8.3	7.7
3	APR	1980	200	94.083336	80.430901	-21.892673	-8.3	7.7
3	APR	1980	221	94.097923	80.429985	-21.878004	-7.9	8.4
3	APR	1980	300	94.125000	80.426366	-21.848238	-7.5	9.1
3	APR	1980	400	94.160000	80.425896	-21.799598	-7.9	9.3
3	APR	1980	500	94.208336	80.423157	-21.753122	-9.0	8.5
3	APR	1980	600	94.250000	80.420044	-21.711363	-10.1	7.5
3	APR	1980	700	94.291664	80.416641	-21.674311	-10.8	6.8
3	APR	1980	800	94.333336	80.413139	-21.639946	-10.7	6.6
3	APR	1980	900	94.375000	80.409790	-21.605410	-9.9	6.9
3	APR	1980	929	94.395142	80.408287	-21.587645	-9.3	7.2
3	APR	1980	1000	94.416664	80.406784	-21.568174	-8.6	7.5
3	APR	1980	1100	94.458336	80.404213	-21.527239	-7.2	8.3
3	APR	1980	1200	94.500000	80.402077	-21.482655	-5.9	8.9
3	APR	1980	1300	94.541664	80.400322	-21.435436	-5.0	9.3
3	APR	1980	1400	94.583336	80.398827	-21.387274	-4.3	9.9
3	APR	1980	1500	94.625000	80.397461	-21.340115	-4.1	9.9
3	APR	1980	1600	94.666664	80.396116	-21.295704	-4.2	8.3
3	APR	1980	1615	94.677080	80.395782	-21.285183	-4.2	8.1
3	APR	1980	1700	94.708336	80.394745	-21.255152	-4.3	7.5
3	APR	1980	1800	94.750000	80.393364	-21.218567	-4.2	7.7
3	APR	1980	1900	94.791664	80.392052	-21.185303	-3.8	8.2
3	APR	1980	2000	94.833336	80.390915	-21.154301	-3.1	8.9
3	APR	1980	2100	94.875000	80.390068	-21.124529	-2.1	9.7
3	APR	1980	2134	94.8843613	80.389748	-21.107935	-1.5	9.7
3	APR	1980	2200	94.916664	80.389572	-21.095356	-1.0	9.6
3	APR	1980	2300	94.958336	80.389404	-21.086914	-0.0	9.4
3	APR	1980	2346	94.949273	80.389450	-21.046190	0.4	9.1
4	APR	1980	0	95.000000	80.389488	-21.040155	0.6	9.0
4	APR	1980	100	95.041664	80.389732	-21.016144	0.9	8.3
4	APR	1980	200	95.083336	80.390068	-20.996176	1.1	8.4
4	APR	1980	300	95.125000	80.390419	-20.981464	1.1	8.3
4	APR	1980	400	95.166664	80.390739	-20.972895	0.9	8.0
4	APR	1980	500	95.208336	80.390999	-20.970860	0.7	8.2
4	APR	1980	600	95.250000	80.391182	-20.975151	0.4	8.4
4	APR	1980	700	95.291664	80.391289	-20.984797	0.2	8.3
4	APR	1980	800	95.333336	80.391314	-20.9947029	0.0	8.7
4	APR	1980	839	95.369413	80.391268	-21.007087	-0.2	8.7
4	APR	1980	900	95.375000	80.391273	-21.011932	-0.2	8.9
4	APR	1980	1000	95.416664	80.391174	-21.024122	-0.4	8.9
4	APR	1980	1100	95.458336	80.391022	-21.030626	-0.5	8.5
4	APR	1980	1200	95.500000	80.390816	-21.027427	-0.7	8.3
4	APR	1980	1214	95.504727	80.390762	-21.027656	-0.7	8.3
4	APR	1980	1300	95.541664	80.390564	-21.017172	-0.9	8.4
4	APR	1980	1400	95.583336	80.390244	-20.999954	-1.1	8.5
4	APR	1980	1500	95.625000	80.389647	-20.983952	-1.4	8.5
4	APR	1980	1600	95.666664	80.389360	-20.976917	-1.6	8.1
4	APR	1980	1700	95.708336	80.388869	-20.964728	-1.8	8.1
4	APR	1980	1800	95.750000	80.388222	-21.008715	-1.8	8.0
4	APR	1980	1900	95.791664	80.387680	-21.043056	-1.5	8.9
4	APR	1980	1932	95.813596	80.387451	-21.051119	-1.2	8.2
4	APR	1980	2000	95.833336	80.387299	-21.071610	-0.8	8.9
4	APR	1980	2046	95.833273	80.387177	-21.085513	-0.2	8.7
4	APR	1980	2100	95.875000	80.387161	-21.099064	-0.1	8.7
4	APR	1980	2200	95.916664	80.387135	-21.085634	-0.3	8.5
4	APR	1980	2205	95.920135	80.387123	-21.084961	-0.4	8.5
4	APR	1980	2257	95.950745	80.386919	-21.079454	-1.0	8.7
4	APR	1980	2300	95.983336	80.386894	-21.079277	-1.0	8.7
4	APR	1980	2325	95.975799	80.386719	-21.078485	-1.1	8.1
4	APR	1980	2352	95.994413	80.386581	-21.078503	-1.1	8.1
5	APR	1980	0	96.000000	80.386530	-21.078583	-1.1	8.1
5	APR	1980	20	96.013885	80.386424	-21.078889	-0.9	8.2
5	APR	1980	44	96.033550	80.386322	-21.079457	-0.7	8.4
5	APR	1980	100	96.041664	80.386280	-21.079692	-0.6	8.4
5	APR	1980	200	96.043316	80.386136	-21.0844032	-0.4	8.3

DAY	MONTH	YEAR	GAI	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
0	APR	1980	207	90.088190	00.286124	-21.064896	-0.4	-1.5
0	APR	1980	230	90.104104	00.380070	-21.088530	-0.5	-1.5
0	APR	1980	257	90.122917	00.385994	-21.094450	-0.6	-2.0
0	APR	1980	300	90.125000	00.385979	-21.095230	-0.8	-3.0
0	APR	1980	354	90.152498	00.385911	-21.111151	-0.4	-3.5
0	APR	1980	400	90.165504	00.385796	-21.112925	-0.3	-3.4
0	APR	1980	416	90.177773	00.385788	-21.117422	0.0	-3.1
0	APR	1980	500	90.203336	00.385895	-21.126774	0.8	-1.6
0	APR	1980	511	90.215973	00.385948	-21.128099	1.0	-1.1
0	APR	1980	600	90.250000	00.380246	-21.130360	0.9	-0.5
0	APR	1980	629	90.270142	00.386337	-21.132395	0.2	-1.1
0	APR	1980	658	90.290270	00.386307	-21.137115	0.5	-2.3
0	APR	1980	700	90.291664	00.386307	-21.137558	-0.5	-2.6
0	APR	1980	800	90.333330	00.386086	-21.152769	-0.4	-2.3
0	APR	1980	815	90.343750	00.386070	-21.155109	0.0	-1.4
0	APR	1980	846	90.365273	00.386116	-21.156818	0.4	-0.1
0	APR	1980	900	90.375000	00.385147	-21.156683	0.5	0.3
0	APR	1980	1000	90.410000	00.386284	-21.155228	0.2	-0.3
0	APR	1980	1100	90.453330	00.385292	-21.152106	0.0	-0.3
0	APR	1980	1124	90.474998	00.385292	-21.156986	0.0	-2.5
0	APR	1980	1200	90.500000	00.386322	-21.175615	0.2	-2.5
0	APR	1980	1220	90.513685	00.386345	-21.179099	0.2	-2.2
0	APR	1980	1300	90.541864	00.386398	-21.186249	0.3	-2.2
0	APR	1980	1312	90.549995	00.386421	-21.188467	0.3	-2.2
0	APR	1980	1331	90.560319	00.386458	-21.192291	0.5	-2.5
0	APR	1980	1400	90.583330	00.386551	-21.199131	0.7	-2.0
0	APR	1980	1500	90.625000	00.386909	-21.217061	1.5	-3.8
0	APR	1980	1500	90.625000	00.386909	-21.217001	1.5	-3.8
0	APR	1980	1515	90.635108	00.387047	-21.222345	1.7	-4.0
0	APR	1980	1554	90.662498	00.387428	-21.236385	1.9	-4.8
0	APR	1980	1600	90.665000	00.387469	-21.236880	1.8	-4.9
0	APR	1980	1624	90.683327	00.387711	-21.249676	1.5	-5.5
0	APR	1980	1647	90.696310	00.387856	-21.260895	0.6	-5.8
0	APR	1980	1700	90.705330	00.387901	-21.267399	0.4	-5.8
0	APR	1980	1700	90.705023	00.387901	-21.267902	0.4	-5.9
0	APR	1980	1740	90.735115	00.387901	-21.287541	0.3	-5.7
0	APR	1980	1800	90.750000	00.387671	-21.297012	-0.2	-5.4
0	APR	1980	1810	90.755950	00.387671	-21.301511	-0.1	-5.3
0	APR	1980	1840	90.781000	00.387955	-21.324543	1.1	-5.9
0	APR	1980	1820	90.805423	00.388199	-21.337955	1.9	-7.7
0	APR	1980	1900	90.833330	00.388320	-21.352892	2.7	-11.3
0	APR	1980	2100	90.875000	00.389572	-21.417122	2.8	-10.5
0	APR	1980	2113	90.881000	00.389753	-21.428907	2.7	-11.0
0	APR	1980	2144	90.905000	00.389750	-21.434155	2.2	-10.3
0	APR	1980	2200	90.915000	00.389343	-21.448484	2.2	-10.7
0	APR	1980	2200	90.915000	00.389343	-21.448484	2.2	-10.7
0	APR	1980	2230	90.937000	00.389447	-21.460995	1.2	-10.3
0	APR	1980	2300	90.955330	00.389654	-21.469375	1.2	-10.3
0	APR	1980	2354	90.995827	00.389122	-21.513809	1.0	-10.0
0	APR	1980	0	97.000000	00.389127	-21.517305	1.0	-10.0
0	APR	1980	40	97.003194	00.389178	-21.548895	2.0	-11.0
0	APR	1980	100	97.041804	00.389193	-21.557503	2.0	-11.0
0	APR	1980	112	97.054189	00.389212	-21.559533	1.8	-10.7
0	APR	1980	140	97.099390	00.389234	-21.584021	1.9	-10.7
0	APR	1980	200	97.095330	00.389286	-21.597244	2.2	-10.7
0	APR	1980	300	97.125000	00.389353	-21.599951	2.2	-10.7
0	APR	1980	305	97.124471	00.389353	-21.599116	2.4	-10.7
0	APR	1980	327	97.133745	00.389415	-21.603570	2.7	-10.6
0	APR	1980	400	97.150000	00.389500	-21.607200	2.2	-10.6
0	APR	1980	414	97.173103	00.389556	-21.613300	3.1	-10.6
0	APR	1980	453	97.213433	00.389673	-21.624044	3.8	-10.5
0	APR	1980	500	97.204330	00.389581	-21.708624	3.5	-10.4
0	APR	1980	600	97.250000	00.389727	-21.750291	1.3	-7.7
0	APR	1980	700	97.258173	00.389732	-21.755234	1.2	-7.4
0	APR	1980	754	97.291803	00.389750	-21.763377	1.4	-7.4
0	APR	1980	800	97.323103	00.389814	-21.762990	2.7	-9.6
0	APR	1980	900	97.333330	00.389820	-21.763000	2.2	-9.5
0	APR	1980	928	97.352775	00.389813	-21.764500	2.3	-9.4
0	APR	1980	948	97.350000	00.389857	-21.765482	2.2	-9.5

FPA 4 2 NAVIGATION - 1204A

DAY	MOON	YEAH	GAI	JULIOMI	LATITUDE	LONGITUDE	X-VEL.	S-VEL.
0	0	900	97.375000	80.398999	-21.860367	2.0	-5.3	
0	0	941	97.403473	80.399339	-21.876143	1.6	-4.9	
0	0	1000	97.416884	80.399551	-21.886095	1.4	-4.8	
0	0	1100	97.458336	80.399915	-21.908498	0.8	-3.8	
0	0	1128	97.477778	80.400002	-21.916954	0.4	-2.8	
0	0	1200	97.500000	80.400032	-21.923540	-0.1	-2.0	
0	0	1300	97.541554	80.399953	-21.934397	-0.1	-2.0	
0	0	1349	97.575891	80.400009	-21.952551	0.6	-5.8	
0	0	1400	97.583336	80.400047	-21.958435	0.8	-6.6	
0	0	1500	97.625000	80.400490	-21.974936	1.9	-8.3	
0	0	1536	97.650002	80.400925	-22.023764	2.4	-7.6	
0	0	1600	97.666664	80.401253	-22.038550	2.6	-5.2	
0	0	1648	97.700005	80.401976	-22.052904	2.9	-4.8	
0	0	1700	97.708336	80.402153	-22.066807	2.9	-4.8	
0	0	1722	97.723010	80.402512	-22.076796	3.0	-4.8	
0	0	1800	97.750000	80.403152	-22.089493	3.2	-3.5	
0	0	1835	97.774300	80.403740	-22.100351	2.4	-3.7	
0	0	1900	97.781884	80.404099	-22.108597	2.0	-4.0	
0	0	2000	97.833336	80.404648	-22.131113	1.4	-4.5	
0	0	2021	97.841742	80.404724	-22.139233	0.5	-4.4	
0	0	2055	97.871524	80.404779	-22.150574	0.0	-3.3	
0	0	2100	97.875000	80.404778	-22.151827	0.0	-2.7	
0	0	2200	97.921532	80.404970	-22.159281	1.4	-1.9	
0	0	2207	97.954336	80.405571	-22.149615	2.4	-1.6	
0	0	2300	97.980000	80.406322	-22.145023	2.2	-0.7	
0	0	2305	98.000000	80.406273	-22.145023	1.8	-0.0	
7	7	0	98.020142	80.406509	-22.148857	1.2	-2.3	
7	7	52	98.030119	80.406639	-22.154327	0.0	-3.3	
7	7	100	98.041854	80.406670	-22.156584	0.0	-4.4	
7	7	200	98.043336	80.406830	-22.176284	0.0	-3.5	
7	7	216	98.044444	80.406845	-22.181381	0.0	-3.5	
7	7	236	98.079718	80.406887	-22.187824	0.0	-3.5	
7	7	300	98.125000	80.406883	-22.193331	0.0	-3.0	
7	7	400	98.188884	80.407143	-22.203201	1.1	-1.1	
7	7	500	98.213336	80.407763	-22.209595	2.2	-1.1	
7	7	514	98.213955	80.407944	-22.209837	2.3	-1.1	
7	7	600	98.250000	80.407944	-22.214057	1.4	-0.6	
7	7	700	98.291884	80.408899	-22.217491	0.0	-0.5	
7	7	701	98.292356	80.408899	-22.217524	0.0	-0.5	
7	7	750	98.331840	80.408899	-22.220699	-0.2	-1.1	
7	7	800	98.333336	80.408899	-22.222010	-0.2	-1.1	
7	7	848	98.339784	80.408899	-22.224107	0.0	-1.1	
7	7	900	98.375000	80.408899	-22.227972	0.0	-1.1	
7	7	960	98.393339	80.408899	-22.230735	0.0	-1.1	
7	7	1000	98.400444	80.408899	-22.231427	0.0	-1.1	
7	7	1030	98.411785	80.408899	-22.233055	0.0	-0.5	
7	7	1040	98.411884	80.408899	-22.233062	0.0	-1.1	
7	7	1080	98.431336	80.409220	-22.228748	0.0	-2.2	
7	7	1100	98.441256	80.409220	-22.226583	-0.4	-1.1	
7	7	1200	98.490000	80.409918	-22.213137	-0.0	-1.1	
7	7	1300	98.541884	80.409918	-22.213137	-0.0	-1.1	
7	7	1321	98.541884	80.409918	-22.213137	-0.0	-1.1	
7	7	1400	98.583336	80.409918	-22.218012	-0.0	-1.1	
7	7	1500	98.593336	80.409918	-22.220027	-0.0	-1.1	
7	7	1504	98.593336	80.409918	-22.220027	-0.0	-1.1	
7	7	1550	98.633336	80.409918	-22.227133	-0.0	-1.1	
7	7	1600	98.633336	80.409918	-22.227133	-0.0	-1.1	
7	7	1644	98.633336	80.409918	-22.227133	-0.0	-1.1	
7	7	1700	98.675000	80.409918	-22.227133	-0.0	-1.1	
7	7	1743	98.702336	80.409918	-22.227133	-0.0	-1.1	
7	7	1800	98.750000	80.409918	-22.227133	-0.0	-1.1	
7	7	1829	98.750000	80.409918	-22.227133	-0.0	-1.1	
7	7	1900	98.781884	80.409918	-22.227133	-0.0	-1.1	
7	7	2000	98.833336	80.409918	-22.227133	-0.0	-1.1	
7	7	2100	98.875000	80.409918	-22.227133	-0.0	-1.1	

FRAM 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
7	APR	1980	2115	98.885414	86.408493	-22.226641	-0.3	0.3
7	APR	1980	2200	98.916604	86.408516	-22.223755	-1.0	1.2
7	APR	1980	2300	98.953336	86.408302	-22.216942	-1.0	1.1
7	APR	1980	2302	98.959724	86.408295	-22.216763	-1.0	1.0
8	APR	1980	2333	98.981255	86.408119	-22.215136	-1.0	0.8
8	APR	1980	0	99.000000	86.407990	-22.215981	-0.8	-0.1
8	APR	1980	2	99.001396	86.407982	-22.216118	-0.8	-0.8
8	APR	1980	48	99.033333	86.407784	-22.220619	-1.1	-1.1
8	APR	1980	100	99.041664	86.407700	-22.221590	-1.4	-0.8
8	APR	1980	119	99.054863	86.407532	-22.222637	-1.8	-0.5
8	APR	1980	149	99.075691	86.407227	-22.223072	-1.8	-0.1
8	APR	1980	200	99.083336	86.407127	-22.222862	-1.6	0.3
8	APR	1980	300	99.125000	86.406776	-22.219219	-0.6	0.9
8	APR	1980	305	99.128471	86.406761	-22.218834	-0.5	0.9
8	APR	1980	336	99.150002	86.406715	-22.216448	-0.1	0.0
8	APR	1980	400	99.166664	86.406715	-22.214687	0.0	0.8
8	APR	1980	422	99.181946	86.406715	-22.213522	0.0	0.4
8	APR	1980	451	99.202087	86.406685	-22.213255	-0.3	0.2
8	APR	1980	500	99.208336	86.406662	-22.213507	-0.5	0.4
8	APR	1980	600	99.250000	86.406403	-22.217726	-1.1	0.9
8	APR	1980	700	99.291664	86.406052	-22.219780	-0.9	0.3
8	APR	1980	756	99.330559	86.405930	-22.214853	0.1	1.5
8	APR	1980	800	99.333336	86.405930	-22.214338	0.2	1.5
8	APR	1980	850	99.372223	86.406097	-22.208347	0.7	0.5
8	APR	1980	900	99.375000	86.406113	-22.208204	0.7	0.3
8	APR	1980	944	99.405556	86.406212	-22.209797	0.0	0.9
8	APR	1980	1000	99.416664	86.406197	-22.211248	-0.4	-0.2
8	APR	1980	1044	99.447227	86.406021	-22.216381	-0.9	-1.5
8	APR	1980	1100	99.458336	86.405952	-22.218433	-0.8	-1.5
8	APR	1980	1130	99.479164	86.405830	-22.221865	-0.6	-1.1
8	APR	1980	1200	99.500000	86.405754	-22.223749	-0.5	-0.4
8	APR	1980	1231	99.521523	86.405655	-22.224089	-0.8	0.1
8	APR	1980	1300	99.541664	86.405495	-22.223621	-1.3	0.3
8	APR	1980	1400	99.583336	86.405006	-22.221172	-1.3	0.7
8	APR	1980	1419	99.595527	86.404892	-22.219942	-0.9	0.8
8	APR	1980	1500	99.625000	86.404846	-22.217592	0.7	0.3
8	APR	1980	1524	99.641663	86.405014	-22.217804	1.9	0.5
8	APR	1980	1545	99.655250	86.405281	-22.219456	2.3	-1.3
8	APR	1980	1600	99.655664	86.405540	-22.221443	3.4	-1.8
8	APR	1980	1606	99.670437	86.405647	-22.222464	3.6	-1.9
8	APR	1980	1551	99.702987	86.405441	-22.230389	1.4	-1.7
8	APR	1980	1700	99.733336	86.405509	-22.231537	0.9	-1.3
8	APR	1980	1800	99.750000	86.405013	-22.232800	3.2	0.6
8	APR	1980	1837	99.775691	86.405342	-22.229664	3.1	1.3
8	APR	1980	1854	99.787498	86.405683	-22.227584	-2.5	1.4
8	APR	1980	1900	99.791664	86.405006	-22.226919	-2.2	1.5
8	APR	1980	2000	99.833336	86.404724	-22.218882	0.4	1.3
8	APR	1980	2024	99.845998	86.404839	-22.216665	1.2	0.9
8	APR	1980	2100	99.875000	86.405151	-22.215311	1.8	0.1
8	APR	1980	2200	99.916664	86.405663	-22.216503	0.9	-0.2
8	APR	1980	2210	99.923615	86.405693	-22.216646	0.5	-0.1
8	APR	1980	2300	99.953336	86.405609	-22.215605	-1.0	0.7
8	APR	1980	2356	99.997223	86.405286	-22.211592	-0.9	0.5
8	APR	1980	0	100.000000	86.405251	-22.211388	-0.8	0.5
8	APR	1980	11	100.007637	86.405212	-22.210981	-0.5	0.3
8	APR	1980	100	100.041664	86.405258	-22.212088	0.0	-0.8
8	APR	1980	100	100.041664	86.405258	-22.212088	0.4	-0.8
8	APR	1980	157	100.031245	86.405602	-22.216864	0.0	-0.7
8	APR	1980	200	100.033336	86.405609	-22.217939	0.5	-0.6
8	APR	1980	246	100.115273	86.405540	-22.216940	-0.9	0.7
8	APR	1980	300	100.125000	86.405464	-22.215796	-1.1	1.2
8	APR	1980	400	100.166664	86.405037	-22.206688	-1.4	2.0
8	APR	1980	500	100.208336	86.404610	-22.198612	-1.3	0.9
8	APR	1980	517	100.220140	86.404445	-22.197724	-1.2	0.3
8	APR	1980	600	100.250000	86.404235	-22.198515	-0.9	-0.6
8	APR	1980	700	100.241664	86.404083	-22.202135	0.1	-0.5
8	APR	1980	704	100.244441	86.404091	-22.202288	0.2	-0.4
8	APR	1980	800	100.333336	86.404236	-22.203347	0.5	-0.3

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
9	APR	1980	807	100.338195	86.404251	-22.203564	0.4	-0.4
9	APR	1980	851	100.368752	86.404289	-22.206253	-0.1	-1.0
9	APR	1980	900	100.375000	86.404287	-22.207037	-0.2	-1.1
9	APR	1980	954	100.412498	86.404175	-22.211905	-0.5	-0.8
9	APR	1980	1000	100.416664	86.404160	-22.212263	-0.55	-0.6
9	APR	1980	1038	100.443054	86.404053	-22.212736	-0.55	0.4
9	APR	1980	1100	100.458336	86.403984	-22.211189	-0.6	1.2
9	APR	1980	1142	100.487495	86.403870	-22.205074	-0.7	2.0
9	APR	1980	1200	100.500000	86.403809	-22.202003	-0.8	2.0
9	APR	1980	1300	100.541664	86.403564	-22.195181	-0.8	0.0
9	APR	1980	1310	100.548615	86.403519	-22.195230	-0.8	-0.3
9	APR	1980	1330	100.562500	86.403435	-22.196575	-0.8	-1.2
9	APR	1980	1400	100.583336	86.403320	-22.200705	-0.7	-1.9
9	APR	1980	1500	100.625000	86.403160	-22.209599	-0.3	-1.2
9	APR	1980	1600	100.666664	86.403145	-22.211620	0.0	0.0
9	APR	1980	1643	100.696526	86.403214	-22.209921	0.3	0.6
9	APR	1980	1700	100.708336	86.403244	-22.209985	0.3	0.0
9	APR	1980	1800	100.750000	86.403305	-22.206905	-0.1	0.2
9	APR	1980	1900	100.791664	86.403145	-22.207001	-0.9	-0.1
9	APR	1980	1932	100.813896	86.402977	-22.207031	-1.1	0.0
9	APR	1980	2000	100.833336	86.402817	-22.206306	-1.0	0.5
9	APR	1980	2016	100.844444	86.402740	-22.205433	-0.8	0.8
9	APR	1980	2038	100.859718	86.402657	-22.203793	-0.6	0.9
9	APR	1980	2100	100.875000	86.402611	-22.202093	-0.3	0.8
9	APR	1980	2200	100.916664	86.402580	-22.199680	-0.1	0.0
9	APR	1980	2225	100.934029	86.402565	-22.200031	-0.2	-0.3
9	APR	1980	2300	100.958336	86.402504	-22.201448	-0.2	-0.5
10	APR	1980	0	101.000000	86.402451	-22.203672	0.0	-0.2
10	APR	1980	1	101.000000	86.402473	-22.203791	0.4	0.0
10	APR	1980	100	101.041664	86.402626	-22.203583	0.6	0.0
10	APR	1980	137	101.067350	86.402695	-22.204504	0.0	-0.6
10	APR	1980	158	101.081940	86.402664	-22.205782	-0.5	-0.8
10	APR	1980	200	101.083336	86.402657	-22.205929	-0.6	-0.9
10	APR	1980	300	101.125000	86.402306	-22.211069	-1.4	-0.6
10	APR	1980	325	101.142365	86.402107	-22.212700	-1.4	-0.6
10	APR	1980	344	101.155556	86.401970	-22.213474	-1.3	-0.3
10	APR	1980	400	101.166664	86.401855	-22.213783	-1.2	0.0
10	APR	1980	422	101.181940	86.401725	-22.213705	-1.0	0.2
10	APR	1980	500	101.208336	86.401550	-22.212513	-0.7	0.5
10	APR	1980	600	101.250000	86.401382	-22.209520	-0.4	0.5
10	APR	1980	700	101.291664	86.401230	-22.207092	-0.5	0.3
10	APR	1980	800	101.333336	86.400993	-22.206123	-0.9	0.0
10	APR	1980	900	101.375000	86.400888	-22.207170	-0.9	-0.5
10	APR	1980	906	101.379173	86.400658	-22.207430	-0.9	-0.5
10	APR	1980	1000	101.416664	86.400475	-22.211450	-0.2	-1.2
10	APR	1980	1053	101.453408	86.400551	-22.217705	0.7	-1.3
10	APR	1980	1160	101.453336	86.400574	-22.218430	0.8	-1.1
10	APR	1980	1134	101.481941	86.400734	-22.220670	0.9	-0.3
10	APR	1980	1200	101.500000	86.400843	-22.220201	0.7	0.7
10	APR	1980	1240	101.527779	86.400917	-22.216347	0.0	1.3
10	APR	1980	1300	101.541664	86.400894	-22.214180	-0.4	1.2
10	APR	1980	1400	101.583336	86.400696	-22.211544	-0.5	-0.4
10	APR	1980	1408	101.588890	86.400673	-22.211926	-0.4	-0.7
10	APR	1980	1428	101.602776	86.400550	-22.213724	-0.1	-1.3
10	APR	1980	1500	101.625000	86.400581	-22.217941	0.4	-1.5
10	APR	1980	1600	101.658664	86.400871	-22.222429	0.4	0.2
10	APR	1980	1615	101.671085	86.400894	-22.221750	0.2	0.9
10	APR	1980	1654	101.704153	86.400871	-22.217250	-0.3	1.5
10	APR	1980	1700	101.708336	86.400864	-22.216516	-0.3	1.4
10	APR	1980	1741	101.738899	86.400772	-22.212804	-0.4	0.5
10	APR	1980	1800	101.750000	86.400734	-22.212511	-0.4	-0.1
10	APR	1980	1840	101.777779	86.400658	-22.214481	-0.4	-0.9
10	APR	1980	1900	101.791664	86.400612	-22.216200	-0.4	-1.0
10	APR	1980	1928	101.811104	86.400543	-22.218672	-0.5	-0.9
10	APR	1980	2000	101.833336	86.400459	-22.220398	-0.4	-0.4
10	APR	1980	2025	101.851387	86.400406	-22.220577	-0.3	0.2
10	APR	1980	2100	101.875000	86.400358	-22.218950	0.0	0.9
10	APR	1980	2114	101.884727	86.400375	-22.217758	0.1	1.1

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
10	APR	1980	2136	101.900002	80.400406	-22.215466	0.4	1.3
10	APR	1980	2200	101.916004	80.400459	-22.213037	0.5	1.1
10	APR	1980	2213	101.925090	80.400497	-22.211969	0.5	0.9
10	APR	1980	2300	101.958336	80.400597	-22.210426	0.3	-0.2
10	APR	1980	2322	101.973610	80.400627	-22.211334	0.2	-0.8
10	APR	1980	2359	101.999308	80.400635	-22.214598	-0.2	-1.1
11	APR	1980	0	102.000000	80.400635	-22.214695	-0.2	-1.1
11	APR	1980	100	102.041604	80.400520	-22.219854	-0.2	-0.8
11	APR	1980	109	102.047913	80.400513	-22.220478	-0.1	-0.8
11	APR	1980	200	102.083336	80.400551	-22.223080	0.3	-0.4
11	APR	1980	256	102.122223	80.400620	-22.223209	-0.1	0.4
11	APR	1980	300	102.125000	80.400612	-22.223055	-0.2	0.5
11	APR	1980	400	102.166064	80.400475	-22.217949	-0.4	1.4
11	APR	1980	423	102.182640	80.400436	-22.214862	-0.2	1.7
11	APR	1980	500	102.208336	80.400436	-22.208830	0.2	2.1
11	APR	1980	500	102.208336	80.400436	-22.208830	0.2	2.1
11	APR	1980	520	102.222221	80.400467	-22.205011	0.4	2.3
11	APR	1980	600	102.250000	80.400581	-22.197079	0.6	2.2
11	APR	1980	700	102.291064	80.400795	-22.189867	0.7	0.3
11	APR	1980	800	102.333336	80.400970	-22.194321	0.3	-1.8
11	APR	1980	816	102.344444	80.400993	-22.197035	0.1	-2.1
11	APR	1980	854	102.370827	80.400955	-22.204340	-0.5	-2.1
11	APR	1980	900	102.375000	80.400940	-22.205399	-0.6	-2.0
11	APR	1980	1000	102.415004	80.400650	-22.213257	-1.0	-1.2
11	APR	1980	1004	102.419441	80.400627	-22.213652	-1.0	-1.1
11	APR	1980	1042	102.445831	80.400459	-22.216822	-0.6	-0.8
11	APR	1980	1100	102.458336	80.400406	-22.217892	-0.4	-0.6
11	APR	1980	1151	102.493752	80.400375	-22.220341	0.1	-0.7
11	APR	1980	1200	102.500000	80.400383	-22.220936	0.2	-0.8
11	APR	1980	1300	102.541064	80.400490	-22.226128	0.3	-0.9
11	APR	1980	1400	102.583336	80.400467	-22.227636	-0.5	0.7
11	APR	1980	1500	102.625000	80.400223	-22.218952	-0.8	2.4
11	APR	1980	1520	102.643059	80.400124	-22.213348	-0.8	2.5
11	APR	1980	1500	102.666064	80.400085	-22.207666	0.3	1.5
11	APR	1980	1602	102.668000	80.400093	-22.206812	0.4	1.4
11	APR	1980	1652	102.702782	80.400360	-22.205482	1.4	-0.6
11	APR	1980	1700	102.708336	80.400421	-22.206001	1.4	-0.9
11	APR	1980	1748	102.711669	80.400726	-22.211510	0.5	-1.5
11	APR	1980	1800	102.750000	80.400742	-22.213100	0.0	-1.5
11	APR	1980	1839	102.777077	80.400566	-22.217918	-1.5	-1.3
11	APR	1980	1900	102.791504	80.400360	-22.220066	-2.1	-1.1
11	APR	1980	2000	102.833336	80.399536	-22.223684	-2.7	-0.3
11	APR	1980	2100	102.875000	80.398760	-22.222652	-1.9	0.7
11	APR	1980	2200	102.915004	80.398346	-22.217234	-0.8	1.4
11	APR	1980	2300	102.958336	80.398370	-22.209021	0.7	1.7
12	APR	1980	0	103.000000	80.398781	-22.200340	1.7	1.6
12	APR	1980	100	103.041064	80.399391	-22.193051	2.0	1.0
12	APR	1980	200	103.083336	80.400002	-22.190877	1.7	0.1
12	APR	1980	300	103.125000	80.400421	-22.192936	0.9	-0.8
12	APR	1980	400	103.166064	80.400558	-22.198014	0.0	-1.4
12	APR	1980	426	103.186104	80.400528	-22.202322	-0.4	-1.4
12	APR	1980	500	103.208336	80.400436	-22.206209	-0.7	-1.7
12	APR	1980	600	103.250000	80.400200	-22.211746	-0.6	-0.7
12	APR	1980	614	103.259727	80.400154	-22.212410	-0.5	-0.4
12	APR	1980	700	103.291064	80.400101	-22.212978	0.1	0.0
12	APR	1980	800	103.333336	80.400253	-22.213583	0.8	-0.5
12	APR	1980	802	103.334724	80.400281	-22.213682	0.8	-0.6
12	APR	1980	900	103.375000	80.400581	-22.219494	1.1	-1.7
12	APR	1980	1000	103.415004	80.400667	-22.229303	0.6	-1.8
12	APR	1980	1100	103.458336	80.400970	-22.235472	-0.2	-0.3
12	APR	1980	1136	103.433337	80.400902	-22.234106	-0.5	1.2
12	APR	1980	1200	103.500000	80.400826	-22.230574	-0.6	2.2
12	APR	1980	1249	103.534027	80.400696	-22.217756	-0.2	3.6
12	APR	1980	1300	103.541064	80.400888	-22.214226	0.0	3.8
12	APR	1980	1400	103.583336	80.400818	-22.196309	0.7	2.3
12	APR	1980	1500	103.625000	80.401939	-22.193827	0.5	-1.3
12	APR	1980	1510	103.631950	80.401062	-22.195185	0.3	-1.9
12	APR	1980	1600	103.666064	80.401070	-22.205261	-0.3	-1.9

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
12	APR	1980	1604	103.659441	86.401062	-22.205896	-0.4	-1.7
12	APR	1980	1624	103.683327	86.401009	-22.207993	-0.6	-0.7
12	APR	1980	1656	103.705559	86.400879	-22.207970	-0.9	0.5
12	APR	1980	1700	103.708336	86.400864	-22.207769	-0.9	0.6
12	APR	1980	1800	103.750000	86.400581	-22.203846	-0.7	0.4
12	APR	1980	1843	103.779854	86.400467	-22.204683	-0.2	-0.8
12	APR	1980	1900	103.791064	86.400459	-22.206217	0.0	-1.3
12	APR	1980	2000	103.833336	86.400475	-22.215599	0.0	-2.1
12	APR	1980	2029	103.853477	86.400459	-22.220722	-0.3	-1.9
12	APR	1980	2100	103.875000	86.400398	-22.224651	-0.4	-0.9
12	APR	1980	2124	103.891663	86.400337	-22.225193	-0.4	0.4
12	APR	1980	2200	103.916004	86.400276	-22.221243	-0.2	2.0
12	APR	1980	2215	103.927086	86.400269	-22.218449	0.0	2.3
12	APR	1980	2300	103.958336	86.400322	-22.210714	0.3	0.9
12	APR	1980	2331	103.979858	86.400383	-22.211714	0.3	-1.7
13	APR	1980	0	104.000000	86.400406	-22.218863	0.1	-3.8
13	APR	1980	2	104.001396	86.400406	-22.219538	0.1	-4.0
13	APR	1980	100	104.041664	86.400368	-22.242111	-0.3	-4.1
13	APR	1980	200	104.083336	86.400215	-22.253700	-0.6	-0.2
13	APR	1980	300	104.125000	86.400032	-22.244450	-0.5	3.4
13	APR	1980	400	104.166664	86.399918	-22.222639	-0.1	4.5
13	APR	1980	500	104.208336	86.399986	-22.203449	0.6	2.6
13	APR	1980	522	104.223610	86.400078	-22.199727	0.9	1.4
13	APR	1980	600	104.250000	86.400330	-22.198515	1.5	0.6
13	APR	1980	700	104.291664	86.400879	-22.206770	1.6	-2.1
13	APR	1980	710	104.298615	86.400963	-22.208588	1.5	-2.1
13	APR	1980	800	104.333336	86.401207	-22.216167	0.0	-1.1
13	APR	1980	825	104.359700	86.401123	-22.217480	-1.2	-0.1
13	APR	1980	857	104.372917	86.400826	-22.216482	-2.0	0.7
13	APR	1980	900	104.375000	86.400795	-22.216238	-2.0	0.8
13	APR	1980	1000	104.416664	86.400238	-22.211554	-0.9	0.7
13	APR	1980	1012	104.424995	86.400192	-22.210964	-0.4	0.5
13	APR	1980	1044	104.447227	86.400215	-22.210201	0.7	0.2
13	APR	1980	1100	104.458336	86.400291	-22.209902	1.1	0.2
13	APR	1980	1200	104.500000	86.400711	-22.208525	1.0	0.2
13	APR	1980	1200	104.500000	86.400711	-22.208525	1.0	0.2
13	APR	1980	1300	104.541664	86.400772	-22.208284	-0.6	-0.1
13	APR	1980	1400	104.583336	86.400429	-22.208563	-1.2	0.1
13	APR	1980	1500	104.525000	86.400169	-22.207233	-0.2	0.3
13	APR	1980	1503	104.627083	86.400169	-22.207153	-0.1	0.3
13	APR	1980	1600	104.660000	86.400284	-22.207161	0.7	-0.6
13	APR	1980	1604	104.669441	86.400299	-22.207376	0.7	-0.7
13	APR	1980	1644	104.700005	86.400475	-22.211416	0.5	-1.2
13	APR	1980	1700	104.708336	86.400505	-22.212679	0.5	-1.2
13	APR	1980	1751	104.743752	86.400551	-22.216942	-0.2	-0.5
13	APR	1980	1800	104.750000	86.400536	-22.217354	-0.4	-0.4
13	APR	1980	1833	104.772919	86.400436	-22.217627	-0.7	0.3
13	APR	1980	1900	104.791664	86.400330	-22.216351	-0.8	0.3
13	APR	1980	1937	104.817360	86.400192	-22.213724	-0.5	0.7
13	APR	1980	2000	104.833336	86.400146	-22.212772	-0.2	0.2
13	APR	1980	2100	104.875000	86.400185	-22.213671	0.4	-0.4
13	APR	1980	2124	104.891663	86.400246	-22.214338	0.5	-0.3
13	APR	1980	2200	104.916664	86.400368	-22.214569	0.7	0.2
13	APR	1980	2242	104.945831	86.400543	-22.212539	0.8	0.9
13	APR	1980	2300	104.958336	86.400620	-22.210896	0.9	1.3
13	APR	1980	2310	104.955279	86.400673	-22.209675	0.9	1.5
13	APR	1980	2350	104.993050	86.400841	-22.204113	0.0	1.4
14	APR	1980	0	105.000000	86.400864	-22.202958	-0.4	1.2
14	APR	1980	100	105.041664	86.400879	-22.200874	-0.3	-0.4
14	APR	1980	136	105.066673	86.400803	-22.203224	-0.5	-1.0
14	APR	1980	200	105.083336	86.400734	-22.205578	-0.5	-1.2
14	APR	1980	300	105.125000	86.400558	-22.211346	-0.5	-0.8
14	APR	1980	322	105.140282	86.400490	-22.212496	-0.5	-0.4
14	APR	1980	400	105.166664	86.400375	-22.212870	-0.5	0.1
14	APR	1980	402	105.168000	86.400368	-22.212851	-0.5	0.1
14	APR	1980	430	105.187500	86.400314	-22.212400	-0.2	0.2
14	APR	1980	500	105.208336	86.400307	-22.212400	0.1	-0.2
14	APR	1980	508	105.213890	86.400314	-22.212559	0.2	-0.3

FRA 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
14	APR	1980	600	105.259000	86.400429	-22.214584	0.6	-0.5
14	APR	1980	617	105.261810	86.400482	-22.215181	0.6	-0.3
14	APR	1980	654	105.287498	86.400566	-22.215408	0.2	0.3
14	APR	1980	700	105.291664	86.400574	-22.215214	0.1	0.5
14	APR	1980	800	105.333336	86.400467	-22.211145	-0.5	0.7
14	APR	1980	804	105.336113	86.400452	-22.210920	-0.5	0.6
14	APR	1980	900	105.375000	86.400337	-22.210541	-0.1	-0.5
14	APR	1980	952	105.411110	86.400414	-22.214069	0.6	-0.9
14	APR	1980	1000	105.416664	86.400444	-22.214657	0.7	-0.8
14	APR	1980	1100	105.458336	86.400688	-22.216959	0.6	0.1
14	APR	1980	1110	105.465279	86.400719	-22.216724	0.5	0.4
14	APR	1980	1139	105.485413	86.400772	-22.214945	0.2	1.0
14	APR	1980	1200	105.500000	86.400780	-22.213051	0.0	1.1
14	APR	1980	1210	105.506950	86.400780	-22.212158	-0.1	1.0
14	APR	1980	1258	105.540276	86.400734	-22.208847	-0.2	0.6
14	APR	1980	1300	105.541664	86.400726	-22.208755	-0.2	0.5
14	APR	1980	1400	105.583336	86.400673	-22.206930	-0.1	0.3
14	APR	1980	1445	105.614586	86.400681	-22.205772	0.1	0.1
14	APR	1980	1500	105.625000	86.400696	-22.205845	0.2	-0.2
14	APR	1980	1512	105.633331	86.400703	-22.206200	0.2	-0.5
14	APR	1980	1540	105.652779	86.400734	-22.208029	0.1	-1.0
14	APR	1980	1600	105.666664	86.400742	-22.209858	0.0	-1.1
14	APR	1980	1632	105.683336	86.400711	-22.212627	-0.4	-0.8
14	APR	1980	1659	105.707542	86.400627	-22.214001	-0.7	-0.4
14	APR	1980	1700	105.703336	86.400627	-22.214633	-0.7	-0.4
14	APR	1980	1726	105.726387	86.400505	-22.214777	-0.9	-0.3
14	APR	1980	1800	105.750000	86.400345	-22.216032	-0.8	-0.6
14	APR	1980	1845	105.731250	86.400215	-22.219618	-0.2	-1.1
14	APR	1980	1900	105.731664	86.400215	-22.221090	0.1	-1.1
14	APR	1980	1911	105.739309	86.400223	-22.222153	0.3	-1.1
14	APR	1980	1946	105.823608	86.400330	-22.224825	0.9	-0.6
14	APR	1980	2000	105.833336	86.400406	-22.225288	1.0	-0.2
14	APR	1980	2032	105.855560	86.400604	-22.225109	1.2	0.2
14	APR	1980	2100	105.875000	86.400780	-22.224611	1.1	0.1
14	APR	1980	2153	105.911804	86.401031	-22.226173	0.6	-0.9
14	APR	1980	2200	105.916664	86.401654	-22.226759	0.5	-1.1
14	APR	1980	2218	105.929169	86.401093	-22.228689	0.3	-1.4
14	APR	1980	2300	105.958336	86.401100	-22.234549	-0.2	-1.7
14	APR	1980	2340	105.985115	86.401024	-22.240837	-0.4	-2.1
15	APR	1980	0	105.000000	86.400986	-22.244900	-0.3	-2.7
15	APR	1980	4	105.002777	86.400986	-22.245848	-0.2	-2.8
15	APR	1980	28	105.019440	86.400986	-22.252871	0.4	-4.1
15	APR	1980	100	105.041664	86.401159	-22.257834	1.9	-6.9
15	APR	1980	126	105.059723	86.401535	-22.263301	3.3	-9.6
15	APR	1980	200	105.093336	86.402237	-22.318747	4.0	-12.4
15	APR	1980	214	105.093336	86.402542	-22.334171	3.9	-13.2
15	APR	1980	300	105.125000	86.403519	-22.386387	4.4	-12.0
15	APR	1980	312	105.133331	86.403824	-22.398146	4.9	-10.7
15	APR	1980	400	105.166664	86.405235	-22.434404	5.9	-7.4
15	APR	1980	400	105.166664	86.405235	-22.434464	5.6	-7.4
15	APR	1980	500	105.225336	86.406921	-22.472776	4.7	-8.5
15	APR	1980	525	105.225700	86.407532	-22.493097	4.4	-10.4
15	APR	1980	546	105.230273	86.408020	-22.513271	4.1	-11.9
15	APR	1980	600	105.250000	86.408318	-22.528286	3.8	-12.9
15	APR	1980	700	105.291664	86.409248	-22.601955	1.6	-14.7
15	APR	1980	712	105.293336	86.409332	-22.617052	1.0	-14.5
15	APR	1980	800	105.333336	86.409401	-22.676416	0.1	-14.2
15	APR	1980	834	105.333336	86.409508	-22.718346	1.2	-14.5
15	APR	1980	900	105.375000	86.409737	-22.751553	2.1	-15.1
15	APR	1980	900	105.375000	86.409737	-22.751553	2.1	-15.1
15	APR	1980	1000	105.416664	86.410583	-22.831777	2.8	-15.4
15	APR	1980	1021	105.431252	86.410904	-22.859179	2.7	-14.8
15	APR	1980	1100	105.458336	86.411130	-22.907064	2.3	-13.5
15	APR	1980	1200	105.500000	86.412056	-22.972408	1.5	-11.9
15	APR	1980	1208	105.505554	86.412125	-22.980564	1.4	-11.7
15	APR	1980	1300	105.541664	86.412422	-23.031562	0.9	-11.1
15	APR	1980	1356	105.540559	86.412674	-23.083357	0.8	-10.3
15	APR	1980	1400	105.583336	86.412689	-23.086891	0.8	-10.2

FRAM 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
15	APR	1980	1500	106.625000	80.412827	-23.135963	-0.2	-8.6
15	APR	1980	1543	106.654804	80.412682	-23.166128	-1.0	-7.8
15	APR	1980	1600	106.666664	86.412582	-23.177668	-1.1	-7.9
15	APR	1980	1607	106.671532	86.412537	-23.182457	-1.1	-8.0
15	APR	1980	1700	106.708336	80.412308	-23.222267	-0.2	-9.9
15	APR	1980	1754	106.745827	80.412476	-23.275663	1.2	-12.7
15	APR	1980	1800	106.750000	80.412514	-23.282318	1.3	-12.9
15	APR	1980	1900	106.791604	80.413033	-23.349440	1.6	-11.8
15	APR	1980	2000	106.833336	80.413429	-23.397455	0.8	-6.3
15	APR	1980	2044	106.863892	80.413528	-23.414959	0.1	-3.5
15	APR	1980	2100	106.875000	86.413528	-23.419691	-0.1	-3.4
15	APR	1980	2104	106.877777	80.413528	-23.420860	-0.1	-3.4
15	APR	1980	2200	106.916054	86.413460	-23.444056	-0.3	-7.5
15	APR	1980	2250	106.951385	80.413383	-23.488789	-0.4	-12.6
15	APR	1980	2300	106.958336	86.413361	-23.499920	-0.4	-13.2
15	APR	1980	2312	106.966607	80.413330	-23.513874	-0.5	-13.7
15	APR	1980	0	107.000000	80.413177	-23.556967	-0.5	-11.8
16	APR	1980	37	107.025096	86.413124	-23.599358	0.1	-6.4
16	APR	1980	100	107.041064	80.413162	-23.608328	0.6	-2.6
16	APR	1980	200	107.033336	86.413475	-23.603456	1.1	3.0
16	APR	1980	224	107.094998	80.413605	-23.536779	0.9	2.3
16	APR	1980	300	107.125000	80.413750	-23.587269	-0.5	2.6
16	APR	1980	400	107.106004	80.413803	-23.579756	-0.1	0.2
16	APR	1980	500	107.233336	80.413765	-23.584164	0.0	-1.5
16	APR	1980	600	107.250000	80.413864	-23.591524	0.7	-1.1
16	APR	1980	620	107.253885	86.413948	-23.592989	0.9	-0.6
16	APR	1980	700	107.291604	80.414185	-23.594116	1.2	-0.5
16	APR	1980	744	107.322227	86.414444	-23.594961	0.9	-0.9
16	APR	1980	800	107.333336	80.414513	-23.595810	0.7	-0.8
16	APR	1980	900	107.375000	80.414635	-23.601557	0.2	-1.2
16	APR	1980	932	107.397224	80.414658	-23.604641	0.1	-1.0
16	APR	1980	1000	107.410004	80.414673	-23.606520	0.1	-0.6
16	APR	1980	1100	107.453336	80.414719	-23.607473	0.1	0.1
16	APR	1980	1200	107.500000	80.414734	-23.606148	-0.1	0.2
16	APR	1980	1300	107.541064	80.414642	-23.606594	-0.5	-0.4
16	APR	1980	1306	107.545037	80.414619	-23.606840	-0.0	-0.5
16	APR	1980	1400	107.583336	80.414421	-23.610352	-0.7	-0.9
16	APR	1980	1454	107.621027	80.414253	-23.613913	-0.4	-0.6
16	APR	1980	1500	107.625000	80.414238	-23.614201	-0.3	-0.5
16	APR	1980	1511	107.632037	80.414223	-23.614647	-0.2	-0.4
16	APR	1980	1500	107.600004	80.414200	-23.614737	0.0	0.5
16	APR	1980	1541	107.635137	80.414223	-23.611141	0.2	1.1
16	APR	1980	1700	107.708336	80.414253	-23.608477	0.4	1.5
16	APR	1980	1762	107.739724	80.414253	-23.608477	0.4	1.5
16	APR	1980	1800	107.750000	80.414430	-23.603338	0.7	0.1
16	APR	1980	1848	107.783336	80.414581	-23.607140	0.3	-1.8
16	APR	1980	1900	107.791004	80.414597	-23.609137	0.1	-2.1
16	APR	1980	2000	107.833336	80.414520	-23.622122	-0.3	-2.5
16	APR	1980	2034	107.855000	80.414497	-23.628828	0.0	-2.0
16	APR	1980	2100	107.875000	86.414520	-23.632721	0.2	-1.5
16	APR	1980	2200	107.915004	80.414558	-23.637718	-0.3	-0.6
16	APR	1980	2220	107.930550	86.414490	-23.638588	-0.9	-0.4
16	APR	1980	2300	107.958336	80.414192	-23.639975	-1.1	-0.4
16	APR	1980	2348	107.941069	80.413620	-23.641693	-2.5	-0.2
17	APR	1980	0	108.000000	80.413452	-23.641844	-2.0	0.1
17	APR	1980	7	108.004000	80.413353	-23.641842	-2.7	0.1
17	APR	1980	100	108.041004	80.412521	-23.638101	-3.1	1.3
17	APR	1980	200	108.083336	80.411522	-23.624302	-2.6	3.2
17	APR	1980	300	108.125000	80.410828	-23.610579	-1.3	1.6
17	APR	1980	340	108.152779	80.410690	-23.598902	0.0	-0.7
17	APR	1980	400	108.160004	80.410721	-23.611134	0.5	-1.9
17	APR	1980	500	108.208336	80.410965	-23.620390	0.6	-3.4
17	APR	1980	528	108.227776	80.411003	-23.634096	-0.1	-3.0
17	APR	1980	600	108.250000	80.410904	-23.641176	-1.0	-2.1
17	APR	1980	700	108.291604	80.410461	-23.647760	-1.5	-0.5
17	APR	1980	715	108.302906	80.410347	-23.648199	-1.3	-0.2
17	APR	1980	800	108.333336	80.410049	-23.647863	-1.2	0.1
17	APR	1980	900	108.375000	80.409554	-23.649554	-2.1	-1.1

FRAM 2 NAVIGATION - KALMAR

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
17	APR	1980	902	108.376396	86.409531	-23.649780	-2.2	-1.2
17	APR	1980	1000	108.416664	86.408577	-23.659199	-3.9	-2.3
17	APR	1980	1049	108.450091	86.407417	-23.667833	-4.7	-1.5
17	APR	1980	1100	108.458336	86.407135	-23.669119	-4.8	-1.2
17	APR	1980	1200	108.500000	86.405540	-23.669420	-4.8	-1.2
17	APR	1980	1300	108.541664	86.404091	-23.657177	-4.0	-3.4
17	APR	1980	1400	108.583336	86.402969	-23.636736	-2.9	-4.2
17	APR	1980	1500	108.625000	86.402206	-23.616169	-1.9	-3.9
17	APR	1980	1600	108.666664	86.401680	-23.602116	-1.5	-1.9
17	APR	1980	1610	108.673015	86.401596	-23.600580	-1.5	-1.5
17	APR	1980	1700	108.708336	86.401138	-23.595646	-2.0	-0.8
17	APR	1980	1756	108.747223	86.400391	-23.591320	-3.1	-1.2
17	APR	1980	1800	108.750000	86.400322	-23.590891	-3.1	-1.3
17	APR	1980	1900	108.791664	86.399101	-23.581358	-4.3	-2.4
17	APR	1980	1942	108.820831	86.398079	-23.571508	-4.7	-3.0
17	APR	1980	2000	108.833336	86.397614	-23.566807	-4.8	-3.2
17	APR	1980	2100	108.875000	86.395988	-23.548395	-5.2	-3.9
17	APR	1980	2128	108.894440	86.395195	-23.538762	-5.4	-4.4
17	APR	1980	2200	108.916664	86.394424	-23.527365	-5.7	-4.0
17	APR	1980	2300	108.958336	86.392235	-23.511559	-6.8	-1.4
17	APR	1980	2315	108.968750	86.391670	-23.510431	-7.2	-0.3
18	APR	1980	0	109.000000	86.389755	-23.515335	-8.5	-3.4
18	APR	1980	100	109.041664	86.386681	-23.545736	-10.5	-7.7
18	APR	1980	200	109.083336	86.382980	-23.592167	-12.3	-9.8
18	APR	1980	300	109.125000	86.378716	-23.642408	-13.9	-9.3
18	APR	1980	400	109.166664	86.374016	-23.685904	-15.0	-7.6
18	APR	1980	435	109.190971	86.371117	-23.707357	-15.5	-6.8
18	APR	1980	500	109.203336	86.368996	-23.721731	-15.9	-6.7
18	APR	1980	600	109.250000	86.363701	-23.758825	-16.8	-6.4
18	APR	1980	622	109.265282	86.361679	-23.775642	-17.2	-5.5
18	APR	1980	700	109.291664	86.358055	-23.808401	-18.1	-10.4
18	APR	1980	753	109.328468	86.352631	-23.852421	-19.7	-8.8
18	APR	1980	800	109.333336	86.351853	-23.857534	-19.9	-8.4
18	APR	1980	810	109.340279	86.350800	-23.864470	-20.2	-7.9
18	APR	1980	900	109.375000	86.345108	-23.896662	-22.1	-6.1
18	APR	1980	940	109.402179	86.340149	-23.928467	-23.8	-10.9
18	APR	1980	957	109.414581	86.337936	-23.945276	-24.4	-12.5
18	APR	1980	1000	109.416664	86.337540	-23.948475	-24.5	-12.7
18	APR	1980	1100	109.458336	86.329445	-24.019291	-25.9	-13.7
18	APR	1980	1128	109.477176	86.325714	-24.048935	-24.2	-11.0
18	APR	1980	1144	109.488882	86.323647	-24.062360	-23.5	-8.7
18	APR	1980	1200	109.500000	86.321656	-24.072231	-22.6	-5.0
18	APR	1980	1300	109.541664	86.314429	-24.082771	-21.6	-0.5
18	APR	1980	1315	109.552788	86.312859	-24.081506	-22.0	-1.0
18	APR	1980	1400	109.583336	86.307289	-24.077224	-23.4	-0.2
18	APR	1980	1500	109.625000	86.299244	-24.064772	-25.1	-4.5
18	APR	1980	1600	109.666664	86.291347	-24.122655	-22.6	-6.9
18	APR	1980	1700	109.708336	86.284752	-24.171515	-18.0	-10.1
18	APR	1980	1704	109.711113	86.284355	-24.174862	-18.4	-10.0
18	APR	1980	1800	109.750000	86.278915	-24.219405	-18.5	-10.9
18	APR	1980	1811	109.757637	86.277794	-24.227383	-19.2	-8.5
18	APR	1980	1850	109.784721	86.273552	-24.252954	-20.8	-7.2
18	APR	1980	1900	109.791664	86.272423	-24.254774	-21.1	-6.8
18	APR	1980	2000	109.833336	86.265320	-24.287264	-22.8	-4.7
18	APR	1980	2037	109.859032	86.260651	-24.300587	-23.7	-4.2
18	APR	1980	2100	109.875000	86.257588	-24.309046	-23.7	-4.7
18	APR	1980	2200	109.916664	86.250488	-24.342596	-19.0	-9.7
18	APR	1980	2210	109.923615	86.249451	-24.351141	-19.7	-11.0
18	APR	1980	2223	109.932646	86.248184	-24.363745	-17.4	-12.5
18	APR	1980	2300	109.958336	86.244655	-24.404718	-16.0	-13.2
18	APR	1980	2328	109.977176	86.242149	-24.432175	-19.4	-10.1
19	APR	1980	0	110.000000	86.238472	-24.452124	-23.0	-4.9
19	APR	1980	100	110.041664	86.230644	-24.469289	-23.1	-0.5
19	APR	1980	114	110.051392	86.228951	-24.481155	-21.0	-1.0
19	APR	1980	143	110.071528	86.225607	-24.485454	-18.0	-2.7
19	APR	1980	200	110.083336	86.224474	-24.478184	-17.1	-4.0
19	APR	1980	300	110.125000	86.219009	-24.497725	-16.0	-7.4
19	APR	1980	300	110.125000	86.219009	-24.497725	-16.0	-6.4

FRAM 2 NAVIGATION - KALMAJ

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
19	APR	1980	400	110.106004	80.213470	-24.529772	-18.0	-6.6
19	APR	1980	446	110.198608	80.208977	-24.555332	-17.7	-7.1
19	APR	1980	500	110.203336	80.207057	-24.563589	-17.3	-7.3
19	APR	1980	600	110.250000	80.202492	-24.599979	-14.3	-7.1
19	APR	1980	632	110.272224	80.200150	-24.617170	-12.9	-6.0
19	APR	1980	700	110.291604	80.198212	-24.629484	-12.9	-4.8
19	APR	1980	703	110.293755	80.197998	-24.630640	-13.0	-4.6
19	APR	1980	718	110.304169	80.196938	-24.635912	-13.4	-4.0
19	APR	1980	800	110.333336	80.193718	-24.647755	-15.1	-3.2
19	APR	1980	850	110.363050	80.189468	-24.661745	-15.9	-3.9
19	APR	1980	900	110.375000	80.188606	-24.664972	-15.7	-4.1
19	APR	1980	905	110.378471	80.188187	-24.666658	-15.6	-4.2
19	APR	1980	1000	110.416504	80.183632	-24.685467	-15.2	-3.6
19	APR	1980	1038	110.443054	80.180504	-24.693638	-15.3	-1.7
19	APR	1980	1052	110.452782	80.179352	-24.695135	-15.3	-1.0
19	APR	1980	1100	110.458336	80.178688	-24.695646	-15.2	-0.6
19	APR	1980	1148	110.491669	80.174858	-24.698072	-13.8	-1.7
19	APR	1980	1200	110.500000	80.173981	-24.700260	-13.2	-2.8
19	APR	1980	1226	110.518059	80.172211	-24.708376	-12.1	-4.8
19	APR	1980	1300	110.541054	80.170067	-24.724140	-11.3	-6.4
19	APR	1980	1334	110.565277	80.168022	-24.742228	-11.0	-6.5
19	APR	1980	1400	110.583336	80.166473	-24.755194	-11.2	-5.7
19	APR	1980	1413	110.592354	80.165680	-24.760857	-11.4	-5.1
19	APR	1980	1500	110.625000	80.162758	-24.776695	-11.3	-3.5
19	APR	1980	1518	110.637505	80.161682	-24.781616	-10.8	-3.3
19	APR	1980	1600	110.666664	80.159409	-24.792662	-9.2	-3.4
19	APR	1980	1700	110.708336	80.156738	-24.809896	-7.7	-3.5
19	APR	1980	1704	110.711113	80.156570	-24.811033	-7.7	-3.5
19	APR	1980	1800	110.750000	80.154221	-24.825127	-8.1	-2.5
19	APR	1980	1849	110.784027	80.151955	-24.832422	-9.1	-1.2
19	APR	1980	1900	110.791664	80.151405	-24.833328	-9.3	-0.9
19	APR	1980	2000	110.833336	80.148368	-24.835461	-9.6	-0.4
19	APR	1980	2100	110.875000	80.145376	-24.840191	-8.2	-1.9
19	APR	1980	2121	110.889567	80.144485	-24.844097	-7.5	-2.7
19	APR	1980	2200	110.916664	80.143651	-24.854929	-6.2	-4.1
19	APR	1980	2300	110.958336	80.141197	-24.876640	-5.5	-4.4
20	APR	1980	0	111.000000	80.139297	-24.893875	-5.4	-2.4
20	APR	1980	6	111.004173	80.139091	-24.894985	-6.5	-2.2
20	APR	1980	100	111.031664	80.137016	-24.899776	-7.5	-0.3
20	APR	1980	152	111.077782	80.134842	-24.899450	-7.8	0.2
20	APR	1980	200	111.083336	80.134500	-24.899353	-7.9	0.1
20	APR	1980	240	111.111115	80.132797	-24.899275	-8.0	-0.1
20	APR	1980	300	111.125000	80.131927	-24.899530	-8.0	-0.2
20	APR	1980	335	111.151336	80.130302	-24.900605	-7.7	-0.5
20	APR	1980	400	111.150004	80.129417	-24.901569	-7.2	-0.0
20	APR	1980	500	111.203336	80.127380	-24.905566	-5.3	-1.1
20	APR	1980	500	111.250000	80.125999	-24.912344	-3.4	-1.7
20	APR	1980	700	111.291664	80.125084	-24.921476	-2.4	-2.1
20	APR	1980	710	111.298015	80.124954	-24.923141	-2.4	-2.1
20	APR	1980	800	111.333336	80.124321	-24.931517	-2.4	-2.0
20	APR	1980	900	111.375000	80.123497	-24.939114	-2.7	-1.0
20	APR	1980	1000	111.416664	80.122551	-24.939360	-3.1	1.0
20	APR	1980	1100	111.450000	80.121521	-24.928495	-3.2	3.5
20	APR	1980	1200	111.500000	80.120552	-24.906796	-2.8	0.0
20	APR	1980	1300	111.541664	80.119759	-24.878412	-2.0	5.6
20	APR	1980	1323	111.557640	80.119522	-24.868641	-1.7	3.0
20	APR	1980	1400	111.583336	80.119240	-24.856200	-1.1	3.3
20	APR	1980	1440	111.594973	80.119179	-24.853643	-1.1	2.6
20	APR	1980	1500	111.625000	80.119011	-24.848835	-0.4	0.0
20	APR	1980	1556	111.653007	80.118905	-24.851387	0.0	-0.6
20	APR	1980	1600	111.650004	80.118865	-24.851578	0.0	-0.6
20	APR	1980	1700	111.708336	80.118980	-24.851311	0.0	-0.7
20	APR	1980	1741	111.738009	80.118973	-24.847574	-0.1	1.5
20	APR	1980	1800	111.750000	80.118958	-24.845154	-0.2	1.7
20	APR	1980	1900	111.791664	80.118858	-24.838254	-0.4	1.8
20	APR	1980	2000	111.833336	80.118664	-24.828547	-0.5	1.3
20	APR	1980	2100	111.875000	80.118510	-24.824664	-0.5	0.6
20	APR	1980	2200	111.916664	80.118301	-24.822605	-0.7	0.1

FRAM 2 NAVIGATION - KALMAN

DAY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
20	APR	1980	2258	111.956940	80.118042	-24.822241	-1.0	0.2
20	APR	1980	2300	111.958336	80.118034	-24.822216	-1.0	0.2
21	APR	1980	0	112.009000	80.117607	-24.819988	-1.6	0.9
21	APR	1980	4	112.092777	80.117577	-24.819702	-1.7	0.9
21	APR	1980	44	112.039556	80.117172	-24.815792	-2.0	1.5
21	APR	1980	100	112.041004	80.116997	-24.813745	-2.0	1.7
21	APR	1980	200	112.083336	80.116333	-24.805172	-2.0	1.6
21	APR	1980	230	112.104164	80.116028	-24.801777	-1.8	1.2
21	APR	1980	300	112.125000	80.115746	-24.799604	-1.6	0.6
21	APR	1980	400	112.156664	80.115288	-24.798779	-1.2	-0.2
21	APR	1980	500	112.208336	80.114937	-24.799908	-0.9	-0.1
21	APR	1980	600	112.250000	80.114662	-24.798119	-0.8	1.0
21	APR	1980	700	112.291064	80.114426	-24.789965	-0.7	2.4
21	APR	1980	748	112.325005	80.114250	-24.779612	-0.6	2.9
21	APR	1980	800	112.333336	80.114212	-24.776875	-0.6	2.9
21	APR	1980	859	112.374306	80.114021	-24.765617	-0.6	1.5
21	APR	1980	900	112.375000	80.114021	-24.765497	-0.6	1.5
21	APR	1980	1000	112.416004	80.113747	-24.762655	-1.3	0.0
21	APR	1980	1046	112.448608	80.113260	-24.762300	-2.5	0.4
21	APR	1980	1100	112.458336	80.113068	-24.751745	-2.9	0.6
21	APR	1980	1200	112.500000	80.111954	-24.756891	-3.7	1.1
21	APR	1980	1234	112.523013	80.111282	-24.754421	-3.6	0.6
21	APR	1980	1300	112.541064	80.110780	-24.754021	-3.5	-0.3
21	APR	1980	1304	112.544441	80.110710	-24.754126	-3.5	-0.4
21	APR	1980	1400	112.583336	80.109604	-24.759983	-4.0	-2.0
21	APR	1980	1421	112.597923	80.109131	-24.763681	-4.4	-2.4
21	APR	1980	1449	112.617363	80.108429	-24.769249	-4.9	-2.6
21	APR	1980	1500	112.625000	80.108139	-24.771511	-5.0	-2.6
21	APR	1980	1600	112.656664	80.106483	-24.781527	-4.8	-1.1
21	APR	1980	1608	112.672218	80.106277	-24.782118	-4.6	-0.7
21	APR	1980	1634	112.690277	80.105659	-24.782578	-4.2	0.2
21	APR	1980	1700	112.708336	80.105103	-24.781647	-3.8	0.6
21	APR	1980	1800	112.750000	80.103905	-24.778736	-3.7	0.3
21	APR	1980	1819	112.763191	80.103510	-24.778448	-3.8	0.0
21	APR	1980	1900	112.791604	80.102646	-24.779320	-4.0	-0.5
21	APR	1980	2000	112.833336	80.101311	-24.783264	-4.1	-1.0
21	APR	1980	2100	112.875000	80.100021	-24.788410	-3.8	-1.1
21	APR	1980	2200	112.916664	80.098846	-24.793125	-3.4	-0.9
21	APR	1980	2256	112.955559	80.097794	-24.796791	-3.7	-0.8
21	APR	1980	2300	112.958336	80.097717	-24.797043	-3.7	-0.8
21	APR	1980	2336	112.963337	80.096931	-24.799410	-4.4	-0.9
22	APR	1980	0	113.000000	80.096336	-24.801144	-4.9	-0.6
22	APR	1980	100	113.041064	80.094627	-24.805662	-5.4	-0.9
22	APR	1980	162	113.083336	80.094574	-24.805570	-5.4	-0.9
22	APR	1980	122	113.056664	80.093987	-24.807070	-5.4	-0.7
22	APR	1980	200	113.083336	80.092880	-24.809038	-5.5	-0.6
22	APR	1980	300	113.125000	80.091649	-24.811977	-5.9	-0.3
22	APR	1980	308	113.130554	80.090790	-24.812496	-5.9	-0.6
22	APR	1980	400	113.156664	80.089081	-24.817379	-5.2	-1.0
22	APR	1980	454	113.204163	80.087280	-24.825571	-6.1	-2.2
22	APR	1980	500	113.208336	80.087082	-24.826612	-6.0	-2.2
22	APR	1980	600	113.250000	80.085243	-24.835941	-5.2	-1.3
22	APR	1980	649	113.277779	80.084190	-24.837837	-4.6	0.1
22	APR	1980	700	113.291064	80.083710	-24.837023	-4.3	0.9
22	APR	1980	751	113.327987	80.082527	-24.831455	-4.5	1.5
22	APR	1980	800	113.333336	80.082306	-24.830416	-4.6	1.4
22	APR	1980	900	113.375000	80.080612	-24.826134	-5.0	0.1
22	APR	1980	1000	113.416664	80.078423	-24.829746	-7.5	-1.0
22	APR	1980	1100	113.456664	80.075813	-24.833945	-8.4	-2.4
22	APR	1980	1145	113.489580	80.073730	-24.847952	-8.7	-2.2
22	APR	1980	1200	113.500000	80.073029	-24.850542	-8.7	-2.1
22	APR	1980	1300	113.541064	80.070198	-24.859402	-8.8	-1.6
22	APR	1980	1332	113.553590	80.068680	-24.863115	-8.7	-1.3
22	APR	1980	1400	113.583336	80.067360	-24.865800	-8.7	-1.1
22	APR	1980	1500	113.625000	80.064568	-24.871056	-8.4	-0.9
22	APR	1980	1520	113.633666	80.063067	-24.871916	-8.2	-0.9
22	APR	1980	1600	113.656664	80.061935	-24.874405	-7.8	-0.7
22	APR	1980	1700	113.703336	80.059569	-24.877548	-7.2	-0.6

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	G.M.T	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
22	APR	1980	1800	113.750000	86.057274	-24.879467	-6.7	-0.2
22	APR	1980	1900	113.791604	86.055145	-24.879221	-6.5	0.4
22	APR	1980	2000	113.833330	86.053017	-24.875799	-6.7	1.1
22	APR	1980	2100	113.875000	86.050743	-24.868485	-7.3	2.0
22	APR	1980	2200	113.916604	86.048248	-24.857151	-8.1	2.8
22	APR	1980	2228	113.936104	86.046997	-24.850702	-8.5	3.1
22	APR	1980	2300	113.958336	86.045486	-24.842587	-8.9	3.4
23	APR	1980	0	114.000000	86.042480	-24.826206	-9.5	3.5
23	APR	1980	100	114.041664	86.039360	-24.810835	-9.7	3.0
23	APR	1980	140	114.069450	86.037277	-24.802555	-9.6	2.3
23	APR	1980	200	114.083336	86.036247	-24.799206	-9.5	2.0
23	APR	1980	300	114.125000	86.033226	-24.792498	-9.1	0.9
23	APR	1980	400	114.166664	86.030327	-24.790548	-8.8	0.0
23	APR	1980	500	114.208336	86.027534	-24.792059	-8.5	-0.6
23	APR	1980	600	114.250000	86.024603	-24.794935	-8.4	-0.6
23	APR	1980	700	114.291664	86.022072	-24.796785	-8.5	-0.1
23	APR	1980	800	114.333330	86.019272	-24.795456	-8.8	0.7
23	APR	1980	849	114.367303	86.016891	-24.790980	-9.2	1.6
23	APR	1980	900	114.375000	86.016342	-24.789526	-9.2	1.8
23	APR	1980	1000	114.416664	86.013268	-24.778797	-9.7	2.7
23	APR	1980	1100	114.458336	86.010063	-24.764490	-10.0	3.3
23	APR	1980	1200	114.500000	86.006775	-24.748907	-10.2	3.3
23	APR	1980	1300	114.541664	86.003471	-24.734989	-10.1	2.6
23	APR	1980	1400	114.583336	86.000229	-24.725851	-9.8	1.2
23	APR	1980	1500	114.625000	86.997116	-24.724308	-9.3	-0.7
23	APR	1980	1600	114.666664	86.994202	-24.732418	-8.7	-2.9
23	APR	1980	1700	114.708336	86.991501	-24.751000	-8.0	-5.1
23	APR	1980	1745	114.739580	86.989624	-24.771461	-7.5	-6.6
23	APR	1980	1800	114.750000	86.989029	-24.779385	-7.3	-7.1
23	APR	1980	1900	114.791664	86.986732	-24.815464	-6.9	-8.3
23	APR	1980	1950	114.825305	86.984894	-24.848433	-6.7	-8.6
23	APR	1980	2000	114.833336	86.984528	-24.855101	-6.7	-8.6
23	APR	1980	2100	114.875000	86.982353	-24.894318	-6.7	-8.2
23	APR	1980	2200	114.916664	86.980141	-24.929504	-6.9	-6.9
23	APR	1980	2300	114.958336	86.977859	-24.957813	-7.1	-5.2
24	APR	1980	0	115.000000	86.975510	-24.977459	-7.3	-3.2
24	APR	1980	100	115.041664	86.973114	-24.987646	-7.5	-1.2
24	APR	1980	200	115.083336	86.970680	-24.988460	-7.5	0.8
24	APR	1980	300	115.125000	86.968209	-24.980881	-7.4	2.5
24	APR	1980	400	115.166664	86.965964	-24.966505	-7.2	3.7
24	APR	1980	500	115.208336	86.963615	-24.947553	-6.9	4.4
24	APR	1980	600	115.250000	86.961441	-24.927183	-6.5	4.4
24	APR	1980	700	115.291664	86.959199	-24.923744	-6.5	4.3
24	APR	1980	700	115.291664	86.959381	-24.900015	-6.2	3.8
24	APR	1980	800	115.333336	86.957437	-24.893152	-6.9	2.5
24	APR	1980	900	115.375000	86.955559	-24.885944	-5.7	0.7
24	APR	1980	1000	115.416664	86.953720	-24.887041	-5.7	-1.1
24	APR	1980	1100	115.458336	86.951851	-24.895502	-5.4	-2.4
24	APR	1980	1127	115.477081	86.950989	-24.900663	-5.0	-2.6
24	APR	1980	1200	115.500000	86.949898	-24.907328	-5.2	-2.6
24	APR	1980	1300	115.541664	86.947800	-24.917086	-6.8	-1.3
24	APR	1980	1312	115.549445	86.947350	-24.918683	-6.9	-0.9
24	APR	1980	1400	115.583336	86.945457	-24.917940	-7.7	0.9
24	APR	1980	1457	115.622917	86.943824	-24.912176	-7.9	1.3
24	APR	1980	1500	115.625000	86.942694	-24.911892	-7.9	1.3
24	APR	1980	1520	115.643778	86.941811	-24.910158	-7.5	1.5
24	APR	1980	1600	115.683336	86.940491	-24.910311	-6.8	-0.5
24	APR	1980	1700	115.725000	86.938945	-24.912544	-6.4	-0.6
24	APR	1980	1760	115.758336	86.938370	-24.913044	-6.5	-0.2
24	APR	1980	1717	115.715000	86.937950	-24.913657	-6.5	0.1
24	APR	1980	1800	115.750000	86.936741	-24.911201	-6.7	0.7
24	APR	1980	1827	115.753745	86.935549	-24.909854	-6.6	0.6
24	APR	1980	1854	115.790270	86.934097	-24.908801	-6.8	0.2
24	APR	1980	1900	115.791664	86.933421	-24.908880	-6.7	0.2
24	APR	1980	2000	115.833336	86.931940	-24.909569	-6.1	-0.4
24	APR	1980	2044	115.863892	86.930481	-24.911125	-6.2	-0.5
24	APR	1980	2100	115.900000	86.929039	-24.911634	-6.4	-0.4
24	APR	1980	2200	115.941664	86.927711	-24.912365	-7.2	0.1

FRAM 2 NAVIGATION - KALVAN

DY	MON	YEAR	GMT	JULDAI	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
24	APR	1980	2300	115.9533336	85.925293	-24.910143	-7.6	0.8
24	APR	1980	2344	115.968892	85.923508	-24.906822	-7.4	1.1
25	APR	1980	0	116.000000	85.922867	-24.905467	-7.3	1.2
25	APR	1980	100	116.041004	85.920509	-24.900066	-7.4	1.0
25	APR	1980	130	116.062500	85.919289	-24.898066	-7.5	0.7
25	APR	1980	200	116.0933336	85.918030	-24.896723	-7.9	0.5
25	APR	1980	300	116.125000	85.915436	-24.895699	-8.0	0.0
25	APR	1980	316	116.135106	85.914749	-24.895754	-7.9	-0.1
25	APR	1980	400	116.1666664	85.912865	-24.897196	-7.9	-0.9
25	APR	1980	500	116.2083336	85.910210	-24.904871	-8.6	-2.4
25	APR	1980	502	116.209724	85.910110	-24.905239	-8.6	-2.4
25	APR	1980	600	116.250000	85.907265	-24.913673	-9.4	-0.3
25	APR	1980	648	116.2833333	85.904770	-24.905354	-9.7	5.2
25	APR	1980	700	116.2916664	85.904144	-24.899944	-9.7	6.7
25	APR	1980	800	116.3333336	85.900955	-24.859791	-10.1	9.2
25	APR	1980	900	116.375000	85.897552	-24.831980	-11.0	1.5
25	APR	1980	1000	116.4166664	85.893883	-24.847162	-11.4	-6.8
25	APR	1980	1019	116.429803	85.892715	-24.857679	-11.3	-7.7
25	APR	1980	1100	116.4583336	85.890305	-24.877480	-10.3	-3.4
25	APR	1980	1100	116.4583336	85.890305	-24.877480	-10.3	-3.4
25	APR	1980	1200	116.500000	85.887100	-24.869444	-10.1	-5.0
25	APR	1980	1204	116.502777	85.886879	-24.867903	-10.2	5.2
25	APR	1980	1300	116.541004	85.883545	-24.844904	-11.8	4.7
25	APR	1980	1349	116.575091	85.880318	-24.831865	-12.4	2.7
25	APR	1980	1400	116.5833336	85.879578	-24.829752	-12.4	2.4
25	APR	1980	1500	116.625000	85.875572	-24.819780	-12.4	2.4
25	APR	1980	1534	116.648013	85.873253	-24.812418	-12.7	3.1
25	APR	1980	1600	116.6666664	85.871445	-24.806299	-13.0	3.7
25	APR	1980	1700	116.7083336	85.867119	-24.785494	-13.0	5.5
25	APR	1980	1719	116.721527	85.865715	-24.777195	-13.7	6.6
25	APR	1980	1800	116.750000	85.862648	-24.757322	-14.0	6.6
25	APR	1980	1900	116.791004	85.858017	-24.731092	-14.6	4.4
25	APR	1980	1904	116.794441	85.857697	-24.729610	-14.7	4.1
25	APR	1980	2000	116.8333336	85.853165	-24.720264	-15.2	0.6
25	APR	1980	2100	116.875000	85.848267	-24.722595	-14.8	-0.9
25	APR	1980	2200	116.916004	85.843620	-24.723316	-13.7	1.2
25	APR	1980	2236	116.941073	85.841026	-24.717041	-13.0	3.5
25	APR	1980	2300	116.9533336	85.839383	-24.706393	-12.6	5.0
26	APR	1980	0	117.000000	85.835289	-24.682022	-12.8	0.5
26	APR	1980	22	117.015282	85.833733	-24.671507	-13.3	6.3
26	APR	1980	190	117.041004	85.830925	-24.654804	-14.1	5.5
26	APR	1980	195	117.051135	85.830544	-24.652784	-14.2	5.4
26	APR	1980	200	117.0833336	85.825233	-24.633144	-14.6	4.3
26	APR	1980	206	117.136090	85.825097	-24.630604	-14.6	5.3
26	APR	1980	300	117.125000	85.821500	-24.615270	-14.6	3.8
26	APR	1980	354	117.152798	85.817700	-24.599548	-13.1	3.3
26	APR	1980	400	117.195504	85.817164	-24.596517	-12.0	3.2
26	APR	1980	440	117.194450	85.814401	-24.591533	-12.2	2.2
26	APR	1980	500	117.2083336	85.813148	-24.587690	-12.0	1.5
26	APR	1980	540	117.235115	85.810000	-24.565789	-11.6	0.5
26	APR	1980	600	117.250000	85.804357	-24.558513	-11.4	0.4
26	APR	1980	623	117.269440	85.807603	-24.554310	-11.0	0.0
26	APR	1980	700	117.2916664	85.805840	-24.551746	-10.0	2.0
26	APR	1980	726	117.309723	85.804497	-24.547613	-9.1	3.8
26	APR	1980	800	117.3333336	85.802902	-24.543694	-8.4	5.0
26	APR	1980	815	117.343700	85.802223	-24.545694	-8.4	5.3
26	APR	1980	900	117.375000	85.800140	-24.534575	-9.0	5.1
26	APR	1980	1000	117.4166664	85.795997	-24.520627	-10.2	7.2
26	APR	1980	1050	117.455559	85.793938	-24.473385	-9.6	7.8
26	APR	1980	1100	117.4783336	85.793732	-24.471215	-9.5	7.3
26	APR	1980	1144	117.492503	85.791426	-24.447478	-7.8	5.0
26	APR	1980	1200	117.500000	85.790970	-24.444145	-7.4	4.2
26	APR	1980	1242	117.529107	85.789444	-24.434586	-5.2	2.6
26	APR	1980	1300	117.541004	85.788657	-24.431069	-5.9	2.8
26	APR	1980	1336	117.555573	85.787727	-24.422907	-5.7	3.5
26	APR	1980	1400	117.5833336	85.786972	-24.419321	-5.9	4.0
26	APR	1980	1427	117.592051	85.786087	-24.410745	-5.2	4.4
26	APR	1980	1500	117.525000	85.784920	-24.397135	-6.0	4.5

FRAM 2 NAVIGATION - NALRAD

DY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VFL.	E-VFL.
26	APR	1980	1522	117.640282	85.784073	-24.390043	-7.3	4.3
26	APR	1980	1500	117.666004	85.782509	-24.378679	-7.9	3.8
26	APR	1980	1612	117.674935	85.781990	-24.375399	-7.9	3.6
26	APR	1980	1700	117.708336	85.779984	-24.363272	-7.2	3.4
26	APR	1980	1709	117.714577	85.779640	-24.366691	-6.9	3.5
26	APR	1980	1757	117.747917	85.778069	-24.348602	-5.3	3.3
26	APR	1980	1800	117.750000	85.777977	-24.347851	-5.2	3.4
26	APR	1980	1850	117.738887	85.776466	-24.335743	-5.3	3.3
26	APR	1980	1960	117.791004	85.776352	-24.335081	-5.4	2.2
26	APR	1980	1942	117.826831	85.775055	-24.328718	-5.7	2.4
26	APR	1980	2000	117.833336	85.774513	-24.325081	-5.4	3.1
26	APR	1980	2100	117.875000	85.773019	-24.305746	-3.8	5.5
26	APR	1980	2200	117.915004	85.772011	-24.286148	-2.7	5.4
26	APR	1980	2229	117.936800	85.771591	-24.270094	-2.7	4.0
26	APR	1980	2300	117.958336	85.771126	-24.262720	-2.8	2.4
27	APR	1980	0	118.000000	85.770256	-24.256952	-2.4	0.6
27	APR	1980	100	118.041004	85.769638	-24.254223	-1.5	1.0
27	APR	1980	100	118.041004	85.769638	-24.254223	-1.5	1.0
27	APR	1980	200	118.083336	85.769218	-24.248131	-1.4	1.6
27	APR	1980	204	118.086113	85.769188	-24.247675	-1.4	1.1
27	APR	1980	246	118.115273	85.768822	-24.243223	-1.7	1.3
27	APR	1980	300	118.125000	85.768790	-24.241985	-1.6	1.1
27	APR	1980	351	118.150423	85.768265	-24.238500	-1.5	0.8
27	APR	1980	400	118.160004	85.768190	-24.238004	-1.4	0.7
27	APR	1980	432	118.164690	85.767960	-24.236345	-1.3	0.8
27	APR	1980	500	118.208336	85.767784	-24.234632	-1.0	0.9
27	APR	1980	539	118.235413	85.767609	-24.231937	-0.7	0.9
27	APR	1980	600	118.250000	85.767540	-24.230503	-0.5	0.9
27	APR	1980	618	118.262505	85.767494	-24.229305	-0.4	0.9
27	APR	1980	700	118.291004	85.767403	-24.226286	-0.4	1.1
27	APR	1980	726	118.309723	85.767342	-24.223518	-0.5	1.5
27	APR	1980	800	118.333336	85.767250	-24.221855	-0.5	2.0
27	APR	1980	900	118.375000	85.767130	-24.209550	-0.2	2.4
27	APR	1980	1000	118.415004	85.767136	-24.200012	0.2	1.6
27	APR	1980	1100	118.455004	85.767281	-24.195013	0.0	0.4
27	APR	1980	1135	118.462035	85.767387	-24.194925	0.6	-0.3
27	APR	1980	1200	118.500000	85.767464	-24.195890	0.5	-0.7
27	APR	1980	1300	118.541004	85.767548	-24.199106	-0.1	-0.5
27	APR	1980	1320	118.555556	85.767525	-24.199382	-0.4	-0.1
27	APR	1980	1400	118.583336	85.767403	-24.199083	-0.6	0.2
27	APR	1980	1434	118.600941	85.767303	-24.199219	-0.4	-0.4
27	APR	1980	1500	118.625000	85.767285	-24.200097	-0.1	-1.2
27	APR	1980	1500	118.625000	85.767372	-24.204221	0.7	-2.5
27	APR	1980	1621	118.661252	85.767171	-24.213151	0.9	-2.5
27	APR	1980	1700	118.700000	85.767021	-24.214551	1.0	-2.5
27	APR	1980	1700	118.700000	85.767077	-24.214577	1.0	-2.3
27	APR	1980	1700	118.700000	85.767077	-24.214577	1.0	-1.7
27	APR	1980	1700	118.700000	85.767077	-24.214577	1.0	-0.5
27	APR	1980	1835	118.771504	85.766646	-24.230335	0.3	-0.5
27	APR	1980	1900	118.791004	85.766080	-24.231531	0.1	-0.3
27	APR	1980	2000	118.833336	85.766051	-24.230135	-0.1	0.3
27	APR	1980	2100	118.875000	85.766015	-24.229271	-0.1	0.1
27	APR	1980	2200	118.915004	85.766005	-24.228950	0.1	-0.4
27	APR	1980	2300	118.958336	85.766074	-24.232000	0.3	-0.5
28	APR	1980	0	119.000000	85.766211	-24.235271	0.5	-0.6
28	APR	1980	100	119.041004	85.766217	-24.244271	0.7	-0.5
28	APR	1980	200	119.083336	85.766667	-24.243501	0.7	-0.5
28	APR	1980	300	119.125000	85.766667	-24.245555	0.5	-0.5
28	APR	1980	303	119.127003	85.766675	-24.245755	0.5	-0.4
28	APR	1980	400	119.166667	85.766667	-24.245755	0.5	-0.4
28	APR	1980	500	119.208336	85.766667	-24.245755	0.5	-0.4
28	APR	1980	600	119.250000	85.766667	-24.245755	0.5	-0.4
28	APR	1980	700	119.291667	85.766667	-24.245755	0.5	-0.4
28	APR	1980	800	119.333336	85.766667	-24.245755	0.5	-0.4
28	APR	1980	900	119.375000	85.766667	-24.245755	0.5	-0.4
28	APR	1980	1000	119.416667	85.766667	-24.245755	0.5	-0.4

FRAM 2 NAVIGATION - SALMAN

DAY	MOON	YEAR	GVI	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
28	APR	1980	1100	119.453333	05.770752	-24.233729	11.0	0.7
28	APR	1980	1159	119.49306	05.770409	-24.233594	11.2	0.1
28	APR	1980	1200	119.509000	05.770401	-24.233594	11.2	0.0
28	APR	1980	1212	119.513333	05.770332	-24.233594	11.0	0.1
28	APR	1980	1300	119.541000	05.770180	-24.233594	11.0	0.1
28	APR	1980	1400	119.553333	05.770333	-24.233594	11.0	0.1
28	APR	1980	1500	119.562500	05.770374	-24.233594	11.1	0.1
28	APR	1980	1545	119.565000	05.771255	-24.233594	11.1	0.1
28	APR	1980	1600	119.566000	05.771439	-24.233594	11.1	0.1
28	APR	1980	1700	119.718333	05.772285	-24.233594	11.1	0.1
28	APR	1980	1719	119.721527	05.772726	-24.233594	11.1	0.1
28	APR	1980	1800	119.750000	05.774048	-24.233594	11.1	0.1
28	APR	1980	1900	119.741604	05.776817	-24.233594	11.1	0.1
28	APR	1980	2000	119.833333	05.780052	-24.233594	11.1	0.1
28	APR	1980	2100	119.867500	05.783043	-24.233594	11.1	0.1
28	APR	1980	2106	119.879173	05.783310	-24.233594	11.1	0.1
28	APR	1980	2200	119.915000	05.785459	-24.233594	11.1	0.1
28	APR	1980	2230	119.954333	05.786784	-24.233594	11.1	0.1
28	APR	1980	2300	119.990000	05.787555	-24.233594	11.1	0.1
29	APR	1980	0	120.000000	05.790000	-24.233594	11.1	0.1
29	APR	1980	39	120.027077	05.790180	-24.233594	11.1	0.1
29	APR	1980	100	120.044106	05.792285	-24.233594	11.1	0.1
29	APR	1980	200	120.043333	05.792854	-24.233594	11.1	0.1
29	APR	1980	300	120.125000	05.794955	-24.233594	11.1	0.1
29	APR	1980	400	120.165000	05.804001	-24.233594	11.1	0.1
29	APR	1980	500	120.205000	05.804552	-24.233594	11.1	0.1
29	APR	1980	600	120.250000	05.804555	-24.233594	11.1	0.1
29	APR	1980	700	120.291504	05.811905	-24.233594	11.1	0.1
29	APR	1980	731	120.313194	05.815353	-24.233594	11.1	0.1
29	APR	1980	800	120.333333	05.816956	-24.233594	11.1	0.1
29	APR	1980	900	120.375000	05.823229	-24.233594	11.1	0.1
29	APR	1980	1000	120.410000	05.829477	-24.233594	11.1	0.1
29	APR	1980	1100	120.453333	05.823312	-24.233594	11.1	0.1
29	APR	1980	1121	120.472423	05.825332	-24.233594	11.1	0.1
29	APR	1980	1200	120.500000	05.827555	-24.233594	11.1	0.1
29	APR	1980	1250	120.534741	05.830155	-24.233594	11.1	0.1
29	APR	1980	1300	120.554100	05.833333	-24.233594	11.1	0.1
29	APR	1980	1350	120.517210	05.833114	-24.233594	11.1	0.1
29	APR	1980	1400	120.533333	05.833333	-24.233594	11.1	0.1
29	APR	1980	1455	120.522423	05.833551	-24.233594	11.1	0.1
29	APR	1980	1500	120.520000	05.833555	-24.233594	11.1	0.1
29	APR	1980	1525	120.530000	05.833333	-24.233594	11.1	0.1
29	APR	1980	1600	120.570000	05.833555	-24.233594	11.1	0.1
29	APR	1980	1700	120.710000	05.833555	-24.233594	11.1	0.1
29	APR	1980	1800	120.750000	05.833555	-24.233594	11.1	0.1
29	APR	1980	2000	120.833333	05.833555	-24.233594	11.1	0.1
29	APR	1980	2100	120.875000	05.833555	-24.233594	11.1	0.1
29	APR	1980	2144	120.905555	05.833555	-24.233594	11.1	0.1
29	APR	1980	2200	120.915000	05.833555	-24.233594	11.1	0.1
29	APR	1980	2203	120.915755	05.833555	-24.233594	11.1	0.1
29	APR	1980	2300	120.953333	05.833555	-24.233594	11.1	0.1
31	MAY	1980	0	121.000000	05.852514	-24.233594	11.1	0.1
31	MAY	1980	100	121.000000	05.852515	-24.233594	11.1	0.1
31	MAY	1980	136	121.000000	05.852515	-24.233594	11.1	0.1
31	MAY	1980	200	121.053333	05.857437	-24.233594	11.1	0.1
31	MAY	1980	300	121.125000	05.864360	-24.233594	11.1	0.1
31	MAY	1980	400	121.100000	05.864360	-24.233594	11.1	0.1
31	MAY	1980	510	121.200000	05.864360	-24.233594	11.1	0.1
31	MAY	1980	610	121.250000	05.864360	-24.233594	11.1	0.1
31	MAY	1980	700	121.240501	05.864360	-24.233594	11.1	0.1
31	MAY	1980	800	121.333333	05.864360	-24.233594	11.1	0.1
31	MAY	1980	900	121.333333	05.864360	-24.233594	11.1	0.1
31	MAY	1980	1000	121.375000	05.864360	-24.233594	11.1	0.1
31	MAY	1980	1032	121.410000	05.864360	-24.233594	11.1	0.1

FR44 2 VIGATION - PALMAS

DAY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	V-L	E-V
31	MAY	1980	1100	121.454336	85.878183	-24.720196	3.57	3.2
31	MAY	1980	1159	121.449300	85.877453	-24.734461	3.7	3.4
31	MAY	1980	1200	121.500000	85.877876	-24.737447	4.6	3.3
31	MAY	1980	1219	121.513191	85.878334	-24.739867	4.4	3.5
31	MAY	1980	1300	121.541064	85.879160	-24.750759	3.3	3.3
31	MAY	1980	1400	121.553330	85.880142	-24.765781	2.8	3.1
31	MAY	1980	1465	121.547502	85.880234	-24.767153	2.8	3.0
31	MAY	1980	1500	121.525000	85.881073	-24.760106	3.0	3.3
31	MAY	1980	1533	121.647919	85.881615	-24.791739	3.0	3.2
31	MAY	1980	1554	121.652400	85.881950	-24.800102	2.9	3.0
31	MAY	1980	1580	121.658004	85.882050	-24.800102	2.9	3.0
31	MAY	1980	1658	121.706440	85.882935	-24.833502	2.9	3.0
31	MAY	1980	1700	121.704336	85.882900	-24.834637	2.9	3.0
31	MAY	1980	1719	121.721527	85.883278	-24.845490	3.1	3.5
31	MAY	1980	1800	121.757000	85.883945	-24.854532	3.1	3.0
31	MAY	1980	1843	121.779054	85.884780	-24.888691	3.5	3.3
31	MAY	1980	1900	121.790004	85.885511	-24.894433	3.3	3.1
31	MAY	1980	1906	121.795837	85.885523	-24.896338	3.3	3.1
31	MAY	1980	2000	121.833330	85.886353	-24.900000	3.4	3.0
31	MAY	1980	2100	121.807500	85.887710	-24.922471	4.4	3.1
31	MAY	1980	2114	121.808472	85.887917	-24.923210	4.4	3.1
31	MAY	1980	2200	121.910000	85.889335	-24.933257	4.4	3.0
31	MAY	1980	2214	121.925392	85.889667	-24.941401	4.4	3.0
31	MAY	1980	2300	121.953336	85.890592	-24.956775	3.3	3.0
1	MAY	1980	0	122.000000	85.891624	-24.997705	3.0	3.0
1	MAY	1980	0	122.000000	85.891624	-24.997705	3.0	3.0
1	MAY	1980	47	122.032646	85.892776	-25.001703	3.7	3.4
1	MAY	1980	100	122.041064	85.893320	-25.022224	3.0	3.0
1	MAY	1980	146	122.073000	85.894489	-25.033577	3.0	3.0
1	MAY	1980	200	122.083330	85.895538	-25.035593	3.0	3.0
1	MAY	1980	300	122.125000	85.897052	-25.055796	3.0	3.0
1	MAY	1980	332	122.147224	85.898894	-25.066244	3.0	3.0
1	MAY	1980	400	122.150004	85.899415	-25.072803	3.0	3.0
1	MAY	1980	500	122.200330	85.900622	-25.092226	3.0	3.0
1	MAY	1980	518	122.220333	85.900557	-25.095407	3.0	3.0
1	MAY	1980	600	122.250000	85.901227	-25.100464	3.0	3.0
1	MAY	1980	700	122.291064	85.902442	-25.122715	3.0	3.0
1	MAY	1980	794	122.294141	85.902140	-25.122951	3.0	3.0
1	MAY	1980	800	122.303330	85.902442	-25.122715	3.0	3.0
1	MAY	1980	900	122.330000	85.903355	-25.127611	3.0	3.0
1	MAY	1980	952	122.347224	85.904335	-25.132591	3.0	3.0
1	MAY	1980	1000	122.410000	85.906135	-25.142577	3.0	3.0
1	MAY	1980	1100	122.417224	85.906935	-25.147557	3.0	3.0
1	MAY	1980	1200	122.450000	85.908735	-25.157537	3.0	3.0
1	MAY	1980	1300	122.510000	85.910535	-25.167517	3.0	3.0
1	MAY	1980	1360	122.513064	85.910535	-25.167517	3.0	3.0
1	MAY	1980	1400	122.530000	85.913064	-25.177517	3.0	3.0
1	MAY	1980	1500	122.553330	85.916064	-25.187517	3.0	3.0
1	MAY	1980	1600	122.553330	85.916064	-25.187517	3.0	3.0
1	MAY	1980	1700	122.570000	85.919064	-25.197517	3.0	3.0
1	MAY	1980	1800	122.570000	85.919064	-25.197517	3.0	3.0
1	MAY	1980	1900	122.580000	85.922064	-25.207517	3.0	3.0
1	MAY	1980	1950	122.580000	85.922064	-25.207517	3.0	3.0
1	MAY	1980	2000	122.590000	85.925064	-25.217517	3.0	3.0
1	MAY	1980	2100	122.590000	85.925064	-25.217517	3.0	3.0
1	MAY	1980	2200	122.600000	85.928064	-25.227517	3.0	3.0
1	MAY	1980	2300	122.600000	85.928064	-25.227517	3.0	3.0
1	MAY	1980	2400	122.610000	85.931064	-25.237517	3.0	3.0
1	MAY	1980	2500	122.610000	85.931064	-25.237517	3.0	3.0
1	MAY	1980	2600	122.620000	85.934064	-25.247517	3.0	3.0
1	MAY	1980	2700	122.620000	85.934064	-25.247517	3.0	3.0
1	MAY	1980	2800	122.630000	85.937064	-25.257517	3.0	3.0
1	MAY	1980	2900	122.630000	85.937064	-25.257517	3.0	3.0
1	MAY	1980	3000	122.640000	85.940064	-25.267517	3.0	3.0
1	MAY	1980	3100	122.640000	85.940064	-25.267517	3.0	3.0

FRAM 2 NAVIGATION - KALMAN

DY	MON	YEAR	GMT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
1	MAY	1980	2300	122.952336	85.8882222	-25.075306	-6.4	-1.0
1	MAY	1980	2358	122.998604	85.880314	-25.080305	-5.4	-1.0
2	MAY	1980	0	123.000000	85.886261	-25.080456	-5.3	-1.0
2	MAY	1980	38	123.026390	85.885277	-25.082788	-4.3	-0.7
2	MAY	1980	100	123.041664	85.884781	-25.083773	-4.0	-0.5
2	MAY	1980	200	123.063336	85.883537	-25.086309	-3.8	-0.7
2	MAY	1980	224	123.099498	85.883026	-25.087845	-4.0	-1.0
2	MAY	1980	300	123.125000	85.882179	-25.090933	-4.8	-1.3
2	MAY	1980	306	123.129173	85.880033	-25.091518	-5.0	-1.3
2	MAY	1980	400	123.166664	85.880379	-25.096962	-6.2	-1.2
2	MAY	1980	410	123.173615	85.880035	-25.097828	-6.4	-1.1
2	MAY	1980	454	123.204103	85.878410	-25.099485	-7.4	0.0
2	MAY	1980	500	123.208336	85.878174	-25.099760	-7.5	0.0
2	MAY	1980	556	123.247223	85.875679	-25.092171	-8.9	3.3
2	MAY	1980	600	123.250000	85.875481	-25.091072	-9.0	3.8
2	MAY	1980	641	123.278473	85.873383	-25.076368	-10.0	3.3
2	MAY	1980	700	123.291664	85.872337	-25.068792	-10.4	3.3
2	MAY	1980	800	123.333336	85.868774	-25.046448	-11.3	4.5
2	MAY	1980	828	123.352776	85.867065	-25.037184	-11.3	4.5
2	MAY	1980	900	123.375000	85.865150	-25.025824	-10.8	5.4
2	MAY	1980	1000	123.416664	85.861938	-24.992231	-8.8	10.1
2	MAY	1980	1016	123.427773	85.861214	-24.979099	-8.1	11.7
2	MAY	1980	1040	123.444450	85.860222	-24.956434	-7.2	13.2
2	MAY	1980	1100	123.458336	85.859467	-24.933604	-6.8	13.5
2	MAY	1980	1113	123.467354	85.856994	-24.923214	-6.6	13.4
2	MAY	1980	1200	123.500000	85.857285	-24.878660	-7.2	11.7
2	MAY	1980	1258	123.540276	85.854813	-24.833349	-8.4	9.6
2	MAY	1980	1300	123.541664	85.854721	-24.831903	-8.4	9.9
2	MAY	1980	1349	123.575691	85.852524	-24.797648	-7.7	9.9
2	MAY	1980	1400	123.583336	85.852081	-24.790487	-7.3	9.9
2	MAY	1980	1415	123.593750	85.851517	-24.780493	-6.7	9.9
2	MAY	1980	1443	123.613190	85.850548	-24.761196	-6.2	9.6
2	MAY	1980	1500	123.625000	85.849968	-24.748600	-6.3	10.2
2	MAY	1980	1536	123.650002	85.848694	-24.719883	-6.8	11.0
2	MAY	1980	1600	123.666664	85.847786	-24.700129	-6.8	11.1
2	MAY	1980	1700	123.703336	85.845329	-24.650616	-7.2	11.1
2	MAY	1980	1722	123.723610	85.844363	-24.632425	-8.1	11.1
2	MAY	1980	1800	123.750000	85.842659	-24.601160	-8.9	10.9
2	MAY	1980	1813	123.759026	85.842018	-24.590258	-9.3	10.8
2	MAY	1980	1900	123.791664	85.839516	-24.550652	-10.1	10.4
2	MAY	1980	1908	123.797218	85.839091	-24.547464	-10.1	10.4
2	MAY	1980	1936	123.816673	85.837576	-24.526017	-9.7	10.2
2	MAY	1980	2000	123.833336	85.836357	-24.507895	-9.0	10.1
2	MAY	1980	2054	123.870827	85.833934	-24.467573	-7.8	10.1
2	MAY	1980	2100	123.875000	85.833687	-24.463064	-7.7	10.1
2	MAY	1980	2123	123.870968	85.832741	-24.445673	-7.5	10.2
2	MAY	1980	2200	123.916664	85.831215	-24.417713	-7.8	9.3
2	MAY	1980	2241	123.945137	85.829407	-24.388166	-8.6	9.0
2	MAY	1980	2300	123.958336	85.828506	-24.375225	-8.9	8.8
2	MAY	1980	2309	123.954577	85.828072	-24.369240	-9.6	8.8
2	MAY	1980	2330	123.979164	85.827042	-24.355469	-9.1	8.8
3	MAY	1980	0	124.000000	85.825592	-24.335934	-8.7	8.8
3	MAY	1980	100	124.011664	85.822968	-24.297595	-7.4	8.8
3	MAY	1980	116	124.052773	85.822342	-24.286245	-7.1	8.7
3	MAY	1980	200	124.083336	85.820755	-24.257908	-6.3	8.8
3	MAY	1980	300	124.125000	85.818817	-24.217392	-5.7	9.4
3	MAY	1980	302	124.126396	85.818475	-24.215094	-5.7	9.4
3	MAY	1980	400	124.166664	85.816956	-24.177624	-5.0	7.8
3	MAY	1980	401	124.167358	85.816925	-24.177054	-6.0	7.7
3	MAY	1980	448	124.200005	85.815285	-24.154388	-7.0	5.7
3	MAY	1980	500	124.208336	85.814819	-24.149471	-7.3	5.4
3	MAY	1980	548	124.241669	85.812813	-24.130728	-7.8	5.5
3	MAY	1980	600	124.250000	85.812309	-24.125757	-7.7	5.7
3	MAY	1980	634	124.273613	85.810928	-24.109788	-7.4	7.1
3	MAY	1980	700	124.291664	85.809698	-24.094683	-7.3	8.5
3	MAY	1980	800	124.333336	85.807434	-24.054518	-8.2	8.7
3	MAY	1980	803	124.335419	85.807304	-24.052603	-8.3	8.5
3	MAY	1980	900	124.375000	85.804049	-24.018175	-8.5	8.6

FRAM 2 NAVIGATION - KALMAN

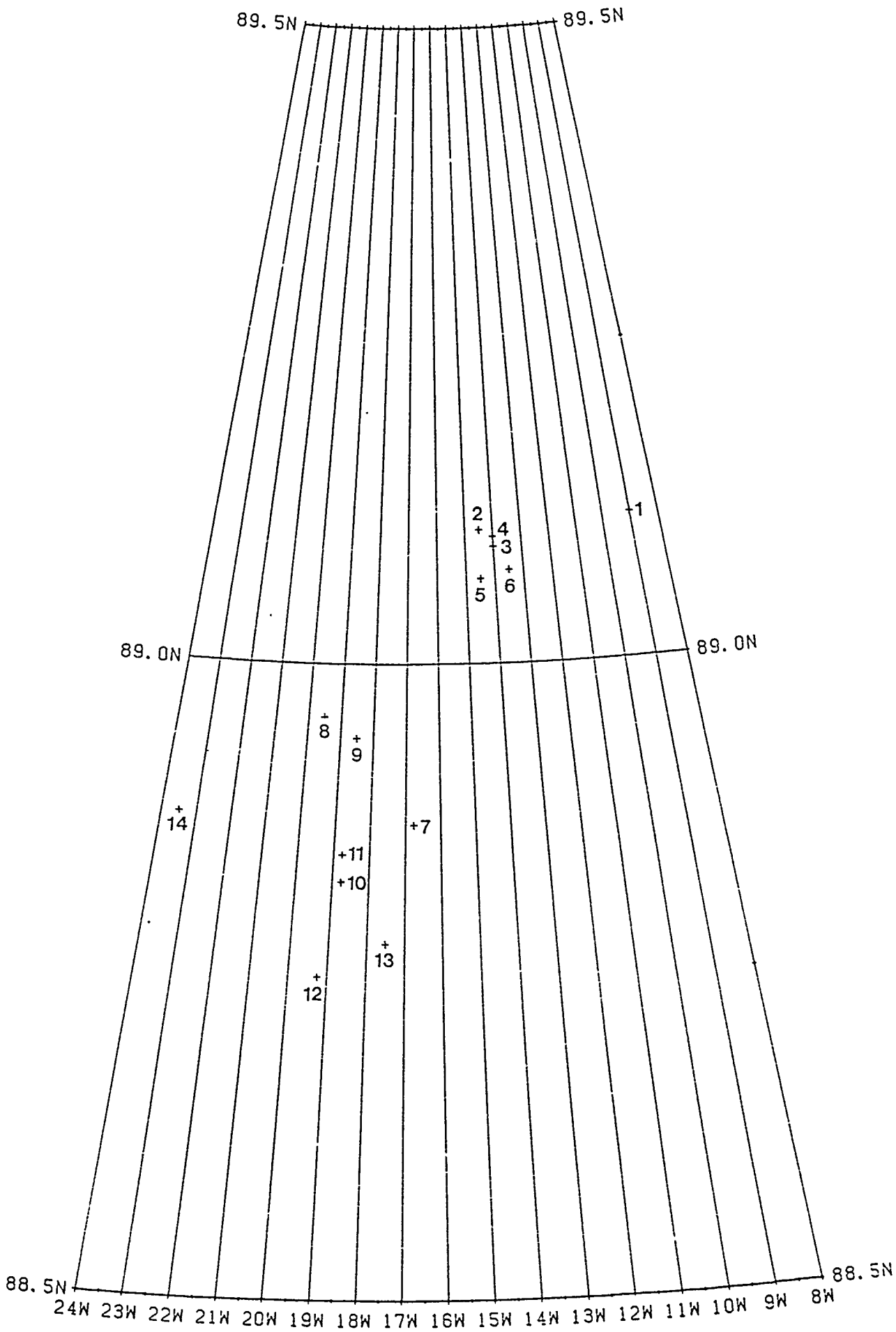
DY	MON	YEAR	GAT	JULDAY	LATITUDE	LONGITUDE	N-VEL.	E-VEL.
3	MAY	1980	923	124.390900	85.803619	-24.002907	-8.1	9.4
3	MAY	1980	950	124.409721	85.802467	-23.983841	-7.8	9.5
3	MAY	1980	1000	124.416664	85.802040	-23.976927	-7.9	9.0
3	MAY	1980	1005	124.420135	85.801826	-23.973558	-7.9	9.2
3	MAY	1980	1160	124.458336	85.799400	-23.941574	-8.6	9.5
3	MAY	1980	1138	124.484718	85.797577	-23.925791	-9.1	5.1
3	MAY	1980	1200	124.500000	85.796494	-23.917671	-9.2	5.0
3	MAY	1980	1300	124.541664	85.793510	-23.894999	-9.2	5.5
3	MAY	1980	1326	124.559723	85.792221	-23.884203	-9.1	5.8
3	MAY	1980	1400	124.583336	85.790550	-23.869783	-9.1	5.6
3	MAY	1980	1444	124.613892	85.788429	-23.852264	-8.6	5.4
3	MAY	1980	1500	124.625000	85.787689	-23.845882	-8.4	5.5
3	MAY	1980	1513	124.634026	85.787109	-23.840466	-8.1	5.8
3	MAY	1980	1600	124.666604	85.785156	-23.818724	-7.7	6.4
3	MAY	1980	1630	124.687500	85.784004	-23.804262	-7.0	6.4
3	MAY	1980	1700	124.708336	85.782890	-23.791155	-6.9	5.5
3	MAY	1980	1800	124.750000	85.780624	-23.769587	-7.2	4.7
3	MAY	1980	1816	124.761108	85.779991	-23.763937	-7.5	4.9
3	MAY	1980	1900	124.791664	85.778137	-23.747158	-8.1	5.5
3	MAY	1980	2000	124.833336	85.775467	-23.721569	-8.0	5.9
3	MAY	1980	2002	124.831724	85.775383	-23.720703	-8.0	5.9
3	MAY	1980	2034	124.855941	85.774055	-23.707052	-7.2	5.7
3	MAY	1980	2100	124.875000	85.773109	-23.694621	-6.3	5.6
3	MAY	1980	2149	124.909027	85.771584	-23.675009	-5.4	6.6
3	MAY	1980	2200	124.916604	85.771271	-23.669655	-5.3	6.8
3	MAY	1980	2220	124.930550	85.770706	-23.659061	-5.2	7.6
3	MAY	1980	2300	124.953336	85.769608	-23.634657	-4.9	8.9
3	MAY	1980	2335	124.982635	85.768692	-23.611538	-4.8	9.0
4	MAY	1980	0	125.000000	85.768059	-23.595531	-4.6	8.5
4	MAY	1980	100	125.041664	85.766571	-23.562328	-4.5	5.5
4	MAY	1980	200	125.083336	85.765083	-23.537607	-4.7	5.0
4	MAY	1980	300	125.125000	85.763527	-23.516035	-4.9	5.1
4	MAY	1980	309	125.131248	85.763283	-23.512669	-5.0	5.2
4	MAY	1980	400	125.166604	85.761894	-23.492487	-5.1	5.5
4	MAY	1980	456	125.205559	85.760384	-23.470226	-4.9	5.2
4	MAY	1980	500	125.208336	85.760277	-23.468721	-4.0	5.1
4	MAY	1980	600	125.250000	85.758743	-23.447830	-4.0	4.5
4	MAY	1980	644	125.240550	85.757675	-23.433350	-4.4	4.5
4	MAY	1980	700	125.291664	85.757294	-23.428045	-4.4	4.6
4	MAY	1980	800	125.333336	85.755852	-23.408175	-4.6	4.4
4	MAY	1980	831	125.354858	85.755056	-23.398718	-4.8	4.0
4	MAY	1980	900	125.375000	85.754288	-23.390795	-5.1	3.5
4	MAY	1980	1000	125.410000	85.752533	-23.377987	-5.7	2.3
4	MAY	1980	1016	125.429109	85.751958	-23.375229	-5.9	1.9

POSITIONS OF THE DRIFTING STATION CAMP I
AS DETERMINED BY CELESTIAL NAVIGATION

<u>Fix Number</u>	<u>Date</u>		<u>GMT</u>	<u>Latitude</u>	<u>Longitude*</u>
1	Apr. 8	1980	1916	89.113	-9.00
2	9	1980	1057	89.105	-14.50
3	10	1980	1124	89.093	-14.00
4	11	1980	1148	89.100	-14.00
5	14	1980	1006	89.067	-14.50
6	15	1980	1434	89.073	-13.50
7	20	1980	2039	88.873	-16.75
8	21	1980	1402	88.958	-19.50
9	22	1980	1525	88.942	-18.50
10	23	1980	2359	88.828	-18.75
11	25	1980	1053	88.850	-18.75
12	28	1980	1608	88.753	-19.25
13	30	1980	2116	88.780	-17.50
14	May 2	1980	1300	88.880	-23.50

The fix number is placed next to the position indicator (+) on the following plot to aid in the interpretation of the Camp I drift track through time.

*negative sign implies west longitude



CAMP I ICE FLOE AZIMUTH, GRID AZIMUTH AND MAGNETIC DECLINATION

During the drift of Camp I, ice floe azimuths and magnetic declinations were taken when weather and time permitted. Markers positioned on the ice flow determined the imaginary line of the camp azimuth. Bearings of the camp azimuth relative to True North were determined using sun shots.

Magnetic declinations were obtained using a K & E surveyors compass placed in between and in line with the markers defining the line of the camp azimuth. The difference between the True North bearing of the camp azimuth and magnetic north reading from the surveyors compass is defined as the magnetic declination. Error estimates for magnetic declination are ± 0.5 degrees.

Key to column headings:

Date and GMT are as previously noted

True Azimuth degrees clockwise from True North with estimated error (also in decimal degrees)

Grid Azimuth degrees clockwise from Grid North. Grid North is defined as any directed line parallel to the 0 degree meridian from Greenwich, England to the North Pole. Grid East is 90 degrees clockwise.

Magnetic
Declination decimal degrees, positive values imply west declinations

CAMP I AZIMUTH AND DECLINATION

	<u>Date</u>	<u>GMT</u>	<u>True Azimuth</u>	<u>Grid Azimuth</u>	<u>Magnetic Declination</u>
April	8	1916	17.9 ± 0.4	26.9	
	9	1057	15.9 ± 0.2	27.4	
	10	1124	15.9 ± 2.6	26.9	
	11	1148	13.6 ± 0.1	27.6	
	14	1006	13.5 ± 0.2	28.0	
	15	1434	15.0 ± 0.5	28.5	40.5
	18	1107	15.0		
	20	2039	12.7 ± 1.0	29.5	46.0
	21	1402	9.3 ± 0.1	28.8	45.0
	22	1525	10.4 ± 0.3	28.9	45.0
	23	2359	10.7 ± 0.1	29.5	45.0
	24	1300	10.8 ± 0.5	29.5	
	25	1053	11.0 ± 0.1	29.8	
	26	2207	10.3	29.3	
	28	1608	9.2 ± 0.1	28.5	45.0
	30	2116	9.8 ± 0.1	27.3	45.0
May	2	1300	3.0	26.5	42.0

Depth Soundings

As FRAM II drifted, a continuous record of ocean depths was made with an echo sounder operating at a frequency of 12 kHz. The sounder was manufactured by the Edo Western Corp. and consisted of three units: Model D-100 transducer, Model 248E sonar transceiver and Model 550A graphic recorder. The instrument was installed through an open hydrographic well with the transducer suspended at a depth of 2 m below sea level. Depths for this report were scaled at hourly intervals from the chart records on which 19" represented a depth change of 1500 m. The actual physical measurement is two-way reflection time from the transducer to the bottom and return. The uncorrected depth is defined as the one-way reflection time multiplied by the nominal speed of sound in seawater, 1500 m/s. More precise depth determination requires a correction for the sound speed profile in particular geographic areas of the ocean. The corrected depths listed here are based on tables by Matthews (1939).

FRAM II drifted over the lower flanks of the Morris Jessup Plateau, a marginal continental feature north of Greenland. Depths ranged from 4036 m at the commencement of recording to 3650 m at the shallowest.

OCEAN DEPTHS AT FRAM II

Key to column headings:

DY = Day

MON = Month

YEAR = Year

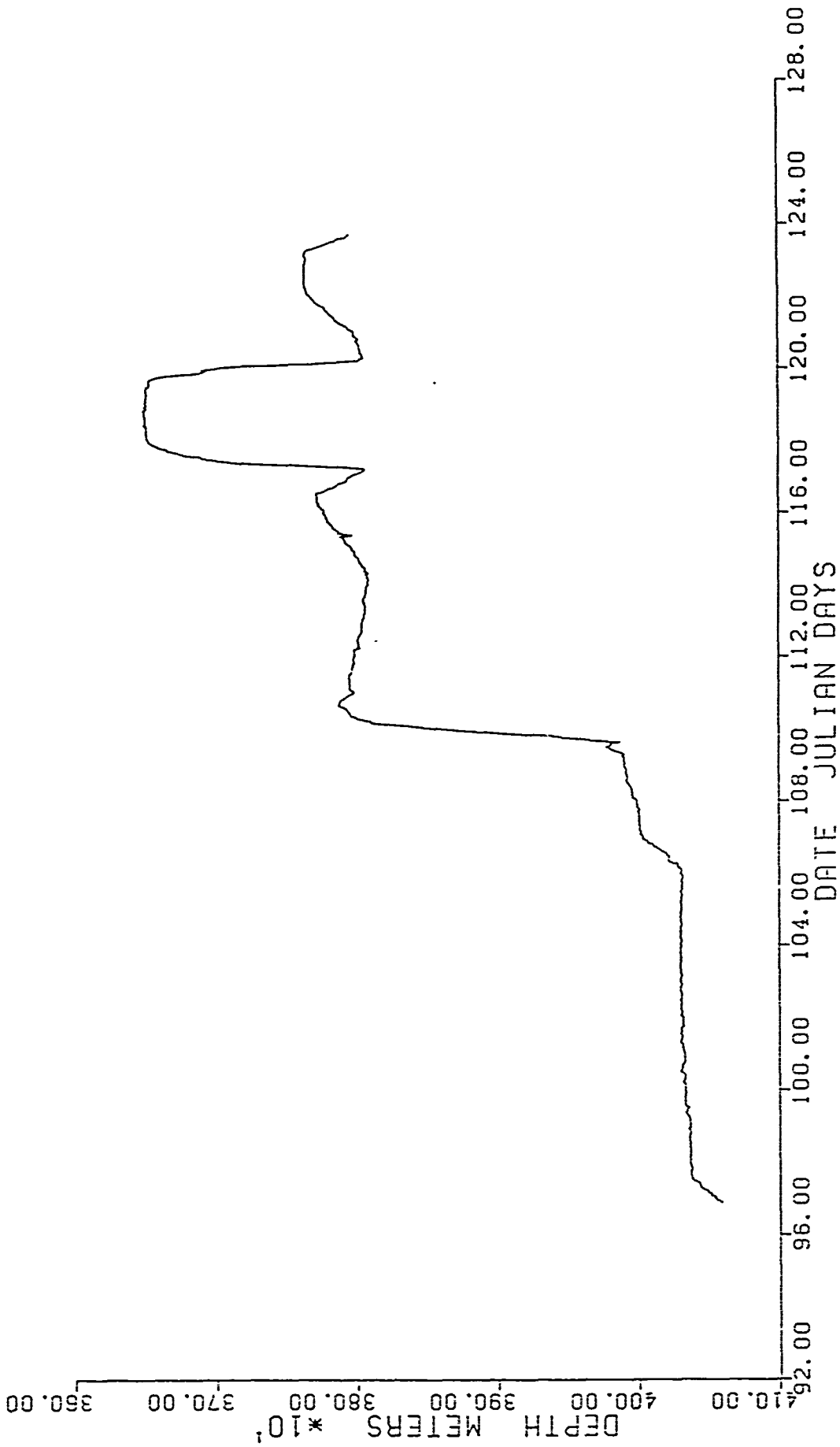
GMT = Greenwich Mean Time

SECONDS = Two-way reflection time

METERS (UNCORR) = Uncorrected depth based on sound
speed of 1500 m s^{-1}

VEL (CORR) = Depth correction for sound speed
in Arctic waters (Matthews, 1939)

METERS (CORR) = Corrected depths = METERS (UNCORR)
+ VEL (CORR)



FRA 4 2 DEPTH DATA

DAY	MON	YEAR	GAT	SECONDS	METERS (UNCURR)	VEL CURR	METERS (CURR)
5	APR	1980	2100	5.490	4117.5	1.58	4059.6
5	APR	1980	2200	5.488	4116.0	1.58	4058.6
5	APR	1980	2300	5.485	4113.8	1.58	4055.8
5	APR	1980	0	5.483	4112.3	1.58	4054.3
6	APR	1980	100	5.484	4113.0	1.58	4055.6
6	APR	1980	200	5.479	4109.3	1.58	4051.3
6	APR	1980	300	5.480	4110.0	1.58	4052.0
6	APR	1980	400	5.476	4107.0	1.58	4049.0
6	APR	1980	500	5.476	4107.0	1.58	4049.0
6	APR	1980	600	5.472	4104.0	1.58	4046.0
6	APR	1980	700	5.470	4102.5	1.58	4044.2
6	APR	1980	800	5.469	4101.8	1.58	4043.8
6	APR	1980	900	5.468	4101.0	1.58	4043.0
6	APR	1980	1000	5.466	4101.0	1.58	4043.0
6	APR	1980	1100	5.465	4098.3	1.58	4040.8
6	APR	1980	1200	5.462	4096.5	1.58	4038.8
6	APR	1980	1300	5.461	4095.5	1.58	4037.8
6	APR	1980	1400	5.461	4095.8	1.58	4037.8
6	APR	1980	1500	5.460	4095.0	1.58	4037.0
6	APR	1980	1600	5.460	4095.0	1.58	4037.0
6	APR	1980	1700	5.460	4095.0	1.58	4037.0
6	APR	1980	1800	5.460	4095.0	1.58	4037.0
6	APR	1980	1900	5.461	4095.8	1.58	4037.8
6	APR	1980	2000	5.461	4095.8	1.58	4037.8
6	APR	1980	2100	5.460	4095.0	1.58	4037.0
6	APR	1980	2200	5.460	4095.0	1.58	4037.0
6	APR	1980	2300	5.459	4094.3	1.58	4036.6
6	APR	1980	0	5.459	4094.3	1.58	4036.6
7	APR	1980	100	5.459	4094.3	1.58	4036.6
7	APR	1980	200	5.459	4095.0	1.58	4037.0
7	APR	1980	300	5.459	4094.3	1.58	4036.6
7	APR	1980	400	5.460	4095.0	1.58	4037.0
7	APR	1980	500	5.460	4095.0	1.58	4037.0
7	APR	1980	600	5.460	4095.0	1.58	4037.0
7	APR	1980	700	5.460	4095.0	1.58	4037.0
7	APR	1980	800	5.460	4095.0	1.58	4037.0
7	APR	1980	900	5.460	4095.0	1.58	4037.0
7	APR	1980	1000	5.460	4095.0	1.58	4037.0
7	APR	1980	1100	5.460	4095.0	1.58	4037.0
7	APR	1980	1200	5.460	4095.0	1.58	4037.0
7	APR	1980	1300	5.460	4095.0	1.58	4037.0
7	APR	1980	1400	5.460	4095.0	1.58	4037.0
7	APR	1980	1500	5.460	4095.0	1.58	4037.0
7	APR	1980	1600	5.460	4095.0	1.58	4037.0
7	APR	1980	1700	5.460	4095.0	1.58	4037.0
7	APR	1980	1800	5.460	4095.0	1.58	4037.0
7	APR	1980	1900	5.460	4095.0	1.58	4037.0
7	APR	1980	2000	5.460	4095.0	1.58	4037.0
7	APR	1980	2100	5.460	4094.3	1.58	4036.6
7	APR	1980	2200	5.460	4093.5	1.58	4035.7
7	APR	1980	2300	5.460	4095.0	1.58	4037.0
7	APR	1980	0	5.460	4095.0	1.58	4037.0
7	APR	1980	100	5.460	4095.0	1.58	4037.0
7	APR	1980	200	5.460	4094.3	1.58	4036.6
7	APR	1980	300	5.460	4094.3	1.58	4036.6
7	APR	1980	400	5.460	4094.3	1.58	4036.6
7	APR	1980	500	5.460	4094.3	1.58	4036.6
7	APR	1980	600	5.460	4094.3	1.58	4036.6
7	APR	1980	700	5.460	4094.3	1.58	4036.6
7	APR	1980	800	5.460	4094.3	1.58	4036.6
7	APR	1980	900	5.460	4094.3	1.58	4036.6
7	APR	1980	1000	5.460	4094.3	1.58	4036.6
7	APR	1980	1100	5.460	4094.3	1.58	4036.6
7	APR	1980	1200	5.460	4094.3	1.58	4036.6
7	APR	1980	1300	5.460	4094.3	1.58	4036.6
7	APR	1980	1400	5.460	4094.3	1.58	4036.6
7	APR	1980	1500	5.460	4094.3	1.58	4036.6
7	APR	1980	1600	5.460	4094.3	1.58	4036.6
7	APR	1980	1700	5.460	4094.3	1.58	4036.6
7	APR	1980	1800	5.460	4094.3	1.58	4036.6
7	APR	1980	1900	5.460	4094.3	1.58	4036.6
7	APR	1980	2000	5.460	4094.3	1.58	4036.6
7	APR	1980	2100	5.460	4094.3	1.58	4036.6
7	APR	1980	2200	5.460	4094.3	1.58	4036.6
7	APR	1980	2300	5.460	4094.3	1.58	4036.6
7	APR	1980	0	5.460	4094.3	1.58	4036.6

FRA 4 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CURR	METERS (CORR)
8	APR	1980	1700	5.455	4091.3		4033.3
8	APR	1980	1800	5.455	4091.3		4033.3
8	APR	1980	1900	5.455	4091.3		4033.3
8	APR	1980	2000	5.455	4091.3		4033.3
8	APR	1980	2100	5.455	4091.3		4033.3
8	APR	1980	2200	5.455	4092.0		4034.0
8	APR	1980	2300	5.455	4091.3		4033.3
8	APR	1980	0	5.455	4091.3		4033.3
8	APR	1980	100	5.455	4091.3		4033.3
8	APR	1980	200	5.455	4091.3		4033.3
8	APR	1980	300	5.455	4091.3		4033.3
8	APR	1980	400	5.455	4091.3		4033.3
8	APR	1980	500	5.452	4089.9		4031.5
8	APR	1980	600	5.454	4090.0		4032.5
8	APR	1980	700	5.455	4091.3		4033.3
8	APR	1980	800	5.455	4091.3		4033.3
8	APR	1980	900	5.455	4091.3		4033.3
8	APR	1980	1000	5.453	4089.9		4031.5
8	APR	1980	1100	5.453	4089.9		4031.5
8	APR	1980	1200	5.451	4088.8		4030.0
8	APR	1980	1300	5.452	4089.9		4031.5
8	APR	1980	1400	5.453	4089.9		4031.5
8	APR	1980	1500	5.453	4089.9		4031.5
8	APR	1980	1600	5.453	4089.9		4031.5
8	APR	1980	1700	5.454	4090.0		4032.5
8	APR	1980	1800	5.455	4091.3		4033.3
8	APR	1980	1900	5.455	4091.3		4033.3
8	APR	1980	2000	5.455	4091.3		4033.3
8	APR	1980	2100	5.455	4091.3		4033.3
8	APR	1980	2200	5.455	4091.3		4033.3
8	APR	1980	2300	5.455	4091.3		4033.3
8	APR	1980	0	5.455	4091.3		4033.3
10	APR	1980	100	5.454	4090.0		4032.5
10	APR	1980	200	5.454	4090.0		4032.5
10	APR	1980	300	5.453	4089.9		4031.5
10	APR	1980	400	5.453	4089.9		4031.5
10	APR	1980	500	5.453	4089.9		4031.5
10	APR	1980	600	5.452	4089.9		4031.5
10	APR	1980	700	5.451	4089.9		4031.5
10	APR	1980	800	5.451	4089.9		4031.5
10	APR	1980	900	5.452	4089.9		4031.5
10	APR	1980	1000	5.453	4089.9		4031.5
10	APR	1980	1100	5.452	4089.9		4031.5
10	APR	1980	1200	5.452	4089.9		4031.5
10	APR	1980	1300	5.451	4089.9		4031.5
10	APR	1980	1400	5.452	4089.9		4031.5
10	APR	1980	1500	5.452	4089.9		4031.5
10	APR	1980	1600	5.451	4089.9		4031.5
10	APR	1980	1700	5.452	4089.9		4031.5
10	APR	1980	1800	5.453	4089.9		4031.5
10	APR	1980	1900	5.453	4089.9		4031.5
10	APR	1980	2000	5.452	4089.9		4031.5
10	APR	1980	2100	5.452	4089.9		4031.5
10	APR	1980	2200	5.452	4089.9		4031.5
10	APR	1980	2300	5.452	4089.9		4031.5
10	APR	1980	0	5.451	4089.9		4031.5
11	APR	1980	100	5.452	4089.9		4031.5
11	APR	1980	200	5.452	4089.9		4031.5
11	APR	1980	300	5.452	4089.9		4031.5
11	APR	1980	400	5.452	4089.9		4031.5
11	APR	1980	500	5.451	4089.9		4031.5
11	APR	1980	600	5.451	4089.9		4031.5
11	APR	1980	700	5.452	4089.9		4031.5
11	APR	1980	800	5.452	4089.9		4031.5
11	APR	1980	900	5.452	4089.9		4031.5
11	APR	1980	1000	5.451	4089.9		4031.5
11	APR	1980	1100	5.452	4089.9		4031.5
11	APR	1980	1200	5.452	4089.9		4031.5
11	APR	1980	1300	5.451	4089.9		4031.5
11	APR	1980	1400	5.451	4089.9		4031.5
11	APR	1980	1500	5.451	4089.9		4031.5
11	APR	1980	1600	5.451	4089.9		4031.5
11	APR	1980	1700	5.451	4089.9		4031.5
11	APR	1980	1800	5.451	4089.9		4031.5
11	APR	1980	1900	5.451	4089.9		4031.5
11	APR	1980	2000	5.451	4089.9		4031.5
11	APR	1980	2100	5.451	4089.9		4031.5
11	APR	1980	2200	5.451	4089.9		4031.5
11	APR	1980	2300	5.451	4089.9		4031.5
11	APR	1980	0	5.451	4089.9		4031.5

FRA 4 2 Paper Data

DAY	MON	YEAR	GAT	SEC	METERS (UNCORRECTED)	VEL (CM/HR)	FIT (CM/HR)
17	17	1960	500	5	400	11	11
17	17	1960	600	5	410	11	11
17	17	1960	700	5	420	11	11
17	17	1960	800	5	430	11	11
17	17	1960	900	5	440	11	11
17	17	1960	1000	5	450	11	11
17	17	1960	1100	5	460	11	11
17	17	1960	1200	5	470	11	11
17	17	1960	1300	5	480	11	11
17	17	1960	1400	5	490	11	11
17	17	1960	1500	5	500	11	11
17	17	1960	1600	5	510	11	11
17	17	1960	1700	5	520	11	11
17	17	1960	1800	5	530	11	11
17	17	1960	1900	5	540	11	11
17	17	1960	2000	5	550	11	11
17	17	1960	2100	5	560	11	11
17	17	1960	2200	5	570	11	11
17	17	1960	2300	5	580	11	11
17	17	1960	2400	5	590	11	11
17	17	1960	2500	5	600	11	11
17	17	1960	2600	5	610	11	11
17	17	1960	2700	5	620	11	11
17	17	1960	2800	5	630	11	11
17	17	1960	2900	5	640	11	11
17	17	1960	3000	5	650	11	11
17	17	1960	3100	5	660	11	11
17	17	1960	3200	5	670	11	11
17	17	1960	3300	5	680	11	11
17	17	1960	3400	5	690	11	11
17	17	1960	3500	5	700	11	11
17	17	1960	3600	5	710	11	11
17	17	1960	3700	5	720	11	11
17	17	1960	3800	5	730	11	11
17	17	1960	3900	5	740	11	11
17	17	1960	4000	5	750	11	11
17	17	1960	4100	5	760	11	11
17	17	1960	4200	5	770	11	11
17	17	1960	4300	5	780	11	11
17	17	1960	4400	5	790	11	11
17	17	1960	4500	5	800	11	11
17	17	1960	4600	5	810	11	11
17	17	1960	4700	5	820	11	11
17	17	1960	4800	5	830	11	11
17	17	1960	4900	5	840	11	11
17	17	1960	5000	5	850	11	11
17	17	1960	5100	5	860	11	11
17	17	1960	5200	5	870	11	11
17	17	1960	5300	5	880	11	11
17	17	1960	5400	5	890	11	11
17	17	1960	5500	5	900	11	11
17	17	1960	5600	5	910	11	11
17	17	1960	5700	5	920	11	11
17	17	1960	5800	5	930	11	11
17	17	1960	5900	5	940	11	11
17	17	1960	6000	5	950	11	11
17	17	1960	6100	5	960	11	11
17	17	1960	6200	5	970	11	11
17	17	1960	6300	5	980	11	11
17	17	1960	6400	5	990	11	11
17	17	1960	6500	5	1000	11	11
17	17	1960	6600	5	1010	11	11
17	17	1960	6700	5	1020	11	11
17	17	1960	6800	5	1030	11	11
17	17	1960	6900	5	1040	11	11
17	17	1960	7000	5	1050	11	11
17	17	1960	7100	5	1060	11	11
17	17	1960	7200	5	1070	11	11
17	17	1960	7300	5	1080	11	11
17	17	1960	7400	5	1090	11	11
17	17	1960	7500	5	1100	11	11
17	17	1960	7600	5	1110	11	11
17	17	1960	7700	5	1120	11	11
17	17	1960	7800	5	1130	11	11
17	17	1960	7900	5	1140	11	11
17	17	1960	8000	5	1150	11	11
17	17	1960	8100	5	1160	11	11
17	17	1960	8200	5	1170	11	11
17	17	1960	8300	5	1180	11	11
17	17	1960	8400	5	1190	11	11
17	17	1960	8500	5	1200	11	11
17	17	1960	8600	5	1210	11	11
17	17	1960	8700	5	1220	11	11
17	17	1960	8800	5	1230	11	11
17	17	1960	8900	5	1240	11	11
17	17	1960	9000	5	1250	11	11
17	17	1960	9100	5	1260	11	11
17	17	1960	9200	5	1270	11	11
17	17	1960	9300	5	1280	11	11
17	17	1960	9400	5	1290	11	11
17	17	1960	9500	5	1300	11	11
17	17	1960	9600	5	1310	11	11
17	17	1960	9700	5	1320	11	11
17	17	1960	9800	5	1330	11	11
17	17	1960	9900	5	1340	11	11
17	17	1960	10000	5	1350	11	11

FRA I 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CORR	FEET (CORR)
20	APR	1980	100	5.141	3855.0	1.5	3799.0
20	APR	1980	200	5.141	3855.0	1.5	3799.0
20	APR	1980	300	5.140	3855.0	1.5	3799.0
20	APR	1980	400	5.140	3855.0	1.5	3799.0
20	APR	1980	500	5.140	3855.0	1.5	3799.0
20	APR	1980	600	5.140	3855.0	1.5	3799.0
20	APR	1980	700	5.140	3855.0	1.5	3799.0
20	APR	1980	800	5.140	3855.0	1.5	3799.0
20	APR	1980	900	5.140	3855.0	1.5	3799.0
20	APR	1980	1000	5.140	3855.0	1.5	3799.0
20	APR	1980	1100	5.140	3855.0	1.5	3799.0
20	APR	1980	1200	5.141	3855.0	1.5	3799.0
20	APR	1980	1300	5.142	3856.5	1.5	3797.5
20	APR	1980	1400	5.142	3856.5	1.5	3797.5
20	APR	1980	1500	5.143	3857.3	1.5	3798.3
20	APR	1980	1600	5.143	3857.3	1.5	3798.3
20	APR	1980	1700	5.143	3857.3	1.5	3798.3
20	APR	1980	1800	5.144	3858.0	1.5	3799.0
20	APR	1980	1900	5.143	3857.3	1.5	3798.3
20	APR	1980	2000	5.145	3858.0	1.5	3799.0
20	APR	1980	2100	5.144	3857.3	1.5	3798.3
20	APR	1980	2200	5.144	3857.3	1.5	3798.3
20	APR	1980	2300	5.144	3857.3	1.5	3798.3
21	APR	1980	0	5.145	3858.0	1.5	3799.0
21	APR	1980	100	5.145	3858.0	1.5	3799.0
21	APR	1980	200	5.145	3858.0	1.5	3799.0
21	APR	1980	300	5.145	3858.0	1.5	3799.0
21	APR	1980	400	5.145	3858.0	1.5	3799.0
21	APR	1980	500	5.145	3858.0	1.5	3799.0
21	APR	1980	600	5.146	3859.0	1.5	3800.0
21	APR	1980	700	5.146	3859.0	1.5	3800.0
21	APR	1980	800	5.146	3859.0	1.5	3800.0
21	APR	1980	900	5.146	3859.0	1.5	3800.0
21	APR	1980	1000	5.146	3859.0	1.5	3800.0
21	APR	1980	1100	5.146	3859.0	1.5	3800.0
21	APR	1980	1200	5.144	3857.3	1.5	3798.3
21	APR	1980	1300	5.144	3857.3	1.5	3798.3
21	APR	1980	1400	5.145	3858.0	1.5	3799.0
21	APR	1980	1500	5.145	3858.0	1.5	3799.0
21	APR	1980	1600	5.145	3858.0	1.5	3799.0
21	APR	1980	1700	5.145	3858.0	1.5	3799.0
21	APR	1980	1800	5.145	3858.0	1.5	3799.0
21	APR	1980	1900	5.145	3858.0	1.5	3799.0
21	APR	1980	2000	5.145	3858.0	1.5	3799.0
21	APR	1980	2100	5.145	3858.0	1.5	3799.0
21	APR	1980	2200	5.145	3858.0	1.5	3799.0
21	APR	1980	2300	5.145	3858.0	1.5	3799.0
22	APR	1980	0	5.145	3858.0	1.5	3799.0
22	APR	1980	100	5.145	3858.0	1.5	3799.0
22	APR	1980	200	5.144	3857.3	1.5	3798.3
22	APR	1980	300	5.144	3857.3	1.5	3798.3
22	APR	1980	400	5.144	3857.3	1.5	3798.3
22	APR	1980	500	5.144	3857.3	1.5	3798.3
22	APR	1980	600	5.144	3857.3	1.5	3798.3
22	APR	1980	700	5.144	3857.3	1.5	3798.3
22	APR	1980	800	5.144	3857.3	1.5	3798.3
22	APR	1980	900	5.144	3857.3	1.5	3798.3
22	APR	1980	1000	5.144	3857.3	1.5	3798.3
22	APR	1980	1100	5.144	3857.3	1.5	3798.3
22	APR	1980	1200	5.144	3857.3	1.5	3798.3
22	APR	1980	1300	5.144	3857.3	1.5	3798.3
22	APR	1980	1400	5.144	3857.3	1.5	3798.3
22	APR	1980	1500	5.144	3857.3	1.5	3798.3
22	APR	1980	1600	5.144	3857.3	1.5	3798.3
22	APR	1980	1700	5.144	3857.3	1.5	3798.3
22	APR	1980	1800	5.144	3857.3	1.5	3798.3
22	APR	1980	1900	5.144	3857.3	1.5	3798.3
22	APR	1980	2000	5.144	3857.3	1.5	3798.3

FRAM 2 DEPTH DATA

DY	MON	YEAR	GAT	SECONDS	METERS (UNCORR)	VEL CURR	METERS (CURR)
22	APR	1980	2100	5.156	3867.0	1.59	3808.0
22	APR	1980	2200	5.156	3867.0	1.59	3808.0
22	APR	1980	2300	5.156	3867.0	1.59	3808.0
23	APR	1980	0	5.158	3868.5	1.59	3809.5
23	APR	1980	100	5.157	3867.8	1.59	3808.8
23	APR	1980	200	5.157	3867.8	1.59	3808.8
23	APR	1980	300	5.158	3868.5	1.59	3809.5
23	APR	1980	400	5.158	3868.5	1.59	3809.5
23	APR	1980	500	5.157	3867.8	1.59	3808.8
23	APR	1980	600	5.157	3867.8	1.59	3808.8
23	APR	1980	700	5.156	3867.0	1.59	3808.0
23	APR	1980	800	5.158	3868.5	1.59	3809.5
23	APR	1980	900	5.155	3866.3	1.59	3807.7
23	APR	1980	1000	5.155	3866.3	1.59	3807.7
23	APR	1980	1100	5.155	3866.3	1.59	3807.7
23	APR	1980	1200	5.153	3864.4	1.59	3805.5
23	APR	1980	1300	5.152	3864.0	1.59	3805.0
23	APR	1980	1400	5.151	3863.3	1.59	3804.3
23	APR	1980	1500	5.150	3862.5	1.59	3803.5
23	APR	1980	1600	5.149	3861.8	1.59	3802.8
23	APR	1980	1700	5.148	3861.8	1.59	3802.8
23	APR	1980	1800	5.148	3861.0	1.59	3802.0
23	APR	1980	1900	5.146	3859.5	1.59	3800.5
23	APR	1980	2000	5.145	3858.8	1.59	3799.8
23	APR	1980	2100	5.145	3858.8	1.59	3799.8
23	APR	1980	2200	5.145	3858.8	1.59	3799.8
23	APR	1980	2300	5.143	3857.7	1.59	3798.7
24	APR	1980	0	5.142	3857.0	1.59	3797.7
24	APR	1980	100	5.142	3857.0	1.59	3797.7
24	APR	1980	200	5.140	3855.0	1.59	3795.6
24	APR	1980	300	5.138	3853.0	1.59	3793.6
24	APR	1980	400	5.138	3853.0	1.59	3793.6
24	APR	1980	500	5.136	3851.1	1.59	3791.7
24	APR	1980	600	5.135	3850.5	1.59	3791.1
24	APR	1980	700	5.134	3850.0	1.59	3790.6
24	APR	1980	800	5.133	3849.6	1.59	3789.9
24	APR	1980	900	5.132	3849.0	1.59	3789.0
24	APR	1980	1000	5.131	3848.0	1.59	3788.0
24	APR	1980	1100	5.131	3847.7	1.59	3787.7
24	APR	1980	1200	5.130	3847.0	1.59	3787.0
24	APR	1980	1300	5.128	3845.1	1.59	3785.1
24	APR	1980	1400	5.128	3844.4	1.59	3784.4
24	APR	1980	1500	5.126	3842.5	1.59	3782.5
24	APR	1980	1600	5.124	3840.6	1.59	3780.6
24	APR	1980	1700	5.123	3840.0	1.59	3780.0
24	APR	1980	1800	5.121	3838.0	1.59	3778.0
24	APR	1980	1900	5.121	3838.0	1.59	3778.0
24	APR	1980	2000	5.120	3838.0	1.59	3778.0
24	APR	1980	2100	5.120	3838.0	1.59	3778.0
24	APR	1980	2200	5.119	3837.5	1.59	3777.5
24	APR	1980	2300	5.118	3837.0	1.59	3777.0
25	APR	1980	0	5.117	3836.5	1.59	3776.5
25	APR	1980	100	5.116	3836.0	1.59	3776.0
25	APR	1980	200	5.117	3837.0	1.59	3777.0
25	APR	1980	300	5.115	3835.5	1.59	3775.5
25	APR	1980	400	5.114	3835.0	1.59	3775.0
25	APR	1980	500	5.112	3833.4	1.59	3773.4
25	APR	1980	600	5.113	3834.0	1.59	3774.0
25	APR	1980	700	5.111	3833.0	1.59	3773.0
25	APR	1980	800	5.111	3833.0	1.59	3773.0
25	APR	1980	900	5.111	3833.0	1.59	3773.0
25	APR	1980	1000	5.111	3833.0	1.59	3773.0
25	APR	1980	1100	5.111	3833.0	1.59	3773.0
25	APR	1980	1200	5.111	3833.0	1.59	3773.0
25	APR	1980	1300	5.113	3833.0	1.59	3773.0
25	APR	1980	1400	5.117	3837.0	1.59	3777.0
25	APR	1980	1500	5.123	3842.0	1.59	3782.0
25	APR	1980	1600	5.123	3842.0	1.59	3782.0

FRAM 2 DEPTH DATA

DY	MON	YEAR	GMT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
25	APR	1980	1700	5.128	3846.0	-60	3786.0
25	APR	1980	1800	5.130	3847.5	-60	3787.5
25	APR	1980	1900	5.132	3849.0	-60	3789.0
25	APR	1980	2000	5.135	3851.5	-59	3792.3
25	APR	1980	2100	5.138	3853.5	-59	3794.5
25	APR	1980	2200	5.139	3854.5	-59	3795.3
25	APR	1980	2300	5.140	3855.5	-59	3796.0
26	APR	1980	0	5.143	3857.3	-59	3798.3
26	APR	1980	100	5.144	3858.0	-59	3799.0
26	APR	1980	200	5.149	3861.8	-59	3802.8
26	APR	1980	300	5.152	3864.0	-59	3805.0
26	APR	1980	400	5.155	3866.3	-59	3807.3
26	APR	1980	500	5.155	3866.3	-59	3807.3
26	APR	1980	600	5.139	3854.3	-59	3795.3
26	APR	1980	700	5.111	3833.3	-60	3773.3
26	APR	1980	800	5.080	3810.0	-60	3750.0
26	APR	1980	900	5.039	3779.3	-60	3710.3
26	APR	1980	1000	5.021	3755.5	-60	3705.5
26	APR	1980	1100	5.013	3759.8	-60	3699.8
26	APR	1980	1200	5.002	3751.5	-60	3691.5
26	APR	1980	1300	5.001	3750.4	-60	3690.4
26	APR	1980	1400	4.987	3740.3	-60	3680.3
26	APR	1980	1500	4.982	3736.5	-60	3676.5
26	APR	1980	1600	4.977	3732.8	-60	3672.8
26	APR	1980	1700	4.969	3726.8	-60	3666.8
26	APR	1980	1800	4.969	3726.8	-60	3666.8
26	APR	1980	1900	4.962	3721.5	-60	3661.5
26	APR	1980	2000	4.960	3720.0	-60	3660.0
26	APR	1980	2100	4.956	3717.5	-60	3657.5
26	APR	1980	2200	4.953	3714.6	-60	3654.6
26	APR	1980	2300	4.951	3713.3	-60	3653.3
27	APR	1980	0	4.951	3713.3	-60	3653.3
27	APR	1980	100	4.950	3712.5	-60	3652.5
27	APR	1980	200	4.950	3712.5	-60	3652.5
27	APR	1980	300	4.950	3712.5	-60	3652.5
27	APR	1980	400	4.950	3712.5	-60	3652.5
27	APR	1980	500	4.950	3712.5	-60	3652.5
27	APR	1980	600	4.950	3712.5	-60	3652.5
27	APR	1980	700	4.950	3712.5	-60	3652.5
27	APR	1980	800	4.950	3712.5	-60	3652.5
27	APR	1980	900	4.946	3711.0	-60	3651.0
27	APR	1980	1000	4.944	3711.3	-60	3651.3
27	APR	1980	1100	4.944	3711.3	-60	3651.3
27	APR	1980	1200	4.944	3711.3	-60	3651.3
27	APR	1980	1300	4.944	3711.3	-60	3651.3
27	APR	1980	1400	4.944	3711.3	-60	3651.3
27	APR	1980	1500	4.946	3711.0	-60	3651.0
27	APR	1980	1600	4.946	3711.0	-60	3651.0
27	APR	1980	1700	4.946	3711.0	-60	3651.0
27	APR	1980	1800	4.946	3711.0	-60	3651.0
27	APR	1980	1900	4.947	3710.3	-60	3650.3
27	APR	1980	2000	4.945	3712.5	-60	3652.5
27	APR	1980	2100	4.948	3711.0	-60	3651.0
27	APR	1980	2200	4.948	3711.0	-60	3651.0
27	APR	1980	2300	4.950	3712.5	-60	3652.5
28	APR	1980	0	4.944	3711.3	-60	3651.3
28	APR	1980	100	4.944	3711.3	-60	3651.3
28	APR	1980	200	4.945	3712.5	-60	3652.5
28	APR	1980	300	4.944	3711.3	-60	3651.3
28	APR	1980	400	4.950	3712.5	-60	3652.5
28	APR	1980	500	4.950	3712.5	-60	3652.5
28	APR	1980	600	4.950	3712.5	-60	3652.5
28	APR	1980	700	4.950	3712.5	-60	3652.5
28	APR	1980	800	4.950	3712.5	-60	3652.5
28	APR	1980	900	4.944	3711.3	-60	3651.3
28	APR	1980	1000	4.950	3712.5	-60	3652.5
28	APR	1980	1100	4.950	3712.5	-60	3652.5
28	APR	1980	1200	4.953	3714.8	-60	3654.8

FRAM 2 DEPTH DATA

DY	MON	YEAR	GMT	SECONDS	METERS (UNCORR)	VEL CORR	METERS (CORR)
1	MAY	1980	900	5.100	3825.0	-00	3765.0
1	MAY	1980	1000	5.100	3825.0	-00	3765.0
1	MAY	1980	1100	5.100	3825.0	-00	3765.0
1	MAY	1980	1200	5.100	3825.0	-00	3765.0
1	MAY	1980	1300	5.100	3825.0	-00	3765.0
1	MAY	1980	1400	5.100	3825.0	-00	3765.0
1	MAY	1980	1500	5.100	3825.0	-00	3765.0
1	MAY	1980	1600	5.100	3825.0	-00	3765.0
1	MAY	1980	1700	5.100	3825.0	-00	3765.0
1	MAY	1980	1800	5.100	3825.0	-00	3765.0
1	MAY	1980	1900	5.100	3825.0	-00	3765.0
1	MAY	1980	2000	5.100	3825.0	-00	3765.0
1	MAY	1980	2100	5.100	3825.0	-00	3765.0
1	MAY	1980	2200	5.101	3825.8	-00	3765.8
1	MAY	1980	2300	5.101	3825.8	-00	3765.8
2	MAY	1980	0	5.101	3825.8	-00	3765.8
2	MAY	1980	100	5.102	3825.5	-00	3766.5
2	MAY	1980	200	5.101	3825.8	-00	3765.8
2	MAY	1980	300	5.100	3825.0	-00	3765.0
2	MAY	1980	400	5.101	3825.8	-00	3765.8
2	MAY	1980	500	5.101	3825.8	-00	3765.8
2	MAY	1980	600	5.102	3825.5	-00	3766.5
2	MAY	1980	700	5.104	3828.0	-00	3768.0
2	MAY	1980	800	5.104	3831.8	-00	3771.8
2	MAY	1980	900	5.113	3834.8	-00	3774.8
2	MAY	1980	1000	5.116	3838.5	-00	3778.5
2	MAY	1980	1100	5.122	3841.5	-00	3781.5
2	MAY	1980	1200	5.125	3843.8	-00	3783.8
2	MAY	1980	1300	5.130	3847.5	-00	3787.5
2	MAY	1980	1400	5.132	3849.0	-00	3789.0
2	MAY	1980	1500	5.138	3853.5	-00	3794.5
2	MAY	1980	1600	5.140	3855.0	-00	3796.0
2	MAY	1980	1700	5.141	3855.8	-00	3796.8

Gravity

The earth's gravity field was monitored during the station drift with a La Coste and Romberg Model G gravimeter. This instrument has a range of over 7000 milligals, a reading accuracy of ± 0.01 milligal and a drift rate normally less than 1 milligal per month. The instrument used, serial number 27, was especially modified for use on ice floes by the addition of variable damping and electronic readout. Gravity output was monitored continuously with a chart recorder but only those values read directly for calibrating the chart are reported here. The instrument was located in the Lamont residence hut at FRAM II where it was mounted on a wooden pier frozen into the ice floe. The pier extended through a hole in the floor of the hut and was free of any contact with the hut itself. The instrument was at an elevation of $1/2$ m above sea level.

The gravity readings were calibrated with readings at Lamont, Thule and Nord. The manufacturer's screw curve for the instrument was checked between the gravity pier in the Oceanography Building at Lamont and Hangar #7 (SE corner, field level) at Thule AFB, Greenland. The difference in gravity between the two points is over 2600 milligals yet the difference based on the manufacturer's screw curve was found to give a gravity tie within 6 milligals of that based on the survey values for these two sites.

Site	Date	Base Surveyed Value (gals.)	Value based on G-27 Rds. (gals.)
Thule AFB HGR #7	24 Mar 80	982.9280	982.92205
Lamont Grav. Pier	7 May 80	980.2546	(980.2546)
Gravity Difference		2.6734	2.66745

Gravity based on our gravimeter readings using the screw curve agree with the accepted surveyed values with a difference of 5.95 milligals. This check provided confidence in the manufacturer's screw curve which was used to reduce all observations.

Drift is also a possible potential source of error. Readings were taken at the same site at Thule on both the trip to FRAM II and on return. The relative readings at Thule were:

24 March 80	6611.36 mgal
5 May 80	<u>6610.62 mgal</u>
Drift	0.74 mgal

The drift rate of 1/2 milligal per month is considered negligibly small and no drift corrections were made to the data.

GRAVITY OBSERVATIONS AT FRAM II

Key to column headings:

DY = Day

MON = Month

YEAR = Year

GMT - Greenwich mean time

CTR RDG = Counter reading

MGALS = Relative gravity in milligals

GRAVITY = Absolute gravity value in milligals.

FRA 4 2 GRAVITY DATA

DY	MON	YEAR	GMI	CTR	RDG	MGALS	GRAVITY
31	MAR	1980	1956	6551	.52	6897.45	983214.87
31	MAR	1980	2235	6551	.36	6897.55	983214.65
1	APR	1980	57	6551	.35	6897.97	983214.69
1	APR	1980	824	6551	.29	6897.60	983214.62
1	APR	1980	1020	6551	.43	6897.75	983214.75
1	APR	1980	1830	6551	.12	6897.42	983214.44
3	APR	1980	950	6551	.45	6897.75	983214.75
4	APR	1980	1333	6551	.75	6895.98	983213.20
4	APR	1980	2341	6551	.92	6896.16	983213.19
5	APR	1980	946	6550	.15	6896.40	983213.37
5	APR	1980	1316	6550	.30	6896.50	983213.55
6	APR	1980	2330	6551	.30	6897.61	983214.52
6	APR	1980	1935	6551	.25	6897.55	983214.56
6	APR	1980	1622	6551	.18	6897.40	983214.37
7	APR	1980	2217	6550	.85	6897.14	983214.37
7	APR	1980	1939	6550	.80	6896.88	983214.38
7	APR	1980	1321	6550	.57	6896.85	983213.88
8	APR	1980	2142	6550	.52	6896.85	983213.50
8	APR	1980	957	6550	.54	6896.90	983213.81
9	APR	1980	1523	6550	.80	6896.88	983213.87
9	APR	1980	15	6550	.85	6896.93	983213.94
9	APR	1980	1055	6550	.70	6896.98	983214.00
9	APR	1980	1522	6550	.50	6896.77	983213.75
9	APR	1980	2130	6550	.54	6896.86	983213.61
10	APR	1980	1130	6550	.58	6896.88	983213.88
10	APR	1980	1539	6550	.58	6896.66	983213.86
10	APR	1980	2215	6550	.78	6897.77	983214.07
11	APR	1980	1943	6550	.78	6897.05	983214.07
11	APR	1980	1715	6550	.75	6897.63	983214.68
11	APR	1980	2358	6550	.74	6897.64	983214.68
12	APR	1980	1943	6550	.74	6897.65	983214.68
12	APR	1980	1712	6550	.52	6897.11	983214.13
12	APR	1980	2214	6550	.55	6897.11	983214.13
13	APR	1980	1175	6550	.43	6897.12	983214.13
13	APR	1980	2210	6550	.41	6897.16	983214.13
14	APR	1980	33	6550	.78	6897.65	983214.65
14	APR	1980	1940	6550	.73	6897.61	983214.61
14	APR	1980	1541	6550	.73	6897.61	983214.61
15	APR	1980	453	6550	.55	6896.85	983213.85
15	APR	1980	2123	6550	.72	6897.55	983213.71
16	APR	1980	453	6550	.72	6897.55	983213.71
16	APR	1980	1622	6550	.74	6897.77	983214.77
17	APR	1980	2331	6550	.74	6897.77	983214.77
17	APR	1980	1133	6550	.50	6897.11	983214.11
17	APR	1980	1133	6550	.50	6897.11	983214.11
17	APR	1980	2333	6550	.56	6897.77	983214.77
18	APR	1980	1140	6550	.48	6897.77	983214.77
18	APR	1980	1738	6552	.87	6896.27	983213.27
18	APR	1980	2227	6553	.82	6896.27	983213.27
19	APR	1980	1140	6550	.41	6896.99	983213.99
19	APR	1980	1318	6550	.27	6896.99	983213.99
19	APR	1980	1514	6551	.10	6897.44	983214.44
20	APR	1980	1233	6550	.25	6897.77	983214.77
20	APR	1980	1318	6550	.32	6897.44	983214.44
21	APR	1980	1337	6550	.44	6897.44	983214.44
22	APR	1980	2112	6550	.24	6896.22	983213.22
22	APR	1980	1122	6550	.65	6896.22	983213.22
22	APR	1980	1122	6550	.65	6896.22	983213.22
22	APR	1980	2224	6550	.44	6897.77	983214.77
23	APR	1980	1107	6550	.10	6896.99	983213.99
23	APR	1980	1415	6554	.47	6896.99	983213.99
23	APR	1980	2337	6553	.78	6896.34	983213.34
24	APR	1980	2334	6553	.11	6897.55	983213.55
24	APR	1980	1125	6550	.42	6897.75	983214.75
24	APR	1980	1125	6550	.42	6897.75	983214.75
24	APR	1980	1738	6550	.50	6897.77	983214.77
24	APR	1980	2337	6527	.60	6897.72	983214.72

FR 4 2 GRAVITY DATA

DY	MON	YEAR	GAT	CIR	RDG	MGALS	GRAVITY
25	APR	1980	1203	05	21.00	0805.34	983183.31
25	APR	1980	1213	05	18.67	0803.25	983180.25
25	APR	1980	2213	05	10.33	0850.79	983177.81
26	APR	1980	1350	05	14.20	0858.54	983175.56
26	APR	1980	1359	05	13.45	0857.75	983174.75
26	APR	1980	2208	05	12.78	0857.05	983174.06
27	APR	1980	55	05	13.04	0857.32	983174.31
27	APR	1980	1322	05	13.04	0857.32	983174.31
27	APR	1980	1730	05	13.01	0857.29	983174.31
28	APR	1980	1340	05	13.00	0857.34	983174.31
28	APR	1980	2129	05	14.01	0858.34	983175.31
29	APR	1980	2315	05	14.21	0858.55	983175.56
29	APR	1980	1238	05	16.50	0860.97	983178.00
29	APR	1980	1904	05	17.31	0861.82	983178.81
29	APR	1980	2320	05	18.11	0862.86	983179.69
30	APR	1980	1210	05	20.58	0865.20	983182.25
30	APR	1980	2128	05	22.03	0866.70	983183.81
1	MAY	1980	1337	05	22.85	0867.85	983184.82
2	MAY	1980	513	05	19.01	0803.01	983180.82

REFERENCES:

Matthews, D. J.. Tables of the velocity of sound in pure water and sea water for use in echo-sounding and sound-ranging, Hydrographic Dept., Admiralty, London, 1939.

Thorndike, A. S. and Manley, T. O., 1980, Updated Position and Ice Velocity for the AIDJEX Manned Camps, Vol. 1, 11 April, to 17 October, 1975, CU-2-80. Tech. Rpt. No. 2 Lamont-Doherty Geological Observatory, Palisades, N. Y.

MANDATORY DISTRIBUTION LIST

FOR UNCLASSIFIED TECHNICAL REPORTS, REPRINTS, & FINAL REPORTS
PUBLISHED BY OCEANOGRAPHIC CONTRACTORS
OF THE OCEAN SCIENCE AND TECHNOLOGY DIVISION
OF THE OFFICE OF NAVAL RESEARCH
(REVISED JAN 1975)

1	Director of Defense Research and Engineering Office of the Secretary of Defense Washington, D.C. 20301 ATTN: Office, Assistant Director (Research)	12**	Defense Documentation Center Cameron Station Alexandria, Virginia 22314
	Office of Naval Research Arlington, Virginia 22217	1	Commander Naval Oceanographic Office Bay St. Louis, Mississippi 39529 ATTN: Code 1640
3	ATTN: (Code 480)*		
1	ATTN: (Code 460)		
1	ATTN: (Code 102- C)		
1	CNR Res. Rep. (if any)	1	World Data Ctr.A: Oceanography National Oceanic and Atmos- pheric Administration Washington, D.C., 20235
	Director Naval Research Laboratory Washington, D.C. 20375	1	U.S. Navy NORDA Code 300 Director, NOL NSTL Station Bay St. Louis, Mississippi 39529
6	ATTN: Library, Code 2620		
TOTAL REQUIRED - 28 copies			
*	One separate copy of Form DD-1473 added.	**	Sent with these 12 copies two completed forms DD-50, one self addressed back to contractor, the other addressed to CNR, Code 480

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CU-13-80 Tech. Rpt. No. 13	2. GOVT ACCESSION NO. AD-A090 717	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) OBSERVATIONS OF POSITION, OCEAN DEPTHS, AND GRAVITY TAKEN FROM THE FRAM II AND CAMP I DRIFTING ICE STATIONS	5. TYPE OF REPORT & PERIOD COVERED Technical Report	
	6. PERFORMING ORG. REPORT NUMBER CU-13-80	
7. AUTHOR(s) B. Allen, J. Ardai, K. Hunkins, T. Lee, T. O. Manley and W. Tiemann	8. CONTRACT OR GRANT NUMBER(s) Contract N00014-76-C- 0004	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Lamont-Doherty Observatory of Columbia U. Palisades, N. Y.	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR307-359	
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research Arctic Programs, Code 461 Arlington, VA. 22217	12. REPORT DATE August 1980	
	13. NUMBER OF PAGES 60	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified	
	15a. DECLASSIFICATION, DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (for the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Arctic Ocean, ice drift, geophysics, bathymetry, Fram II		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report contains geophysical data collected by the Lamont group at the FRAM II and Camp I drifting stations. These data include station positions determined by satellite navigation, echo soundings, ice floe azimuths, magnetic de- clination and gravity readings.		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0132-LF-014-6601

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)