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NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY NSTL 5--ETC F/G B/12
AIRBORNE LASER SEA ICE PROFILES NEAR A DRIFTING CAMP, APRIL 197--ETC(U)
JUN 79 A W LOHANICK

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6 Airborne Laser Sea Ice Profiles
Near a Drifting Camp, April 1977.

10 Alan W./Lohanick

9 Final report

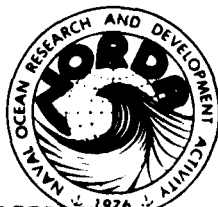
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Oceanography Division
Naval Oceanographic Laboratory

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EXECUTIVE SUMMARY

This Technical Note reports the results of reduction and preliminary analysis of airborne-laser sea-ice surface profiles obtained in April 1977 from Fram Strait between northern Greenland and Spitzbergen. Data reduction consists of the removal of discontinuities in the profiles, and numerical computer filtering to remove aircraft motion. Analysis consists of computer calculations of descriptive statistics. The data set chosen is in proximity to an ice camp (Ruby) operated by personnel from the Polar Research Laboratory, Santa Barbara, California. Aerial photography taken simultaneously with the laser profiles serves to place the profile data precisely with respect to Camp Ruby on 12 April 1977.

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I. BACKGROUND

The Polar Oceanography Branch of the Naval Ocean Research and Development Activity (NORDA) has on file analog tapes of laser sea-ice surface profiles obtained in the Arctic from P-3A aircraft at approximately six month intervals since 1970. The total amount of data in the library is about 100,000 nautical miles, of which only a small fraction, perhaps 1%, has been reduced and analyzed for specific projects. Sea-ice surface profiles provide statistical information such as spatial frequency of pressure ridges, distributions of ridge heights and spacings, and general sea ice roughness. These parameters are used in either numerical models of sea ice movements and distribution, acoustic models in which sea ice serves as a boundary or a source of ambient noise, or both.

The raw data appear on FM analog tapes. Reduction of the data is made difficult by the presence of aircraft motion (long-wavelength variations in the profile) and various automatic and accidental discontinuities introduced by the recording system. Removal of these extraneous effects has been the subject of numerous papers (Holyer et al., 1977, and Hibler, 1972). Computer programs have been developed which remove aircraft motion numerically, but discontinuities are usually of such an unpredictable nature that they must be treated on an individual basis by a trained analyst, and cannot be removed automatically by computer. It is this individual treatment which makes the data reduction process very slow, and has resulted in the large percentage of data which remain unreduced. The Polar Oceanography Branch is presently developing the capability to reduce this data much more efficiently by means of real-time graphic analysis using a table-top minicomputer. This note, however, describes the scheme presently in use.

II. DATA REDUCTION SCHEME

Data produced on an x-y analog plotter directly from an analog laser profile tape are shown in Figure 1. The slope in the data between points C and B is one example of the long-wavelength aircraft motion superimposed on the terrain profile. The "event" at point A is a ridge about 4.6 m high. The vertical exaggeration of about 30:1 best displays the discontinuities. "Events" at B and C are discontinuities which must be somehow removed so that the "real" profile can be recovered from the data. If these discontinuities are ignored in the data reduction, the program which removes aircraft motion will produce spurious peaks at these locations. These peaks will be counted as ridges. Point B is an automatic shift of the data (back to center-scale) which prevents recordings of analog voltages larger than about 1.5 v (a limitation of the recording system). Point C is a type of discontinuity called a "dropout". Dropouts are almost always a total change of about one-fourth of full scale, but have widely varying shapes. The phenomenon of dropouts is yet to be explained (by anyone, including the manufacturer of the laser profiling system, Spectra Physics). They appear to occur predominately over rough terrain.

Data are usually chosen for reduction on the basis of its proximity to a specific experiment area, such as an acoustic array. Location of the data in time and space is accomplished by comparing the time (simultaneously recorded in flight on a parallel channel of the analog tape) with an aircraft log giving aircraft position. Precise determinations of location can then be made by comparing the laser profile with aerial photography taken simultaneously with the profile.

Data are first plotted on an analog recorder and visually reviewed for quality. Figure 2 shows typical data hand-annotated with the results of a visual review,

with one area marked as unsuitable for further reduction because the number of discontinuities is considered excessive. "Hand" removal of so many discontinuities might lead to unreliable descriptive statistics. The "unsuitable" section (Fig. 2) where several closely spaced data shifts are shown may indicate that the aircraft was executing a maneuver such as an altitude change or turn. This condition would result in the laser beam pointing obliquely at the terrain, thus giving erroneous ridge heights.

When it has been decided which profiled area is to be reduced, the profile is digitized using an A/D converter, onto a 7-track computer-compatible tape. Data are recorded in millivolts (-1500 to +1500 mv) and are sampled at about 200 Hz. Since the aircraft ground speed is usually 180 to 250 knots, this amounts to an actual data point spacing of 0.46-0.64 m. Average data point spacing used is 0.5 m. One digital record is usually 15,000 points, or about 7500 m in length.

Figure 2 also shows time and data-point-number scales added by hand to the analog trace. This procedure approximately locates discontinuities in the digital record. The approximate locations can then be used to obtain a print listing of the small portions of the record near the discontinuity, or the entire record can be computer-listed (in millivolts) and the locations used as a guide in finding the discontinuities and removing them.

Table 1 shows a computer listing of data in the vicinity of a data shift. A notation is made to add +1600 mv to each data point after point number 5127. If another discontinuity is reached later in the record, further corrections are then necessary.

Table 2 shows a computer listing of data in the vicinity of a "dropout." A series of corrections, amounting to subtracting a sloping straight line, is shown in Figure 3 (see Holyer et al., 1977). The plot (Fig. 3) of the data shows the extent of the discontinuity.

The cumulative corrections are applied to the data in the computer, and checked by listing and inspecting the corrected record. When all corrections are satisfactory, the data are ready for numerical filtering and computation of statistics. These two final steps are performed in one computer run by an algorithm suggested by Hibler (1972).

The procedure outlined above has been used on a recently acquired data set to demonstrate the output of the computer programs and the presentation of results.

III. DATA NEAR SEA ICE CAMP RUBY, 1977

In April 1977, personnel from NORDA's Polar Oceanography Branch operated sensors aboard the Naval Oceanographic Office's (NAVOCEANO) P-3A BIRDSEYE aircraft as part of a field experiment in the Fram Strait (between Greenland and Spitzbergen). Data were gathered around two drifting sea ice stations, Ruby and Pearl, which were operated by personnel of the Polar Research Laboratory, Santa Barbara, California. The locations of the camps are shown in Figure 4.

Acoustic experiments were performed in the sea in the vicinity of Camp Ruby, and airborne laser profiles and 9 x 9 in aerial photographs were made of the sea ice terrain on 12 April. The profiles and photography provided the relative locations and statistical terrain features of the sea ice near Camp Ruby for 12 April, and for as many days before and after 12 April, as the ice remained in

nearly the same configuration near the camp. (On 12 April at 1517Z, the camp was located at 8217N 0652W, according to the LTN-51 inertial navigation system aboard the aircraft). Figure 5 is an uncontrolled photomosaic of the area of Camp Ruby, using the 9 X 9 inch cartographic quality aerial photographs.

Figure 6 is an analog trace of the uncorrected profile data. In this particular data set, all data were considered reliable. File and record numbers referring to the digital data tape are annotated on the trace, and serve to name the record. Many discontinuities (a total of 49) are to be found. Each must be removed individually by the procedure described in the previous sections.

After the data are resampled and numerically filtered with the existing FORTRAN program, each final record contains exactly 4980 data points, with aircraft motion and discontinuities removed.

IV. SUMMARY OF RESULTS

Appendix 1 contains all final reduced data (with terrain height in meters) obtained from the uncorrected data plotted in Figure 6.

Appendix 2 is a reproduction of the computer listings summarizing the data in each record in Appendix 1. The ridges counted are listed individually by height ("Z(M)"), position in the record (data point "I"), and distance from the beginning of the record in kilometers ("KM"), which provides scaling to the actual terrain. Provision is made for 120 ridges in the listing, but in this particular analysis, excess ridges are hand annotated on the page. Excess ridges are located by inspection of the appropriate data in Appendix 1. Another table in the listing, headed "STATISTICS OF COUNTED RIDGES," gives the height ranges (bins) into which ridges are placed according to height, the number in each range, and the number per kilometer in each range for this record. A third table headed "PROFILE STATISTICS," is based on the entire record, not individual ridges, and contains the mean, root-mean-square (RMS), etc., of the data. Other information provided in the listing includes the aircraft groundspeed, data point spacing, number of data points in the record, actual length of the record in kilometers, number of ridges counted, and the location of the highest ridge in the record.

Ridges are counted by the Rayleigh criterion (borrowed from optics), where a local maximum terrain height (over 0.5 m in this case) is counted as a ridge if adjacent minima in both directions are less than one half the maximum. No minimum ridge spacing or maximum terrain slope is considered (see Diachok, 1975).

The print listing is designed to provide a general analysis of the terrain included in the record. It is expected that individual applications of the data may use only a small portion of this information.

Figure 7 shows the location of each record with respect to the terrain. This step is performed using either a plot (not shown) of the final reduced data, or an analog trace such as Figure 6, and comparing ridges seen in the photography with those in the profile. The user can employ Figure 7 to map required ice parameters as a function of position. Since, in effect, each data point (terrain height) is now located, it is possible to re-analyze the data in any desired way and tie the results to an experiment conducted in the area. For one example, one may use a sliding window to compute a continuous RMS, or ridge spacing as a function of position.

V. REFERENCES

Diachok, O. I. (1975). A Simple Geometrical/Statistical Model of Sea Ice Ridges. Naval Oceanographic Office, NSTL Station, MS, Technical Note 6130-5-75.

Hibler, W. D. (1972). Removal of Aircraft Altitude Variations from Laser Profiles of the Arctic Ice Pack. J. Geophys. Res., 77, 36, p. 7190-95.

Holyer, I. J. J., P. Wadhams, and R. T. Lowry (1977). An Interactive Graphics System for Reduction of Airborne Laser Profiles of Sea Ice. Scott Polar Research Institute, Cambridge, England, Tech. Rep. 77-1.

TABLE 1
COMPUTER LISTING OF DIGITAL PROFILE DATA NEAR A DATA SHIFT

SEASAL COMPUTATION - 511277

RECORD = 2
PROCESSING BEGINS ON RECORD 2

VALUES FOR STORAGE (120)

1366	1396	1408	1452	1486	1420	1420	1478	1400	1474	146	1472	144	1470	1444	1424	1504	1457	1361	1369
1372	1425	1441	1474	1443	1504	1504	1424	1512	151	142	1340	1542	1514	1564	1556	1544	1517	1394	1513
1456	1406	1476	1462	1462	1504	1504	1452	1504	1504	1504	1504	1504	1504	1504	1504	1504	1504	1504	1504
1488	1566	1552	1552	1552	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572	1572
35	52	25	19	37	-2	22	42	58	91	14	72	143	132	76	69	74	72	106	135
56	61	172	109	136	142	142	131	121	124										

* after data pt. # 5127 add +1600

TABLE 2
HAND REMOVAL OF A "DROPOUT"

SEASAL COMPUTATION - 511277

RECORD = 1
PROCESSING BEGINS ON RECORD 1

VALUES FOR STORAGE (120)

-209	-333	-237	-83	-233	-137	-57	-75	-75	-75	-75	-75	-75	-75	-75	-75	-75	-75	-75	-75
595	733	749	781	782	782	782	782	782	782	782	782	782	782	782	782	782	782	782	782
654	718	645	717	672	661	661	661	661	661	661	661	661	661	661	661	661	661	661	661
723	755	746	757	747	751	751	751	751	751	751	751	751	751	751	751	751	751	751	751
722	732	715	691	646	641	641	641	641	641	641	641	641	641	641	641	641	641	641	641

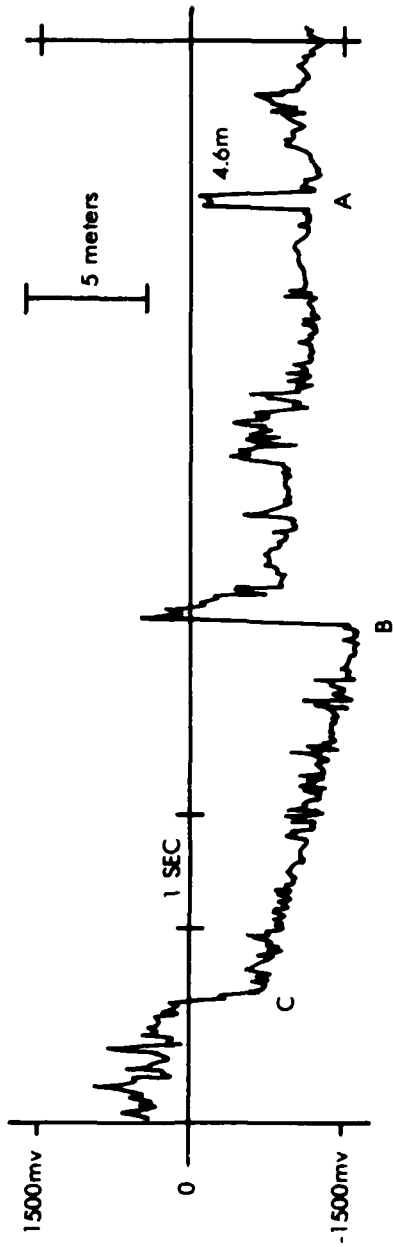


Figure 1. Example of raw sea ice profile data showing ridges, discontinuities, and aircraft motion

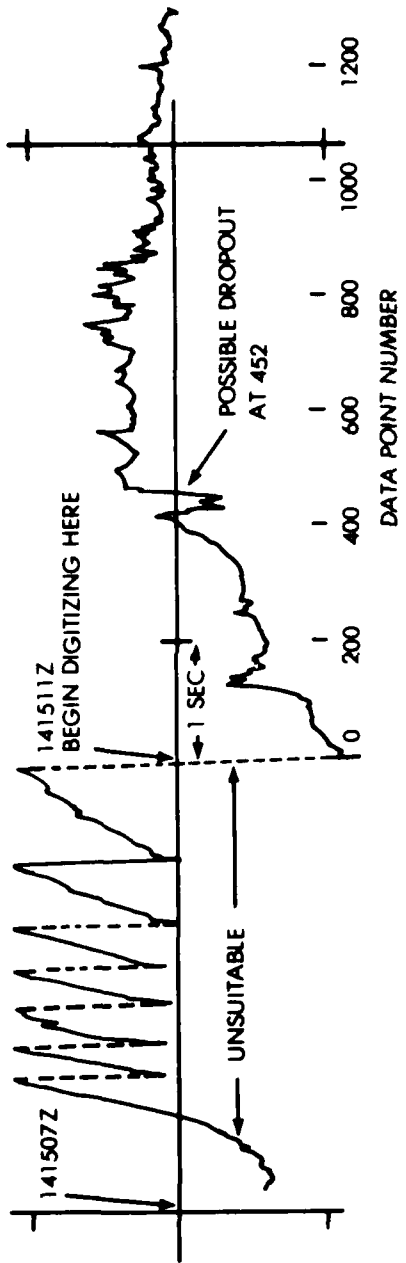


Figure 2. Hand-annotated review of typical sea ice profile data

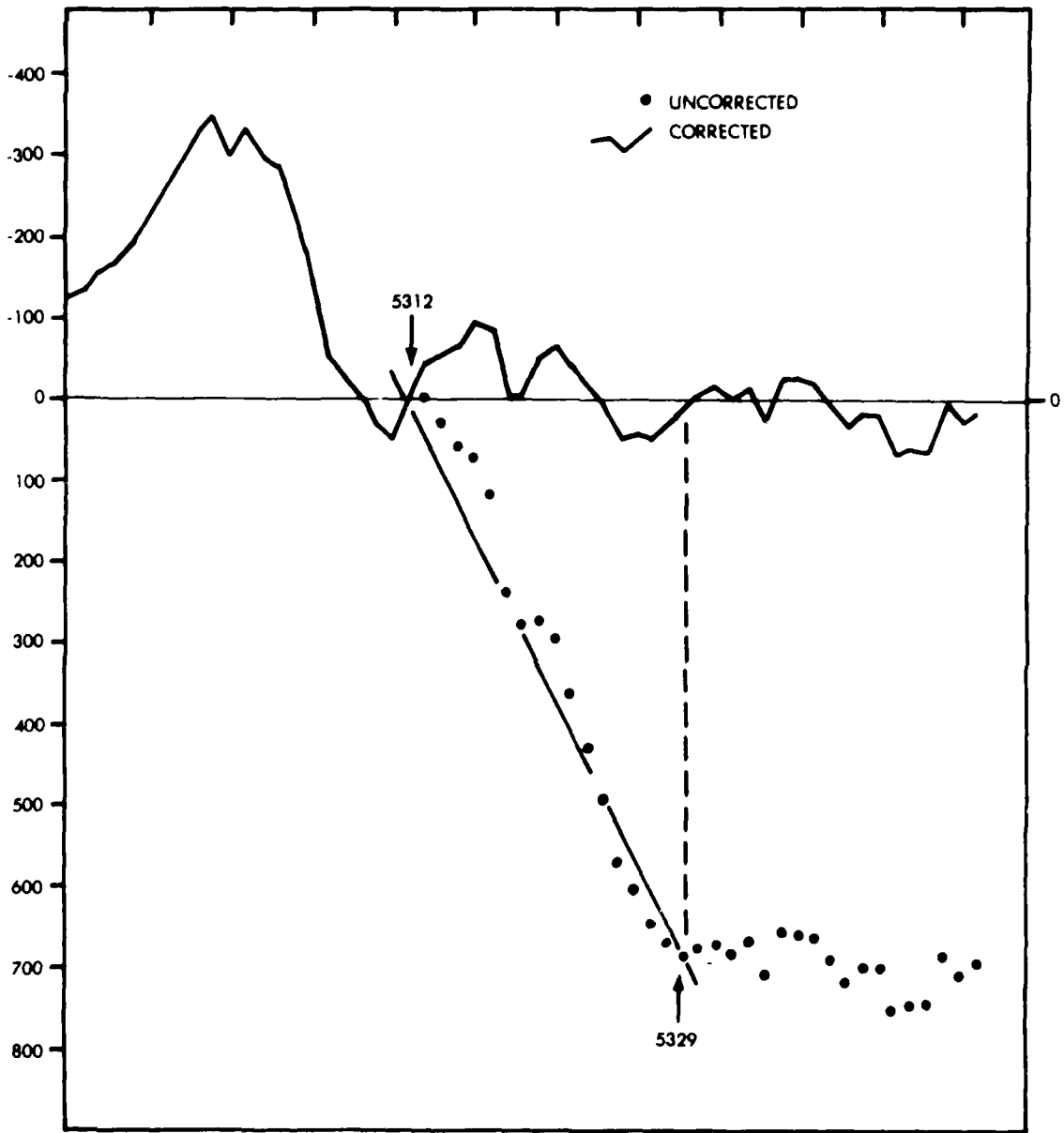


Figure 3. Plot of correction for a "dropout"

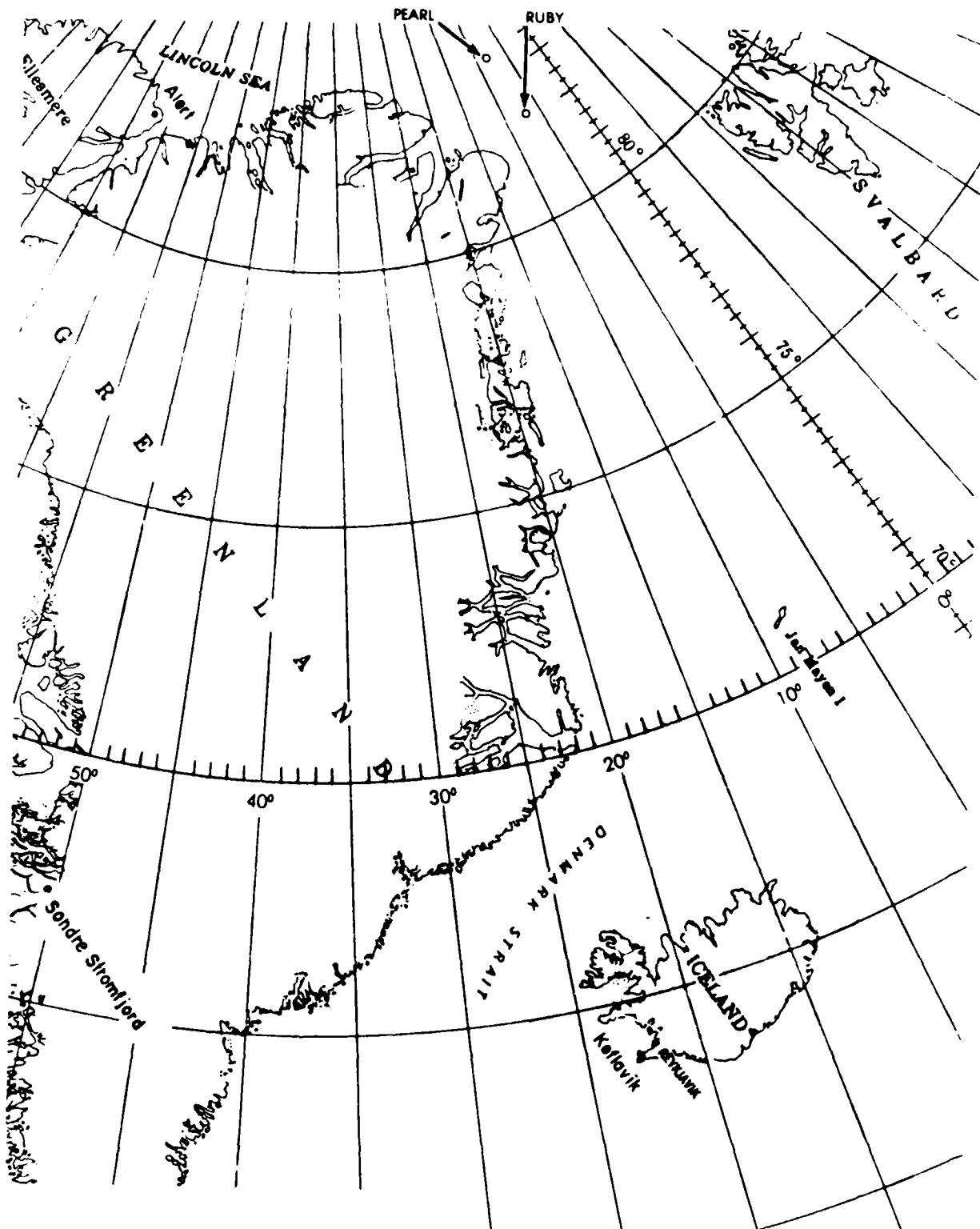


Figure 4. Map showing location of Sea Ice Camps Ruby and Pearl on 12 April 1977

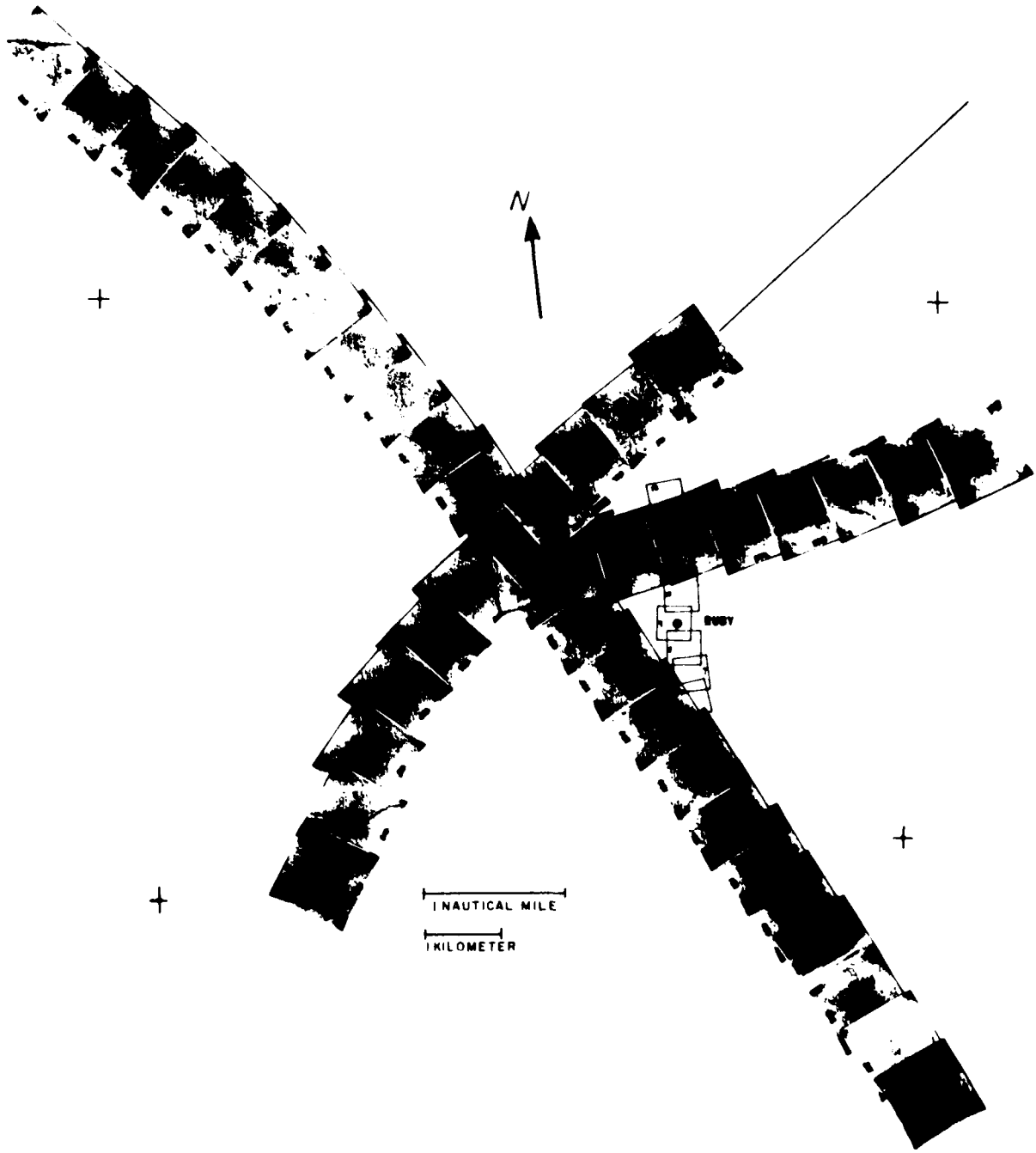


Figure 5. Uncontrolled Photomosaic of sea ice near Camp Ruby on 12 April 1977

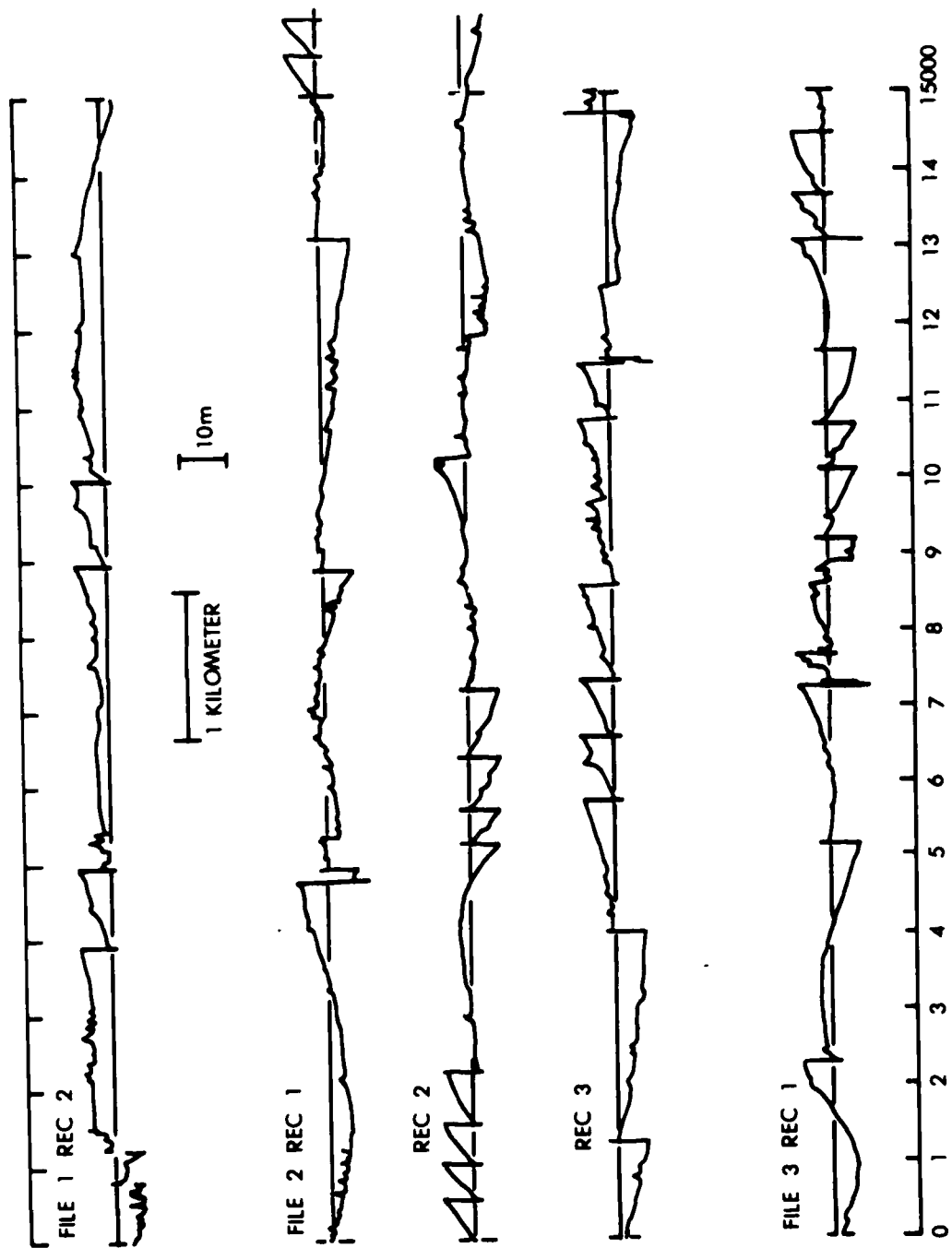


Figure 6. Uncorrected sea ice profile data near Camp Ruby, 12 April 1977

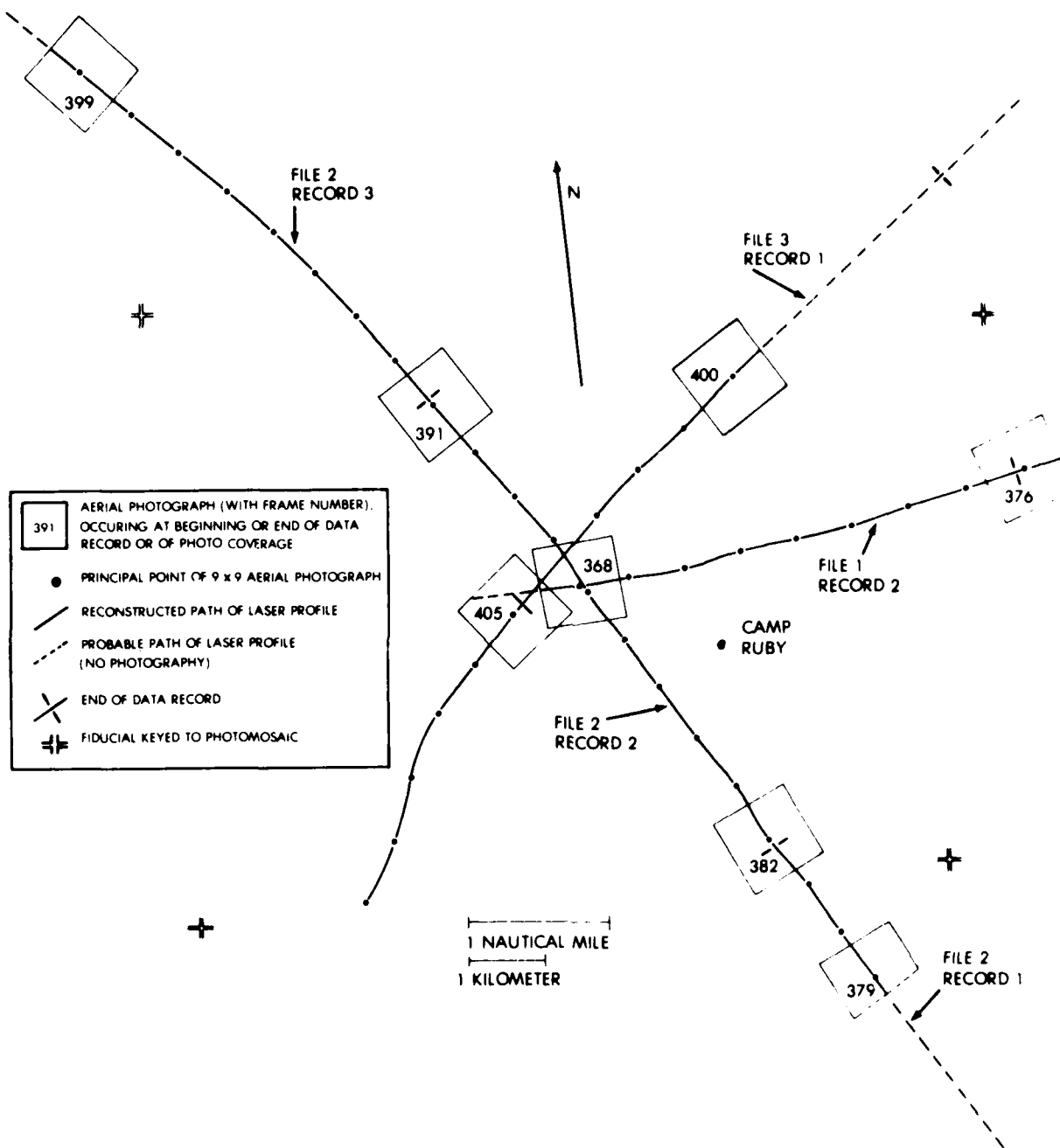


Figure 7. Location of sea ice profiles with respect to Camp Ruby, 12 April 1977

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11154	27804	22190	13171	23964	40004	28004	13404	10565	12507	23028
11155	27805	22191	13172	23965	40005	28005	13405	82211	92333	23029
11156	27806	22192	13173	23966	40006	28006	13406	59476	59553	23030
11157	27807	22193	13174	23967	40007	28007	13407	23137	132408	23031
11158	27808	22194	13175	23968	40008	28008	13408	82497	82501	23032
11159	27809	22195	13176	23969	40009	28009	13409	133337	11879	23033
11160	27810	22196	13177	23970	40010	28010	13410	11879	12000	23034
11161	27811	22197	13178	23971	40011	28011	13411	133337	12000	23035
11162	27812	22198	13179	23972	40012	28012	13412	83201	95691	23036
11163	27813	22199	13180	23973	40013	28013	13413	133337	95691	23037
11164	27814	22200	13181	23974	40014	28014	13414	133337	95691	23038
11165	27815	22201	13182	23975	40015	28015	13415	133337	95691	23039
11166	27816	22202	13183	23976	40016	28016	13416	133337	95691	23040
11167	27817	22203	13184	23977	40017	28017	13417	133337	95691	23041
11168	27818	22204	13185	23978	40018	28018	13418	133337	95691	23042
11169	27819	22205	13186	23979	40019	28019	13419	133337	95691	23043
11170	27820	22206	13187	23980	40020	28020	13420	133337	95691	23044
11171	27821	22207	13188	23981	40021	28021	13421	133337	95691	23045
11172	27822	22208	13189	23982	40022	28022	13422	133337	95691	23046
11173	27823	22209	13190	23983	40023	28023	13423	133337	95691	23047
11174	27824	22210	13191	23984	40024	28024	13424	133337	95691	23048
11175	27825	22211	13192	23985	40025	28025	13425	133337	95691	23049
11176	27826	22212	13193	23986	40026	28026	13426	133337	95691	23050
11177	27827	22213	13194	23987	40027	28027	13427	133337	95691	23051
11178	27828	22214	13195	23988	40028	28028	13428	133337	95691	23052
11179	27829	22215	13196	23989	40029	28029	13429	133337	95691	23053
11180	27830	22216	13197	23990	40030	28030	13430	133337	95691	23054
11181	27831	22217	13198	23991	40031	28031	13431	133337	95691	23055
11182	27832	22218	13199	23992	40032	28032	13432	133337	95691	23056
11183	27833	22219	13200	23993	40033	28033	13433	133337	95691	23057
11184	27834	22220	13201	23994	40034	28034	13434	133337	95691	23058
11185	27835	22221	13202	23995	40035	28035	13435	133337	95691	23059
11186	27836	22222	13203	23996	40036	28036	13436	133337	95691	23060
11187	27837	22223	13204	23997	40037	28037	13437	133337	95691	23061
11188	27838	22224	13205	23998	40038	28038	13438	133337	95691	23062
11189	27839	22225	13206	23999	40039	28039	13439	133337	95691	23063
11190	27840	22226	13207	24000	40040	28040	13440	133337	95691	23064

10133	11847	13486	14455	12333	15617	68845	94074
10529	12949	14461	16717	15373	32378	31012	20956
10601	13716	15272	17216	13397	10738	07887	12363
21377	12982	13947	13841	23136	33174	10089	04955
1522	1191	1652	1191	19482	06526	04881	01709
12189	11448	11448	15284	28724	33153	31153	21739
1058	1864	1626	1134	2681	28527	30127	27886
25887	19949	19949	19949	33739	43131	43771	32032
55826	2857	3378	41761	10371	32341	16779	26609
22285	19929	2659	46284	32882	16372	21127	23687
13951	11182	12747	48284	25068	35906	48754	27817
28379	32971	32971	2876	32815	33102	31081	3354
10526	13527	1305	2325	23128	11774	18696	15383
7078	19897	19897	1117	16789	51746	12823	18209
13357	33312	35137	35984	31134	31754	13356	09071
17218	2382	34682	25311	26281	27025	27524	18010
31816	22935	24917	15462	14923	36657	32354	22331
21078	10954	10954	18454	12854	13077	17856	17856
1931	12612	12887	18571	12676	3167	03436	06615
15976	14444	14444	2624	71106	17565	21814	28162
17222	11012	1685	3132	3716	17565	33247	25856
29099	19949	19949	48281	15335	25882	20572	12763
2328	22725	31688	14644	17632	2238	15276	30513
23922	27949	27949	22442	33352	33012	14007	21171
16681	1114	1661	16321	16325	18736	36796	18166
21949	19949	19949	12442	2254	05335	33423	13820
807	1226	12314	1511	27597	03916	0351	17618
8018	14405	14405	18454	17137	28788	23650	06953
2055	16877	22155	22497	13752	88335	87726	53081
09398	19949	19949	48281	62445	24445	79129	79129
5022	54922	48936	38312	52725	62784	62475	31282
11383	66434	66434	23724	68581	44677	45155	66786
8722	5181	35985	25875	85783	29256	25912	91828
00568	19949	19949	2712	34355	4062	35116	36277
09729	07865	27919	1759	23756	25599	4062	36277
29099	30062	31443	81482	33887	3847	56801	31923
37293	64181	36211	3178	35951	33076	17161	19514
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28252	3125	24483	34314	27785	24483	27719	15611
16146	1444	1444	3165	23725	16869	26953	12763
11781	21784	35885	55981	33969	30170	25325	37875
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31882	33333	2811	16237	26151	17351	12320	28914
37126	21885	20817	2475	31771	8723	8723	23748
4516	3142	15337	11114	3118	38045	33674	26384
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124

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125

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75853	25337	25337	25337	47897	47897	13153	19153	78906
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15738	14977	14977	14977	47897	47897	16236	37112	26607
17787	16556	16556	16556	47897	47897	16811	16550	29209
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31949	26316	26316	26316	47897	47897	11057	11057	17386
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78184	9371	9371	9371	47897	47897	84751	37352	116500
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78773	31382	31382	31382	47897	47897	6587	6587	60987
46721	34443	34443	34443	47897	47897	38063	38063	31287
37933	27158	27158	27158	47897	47897	32612	20378	11100
40437	24442	24442	24442	47897	47897	37453	31298	34179
37777	24321	24321	24321	47897	47897	10321	10321	21859
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27215	13687	13687	13687	47897	47897	23222	23222	23778
26416	23314	23314	23314	47897	47897	56325	50265	73936
46787	56762	56762	56762	47897	47897	44031	42747	42747
37784	18413	18413	18413	47897	47897	36885	24638	23191
23263	15123	15123	15123	47897	47897	26016	26016	27700
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17747	14817	14817	14817	47897	47897	11115	12599	12599
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18491	1241	1241	1241	47897	47897	12376	13205	19035
27267	32246	32246	32246	47897	47897	26776	26776	34123
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31991	31992	31993	31994	31995	31996	31997	31998	31999	32000

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33825	33305	33062	33378	32713	214446	38858	18470	10193
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24810	33307	33064	33380	32715	3336	17437	07068	06130
22124	33308	33065	33381	32716	3265	3337	87183	76893
32277	33309	33066	33382	32717	3337	14237	17759	22197
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28031	33334	33091	33407	32742	3337	16486	14486	77718
18574	33335	33092	33408	32743	3337	11344	22323	15474
33214	33336	33093	33409	32744	3337	18437	33533	26251
37723	33337	33094	33410	32745	3337	37281	8207	11166
81183	33338	33095	33411	32746	3337	14587	27135	16255
27422	33339	33096	33412	32747	3337	34475	21849	46255
28031	33340	33097	33413	32748	3337	17233	22732	16345
18574	33341	33098	33414	32749	3337	27432	20551	26883
33214	33342	33099	33415	32750	3337	34174	24410	40158
37723	33343	33100	33416	32751	3337	18531	4379	30113
81183	33344	33101	33417	32752	3337	25761	49062	30113
27422	33345	33102	33418	32753	3337	51784	44464	29790
28031	33346	33103	33419	32754	3337	33253	22258	13419
18574	33347	33104	33420	32755	3337	4267	16216	12172
33214	33348	33105	33421	32756	3337	27112	98836	10265
37723	33349	33106	33422	32757	3337	25642	27542	11606
81183	33350	33107	33423	32758	3337	25645	9137	11606
27422	33351	33108	33424	32759	3337	23776	27087	15795
28031	33352	33109	33425	32760	3337	33485	38316	51600
18574	33353	33110	33426	32761	3337	5472	83183	5598
33214	33354	33111	33427	32762	3337	61784	54787	59805
37723	33355	33112	33428	32763	3337	77465	27782	11385
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27422	33357	33114	33430	32765	3337	58621	50316	65231
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18574	33359	33116	33432	32767	3337	12372	41566	37835
33214	33360	33117	33433	32768	3337	1816	59376	37835
37723	33361	33118	33434	32769	3337	1816	19249	19249
81183	33362	33119	33435	32770	3337	28373	21346	39509
27422	33363	33120	33436	32771	3337	44584	25916	11824
28031	33364	33121	33437	32772	3337	36371	06638	06638
18574	33365	33122	33438	32773	3337	2716	93168	06797
33214	33366	33123	33439	32774	3337	31887	23188	09761
37723	33367	33124	33440	32775	3337	24484	00120	03453
81183	33368	33125	33441	32776	3337	24484	12838	20665
27422	33369	33126	33442	32777	3337	732	33347	33347
28031	33370	33127	33443	32778	3337	12486	17133	17133

1510	11887	11888	11889	11890	11891	11892	11893	11894	11895	11896	11897	11898	11899	11900	11901	11902	11903	11904	11905	11906	11907	11908	11909	11910	11911	11912	11913	11914	11915	11916	11917	11918	11919	11920	11921	11922	11923	11924	11925	11926	11927	11928	11929	11930	11931	11932	11933	11934	11935	11936	11937	11938	11939	11940	11941	11942	11943	11944	11945	11946	11947	11948	11949	11950	11951	11952	11953	11954	11955	11956	11957	11958	11959	11960	11961	11962	11963	11964	11965	11966	11967	11968	11969	11970	11971	11972	11973	11974	11975	11976	11977	11978	11979	11980	11981	11982	11983	11984	11985	11986	11987	11988	11989	11990	11991	11992	11993	11994	11995	11996	11997	11998	11999	12000
1510	11887	11888	11889	11890	11891	11892	11893	11894	11895	11896	11897	11898	11899	11900	11901	11902	11903	11904	11905	11906	11907	11908	11909	11910	11911	11912	11913	11914	11915	11916	11917	11918	11919	11920	11921	11922	11923	11924	11925	11926	11927	11928	11929	11930	11931	11932	11933	11934	11935	11936	11937	11938	11939	11940	11941	11942	11943	11944	11945	11946	11947	11948	11949	11950	11951	11952	11953	11954	11955	11956	11957	11958	11959	11960	11961	11962	11963	11964	11965	11966	11967	11968	11969	11970	11971	11972	11973	11974	11975	11976	11977	11978	11979	11980	11981	11982	11983	11984	11985	11986	11987	11988	11989	11990	11991	11992	11993	11994	11995	11996	11997	11998	11999	12000
1510	11887	11888	11889	11890	11891	11892	11893	11894	11895	11896	11897	11898	11899	11900	11901	11902	11903	11904	11905	11906	11907	11908	11909	11910	11911	11912	11913	11914	11915	11916	11917	11918	11919	11920	11921	11922	11923	11924	11925	11926	11927	11928	11929	11930	11931	11932	11933	11934	11935	11936	11937	11938	11939	11940	11941	11942	11943	11944	11945	11946	11947	11948	11949	11950	11951	11952	11953	11954	11955	11956	11957	11958	11959	11960	11961	11962	11963	11964	11965	11966	11967	11968	11969	11970	11971	11972	11973	11974	11975	11976	11977	11978	11979	11980	11981	11982	11983	11984	11985	11986	11987	11988	11989	11990	11991	11992	11993	11994	11995	11996	11997	11998	11999	12000

ARGUMENT LIST FOR APPROPRIATE SUB-ROUTINE:

TAPF 1: RADIALS 6/2177 RECORD 1
CALL NO. 1

4979 DATA POINTS
BEGIN AT 1
END AT 4960

MORSE 1.47 METERS/DATA POINT
SMPTIM 75.0 SECONDS
GROUNDSPEED 190.0 KNOTS

VERTICAL SCALE 12.192 METERS (ALREADY APPLIED)

(VII) VALUES ARE

.21322	.39976	.19697	.25583	.15456	.28691	.11278	.09993	.14479	.20751
.20803	.37519	.53155	.85987	.71890	.58996	.54980	.48906	.49487	.44882
.24669	.33641	.29477	.24977	.32173	.34804	.18312	.24320	.17403	.41357
-.00317	.42813	.04783	.27927	.85789	1.13049	1.17445	1.47287	1.08876	.73553
.64237	.62848	.66951	.71541	.74691	.89961	.86044	.82706	.95360	1.05538
1.11305	1.10337	1.07906	1.23325	1.36703	1.62956	1.85346	1.74149	1.73277	1.51444
1.21664	1.23659	1.25438	.90874	.84602	.60102	.51699	.41378	.26674	.29927
.19742	-.00546	-.02686	.00997	-.02277	.17691	.23827	.18477	.17637	.11662
.37003	.21507	.13771	.21948	.24268	.35108	.35108	.41309	.46573	.52410
.37275	.30293	.18282	.30147	.14776	-.03032	.08155	.10772	.19382	.05061
.66758	.02262	.18173	.08518	.20503	.04355	.20268	.14386	.16772	.30795
.21700	.29064	.26985	.26309	.16042	.27716	.11504	.31461	.45694	.32667
.46785	.45993	.54965	.69992	.63645	.50825	.22500	.57471	.43778	.51443
.38838	.40815	.30306	.11061	.19223	.37740	.10971	.22662	.23949	.19614
.19485	.20794	.19509	.40635	.51036	.20958	.08213	.07769	.22296	.19423
.26343	.10870	.22337	.04876	.15036	.20551	.26423	.21554	.16270	.28712
.34922	.33352	.34920	.10854	.23569	.16767	.25979	.27929	.32462	.29459
.14708	.01250	.34094	.36397	.14405	.14932	.07275	.19785	.33813	.40268
.40253	.36388	.34374	.36276	.44544	.17105	.12553	.18360	.30761	.18902
.30876	.41960	.10162	.31932	.32636	.42104	.33318	.26053	.42199	.54931
.93375	.96868	1.16347	1.27975	1.70955	2.36021	2.84883	2.90638	2.43171	1.67696
1.34817	.82070	.82673	.45704	.24643	.18674	.18795	.04454	.00017	.08276
.14106	-.05459	.09981	.08363	.17035	.12122	.09733	.13139	.01659	.10802
.19105	.18363	.18543	.19400	.31267	.27022	.23583	.30787	.41757	.34342
.32481	.37151	.36145	.50195	.39944	.49667	.36633	.29997	.49643	.45939
.51140	.46960	.67288	.56700	.57455	.81845	1.17708	1.11301	1.29398	1.56272
.45797	1.01445	1.66378	1.31182	.93674	.52442	.44618	.37643	.16819	.34969
.34122	.46307	.80340	.72707	.34024	.37990	.29856	.24500	.12556	.20499
.60155	.48035	.23258	.17502	.09044	.95600	.48568	1.31401	1.37961	1.30840
.40193	.59534	.73811	.60328	.64583	.55849	.62568	.89186	.64487	.52635
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1.08768	.83184	.71206	.62575	.44252	.36280	.22038	.47915	.54441	.68862
.19945	.42322	.48823	.76237	.4252	1.34180	1.67901	.28992	.27477	.35569
.37430	.21186	.47700	.32900	.93374	.37374	.19120	1.51473	.84317	.52337
.49520	.63740	.47477	.54700	.16971	.50771	.37482	.23760	.41876	.39958
.56612	.71829	.71226	.85579	.50571	1.05025	.42535	.42474	.49473	.43042
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				.06834	.19760	.17867	.41337	.47545	.55875

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43701	48090	49030	52867	37761	26651	39656	41168	24565	29754
31674	16830	31106	34592	60158	1418A	23987	17661	26194	33324
34852	49836	56081	59783	20178	4217A	25786	34569	16129	26114
34698	40086	28037	34915	28932	37325	32106	40390	56577	53298
54737	47793	62401	34145	34986	40517	37800	27782	36752	34475
30214	41100	32120	44253	44235	49254	40143	45868	41137	47113
20070	04947	32120	03498	05178	17018	19646	05809	14028	13862
13827	07570	30933	17529	09776	20672	27111	27865	11249	25069
23873	13602	09259	36092	33353	11283	18934	32246	25872	34439
30096	13534	11590	21445	22892	09526	09526	17396	15302	15302
15106	02906	15934	11213	19288	14367	02897	12356	07815	03041
01553	07284	08926	09059	-03896	00490	10246	13979	29655	19719
18069	27340	17714	15235	21016	28385	21958	17595	-05097	21811
36476	34117	24310	13588	15763	05381	02077	05166	-06540	-06540
05719	03395	01666	06732	07622	18598	11398	26395	10904	19397
11404	08897	08128	17669	18647	24308	07985	08147	20832	19711
21885	03883	03869	05966	26883	30850	12283	15363	04365	06149
00632	19501	29415	16843	09329	00889	11614	01754	04076	04076
07344	03545	26289	29288	30759	40037	51542	37917	30674	47076
58125	24066	22750	24045	20460	14276	14308	03942	09610	-01196
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13835	-07631	-02495	31562	33936	37689	22042	29004	23235	29165
19387	13353	13834	17179	17005	15553	20702	09896	07772	-6590
04258	15428	24927	16774	20876	03047	10974	01818	23093	-6590
12127	14658	20584	29232	37130	27319	39283	13225	10859	10440
05602	06057	10670	05233	05941	06080	-01081	10498	16018	24141
20159	22592	30482	44839	42655	42390	30568	39394	24324	17966
21811	21985	37899	28287	28536	38402	34658	39346	40715	36923
20588	20455	26729	14474	21300	17201	12127	19416	27838	700
28256	15828	24350	14474	64390	60015	85904	98957	101936	100688
98119	12982	103822	119858	112682	115134	93612	78737	101936	100688
142963	130257	106236	84643	71903	69868	72352	87377	102551	87377
58553	33672	14605	09158	00665	11540	08239	33366	65851	66714
11678	35714	36852	35984	31945	22987	32226	06458	04976	20531
33539	21264	42707	18167	24898	13427	09822	27838	23213	15948
40559	31460	31191	22789	31113	15249	22509	35884	16772	27040
19175	23849	22219	03007	07442	09660	11174	14668	30475	33123
25232	32001	23608	22951	22927	10628	005174	35915	20545	32102
13950	01175	07656	22951	07842	10628	-05174	12704	04555	25183
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19956	18084	11767	13008	22127	18349	17407	22802	-02520	10037
21659	01868	12147	20734	27085	28534	21339	10244	02720	06476
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34864	28507	17673	12940	20572	77871	30039	18468	36541	17469
36134	33545	32148	29266	29266	28906	41337	29460	24606	20137
34496	56629	24840	19740	19740	28722	27896	16884	29212	29212
32609	16332	29370	16675	29020	19954	19497	41539	43950	48933
19106	27321	21839	13051	04859	77757	10737	26714	20169	20736
19772	09155	17595	30254	32552	29229	23790	08400	11638	19356
21974	36826	16482	06388	-01158	04606	13375	23790	23715	23026
61772	65763	62459	51733	37346	58892	36514	44749	60076	27569
59724	60465	66640	62070	61454	58817	61454	65521	60076	66041
77774	46451	61572	64707	56403	43274	60434	70344	72427	72427
66157	56619	65427	56053	55100	44179	56471	39218	53961	57518
								37361	35611

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48755	20651	39276	15156	20471	20094	20491	12691	24631	24267	998
12533	05439	10242	15288	07794	16137	33418	13042	13077	13113	.000
22205	22411	22670	29670	45356	45356	37447	30716	20576	37522	
33940	21904	31194	24745	18424	18272	57614	14396	31546	34970	
126432	23721	20011	10101	16640	15741	03926	07234	04454	16161	
184241	01142	10389	08043	12389	10471	24431	16809	07708	01708	
17047	15208	12637	22116	25815	35633	28982	28451	34352	23166	
37020	19002	12958	07387	12100	10561	11516	07045	06968	14936	
11742	21800	09329	08337	25034	33014	17977	21970	17952	09377	
27743	17533	21604	18921	21130	05745	15900	06400	14470	75447	
27791	24297	26456	23366	19817	23374	48773	43229	57751	47438	
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19430	20354	26464	26464	14594	12883	12883	21117	22568	22879	
13790	19036	09969	27054	20702	16924	16924	45147	60595	54069	
45786	54139	60936	30151	30117	43180	43180	22341	22276	14456	
28694	15572	22534	20561	13070	08995	15222	12789	08156	65578	
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34587	37524	33682	33682	32659	36252	36252	21091	08556	16885	
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37743	49439	35900	22626	50275	24299	24299	36763	24573	39398	
47936	64917	40385	29665	31075	31075	33826	45715	43772	43944	
46237	30899	27632	31807	47035	45522	33062	15811	17336	52420	
21062	27124	38757	48406	50261	47264	47264	40610	69940	42136	
11074	11074	2676	39189	50474	49653	47915	37274	38959	31547	
32369	22741	25076	24200	31617	23603	55824	34616	22359	22329	.000
40662	40662	39809	24361	40003	34820	39676	30019	27231	36274	
36259	21839	33874	33874	21202	09639	39676	22782	29331	19440	
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11465	14972	06288	17175	13504	13504	16403	17031	29686	29648	
40892	29662	42017	52489	60440	81420	108159	112210	117111	98942	
84406	73911	79847	84860	84263	81745	78398	77001	84074	83484	
73640	73640	96694	113322	113322	113322	113322	113322	82184	76464	
66753	71276	47920	42485	44877	30763	25126	17450	22940	44072	
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23153	11144	20721	31147	22274	10496	34116	43789	10613	24191	
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00919	02731	09317	10760	11521	18387	25916	42683	25863	51279	
33550	25955	44616	51107	50516	58861	46747	42665	46610	37730	
22206	36172	22501	21689	17928	20513	20513	23014	27789	37730	
33276	40046	40046	30281	26436	48932	34497	38797	31867	25622	
03345	22997	32644	35847	24900	36625	33277	49524	17172	18636	
00541	23745	23745	32697	10635	26120	22676	14959	02073	05467	
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66541	26594	19696	21648	24116	23361	19641	22644	22644	20846	
27677	19479	16265	19479	34381	24169	03784	03784	21972	83010	
226353	466339	40424	34295	31606	36065	31242	44505	26435	13467	.000

46436	55732	41126	46013	57703	52630	53635	59273	79816
64441	56944	69176	68951	43707	56734	73977	72962	87316
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1.61569	1.42921	1.29131	1.23426	1.17337	1.53360	1.66113	1.77650	1.75433
1.68046	1.62507	1.61361	1.55397	1.54576	1.58976	1.61444	1.61033	1.76285
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18487	25445	25445	0.3829	23111	16379	18921	47221	37281
23683	36789	36789	39043	35079	12681	13729	20341	18041
15768	08204	21990	15131	19931	15042	04537	24509	25821
10760	01109	17958	16441	08493	06101	25753	25753	16653
15072	47746	31959	26689	20821	11069	15246	15246	15246
45420	45420	66671	57908	74084	74485	48327	31134	14690
08989	22280	22136	69336	01412	09279	00306	00306	00498
02762	05663	00304	01557	00431	07666	26861	35335	36836
38556	19470	06624	18907	14408	33634	16470	29942	25842
18995	10619	30839	16770	12938	22135	22085	10971	16498
15074	19299	10330	10269	16382	31673	38547	45663	64340
136947	176525	1.17432	34999	29716	29626	17230	23707	23599
34539	45145	56737	79510	94138	1.21182	1.57239	1.19440	42985
23525	44270	46712	45005	46122	25122	30746	36674	30465
13959	13959	18861	13098	22432	33335	77798	34068	10729
04554	01461	43862	04534	24859	11269	07815	36358	34722
45529	51095	52462	51431	39949	32448	50050	70441	49950
51597	64527	72399	63641	68799	76033	93960	99863	1.07706
64655	72147	42519	35853	08938	11765	20613	27237	35633
39437	40146	21736	31015	16468	09032	17674	10397	09731
01051	10701	30717	23799	18593	23001	41752	28143	10203
28869	33499	25807	28286	21819	50964	65229	91153	60529
57626	43796	46766	42780	52802	23897	19900	28194	14473
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44317	27003	34548	23414	29769	21323	11170	15093	15093
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210

2300

2400

2500

2600

2800

2850

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43583	57818	35391	38903	37203	34815	44375	44375	39373	39373
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17585	02793	06817	21203	04417	02042	02042	025904	06142	05024
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48810	48247	36525	31157	24603	26934	25675	21082	33103	28718
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29570	17641	21459	19241	29111	20993	09266	04651	14316	08592
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19885	12414	21023	27441	15800	27517	18532	23233	26601	26337
29928	31736	21838	19543	24839	22074	31820	14014	11021	03997
15474	01653	19396	32710	27648	00873	17822	13549	13568	09037
22889	28508	23229	33639	30740	22714	20467	14131	00587	09474
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16832	18776	24774	20756	18920	48014	29393	02364	02395	07418
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22500	22500	24517	24839	06001	11816	20706	30520	23696	23696
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44c

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18149	16475	24062	14212	14212	12678	24346	09264	04971	12339
00937	02565	11134	13286	03480	09859	00879	12143	08233	19076
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09760	01172	16377	12040	12040	18976	21202	21485	30242	19931
24827	29566	16926	20400	18773	31605	10586	22629	11022	18728
42936	11326	12531	14367	14367	10779	17259	24303	24303	31187
42375	49377	39227	47640	39071	47346	44706	52653	47767	46983
56172	56048	50302	62021	71136	80636	71532	89774	78400	82603
08546	109450	85564	76245	59837	63993	60267	60531	53324	46357
55932	51057	53775	39401	36249	38561	43271	48214	56235	62699
171488	73184	79894	87033	11569	100680	104193	115316	120123	115805
152723	131103	1122569	102745	102745	62992	67485	62123	45289	46588
52250	33081	14444	15030	27590	28349	25275	45216	42577	47804
31788	36006	26839	26431	11102	36638	22307	15634	15945	19811
15184	11744	08273	09707	50574	51079	10420	08217	13111	20073
20244	22862	30095	41035	65002	52698	50359	82571	104568	108101
122892	121806	105023	104675	104675	77740	95134	97454	88661	98047
106932	105337	106380	103727	95835	90033	101038	95824	83547	77989
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31788	14591	011276	22903	07709	24377	01412	01264	04818	05749
03670	11609	25660	05845	04057	18753	26139	17923	46919	60662
08980	58309	35021	32618	19077	10061	03190	02355	04202	00368
02813	03351	15249	00103	12551	05924	02303	15370	06760	05429
08551	08405	15024	49926	36864	17994	13625	15322	08700	04541
02440	21356	12958	18354	24983	28731	24759	26913	36524	37494
14431	05142	02147	03168	04746	01576	08940	01071	02846	12040
03581	11110	17037	02113	07113	01874	03254	03224	08699	01176
00929	06490	01464	09522	15674	00698	00698	08914	09260	06850
06232	04582	21506	27665	07032	05507	03396	03510	24088	06659
02982	02037	15504	09838	20331	10900	22846	08635	01759	00888
12946	15049	09877	04149	11139	04435	05604	15166	11588	07890
03363	00295	00625	11218	14784	28184	24401	23942	52637	72762
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08667	08772	06847	11809	18517	11285	33216	15445	25414	07318
03961	17111	22640	13203	17133	19337	09617	28069	20090	23678
26025	19504	13216	08145	00238	26150	25541	35134	30642	19166
41369	30182	32706	18319	26734	01121	16628	05618	25291	35848
22758	18658	14311	26906	23229	25982	17121	19584	12066	14429
25473	11761	17734	24173	12821	25939	42106	17055	31103	29446
34731	24719	41338	59244	55682	15130	13913	30292	20223	20283
30434	34934	29328	53697	18414	60331	55966	45131	45114	59825
27962	30948	41485	33714	20373	41172	32008	45200	29450	35226
37078	17436	39536	52146	116285	26586	30756	10803	29786	14015
07671	11785	08170	06741	131284	131009	67146	24291	10645	16937
12514	00952	03280	112756	05025	09127	02513	13161	23207	02691
11625	24319	49279	82431	105720	122635	76589	63057	10647	29445
44963	44060	27594	41898	54105	08038	54977	52755	33015	33015
52500	56952	50737	64175	59618	51940	57720	64205	51859	67228
53584	09951	12842	50438	52235	51212	63150	64205	51454	45669
127312	145038	146604	152444	152444	143710	155790	54133	17424	105225
108053	09788	02380	76745	76745	09790	67542	64037	13204	103709
									76816

AMPLITUDE LIST FOR APPROPRIATE SUBROUTINE:

TAPE ID: RADIALS 672777
CALL NC. 2

REC660

9979 DATA POINTS

BEGIN AT 1
END AT 9980

MORSE 1.47 METERS/DATA POINT
SEPTIM 75.0 SECONDS
GROUNDSPEED 190.0 KNOTS

VERTICAL SCALE 12-192 METERS (ALREADY APPLIED)

VII) VALUES ARE

-09169	-01041	-05623	-04911	-09053	-15026	-01824	-14567
-15102	-117035	-08775	-06128	-12215	-08982	-17645	-16997
-06883	-110443	-08050	-16189	-01107	-07065	-06025	-09243
-12109	-03042	-02199	-01051	-06837	-07151	-04783	-01030
-02162	-19966	-26052	-26052	-29718	-20088	-26421	-13967
-29796	-19426	-00194	-11515	-05425	-10775	-06926	-05435
-01284	-03020	-04993	-05553	-03565	-00745	-04138	-1-235
-05191	-02525	-08982	-02312	-21288	-17513	-01132	-01899
-11258	-24522	-21059	-16124	-21367	-24743	-16832	-07953
-09144	-13149	-20470	-27487	-22717	-25800	-24628	-18688 /00
-03974	-15328	-12516	-07645	-08066	-22063	-18142	-07266
-13198	-16671	-10360	-28630	-00061	-12618	-13276	-05861
-16959	-22102	-31933	-30621	-05190	-18904	-16294	-22955
-22846	-20436	-04985	-20749	-11611	-29214	-14634	-14226
-10273	-11326	-02727	-23933	-30213	-12081	-12081	-10891
-05310	-05830	-30860	-19567	-15321	-12745	-00825	-08047
-05148	-05904	-24992	-01745	-01885	-01623	-03718	-03718
-04152	-16258	-10598	-05034	-04992	-00392	-19506	-21326
-02857	-21097	-22689	-04755	-09514	-03704	-11316	-13121
-14694	-02729	-08055	-06124	-00622	-07121	-14352	-11812 /00
-18725	-16812	-22359	-27431	-38713	-34662	-22572	-34973
-34802	-04501	-38793	-31171	-44469	-54257	-58740	-48500
-51586	-62225	-92944	-89116	-88902	-01847	-116950	-1-27625
-126106	-117908	-121407	-105830	-110122	-106423	-119069	-1-16226
-117621	-124233	-142191	-143448	-143293	-151012	-152371	-1-45074
-136124	-129093	-140098	-140274	-142244	-142985	-149132	-1-56644
-150065	-174104	-172524	-171290	-166836	-175510	-183824	-1-79381
-175987	-169444	-172236	-187228	-165221	-185606	-204267	-1-99532
-192728	-185340	-207793	-200954	-199088	-194777	-190874	-2-00006
-196654	-204349	-207213	-200407	-200459	-183222	-262224	-37323 /00
-111727	-01118	-13770	-25914	-49981	-61774	-73473	-74986
-08019	-64317	-56214	-52024	-47881	-43448	-38248	-34153
-29453	-19827	-09965	-09664	-00891	-06262	-11711	-11711
-24502	-19041	-19949	-17151	-15924	-18244	-171031	-1-70353
-16712	-16074	-14793	-171995	-190220	-156405	-156670	-1-48006
-089262	-164762	-149850	-144379	-136833	-137761	-138163	-1-38798
-136045	-143567	-127094	-128932	-116720	-112820	-98564	-96026
-91004	-83184	-92835	-87595	-82941	-73815	-71286	-71286
-74544	-64711	-60374	-58688	-59445	-60840	-57278	-25472
-31476	-18864	-14674	-14074	-93725	-58694	-57085	-51636 /00
-18444	-15494	-14304	-14304	-75235	-59273	-50241	-28300 /00

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11147	14664	14622	16777	09916	02198	160
11148	12669	12652	29374	34471	04334	
11149	06240	06240	21316	12322	16794	
11150	09995	09995	17699	12663	15435	1600
11151	09152	09152	12937	11228	14556	1600
11152	16753	16753	14183	17549	05690	
11153	23002	23002	23743	28240	21789	
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11155	20688	18945	39627	37776	28738	
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11158	28867	11159	11159	23905	21690	
11159	16162	04582	27244	12189	15982	
11160	07521	54271	54271	51004	57096	
11161	54735	49055	49055	25002	28556	
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11163	60001	44000	48000	51335	55796	
11164	65933	52736	48000	51335	55796	
11165	30996	46271	44219	46415	51668	
11166	60644	40479	17858	10227	44900	
11167	12215	45910	22009	22165	13716	
11168	10208	09014	06045	15756	11643	
11169	16049	46249	52098	49034	30677	
11170	43408	00210	07908	01949	09469	
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11173	33585	37568	54535	60985	72723	1800
11174	59106	61870	62655	48931	49093	
11175	66465	67141	54586	54724	51663	
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11177	23834	15701	17872	14293	03479	
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11181	96390	11724	91640	77011	74640	
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11184	44720	37214	53071	43841	37728	
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11187	19555	01208	20148	59357	50556	
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144805	95278	79384	72080	73940	64840	48946	57321	54317	48394
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24894	14806	27296	34145	34150	33221	31578	29386	20616	12660
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17033	02705	05440	02008	18881	09656	15780	06670	29830	21958
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16640	13249	18436	25395	29511	33304	33977	49752	36915	32573
15575	26313	15098	19733	04038	03327	19522	18786	26839	25364
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34722	23833	27252	34015	24482	35406	21434	29276	38107	34188
29085	16569	50286	54348	55534	40864	64894	59577	52776	58554
61339	72772	80664	73042	54617	50208	33509	40604	27845	4355
37013	22307	29251	35699	31360	36948	24391	31614	26254	23798
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14518	16877	11561	06298	06146	14452	01440	17184	10245	18594
33921	30599	24228	26842	29781	31940	21105	11229	11229	19183
19641	23930	23004	19715	27459	38856	36647	16742	48636	40931
47125	45170	32761	36994	35341	40070	19566	25608	43656	34327
44377	26547	26876	28970	33717	33772	46355	34709	25516	39045
19163	22398	15914	26939	26334	35834	47529	42841	42841	45747
67674	83301	71192	60977	50471	40105	43224	33615	30985	35278
27584	35080	24848	42138	43474	52043	32337	22144	10775	14897
05229	20887	19851	28203	27993	26201	34286	50056	38367	31056
43175	28429	27729	21379	19539	14238	17056	32082	15282	12371
12712	01998	04930	06418	12250	14978	14978	14978	14701	16518
25538	24034	21467	17243	14869	29870	30546	26699	17447	26354
21639	00499	04499	20148	22645	07379	12309	05782	14710	11651
00443	00359	02173	02788	02732	09252	23189	23448	28980	29761
24476	31010	01358	15414	10471	26170	15738	17673	15738	18811
4296	09769	04274	12624	09544	06244	10618	09317	11722	08514
37148	07152	20437	2464	20051	28016	25988	36252	28328	19502

19410	00061	05390	02981	09272	14642	23444	01762	14224
00080	20861	02975	29941	08962	11551	10510	14159	06446
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02753	02121	05837	05422	05422	04222	04222	04222	04222
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06069	10044	10044	10044	10044	10044	10044	10044	08251
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02625	08997	08997	08997	08997	08997	08997	08997	03249
227036	26501	26501	26501	26501	26501	26501	26501	03249
04902	03643	03643	03643	03643	03643	03643	03643	03249
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02010	02453	02453	02453	02453	02453	02453	02453	03249
06758	07398	07398	07398	07398	07398	07398	07398	03249
07429	09363	09363	09363	09363	09363	09363	09363	03249
08103	05032	05032	05032	05032	05032	05032	05032	03249
07167	05250	05250	05250	05250	05250	05250	05250	03249
08174	108472	108472	108472	108472	108472	108472	108472	03249
249144	165070	165070	165070	165070	165070	165070	165070	03249
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08254	05037	05037	05037	05037	05037	05037	05037	03249
08237	03789	03789	03789	03789	03789	03789	03789	03249
02136	04885	04885	04885	04885	04885	04885	04885	03249
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02777	00522	00522	00522	00522	00522	00522	00522	03249
00779	00175	00175	00175	00175	00175	00175	00175	03249
02618	14718	14718	14718	14718	14718	14718	14718	03249
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07862	05145	05145	05145	05145	05145	05145	05145	03249
02746	03258	03258	03258	03258	03258	03258	03258	03249
06876	04973	04973	04973	04973	04973	04973	04973	03249
00038	00061	00061	00061	00061	00061	00061	00061	03249
06385	06267	06267	06267	06267	06267	06267	06267	03249
07198	05799	05799	05799	05799	05799	05799	05799	03249
03731	06588	06588	06588	06588	06588	06588	06588	03249
00692	02453	02453	02453	02453	02453	02453	02453	03249
02832	05743	05743	05743	05743	05743	05743	05743	03249
04002	02439	02439	02439	02439	02439	02439	02439	03249
05001	04263	04263	04263	04263	04263	04263	04263	03249
04885	03227	03227	03227	03227	03227	03227	03227	03249
08965	04984	04984	04984	04984	04984	04984	04984	03249
09285	03376	03376	03376	03376	03376	03376	03376	03249
01459	05215	05215	05215	05215	05215	05215	05215	03249
08109	03603	03603	03603	03603	03603	03603	03603	03249
02393	03184	03184	03184	03184	03184	03184	03184	03249
00016	15859	15859	15859	15859	15859	15859	15859	03249
11158	12921	12921	12921	12921	12921	12921	12921	03249
04692	10537	10537	10537	10537	10537	10537	10537	03249
05361	06746	06746	06746	06746	06746	06746	06746	03249
03704	05361	05361	05361	05361	05361	05361	05361	03249
03704	019369	019369	019369	019369	019369	019369	019369	03249

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.42920	.48902	.38592	.23988	.32886	.20836	.21290	.23064	-.04777	-.11766
-.06671	-.02270	.03410	.01072	-.06117	.07172	.00232	-.03464	.09614	-.07469
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.20802	.26595	.13614	.23910	.19819	.13865	.30618	.20628	.35010	.73990
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.17242	.16446	.20269	.20269	.22746	.40200	.14276	.09687	.01173	.11270

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11991	11992	11993	11994	11995	11996	11997	11998	11999	12000

1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775	1776	1777	1778	1779	1780	1781	1782	1783	1784	1785	1786	1787	1788	1789	1790	1791	1792	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and accountability in the financial process.

2. The second section details the various methods used for data collection and analysis. It highlights the use of statistical software to process large volumes of information efficiently. The results of these analyses are used to identify trends and make informed decisions.

3. The third part of the document focuses on the implementation of new technologies. It describes how modern tools have improved the speed and accuracy of data processing. This has led to significant cost savings and increased productivity.

4. The fourth section addresses the challenges faced in the current market environment. It discusses the impact of economic fluctuations and the need for flexible strategies. The document provides insights into how organizations can adapt to these changes.

5. The fifth part of the document outlines the future prospects of the industry. It predicts continued growth and innovation, driven by technological advancements and changing consumer preferences. It also identifies key areas for investment and research.

6. The sixth section discusses the role of human resources in the organization. It emphasizes the importance of a skilled and motivated workforce. The document provides guidelines for recruitment, training, and performance management.

7. The seventh part of the document covers the legal and regulatory aspects of the business. It highlights the need for compliance with various laws and regulations. It also discusses the importance of maintaining up-to-date legal counsel.

8. The eighth section of the document focuses on the financial performance of the organization. It provides a detailed analysis of the income statement, balance sheet, and cash flow. It also includes key financial ratios and indicators.

9. The ninth part of the document discusses the environmental and social responsibilities of the organization. It highlights the importance of sustainable practices and ethical conduct. The document provides a framework for measuring and reporting on these aspects.

10. The final part of the document provides a summary of the key findings and recommendations. It reiterates the importance of continuous improvement and innovation. It also provides a clear path forward for the organization.

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1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice.

2. The second part of the document outlines the procedures for handling discrepancies between the books and the actual cash on hand. It states that any variance must be investigated immediately and the cause identified.

3. The third part of the document describes the process of reconciling the bank statements with the company's records. It notes that this should be done at the end of each month to ensure that the bank balance matches the book balance.

4. The fourth part of the document discusses the need for regular audits to ensure the integrity of the financial data. It suggests that an independent auditor should be engaged to review the books annually.

5. The fifth part of the document provides a summary of the key points discussed and offers some final thoughts on the importance of sound financial management.



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01394	1117	6416	2770	1475	164	1828	434	1305	29517
02941	3156	6456	4125	3614	3476	1671	4017	1743	25150
2776	3174	1743	1743	474	6476	25236	3537	3673	18014
3358	4182	2373	2471	2452	2787	4312	1167	20651	
2756	3885	2816	2816	4724	6354	30415	2720	2233	19618
2313	2543	2543	1153	1153	1153	2618	3084	27205	
3734	1783	3346	268	268	1968	2057	2434	18009	
5814	1512	13516	1114	1114	2256	1716	3546	18257	
2342	3171	2437	4274	1372	4274	2776	2776	27255	
3667	3351	366	3351	2011	1483	1596	3293	26155	
1866	282	282	2627	2627	2185	2314	3047	1841	
2826	3317	2626	2626	2317	2473	2836	3047	19024	100
1721	1721	2826	2826	3151	3151	1712	1712	1246	
2953	1643	2324	2282	1929	2562	3124	1530	2735	
1549	212	1531	1671	287	2134	4368	2301	2225	
1173	2814	2073	2422	0477	2033	2684	2590	2220	
2252	1554	671	1125	767	426	676	1982	1845	
3131	0337	1976	1214	2744	2426	2261	1363	1089	
2775	285	2238	3316	571	2654	9533	3401	1675	
1040	4157	3627	4229	447	447	447	3339	2573	
3714	3314	2321	1372	1875	3258	3218	4335	5829	
1537	2127	2321	5162	2634	2156	1767	3708	2476	
2431	5753	542	4465	6413	7187	4768	5116	5620	100
6634	3474	2764	4465	245	2460	5725	5157	3351	
1721	1721	1568	1384	1875	1881	1452	1710	2451	
2847	6271	6683	1195	233	6665	0713	2951	1494	
4133	2687	4466	2216	2377	1881	1452	2718	2125	
1161	0892	6933	2185	43	1682	083	2484	16310	
2345	2874	4482	2185	1277	1472	1472	1472	2726	
1858	2181	1957	2214	1861	1839	3258	2754	3037	
2248	4028	1033	2962	176	1363	3367	3767	2361	
2856	1525	1164	1278	184	082	1077	2314	2382	
1458	1655	3186	1508	2785	2814	3206	3186	1646	100
5417	4425	5242	6715	6268	5473	7825	5656	2610	
1874	1744	1162	2280	5616	5473	6402	5656	2610	
1576	2457	2174	0212	0212	2285	2315	14476	18500	
1421	0832	1358	3315	792	1726	2747	2776	2041	
2104	2372	5772	4934	4738	4617	4254	4168	1646	100
1848	2372	2284	2575	6812	3825	636	3284	3583	
1617	1818	1531	1664	0913	1946	077	1176	1314	
1334	1732	7232	1758	1982	1982	0524	0023	1298	100
1367	1767	1824	2327	2367	1782	2724	3034	1610	
2514	2976	1184	2187	7114	0185	1862	15516	20756	
2217	1684	0421	1327	1636	1386	281	10778	2515	
1637	1637	1567	1224	1467	1604	4238	2712	1660	
2374	4654	4654	0711	4116	5445	1303	5338	5331	
3876	5531	3366	3754	651	4224	5445	7218	2862	
1411	1411	3153	242	2124	2517	454	6134	7921	
3359	1724	6682	3956	296	398	2870	3256	1172	
1302	1648	1313	2636	1315	358	358	2405	1172	
1743	2434	3244	1570	5778	2201	2201	3027	9373	
7427	1812	15821	1755	2485	2285	2285	1745	1860	
2482	2756	2475	2437	2454	533	1551	1163	1060	100
2130	1636	1567	2437	224	2694	1870	2652	1706	
2374	2134	0254	2683	2747	2683	2015	2448	1977	
1121	2854	3224	4014	2812	4014	4631	4774	4631	
7662	7662	5124	5463	5511	6167	6585	36118	5463	100

11793	11794	11795	11796	11797	11798	11799	11800	11801	11802	11803	11804	11805	11806	11807	11808	11809	11810	11811	11812	11813	11814	11815	11816	11817	11818	11819	11820	11821	11822	11823	11824	11825	11826	11827	11828	11829	11830	11831	11832	11833	11834	11835	11836	11837	11838	11839	11840	11841	11842	11843	11844	11845	11846	11847	11848	11849	11850	11851	11852	11853	11854	11855	11856	11857	11858	11859	11860	11861	11862	11863	11864	11865	11866	11867	11868	11869	11870	11871	11872	11873	11874	11875	11876	11877	11878	11879	11880	11881	11882	11883	11884	11885	11886	11887	11888	11889	11890	11891	11892	11893	11894	11895	11896	11897	11898	11899	11900	11901	11902	11903	11904	11905	11906	11907	11908	11909	11910	11911	11912	11913	11914	11915	11916	11917	11918	11919	11920	11921	11922	11923	11924	11925	11926	11927	11928	11929	11930	11931	11932	11933	11934	11935	11936	11937	11938	11939	11940	11941	11942	11943	11944	11945	11946	11947	11948	11949	11950	11951	11952	11953	11954	11955	11956	11957	11958	11959	11960	11961	11962	11963	11964	11965	11966	11967	11968	11969	11970	11971	11972	11973	11974	11975	11976	11977	11978	11979	11980	11981	11982	11983	11984	11985	11986	11987	11988	11989	11990	11991	11992	11993	11994	11995	11996	11997	11998	11999	12000
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100576	19971	65951	91647	45567	44264	29044	27047	11176	230
17574	25994	10526	5135	26123	1212	4377	03257	0331F	
5021	5145	5427	1215	1436	26312	1730	14314	1730	
174	4714	16727	5364	12	1797	10645	21065	10645	
2984	2041	242	2402	2532	2197	74274	60464	74274	
5515	5516	2547	35247	28435	5324	2490	81448	36114	
44371	30244	27853	4831	85375	67813	5714	5714	45344	
2244	34284	6335	6343	49864	65874	62762	66044	27106	2200
15511	5267	1134	1134	5814	1322	1322	1450	2349	
1922	1725	1876	1725	2344	13016	05444	16445	16994	
1784	1154	1174	554	143	2744	0814	0814	2101	
118	16547	15247	16435	16435	20376	09755	11435	09755	
131	13740	18655	1457	6136	08147	08147	08147	08147	
1616	1037	2823	1137	743	4264	12662	07263	16801	
13441	0213	1414	11257	28314	28655	22855	14121	11777	
12714	14362	17854	1337	4212	8147	3304	2905	36700	
4917	31646	25327	26536	15554	1944	30327	03549	23282	
4026	41762	41762	4231	4257	4257	37567	21225	25347	3300
28423	28063	36664	27721	37444	25171	30647	30647	24639	
22376	2214	24637	16256	16564	16256	06277	17004	20324	
27173	3213	33545	2416	14466	2515	24237	23444	37126	
4014	2438	16164	2434	38278	44874	45568	28476	31514	
45435	33359	3633	3395	0278	44874	45568	36867	10214	
40161	33389	44134	31272	21324	16174	11059	11059	10214	
10273	2774	14330	191	22215	22215	07074	10382	09020	
22882	4378	13377	12557	23557	25406	01443	10104	14971	
2611	23782	12728	14931	1214	12564	23744	21762	34934	
43514	13556	11104	1186	4643	12617	23744	21762	34934	
48172	36337	36711	573	4643	12617	15728	15728	73144	2400
140272	156594	142694	142694	12628	130112	15648	15648	15648	
117431	13275	15527	42263	3278	6153	139512	139512	139512	
35764	85213	54766	58353	4278	4278	22124	22124	7434	
4248	4248	53671	5673	34975	34975	42324	42324	24889	
47215	44324	4256	4674	18806	3857	36346	1100	42324	
52495	53316	55876	5281	46678	46678	52168	28008	5958	
57548	53064	18447	33561	46678	46678	48101	49334	36710	
76038	8794	1511	21635	33561	7834	7804	82112	42352	
5557	13688	24761	1412	1561	1561	01924	27730	107555	
1241	19164	22120	22511	4632	15646	17580	07432	11212	2300
1747	22527	26246	24625	2633	1751	15162	19147	14980	
18132	52976	13147	11268	19226	2756	14325	26008	2137	
47633	127654	11453	11557	117163	11268	101047	101047	107022	
133408	137161	15537	15484	119375	11754	116074	120232	104504	
177164	14621	12244	14621	19375	20052	19375	19375	185547	
177732	145716	15733	15733	19374	17517	232766	232766	232766	
142432	18377	47335	4714	19374	17517	225263	28154	24741	
7722	75337	75337	346	5233	7525	77357	4614	27646	
6874	6675	6587	346	73124	36417	70614	70614	77646	
48284	57435	22782	2541	51517	37812	70614	70614	77646	
30478	42041	25552	1637	37812	37812	6574	6574	10041	2600
11584	512	44321	3135	37564	1566	18361	23432	21235	
7335	14755	13675	13675	3644	37564	18361	18361	27811	
10424	1932	21076	1777	1043	1043	33550	33550	52554	
29464	4213	55487	55487	58124	4128	37103	37103	23282	
4353	6554	6554	55487	58124	4128	36141	36141	5264	
2511	28734	28734	28734	46548	46548	46548	46548	37241	
6882	44436	44436	44436	4123	4123	37371	37371	45372	
				50505	50505	3016	3016	75411	2490

24874	26971	1 44	26015	12656	34522	27456	19214
13319	1547	2 567	3 48	36522	3283	27311	29376
3991	37721	76 11	3434	6 151	32269	27771	25671
37761	36721	24455	39257	17371	27377	27377	24593
39557	48441	5165	4667	46961	40426	49339	18729
2737	48471	24 57	32477	2637	40442	51004	7679
3313	47225	3 76	48351	47637	47220	34693	7194
38216	47175	3 76	36374	36564	43668	37746	32625
57565	64825	6 11	731	1 26	1 87855	1 71351	1 71351
59179	59437	6 197	58474	38402	44828	23024	23024
19845	22942	22525	11256	06512	43551	44180	74547
68131	4618	2822	22768	17561	03205	16740	16740
18659	6877	1137	4 212	26228	61661	56965	56965
22 46	22 46	1 73	13517	30454	23447	79742	1 10345
22395	163522	0523	9231	30112	1 40846	1 22313	1 08964
1 2484	1 1 925	67377	66322	66322	51174	65267	61275
75245	53237	5753	39266	52443	65529	1 56798	1 37860
4673	45333	5117	35282	57346	47772	37101	37880
37732	48574	423	39648	25483	36432	30658	19873
1 133	251 7	3251	11452	04522	05562	23052	17612
21323	11167	7281	11452	04632	27051	21753	63591
615 9	39695	7132	37594	78463	86345	54867	65324
58847	57826	466	60511	62364	67573	86974	66291
73459	37177	33267	16398	36488	62084	31368	33729
38454	21777	26214	34631	26244	26113	37604	21416
41167	33617	33617	31728	55959	28255	23335	20719
34841	27577	27 57	23758	23434	26732	30345	30345
454 9	43555	31 67	26438	12663	17468	15052	24584
15129	15129	12 79	19211	39167	11276	24982	27423
27820	2 673	248 7	21344	6 398	16841	36928	22461
18432	342 5	30 54	4247	27 34	27710	26607	26607
37119	17561	14264	21323	18144	23077	27925	17769
1 51	40171	2817	25144	13455	25653	16469	10355
16621	212 5	3 94	24577	18886	6697	09571	16709
23412	27544	24428	12264	1873	14613	1847	28124
17532	4 204	25 77	16995	129 4	04466	11766	20232
2 72	454	26 81	1537	55 8	30007	25368	25267
16552	31374	22 61	57335	55 8	1 974	23708	40570
58612	68767	47167	25627	87658	7729	92404	56586
16 17	16 17	167 4	2615	35 66	37591	43670	40484
35476	31546	3 78	5808	11757	11825	01512	00993
1 45	1 45	2677	1383	11489	16848	37189	10638
15472	4 55	1 988	7725	7725	15682	11135	11495
15424	246	11619	7476	15 4	02642	15530	11767
937	6947	1314	3767	15 4	16762	32029	65759
1375	14858	18767	22175	10637	07681	15530	101767
2245	12276	13445	15157	1414	02106	23473	20146
2 22	2 22	6814	17329	12446	21820	43729	27501
24843	22993	4 8	37687	15559	98271	21204	25864
127 4	2332	10213	7828	10555	24878	27728	27728
22177	22225	1147	44337	16786	29693	29693	71679
2 254	5 515	1711	17385	11564	21084	2087	2087
26837	2 276	24427	4 494	18568	29256	31137	23987
26452	33981	3524	28 76	28 76	16437	18048	18048
12342	244 3	10845	17517	17517	16310	16310	16673
3 419	1 4	2 13	2 13	26475	35530	35757	3663
21427	46171	3 14	326	1244	03326	11274	13357
27 17	11757	25 4	124	1244	22606	21332	26512

601-46	601-47	601-48	601-49	601-50	601-51	601-52	601-53	601-54	601-55	601-56	601-57	601-58	601-59	601-60	601-61	601-62	601-63	601-64	601-65	601-66	601-67	601-68	601-69	601-70	601-71	601-72	601-73	601-74	601-75	601-76	601-77	601-78	601-79	601-80	601-81	601-82	601-83	601-84	601-85	601-86	601-87	601-88	601-89	601-90	601-91	601-92	601-93	601-94	601-95	601-96	601-97	601-98	601-99	602-00																																																																																				
69862	69863	69864	69865	69866	69867	69868	69869	69870	69871	69872	69873	69874	69875	69876	69877	69878	69879	69880	69881	69882	69883	69884	69885	69886	69887	69888	69889	69890	69891	69892	69893	69894	69895	69896	69897	69898	69899	69900	69901	69902	69903	69904	69905	69906	69907	69908	69909	69910	69911	69912	69913	69914	69915	69916	69917	69918	69919	69920	69921	69922	69923	69924	69925	69926	69927	69928	69929	69930	69931	69932	69933	69934	69935	69936	69937	69938	69939	69940	69941	69942	69943	69944	69945	69946	69947	69948	69949	69950	69951	69952	69953	69954	69955	69956	69957	69958	69959	69960	69961	69962	69963	69964	69965	69966	69967	69968	69969	69970	69971	69972	69973	69974	69975	69976	69977	69978	69979	69980	69981	69982	69983	69984	69985	69986	69987	69988	69989	69990	69991	69992	69993	69994	69995	69996	69997	69998	69999	70000

APPENDIX B

SUMMARY OF PROFILE ANALYSIS

FILE 1 RECORD 2

ALPHEGAT CURRENT SPEED **190.0** KNOTS
 DATA POINT SPACING **1.5** METERS
 PRINTS 1-4979 (7.83 MFC)

STATION	STATISTICS OF COUNTEC HIRERS				# IN RANGE	#KMS
	HEIGHT	WIND	WAVE	WAVE		
1	1.07	75	1.71	1.49	71	1.15
2	1.71	66	1.94	1.46	72	1.51
3	1.65	53	1.87	1.92	77	1.96
4	1.19	69	1.94	1.88	79	1.34
5	1.47	51	1.91	2.27	81	1.89
6	1.84	62	1.86	2.10	75	1.82
7	1.63	47	1.97	2.67	77	1.74
8	1.56	62	1.81	1.83	90	1.94
9	1.73	57	1.84	2.24	89	1.68
10	1.46	64	1.85	2.24	91	1.55
11	1.71	51	1.85	2.24	85	1.68
12	1.92	64	1.86	1.84	92	1.89
13	1.71	64	1.71	1.64	85	1.84
14	1.7	54	1.82	1.72	94	1.82
15	1.76	51	1.86	1.89	85	1.82
16	1.82	59	1.84	1.75	86	1.85
17	1.11	61	1.87	1.76	97	1.71
18	1.73	64	1.88	1.89	86	1.78
19	1.54	57	1.86	1.89	84	1.65
20	1.57	63	1.87	1.86	84	1.69
21	1.57	63	1.87	1.86	84	1.69
22	1.57	63	1.87	1.86	84	1.69
23	1.57	63	1.87	1.86	84	1.69
24	1.57	63	1.87	1.86	84	1.69
25	1.57	63	1.87	1.86	84	1.69
26	1.57	63	1.87	1.86	84	1.69
27	1.57	63	1.87	1.86	84	1.69
28	1.57	63	1.87	1.86	84	1.69
29	1.57	63	1.87	1.86	84	1.69
30	1.57	63	1.87	1.86	84	1.69
31	1.57	63	1.87	1.86	84	1.69
32	1.57	63	1.87	1.86	84	1.69
33	1.57	63	1.87	1.86	84	1.69
34	1.57	63	1.87	1.86	84	1.69
35	1.57	63	1.87	1.86	84	1.69
36	1.57	63	1.87	1.86	84	1.69
37	1.57	63	1.87	1.86	84	1.69
38	1.57	63	1.87	1.86	84	1.69
39	1.57	63	1.87	1.86	84	1.69
40	1.57	63	1.87	1.86	84	1.69
41	1.57	63	1.87	1.86	84	1.69
42	1.57	63	1.87	1.86	84	1.69
43	1.57	63	1.87	1.86	84	1.69
44	1.57	63	1.87	1.86	84	1.69
45	1.57	63	1.87	1.86	84	1.69
46	1.57	63	1.87	1.86	84	1.69
47	1.57	63	1.87	1.86	84	1.69
48	1.57	63	1.87	1.86	84	1.69
49	1.57	63	1.87	1.86	84	1.69
50	1.57	63	1.87	1.86	84	1.69

PROFILE STATISTICS

MEAN	0.27	METERS
ROOT MEAN SQUARE	0.67	METERS
VARIANCE	0.23	METERS ²
STANDARD DEVIATION	0.48	METERS
SKEWNESS	2.63	
KURTOSIS	12.67	

ALPHEGAT SPEED 190.0 METERS AT 1.5

FILE 2 RECORD 1

AIRCRAFT GROUND SPEED 190.0 KNOTS
 DATA POINT SPACING 1.5 METERS
 POINTS 1-4979 (7.33 KMS)

STATISTICS OF COUNTED RIDGES

POSITION OF DATA POINT

#	Z(M)	I	E	M	Z(M)	I	E	M	#	Z(M)	I	E	M	#	Z(M)	I	E	M	#	Z(M)	I	E	M	#	Z(M)	I	E	M	#		
1	.56	14	.32	41	1.41	1984	2.92	81	1.48	3553	5.27																				
2	1.47	38	.56	42	1.46	2068	3.04	82	.58	3637	5.25																				
3	1.65	57	.38	43	1.04	2135	3.14	83	.95	3658	5.29																				
4	.32	60	.13	44	2.39	2206	3.25	84	.60	3674	5.41																				
5	.77	124	.18	45	.73	2247	3.31	85	.51	3684	5.44																				
6	.51	145	.21	46	2.47	2317	3.41	86	.50	3697	5.44																				
7	2.41	205	.31	47	.96	2379	3.50	87	1.88	3733	5.50																				
8	1.57	261	.38	48	1.24	2390	3.52	88	1.30	3792	5.58																				
9	.67	272	.40	49	1.39	2439	3.59	89	.63	3807	5.61																				
10	1.34	289	.43	50	.57	2453	3.61	90	.84	3836	5.65																				
11	.89	298	.44	51	1.49	2500	3.68	91	.97	3847	5.66																				
12	.44	300	.45	52	.96	2529	3.72	92	1.68	3857	5.68																				
13	1.32	321	.47	53	.86	2550	3.75	93	.86	3906	5.75																				
14	1.68	337	.50	54	1.71	2585	3.81	94	1.28	3927	5.76																				
15	1.35	365	.54	55	.66	2661	3.92	95	.59	4021	5.92																				
16	2.16	345	.56	56	.76	2684	3.95	96	.58	4042	5.95																				
17	.56	410	.60	57	.60	2718	4.00	97	.66	4068	5.99																				
18	.62	425	.64	58	.63	2720	4.00	98	.63	4078	6.00																				
19	.62	463	.67	59	.71	2725	4.01	99	.60	4089	6.02																				
20	.52	597	.88	60	.75	2731	4.02	100	.50	4113	6.06																				
21	1.43	721	1.06	61	2.23	2761	4.07	101	.56	4441	6.54																				
22	.60	883	1.30	62	2.68	2784	4.10	102	1.09	4542	6.69																				
23	.73	461	1.41	63	.88	2807	4.13	103	1.53	4571	6.73																				
24	1.14	1043	1.61	64	1.30	2853	4.20	104	.51	4606	6.78																				
25	.61	1173	1.73	65	.76	2869	4.22	105	1.23	4621	6.80																				
26	.61	1203	1.77	66	.73	2876	4.23	106	.61	4670	6.86																				
27	.82	1250	1.84	67	.66	2891	4.26	107	.77	4780	7.04																				
28	.60	1285	1.89	68	1.15	3006	4.43	108	.60	4866	7.16																				
29	.50	1295	1.91	69	1.18	3024	4.45	109	1.31	4896	7.21																				
30	.56	1307	1.92	70	.68	3046	4.48	110	1.23	4926	7.25																				
31	.54	1336	1.97	71	1.08	3061	4.51	111	1.57	4955	7.31																				
32	1.32	1349	2.00	72	.87	3093	4.55	112	.50																						
33	.59	1436	2.11	73	.77	3114	4.58	113	.50																						
34	1.04	1601	2.36	74	.54	3160	4.65	114	.60																						
35	.57	1683	2.49	75	1.21	3176	4.68	115	.60																						
36	1.77	1742	2.56	76	.66	3197	4.71	116	.60																						
37	1.57	1759	2.59	77	.58	3253	4.79	117	.50																						
38	.77	1778	2.62	78	.77	3275	4.82	118	.60																						
39	1.08	1810	2.66	79	.54	3311	4.87	119	.60																						
40	.92	1849	2.72	80	.52	3524	5.19	120	.60																						

HIGHEST RIDGE 1.91 METERS AT 1.5 ZOP

STATISTICS OF COUNTED RIDGES
 HEIGHT RANGE (M) # IN RANGE #/KM
 .5 < Z < .8 50 6.8
 .8 < Z < 1.1 24 3.3
 1.1 < Z < 1.4 14 1.9
 1.4 < Z < 1.7 10 1.4
 1.7 < Z < 2.0 7 1.1
 2.0 < Z < 2.3 2 .3
 2.3 < Z < 2.6 2 .3
 2.6 < Z < 2.9 1 .1
 2.9 < Z < 3.2 1 .1
 3.2 < Z < 3.5 0 .0
 3.5 < Z < 3.8 0 .0
 3.8 < Z < 4.1 0 .0
 4.1 < Z < 4.4 0 .0
 4.4 < Z < 4.7 0 .0
 Z > 4.7 0 .0

ROOT MEAN SQUARE .41 METERS
 VARIANCE .14 METERS**2
 STANDARD DEVIATION .36 METERS
 SKEWNESS 2.60
 KURTOSIS 8.19

FILE 2 RECORD 2

AIRCRAFT GROUND SPEED 190.0 KNOTS
DATA POINT SPACING 1.5 METERS
POINTS 1-4979 1 7.33 MMSI

#	RANGES COUNTED (116)		2 = FLIGHT		I = POSITION OF DATA POINT		STATISTICS OF COUNTED RIDGES			
	Z(M)	I = KM	#	Z(M)	I = KM	#	Z(M)	I = KM	HEIGHT RANGE (M)	# IN RANGE
1	2.62	2.09	44	.58	2087	3657	41	.51	3602	5.30
2	.75	313	42	1.19	2101	3659	42	1.21	7655	5.38
3	2.26	331	40	1.25	2141	3614	43	1.24	3663	6.3
4	.75	476	44	.60	2156	3617	44	.70	3689	5.43
5	.62	503	46	1.45	2191	3623	45	.66	7703	5.45
6	.15	508	46	.54	2277	3625	46	.61	7710	5.46
7	.66	627	47	1.22	2355	3647	47	1.77	3728	5.49
8	1.47	711	49	.55	2345	3651	48	1.54	3746	5.52
9	.64	753	51	.51	2468	3662	49	.85	3801	5.60
10	.21	772	51	1.54	2506	3669	50	2.03	7851	5.67
11	.56	788	52	1.82	2636	3684	52	.54	7885	6.72
12	.51	922	53	.70	2656	3691	53	.70	3907	5.75
13	.34	943	54	.64	2666	3692	54	.51	7918	5.77
14	.62	1090	55	1.10	2679	3694	55	.64	7925	6.78
15	.53	1165	56	1.17	2699	3697	56	.57	7965	6.84
16	.52	1200	57	1.87	2774	4032	57	1.61	3982	5.86
17	.60	1260	58	.72	2799	412	58	2.26	4014	5.91
18	.51	1277	59	1.77	2846	419	59	1.13	4034	5.94
19	.72	1296	60	.67	2877	424	100	.96	4054	5.97
20	.80	1334	61	.51	2885	425	101	.77	4089	5.98
21	.59	1412	62	.53	2890	426	102	1.99	4083	6.01
22	.57	1426	63	1.33	2908	428	103	.88	4123	6.07
23	.70	1450	64	.81	3053	450	104	.69	4147	6.11
24	.69	1479	65	.83	3152	464	105	.67	4215	6.11
25	.82	1577	66	.57	3166	466	106	1.97	4365	6.43
26	.57	1600	67	.51	3170	468	107	1.55	4420	6.51
27	.74	1702	69	1.21	3317	488	108	1.99	4462	6.57
28	.76	1721	70	1.04	3354	494	110	.54	4580	6.75
29	.57	1731	71	.93	3361	495	111	.80	4621	6.80
30	.54	1763	72	2.61	3383	498	112	1.05	4646	6.84
31	.89	1816	73	.54	3402	502	112	.67	4711	6.94
32	1.17	1858	74	.74	3422	504	114	.67	4748	6.99
33	1.45	1927	75	.57	3434	506	115	1.76	4841	7.12
34	.62	1953	76	2.53	3476	511	116	.53	4937	7.27
35	.72	2005	77	.69	3511	517	117	.80		
36	1.01	2027	78	.93	3523	519	118	.70		
37	1.04	2044	79	.65	3573	526	119	.80		
38	.64	2165	80	.52	3583	528	120	.80		

PROFILE STATISTICS

MEAN	.40 METERS
ROOT MEAN SQUARE	.58 METERS
VARIANCE	.19 METERS ²
STANDARD DEVIATION	.47 METERS
SKEWNESS	2.46
KURTOSIS	4.75

HIGHEST RIDGE 4.66 METERS AT I = 399

FILE 2 RECORD 3

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FILE STATISTICS

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121 1.65 4935

122 3.05 4942

FILE 3 RECORD 1

AIRCRAFT GROUND SPEED 210.0 KNOTS
 DATA POINT SPACING 1.0 METERS
 POINTS 1- 4772 (8.10 HRS)

STATISTICS OF COUNTEE RANGES

POSITION OF DATA POINT

#	Z (M)	T (M)	R (M)	T (M)	R (M)	Z (M)	T (M)	R (M)	#	Z (M)	T (M)	R (M)	#
1	0.74	13	0.0	0.66	1455	2.27	81	0.74	2751	4.48			
2	0.62	32	0.05	0.75	1450	4.34	62	0.73	2745	4.51			
3	1.17	76	0.14	0.96	1542	2.51	65	1.11	2791	4.54			
4	0.76	104	0.2	0.73	1553	2.53	64	1.02	2748	4.55			
5	0.54	164	0.27	0.7	1544	2.59	65	0.72	2617	4.59			
6	0.56	253	0.42	0.83	1521	2.64	64	1.02	2637	4.52			
7	0.74	341	0.55	0.84	1526	2.65	67	1.22	2654	4.64			
8	0.57	513	0.83	0.83	1533	2.63	66	0.55	2378	4.59			
9	0.53	523	0.85	0.73	1442	2.67	64	0.50	2484	4.69			
10	0.7	541	0.69	0.67	1555	2.67	7	2.04	2705	4.73			
11	0.5	593	0.7	0.52	1536	2.75	71	1.48	2723	4.76			
12	0.53	62	0.71	0.54	1595	2.74	72	0.75	2752	4.71			
13	0.62	547	1.0	1.13	1881	3.26	73	0.75	2756	4.61			
14	1.21	65	1.7	0.9	1694	3.08	74	1.04	2383	4.84			
15	1.40	65	1.9	0.9	1472	3.21	75	1.46	2723	4.87			
16	1.01	74	1.3	0.82	2007	3.3	76	0.45	3	4.89			
17	0.64	724	1.10	1.1	2056	3.25	77	0.53	3	4.91			
18	0.44	764	1.21	0.83	21	3.43	76	1.6	3	4.93			
19	1.41	816	1.31	1.11	2114	3.44	74	0.73	3	4.94			
20	0.81	84	1.14	1.1	2122	3.45	1	0.74	3	4.94			
21	1.03	833	1.26	0.81	2135	3.47	1	1.03	314	5.11			
22	0.54	845	1.14	0.74	217	3.53	1	1.1	3149	5.12			
23	0.57	84	1.47	0.9	2177	3.54	1	0.9	3172	5.16			
24	1.07	837	1.5	0.9	2176	3.57	1	0.2	3181	5.18			
25	0.5	878	1.59	0.8	235	3.52	1	0.5	321	5.37			
26	0.55	877	1.56	0.8	2412	3.42	1	0.71	3319	5.40			
27	0.51	104	1.66	0.87	2451	3.49	1	1.08	3344	5.45			
28	0.61	104	1.67	0.8	2451	4.0	1	0.7	3374	5.52			
29	0.74	104	1.71	0.8	249	4.03	1	1.08	342	5.54			
30	0.97	1164	1.8	1.0	249	4.05	1	1.04	3424	5.58			
31	0.51	1184	1.92	1.1	2549	4.14	1	0.8	349	5.68			
32	0.54	124	1.95	1.0	2545	4.21	1	0.52	3498	5.69			
33	0.81	124	1.97	1.0	2549	4.23	1	0.52	3514	5.72			
34	0.5	1214	1.94	1.0	251	4.25	1	0.71	3531	5.71			
35	0.9	1317	2.16	1.0	2614	4.25	1	0.7	3536	5.72			
36	0.74	1314	2.14	1.0	2614	4.31	1	0.56	3543	5.73			
37	0.5	1344	2.31	0.9	2641	4.36	1	0.6	3543	5.74			
38	0.67	1374	2.24	0.9	2645	4.34	1	0.7	3551	5.76			
39	0.53	144	2.34	0.82	27	4.44	1	0.74	357	6.0			
40	0.71	1444	2.37	1.0	2743	4.44	1	0.74	4176	6.04			

PROFILE STATISTICS

MEAN 0.75 METERS
 ROOT MEAN SQUARE 0.36 METERS
 VARIANCE 0.00 METERS²
 STANDARD DEVIATION 0.10 METERS
 SKWENESS 2.02
 KURTOSIS 10.03

HIGHEST HILLS 1.00 METERS AT T = 0.59

#	Z (M)	T (M)	R (M)	Z (M)	T (M)	R (M)	#	Z (M)	T (M)	R (M)
121	0.54	4215	6.858	0.51	4371	7.030	131	1.06	4413	7.180
122	0.65	4226	6.876	1.84	4355	7.086	132	0.63	4457	7.252
123	1.38	4280	6.964	1.06	4362	7.097	133	1.24	4465	7.265
124	0.92	4286	6.973	1.05	4367	7.138	134	0.60	4504	7.328
125	1.32	4290	6.980	1.55	4395	7.151	135	0.51	4543	7.391
							136	0.90	4589	7.466
							137	0.81	4634	7.540

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20 ABSTRACT (Continue on reverse side if necessary and identify by block number) This technical note reports the results of reduction and preliminary analysis of airborne-laser sea-ice surface profiles obtained in April 1977, from Fram Strait between northern Greenland and Spitzbergen. Data reduction consists of the removal of discontinuities in the profiles, and numerical computer filtering to remove aircraft motion. Analysis consists of computer calculations of descriptive statistics. The data set chosen is in proximity to an ice camp (Ruby) operated by personnel from the Polar Research Laboratory, Santa Barbar			

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Santa Barbara, California. Aerial photographs taken simultaneously with the laser profiles serves to precisely place the profile data with respect to Camp Ruby on 12 April 1977.

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