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NSTL, Mississippi 39529-5004

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# Field Report: Oceanographic Conditions in the Iceland-Faeroe Frontal Zone, April 1988

JANICE D. BOYD  
Oceanography Division  
Ocean Science Directorate

GEORGE HEBURN  
Ocean Sensing and Prediction Division  
Ocean Science Directorate

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Iceland-Faeroe Frontal Zone, April 1988**

Janice D. Boyd  
George Heburn  
Naval Ocean Research and Development Activity  
NSTL, Mississippi 39529-5004 USA

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**ABSTRACT**

Between 21 - 27 April 1988, the Tactical Oceanography Project of the Naval Ocean Research and Development Activity (NORDA), provided near real time processing and analysis of environmental data acquired during the first phase of the NATO exercise RESOLUTE SUPPORT/PROUD RUNNER. This report assembles together the analysis results produced in the field to give an overview of the oceanographic conditions during the exercise. An assessment of the acoustic conditions encountered will be the subject of a later report.

**INTRODUCTION**

A Tactical Oceanography Center was established at the Royal Air Force Base at Machrihanish, Scotland, during the last two weeks of April 1988 to process and analyze in near real time the data obtained during the first phase of the NATO exercise RESOLUTE SUPPORT/PROUD RUNNER. Data collected by the various participating platforms were sent in naval message form to the communications center at Machrihanish, the air operations center for NATO and US Navy air elements of the exercise. The data were entered into the Tactical Oceanography Center's database and processed to yield oceanographic and acoustic analyses and predictions in direct support of the air and shipboard units of the exercise.

The members of the Center included the Tactical Oceanography Team from NORDA, headed by Dr. George Heburn; the Harvard University Open Ocean Modeling Team,

headed by Dr. Don Denbow; and the Remote Sensing Team under the leadership of Mr. C. Brownsword from the Royal Aircraft Establishment. The NORDA and Harvard contingents arrived on 19 April. The computer systems were set up and data processing begun on 20 April. To support the Harvard Open Ocean Model, a series of three gridded AXBT (air deployed expendable bathythermograph) flights were flown by operational P-3C aircraft from NAS Keflavik, Iceland: one on 18 - 19 April, immediately before commencement of the exercise, one during the exercise on 23 April, and a final flight on 28 April. These data, along with the AXBT/XBT data from the RESOLUTE SUPPORT aircraft and ships, formed the database for the analyses and predictions performed during the period 21 - 27 April. The two research teams from NORDA and Harvard departed RAF Machrihanish on 28 April.

Five hundred XBT and AXBT observations were received and processed during the exercise and are the subject of this Field Report. Many of the Figures presented here were produced at the Tactical Oceanography Center, although some data from the latter part of the time period came in too late to be processed before the teams had to depart, and these Figures were produced later after the NORDA contingent had returned to Mississippi. After the initial grid of AXBT data was analysed and the first Harvard Open Ocean Model forecast was run, the location of the Iceland-Faeroe Front was digitized and sent to the NATO chief scientist so that he could modify the deployment of the ship components if necessary to maximize the data collection effort to achieve the exercise goals. Throughout the exercise, analyses were provided to the air components based in Machrihanish so that they could make last minute adjustments to their observational plans.

## OCEANOGRAPHIC CONDITIONS, 17 - 28 APRIL 1988

A listing of positions and times of all data entered into the Tactical Oceanography Center database is included in Table 1. The database included all data received by the communications center through noon of 27 April. Plots of the station locations by day from 16 through 28 April are given in Figs. 1 - 13. This data is available on an IBM PC/AT compatible diskette through the senior author of this report.

To put the later analyses in perspective, temperature contours at various depths over the exercise area from the US Navy standard climatological database GDEM (Generalized Digital Environmental Model) are presented in Figs. 14 - 19. Not surprisingly, since the database is on a one-half degree grid and is composed of data taken over a number of different years, the intensity of the Iceland-Faeroe Front appears rather weak, although the Front (defined as the line of maximum horizontal temperature gradient) can be identified and is seen to slope down with depth to the southwest. The weaker temperature gradients at the surface than at, say, 50 m, are due to the usual development over this time period (April - June) of a surface mixed layer.

Figs. 20 - 26 are isotherm contours characterizing the study area around the time of the first gridded AXBT flight on 18 - 19 April. The analyzed dataset includes all data in the database from the day before and through the day after the gridded flight took place;

that is, from 17 - 20 April. Fig. 20 shows the temperature field at 0 m with the data positions superimposed, while Figs. 21 - 26 show only the temperature fields at 0, 50, 100, 200, 250, and 300 m.

The Figures show a northward bulge of the Front along  $11^{\circ}\text{W}$ , similar to features reported in earlier years, including during May of 1987 (Smart, 1984; Boyd, et al, 1987). The Front then appears to push southward around  $10^{\circ}\text{W}$ . The southward protrusion is very distinct with depth, leaving the impression of a penetration of colder, fresher Arctic waters from the East Icelandic Current over the Iceland-Faeroe Ridge and into the warmer, saltier Atlantic water of the Irminger Current which flows westward south of Iceland. Such overflows are known to happen episodically and a similar loop was observed during the same time frame the previous year. It may be that the loop is the reflection of one of these overflow events, perhaps related to the production of cold, deep water in the Norwegian and Iceland Seas during the previous winter.

Some idea of the subsurface characteristics during this time period may be obtained by examining vertical temperature transects through the area. Fig. 27 illustrates the location of two such transects. The first transect, shown in Fig. 28, extends along  $9^{\circ}\text{W}$  from  $63^{\circ}\text{N}$  to  $65^{\circ} 30'\text{N}$ , and utilized only AXBT data from the first gridded flight. The Front shows quite clearly between the ranges of 40 - 80 nmi, as well as the subsurface upwelling of cold water to the north of the front which may be associated with deep water overflow over the Iceland-Faeroe Ridge. Below about 50 m the front slopes downward to the south.

The second transect extends through the data rich region between  $63^{\circ}\text{N}$ ,  $12^{\circ}\text{W}$  and  $65^{\circ} 30' \text{N}$ ,  $8^{\circ}\text{W}$  (Figs. 27 and 29). An upwelling of relatively cold water is observed both south of the Front and north of the Front. In addition, the Front is much more narrowly defined in this transect because of the much greater data density, and in this location it appears to be nearly vertical - at least, down to 300 m.

As a final comment, note that the GDEM climatology does not represent the data very well at all; this will have implications for any acoustic predictions based upon climatology. The climatology does show, however, something of a northward protrusion of the Front along  $11^{\circ}\text{W}$  which may reflect the average of occasional similar events over a number of years.

Figs. 30 - 36 present the horizontal temperature contours at various depths produced from the data in the database for 22 - 24 April, centered around the second gridded AXBT flight. This is by far the most extensive dataset and the Figures show considerable small scale, unrolled structure in the temperature field south of the Front (west of  $9^{\circ}\text{W}$  and south of  $64^{\circ}\text{N}$ ). Perhaps the colder waters from the north have protruded further southward since the 17 - 20 April dataset, but the data distribution is inadequate to resolve this question. Certainly no major changes occurred in the oceanographic environment over this one week time period.

Two vertical temperature transects were produced along much the same tracks as for the earlier dataset (see Fig. 37 for transect locations). The first transect, along  $9^{\circ}\text{W}$  (Fig. 38), shows much more structure than Fig. 28 because of the much greater data density. The Front appears in two sections: one around the 75 nmi range which penetrates to the

surface, and one around the 35 nmi range which is well defined only up to about 100 m. Above that depth the isotherms merge with the more northerly portion of the Front. Relatively cold water is observed to the north of the Front and between the two separate sections of the Front. We can't say from the data whether this division of the Front into a surface and a subsurface portion existed in the 18 April time frame or not; the earlier data density was probably not great enough.

The second transect (Figs. 37 and 39) shows a very convoluted Front with perhaps a small warm eddy-like feature near the surface around the 70 nmi range. The overall slope of the Front is downward to the south and west, with an upwelling of relatively cold water to the north of the Front and cold water below its surface manifestation.

Temperature fields produced from the data over the 26 - 28 April time frame are given in Figs. 40 - 46. These pictures of the environment are probably not correct and no conclusions should be based upon them. The Figures are included for completeness sake only. Much of the environmental analysis must be based on the 28 April AXBT grid flight, and there were serious problems with the data. At some point during the processing, the association between times, positions, and profiles was confused and the data as received was obviously wrong. Dr. Don Denbow of Harvard attempted to correct the problems, but the data remain very suspicious. It is highly unlikely that the northward part of the frontal loop progressed several degrees to the east over a few days, and the temperature fields produced only from the gridded dataset itself show no sign of a loop at all. The observations numbered 1200 through 1224 are still retained in the Tactical Oceanography Center database in case someone wishes to attempt to correct the position - profile association, but they should not be used as is. All other data is, to the best of our knowledge, acceptable, however.

## ACKNOWLEDGMENTS

The hospitality of the Royal Air Force Base at Machrihanish, Scotland, and especially the assistance of Squadron Leader D. I. McCrae is gratefully acknowledged. Jim Gallagher of the Naval Underwater Systems Center, New London, deserves the credit for organizing the Tactical Oceanography Center. Shirley Baker and Robert Broome of Planning Systems, Inc, did much of the programming and data processing. The Tactical Oceanography Project (Program Element 62435N) is sponsored principally by the Office of Naval Technology. Additional funding for this field effort came from the Office of Naval Research (Program Element 65857N).

## REFERENCES

- Smart, J.H. 1984. Spatial variability of major frontal systems in the North Atlantic - Norwegian Sea area: 1980 - 81. *Journal of Physical Oceanography*, 14, 185 - 192.
- Boyd, J.D., P.W. May, and J.W. McCaffrey. 1987. Preliminary Report: Environmental conditions in the Norwegian - Iceland Seas, May 1987. NORDA Technical Note 341, Naval Ocean Research and Development Activity, NSTL, MS 39529-5004, 128 pp.

TABLE 1: Dates, positions, and times of all data in the RESOLUTE SUPPORT/PROUD RUNNER Tactical Oceanography Center database.

DATE: 4/11/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH
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DATE: 4/15/88 PROJECT ID: RESOLUTE SUPPORT

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2	XBT	S	60 53.00	0 -42.00	18:05:00	0	0	0

DATE: 4/16/88 PROJECT ID: RESOLUTE SUPPORT

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4	XBT	S	64 51.00	-10 -17.00	10:16:00	0	0	0
5	XBT	S	61 44.00	3 16.00	10:19:00	0	0	0
6	XBT	S	61 30.00	3 21.00	10:23:00	0	0	0
7	XBT	S	61 2.00	3 32.00	10:32:00	0	0	0
8	XBT	S	60 48.00	3 36.00	10:36:00	0	0	0
9	XBT	S	64 44.00	-10 -21.00	10:45:00	0	0	0
10	XBT	S	64 38.00	-10 -26.00	11:16:00	0	0	0
11	XBT	S	64 33.00	-10 -31.00	11:45:00	0	0	0
12	XBT	S	64 28.00	-10 -35.00	12:13:00	0	0	0
13	XBT	S	61 3.00	-3 -14.00	12:15:00	0	0	0
14	XBT	S	63 .00	0 .00	13:41:00	0	0	0
15	XBT	S	64 10.00	-10 -50.00	13:45:00	0	0	0
16	XBT	S	62 57.00	0 -3.00	14:00:00	0	0	0
17	XBT	S	64 4.00	-10 -55.00	14:15:00	0	0	0
18	XBT	S	62 56.00	0 -6.00	14:40:00	0	0	0
19	XBT	S	63 59.00	-11 .00	14:45:00	0	0	0
20	XBT	S	63 53.00	-11 -5.00	15:17:00	0	0	0
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22	XBT	S	63 48.00	-11 -10.00	15:45:00	0	0	0
23	XBT	S	63 42.00	-11 -15.00	16:14:00	0	0	0
24	XBT	S	62 56.00	0 1.00	16:30:00	0	0	0
25	XBT	S	63 36.00	-11 -21.00	16:46:00	0	0	0
26	XBT	S	62 46.00	0 -28.00	16:51:00	0	0	0
27	XBT	S	62 56.00	0 2.00	17:00:00	0	0	0
28	XBT	S	63 31.00	-11 -26.00	17:17:00	0	0	0
29	XBT	S	50 30.00	-10 -6.00	17:45:00	0	0	0
30	XBT	S	63 25.00	-11 -30.00	17:46:00	0	0	0
31	XBT	S	62 55.00	0 30.00	18:00:00	0	0	0

32	XBT	S	62	38.00	0	-48.00	18:38:00	0	0	0
33	XBT	S	62	33.00	-1	-26.00	19:38:00	0	0	0
34	XBT	S	62	27.00	-1	-14.00	20:47:00	0	0	0

DATE: 4/17/88 PROJECT ID: RESOLUTE SUPPORT

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37	XBT	S	64	14.00	-11	-37.00	10:01:00	0	0	0
38	XBT	S	64	18.00	-11	-36.00	10:57:00	0	0	0
39	XBT	S	64	21.00	-11	-35.00	11:57:00	0	0	0
40	XBT	S	64	25.00	-11	-35.00	13:04:00	0	0	0
41	XBT	S	64	27.00	-11	-32.00	14:26:00	0	0	0
42	XBT	S	64	29.00	-11	-32.00	15:09:00	0	0	0
43	XBT	S	64	31.00	-11	-33.00	16:11:00	0	0	0
44	XBT	S	64	33.00	-11	-33.00	16:57:00	0	0	0
45	XBT	S	64	37.00	-11	-34.00	18:10:00	0	0	0
46	XBT	S	64	36.00	-11	-37.00	18:30:00	0	0	0
47	XBT	S	64	32.00	-11	-47.00	18:59:00	0	0	0
48	XBT	S	64	29.00	-11	-50.00	19:29:00	0	0	0
49	XBT	S	64	27.00	-11	-26.00	19:58:00	0	0	0
50	XBT	S	64	25.00	-12	-2.00	20:29:00	0	0	0
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DATE: 4/18/88 PROJECT ID: RESOLUTE SUPPORT

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54	XBT	S	65	5.00	-4	-51.00	19:00:00	0	0	0
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56	XBT	S	63	.00	-12	.00	20:49:00	0	0	0
57	XBT	S	65	5.00	-4	-51.00	21:00:00	0	0	0
58	XBT	S	63	.00	-11	.00	21:06:00	0	0	0
59	XBT	S	63	.00	-10	.00	21:22:00	0	0	0
60	XBT	S	63	.00	-8	.00	21:27:00	0	0	0
61	XBT	S	63	.00	-7	.00	21:34:00	0	0	0
62	XBT	S	63	30.00	-7	.00	21:45:00	0	0	0
63	XBT	S	63	30.00	-9	.00	22:08:00	0	0	0
64	XBT	S	63	30.00	-11	.00	22:23:00	0	0	0
65	XBT	S	63	30.00	-12	.00	22:29:00	0	0	0
66	XBT	S	64	.00	-12	.00	22:39:00	0	0	0

67	XBT	S	64	.00	-11	.00	22:50:00	0	0	0
68	XBT	S	64	.00	-10	.00	22:58:00	0	0	0
69	XBT	S	64	.00	-9	.00	23:12:00	0	0	0
70	XBT	S	64	.00	-8	.00	23:18:00	0	0	0
71	XBT	S	64	.00	-7	.00	23:24:00	0	0	0
72	XBT	S	64	30.00	-7	.00	23:33:00	0	0	0
73	XBT	S	64	30.00	-8	.00	23:39:00	0	0	0
74	XBT	S	64	30.00	-9	.00	23:46:00	0	0	0
75	XBT	S	64	30.00	-10	.00	23:52:00	0	0	0
76	XBT	S	64	30.00	-11	.00	23:57:00	0	0	0

DATE: 4/19/88 PROJECT ID: RESOLUTE SUPPORT

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79	XBT	S	65	.00	-11	.00	00:17:00	0	0	0
80	XBT	S	62	32.00	-1	-17.00	00:34:00	0	0	0
81	XBT	S	65	.00	-10	.00	00:34:00	0	0	0
82	XBT	S	65	.00	-9	.00	00:43:00	0	0	0
83	XBT	S	65	.00	-8	.00	00:48:00	0	0	0
84	XBT	S	65	.00	-7	.00	00:56:00	0	0	0
85	XBT	S	65	30.00	-7	.00	01:02:00	0	0	0
86	XBT	S	65	30.00	-8	.00	01:08:00	0	0	0
87	XBT	S	65	30.00	-9	.00	01:13:00	0	0	0
88	XBT	S	65	30.00	-10	.00	01:19:00	0	0	0
89	XBT	S	65	30.00	-11	.00	01:24:00	0	0	0
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91	XBT	S	65	5.00	-4	-53.00	08:00:00	0	0	0
92	XBT	S	65	5.00	-4	-53.00	09:00:00	0	0	0
93	XBT	S	65	6.00	-4	-54.00	11:00:00	0	0	0
94	XBT	S	65	5.00	-4	-54.00	12:00:00	0	0	0
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96	XBT	S	63	48.00	-10	-22.00	13:59:00	0	0	0
97	XBT	S	65	5.00	-4	-54.00	14:00:00	0	0	0
98	XBT	S	63	51.00	-10	-18.00	14:59:00	0	0	0
99	XBT	S	65	5.00	-4	-54.00	15:00:00	0	0	0
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102	XBT	S	64	2.00	-10	-2.00	18:30:00	0	0	0
103	XBT	S	64	4.00	-9	-59.00	18:59:00	0	0	0
104	XBT	S	64	8.00	-9	-55.00	19:54:00	0	0	0
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106	XBT	S	65	5.00	-5	-17.00	21:25:00	0	0	0
107	XBT	S	63	12.00	0	-23.00	21:32:00	0	0	0

108	XBT	S	64	18.00	-9	-46.00	22:00:00	0	0	0
109	XBT	S	64	58.00	-5	-35.00	22:30:00	0	0	0
110	XBT	S	64	23.00	-9	-43.00	23:00:00	0	0	0
111	XBT	S	63	19.00	0	-38.00	23:54:00	0	0	0
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DATE: 4/20/88 PROJECT ID: RESOLUTE SUPPORT

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114	XBT	S	64	36.00	-9	-32.00	02:05:00	0	0	0
115	XBT	S	63	26.00	0	-54.00	02:30:00	0	0	0
116	XBT	S	64	40.00	-9	-28.00	02:58:00	0	0	0
117	XBT	S	64	25.00	-6	-9.00	03:08:00	0	0	0
118	XBT	S	64	44.00	-9	-23.00	04:00:00	0	0	0
119	XBT	S	64	48.00	-9	-18.00	04:59:00	0	0	0
120	XBT	S	64	52.00	-9	-13.00	05:59:00	0	0	0
121	XBT	S	64	57.00	-9	-7.00	06:59:00	0	0	0
122	XBT	S	65	3.00	-9	-1.00	08:03:00	0	0	0
123	XBT	S	65	10.10	-6	-2.10	09:43:00	0	0	16
124	XBT	S	65	16.90	-6	-21.90	09:50:00	0	0	14
125	XBT	S	64	48.70	-4	-49.90	10:01:00	0	0	16
126	XBT	S	64	41.80	-4	-26.80	10:04:00	0	0	14
127	XBT	S	64	35.00	-4	-4.00	10:07:00	0	0	16
128	XBT	S	65	16.80	-6	-22.00	10:29:00	0	0	14
129	XBT	S	64	12.00	-7	-36.00	12:22:00	0	0	0
130	XBT	S	64	5.00	-7	-53.00	13:24:00	0	0	0
131	XBT	S	63	51.00	-8	-31.00	17:00:00	0	0	0
132	XBT	S	64	3.00	-2	-16.00	17:44:00	0	0	0
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134	XBT	S	63	38.00	-9	-4.00	20:25:00	0	0	0
135	XBT	S	65	10.00	-8	-52.00	20:59:00	0	0	0
136	XBT	S	62	30.00	-9	-18.00	21:45:00	0	0	0
137	XBT	S	65	6.00	-8	-57.00	21:59:00	0	0	0
138	XBT	S	61	42.00	-13	-42.00	22:10:00	0	0	0
139	XBT	S	65	3.00	-9	.00	23:03:00	0	0	0

DATE: 4/21/88 PROJECT ID: RESOLUTE SUPPORT

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141	XBT	S	61	52.00	-13	-24.00	00:30:00	0	0	0
142	XBT	S	64	56.00	-9	-9.00	00:59:00	0	0	0

143	XBI	S	64	52.00	-9	-15.00	02:00:00	0	0	0
144	XBT	S	64	49.00	-9	-19.00	02:59:00	0	0	0
145	XBI	S	61	57.00	-13	-15.00	03:10:00	0	0	0
146	XBI	S	61	57.00	-13	-15.00	03:15:00	0	0	0
147	XBI	S	64	45.00	-9	-23.00	04:03:00	0	0	0
148	XBI	S	64	41.00	-9	-26.00	05:00:00	0	0	0
149	XBI	S	64	31.00	-9	-35.00	07:02:00	0	0	0
150	XBT	S	64	27.00	-9	-40.00	07:58:00	0	0	0
151	XBI	S	64	24.00	-9	-45.00	08:59:00	0	0	0
152	XBI	S	64	20.00	-9	-50.00	10:01:00	0	0	0
153	XBT	S	64	16.00	-9	-54.00	11:03:00	0	0	0
154	XBT	S	62	14.00	-12	-38.00	11:30:00	0	0	0
155	XBI	S	64	13.00	-9	-57.00	11:58:00	0	0	0
156	XBT	S	64	9.00	-10	-2.00	12:59:00	0	0	0
157	XBI	S	62	21.00	-12	-23.00	13:10:00	0	0	0
158	XBI	S	64	5.00	-10	-6.00	13:59:00	0	0	0
159	XBI	S	64	48.00	-3	-59.00	14:58:00	0	0	0
160	XBI	S	62	27.00	-12	-5.00	15:09:00	0	0	0
161	XBI	S	62	33.00	-11	-56.00	17:30:00	0	0	0
162	XBT	S	61	27.00	-11	-1.00	18:00:00	0	0	0
163	XBI	S	62	37.00	-11	-33.00	19:09:00	0	0	0
164	XBI	S	61	36.00	-10	-46.00	20:00:00	0	0	0
165	XBI	S	62	36.00	-11	-36.00	20:30:00	0	0	0
166	XBI	S	62	41.00	-11	-25.00	21:37:00	0	0	0
167	XBI	S	61	45.00	-10	-30.00	22:00:00	0	0	0

DATE: 4/22/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH		
168	XBI	S	63	2.00	-10	-58.00	00:00:00	0	0	0
169	XBI	S	65	21.00	-5	-25.00	04:25:00	0	0	0
170	XBI	S	62	56.10	-10	-55.10	09:56:00	0	0	16
171	XBI	S	63	12.70	-10	-19.20	10:02:00	0	0	14
172	XBI	S	63	21.00	-10	.00	10:05:00	0	0	16
173	XBI	S	63	29.40	-9	-40.80	10:08:00	0	0	14
174	XBT	S	63	37.90	-9	-21.80	10:11:00	0	0	16
175	XBI	S	63	3.20	-10	-38.00	10:36:00	0	0	14
176	XBI	S	62	37.00	-9	-19.00	11:00:00	0	0	0
177	XBI	S	65	49.00	-6	-38.00	14:32:00	0	0	0
178	XBT	S	62	39.00	-9	-19.00	15:40:00	0	0	0
179	XBT	S	65	56.00	-6	-57.00	17:11:00	0	0	0
180	XBT	S	66	2.00	-7	-16.00	19:22:00	0	0	0
181	XBT	S	62	30.00	-9	-18.00	20:08:00	0	0	0
182	XBT	S	62	27.00	-9	-18.00	21:10:00	0	0	0
183	XBI	S	62	33.00	-9	-17.00	22:09:00	0	0	0

184	XBT	S	62	39.00	-9	-14.00	23:00:00	0	0	0
185	XBT	S	62	45.00	-9	-13.00	23:55:00	0	0	0
186	XBT	S	63	24.00	-12	-19.00	23:58:00	0	0	0

DATE: 4/23/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE		LONGITUDE		TIME	FLT	RT	CH
187	XBT	S	66	14.00	-7	-53.00	00:29:00	0	0	0
188	XBT	S	62	51.00	-9	-16.00	00:37:00	0	0	0
189	XBT	S	63	26.00	-12	-24.00	00:59:00	0	0	0
190	XBT	S	62	57.00	-9	-16.00	01:29:00	0	0	0
191	XBT	S	63	30.00	-12	-30.00	02:09:00	0	0	0
192	XBT	S	63	4.00	-9	-15.00	02:30:00	0	0	0
193	XBT	S	66	21.00	-8	-11.00	02:52:00	0	0	0
194	XBT	S	63	32.00	-12	-34.00	02:59:00	0	0	0
195	XBT	S	62	28.00	-9	-16.00	03:40:00	0	0	0
196	XBT	S	63	36.00	-12	-38.00	03:59:00	0	0	0
197	XBT	S	63	12.00	-8	-24.00	04:00:00	0	0	0
198	XBT	S	63	17.00	-9	-11.00	04:27:00	0	0	0
199	XBT	S	63	38.00	-12	-45.00	05:01:00	0	0	0
200	XBT	S	66	27.00	-8	-42.00	05:03:00	0	0	0
201	XBT	S	63	22.00	-9	-10.00	05:20:00	0	0	0
202	XBT	S	62	30.00	-9	-18.00	05:45:00	0	0	0
203	XBT	S	63	39.00	-12	-53.00	05:59:00	0	0	0
204	XBT	S	63	18.00	-8	-6.00	06:00:00	0	0	0
205	XBT	S	63	18.00	-12	-42.00	06:00:00	0	0	0
206	XBT	S	63	36.00	-12	-54.00	06:00:00	0	0	0
207	XBT	S	63	28.00	-9	-10.00	06:10:00	0	0	0
208	XBT	S	63	40.00	-13	-2.00	06:59:00	0	0	0
209	XBT	S	63	34.00	-9	-9.00	07:11:00	0	0	0
210	XBT	S	63	42.00	-13	-9.00	08:01:00	0	0	0
211	XBT	S	62	30.00	-9	-16.00	08:11:00	0	0	0
212	XBT	S	63	40.00	-9	-8.00	08:19:00	0	0	0
213	XBT	S	63	44.00	-13	-17.00	09:00:00	0	0	0
214	XBT	S	63	46.00	-9	-8.00	09:14:00	0	0	0
215	XBT	S	63	53.00	-9	-6.00	10:11:00	0	0	0
216	XBT	S	63	57.00	-9	-5.00	10:47:00	0	0	0
217	XBT	S	63	32.00	-10	-27.00	11:05:00	0	0	0
218	XBT	S	62	30.00	-9	-16.00	11:10:00	0	0	0
219	XBT	S	64	3.00	-9	-5.00	11:41:00	0	0	0
220	XBT	S	64	13.00	-10	-1.00	11:58:00	0	0	0
221	XBT	S	64	8.00	-9	-5.00	12:23:00	0	0	0
222	XBT	S	63	36.00	-12	-58.00	13:00:00	0	0	0
223	XBT	S	62	28.00	-9	-16.00	13:05:00	0	0	0
224	XBT	S	66	47.00	-9	-39.00	13:06:00	0	0	0

225	XBI	S	64	15.00	-9	-53.00	13:09:00	0	0	0
226	XBT	S	64	15.00	-9	-3.00	13:25:00	0	0	0
227	XBI	S	63	36.00	-12	-51.00	13:59:00	0	0	0
228	XBI	S	64	17.00	-9	-45.00	13:59:00	0	0	0
229	XBI	S	64	21.00	-9	-2.00	14:17:00	0	0	0
230	XBT	S	64	25.00	-8	-59.00	14:54:00	0	0	0
231	XBI	S	63	37.00	-12	-41.00	14:59:00	0	0	0
232	XBT	S	64	19.00	-9	-36.00	14:59:00	0	0	0
233	XBI	S	63	39.00	-12	-32.00	15:57:00	0	0	0
234	XBT	S	64	22.00	-9	-27.00	15:59:00	0	0	0
235	XBT	S	65	30.00	-11	.00	16:16:00	2	0	0
236	XBT	S	62	30.00	-9	-18.00	16:20:00	0	0	0
237	XBI	S	65	30.00	-10	.00	16:22:00	2	0	0
238	XBT	S	64	20.00	-9	-7.00	16:25:00	0	0	0
239	XBT	S	65	30.00	-9	.00	16:28:00	2	0	0
240	XBI	S	65	30.00	-8	.00	16:34:00	2	0	0
241	XBI	S	65	30.00	-7	.00	16:40:00	2	0	0
242	XBI	S	65	.00	-7	.00	16:49:00	2	0	0
243	XBI	S	65	.00	-8	.00	16:58:00	2	0	0
244	XBT	S	63	30.00	-10	-22.00	17:00:00	0	0	0
245	XBI	S	64	24.00	-9	-16.00	17:08:00	0	0	0
246	XBI	S	65	.00	-10	.00	17:10:00	2	0	0
247	XBI	S	64	15.00	-9	-13.00	17:20:00	0	0	0
248	XBT	S	66	59.00	-10	-18.00	17:21:00	0	0	0
249	XBI	S	65	.00	-11	.00	17:21:00	2	0	0
250	XBI	S	65	.00	-12	.00	17:29:00	2	0	0
251	XBT	S	64	30.00	-12	.00	17:36:00	2	0	0
252	XBI	S	65	.00	-9	.00	17:40:00	2	0	0
253	XBT	S	64	30.00	-11	.00	17:43:00	2	0	0
254	XBT	S	64	30.00	-10	.00	17:49:00	2	0	0
255	XBI	S	63	45.00	-12	-19.00	18:00:00	0	0	0
256	XBT	S	64	10.00	-9	-21.00	18:25:00	0	0	0
257	XBI	S	64	30.00	-9	.00	18:37:00	2	0	0
258	XBT	S	64	30.00	-8	.00	18:41:00	2	0	0
259	XBI	S	62	30.00	-9	-18.00	18:45:00	0	0	0
260	XBT	S	64	30.00	-7	.00	18:48:00	2	0	0
261	XBI	S	64	.00	-7	.00	18:55:00	2	0	0
262	XBT	S	63	30.00	-10	-21.00	19:00:00	0	0	0
263	XBI	S	64	.00	-8	.00	19:00:00	2	0	0
264	XBI	S	63	47.00	-12	-11.00	19:03:00	0	0	0
265	XBI	S	64	.00	-9	.00	19:05:00	2	0	0
266	XBT	S	64	.00	-10	.00	19:11:00	2	0	0
267	XBI	S	67	5.00	-10	-28.00	19:15:00	0	0	0
268	XBT	S	64	.00	-11	.00	19:18:00	2	0	0
269	XBI	S	64	.00	-12	.00	19:24:00	2	0	0
270	XBI	S	64	5.00	-9	-29.00	19:36:00	0	0	0
271	XBI	S	63	30.00	-11	.00	19:37:00	2	0	0

272	XBT	S	63	30.00	-12	.00	19:44:00	2	0	0
273	XBT	S	63	.00	-12	.00	19:53:00	2	0	0
274	XBT	S	63	49.00	-12	-6.00	19:58:00	0	0	0
275	XBT	S	63	.00	-11	.00	19:58:00	2	0	0
276	XBT	S	63	.00	-10	.00	20:06:00	2	0	0
277	XBT	S	63	.00	-9	.00	20:21:00	2	0	0
278	XBT	S	63	.00	-8	.00	20:28:00	2	0	0
279	XBT	S	63	.00	-7	.00	20:35:00	2	0	0
280	XBT	S	63	30.00	-7	.00	20:42:00	2	0	0
281	XBT	S	63	58.00	-9	-40.00	20:46:00	0	0	0
282	XBT	S	63	30.00	-8	.00	20:48:00	2	0	0
283	XBT	S	63	30.00	-9	.00	20:55:00	2	0	0
284	XBT	S	63	50.00	-12	.00	20:58:00	0	0	0
285	XBT	S	63	30.00	-10	.00	20:59:00	2	0	0
286	XBT	S	63	29.00	-10	-21.00	21:00:00	0	0	0
287	XBT	S	62	30.00	-9	-18.00	21:00:00	0	0	0
288	XBT	S	67	11.00	-10	-48.00	21:33:00	0	0	0
289	XBT	S	63	53.00	-9	-48.00	21:40:00	0	0	0
290	XBT	S	63	47.00	-9	-56.00	22:46:00	0	0	0
291	XBT	S	63	53.00	-11	-49.00	22:58:00	0	0	0
292	XBT	S	67	17.00	-11	-24.00	23:48:00	0	0	0
293	XBT	S	64	18.00	-8	-53.00	23:56:00	0	0	0

DATE: 4/24/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH		
294	XBT	S	63	54.00	-11	-41.00	00:01:00	0	0	0
295	XBT	S	63	41.00	-10	-5.00	00:04:00	0	0	0
296	XBT	S	63	31.00	-10	-24.00	01:00:00	0	0	0
297	XBT	S	63	55.00	-11	-33.00	01:04:00	0	0	0
298	XBT	S	63	36.00	-10	-13.00	01:05:00	0	0	0
299	XBT	S	62	28.00	-9	-16.00	01:15:00	0	0	0
300	XBT	S	67	22.00	-11	-44.00	02:00:00	0	0	0
301	XBT	S	63	56.00	-11	-24.00	02:25:00	0	0	0
302	XBT	S	63	31.00	-10	-27.00	02:30:00	0	0	0
303	XBT	S	63	31.00	-10	-24.00	03:00:00	0	0	0
304	XBT	S	63	57.00	-11	-20.00	03:02:00	0	0	0
305	XBT	S	62	28.00	-9	-16.00	03:10:00	0	0	0
306	XBT	S	63	31.00	-10	-39.00	03:23:00	0	0	0
307	XBT	S	63	59.00	-11	-12.00	03:59:00	0	0	0
308	XBT	S	67	27.00	-12	-6.00	04:22:00	0	0	0
309	XBT	S	63	32.00	-10	-54.00	04:35:00	0	0	0
310	XBT	S	64	1.00	-11	-3.00	04:48:00	0	0	0
311	XBT	S	63	32.00	-10	-23.00	05:00:00	0	0	0
312	XBT	S	62	30.00	-9	-12.00	05:14:00	0	0	0

313	XBT	S	63	33.00	-11	-9.00	05:45:00	0	0	0
314	XBT	S	64	3.00	-10	-54.00	05:59:00	0	0	0
315	XBT	S	67	35.00	-12	-10.00	06:23:00	0	0	0
316	XBT	S	63	33.00	-11	-24.00	06:35:00	0	0	0
317	XBT	S	64	5.00	-10	-37.00	06:59:00	0	0	0
318	XBT	S	63	32.00	-10	-22.00	07:00:00	0	0	0
319	XBT	S	62	30.00	-9	-12.00	07:20:00	0	0	0
320	XBT	S	63	34.00	-11	-40.00	07:38:00	0	0	0
321	XBT	S	64	6.00	-10	-37.00	08:00:00	0	0	0
322	XBT	S	67	40.00	-12	-51.00	08:28:00	0	0	0
323	XBT	S	63	34.00	-11	-56.00	08:47:00	0	0	0
324	XBT	S	62	30.00	-9	-12.00	09:00:00	0	0	0
325	XBT	S	64	8.00	-10	-30.00	09:01:00	0	0	0
326	XBT	S	63	34.00	-12	-11.00	09:50:00	0	0	0
327	XBT	S	64	10.00	-10	-20.00	09:58:00	0	0	0
328	XBT	S	62	46.00	-9	-34.00	10:00:00	0	0	0
329	XBT	S	67	48.00	-13	-15.00	10:47:00	0	0	0
330	XBT	S	63	36.00	-12	-25.00	10:50:00	0	0	0
331	XBT	S	62	30.00	-9	-12.00	11:00:00	0	0	0
332	XBT	S	64	12.00	-10	-9.00	11:04:00	0	0	0
333	XBT	S	63	38.00	-12	-41.00	12:02:00	0	0	0
334	XBT	S	67	52.00	-13	-15.00	12:31:00	0	0	0
335	XBT	S	62	28.00	-9	-16.00	13:15:00	0	0	0
336	XBT	S	63	38.00	-12	-57.00	13:30:00	0	0	0
337	XBT	S	67	58.00	-13	-38.00	14:39:00	0	0	0
338	XBT	S	63	32.00	-12	-44.00	14:45:00	0	0	0
339	XBT	S	63	34.00	-10	-28.00	15:00:00	0	0	0
340	XBT	S	62	28.00	-9	-14.00	15:15:00	0	0	0
341	XBT	S	63	29.00	-12	-31.00	15:40:00	0	0	0
342	XBT	S	63	26.00	-12	-22.00	16:30:00	0	0	0
343	XBT	S	68	3.00	-14	-14.00	16:36:00	0	0	0
344	XBT	S	63	27.00	-10	-20.00	17:00:00	0	0	0
345	XBT	S	63	23.00	-12	-1.00	17:17:00	0	0	0
346	XBT	S	64	25.00	-9	-9.00	18:00:00	0	0	0
347	XBT	S	63	21.00	-12	-1.00	18:00:00	0	0	0
348	XBT	S	62	30.00	-9	-18.00	18:13:00	0	0	0
349	XBT	S	68	8.00	-14	-21.00	18:38:00	0	0	0
350	XBT	S	64	26.00	-8	-59.00	18:59:00	0	0	0
351	XBT	S	63	17.00	-11	-51.00	19:00:00	0	0	0
352	XBT	S	62	30.00	-9	-18.00	19:25:00	0	0	0
353	XBT	S	63	13.00	-11	-41.00	20:00:00	0	0	0
354	XBT	S	64	26.00	-8	-59.00	21:03:00	0	0	0
355	XBT	S	68	15.00	-15	-2.00	21:10:00	0	0	0
356	XBT	S	63	6.00	-11	-18.00	21:49:00	0	0	0
357	XBT	S	64	26.00	-8	-55.00	22:00:00	0	0	0
358	XBT	S	63	3.00	-11	-7.00	22:39:00	0	0	0
359	XBT	S	64	22.00	-8	-54.00	23:00:00	0	0	0

360	XBT	S	62	60.00	-10	-56.00	23:38:00	0	0	0
361	XBT	S	63	33.00	-9	-50.00	23:55:00	0	0	0

DATE: 4/25/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH
362	XBT	S	62	56.00	-10	-44.00	00:35:00	0 0 0
363	XBT	S	64	14.00	-8	-54.00	01:03:00	0 0 0
364	XBT	S	62	54.00	-10	-33.00	01:37:00	0 0 0
365	XBT	S	64	10.00	-8	-57.00	01:59:00	0 0 0
366	XBT	S	62	51.00	-10	-23.00	02:32:00	0 0 0
367	XBT	S	64	6.00	-8	-58.00	03:03:00	0 0 0
368	XBT	S	62	46.00	-10	-11.00	03:35:00	0 0 0
369	XBT	S	64	3.00	-9	-1.00	03:59:00	0 0 0
370	XBT	S	62	43.00	-10	.00	04:37:00	0 0 0
371	XBT	S	63	59.00	-9	-1.00	04:59:00	0 0 0
372	XBT	S	62	30.00	-9	-18.00	05:04:00	0 0 0
373	XBT	S	68	20.00	-15	-24.00	05:05:00	0 0 0
374	XBT	S	62	40.00	-9	-50.00	05:30:00	0 0 0
375	XBT	S	63	55.00	-9	-5.00	06:00:00	0 0 0
376	XBT	S	62	36.00	-9	-38.00	06:45:00	0 0 0
377	XBT	S	63	51.00	-9	-7.00	07:00:00	0 0 0
378	XBT	S	62	30.00	-9	-18.00	07:00:00	0 0 0
379	XBT	S	62	32.00	-9	-27.00	07:37:00	0 0 0
380	XBT	S	63	47.00	-9	-8.00	08:00:00	0 0 0
381	XBT	S	62	29.00	-9	-18.00	08:27:00	0 0 0
382	XBT	S	63	43.00	-9	-9.00	09:00:00	0 0 0
383	XBT	S	68	25.00	-15	-54.00	09:43:00	0 0 0
384	XBT	S	62	34.00	-9	-20.00	09:44:00	0 0 0
385	XBT	S	63	40.00	-9	-9.00	09:59:00	0 0 0
386	XBT	S	62	40.00	-9	-29.00	10:56:00	0 0 0
387	XBT	S	63	35.00	-9	-9.00	11:00:00	0 0 0
388	XBT	S	63	27.00	-10	-11.00	11:00:00	0 0 0
389	XBT	S	62	30.00	-9	-18.00	11:00:00	0 0 0
390	XBT	S	63	32.00	-9	-10.00	11:56:00	0 0 0
391	XBT	S	62	46.00	-9	-35.00	11:59:00	0 0 0
392	XBT	S	62	52.00	-9	-43.00	13:03:00	0 0 0
393	XBT	S	62	28.00	-9	-16.00	13:05:00	0 0 0
394	XBT	S	63	24.00	-9	-12.00	13:59:00	0 0 0
395	XBT	S	62	59.00	-9	-52.00	14:18:00	0 0 0
396	XBT	S	63	19.00	-9	-13.00	15:00:00	0 0 0
397	XBT	S	63	6.00	-9	-58.00	15:24:00	0 0 0
398	XBT	S	63	15.00	-9	-15.00	15:58:00	0 0 0
399	XBT	S	63	12.00	-10	.00	16:18:00	0 0 0
400	XBT	S	63	11.00	-9	-16.00	16:59:00	0 0 0

401	XBT	S	63	19.00	-10	-12.00	17:30:00	0	0	0
402	XBT	S	63	7.00	-9	-14.00	17:59:00	0	0	0
403	XBT	S	63	25.00	-10	-18.00	18:35:00	0	0	0
404	XBT	S	63	6.00	-9	-11.00	19:00:00	0	0	0
405	XBT	S	63	30.00	-10	-21.00	19:20:00	0	0	0
406	XBT	S	63	2.00	-9	-11.00	20:00:00	0	0	0
407	XBT	S	62	58.00	-9	-11.00	21:00:00	0	0	0
408	XBT	S	62	30.00	-9	-18.00	21:04:00	0	0	0
409	XBT	S	64	32.00	-10	-6.00	21:54:00	0	0	0
410	XBT	S	62	53.00	-9	-13.00	22:02:00	0	0	0
411	XBT	S	62	49.00	-9	-15.00	22:57:00	0	0	0
412	XBT	S	62	30.00	-9	-18.00	23:05:00	0	0	0
413	XBT	S	67	58.00	-15	-34.00	23:30:00	0	0	0

DATE: 4/26/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH		
414	XBT	S	62	44.00	-9	-51.00	00:03:00	0	0	0
415	XBT	S	61	51.00	-15	-52.00	00:50:00	0	0	0
416	XBT	S	63	58.00	-9	-43.00	00:55:00	0	0	0
417	XBT	S	62	40.00	-9	-15.00	01:03:00	0	0	0
418	XBT	S	62	40.00	-9	-15.00	01:03:00	0	0	0
419	XBT	S	62	28.00	-9	-16.00	01:15:00	0	0	0
420	XBT	S	62	36.00	-9	-16.00	01:59:00	0	0	0
421	XBT	S	62	36.00	-9	-16.00	01:59:00	0	0	0
422	XBT	S	67	46.00	-16	-10.00	02:05:00	0	0	0
423	XBT	S	62	33.00	-9	-16.00	02:59:00	0	0	0
424	XBT	S	62	33.00	-9	-16.00	02:59:00	0	0	0
425	XBT	S	62	28.00	-9	-16.00	03:05:00	0	0	0
426	XBT	S	64	10.00	-9	-27.00	03:05:00	0	0	0
427	XBT	S	62	29.00	-9	-17.00	03:59:00	0	0	0
428	XBT	S	62	29.00	-9	-17.00	03:59:00	0	0	0
429	XBT	S	64	15.00	-9	-18.00	04:04:00	0	0	0
430	XBT	S	67	35.00	-16	-59.00	04:47:00	0	0	0
431	XBT	S	64	20.00	-9	-10.00	04:58:00	0	0	0
432	XBT	S	62	28.00	-9	-19.00	05:00:00	0	0	0
433	XBT	S	62	28.00	-9	-19.00	05:00:00	0	0	0
434	XBT	S	67	31.00	-17	-22.00	05:57:00	0	0	0
435	XBT	S	62	33.00	-9	-24.00	06:00:00	0	0	0
436	XBT	S	62	33.00	-9	-24.00	06:00:00	0	0	0
437	XBT	S	64	24.00	-9	-10.00	07:05:00	0	0	0
438	XBT	S	67	34.00	-17	-43.00	07:06:00	0	0	0
439	XBT	S	62	40.00	-9	-29.00	07:59:00	0	0	0
440	XBT	S	64	21.00	-9	-22.00	08:00:00	0	0	0
441	XBT	S	64	19.00	-9	-33.00	08:50:00	0	0	0

442	XBT	S	62	43.00	-9	-32.00	08:59:00	0	0	0
443	XBT	S	64	14.00	-9	-45.00	09:44:00	0	0	0
444	XBT	S	64	14.00	-9	-57.00	10:42:00	0	0	0
445	XBT	S	62	49.00	-9	-40.00	11:00:00	0	0	0
446	XBT	S	62	30.00	-9	-18.00	11:01:00	0	0	0
447	XBT	S	64	11.00	-10	-9.00	11:39:00	0	0	0
448	XBT	S	64	9.00	-10	-22.00	12:42:00	0	0	0
449	XBT	S	62	56.00	-9	-48.00	12:59:00	0	0	0
450	XBT	S	62	28.00	-9	-16.00	13:15:00	0	0	0
451	XBT	S	63	.00	-9	-52.00	14:04:00	0	0	0
452	XBT	S	63	4.00	-9	-55.00	15:00:00	0	0	0
453	XBT	S	67	48.00	-17	-34.00	15:55:00	0	0	0
454	XBT	S	63	8.00	-10	.00	15:59:00	0	0	0
455	XBT	S	63	12.00	-10	-3.00	16:58:00	0	0	0
456	XBT	S	63	16.00	-10	-5.00	17:59:00	0	0	0
457	XBT	S	63	29.00	-10	-16.00	19:00:00	0	0	0
458	XBT	S	63	20.00	-10	-7.00	19:01:00	0	0	0
459	XBT	S	67	42.00	-17	-54.00	19:14:00	0	0	0
460	XBT	S	63	24.00	-10	-10.00	19:59:00	0	0	0
461	XBT	S	63	28.00	-10	-14.00	21:00:00	0	0	0
462	XBT	S	63	27.00	-10	-13.00	21:03:00	0	0	0
463	XBT	S	63	30.00	-10	-17.00	22:00:00	0	0	0
464	XBT	S	67	23.00	-17	-50.00	22:23:00	0	0	0
465	XBT	S	63	34.00	-10	-13.00	23:00:00	0	0	0

DATE: 4/27/88 PROJECT ID: RESOLUTE SUPPORT

#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH		
466	XBT	S	63	37.00	-10	-9.00	00:00:00	0	0	0
467	XBT	S	67	29.00	-18	-15.00	00:55:00	0	0	0
468	XBT	S	63	29.00	-10	-19.00	01:10:00	0	0	0
469	XBT	S	63	44.00	-10	.00	01:59:00	0	0	0
470	XBT	S	67	34.00	-18	-10.00	02:10:00	0	0	0
471	XBT	S	63	48.00	-10	.00	02:59:00	0	0	0
472	XBT	S	63	31.00	-10	-23.00	03:00:00	0	0	0
473	XBT	S	63	53.00	-10	.00	04:00:00	0	0	0
474	XBT	S	63	57.00	-9	-59.00	05:00:00	0	0	0
475	XBT	S	63	34.00	-10	-19.00	07:00:00	0	0	0

DATE: 4/28/88 PROJECT ID: RESOLUTE SUPPORT

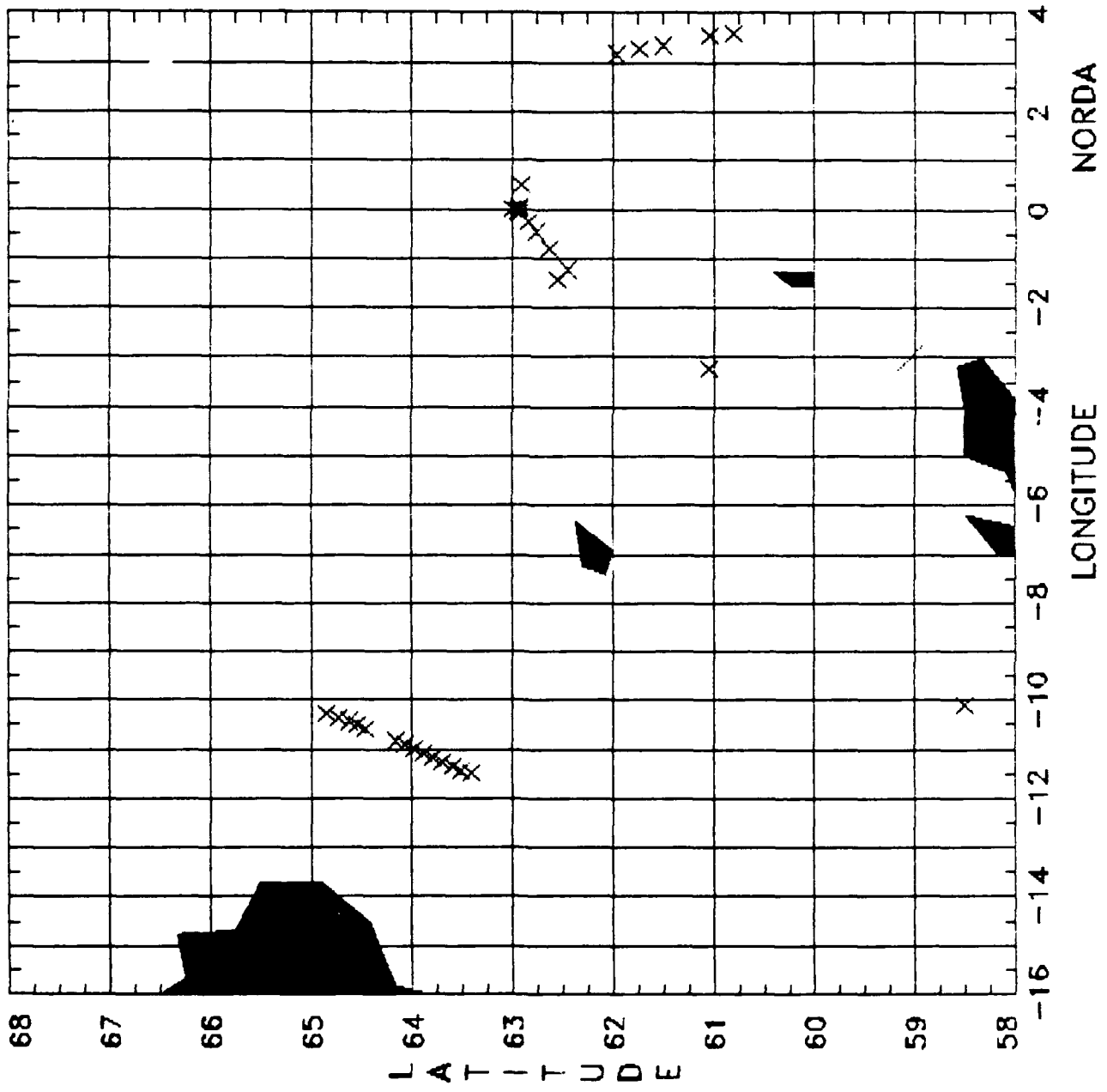
#	TYPE	D/S	LATITUDE	LONGITUDE	TIME	FLT	RT	CH		
1200	XBT	S	65	.00	-7	.00	15:55:00	0	0	0

1201	XBT	S	65	.00	-8	.00	16:03:00	0	0	0
1202	XBT	S	65	.00	-9	.00	16:09:00	0	0	0
1203	XBT	S	65	.00	-10	.00	16:16:00	0	0	0
1204	XBT	S	65	.00	-11	.00	16:22:00	0	0	0
1205	XBT	S	64	30.00	-11	.00	16:43:00	0	0	0
1206	XBT	S	64	30.00	-10	.00	16:49:00	0	0	0
1207	XBT	S	64	30.00	-7	.00	17:09:00	0	0	0
1208	XBT	S	64	.00	-7	.00	17:16:00	0	0	0
1209	XBT	S	64	.00	-8	.00	17:23:00	0	0	0
1210	XBT	S	64	.00	-9	.00	17:30:00	0	0	0
1211	XBT	S	64	.00	-10	.00	17:38:00	0	0	0
1212	XBT	S	64	.00	-11	.00	17:43:00	0	0	0
1213	XBT	S	64	.00	-12	.00	17:50:00	0	0	0
1214	XBT	S	63	30.00	-12	.00	18:10:00	0	0	0
1215	XBT	S	63	30.00	-11	.00	18:25:00	0	0	0
1216	XBT	S	63	30.00	-10	.00	18:33:00	0	0	0
1217	XBT	S	63	30.00	-9	.00	18:40:00	0	0	0
1218	XBT	S	63	30.00	-8	.00	18:46:00	0	0	0
1219	XBT	S	63	30.00	-7	.00	18:55:00	0	0	0
1220	XBT	S	63	.00	-7	.00	19:01:00	0	0	0
1221	XBT	S	63	.00	-8	.00	19:09:00	0	0	0
1222	XBT	S	63	.00	-9	.00	19:15:00	0	0	0
1223	XBT	S	63	.00	-10	.00	19:25:00	0	0	0
1224	XBT	S	63	.00	-11	.00	19:31:00	0	0	0

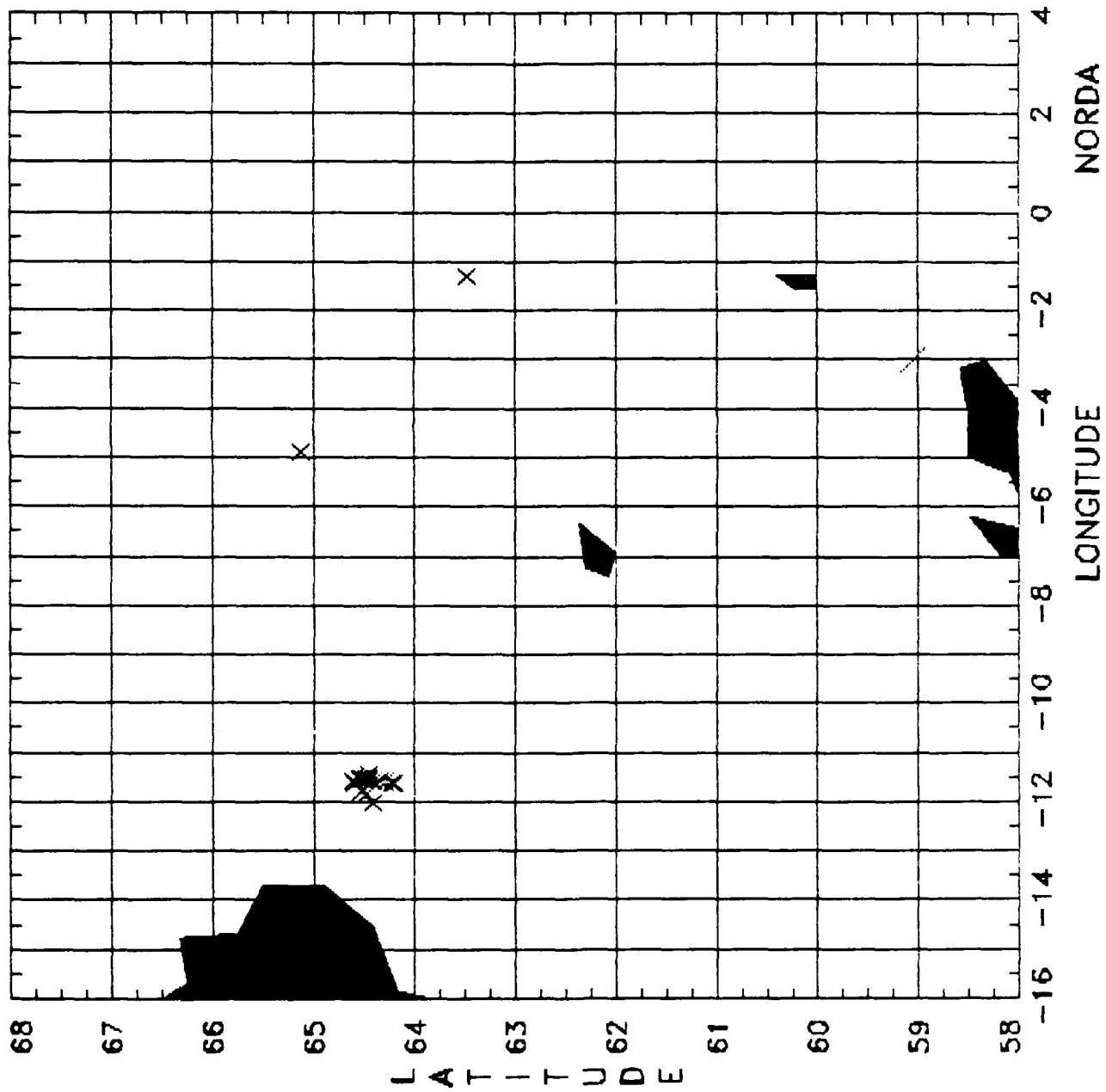
TOTAL NO. OF FILES: 500

**Figures 1 - 13: Station locations for data in the RESOLUTE SUPPORT/PROUD RUNNER Tactical Oceanography Center database.**

32 XBTS 16 April 88 / Proud Runner

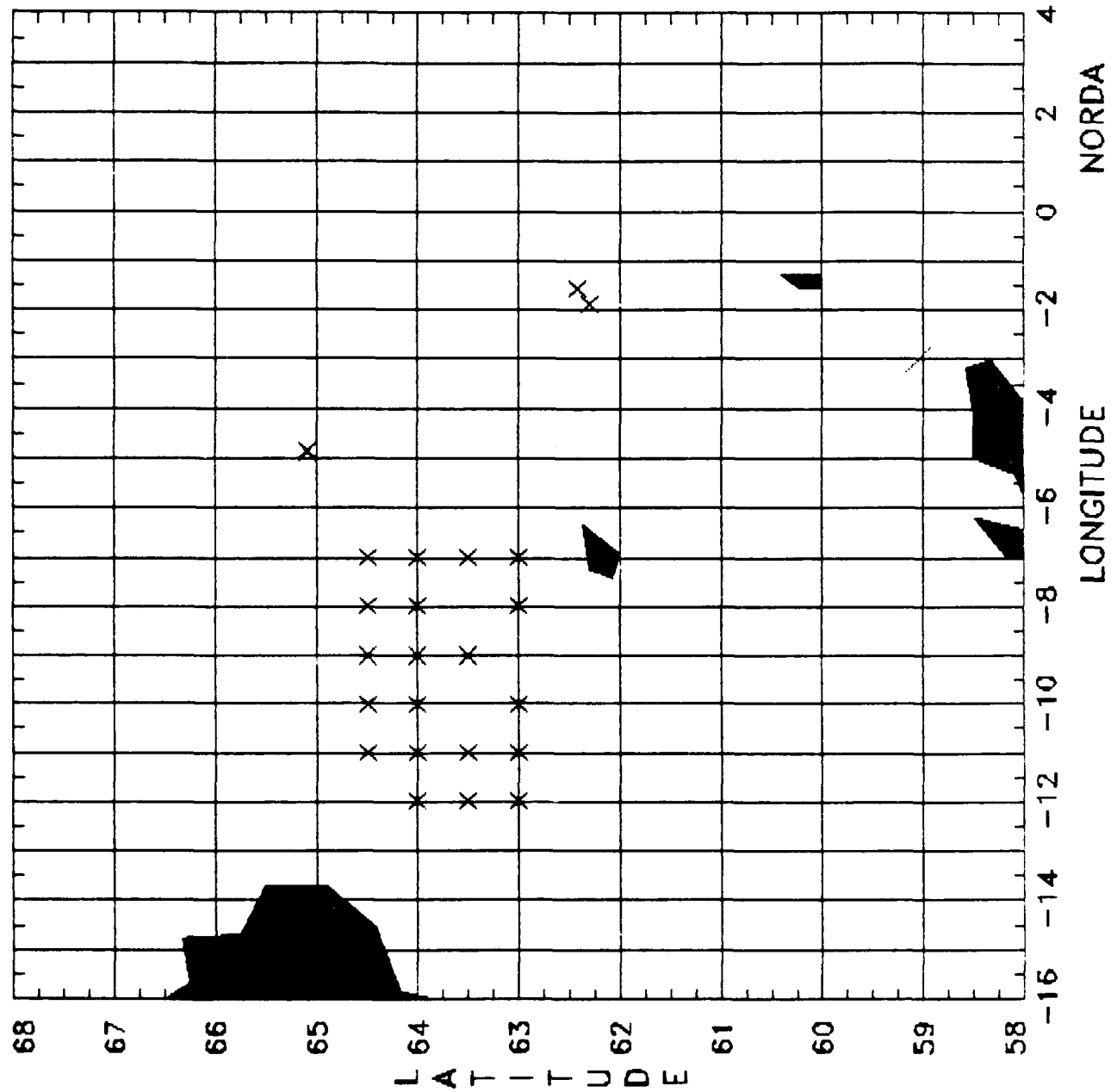


17 XBTs 17 April 88 / Proud Runner

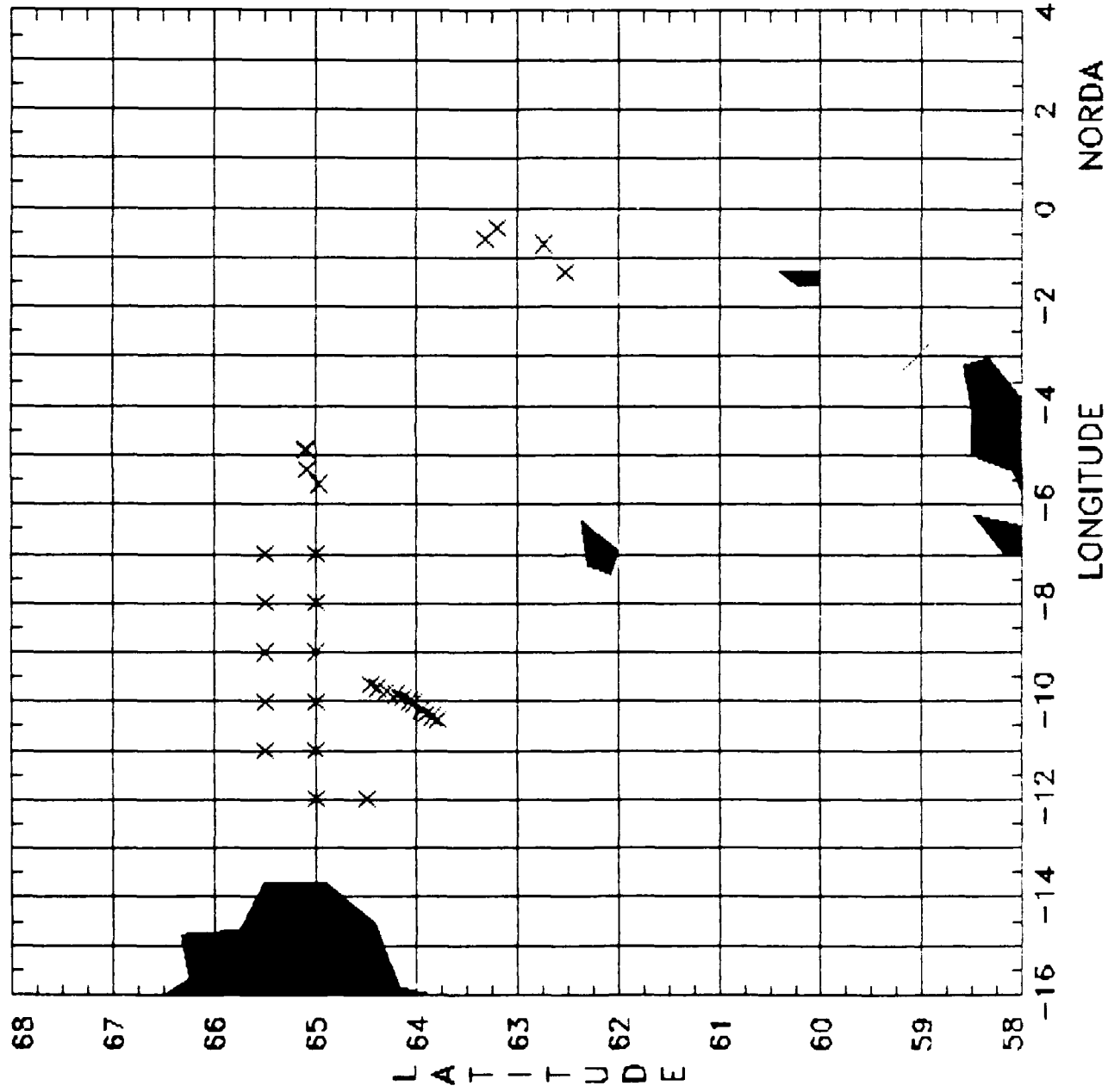


25 XBTs

18 April 88 / Proud Runner

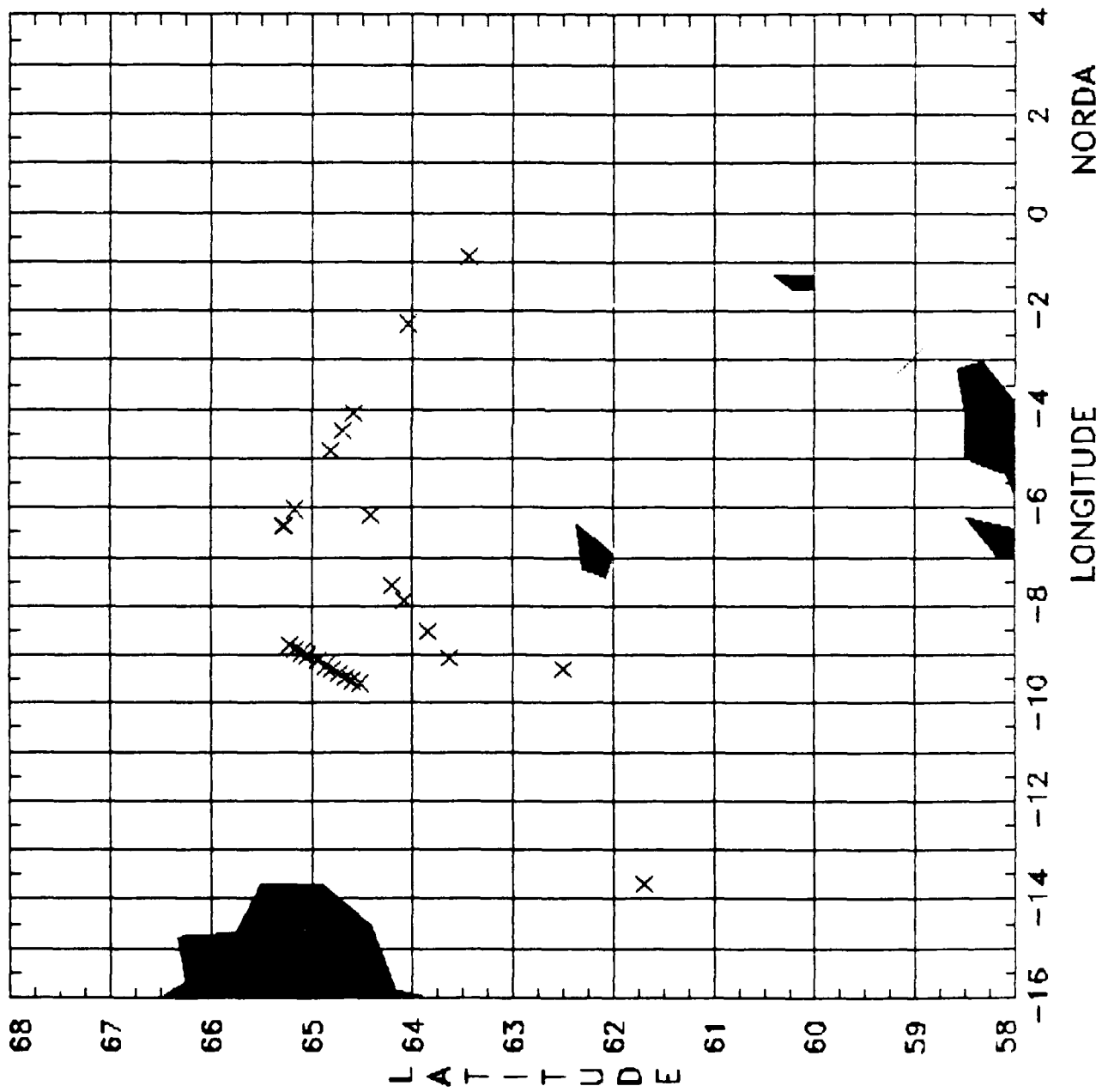


36 XBTs 19 April 88 / Proud Runner

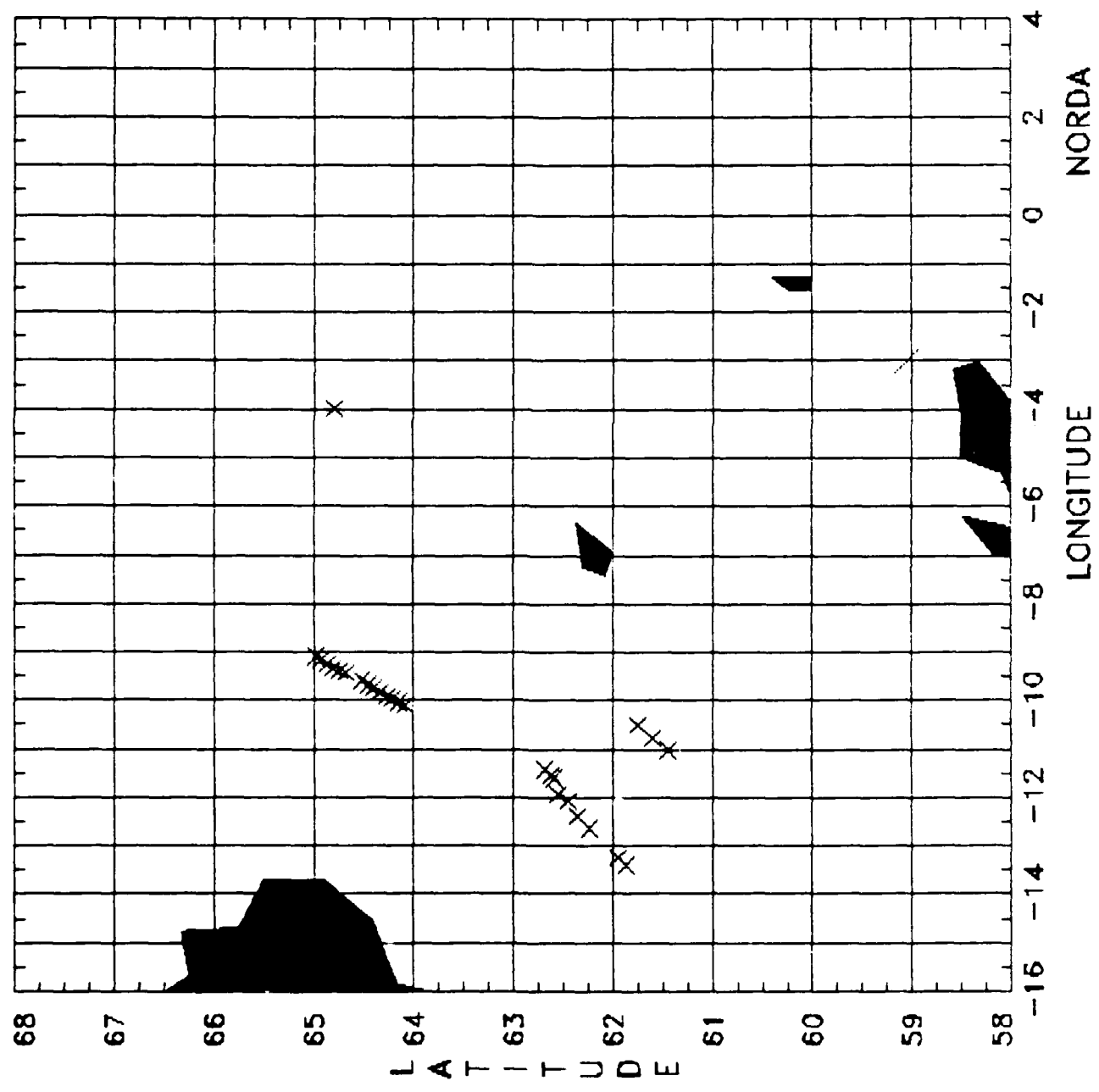


27 XBTs

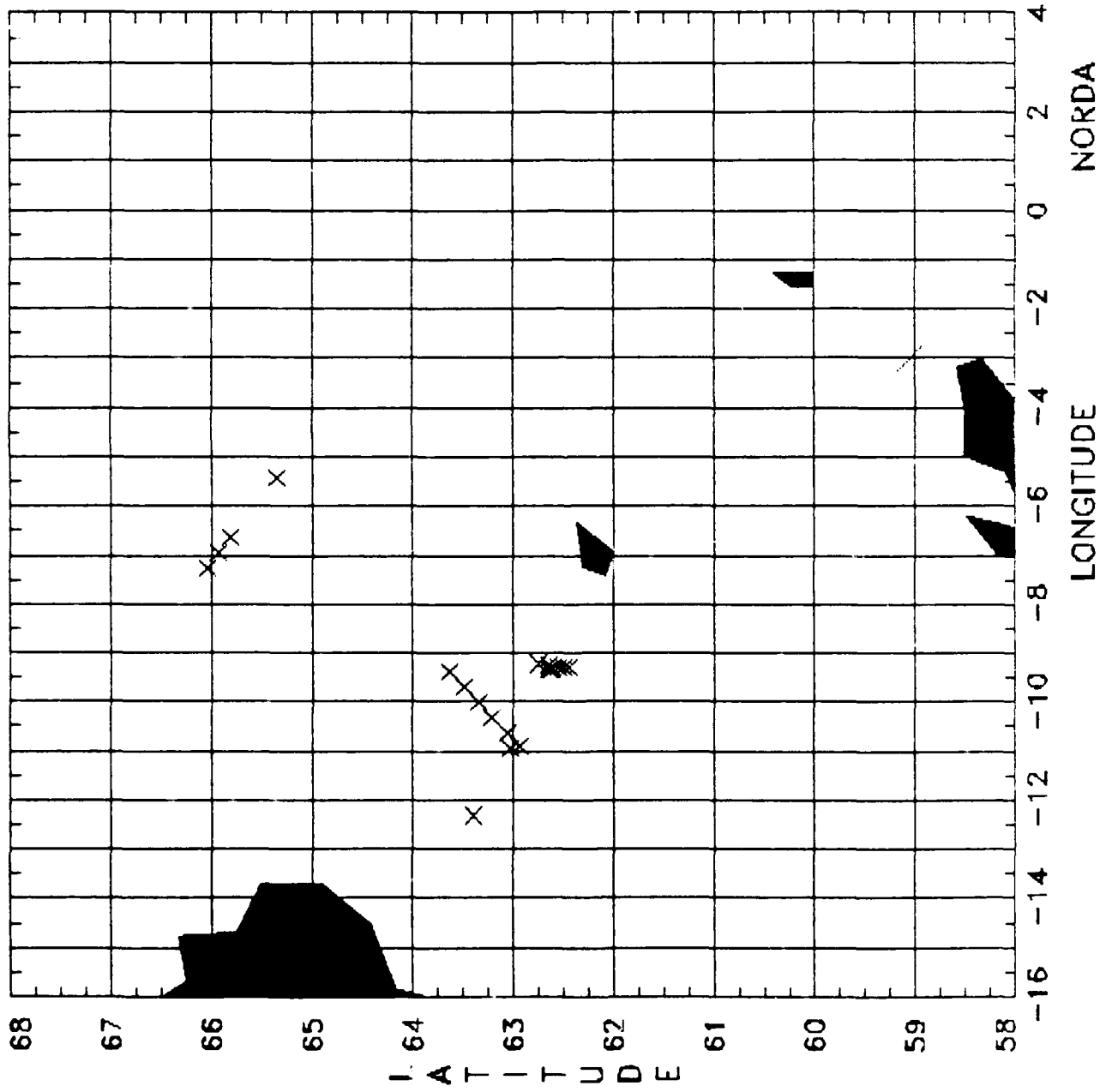
20 April 88 / Proud Runner



28 XBTs 21 April 88 / Proud Runner

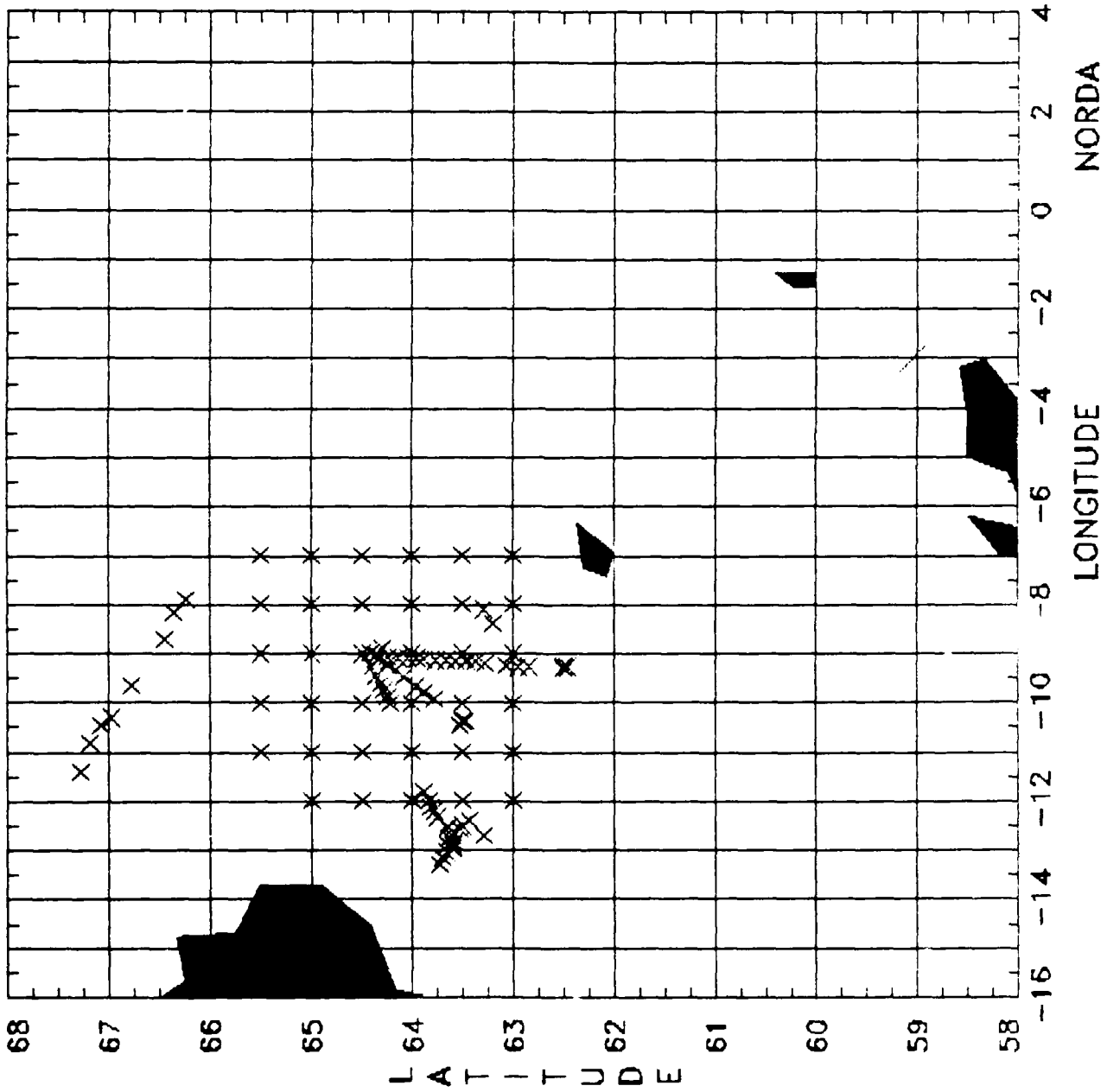


19 XBTs 22 April 88 / Proud Runner



107 XBTs

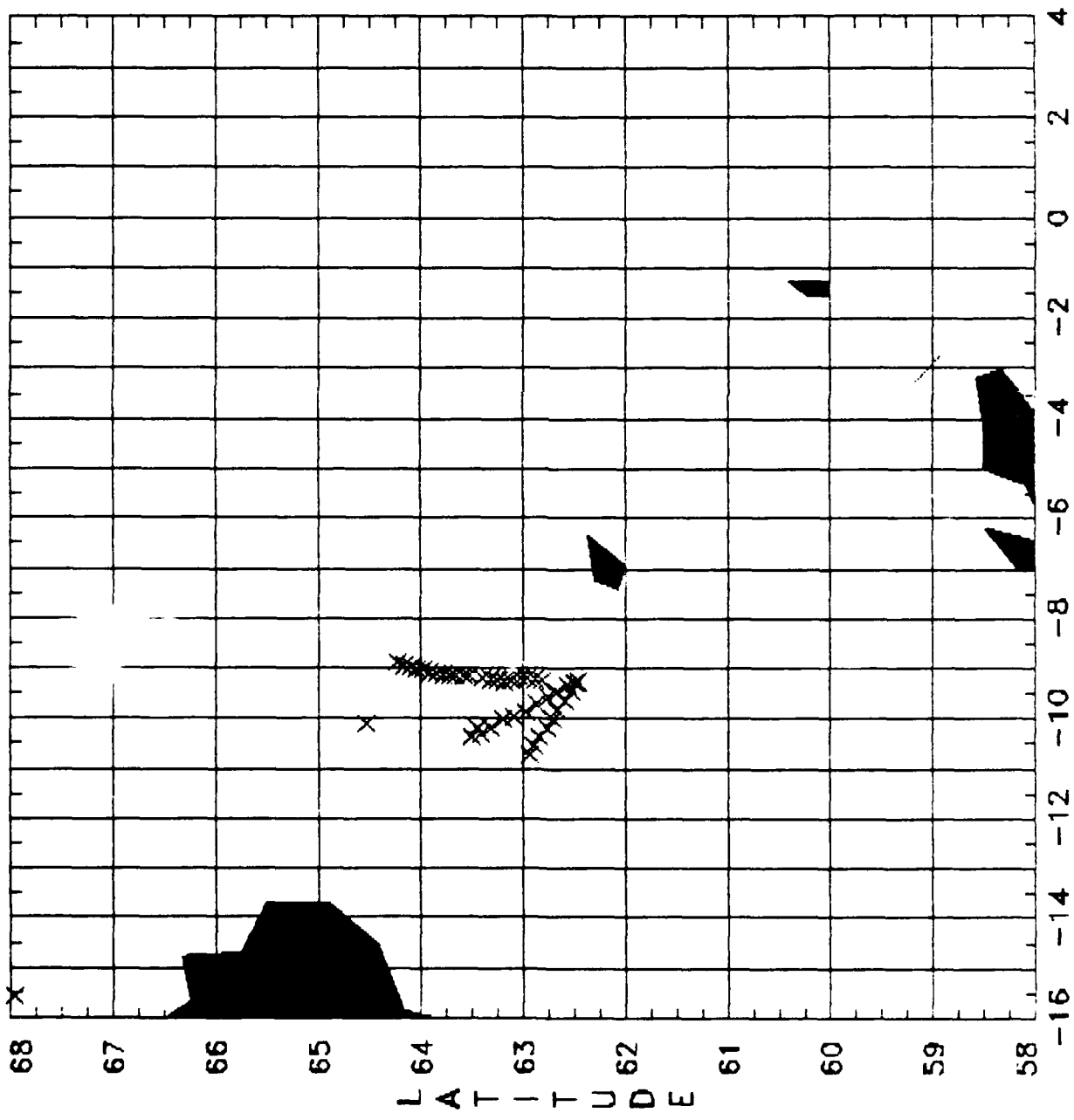
23 April 88 / Proud Runner





XX 52 XBTs

25 April 88 / Proud Runner

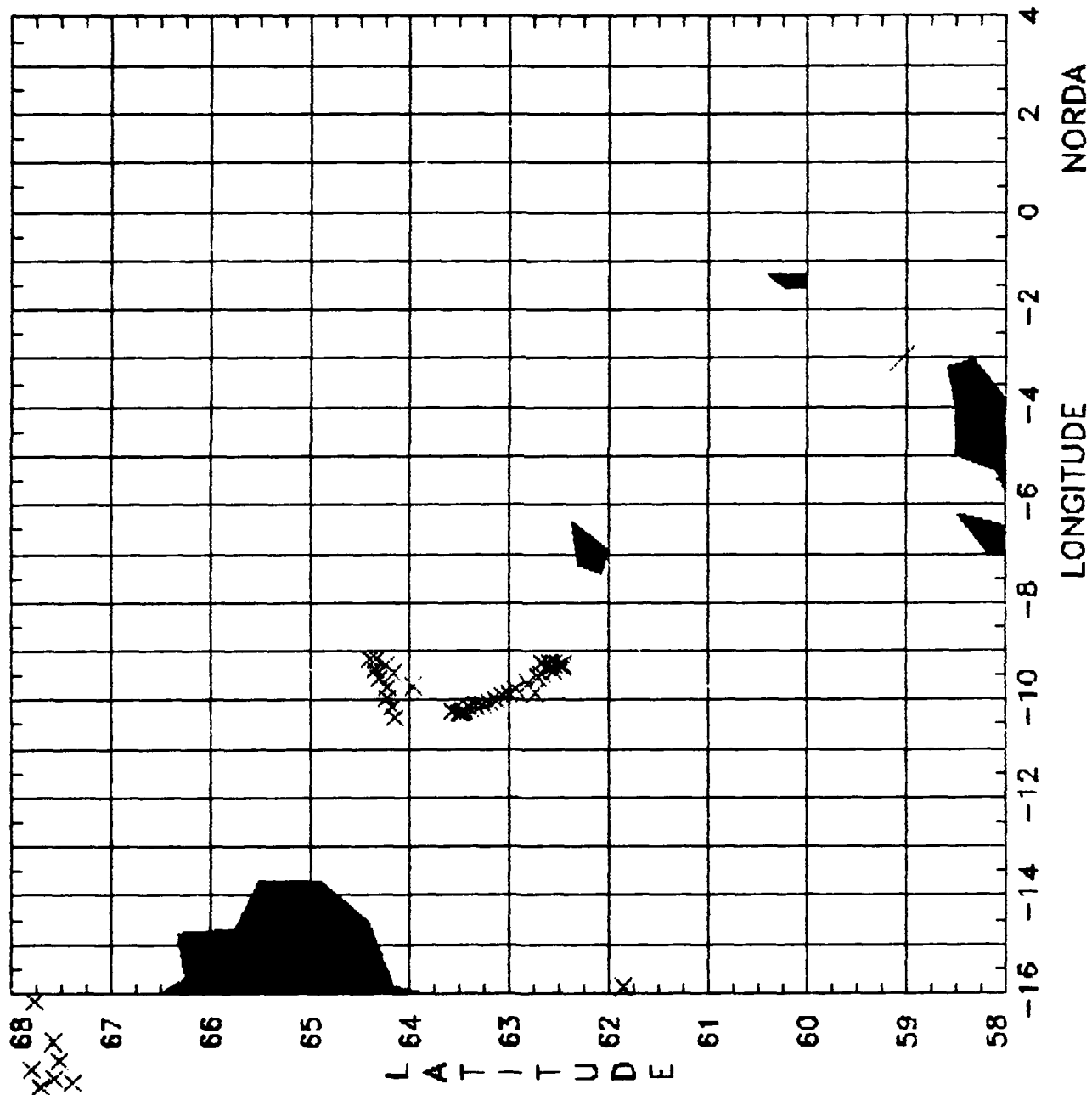


LONGITUDE

NORDA

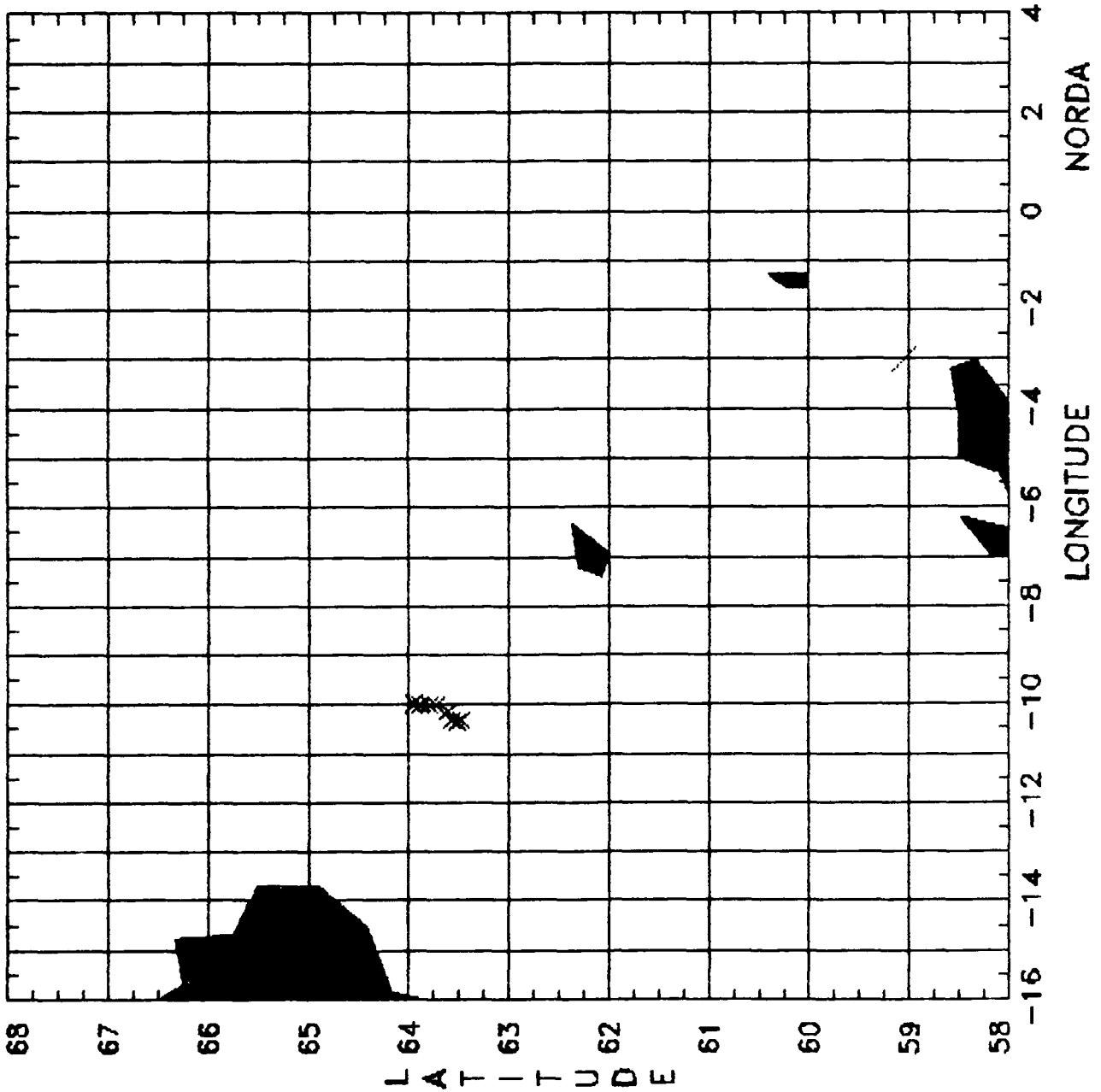


52 XBTs 26 April 88 / Proud Runner



27 April 88 / Proud Runner

10 XBTs



x

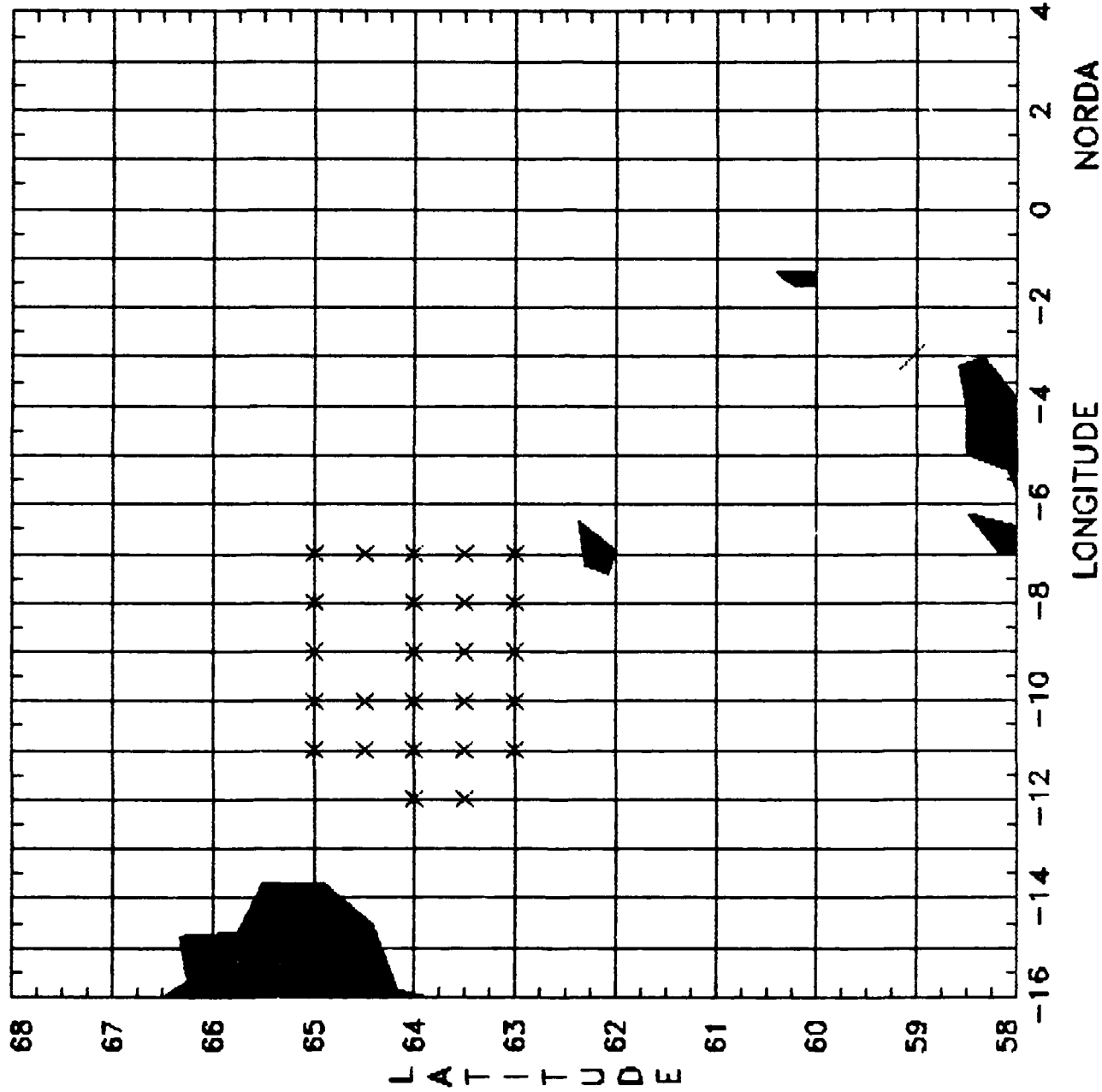
L A T T I T U D E

L O N G I T U D E



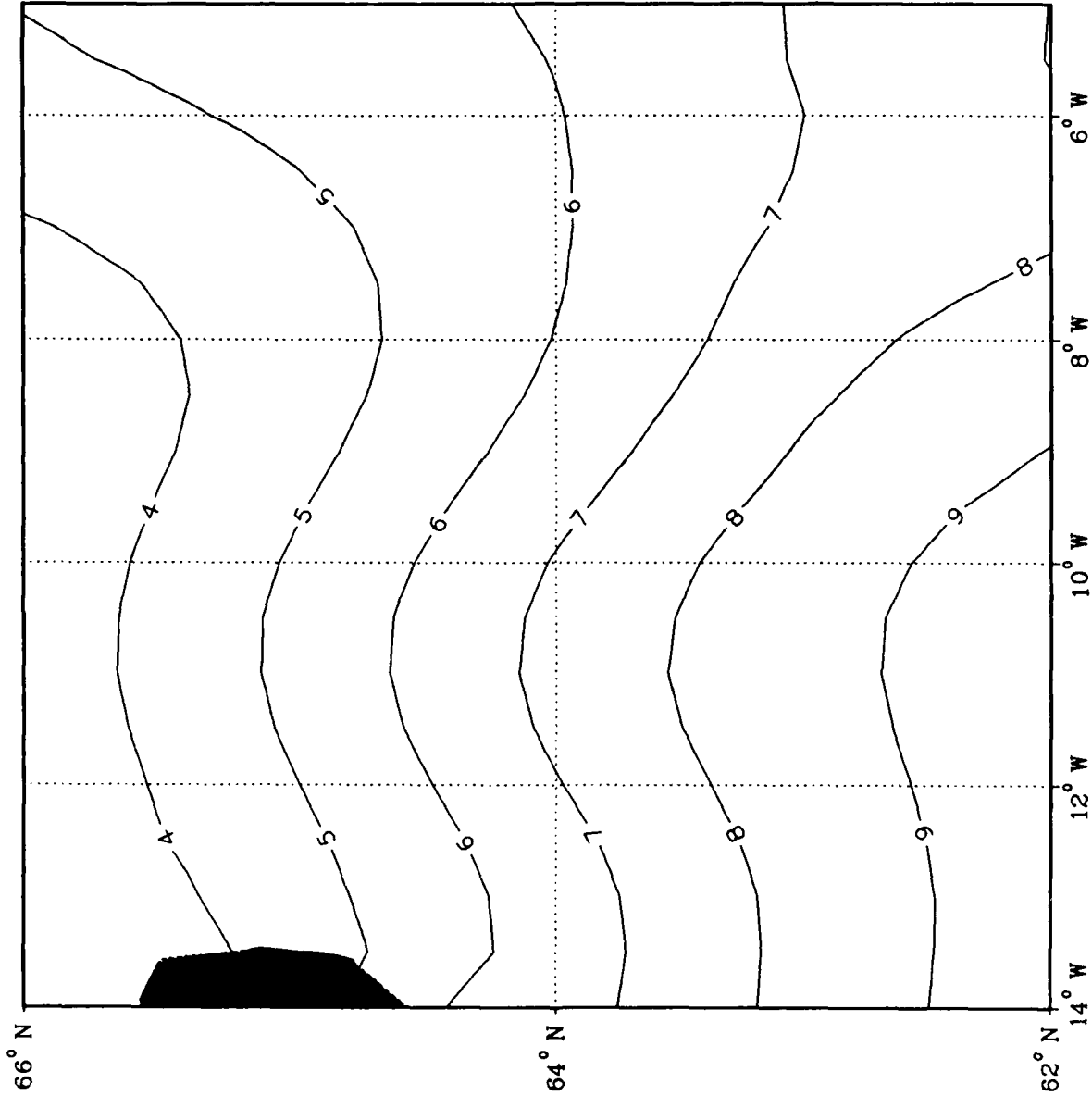
25 XBTs

28 April 88 / Proud Runner

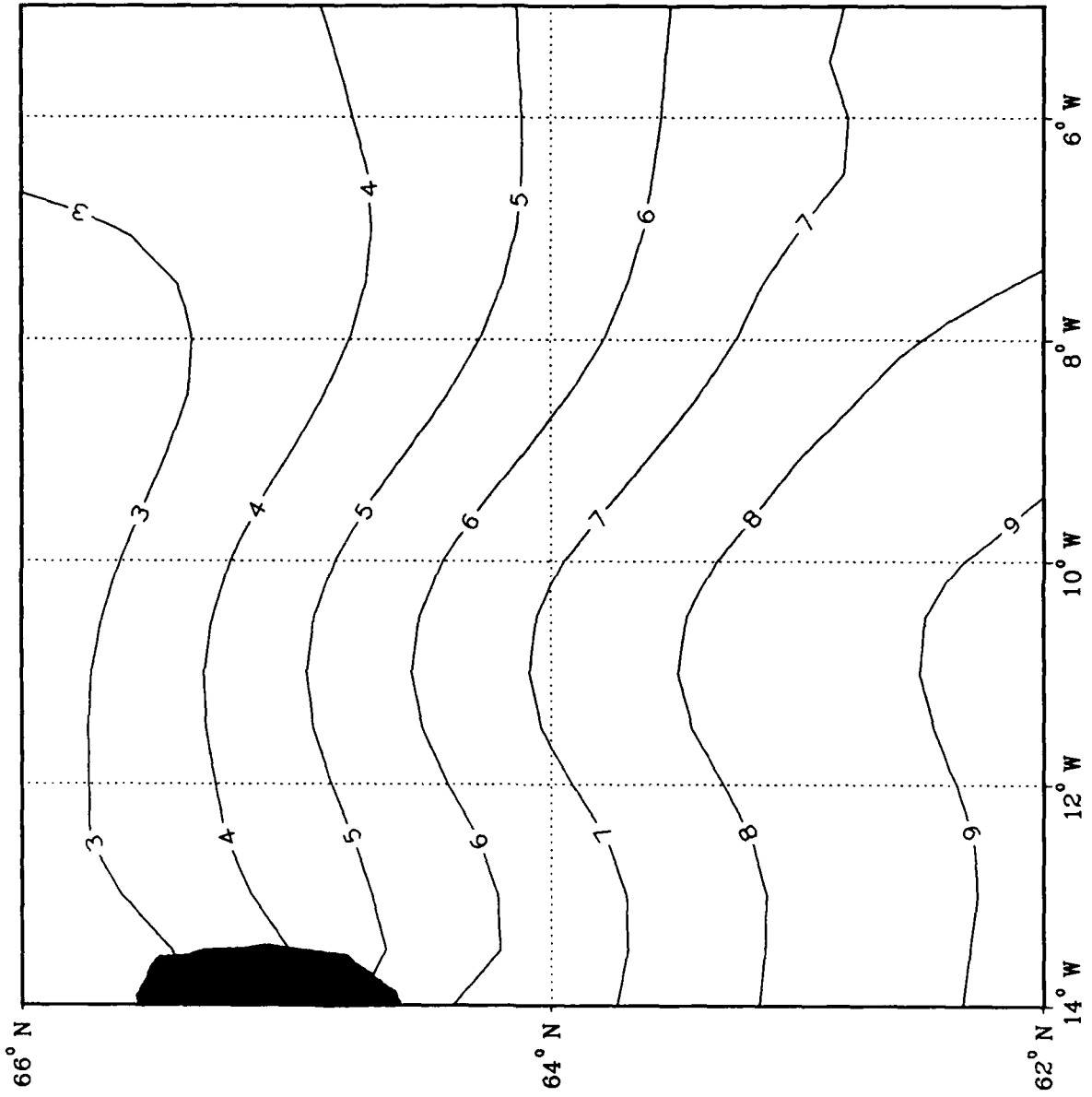


**Figures 14 - 19: Spring season temperature fields at 0, 50, 100, 200, 250, and 300 m from the GDEM climatology for the RESOLUTE SUPPORT/PROUD RUNNER study area.**

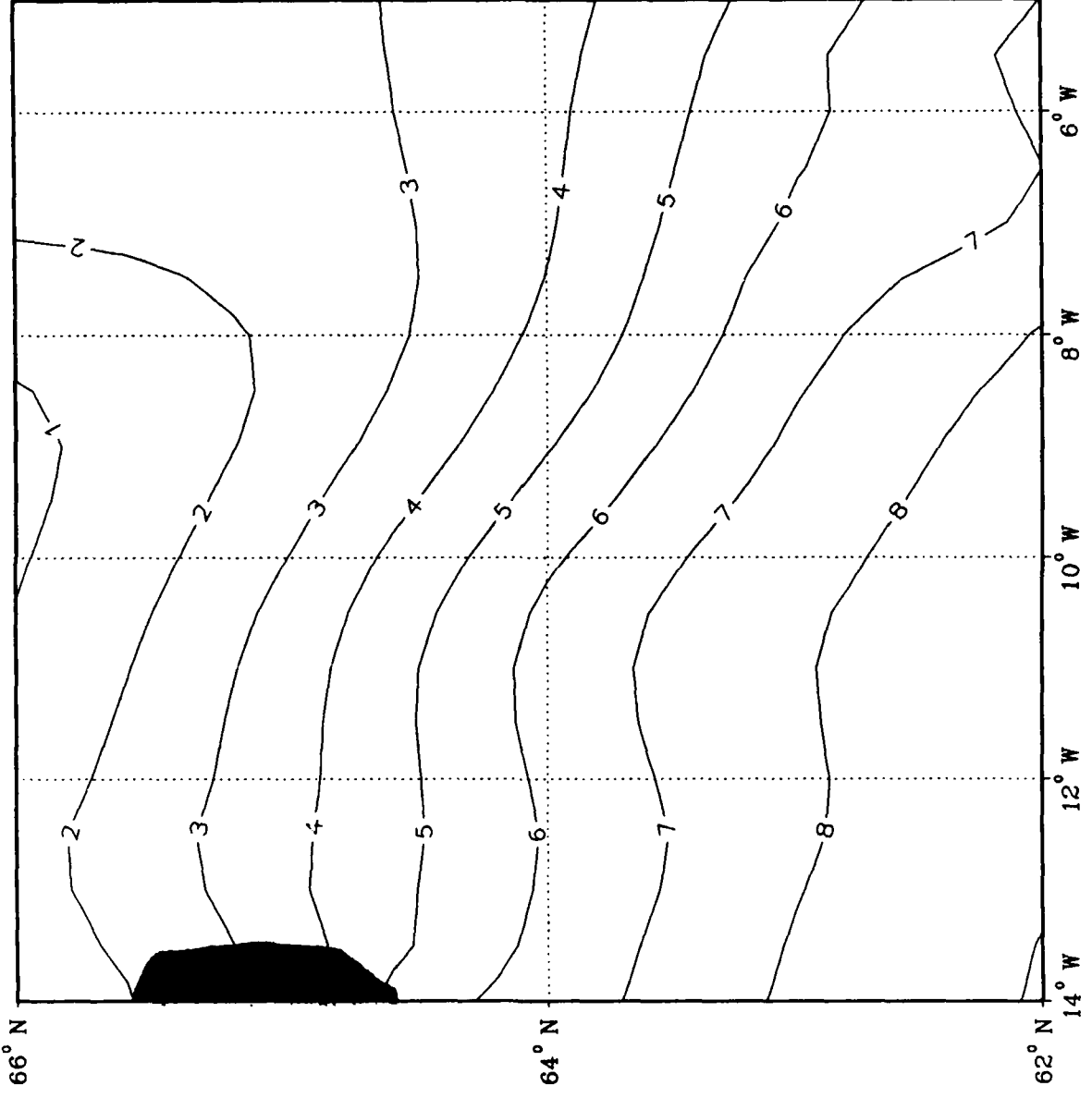
Temperature  
GDEM (Spring)  
0 meters



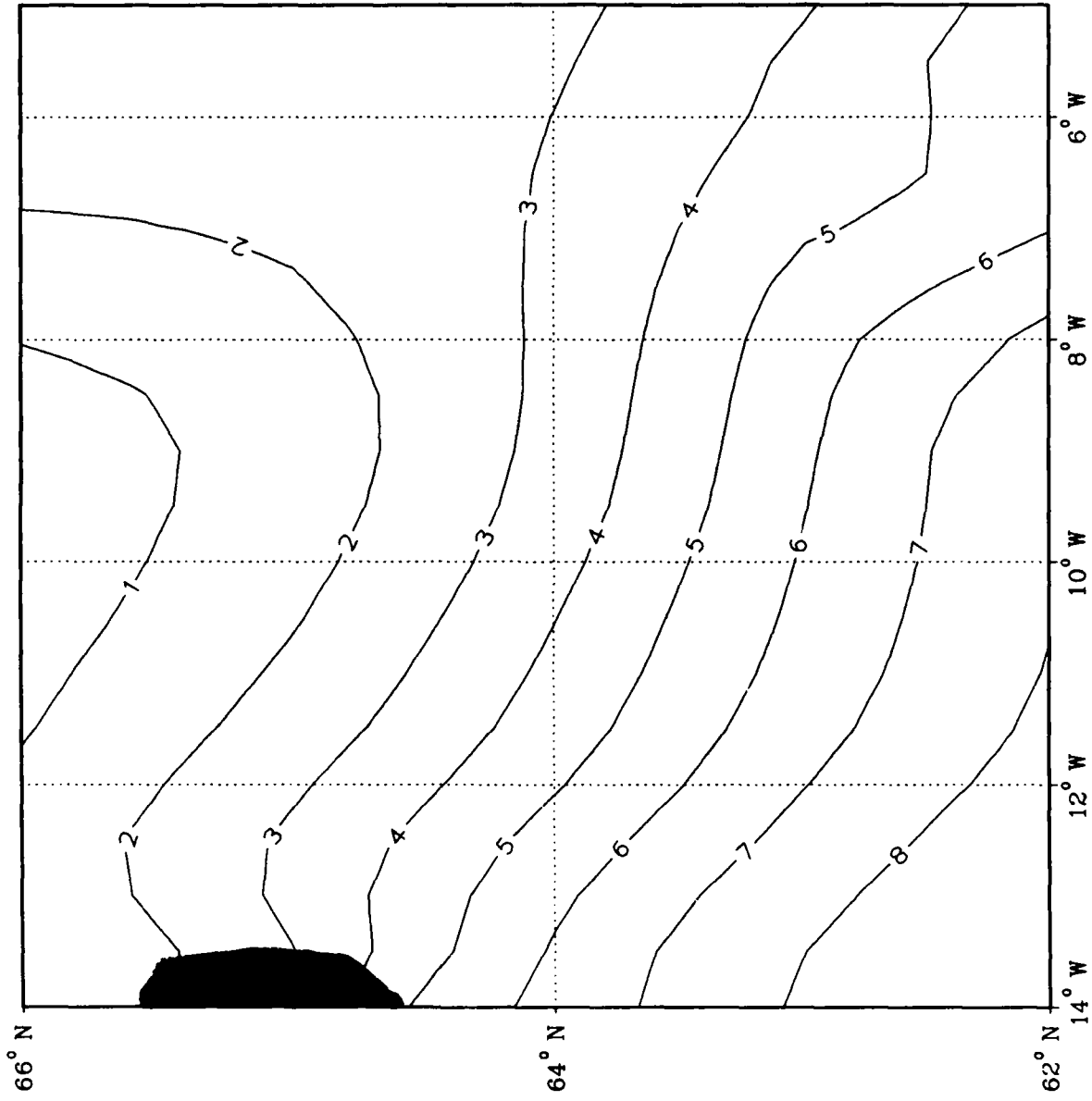
Temperature  
GDEM (Spring)  
50 meters



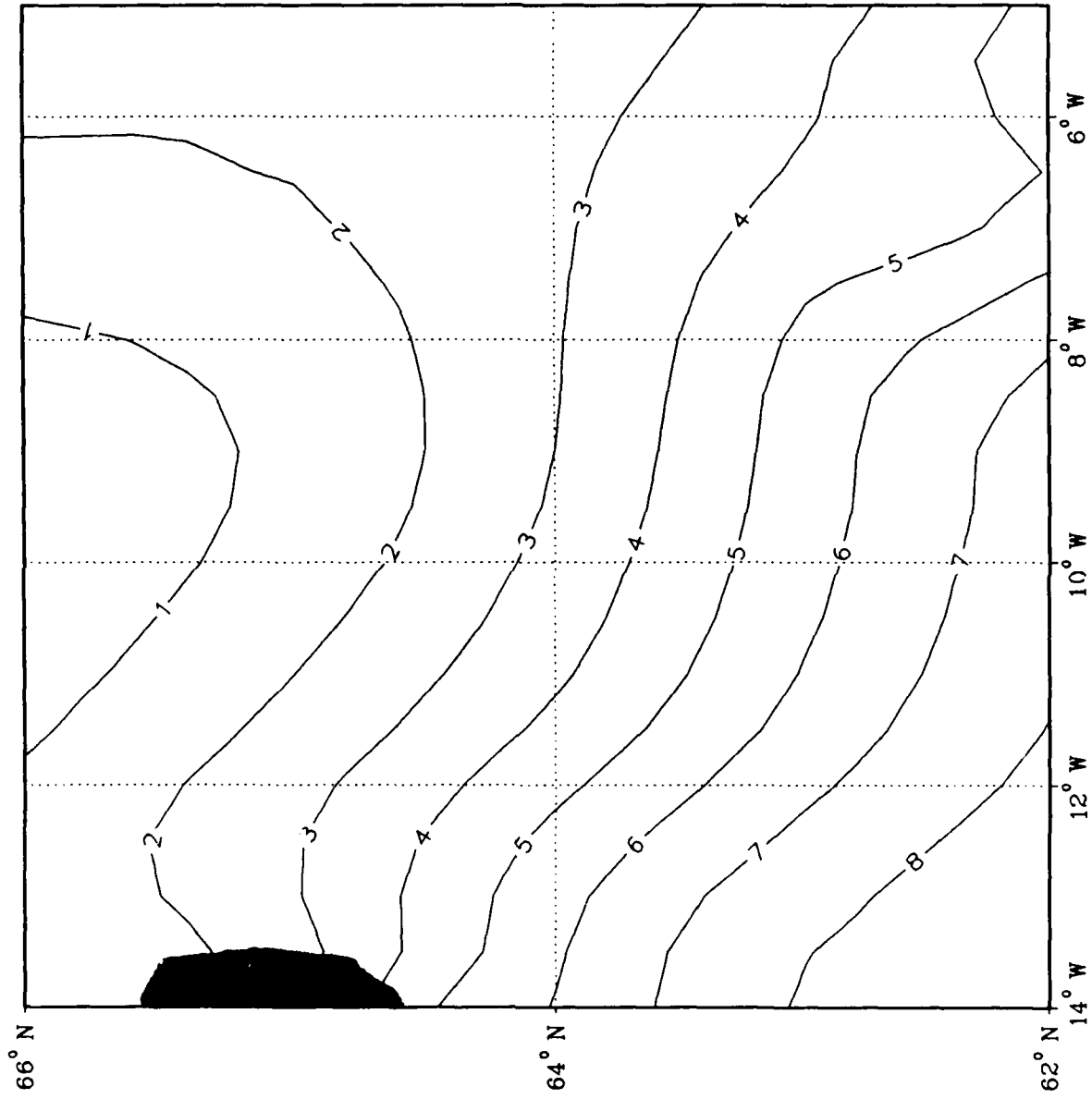
Temperature  
GDEM (Spring)  
100 meters



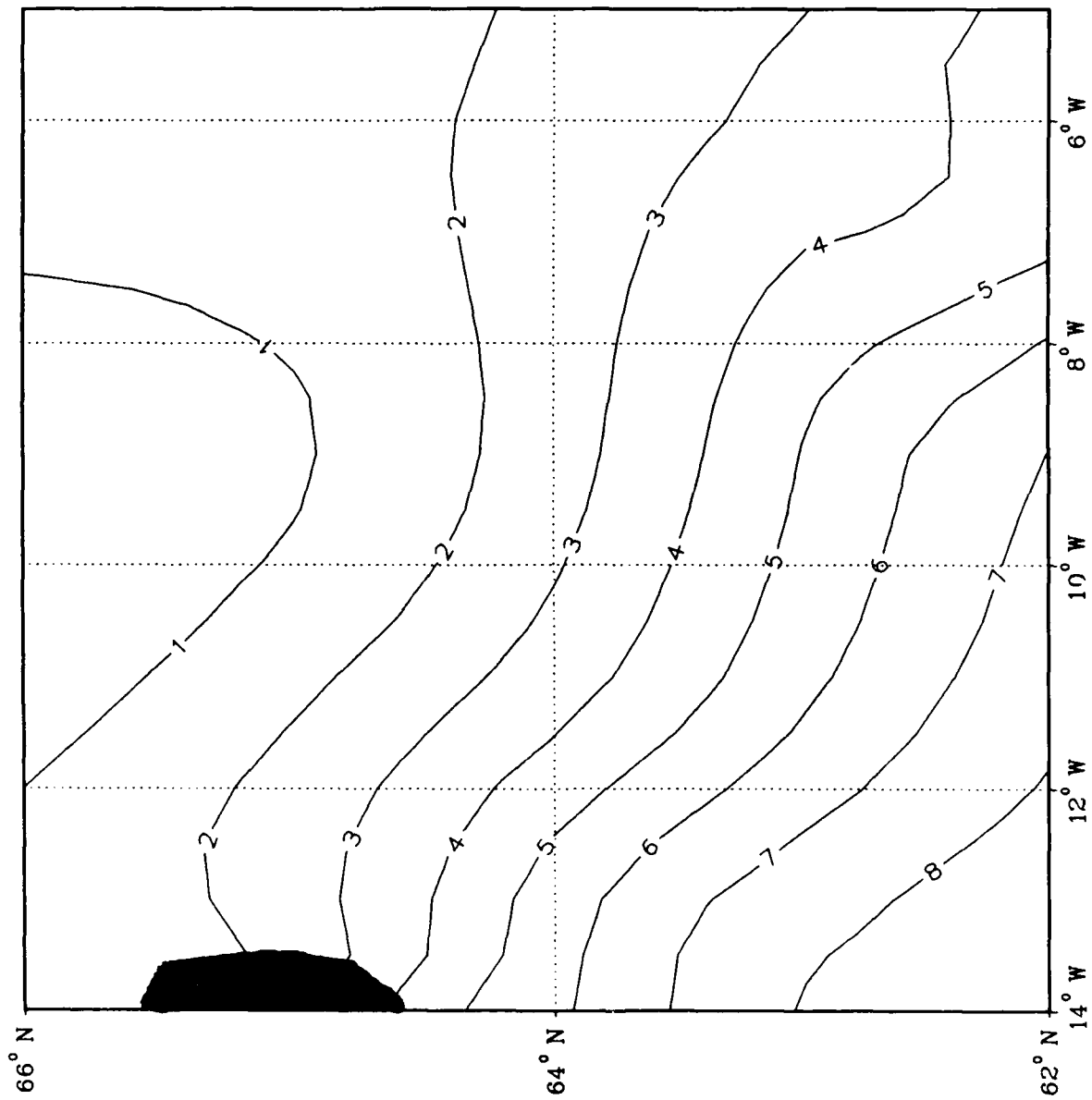
Temperature  
GDEM (Spring)  
200 meters



Temperature  
GDEM (Spring)  
250 meters

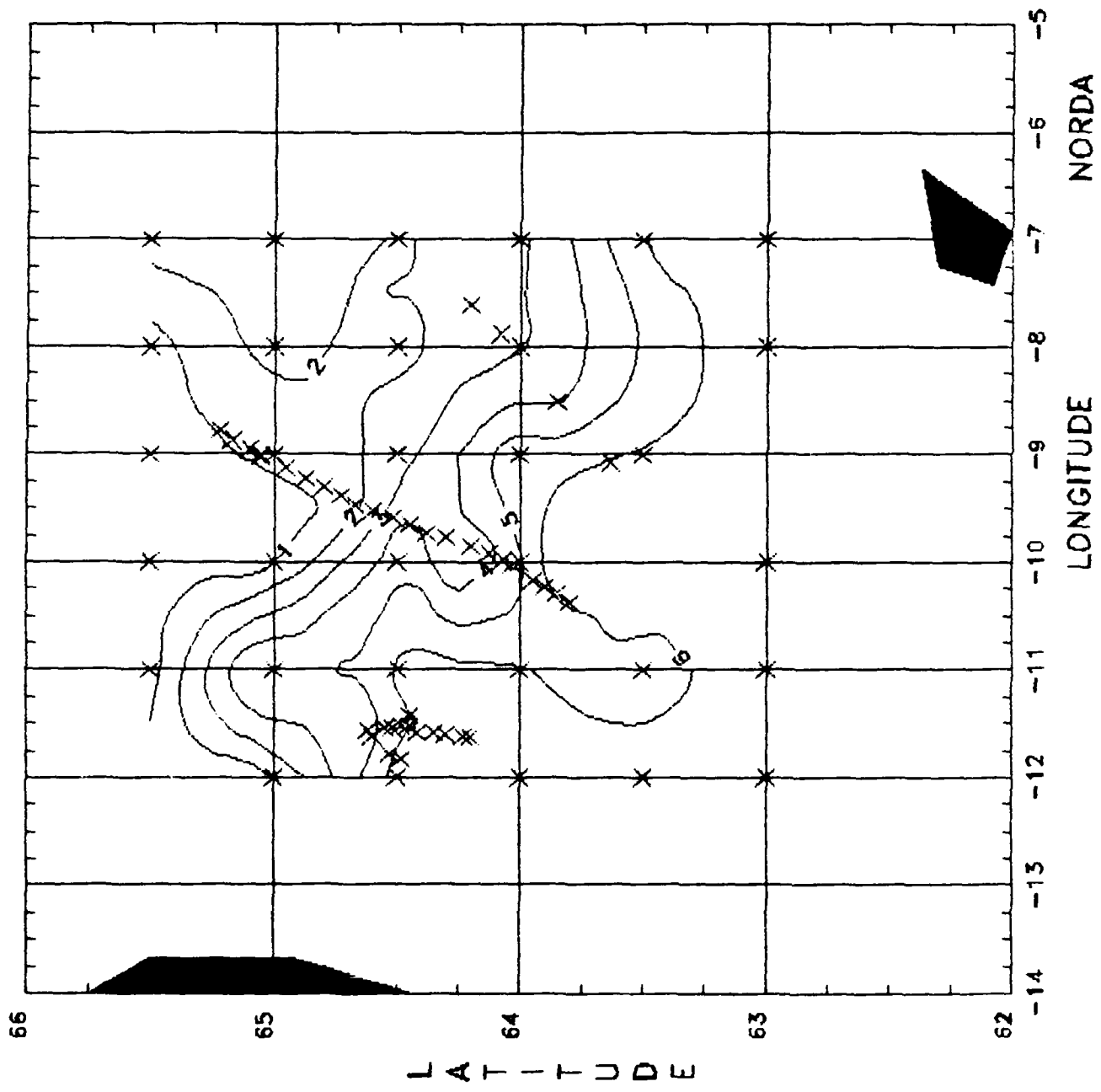


Temperature  
GDEM (Spring)  
300 meters

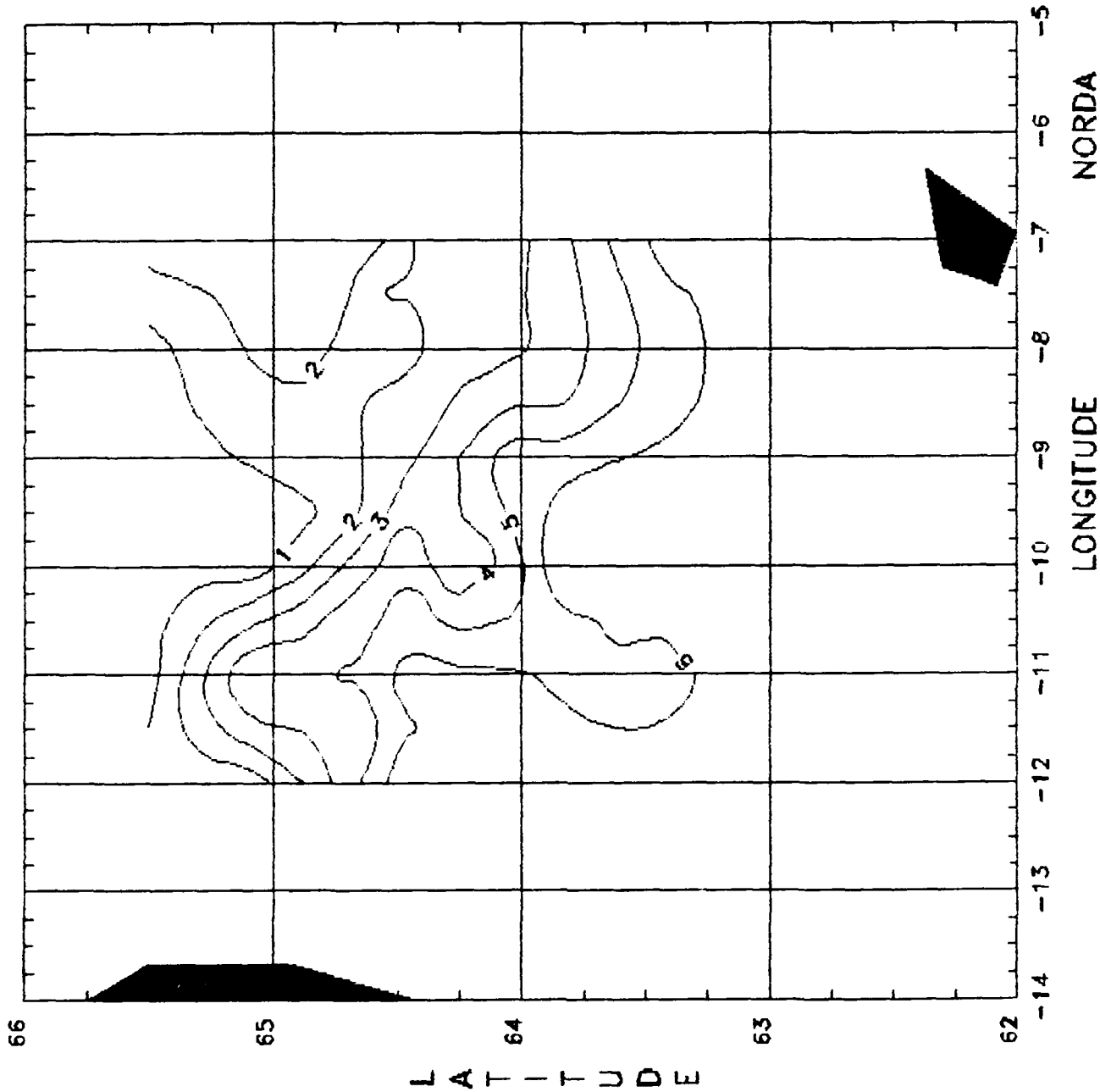


Figures 20 - 26: Station positions and temperature fields at 0, 50, 100, 200, 250, and 300 m in the RESOLUTE SUPPORT/PROUD RUNNER study area, 17 - 20 April 1988.

0 METERS 17 - 20 April 88 /Proud Runner



0 METERS 17 - 20 April 88 /Proud Runner



NORDA

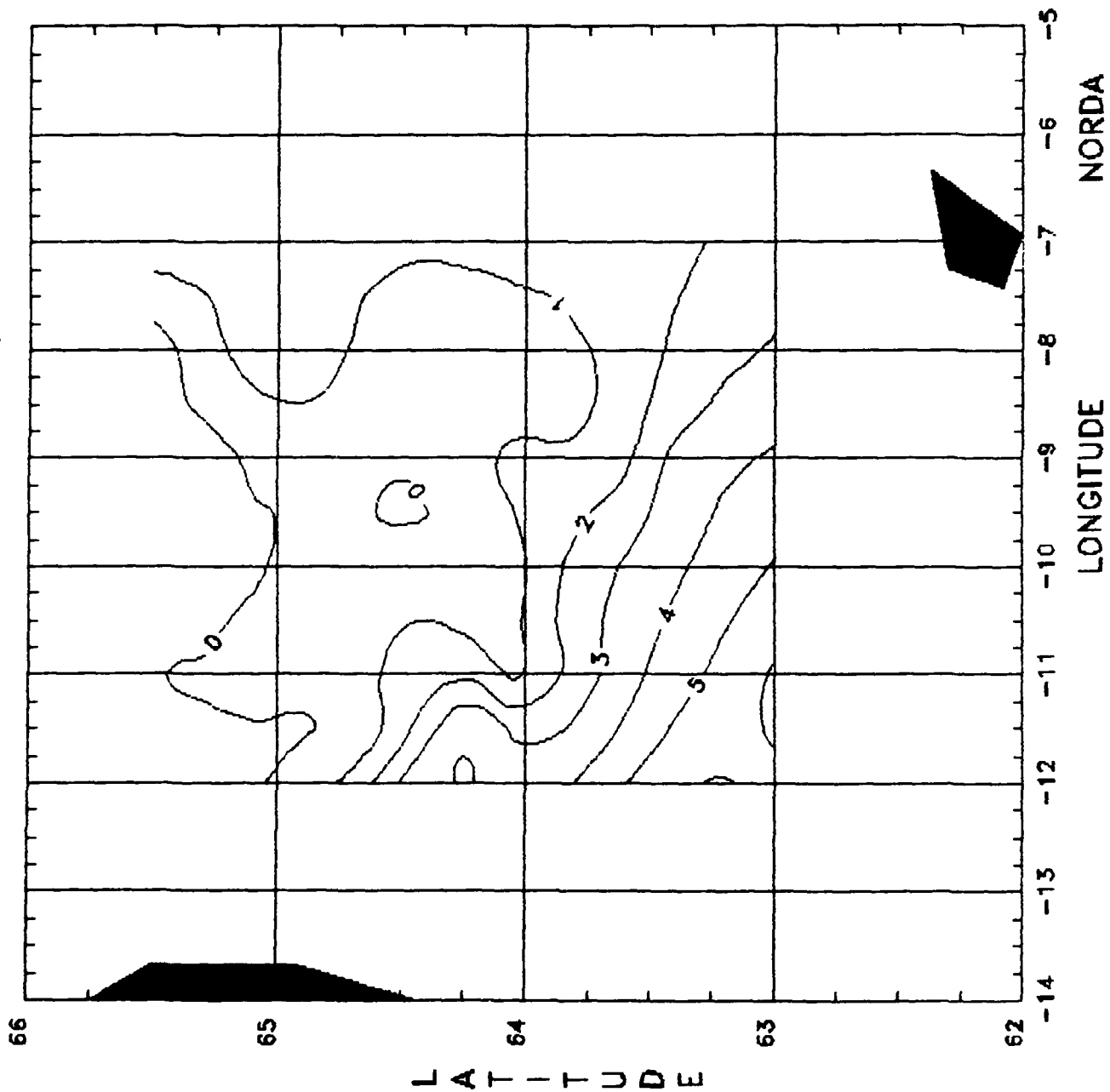








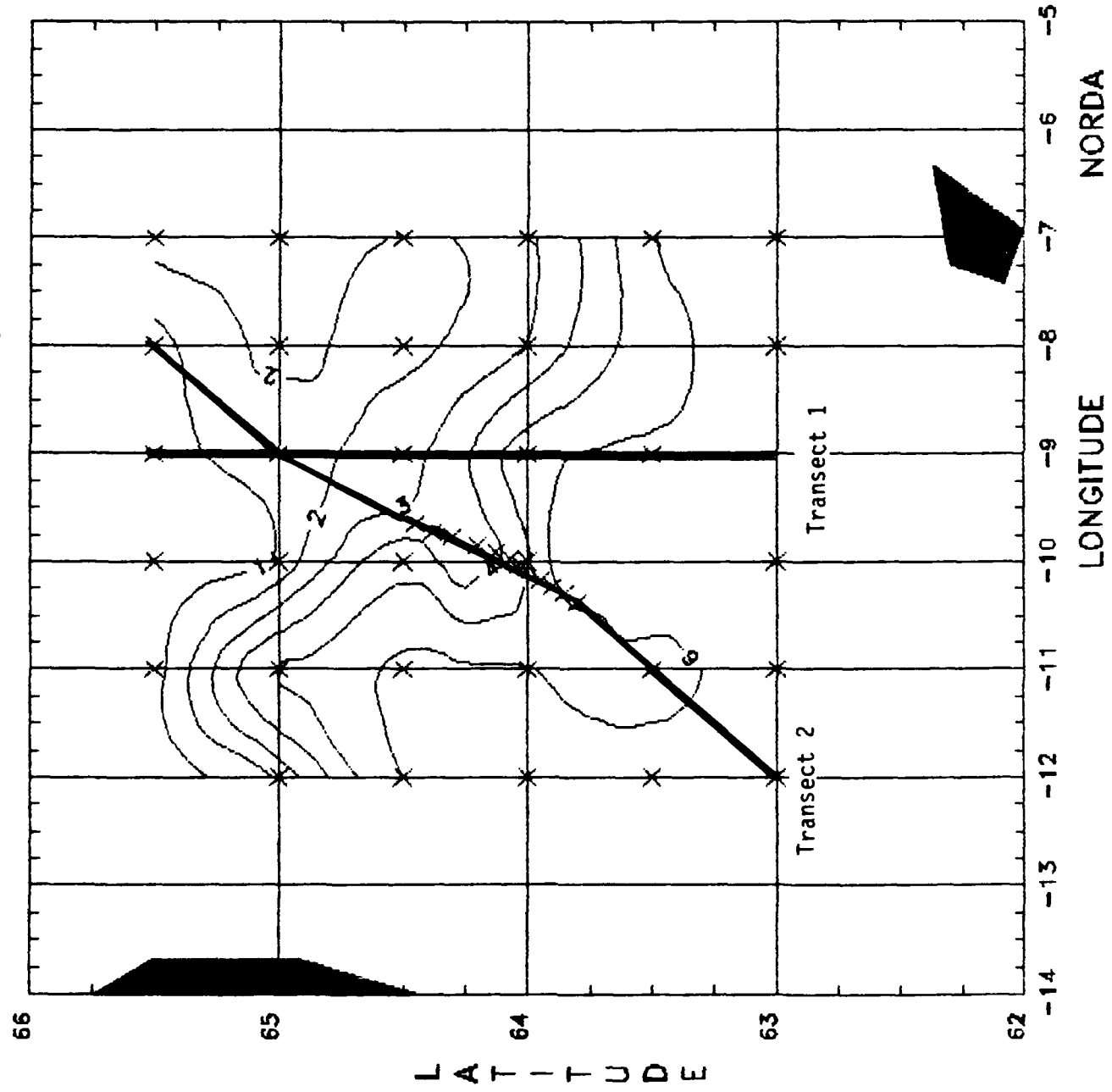
300 METERS 17 - 20 April 88 /Proud Runner



NORDA

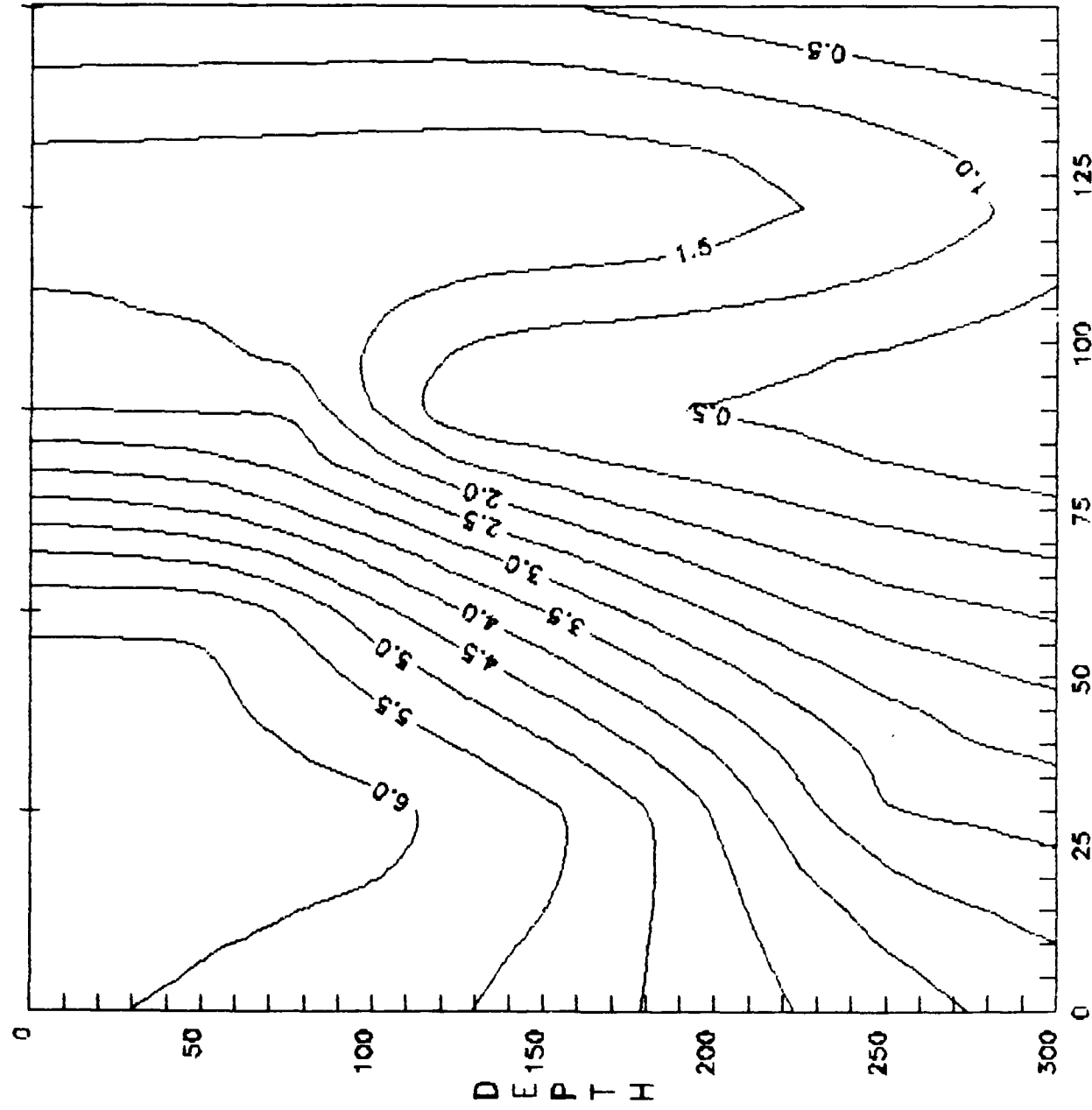
**Figures 27 - 29: Station locations and selected vertical temperature transects through the RESOLUTE SUPPORT/PROUD RUNNER study area, 18 - 19 April 1988.**

0 METERS 18 - 19 April 88 / Proud Runner



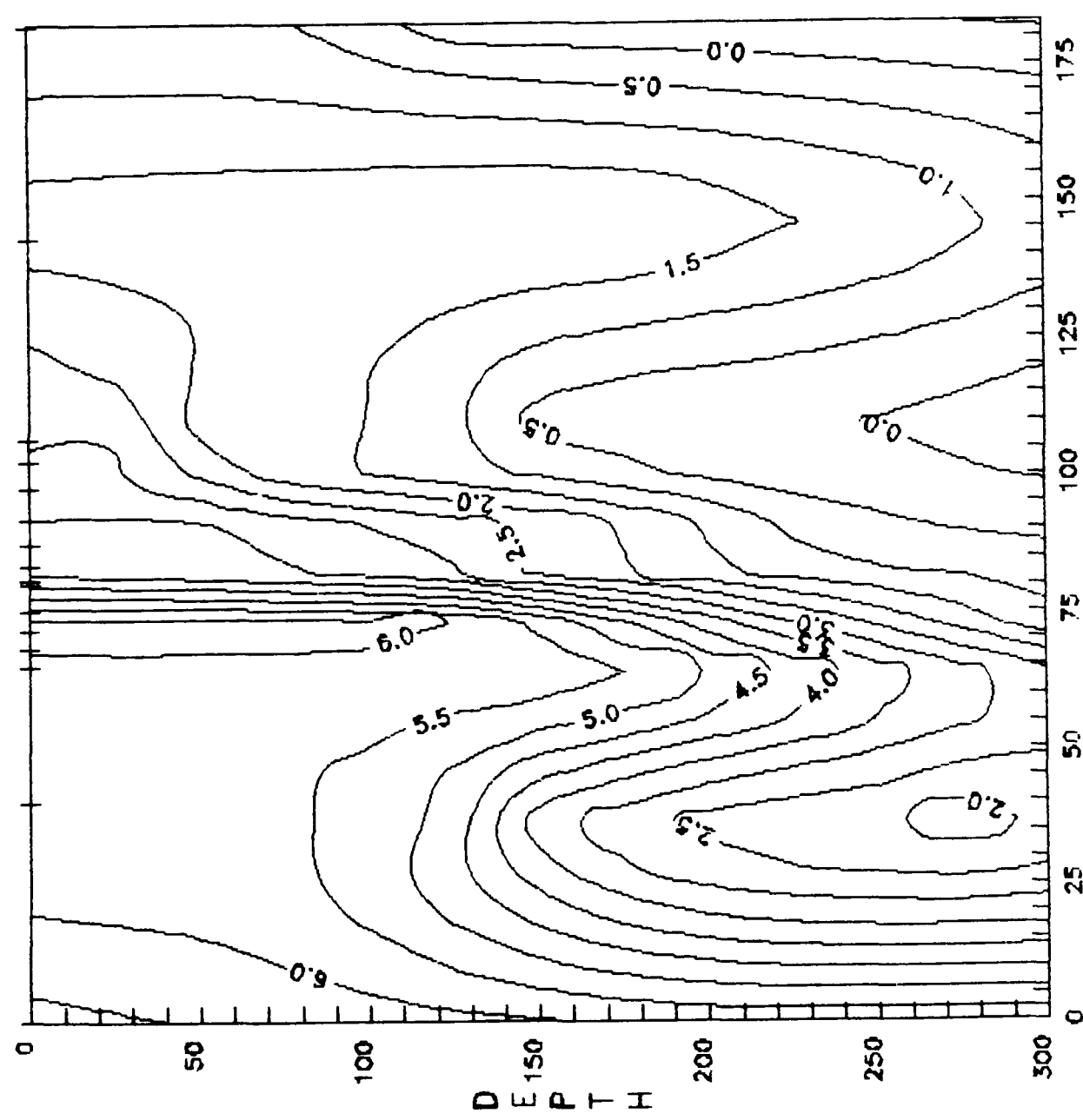
NORDA

18 - 19 April 88 / Proud Runner  
-9.00, 63.00                      -9.00, 65.50



RANGE IN NAUTICAL MILES    NORDA

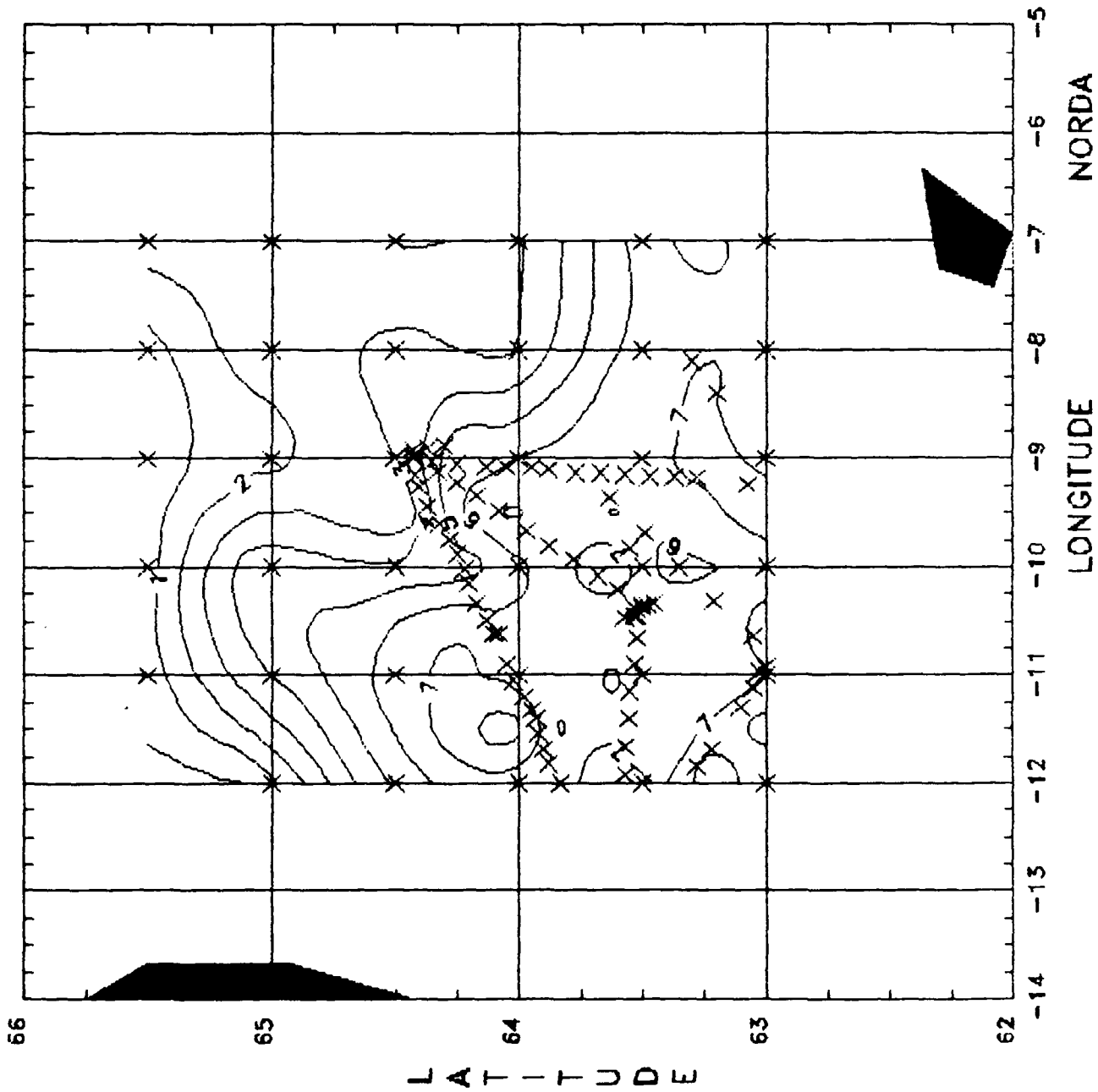
18 - 19 April 88 / Proud Runner  
-12.00, 63.00 -8.00, 65.50



RANGE IN NAUTICAL MILES NORDA

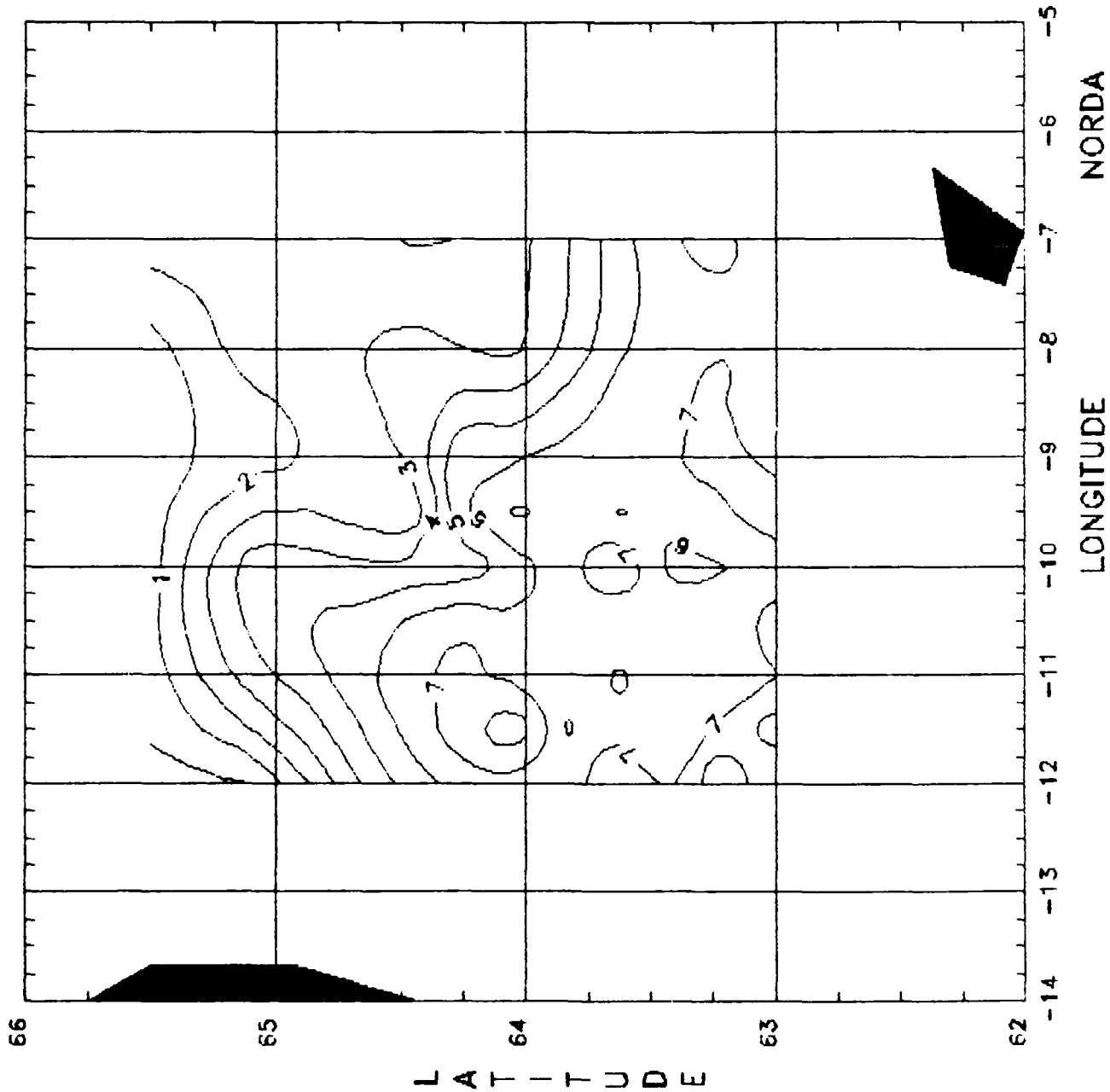
**Figures 30 - 36: Station positions and temperature fields at 0, 50, 100, 200, 250, and 300 m in the RESOLUTE SUPPORT/PROUD RUNNER study area, 22 - 24 April 1988.**

0 METERS 22 - 24 April 88 /Proud Runner



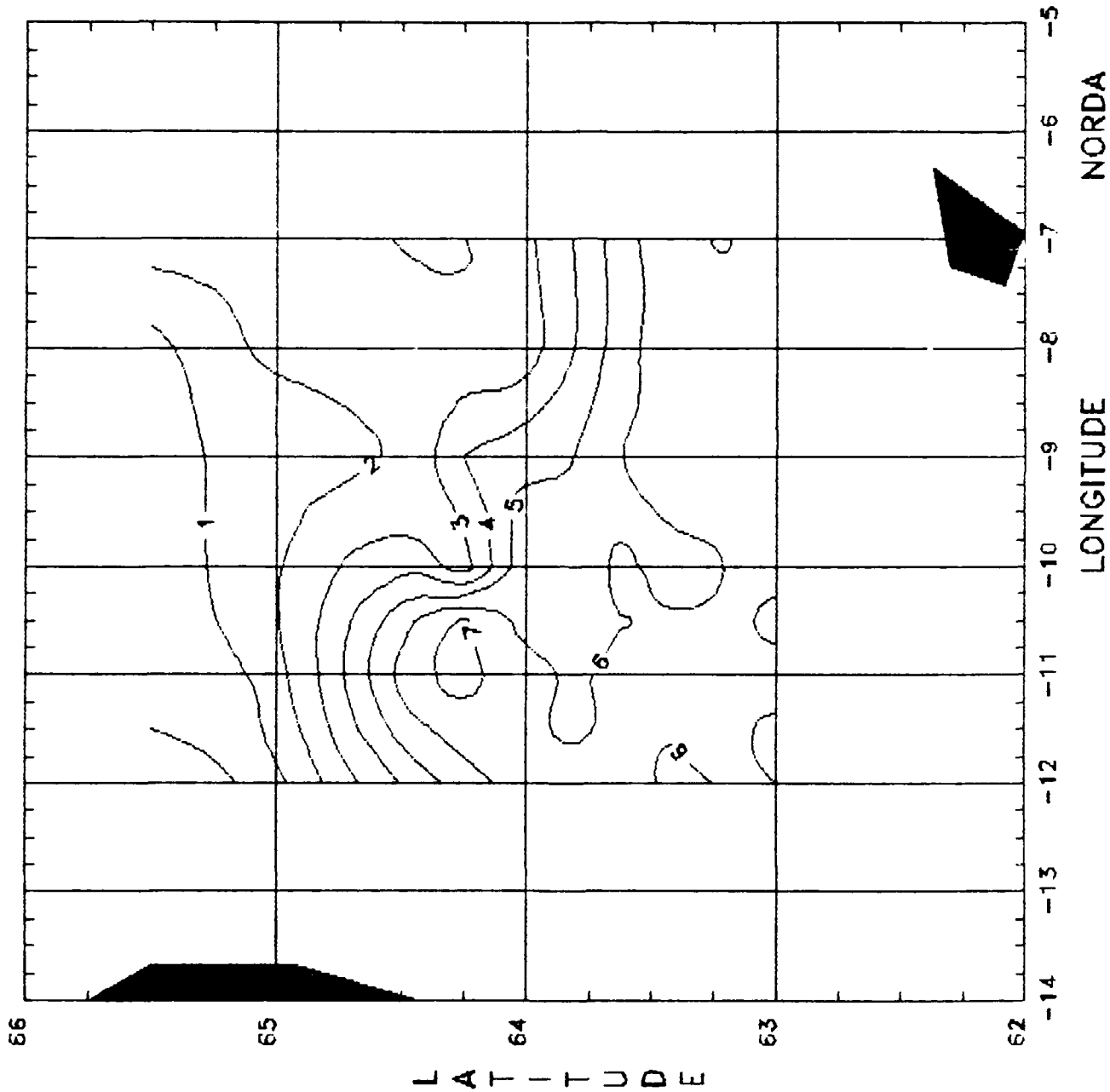
NORDA

0 METERS 22 - 24 April 88 /Proud Runner



NORDA

50 METERS 22 - 24 April 88 /Proud Runner

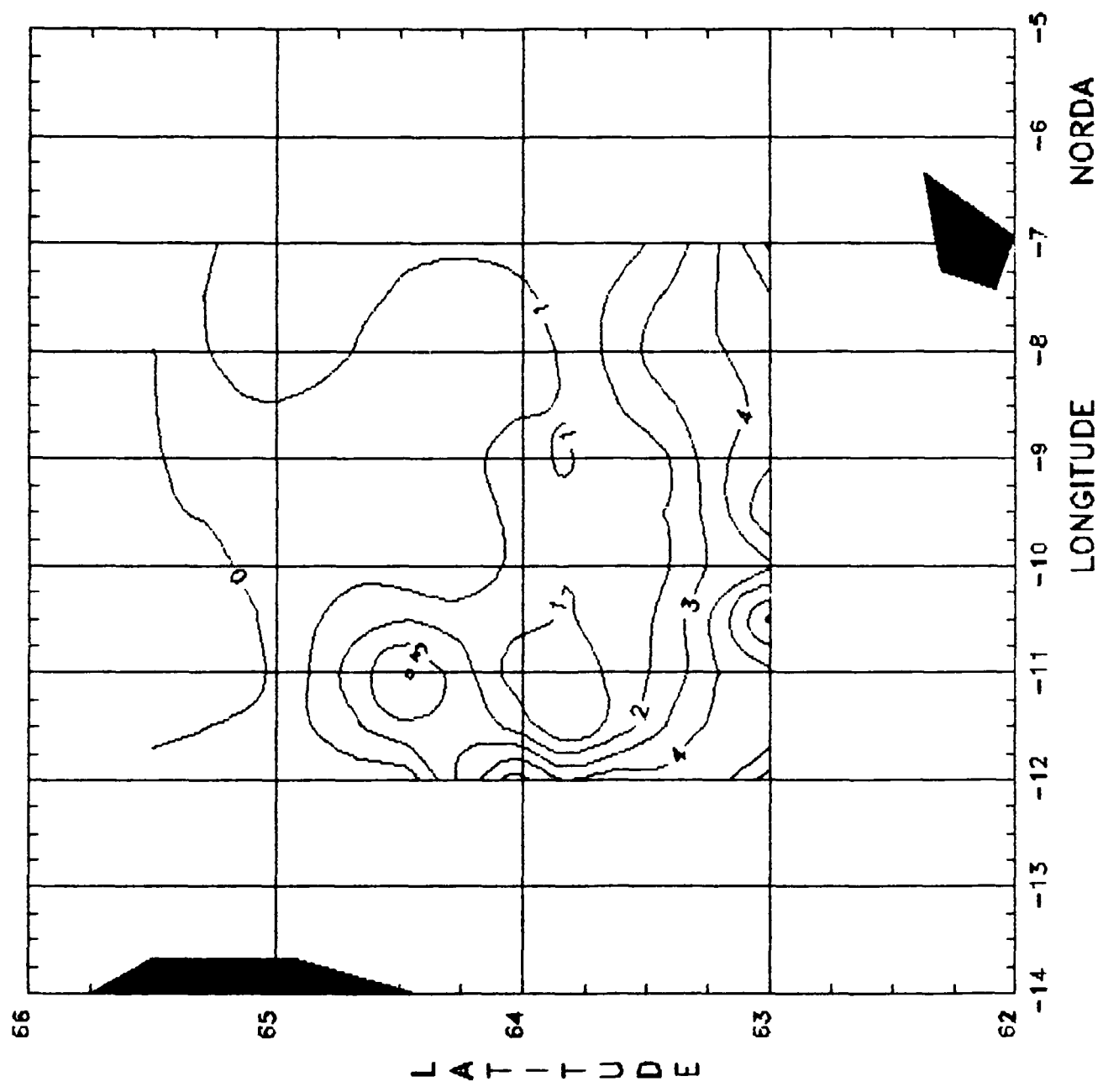






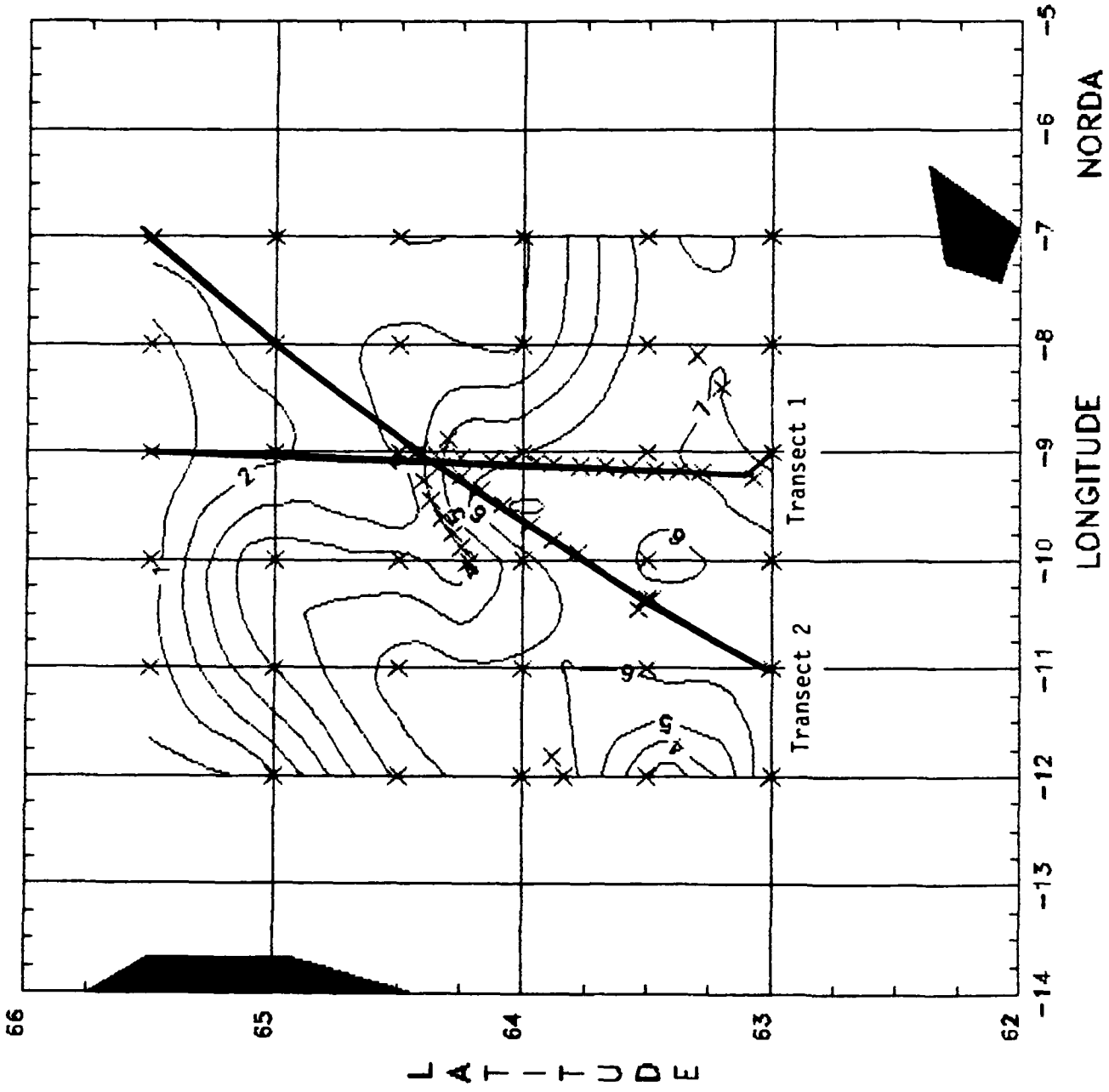


300 METERS 22 - 24 April 88 / Proud Runner

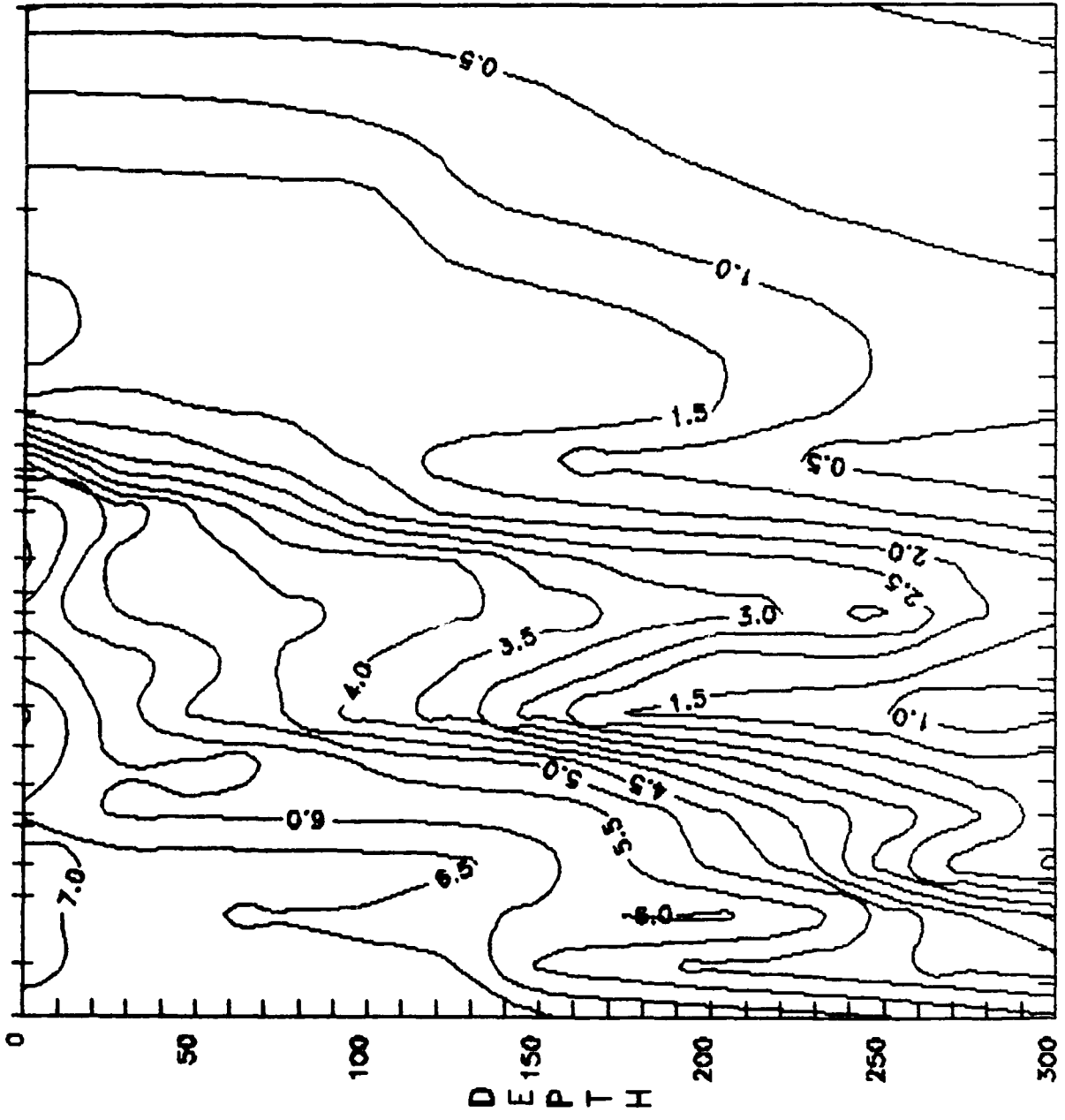


**Figures 37 - 39: Station locations and selected vertical temperature transects through the RESOLUTE SUPPORT/PROUD RUNNER study area, 23 April 1988.**

0 METERS 23 April 88 / Proud Runner



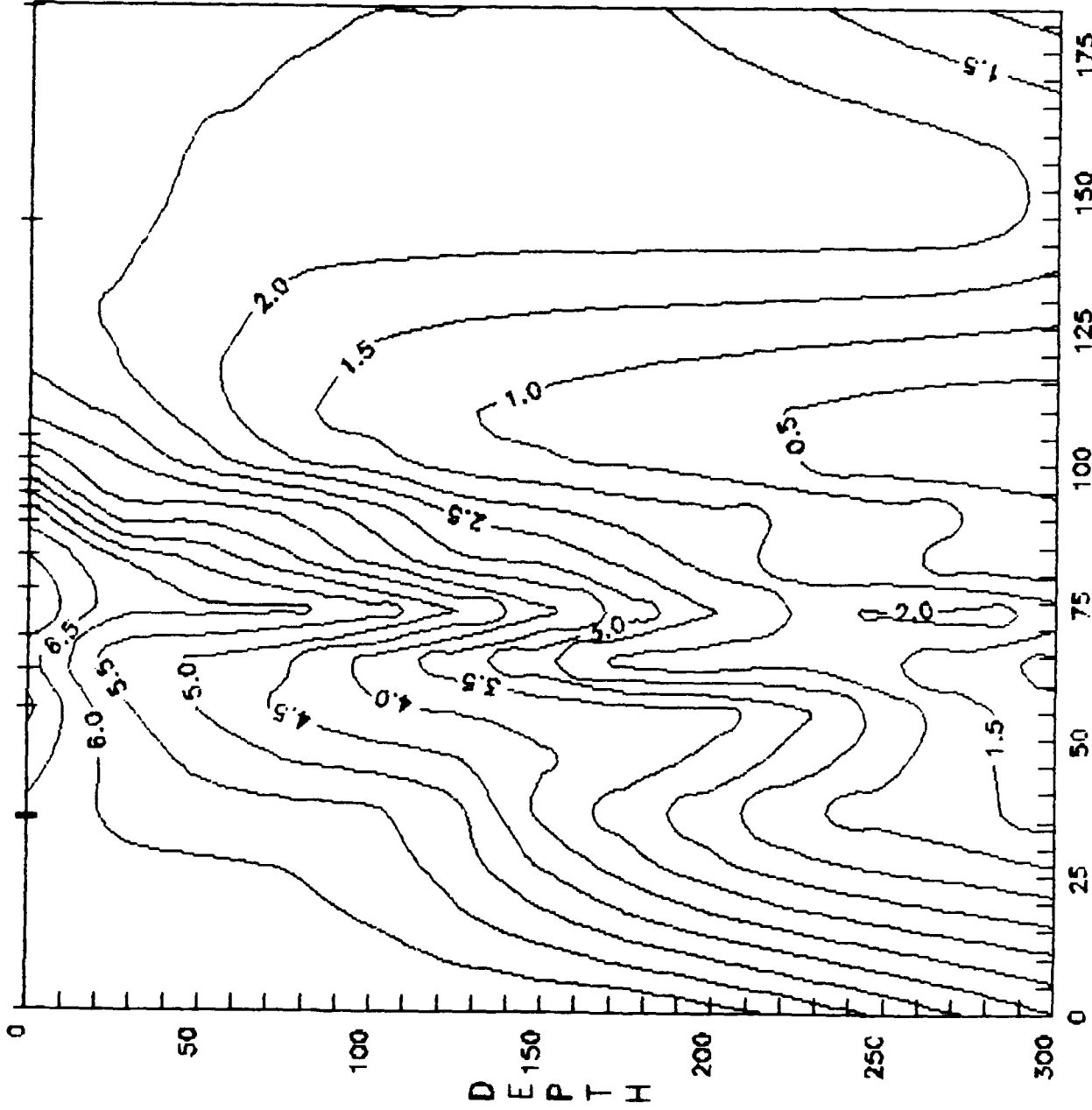
23 April 88 / Proud Runner -9.00, 63.50 -9.00, 65.50



RANGE IN NAUTICAL MILES NORDA

23 April 88 / Proud Runner -7.00, 65.50

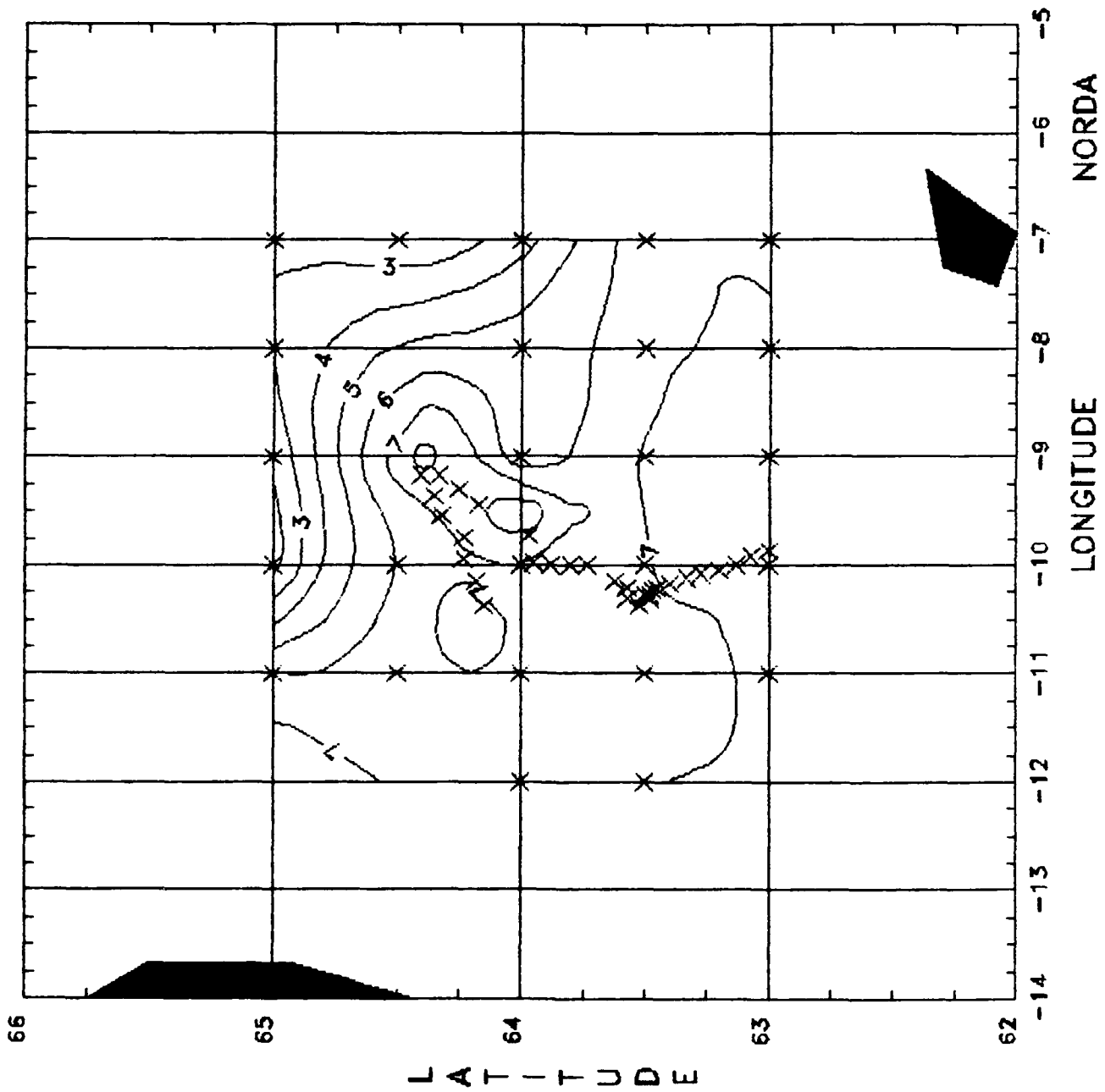
-11.00, 63.00



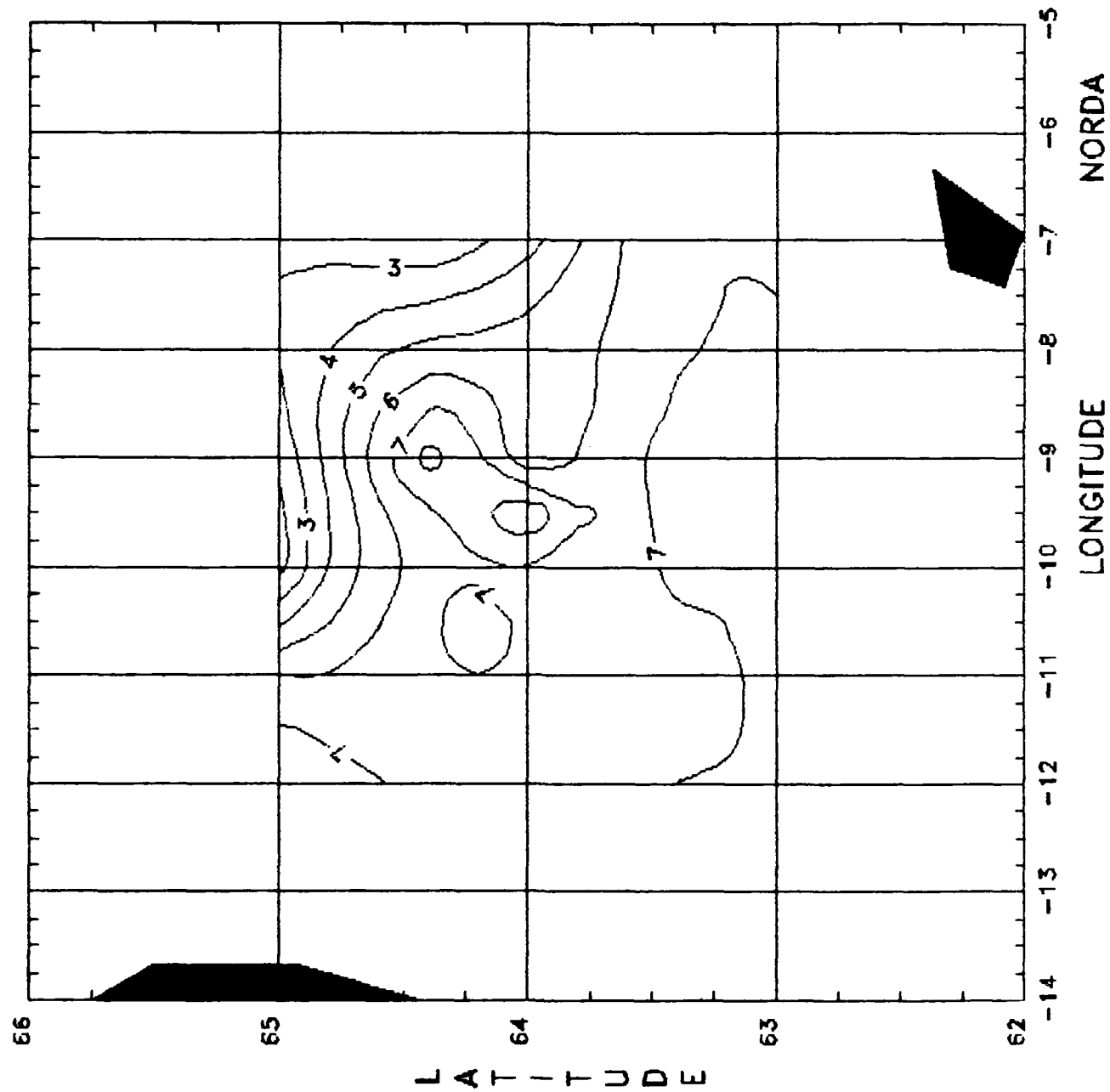
NORDA

Figures 40 - 46: Station positions and temperature fields at 0, 50, 100, 200, 250, and 300 m in the RESOLUTE SUPPORT/PROUD RUNNER study area, 26 - 28 April 1988. The fields may very well be in error, due to unresolved confusion in the positions of the 28 April gridded AXBT flight data, stations 1200 - 1224 in Table 1.

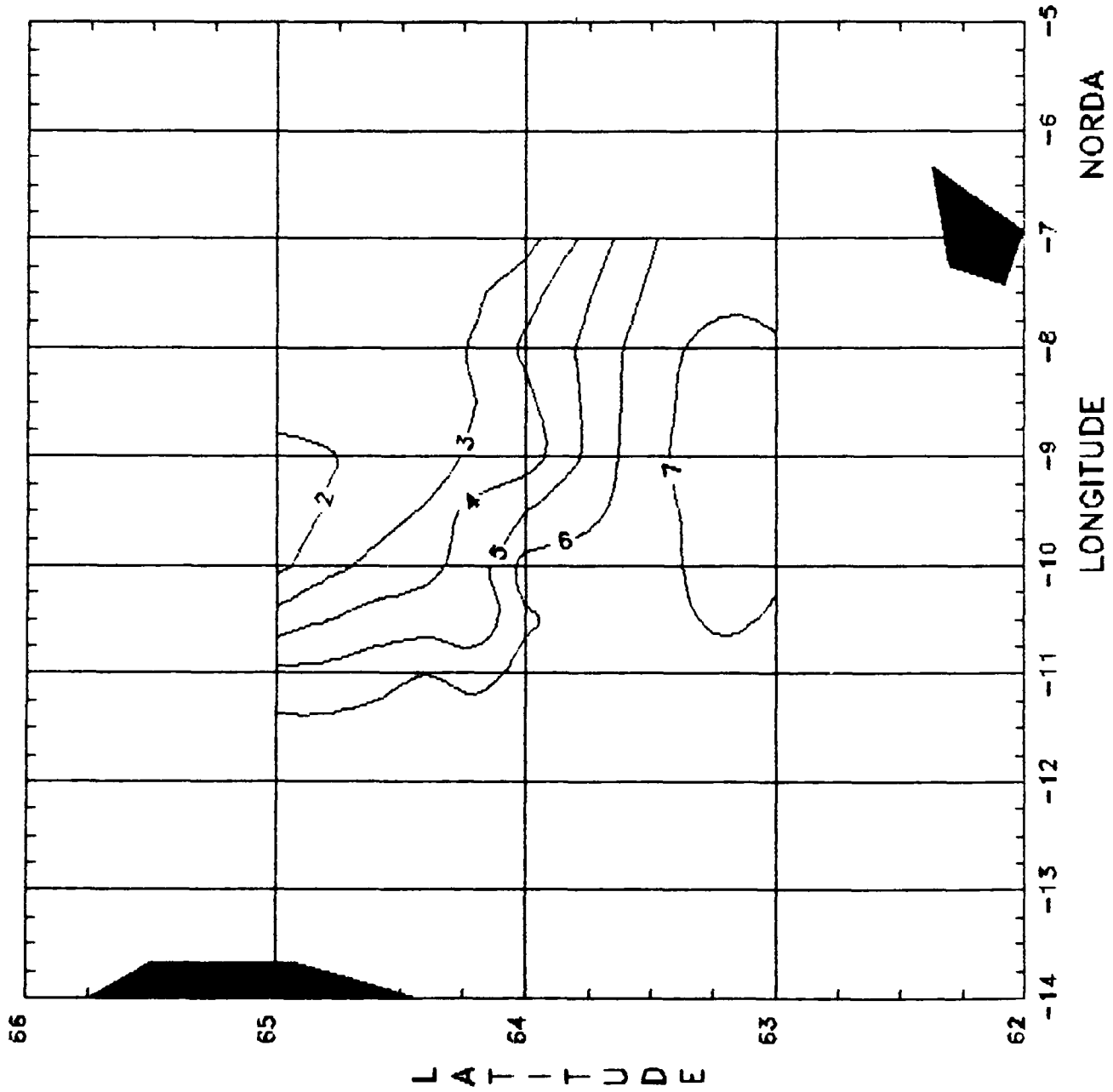
0 METERS 26 - 28 April 88 / Proud Runner



0 METERS 26 - 28 April 88 /Proud Runner

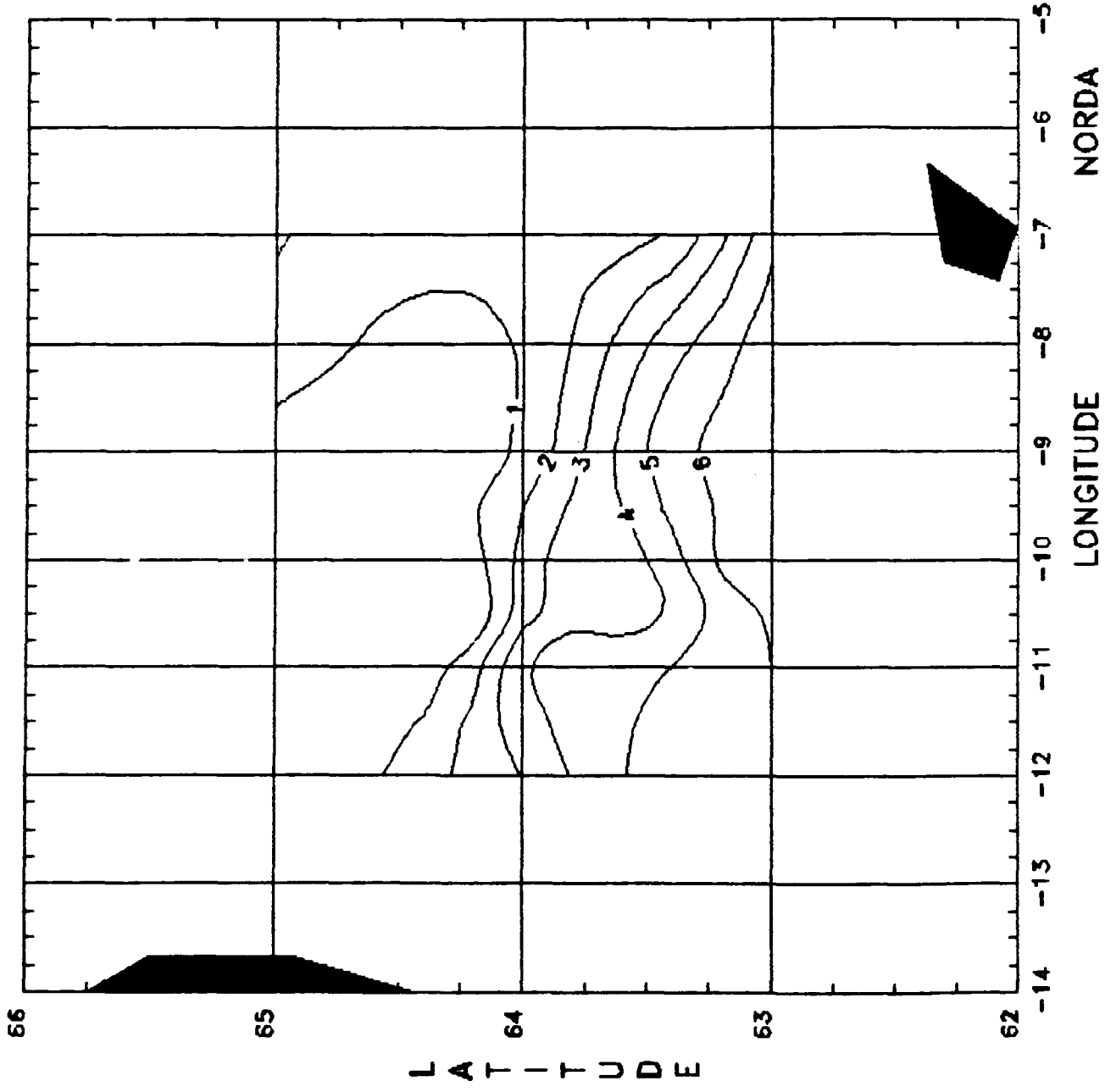


50 METERS 26 - 28 April 88 /Proud Runner

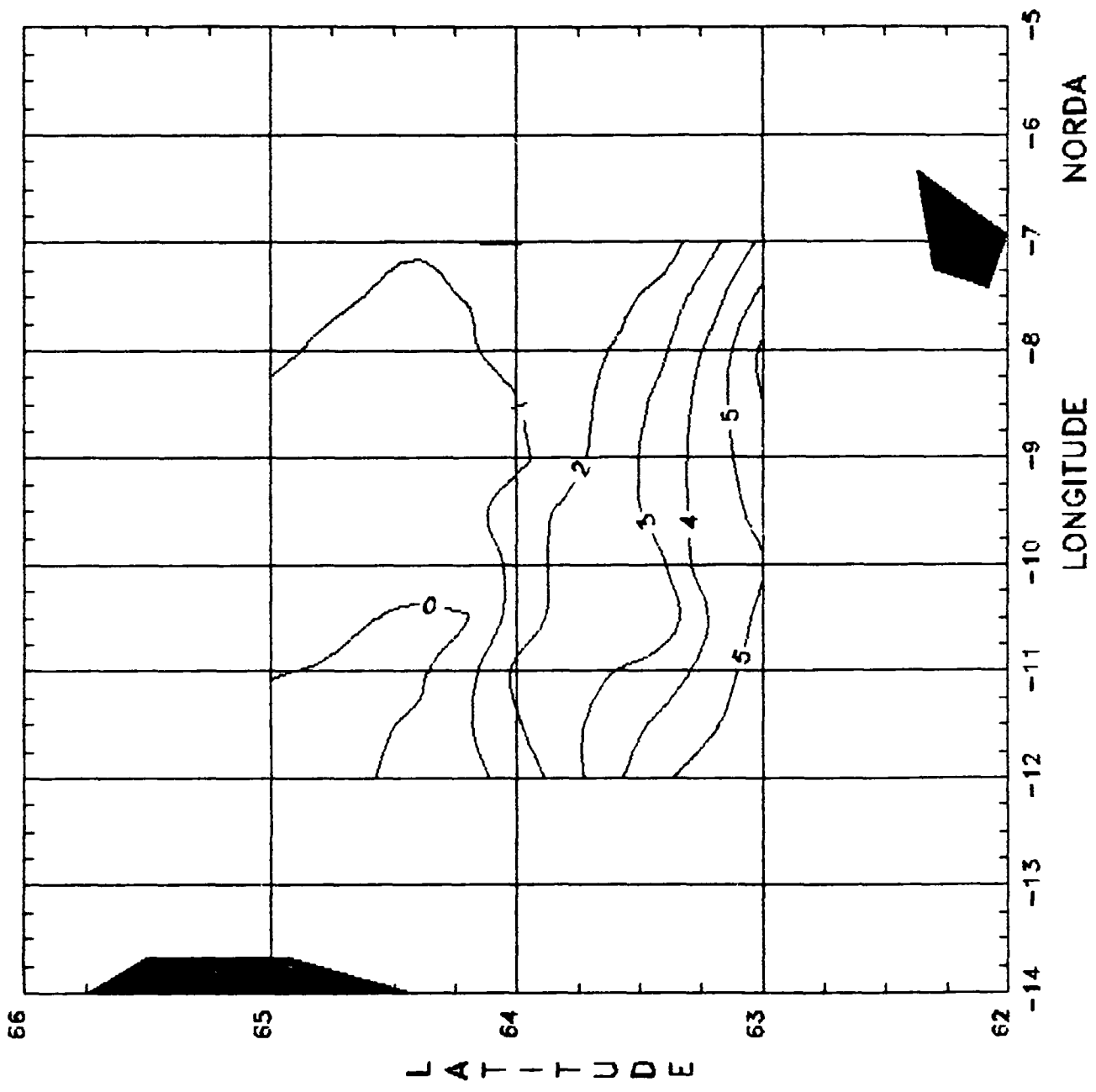




250 METERS 26 - 28 April 88 /Proud Runner



300 METERS 26 - 28 April 88 /Proud Runner



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

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1a. REPORT SECURITY CLASSIFICATION <b>Unclassified</b>		1b. RESTRICTIVE MARKINGS <b>None</b>		
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<p>Between 21-27 April 1988, the Tactical Oceanography Project of the Naval Ocean Research and Development Activity (NORDA) provided near real time processing and analysis of environmental data acquired during the first phase of the NATO exercise RESOLUTE SUPPORT/PROUD RUNNER. This report assembles together the analysis results produced in the field to give an overview of the oceanographic conditions during the exercise. An assessment of the acoustic conditions encountered will be the subject of a later report.</p>				
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