AD-A126 211 HYDROGRAPHIC MEASUREMENTS IN THE WESTERN ALBORAN SEA JUNE 1982(U) NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY NSTL STATION MS T H KINDER ET AL. FEB 83 1/2

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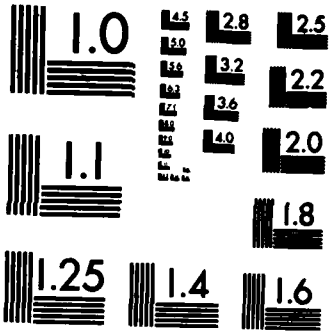
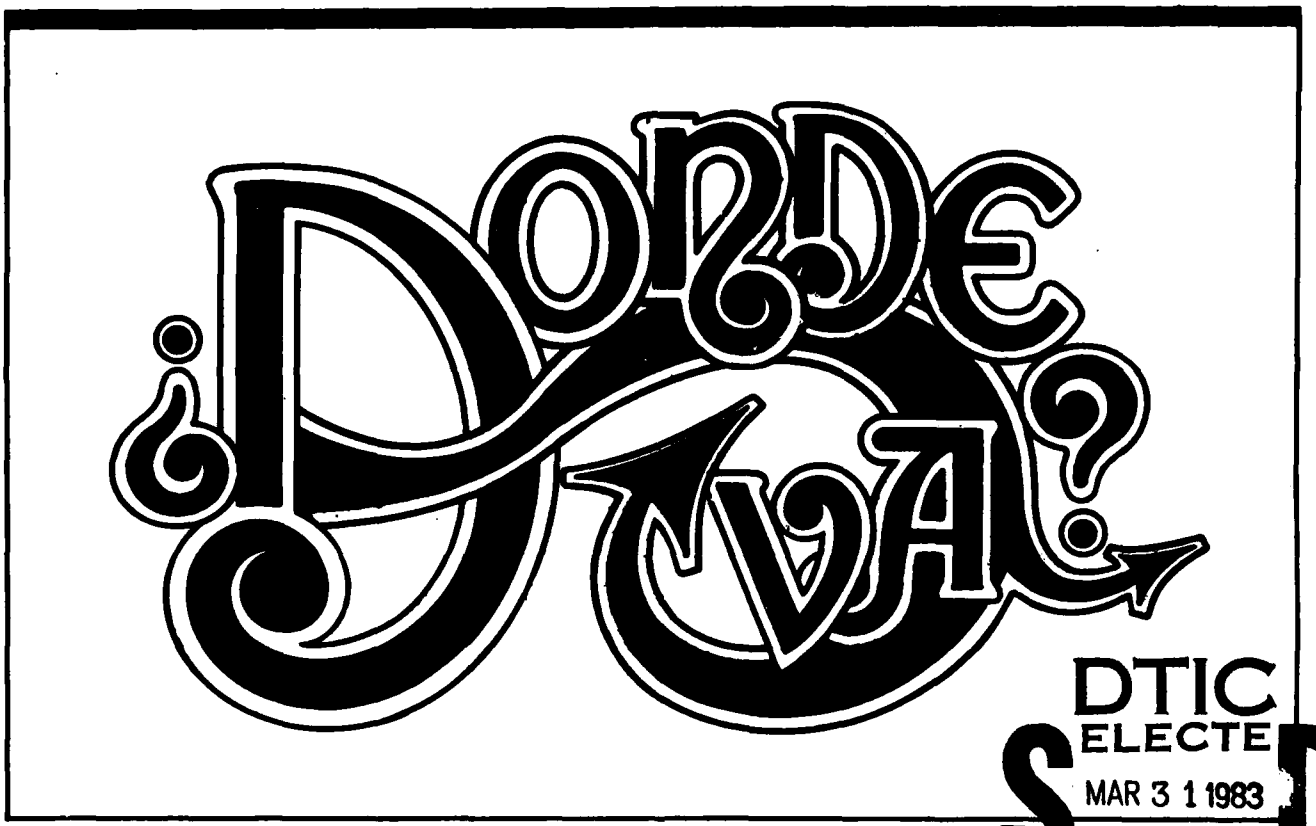


NORDA Technical Note 202

Naval Ocean Research and
Development Activity
NSTL Station, Mississippi 39529

Hydrographic Measurements in the Western Alboran Sea, June 1982



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ABSTRACT

During June 1982, 57 CTD stations were taken, 56 in the northwestern Alboran Sea (western Mediterranean) and one in the Atlantic Ocean just west of the Strait of Gibraltar. Vertical profiles of potential temperature, salinity, and density are presented along with the potential temperature versus salinity correlation diagrams. A comparison of CTD and water sample salinity data is presented.

ACKNOWLEDGMENTS

The officers and crew of USNS BARTLETT (T-AGOR-13), A. Rashkin, master, enthusiastically supported our work. In addition to Burns and Kinder, members of the scientific party were: Louis Banchero (NORDA), Stephen Sova (NORDA), Richard Myrick (NORDA), Gregorio Parrilla (Instituto Espanol de Oceanografia, Madrid), Luis Arevalo (Laboratorio Oceanografia, Malaga), Teniente Antonio Ruiz (Instituto Hidrografico de la Marina, Cadiz), Edward Boyle (MIT), Margaret Delaney (MIT), Glen Shen (MIT), and E. Birch Criss (Computer Sciences Corporation). All contributed to the hydrographic measurements. Code 422CS of the Office of Naval Research, under Dr. Dennis Conlon, funded this work under Program Element 61153N.

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ILLUSTRATIONS

TABLES

HYDROGRAPHIC MEASUREMENTS IN THE WESTERN ALBORAN SEA, JUNE 1982

1. Introduction. The Naval Ocean Research and Development Activity (NORDA) is studying the inflow of the Atlantic water into the Mediterranean Sea in an Office of Naval Research funded project entitled "Mesoscale Flow Dynamics in the Strait of Gibraltar and Alboran Sea." This project has become part of an international study of the Alboran Sea/Strait of Gibraltar/ Gulf of Cadiz region. This broad study has taken the name ¿Donde Va?

The first of two ¿Donde Va? field periods occurred during June 1982 when USNS BARTLETT deployed 5 current meter moorings and did 57 conductivity-temperature-depth profile (CTD) stations. This note discusses the CTD data.

2. Cruise Plan. The plan of the cruise was to accomplish three objectives (listed in decreasing priority):

- Place five subsurface current meter moorings across the inflowing jet of Atlantic water;
- Do CTD section across the current; and
- Do trace element chemical sampling.

The CTD sections were designed to cross the historical position of the jet and anticyclonic gyre (Cano and Castillejo, 1972; Lanoix, 1974; Cheney and Doblar, 1982; and Philipe and Harang, 1982) We also monitored satellite imagery provided by M. Philipe of the Centre de Meteorologie Spatiale, Lannion, France, and processed at NORDA by P. La Violette, and used a numerical model of the circulation (Preller and Hurlburt, 1982) to design the station locations.

3. Data Collection and Processing. Data were acquired using a Neil-Brown MK III CTD lowered at 60 m/min. Data were recorded directly on digital tape (Model 1150 Neil Brown data terminal and Digi Data tape deck). This Naval Oceanographic Office equipment, installed for evaluation aboard BARTLETT, streamlined the post-cruise data processing considerably. The raw data were then edited to remove spikes, the sensor responses were matched, and the data were pressure-sorted and filtered to produce one-decibar averages (Hallock, 1982). Individual profiles and TS diagrams (Figures 2-117) and composite TS diagrams (Figures 118 and 119) show the 1 m averaged values. Salinities were calculated using the 1978 practical salinity scale (Lewis and Perkin, 1981). Potential temperature and σ_t were computed according to Fofonoff (1962).

Several anomalies remain in the data. Station 23 had salinities which were about 0.03 parts per thousand (PPT) too low (Figures 46, 47 and 119), and station 43 had bad salinities from about 300 to 500 decibars (dbars) (Figures 88, 89 and 119). Both of these anomalies may have been caused by foreign material lodging in the conductivity cell and subsequently being flushed. Station 34 (034001) was repeated (034002) after the CTD struck bottom on the first cast (Figures 68-71).

Water samples were obtained with a rosette sampler to monitor CTD performance. Two water sample bottles were collected at the same depth at each of 17 designated stations. Salinity analyses were performed using a Guildline AUTOSAL salinometer, and compared to the CTD values (Table 2). Rosette malfunctions and other errors sometimes prevented collecting two samples, and disagreement between samples sometimes indicated an error in the sample collection. When only samples that agreed within 0.005 PPT were compared to CTD values (16 samples at 8 stations), then the differences had a mean of -0.003 (CTD low) and a standard deviation of $\pm$0.002. The pressure error of the instrument determined by the Naval Oceanographic Office was from 0.8 dbar at 0 dbar to 5.3 dbar at 2000 dbar. We claim that our measurements were accurate to 0.005°C, 0.005 PPT, and 5 dbar, and their precision probably exceeds these values.

Navigation was by radar and visual fixes near land, and by satellite navigation away from land. Station positions within 20 km of land are probably accurate to $\pm$0.2 km. Because of the intermittentency of satellite passes that yield accurate fixes (up to four hours between such passes), station positions away from land are reconstructed within 2 km (the relative position of stations is probably within 1 km). At the core of the inflowing Atlantic jet, drift was estimated at 2.5 knots. Using a lowering rate of 60 m/min at a 1500 m deep station (the deepest station: Table 1) therefore resulted in a station that occupied a track about 2 km long.

4. Discussion. Station 45 (Figures 93 and 94) illustrates the hydrographic structure that was present (also see composite Figures 118 and 119). This station was located near the center of the gyre both historically and during June 1982. Low salinity Atlantic water (20.6°C, 36.43 PPT, 6 dbar) was present at the surface, extending as a nearly isohaline layer to 129 dbar (15.5°C, 36.51 PPT). Values then increased in salinity and decreased slowly in temperature towards a series of subtle temperature minima (13.17°C, 38.46 PPT, 310 dbar) which mark the western Mediterranean winter water (Lanoix, 1974). This was underlain by a salinity maximum (13.15°C, 38.48 PPT, 370 dbar, potential density 29.08 kg/m^3) that is the remaining signature of eastern Mediterranean (Levantine) intermediate water (Katz, 1972; Lanoix, 1974). Temperature and salinity

then both decreased toward western Mediterranean deep water (12.78°C, 38.42 PPT, 1300 dbar, potential density 29.11 kg/m^3). Below 300 dbar the waters are quite homogeneous: most of the density stratification occurs in the upper 200 dbar (potential density at station 45 = 25.70 $kg.m^3$ at the surface and 28.78 kg/m^3 at 200 dbar). The subtle differences below 200 dbar remain interesting, however, because of questions concerning the origins and circulation of these waters and their importance to the flushing of the Mediterranean Sea and their contribution to the North Atlantic Ocean (Lacombe and Tchernia, 1972; Bryden and Stommel, 1982).

REFERENCES

Bryden, H. L. and H. M. Stommel (1982). Origin of the Mediterranean Outflow. J. Mar. Res. 40, Suppl:55-71.

Cano, C. and F. F. de Castillejo (1972). Contribucion al Conocimiento del mar de Alboran: III. Variaciones del Remolino Anticiclonico. Boletin del Instituto Espanol de Oceanografia, Madrid, 157:3-7 plus 18 figs.

Cheney, R. E. and R. A. Doblar (1982). Structure and Variability of the Alboran Sea Frontal System. J. Geophys. Res. 87 (C1):585-594.

Fofonoff, N. P. (1962). Physical Properties of Seawater. In: The Sea, Vol. I, M. N. Hill (ed.), New York, Wiley, p. 3-30.

Hallock, Z. R. (1982). A Computer Program for Processing CTD (Conductivity-Temperature-Depth) Data. Naval Ocean Research and Development Activity, NSTL Station, Miss., NORDA Technical Note 196 (in press).

Katz, E. J. (1972). The Levantine Intermediate Water Between the Strait of Sicily and the Strait of Gibraltar. Deep Sea Res. 7:152-162.

Lacombe, H. and P. Tchernia (1972). Caracteres hydrologiques et circulation des eaux en Mediterranee. In: The Mediterranean Sea: A Natural Sedimentation Laboratory, D. J. Stanley (ed.), Stroudsburg, Pa., Dowden, Hutchinson and Ross, p. 25-36.

Lanoix, F. (1974). Projet Alboran: etude hydrologique et dynamique de la mer Alboran. NATO Technical Report 66, 39 p. plus 18 figs.

Lewis, E. L. and R. G. Perkin (1981). The Practical Salinity Scale 1978: Conversion of Existing Data. Deep Sea Res. 28(4):307-328.

Philippe, M. and L. Harang (1982). Surface Temperature Fronts in the Mediterranean Sea from Infrared Satellite Imagery. In: Hydrodynamics of Semi-Enclosed Seas, J. C. J. Nihoul (ed.), Elsevier, p. 91-128.

Preller, R. and H. Hurlburt (1982). A Reduced Gravity Numerical Model of Circulation in the Alboran Sea. In: Hydrodynamics of Semi-Enclosed Seas, J. C. J. Nihoul (ed.), Elsevier, p. 75-90.

TABLE 1. Station Positions

NUMBER	TIME (Z)	LATITUDE (N)	LONGITUDE (W)	DEPTH (M)	COMMENTS
1	1252 22 June	35-54.6	5-03.0	468	Gibraltar Section
2	1357 22 June	35-57.0	5-04.6	512	Gibraltar Section
3	1510 22 June	36-00.7	5-04.7	550	Gibraltar Section
4	1650 22 June	36-03.3	5-05.9	732	Gibraltar Section
5	1841 22 June	36-06.0	5-09.6	798	Gibraltar Section
6	1955 22 June	36-09.0	5-11.2	710	Gibraltar Section
7	2110 22 June	36-12.0	5-13.0	351	Gibraltar Section
8	2212 22 June	36.14.7	5-14.0	220	Gibraltar Section
9	2335 22 June	36-05.9	5-09.7	801	Chemical Station
10	1423 23 June	36.16.6	4-50.2	720	Mooring 12
11	1843 23 June	36-17.4	4-51.1	672	Mooring 12
12	2032 23 June	36-11.1	4-48.2	871	Mooring 13
13	2130 23 June	36-07.0	4-48.0	949	Mooring 14 (poor pos.)
14	1414 24 June	36-12.5	4-47.0	814	Mooring 13
15	0208 25 June	35-52.3	4-27.8	1407	Chemical Station
16	0920 25 June	36-08.5	4-45.9	937	Mooring 14 (poor pos.)
17	1846 25 June	36-02.4	4-44.8	1021	Mooring 15
18	1334 26 June	35-58.2	4-46.6	994	Mooring 16
19	1537 26 June	36-10.8	4-39.9	966	Marbella Line
20	1712 26 June	36-06.3	4-40.3	1014	Marbella Line
21	1822 26 June	36-03.1	4-38.5	1080	Marbella Line
22	1943 26 June	36-00.7	4-36.4	1131	Marbella Line
23	2115 26 June	35-57.7	4-36.1	1131	Marbella Line
24	2221 26 June	35-55.2	4-35.8	1138	Marbella Line
25	0016 27 June	35-51.5	4-35.8	1211	Marbella Line
26	0333 27 June	36-12.3	4-40.4	972	Marbella Line
27	0455 27 June	36-15.7	4-40.8	856	Marbella Line
28	0619 27 June	36-19.6	4-42.2	684	Marbella Line
29	0714 27 June	36-20.7	4-43.4	500	Marbella Line
30	0804 27 June	36-24.0	4-45.1	232	Marbella Line
31	0907 27 June	36-27.8	4-45.7	82	Marbella Line
32	1235 27 June	36-41.0	4-16.8	51	Malaga Section
33	1342 27 June	36-37.8	4-17.5	167	Malaga Section
34	1500 27 June	36-34.7	4-18.0	249	Malaga Section
35	1606 27 June	36-31.7	4-18.2	317	Malaga Section
36	1650 27 June	36-27.2	4-18.7	454	Malaga Section
37	1759 27 June	36-24.5	4-16.2	586	Malaga Section
38	1848 27 June	36-22.4	4-15.5	644	Malaga Section
39	1951 27 June	36-20.1	4-15.2	721	Malaga Section
40	2107 27 June	36-15.9	4-15.2	860	Malaga Section
41	2310 27 June	36-12.8	4-14.5	1094	Malaga Section
42	0053 28 June	36-08.0	4-09.2	1295	Malaga Section
43	0425 28 June	36-03.2	4-07.7	1330	Malaga Section
44	0630 28 June	35-58.6	4-09.3	1356	Malaga Section
45	0905 28 June	35-52.2	4-09.0	1341	Malaga Section
46	1042 28 June	35-52.7	4-02.4	1318	Alboran Island Section
47	1320 28 June	35-50.7	3-53.3	1098	Alboran Island Section
48	1623 28 June	35-52.2	3-46.8	1427	Alboran Island Section
49	1850 28 June	35-54.0	3-39.7	1466	Alboran Island Section
50	2100 28 June	35-54.2	3-31.2	1533	Alboran Island Section
51	2325 28 June	35-53.8	3-23.5	1436	Alboran Island Section
52	0138 29 June	35-55.0	3-18.7	1171	Alboran Island Section
53	0315 29 June	35-55.2	3-15.4	1017	Alboran Island Section
54	0454 29 June	35-55.4	3-11.0	660	Alboran Island Section
55	0614 29 June	35-55.3	3-06.9	262	Alboran Island Section
56	0709 29 June	35-55.8	3-04.0	110	Alboran Island Section
57	0404 30 June	35-45.8	6-29.8	443	Chemical Station (Atlantic)

TABLE 2. Salinity Comparison

BOTTLE NUMBER	STATION	PRESSURE (dbar)	CTD	SALINOMETER	DIFFERENCE	COMMENTS
1	2	447	38.436	38.424	+0.012	Bottles disagree
2	2	447	38.436	38.443	-0.007	Bottles disagree
3	4	583	38.426	38.429	-0.003	
4	4	583	38.426	38.430	-0.004	
5	6	642	38.442	38.445	-0.003	Bottles disagree
6	6	642	38.442	38.461	-0.019	Bottles disagree
7	17	1000	38.429	38.465	-0.036	Bottles disagree
8	17	1000	38.429	38.432	-0.003	Bottles disagree
9	18	935	38.434	38.443	-0.009	Bottles disagree
10	18	935	38.434	38.436	-0.002	ottles disagree
11	21	1029	38.430	38.435	-0.005	ottles disagree
12	21	1029	38.430	38.427	+0.003	ottles disagree
13	24	1115	38.424	38.426	-0.002	
14	24	1115	38.424	38.426	-0.002	
15	27	794	38.441	38.446	-0.005	
16	27	750	38.445	38.450	-0.005	
17	30	218	38.415	38.416	-0.001	
18	30	218	38.415	38.414	+0.001	
19	34	260	38.426	38.426	0.000	
20	36	408	38.476	38.485	-0.009	
21	39	700	38.455	38.459	-0.004	
22	39	700	38.455	38.454	+0.001	
23	42	1230	38.425	38.428	-0.003	
24	42	1230	38.425	38.427	-0.002	
25	45	1320	38.425	38.433	-0.008	Bottles disagree
26	45	1320	38.425	38.423	+0.002	Bottles disagree
27	49	1440	38.423	38.426	-0.003	
28	49	1440	38.423	38.427	-0.004	
29	51	1400	38.420	38.423	-0.003	
30	51	1400	38.420	38.422	-0.002	
31	54	625	38.448	38.455	-0.007	

For all samples:
n = 31 mean difference: -0.004
standard deviation: ±0.008

For samples with paired samples agreeing within ±0.005 only:
n = 16 mean difference: -0.003
standard deviation ±0.002

Calibration by Naval Oceanographic Office at 15°C had a difference of +0.0005.

Guildline AUTOSAL Salinometer Serial: 13059

Neil Brown CTD Sensor Serial: 01-2797-02

Vertical Profiles, Stations 1 - 57, Figures 2 - 116

Pages 10 - 124,

Even Numbers

TS Diagrams, Stations 1 - 57, Figures 3 - 117

Pages 11 - 125,

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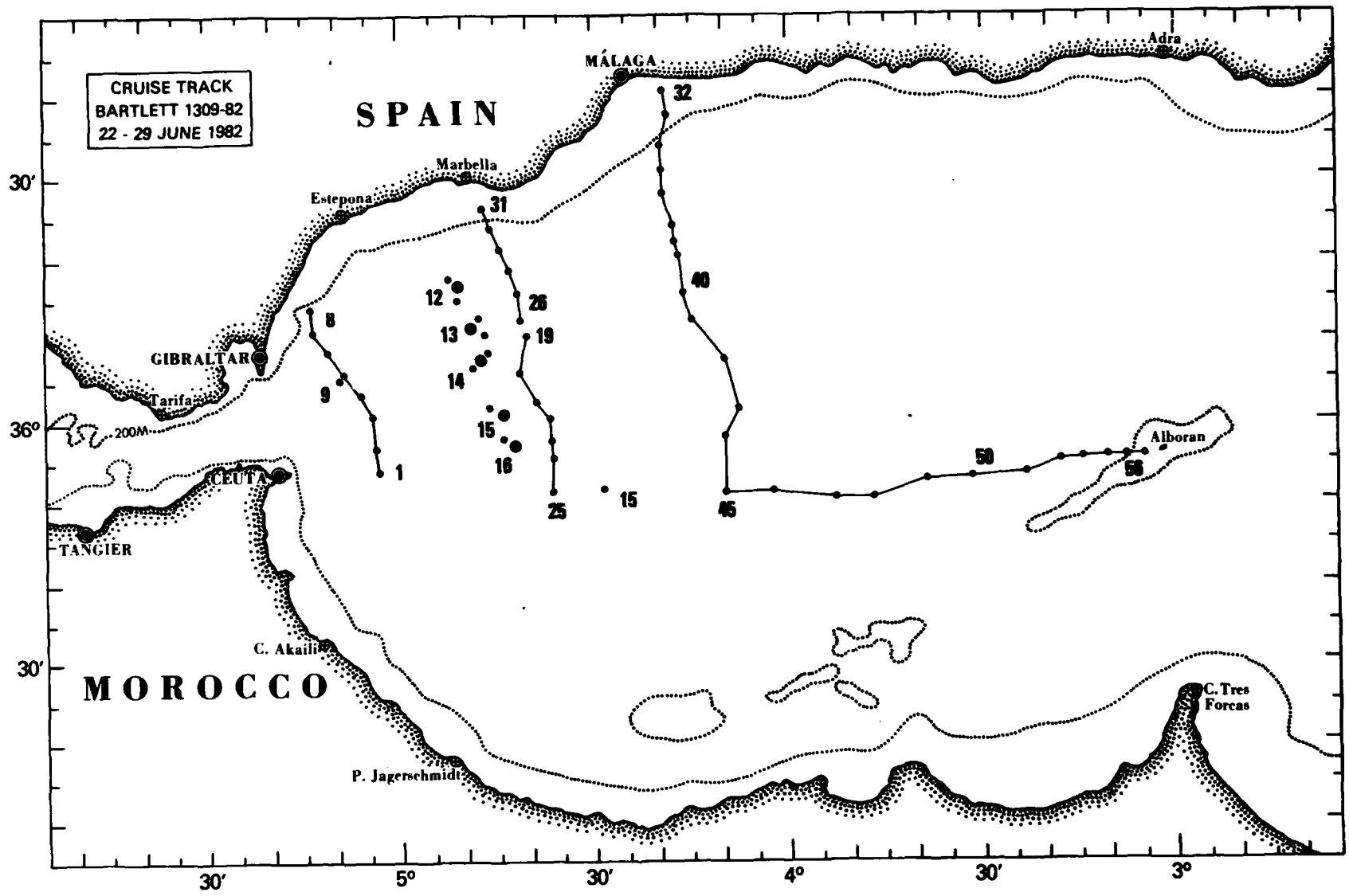
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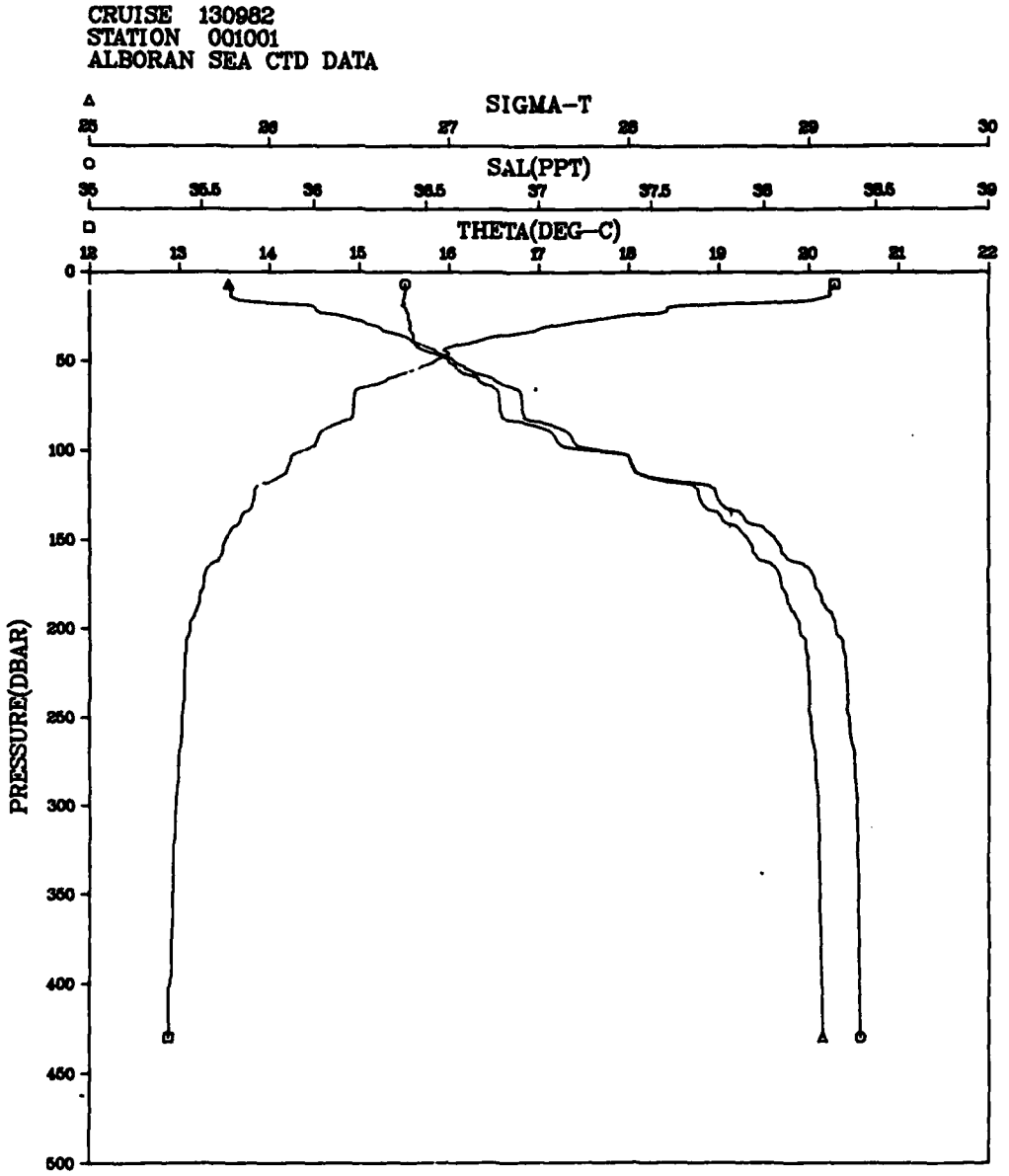
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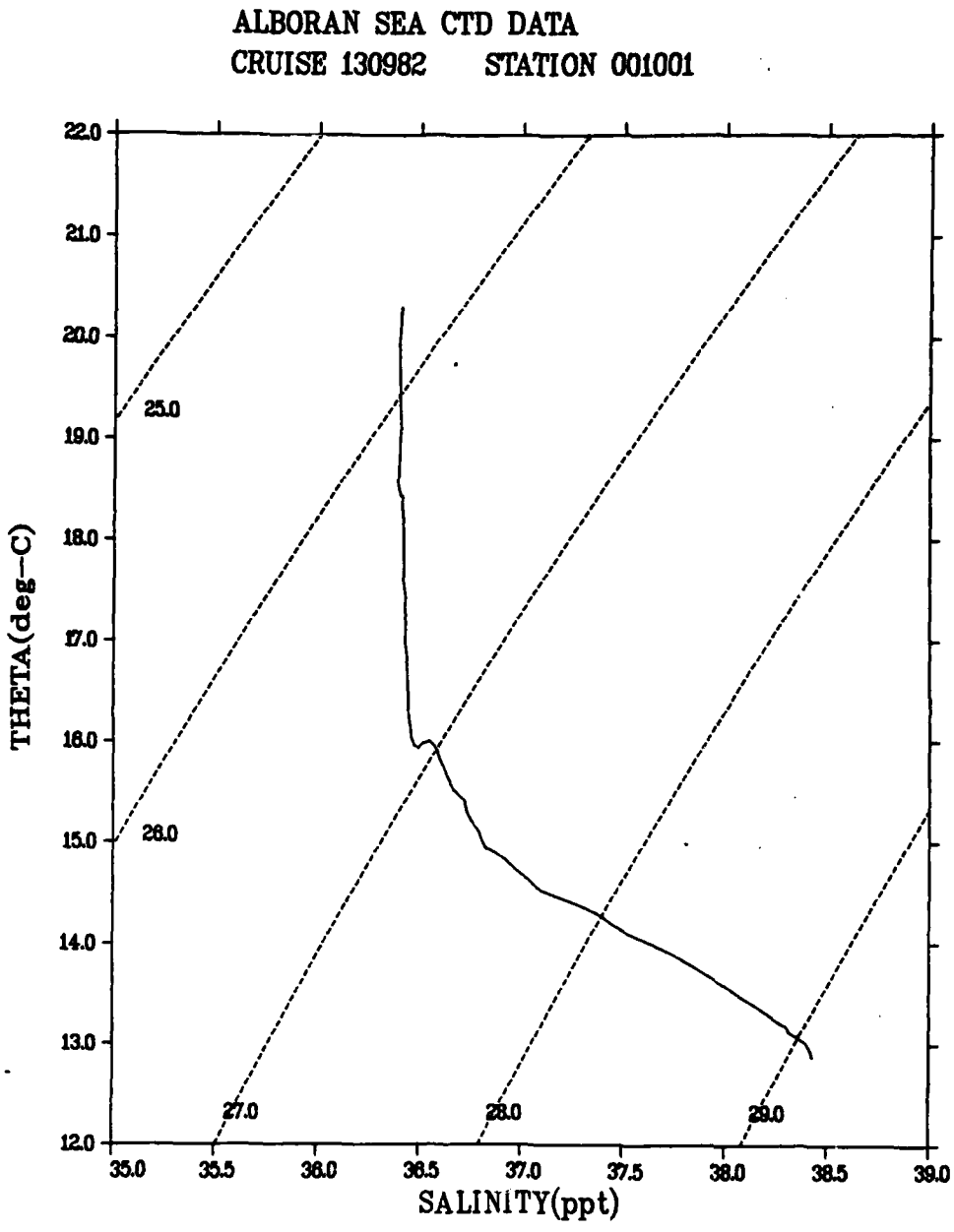
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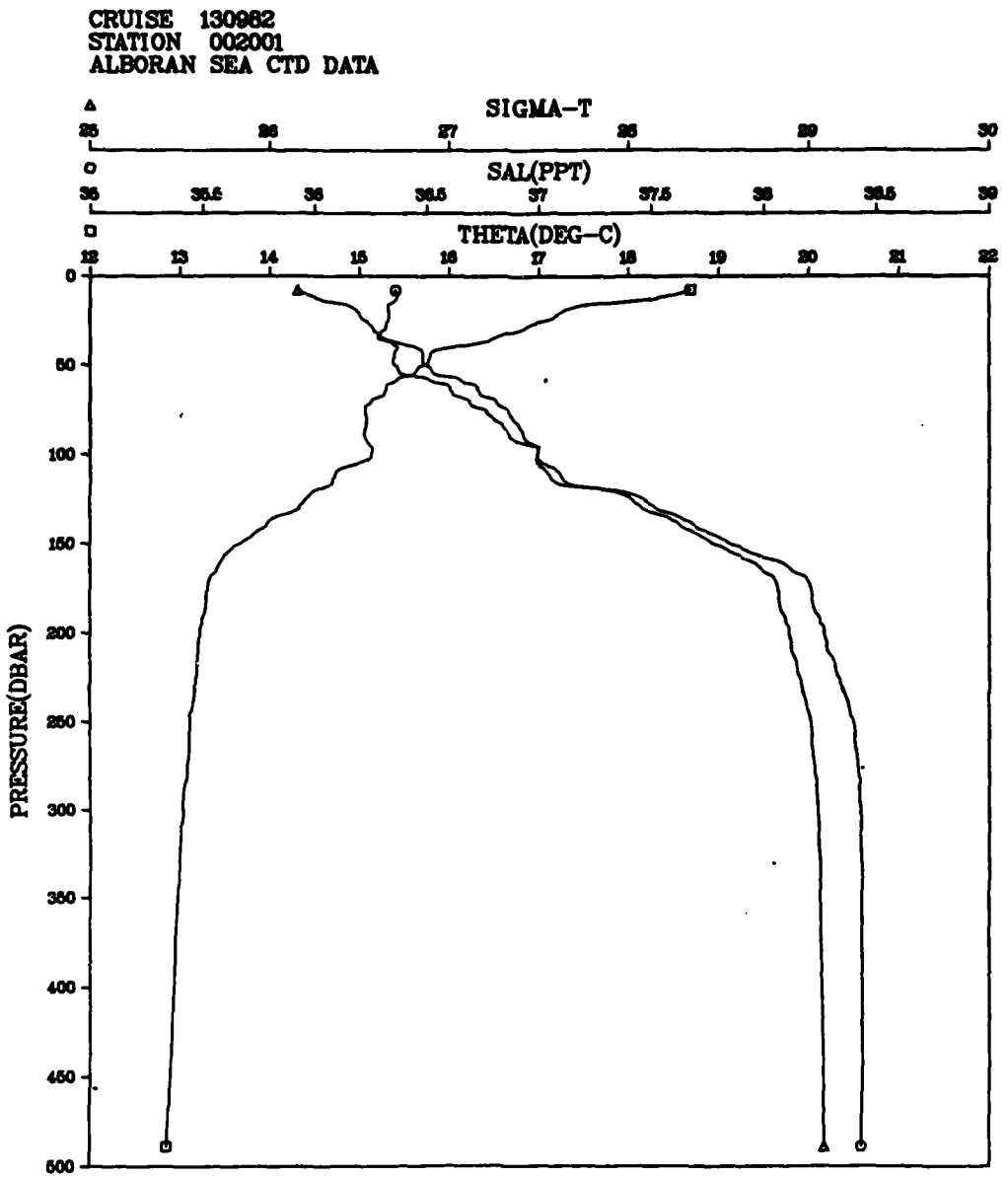
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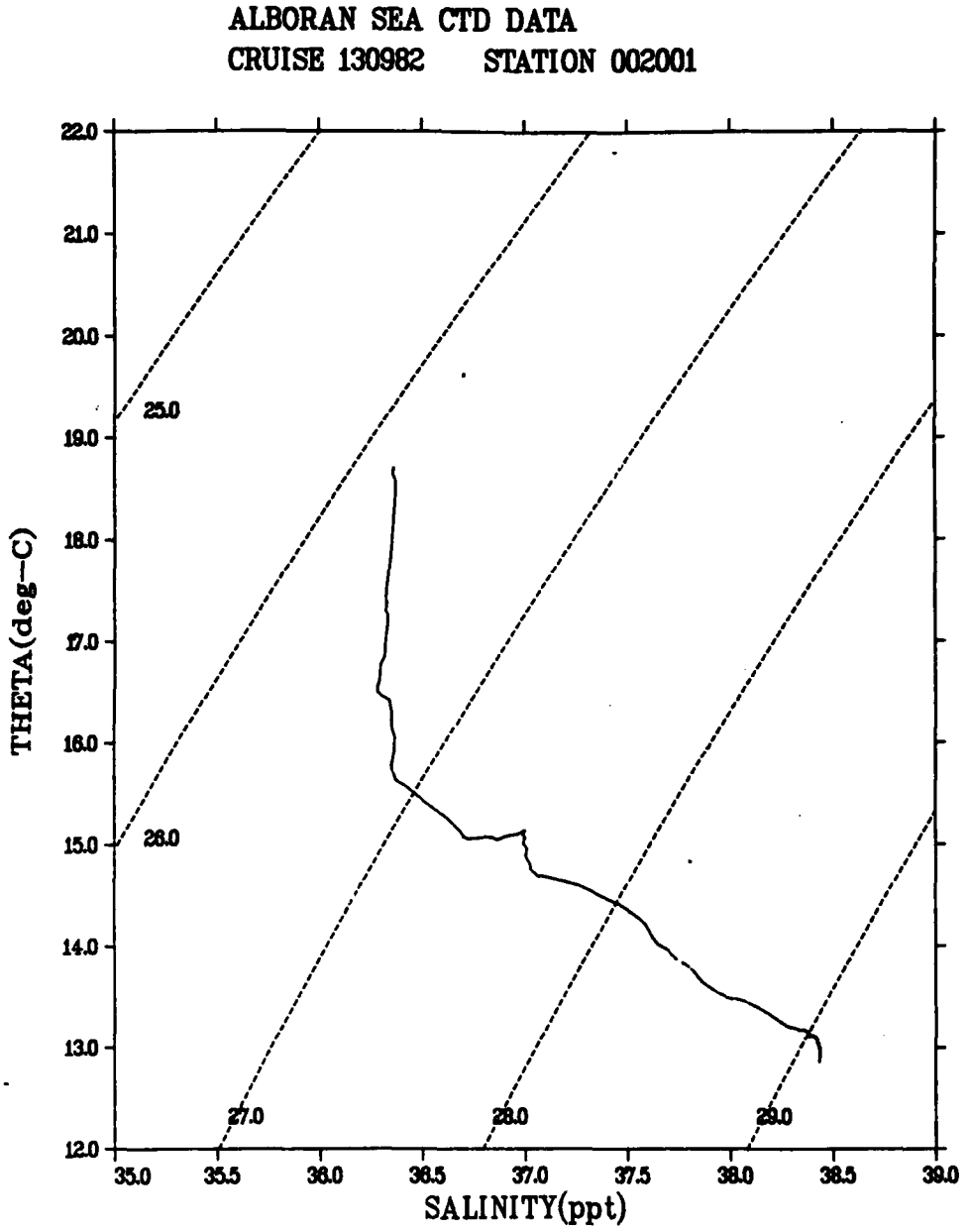
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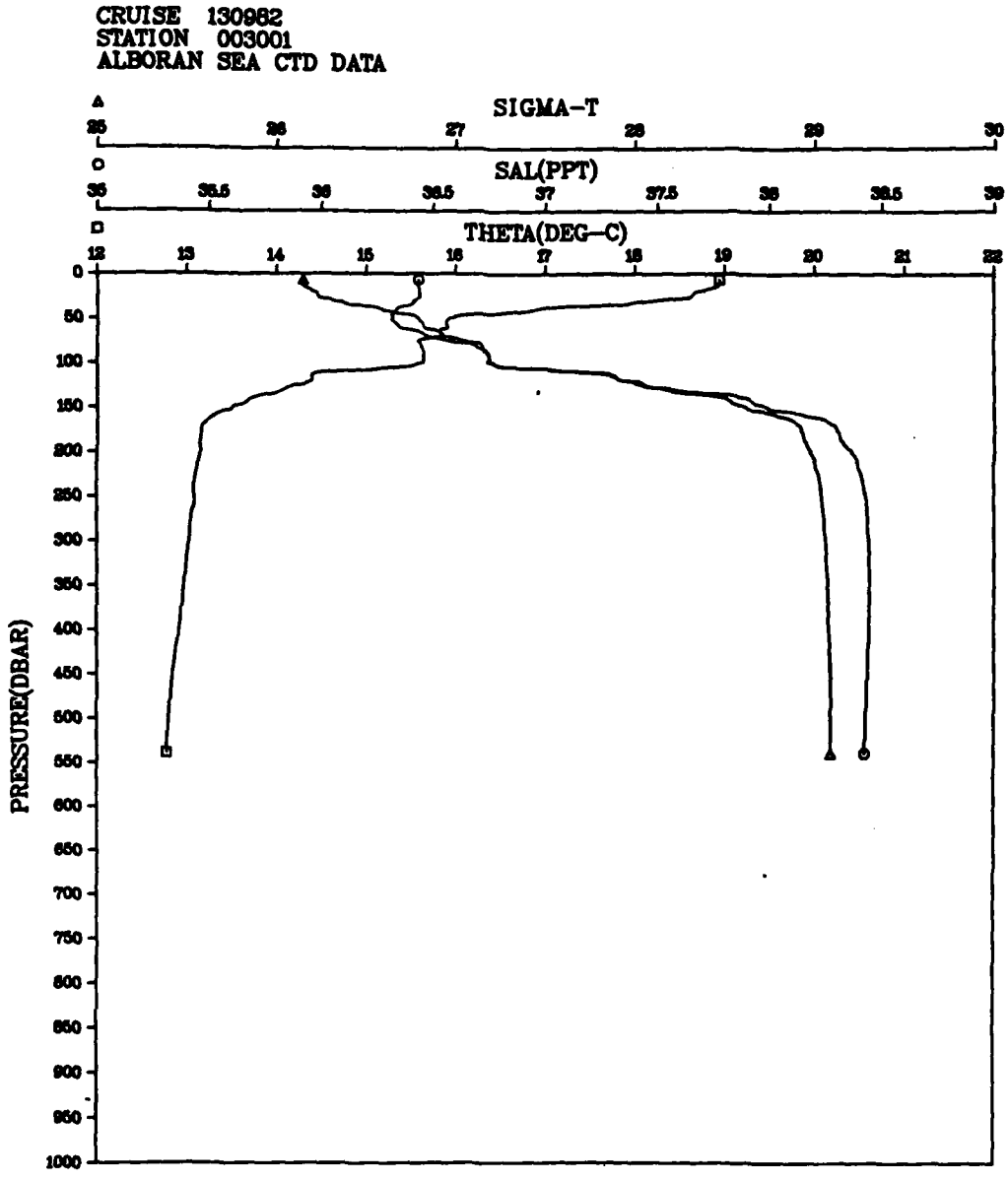
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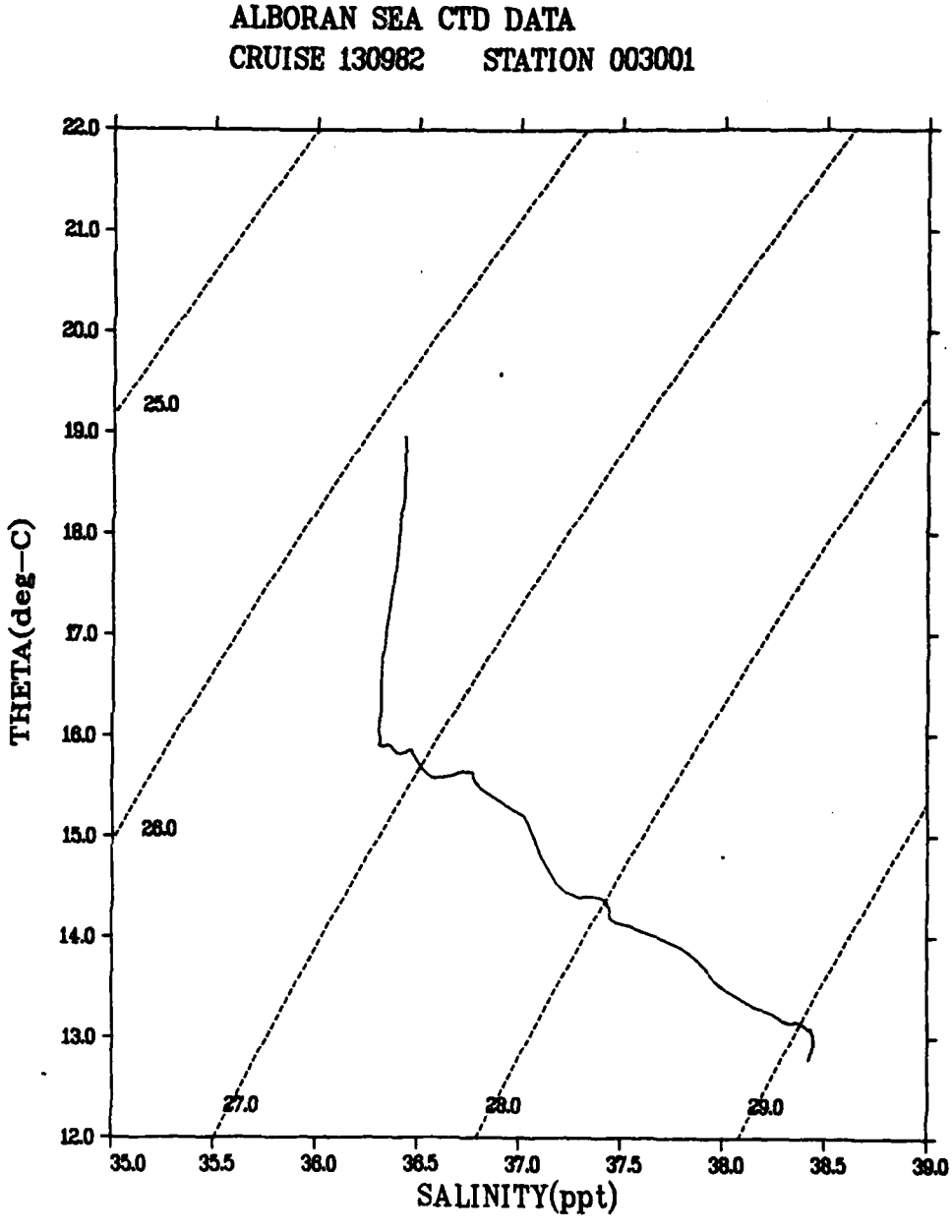
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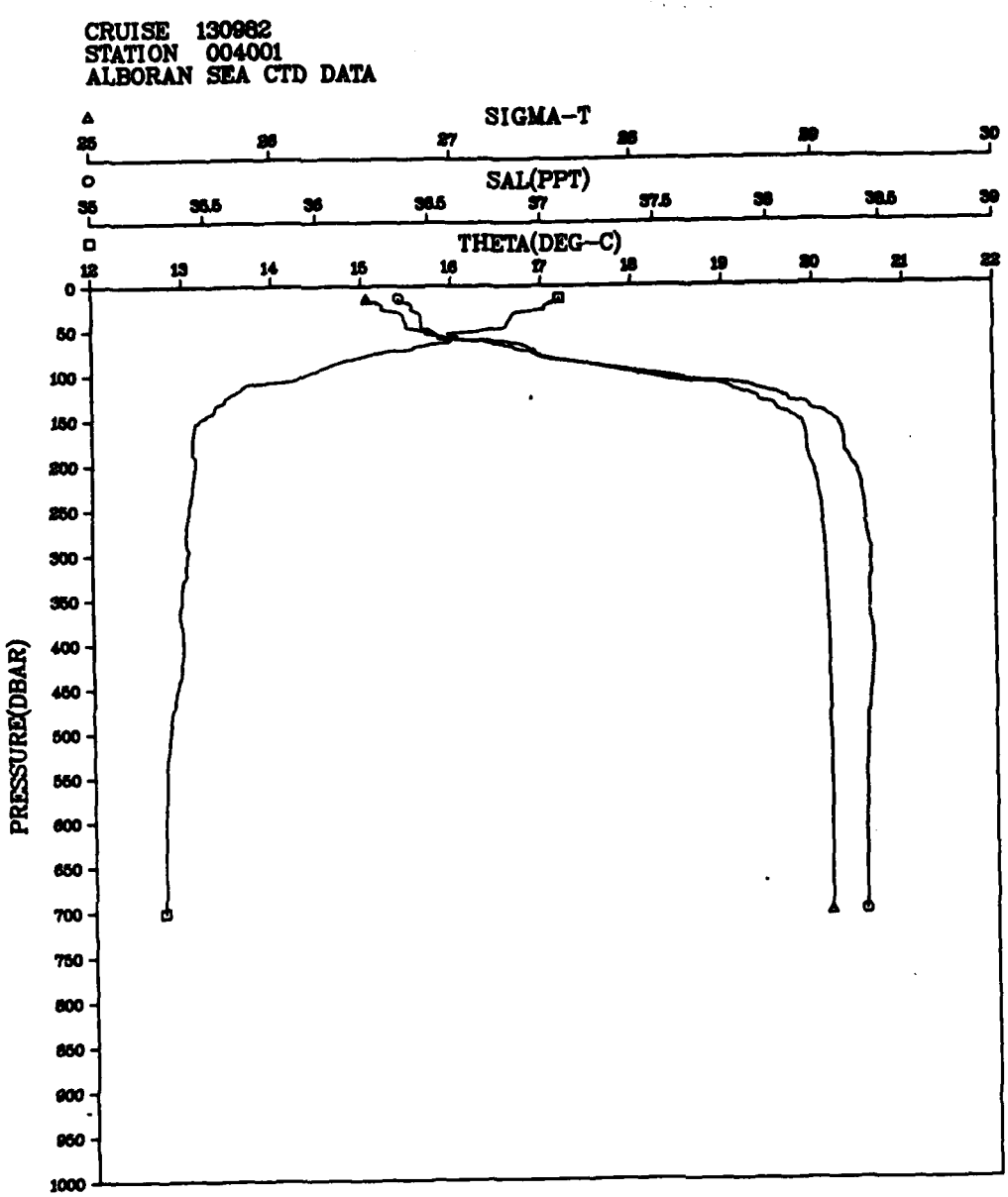
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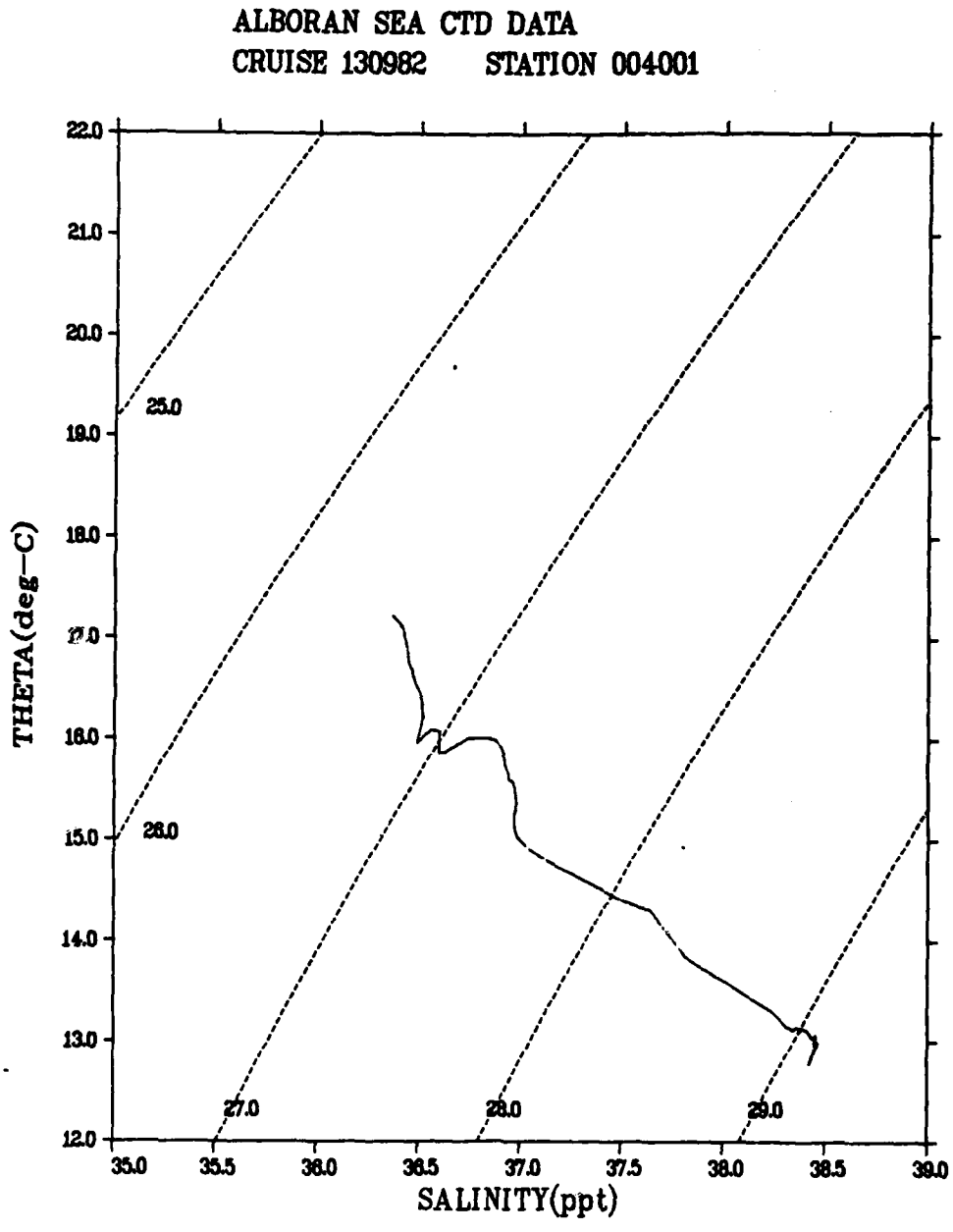
Figure 8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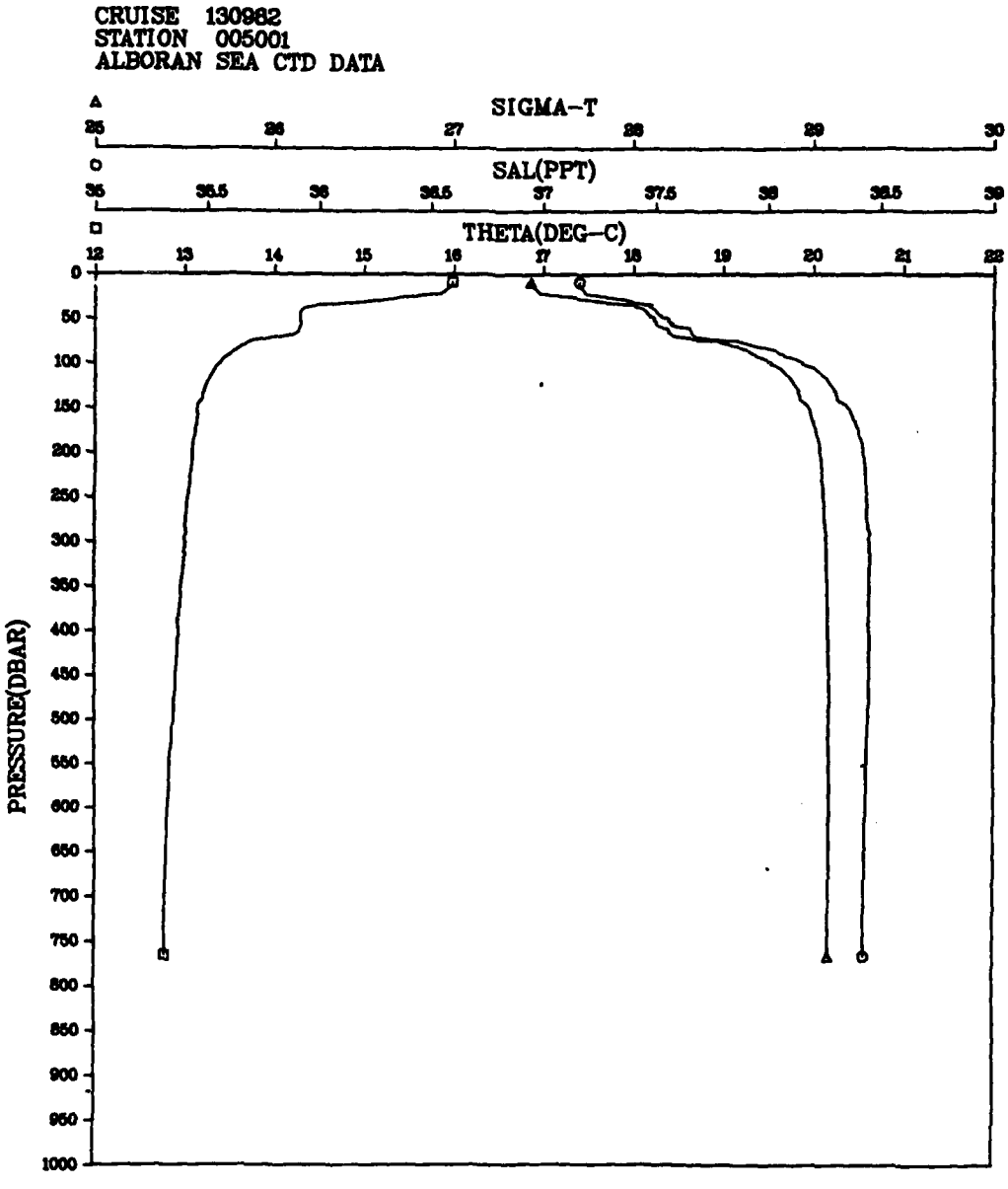
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650
700
750
800
850
900
950
1000

Figure 10

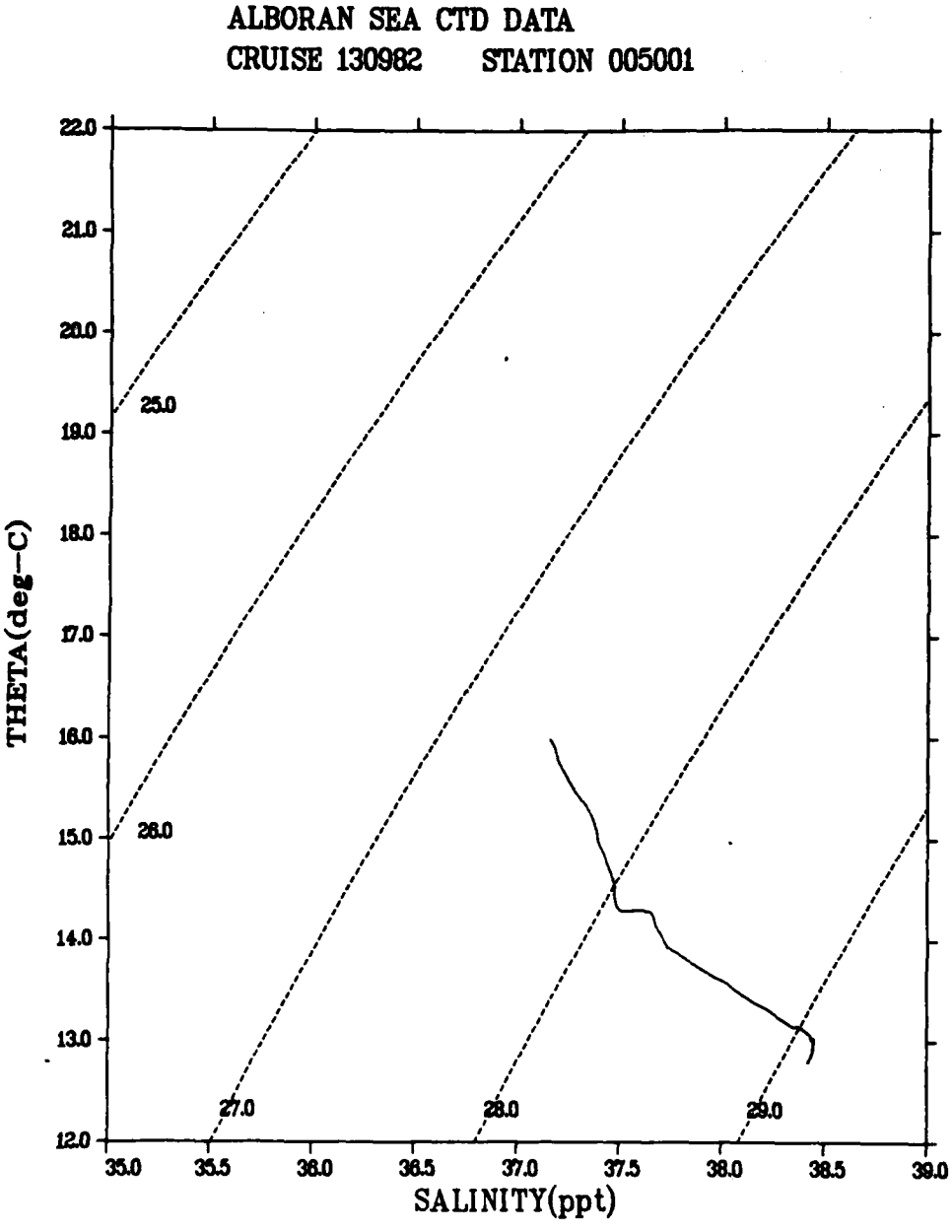

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 005001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 11

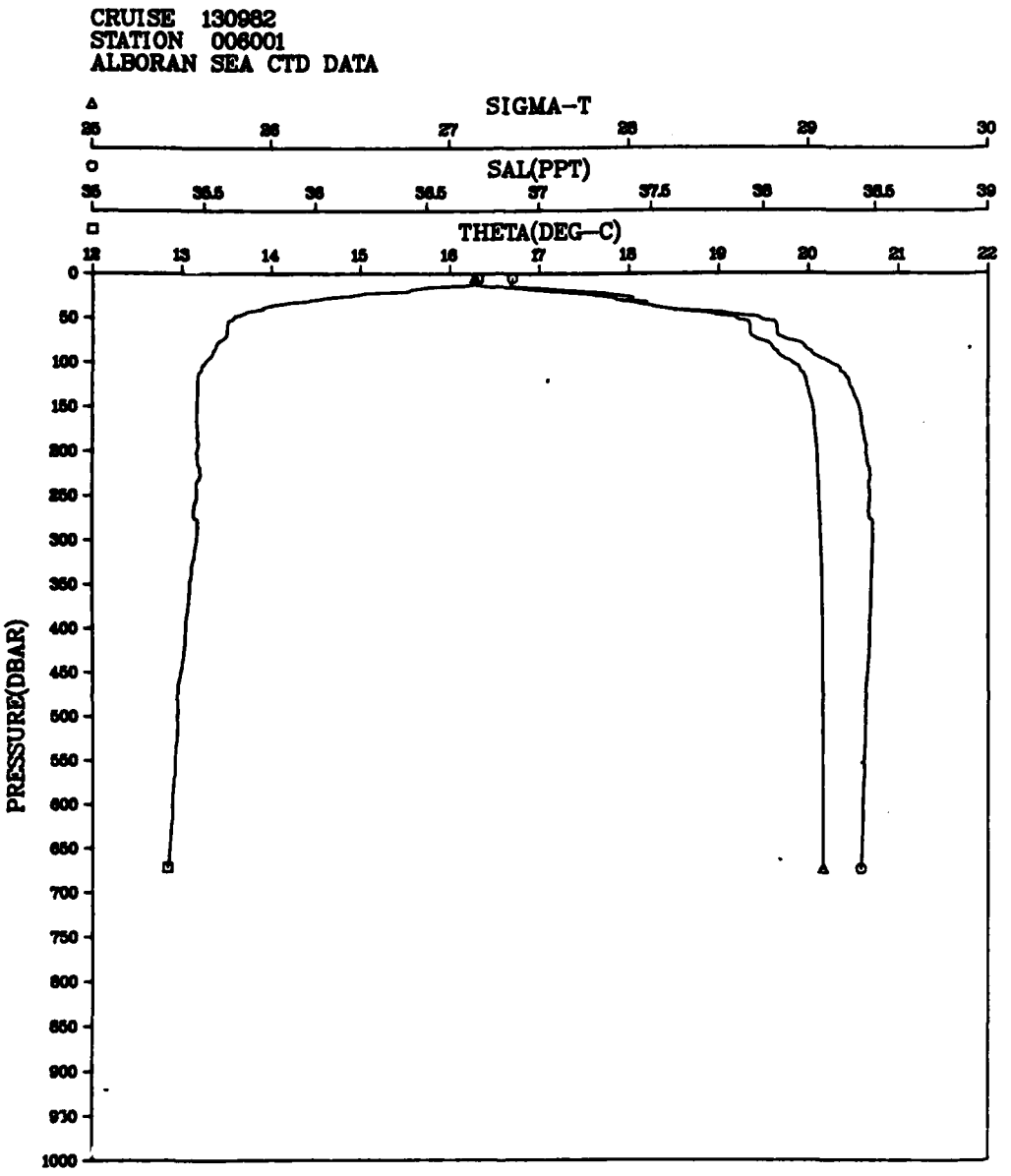
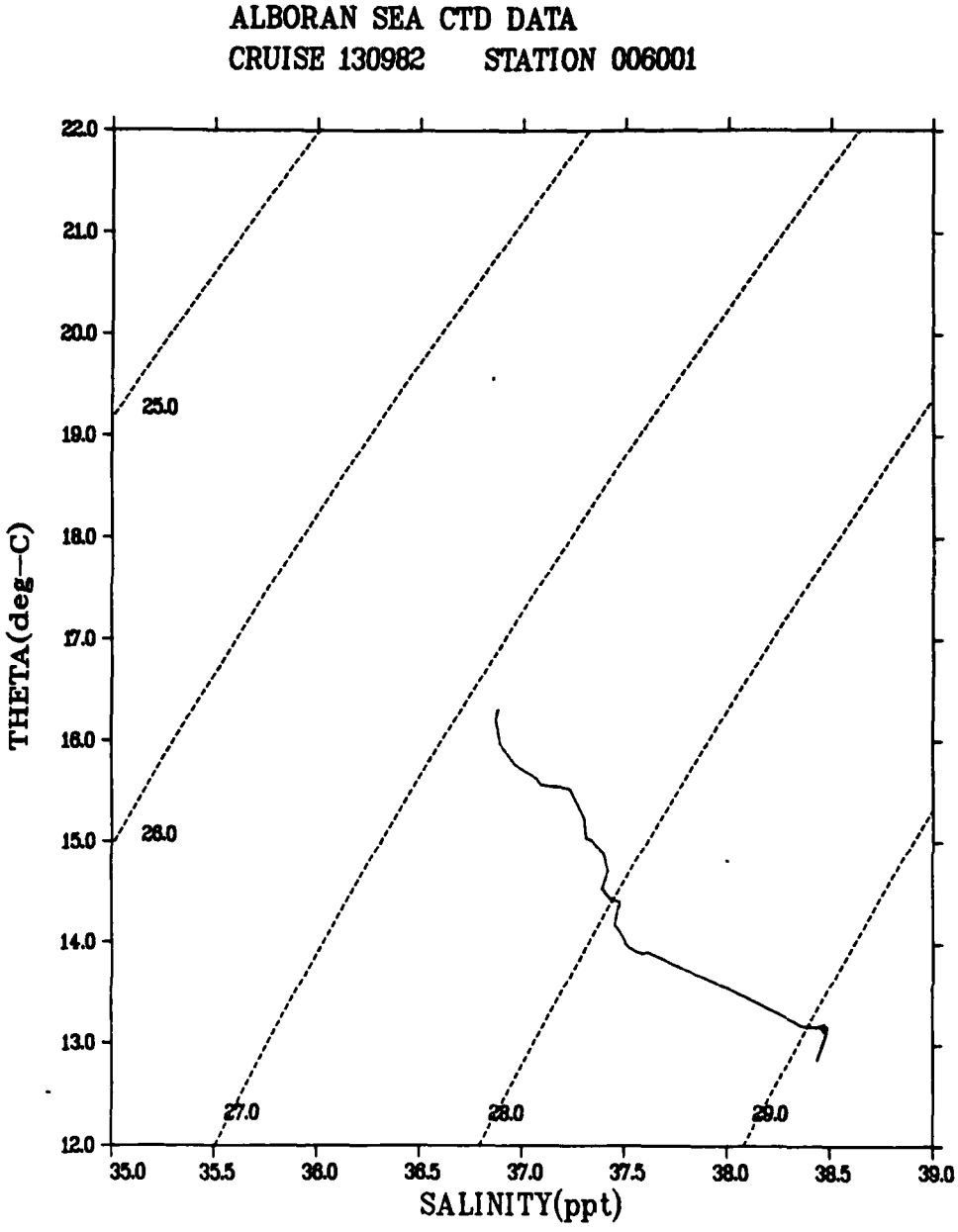

CRUISE 130982
STATION 006001
ALBORAN SEA CTD DATA
SIGMA-T
25 26 27 28 29 30
SAL(PPT)
35 35.5 36 36.5 37 37.5 38 38.5 39
THETA(DEG-C)
12 13 14 15 16 17 18 19 20 21 22
PRESSURE(DBAR)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000

Figure 12


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 006001
THETA(deg-C)
SALINITY(ppt)
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13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 13

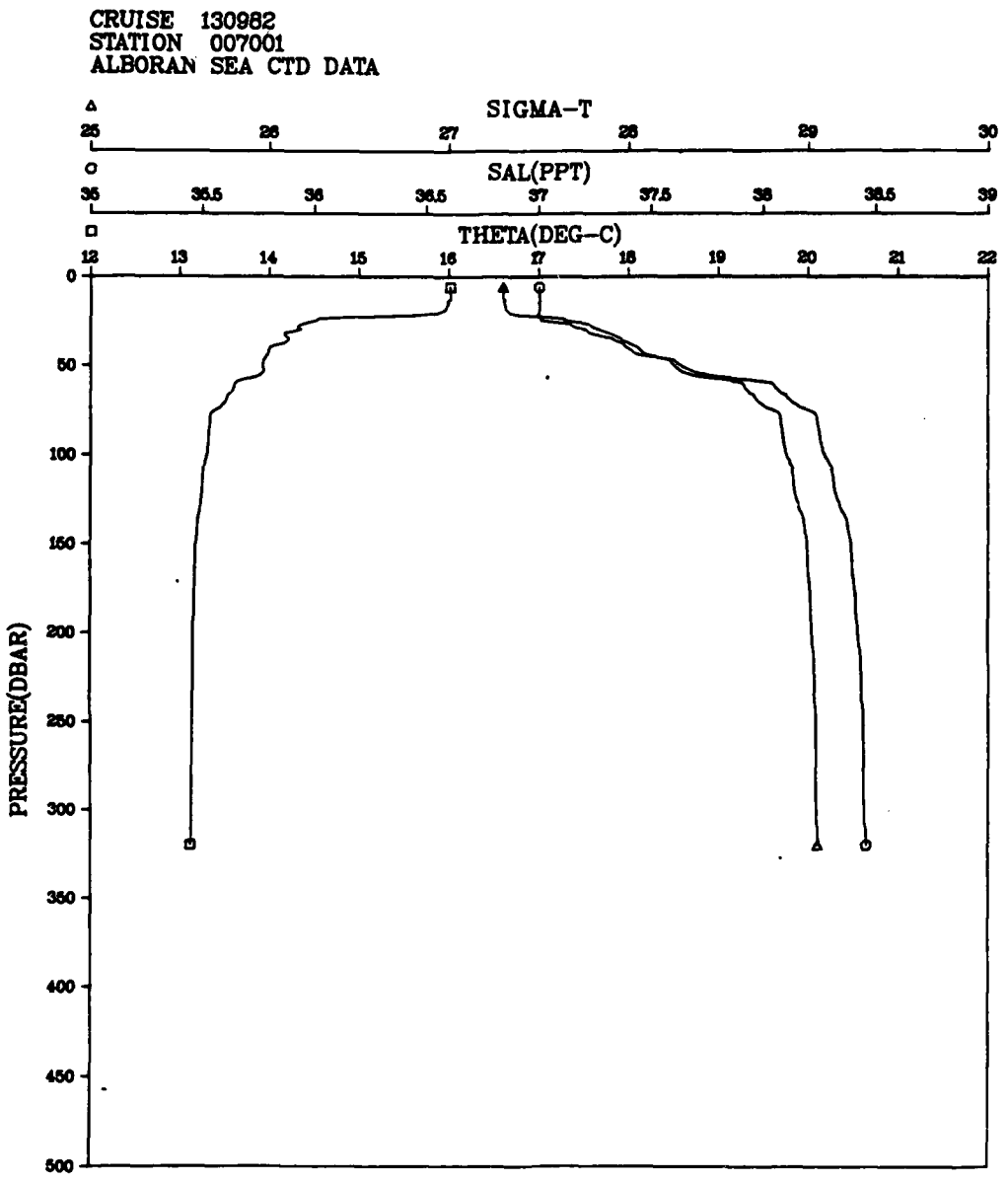
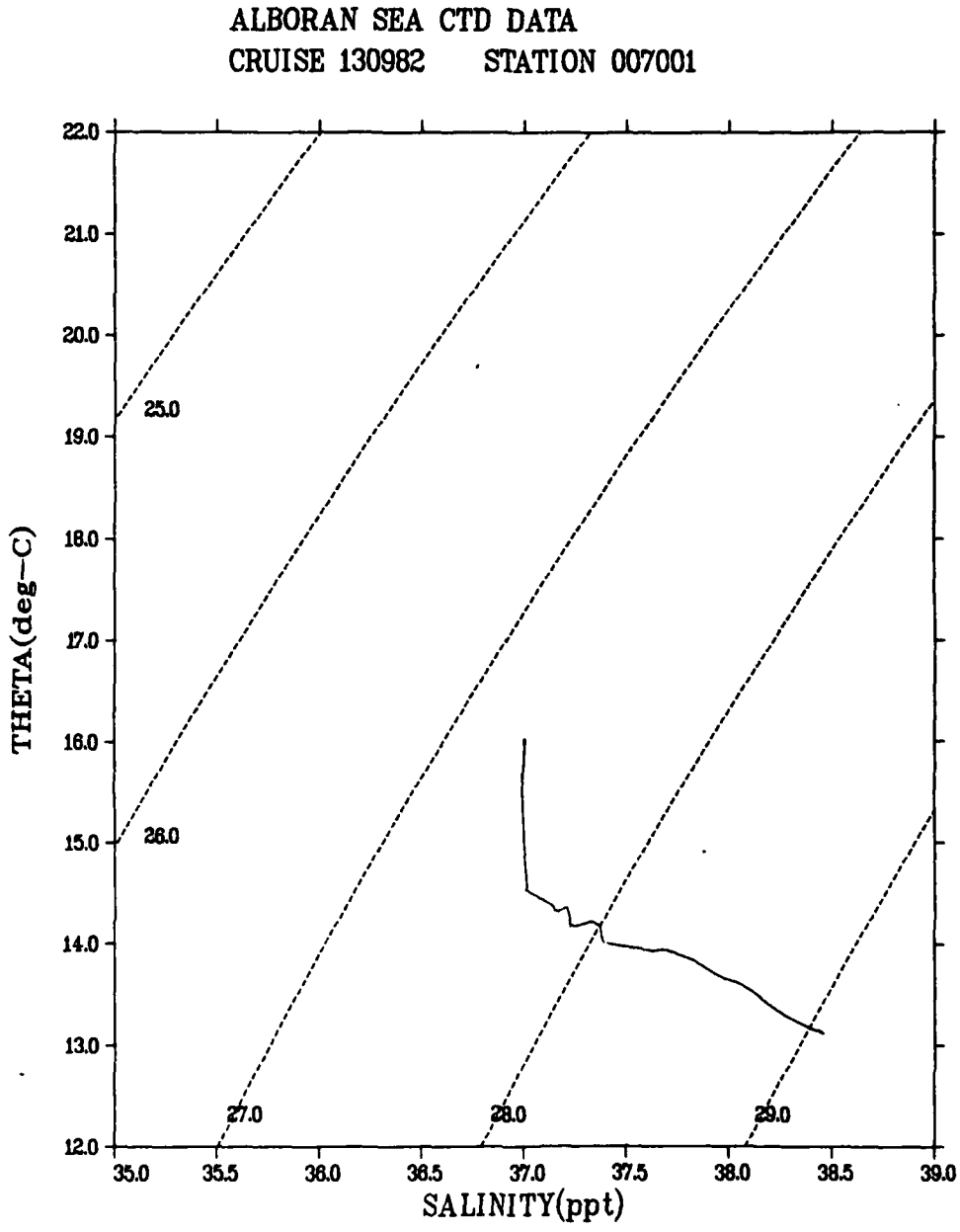

CRUISE 130982
STATION 007001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 14


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 007001
THETA(deg-C)
SALINITY(ppt)
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21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 15

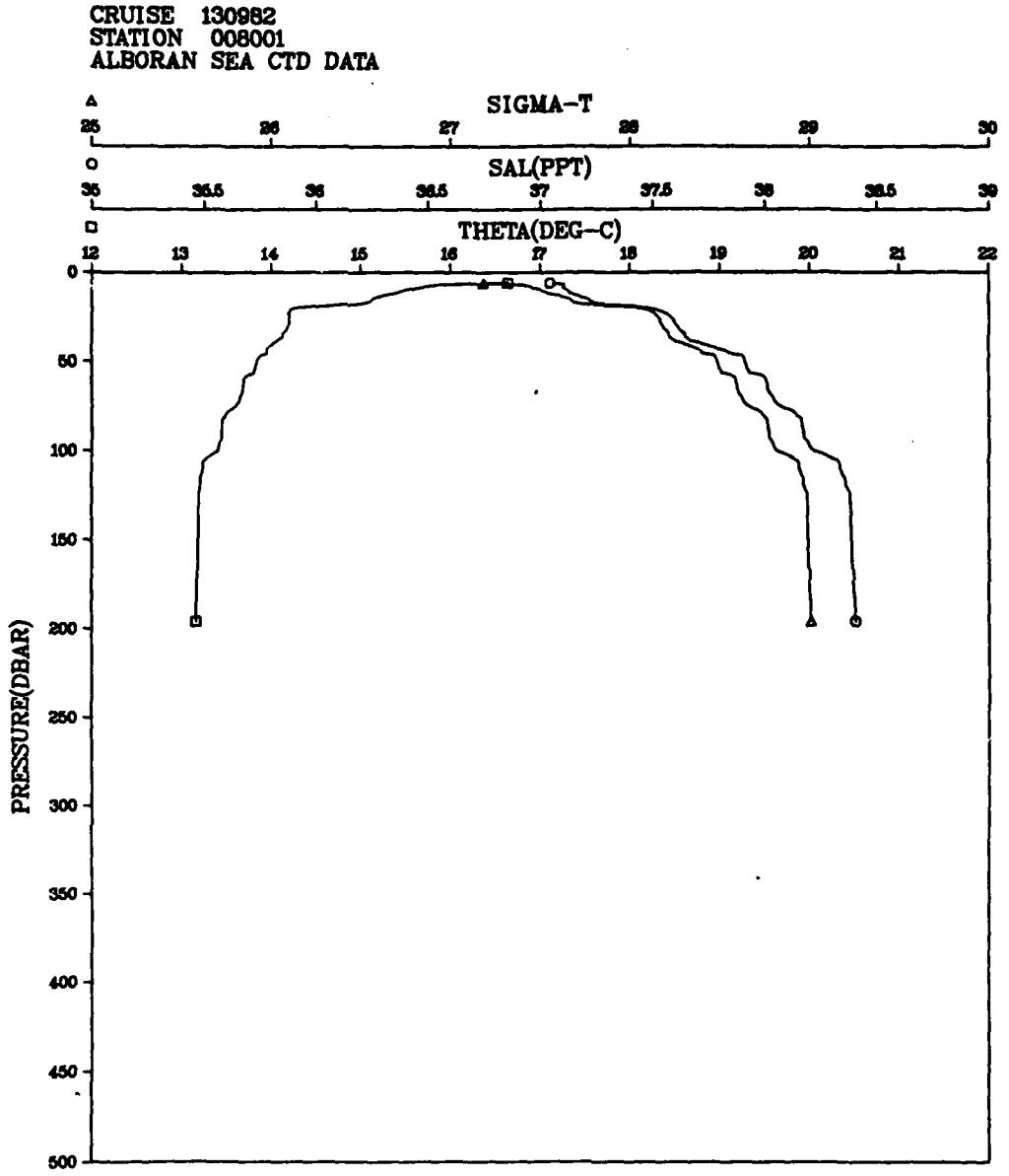

CRUISE 130982
STATION 008001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 16

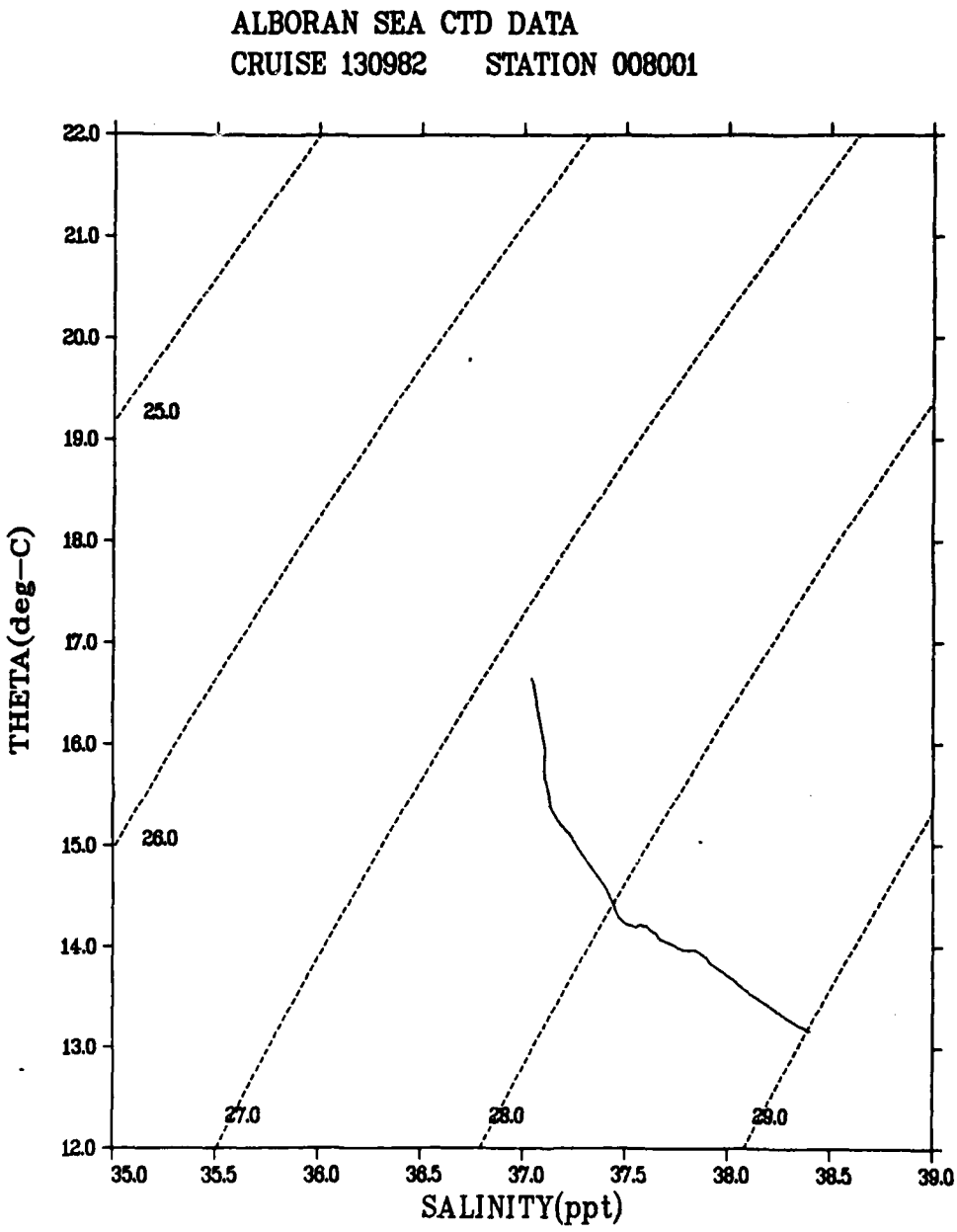

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 008001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 17

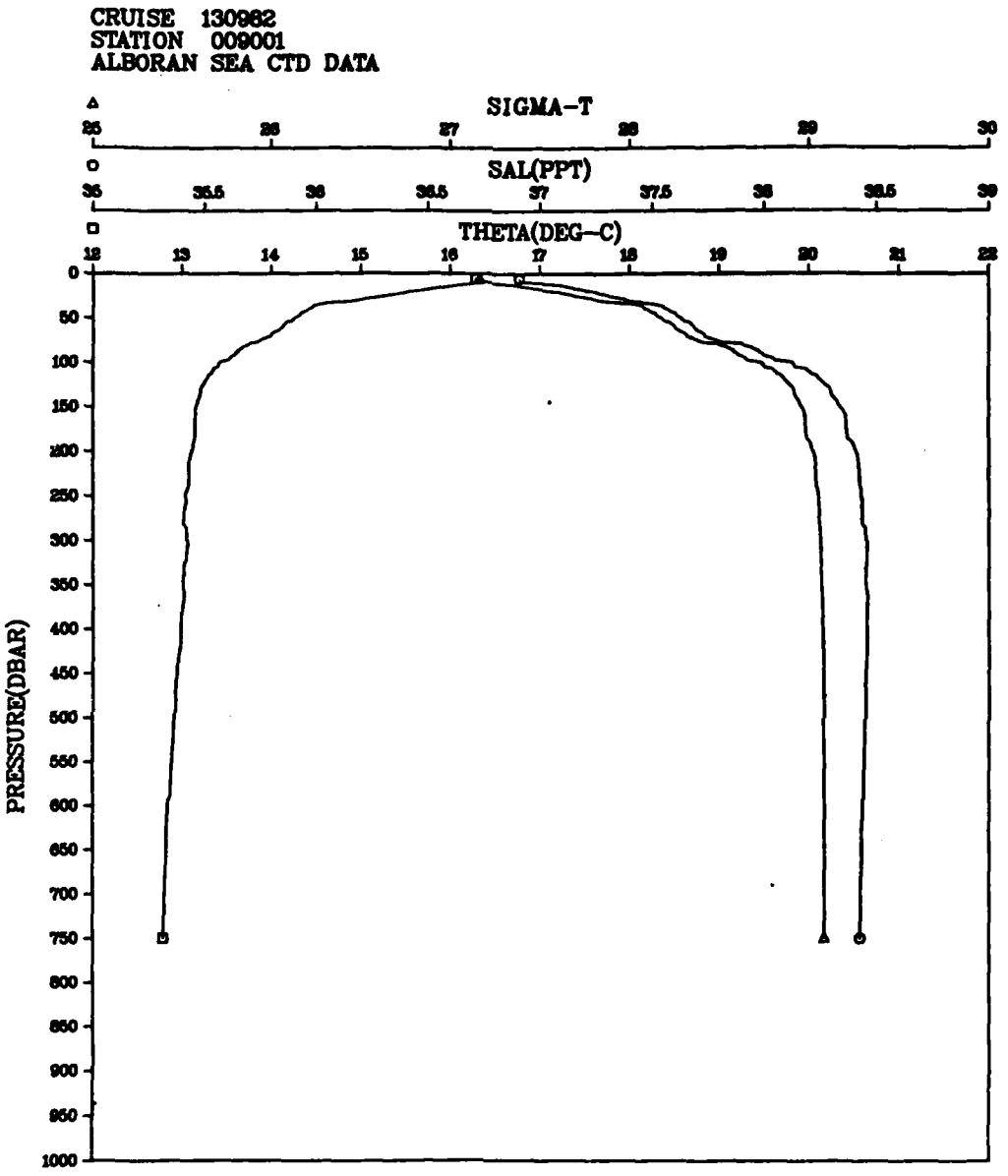
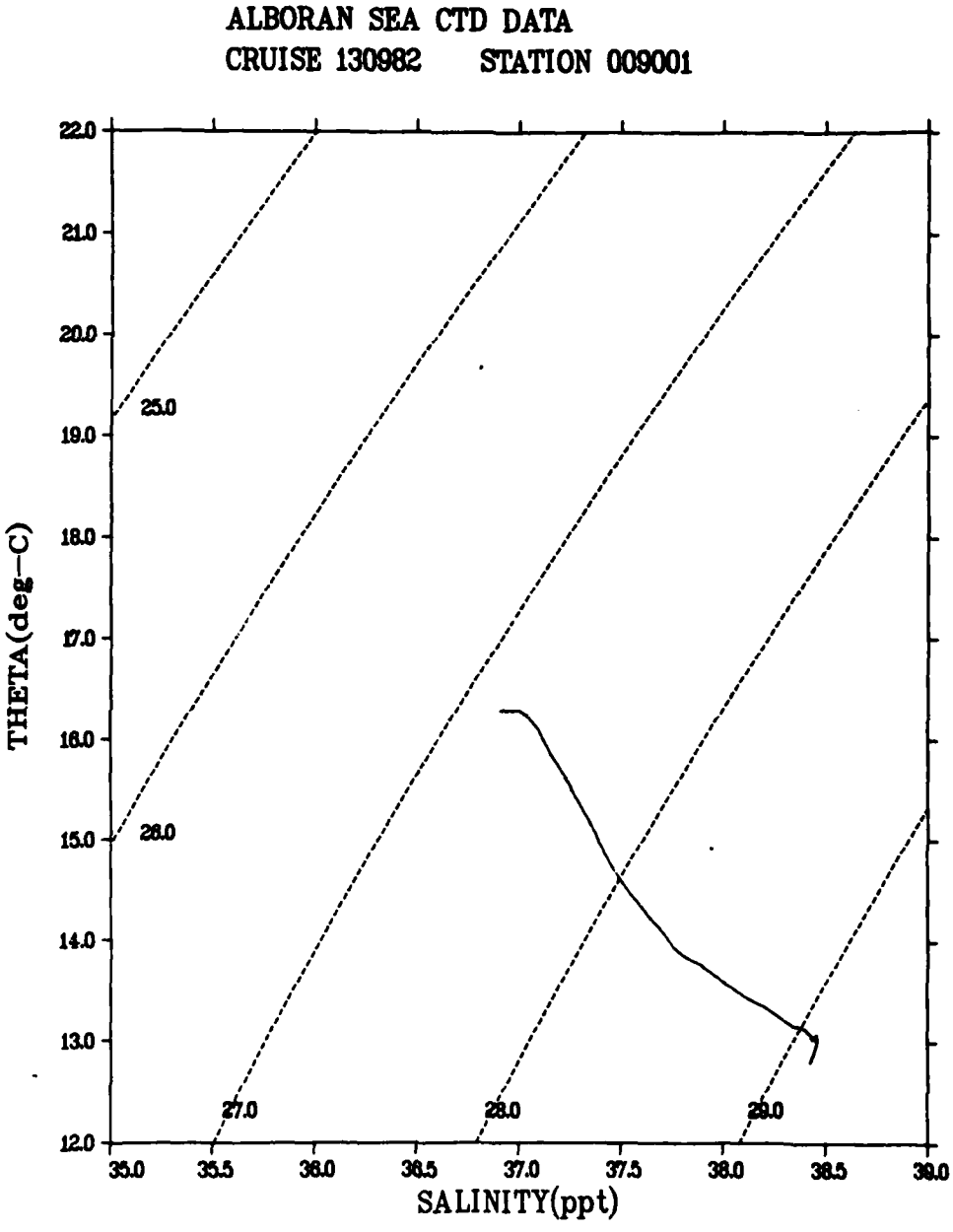

CRUISE 130982
STATION 009001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 18


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 009001
THETA(deg-C)
SALINITY(ppt)
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21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 19

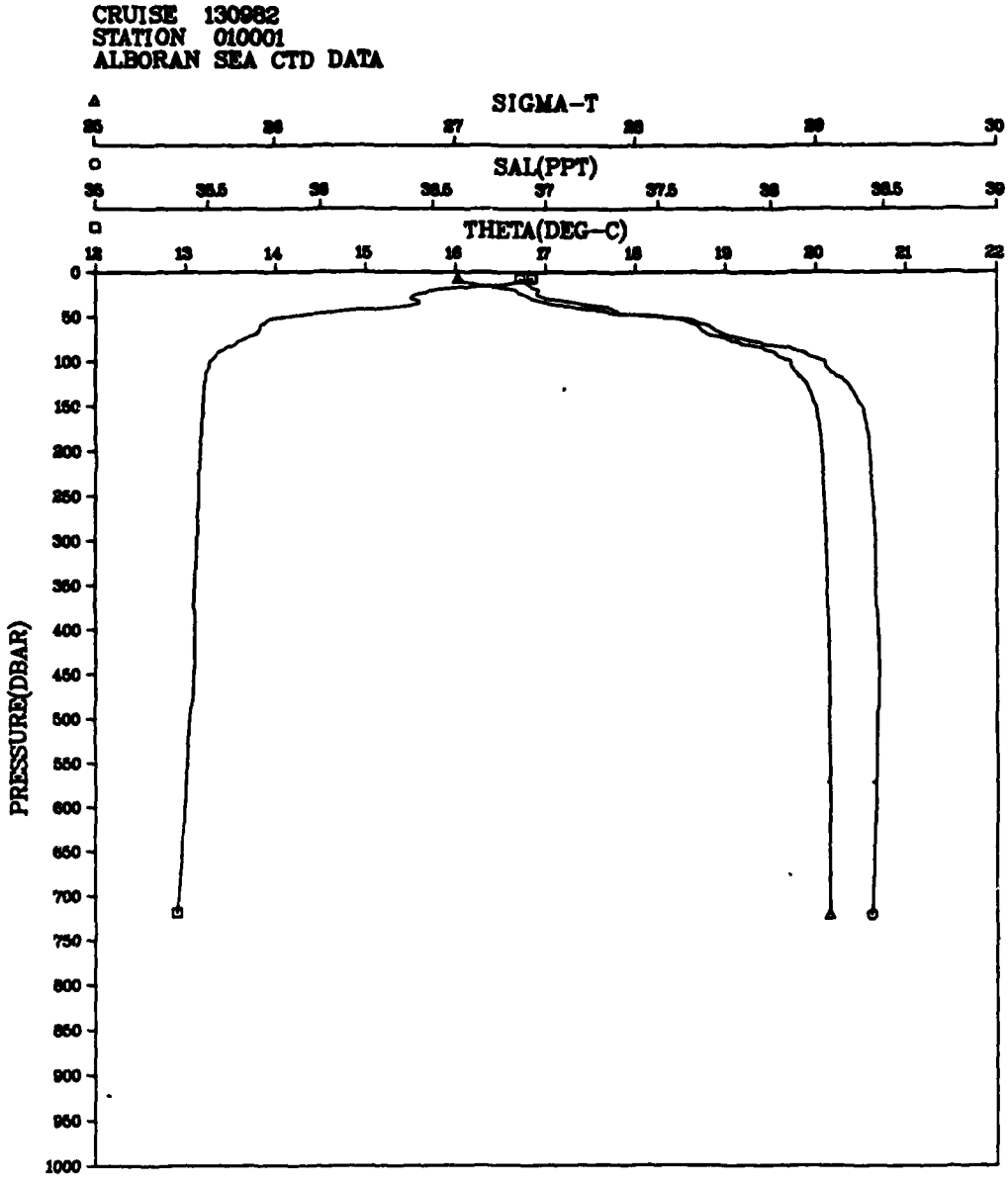
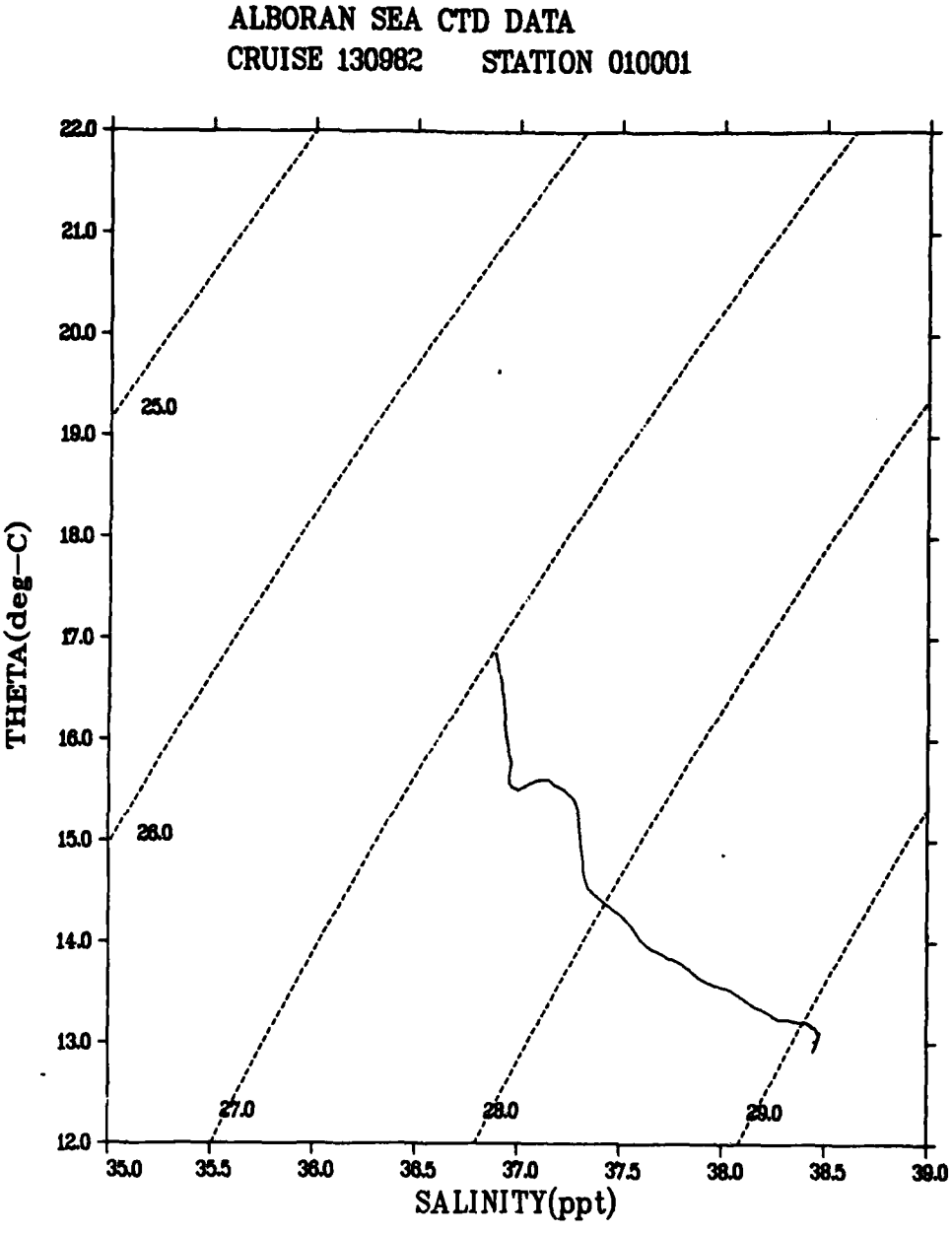

CRUISE 130982
STATION 010001
ALBORAN SEA CTD DATA
SIGMA-T
SAL(PPT)
THETA(DEG-C)
PRESSURE(DBAR)

Figure 20


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 010001
THETA(deg-C)
SALINITY(ppt)
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21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 21

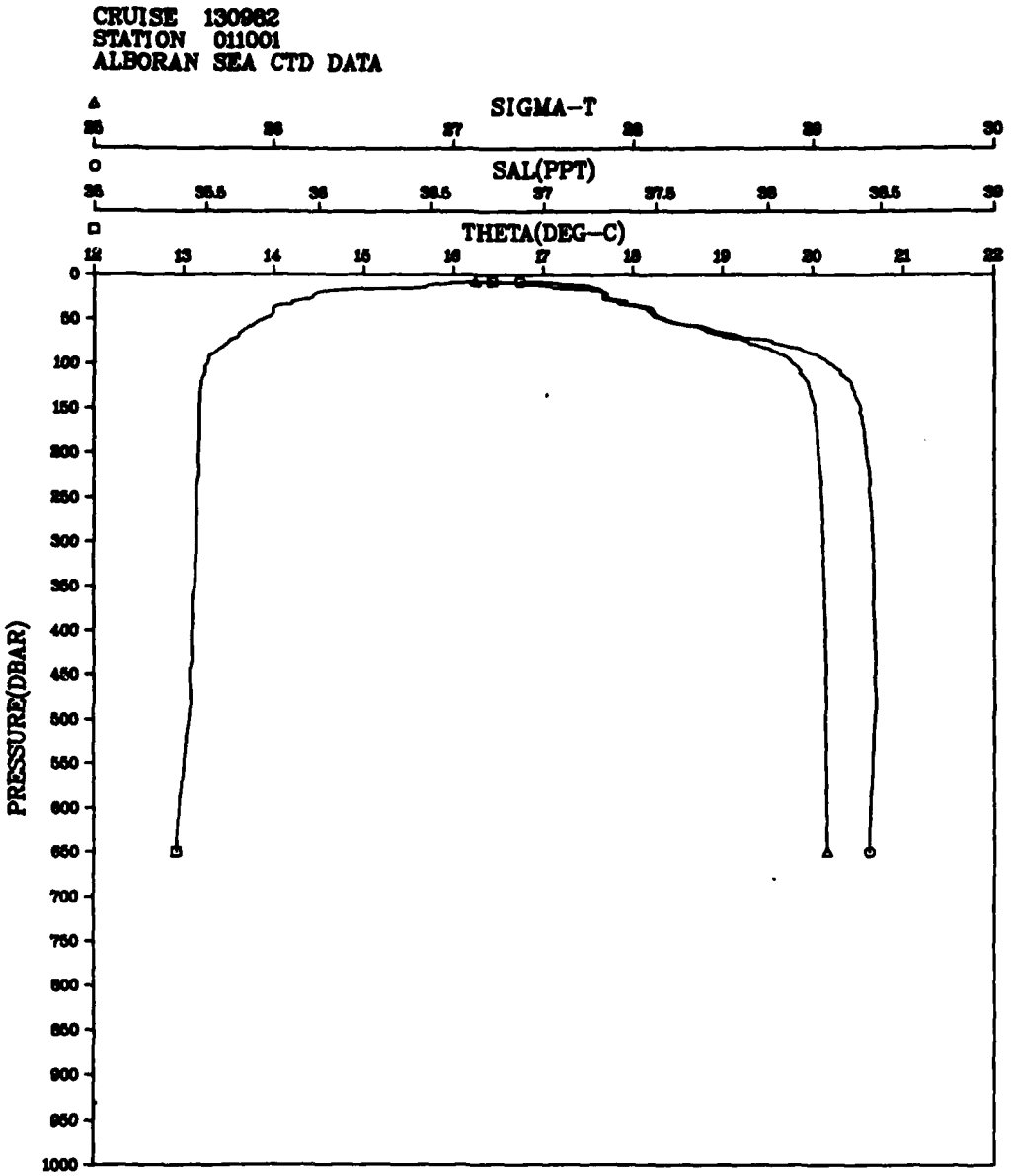

CRUISE 130982
STATION 011001
ALBORAN SEA CTD DATA
SIGMA-T
SAL(PPT)
THETA(DEG-C)
PRESSURE(DBAR)

Figure 22

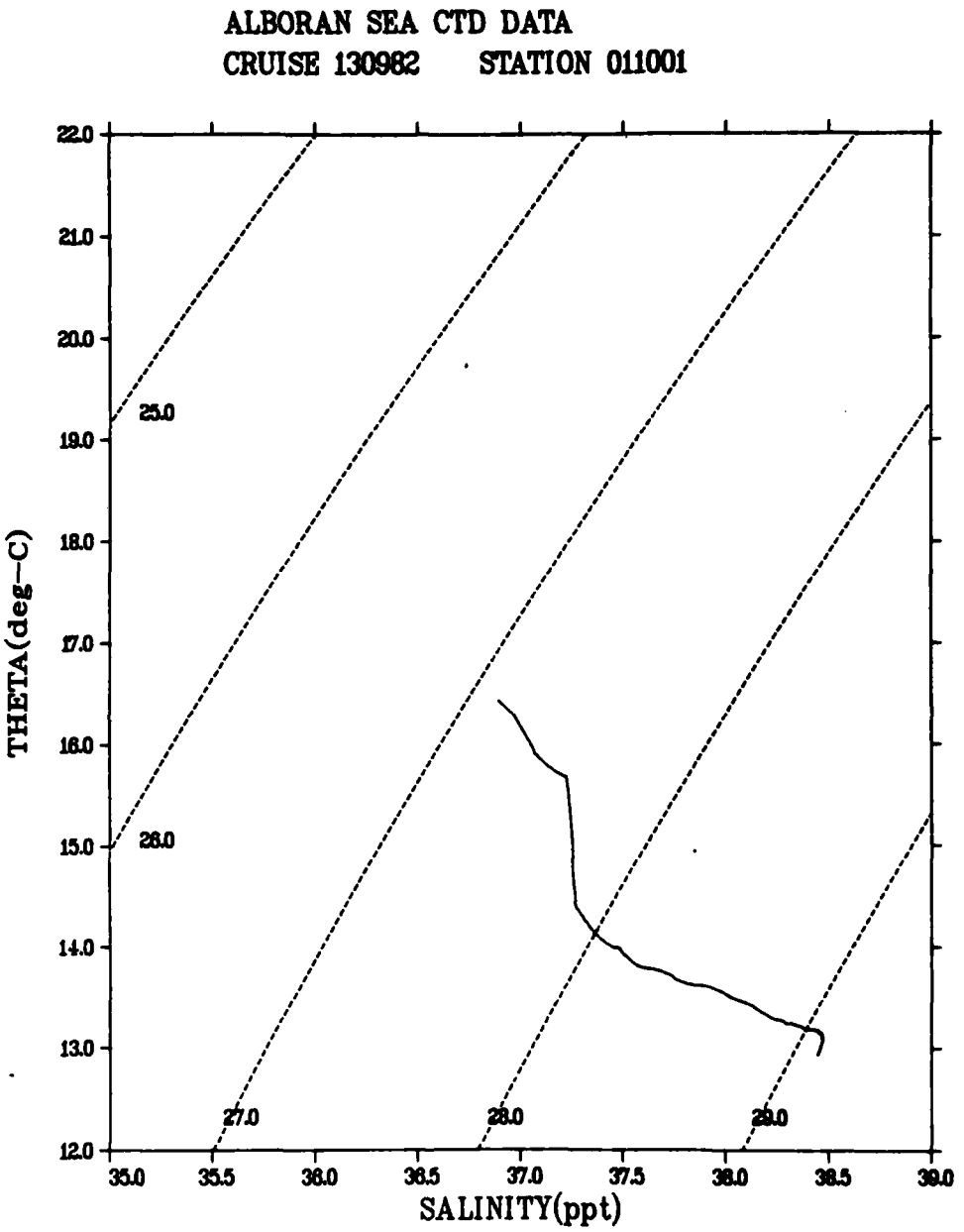

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 011001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 23

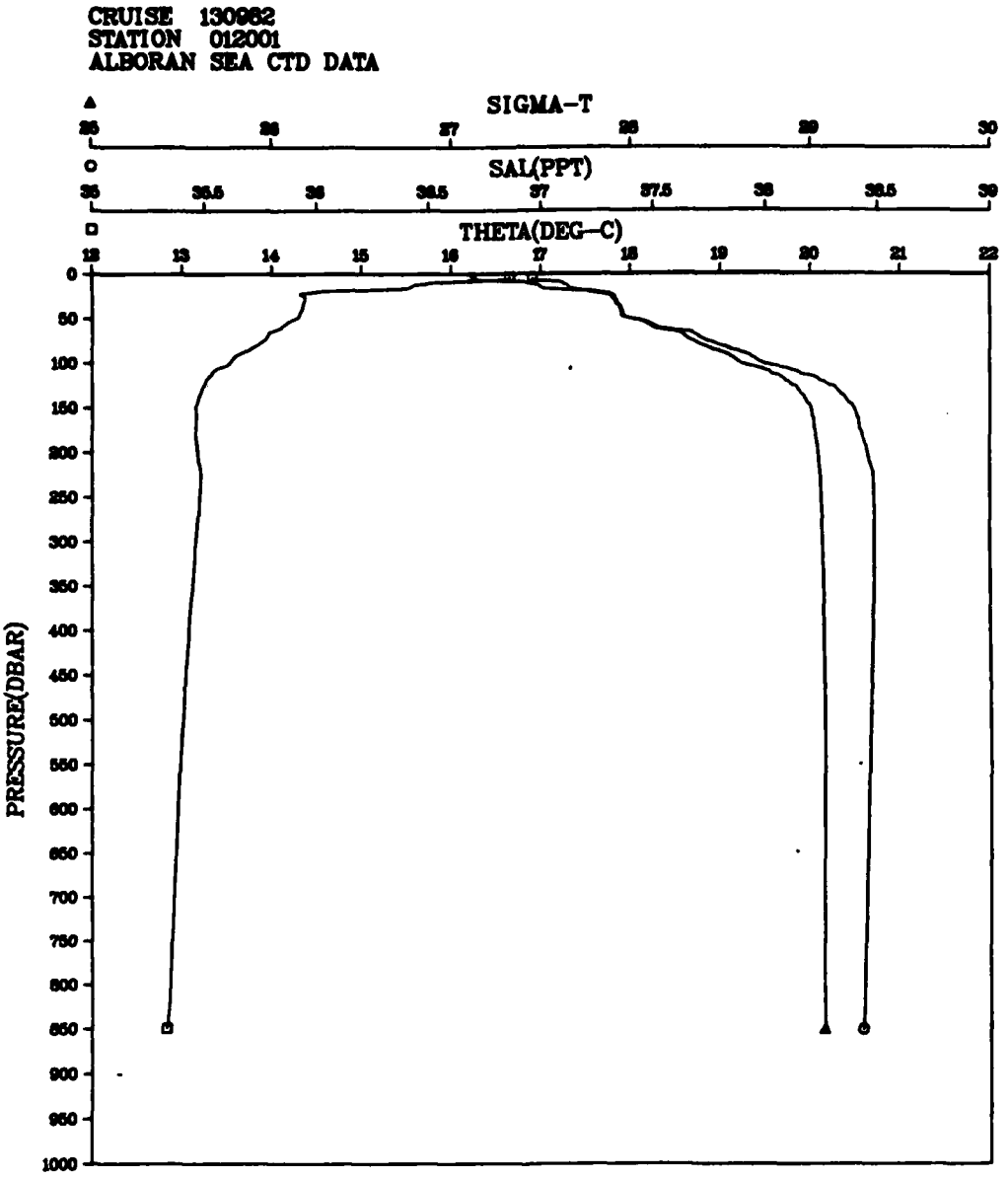

CRUISE 130962
STATION 012001
ALBORAN SEA CTD DATA
SIGMA-T
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 24

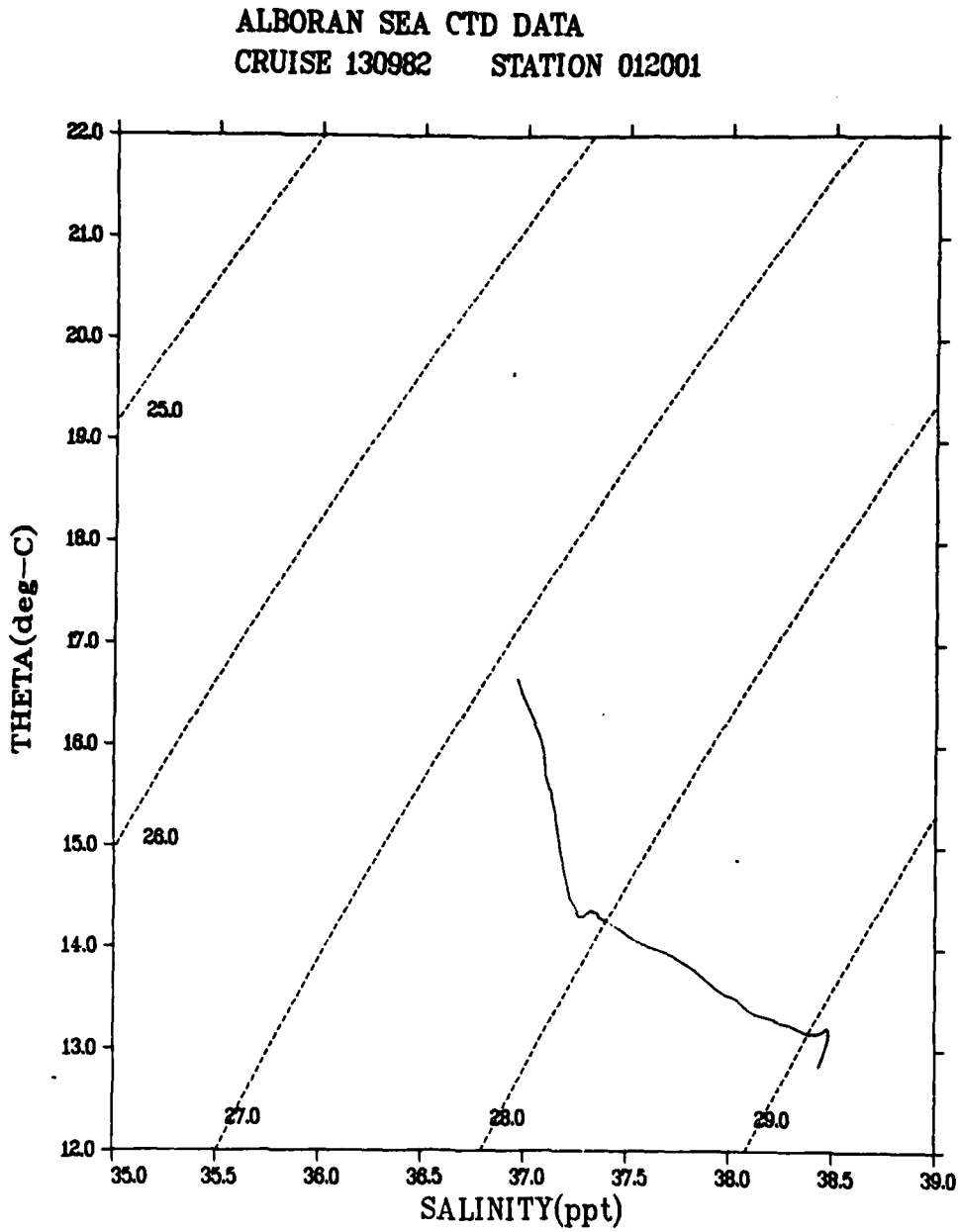

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 012001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 25

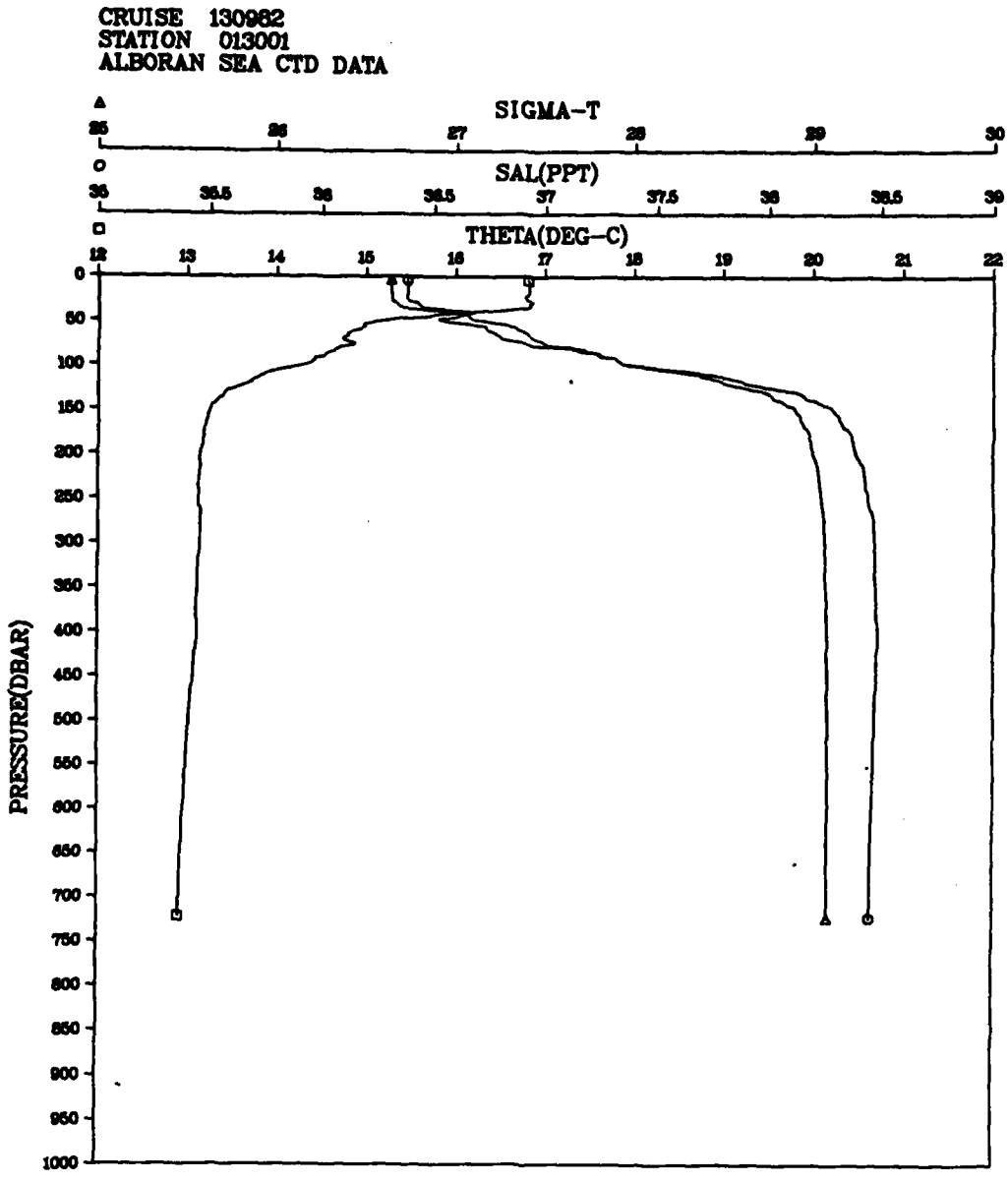

CRUISE 130982
STATION 013001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 26

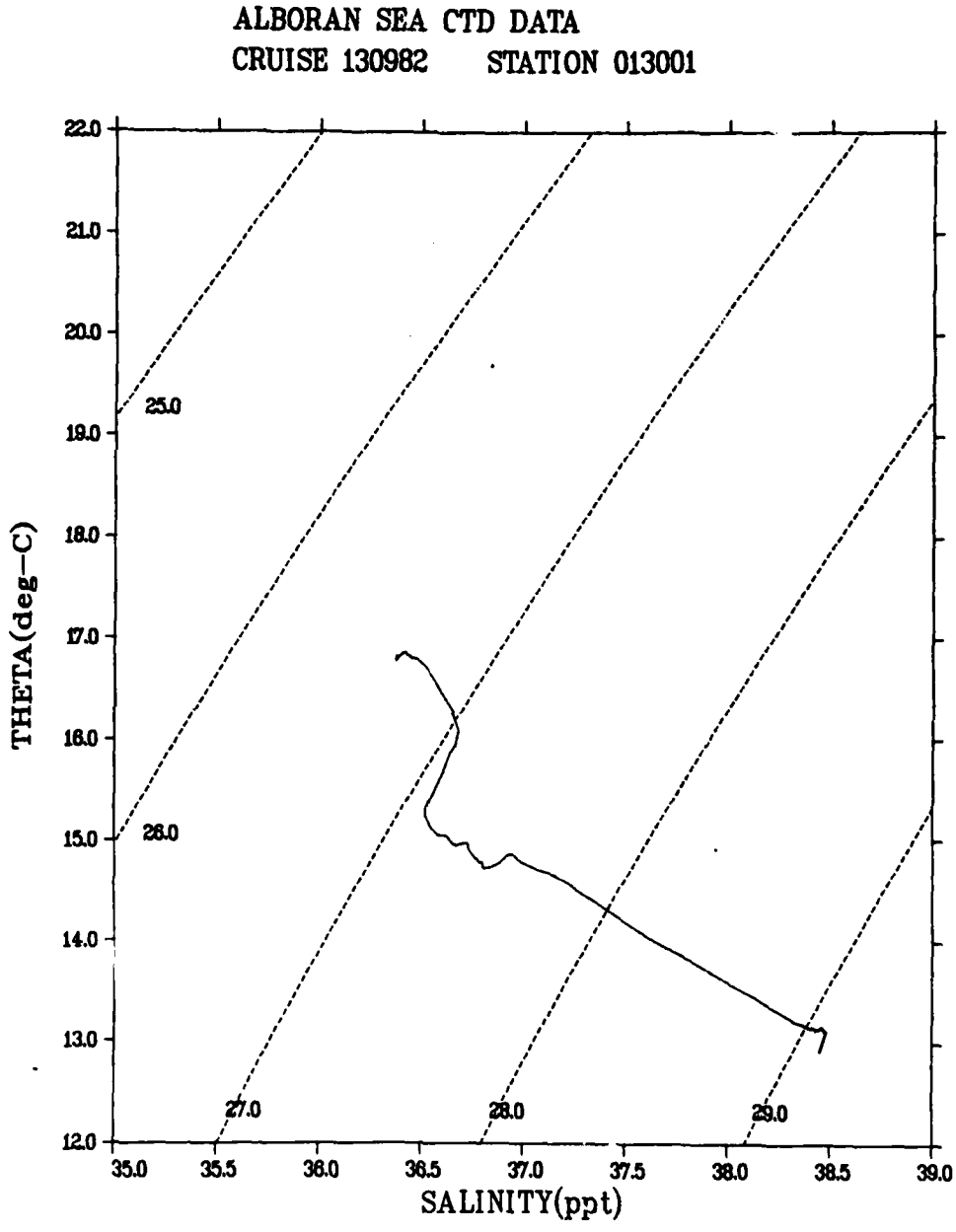

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 013001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 27

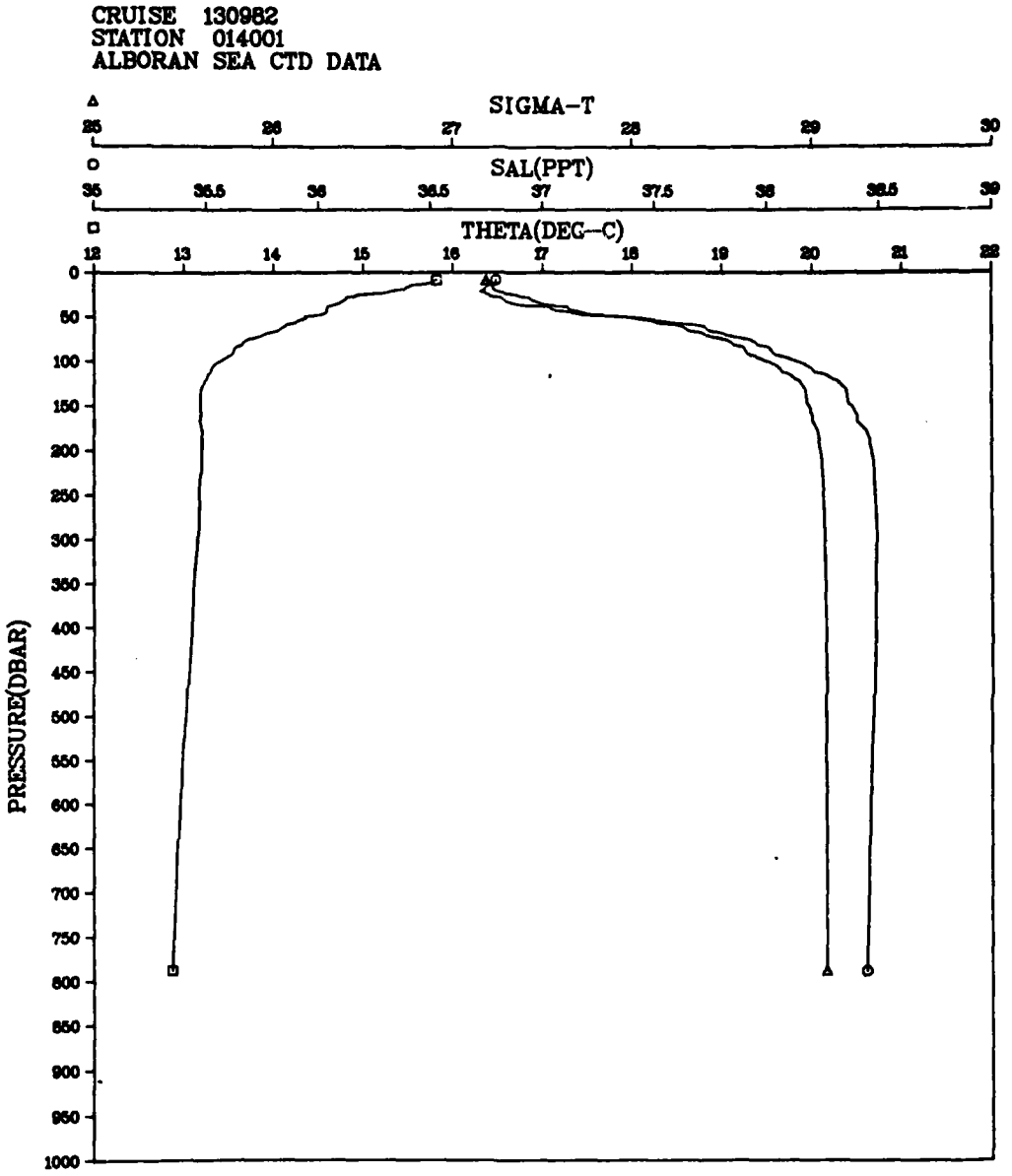
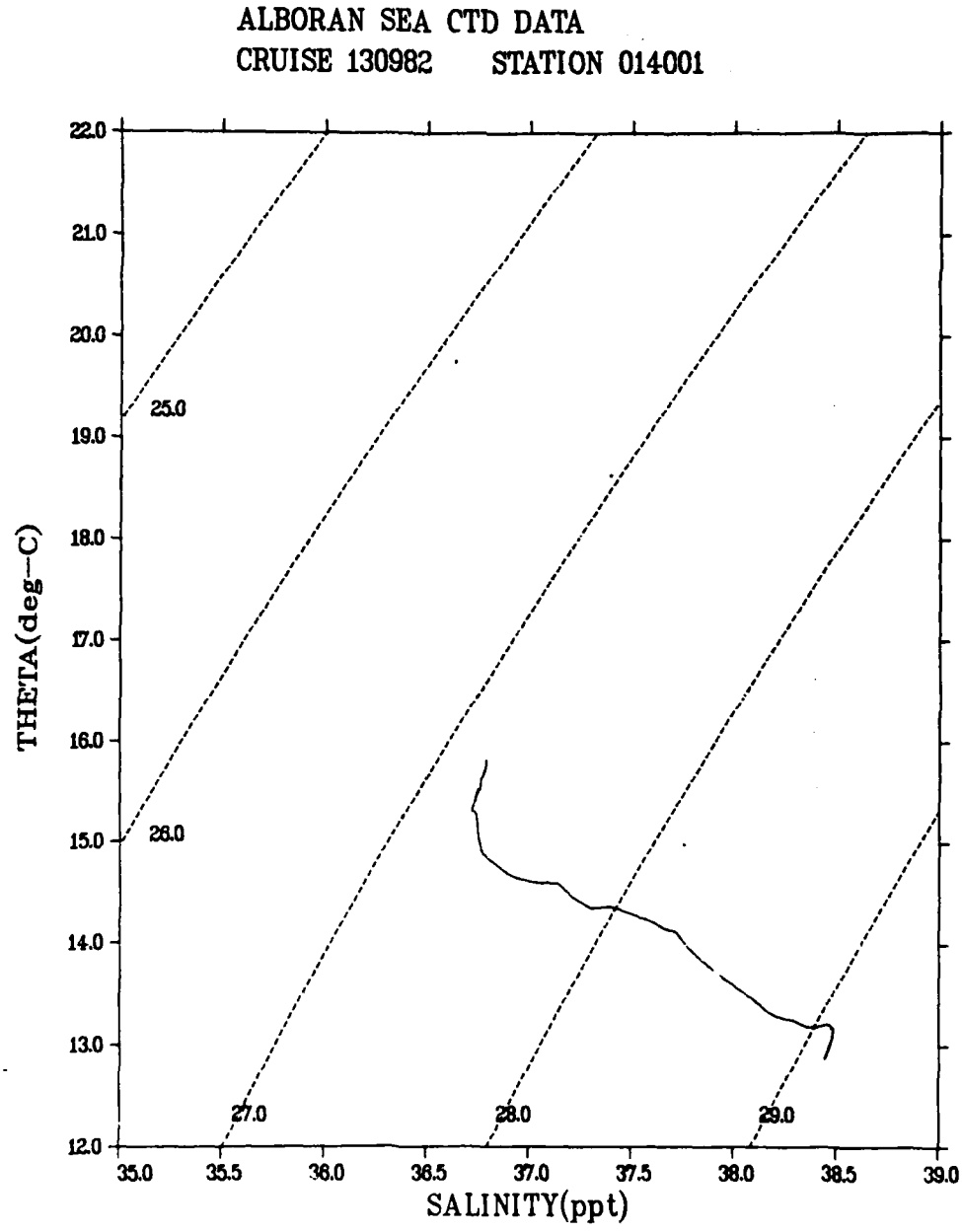

CRUISE 130982
STATION 014001
ALBORAN SEA CTD DATA
SIGMA-T
25 26 27 28 29 30
SAL(PPT)
35 36.5 36 36.5 37 37.5 38 38.5 39
THETA(DEG-C)
12 13 14 15 16 17 18 19 20 21 22
PRESSURE(DBAR)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000

Figure 28


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 014001
THETA(deg-C)
SALINITY(ppt)
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20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 29

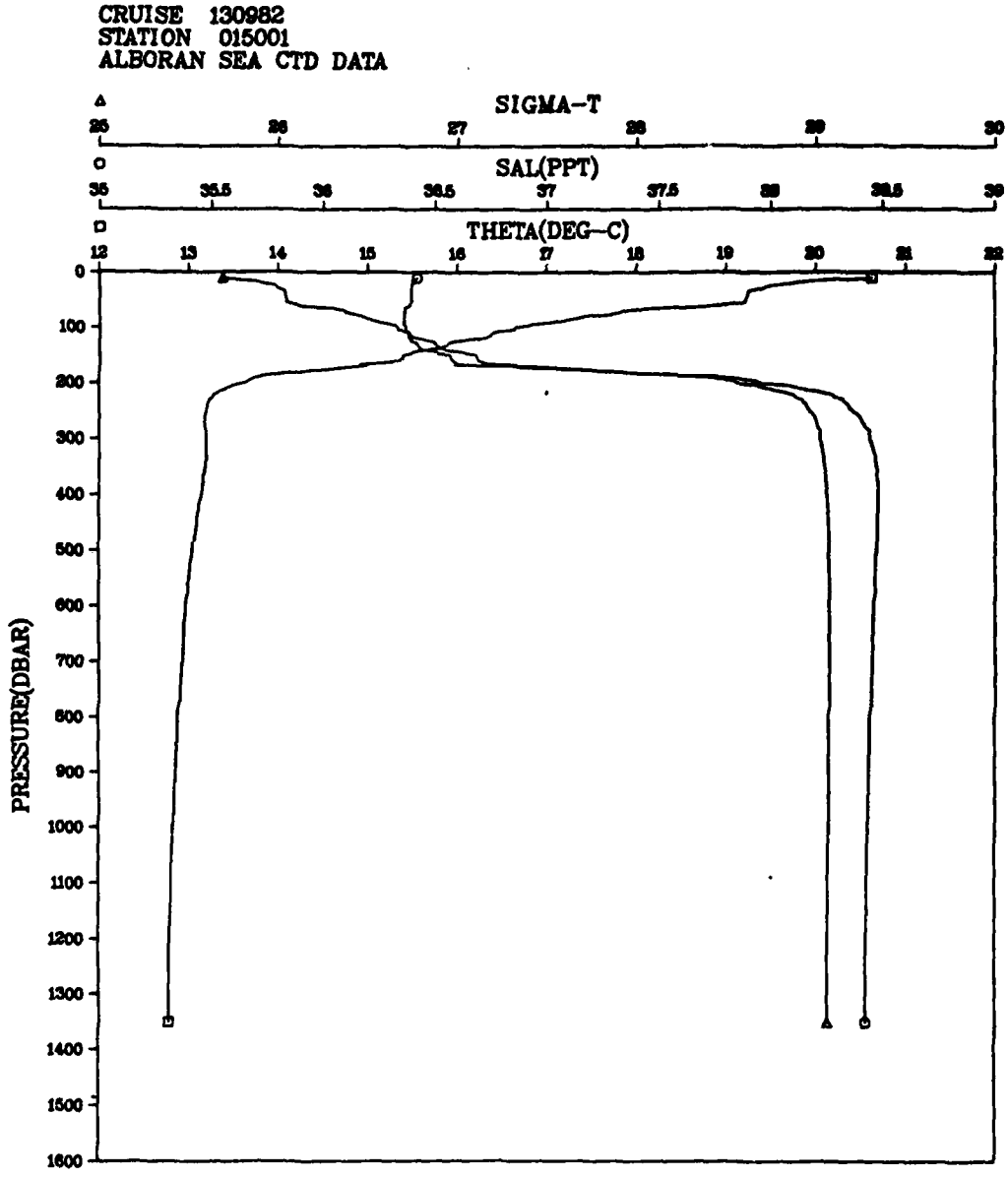
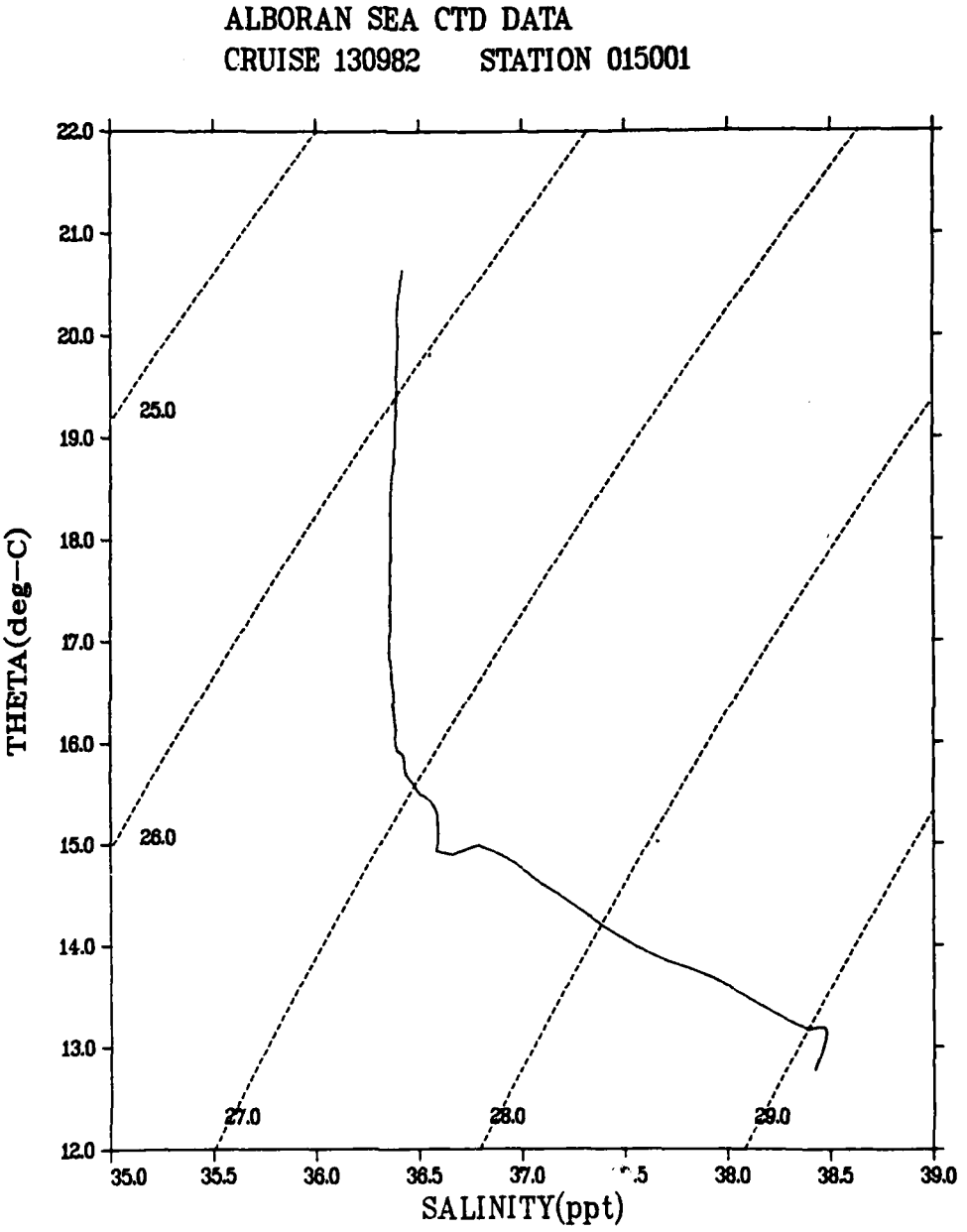

CRUISE 130982
STATION 015001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 30


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 015001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
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16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 31

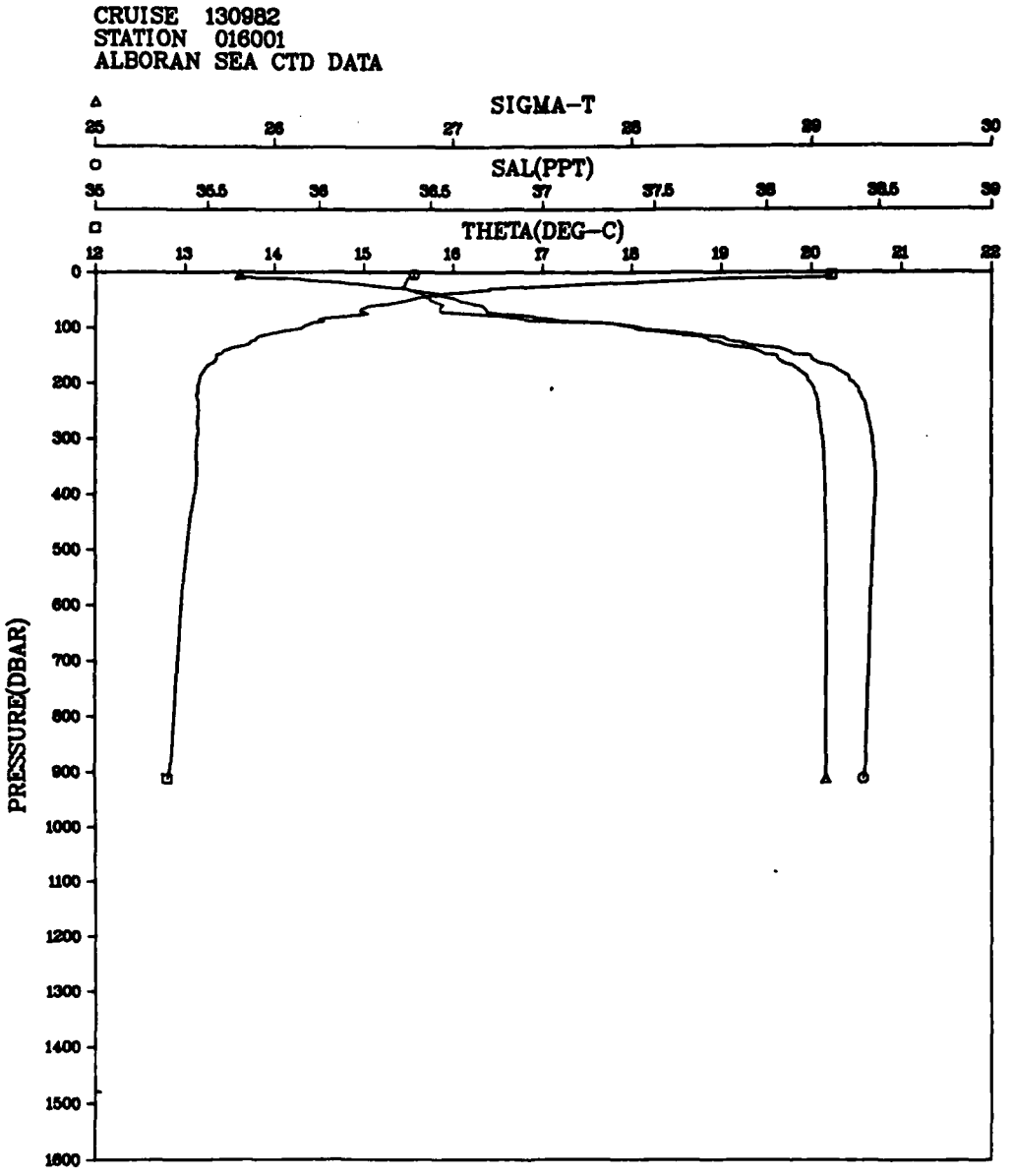

CRUISE 130982
STATION 016001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
36.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 32

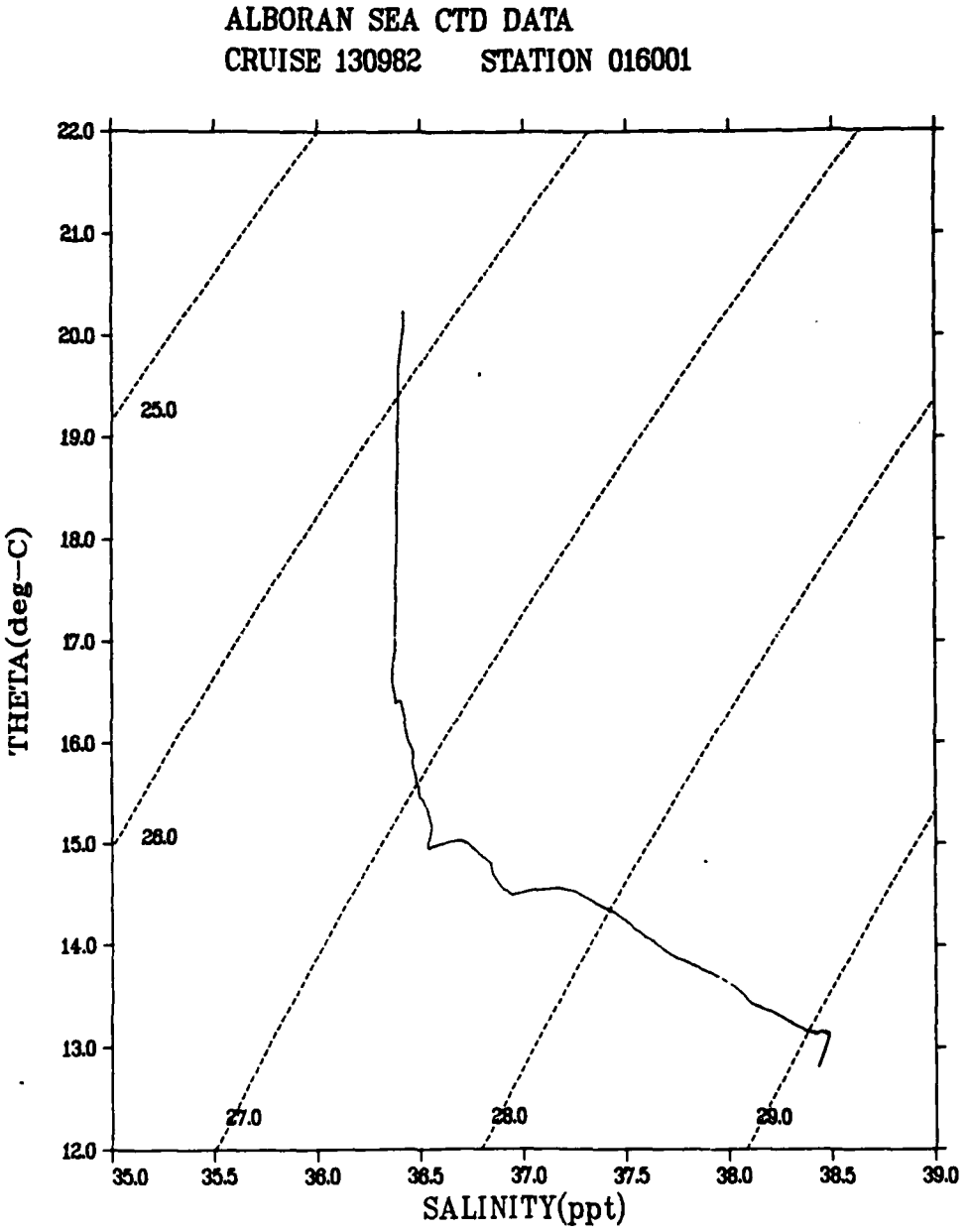

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 016001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 33

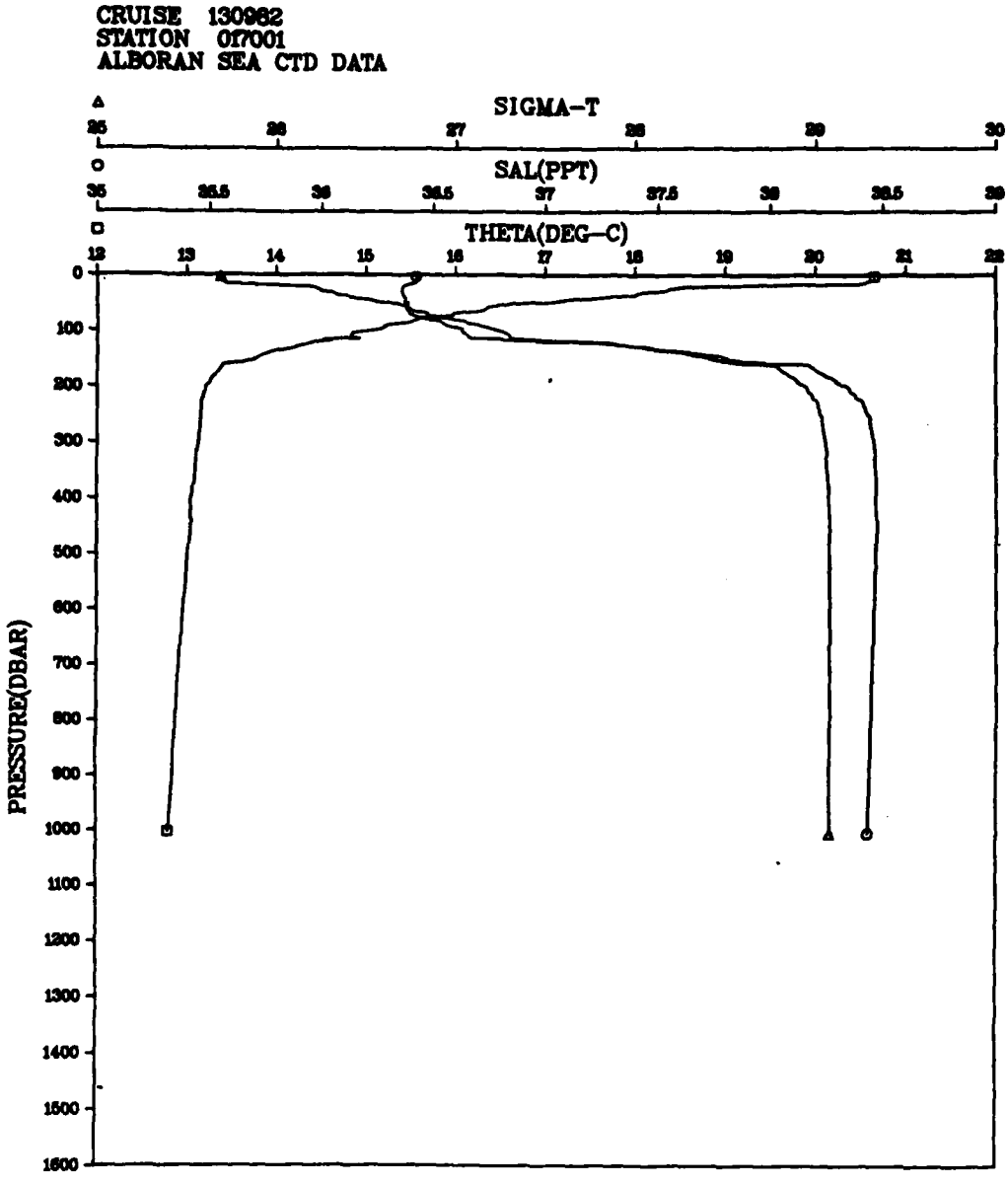
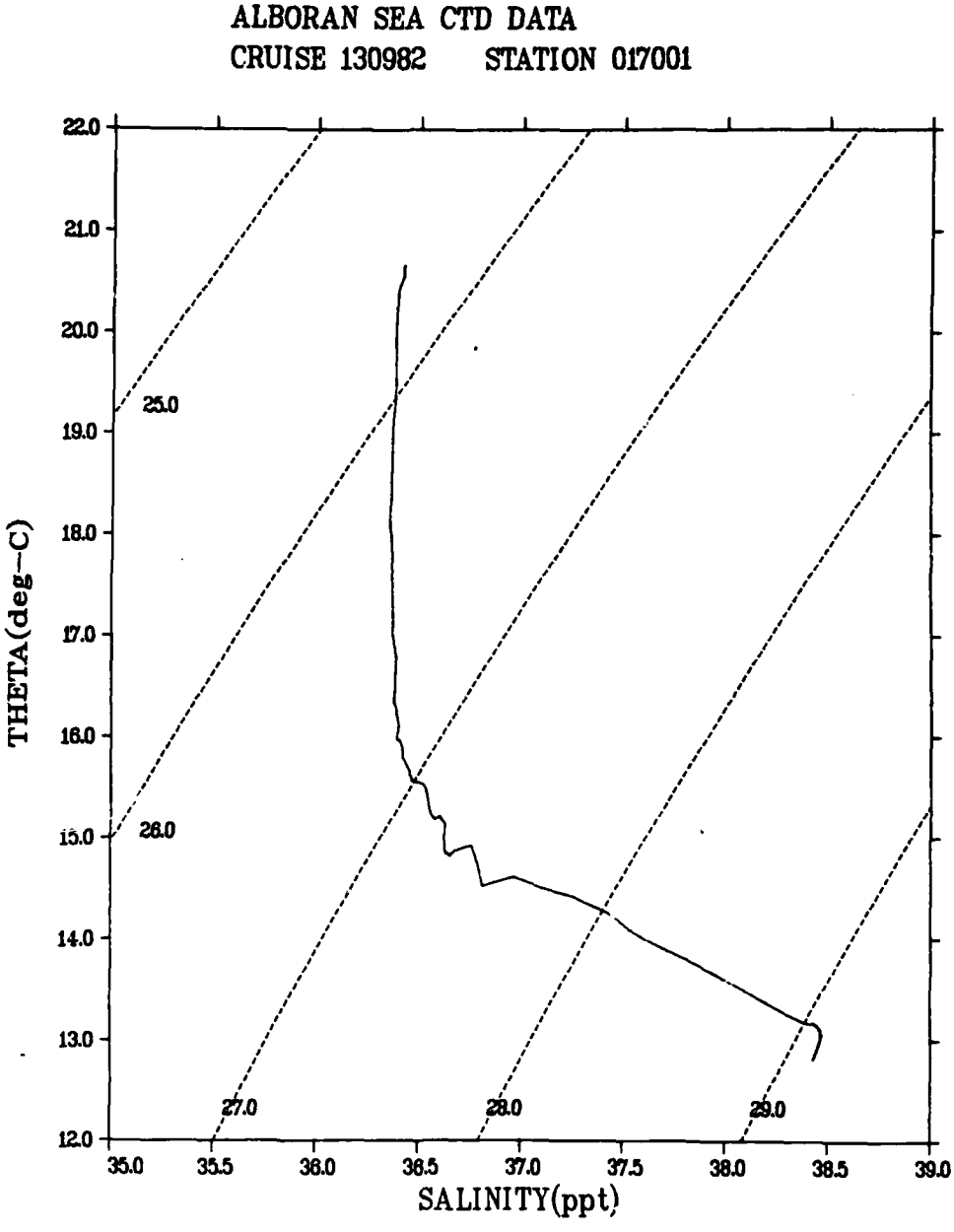

CRUISE 130982
STATION 017001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 34


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 017001
THETA(deg-C)
SALINITY(ppt)
22.0
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20.0
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16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 35

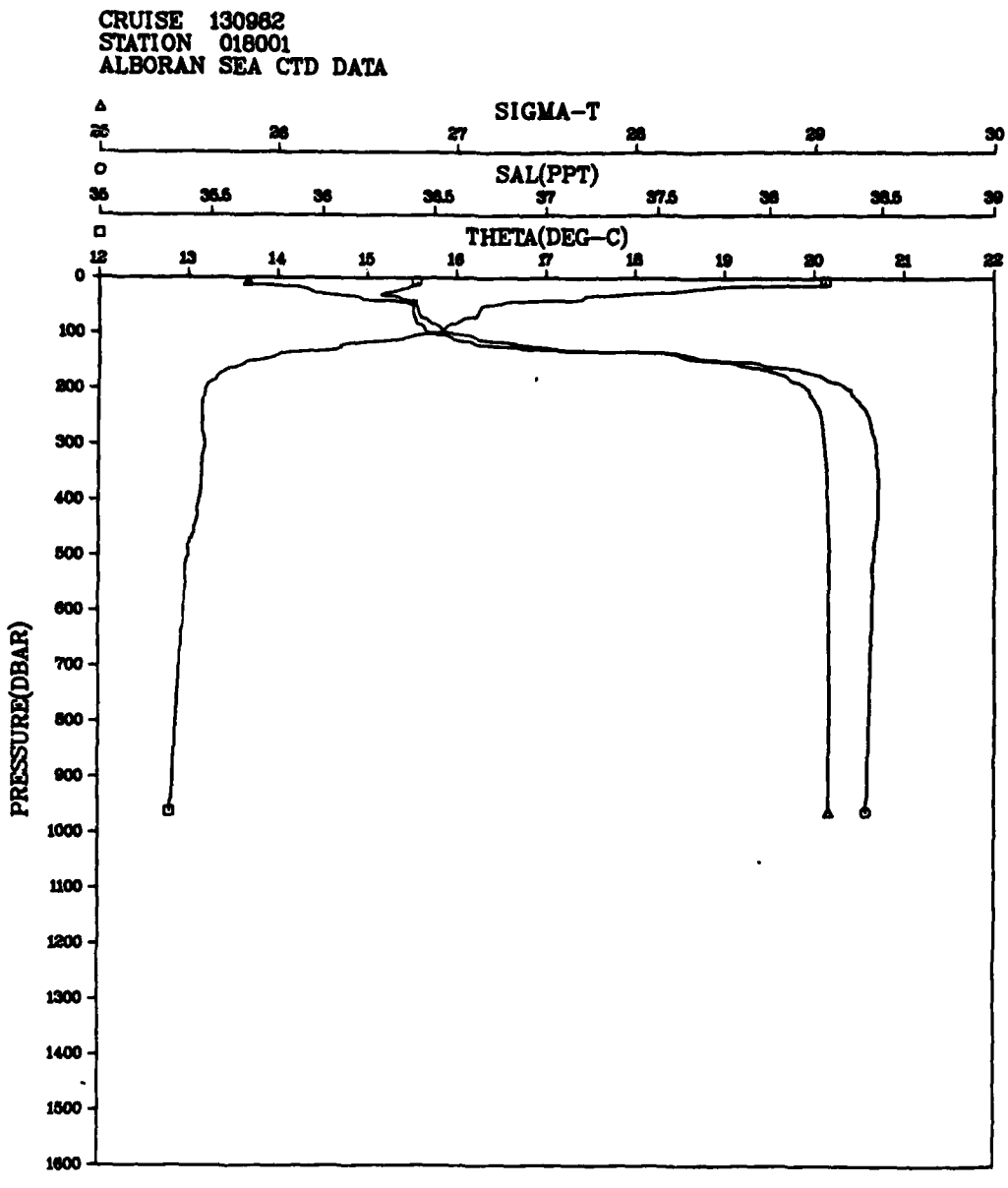
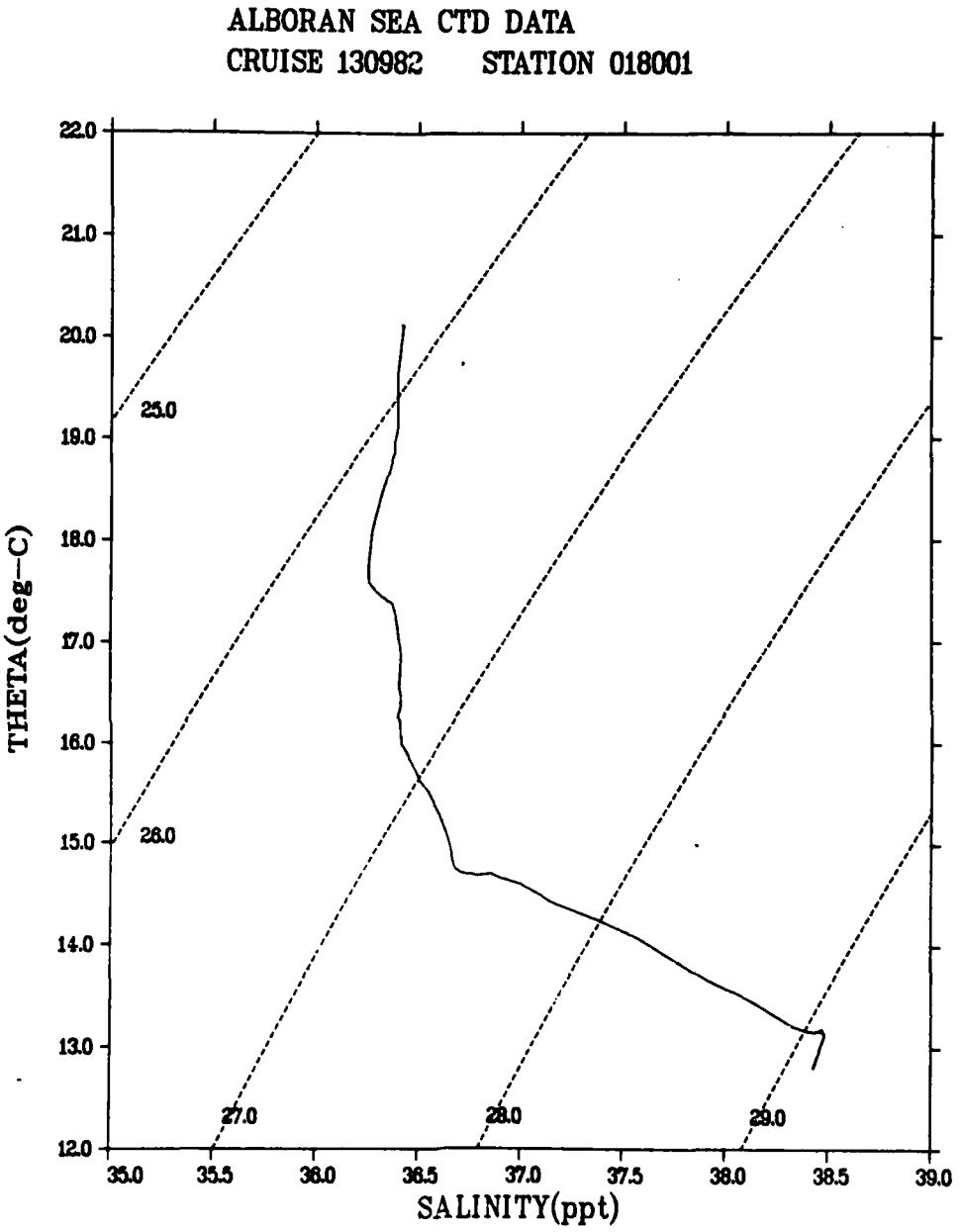

CRUISE 130982
STATION 018001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 36


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 018001
THETA(deg-C)
SALINITY(ppt)
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20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
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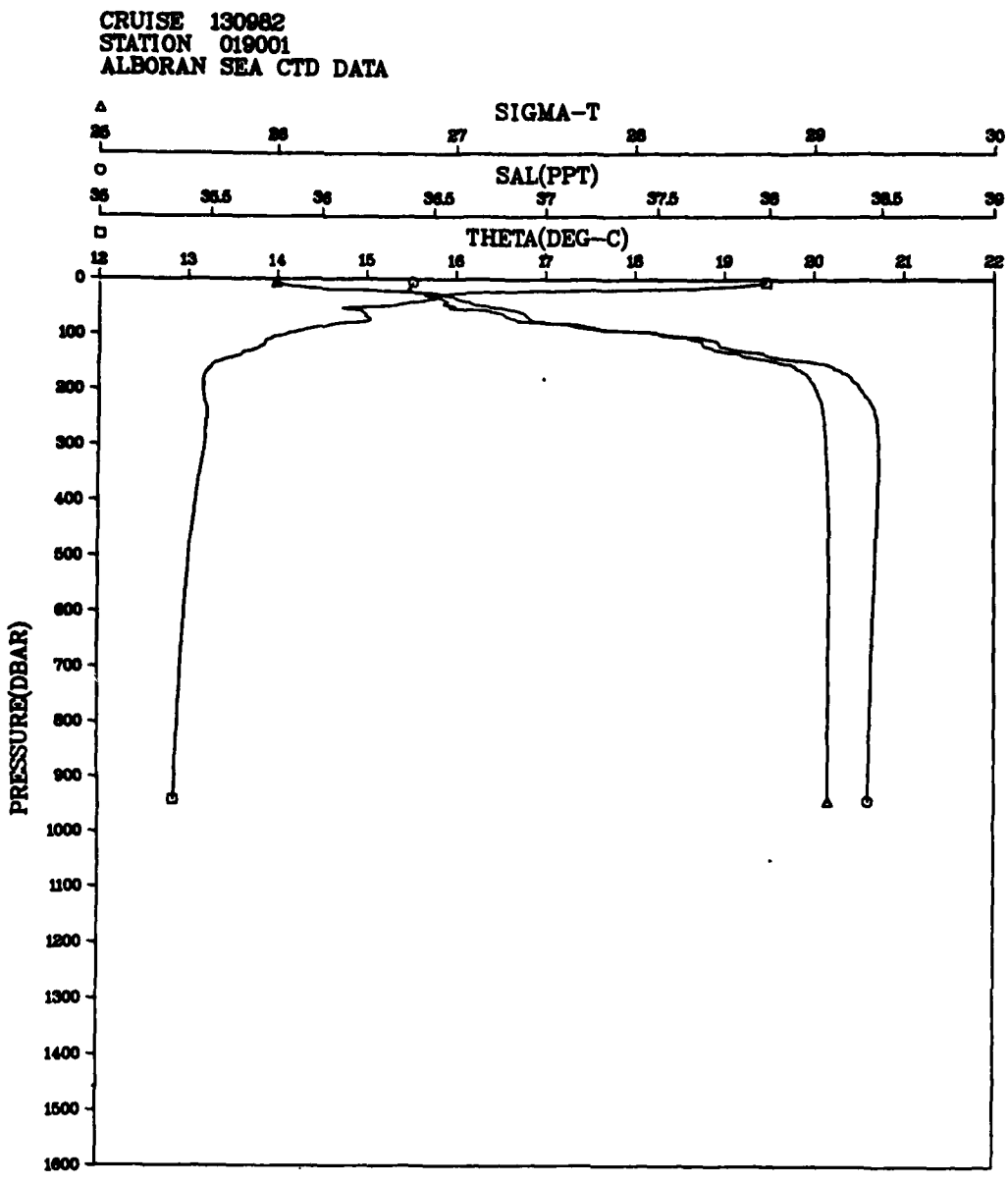
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 37


CRUISE 130982
STATION 019001
ALBORAN SEA CTD DATA
SIGMA-T
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26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 38

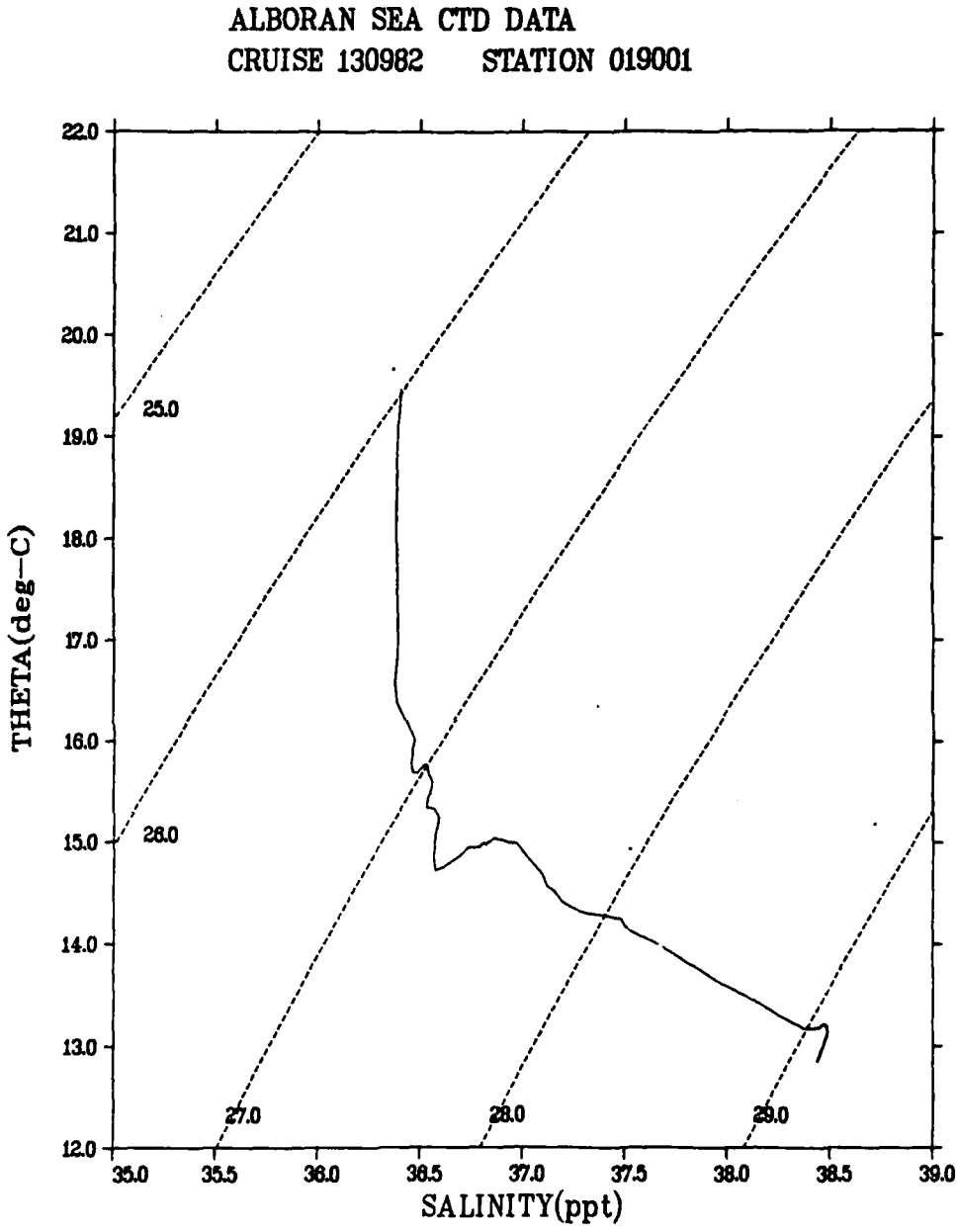

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 019001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 39

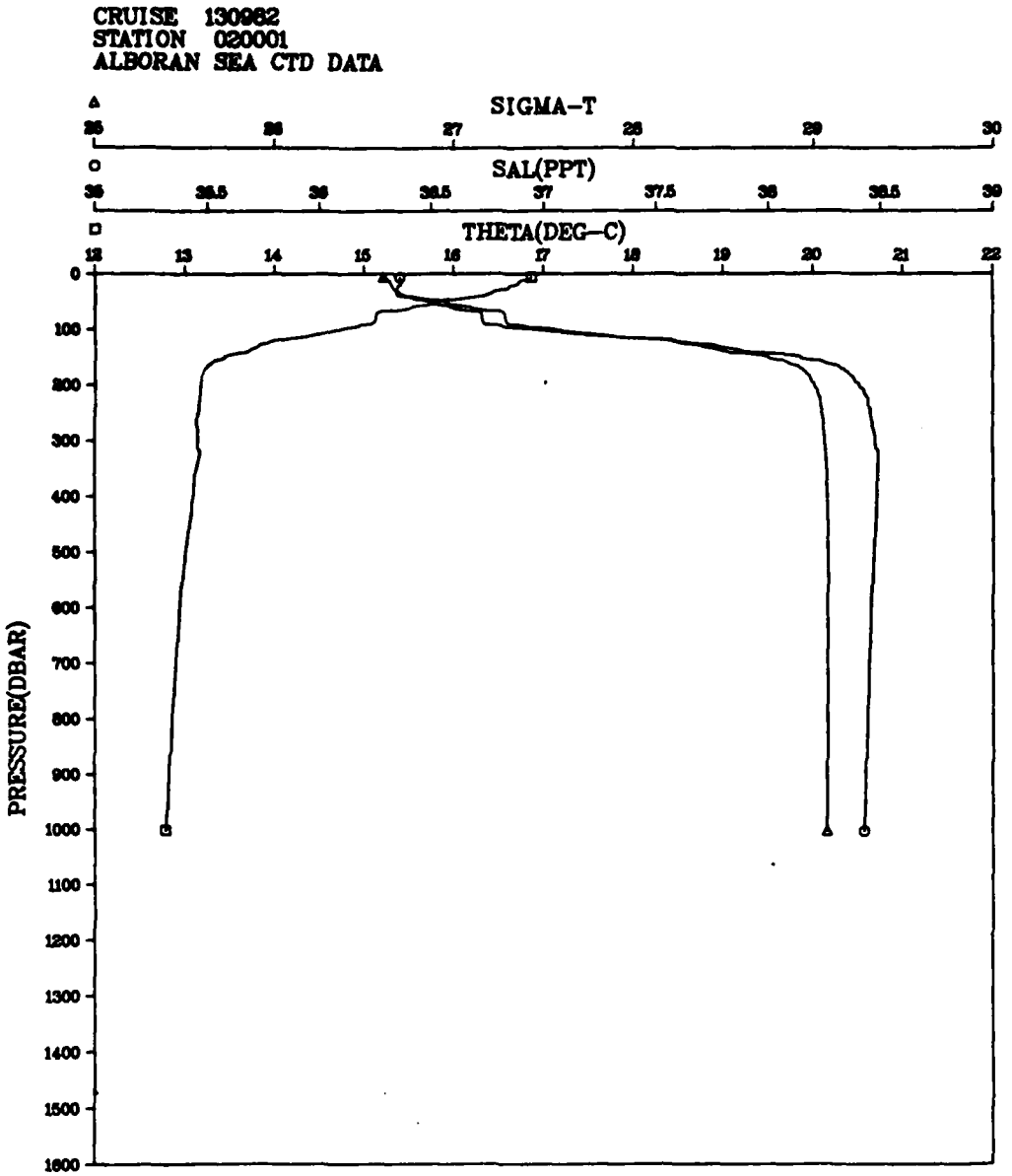

CRUISE 130962
STATION 020001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 40

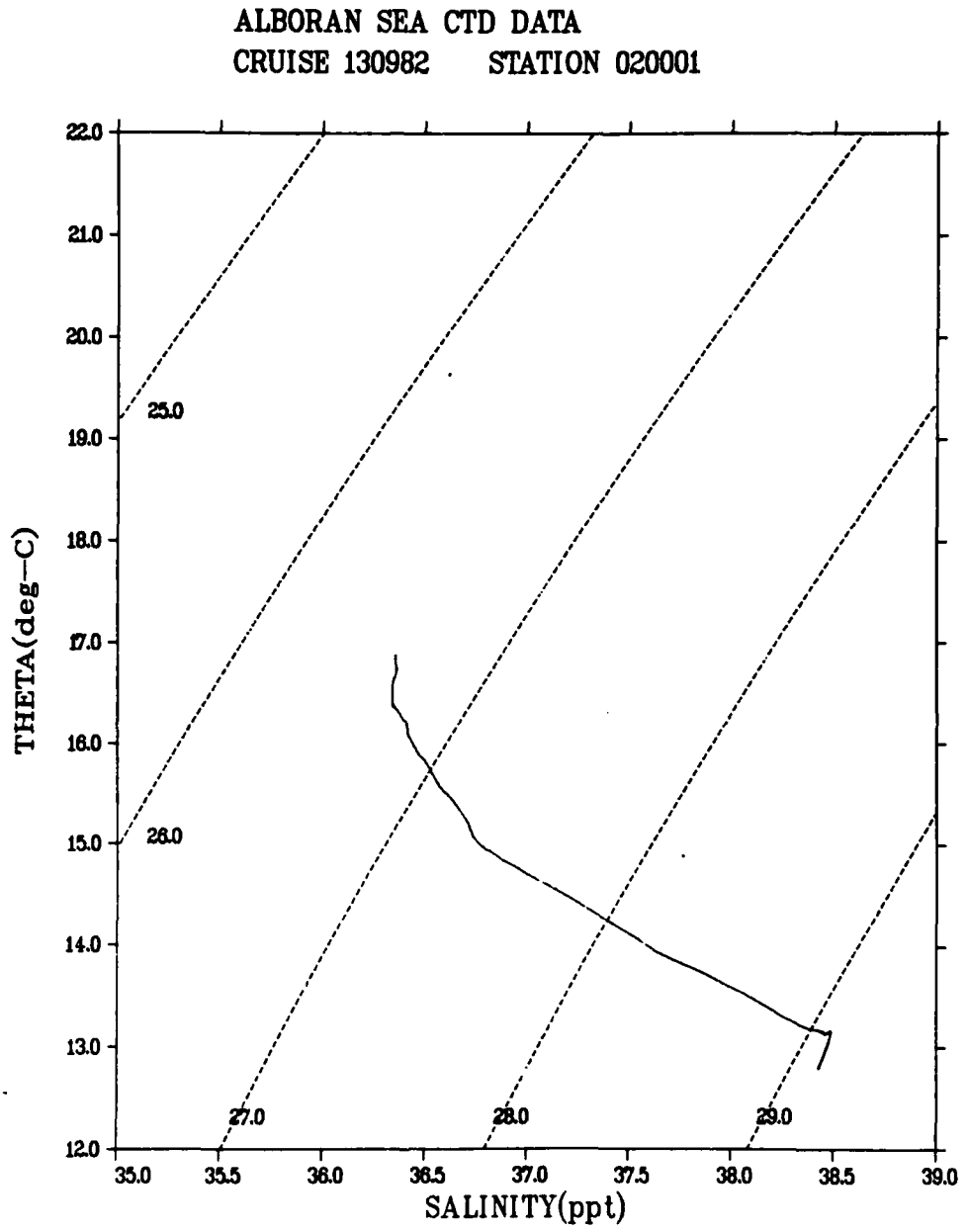

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 020001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 41

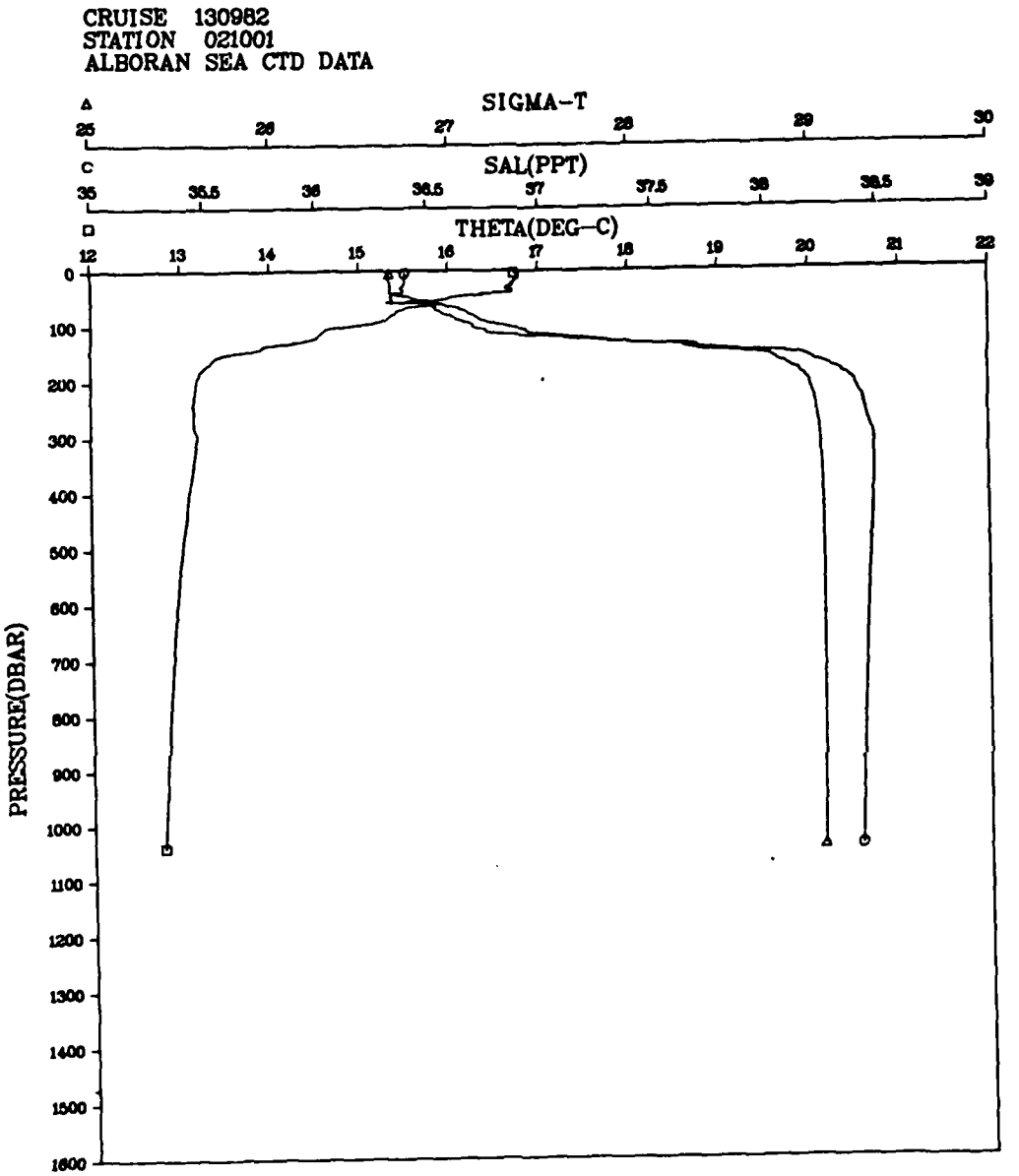

CRUISE 130982
STATION 021001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 42

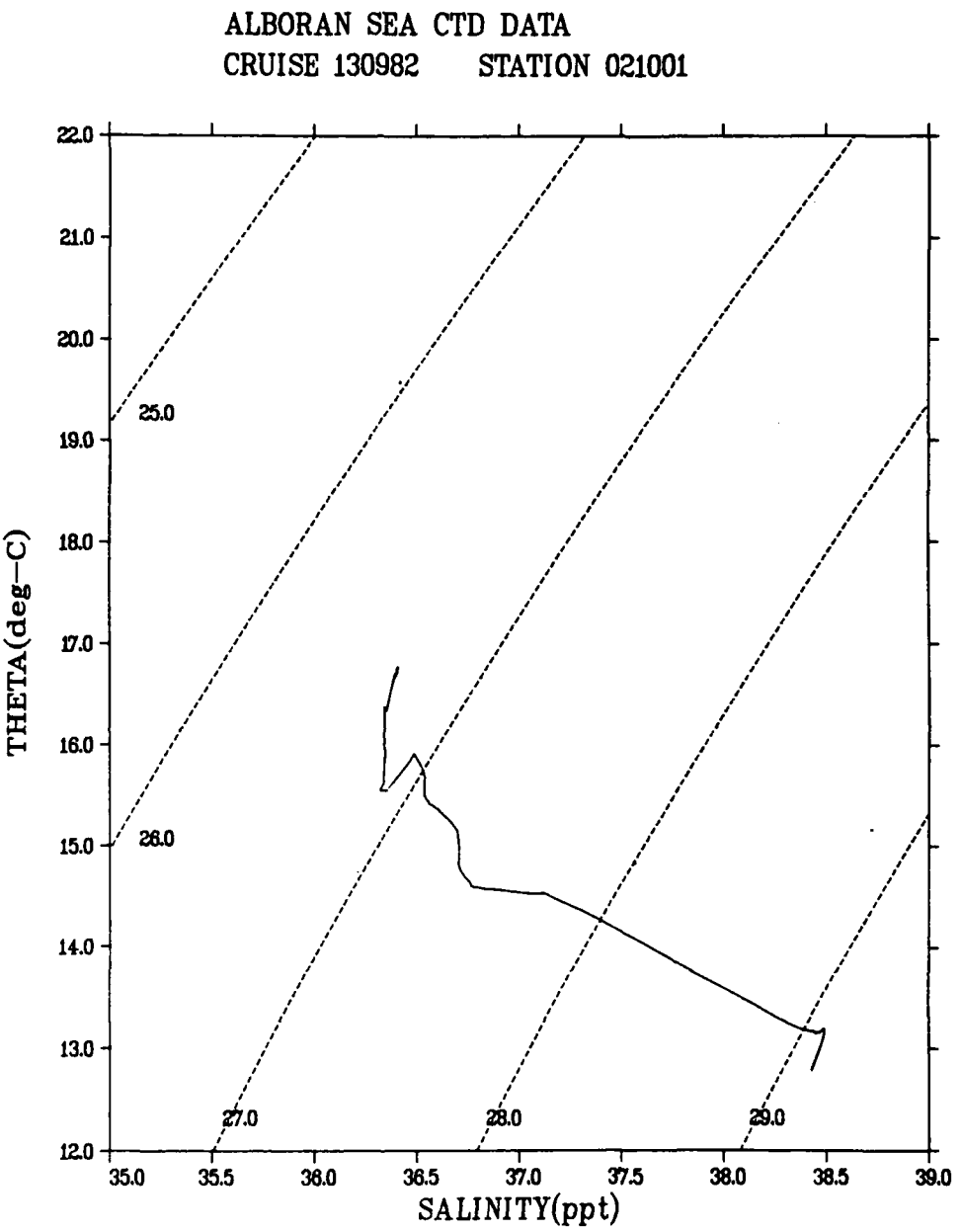

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 021001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 43

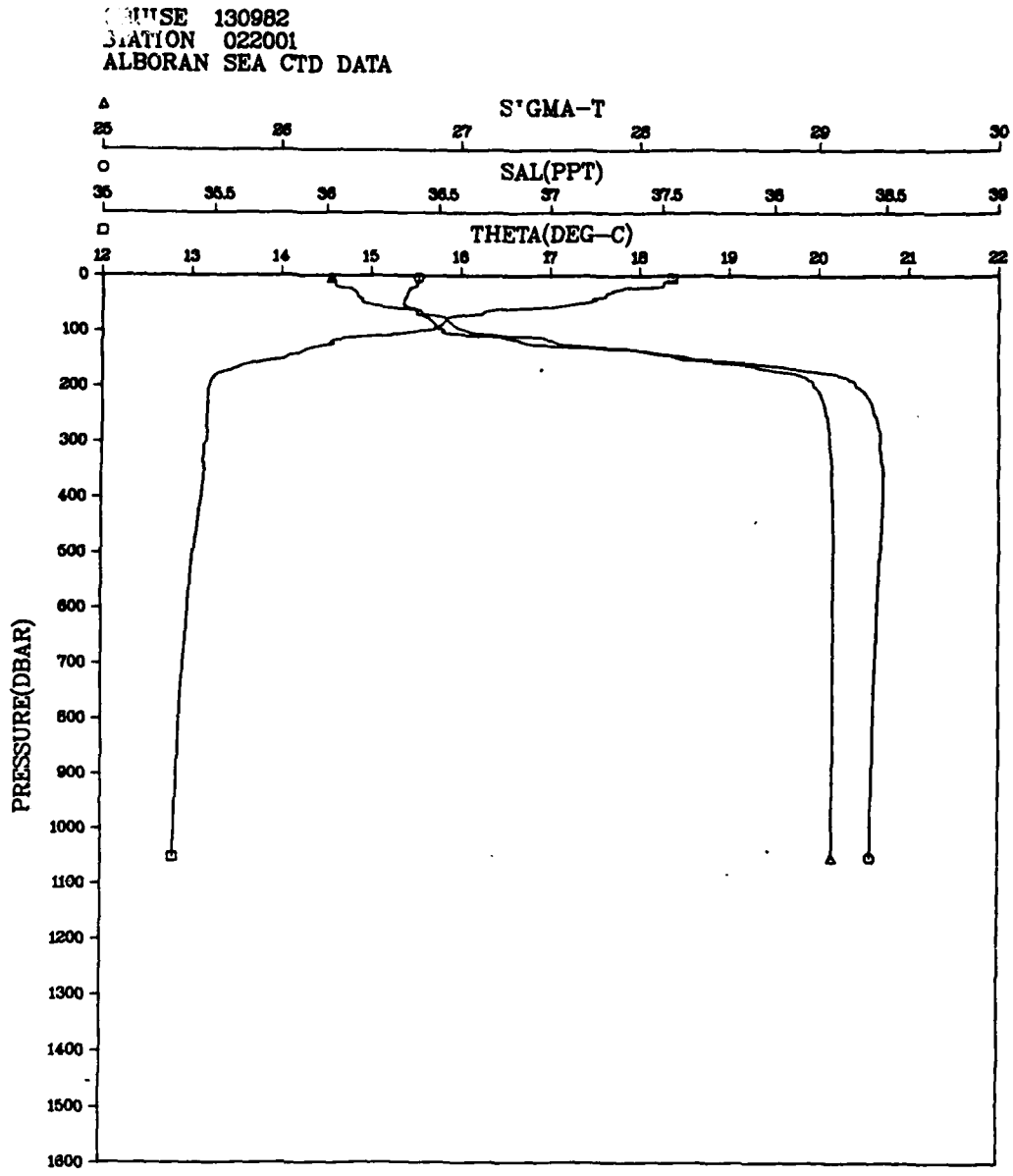

CRUISE 130982
STATION 022001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 44

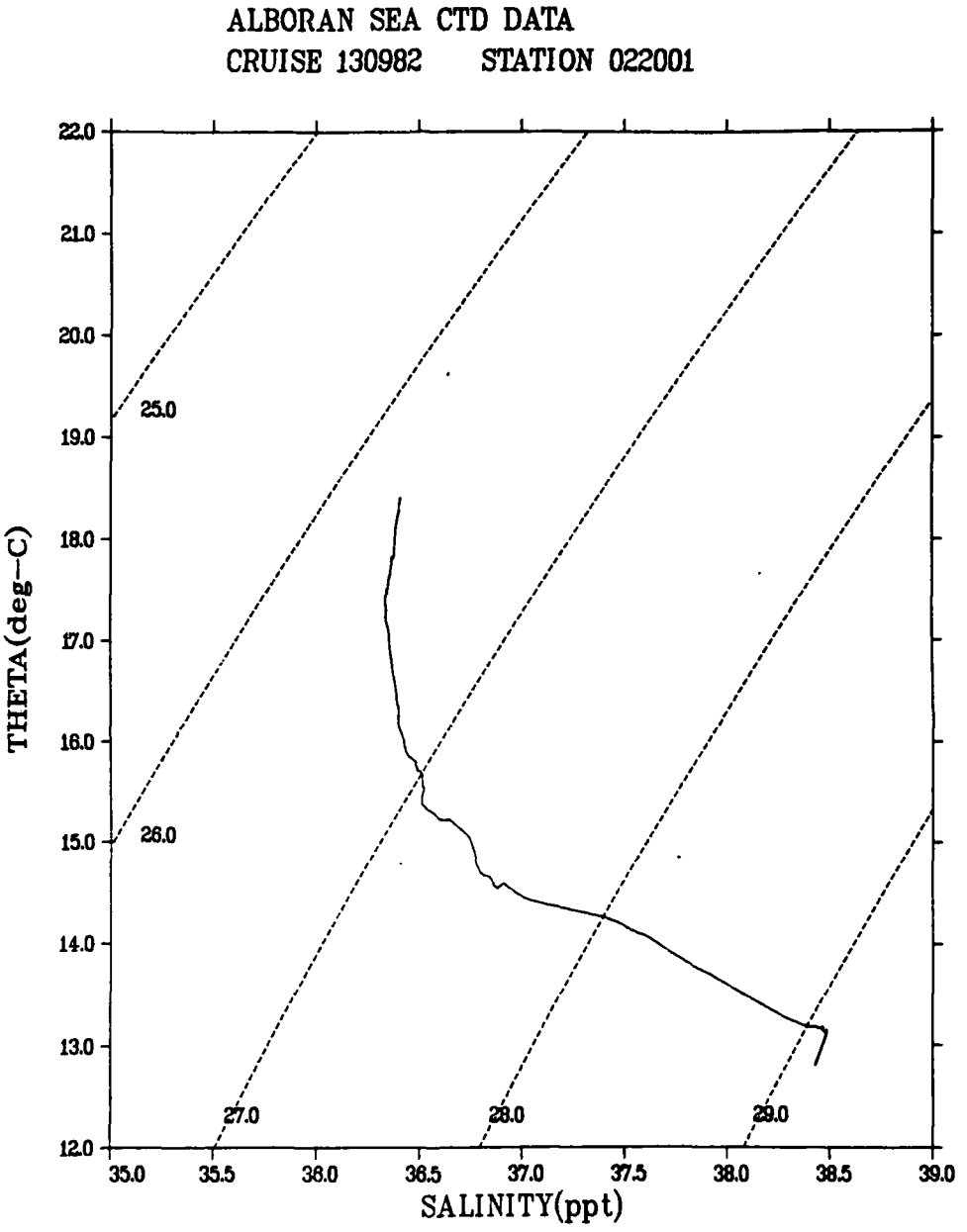

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 022001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 45

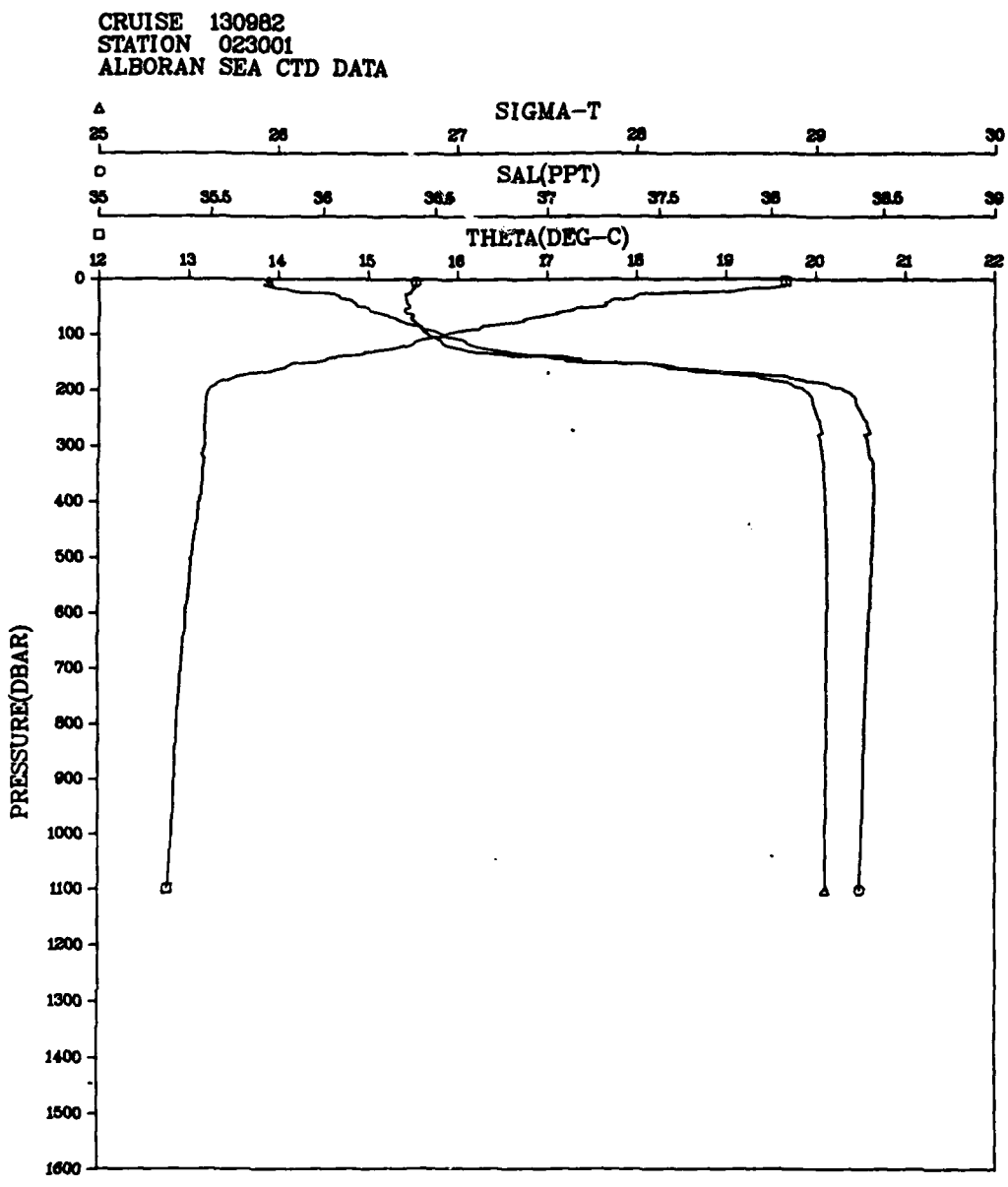

CRUISE 130982
STATION 023001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 46

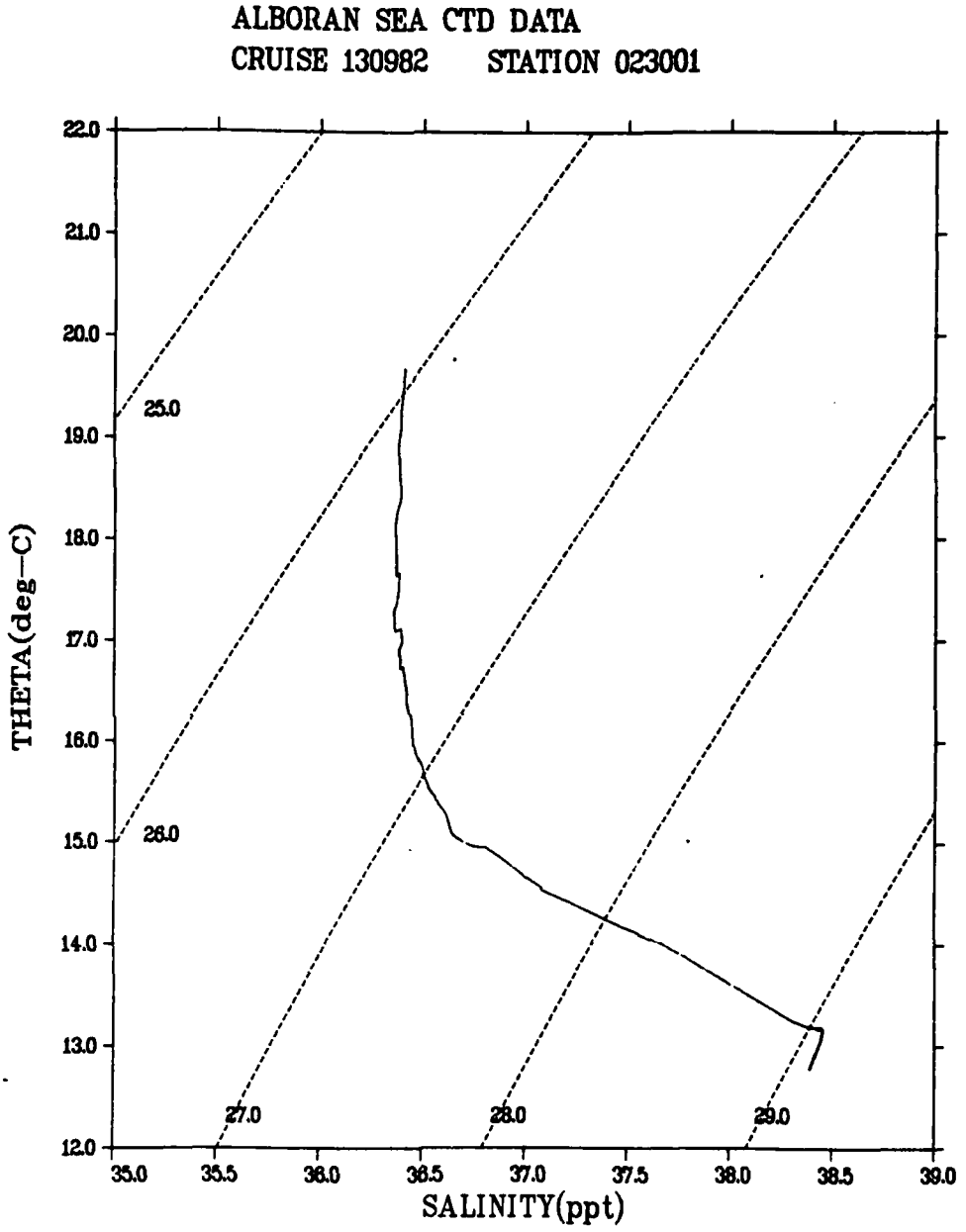

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 023001
THETA(deg—C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 47

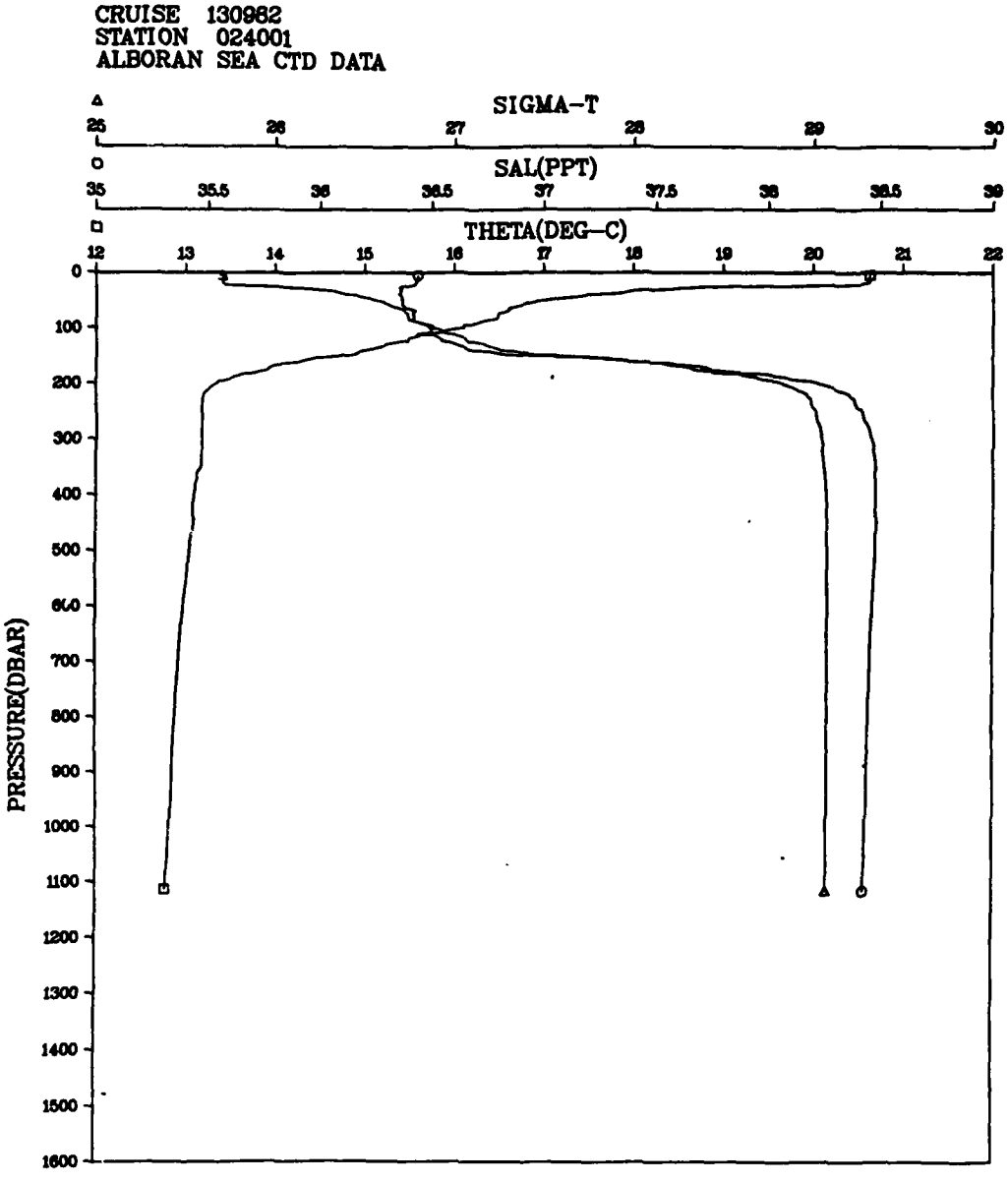

CRUISE 130962
STATION 024001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 48

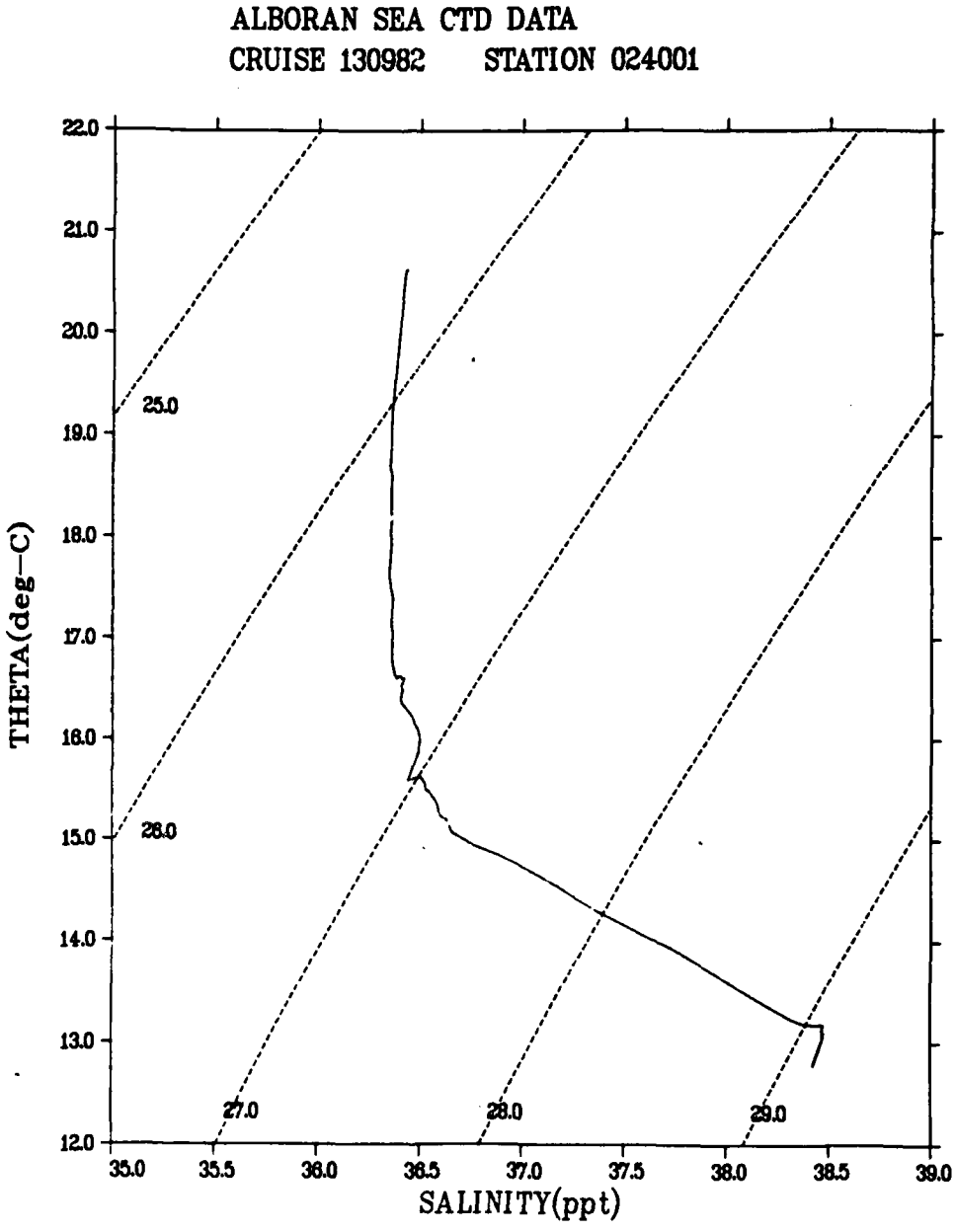

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 024001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 49

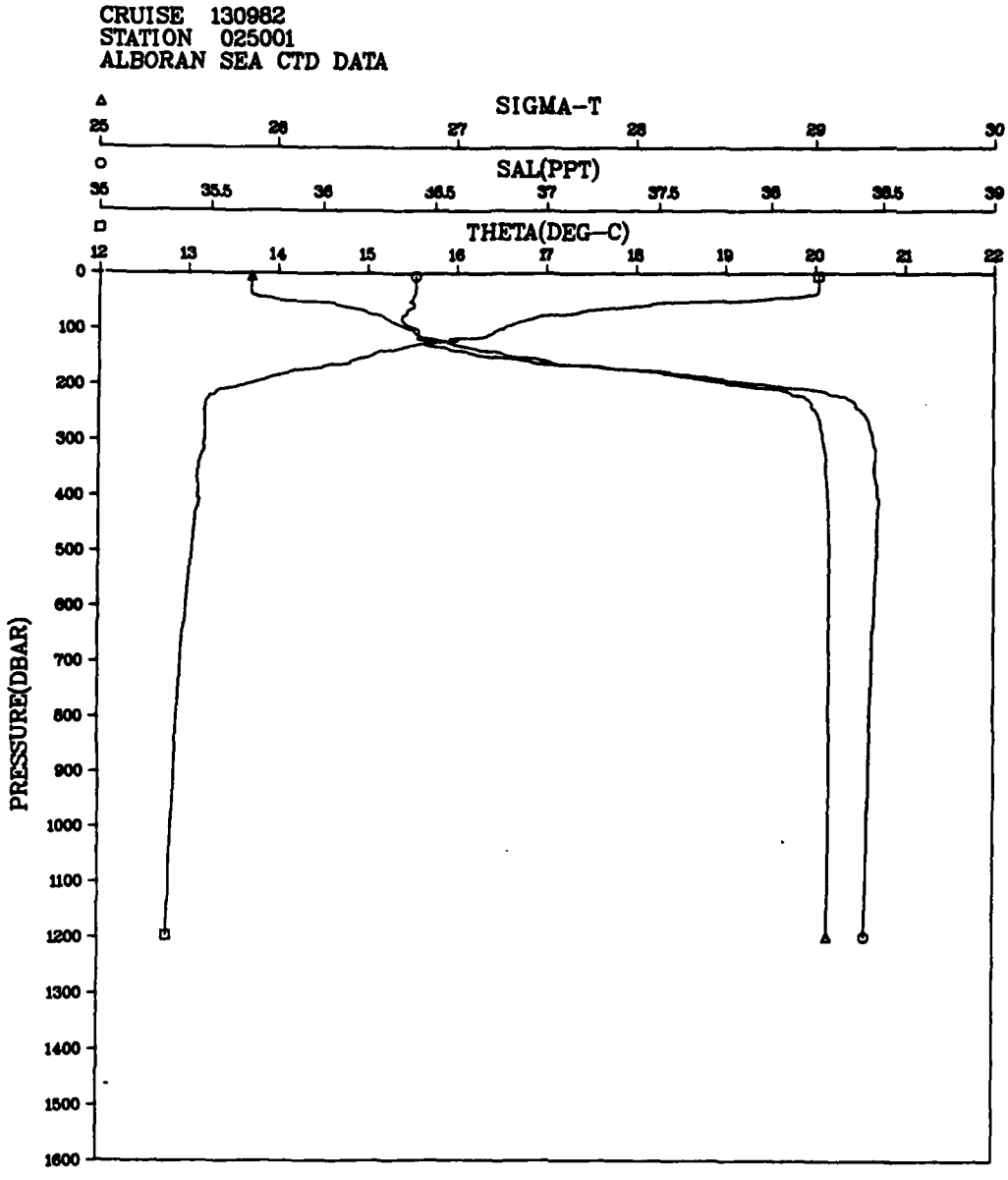

CRUISE 130982
STATION 025001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 50

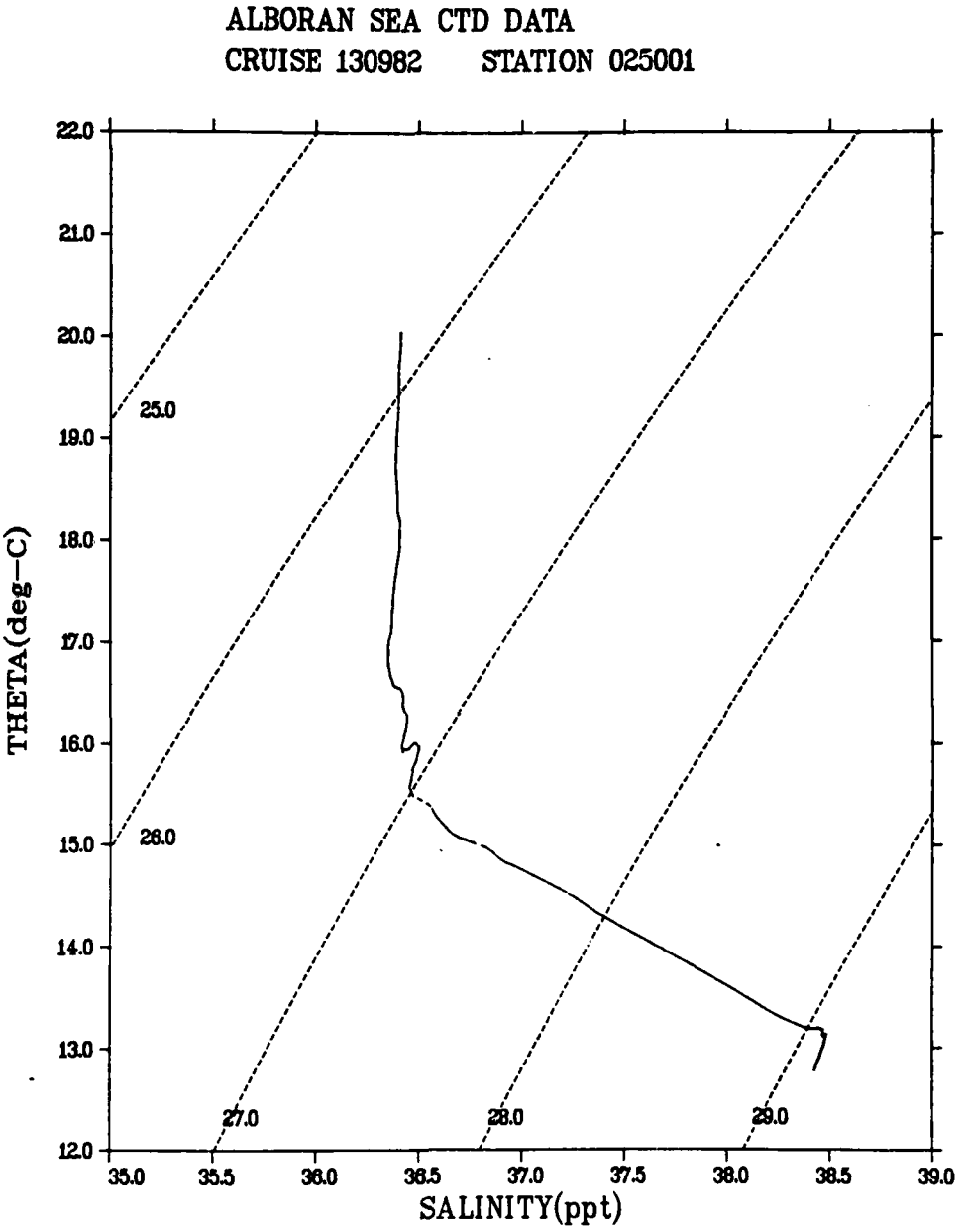

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 025001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 51

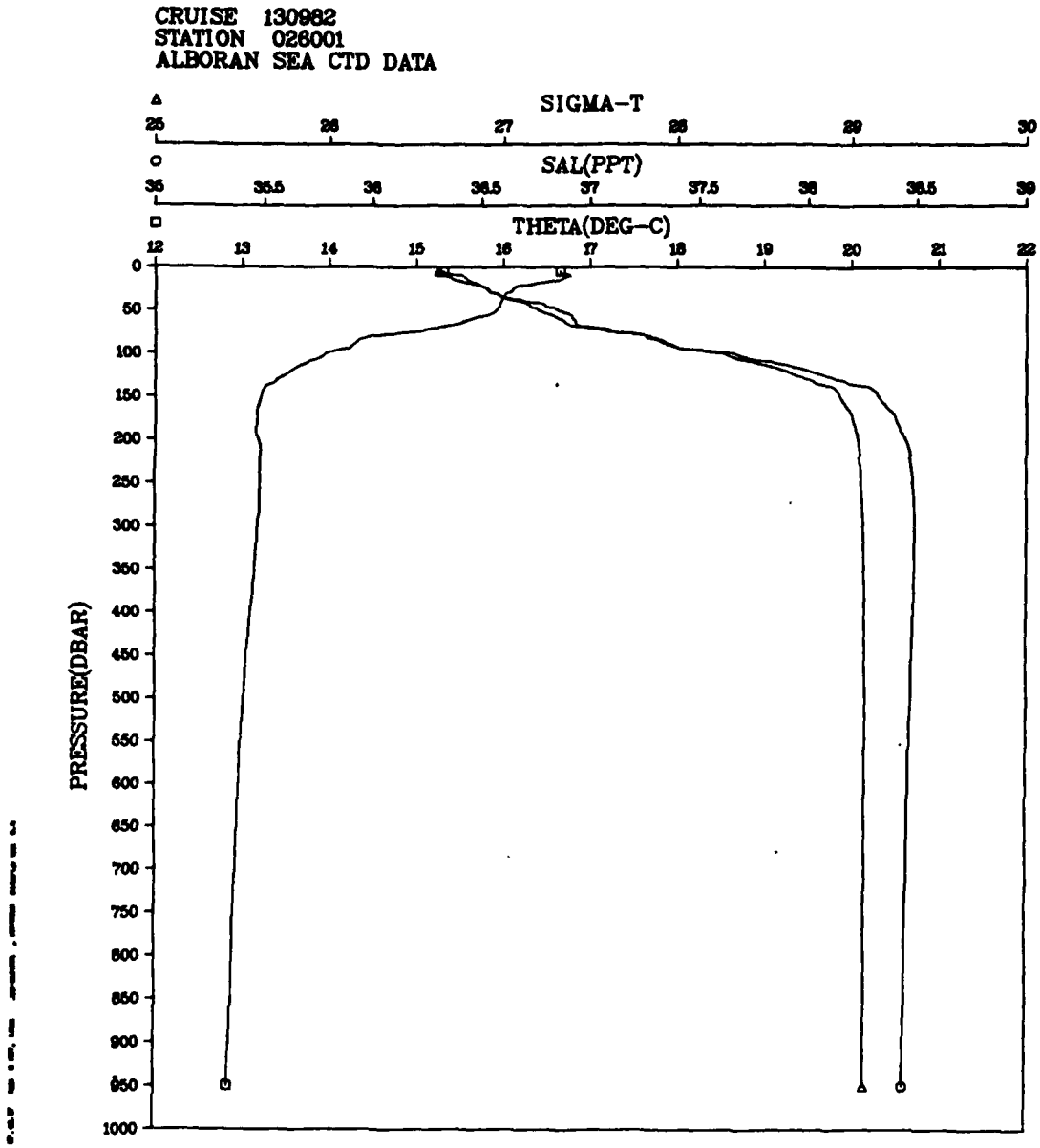

CRUISE 130982
STATION 026001
ALBORAN SEA CTD DATA
SIGMA-T
25 26 27 28 29 30
SAL(PPT)
35 35.5 36 36.5 37 37.5 38 38.5 39
THETA(DEG-C)
12 13 14 15 16 17 18 19 20 21 22
PRESSURE(DBAR)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000

Figure 52

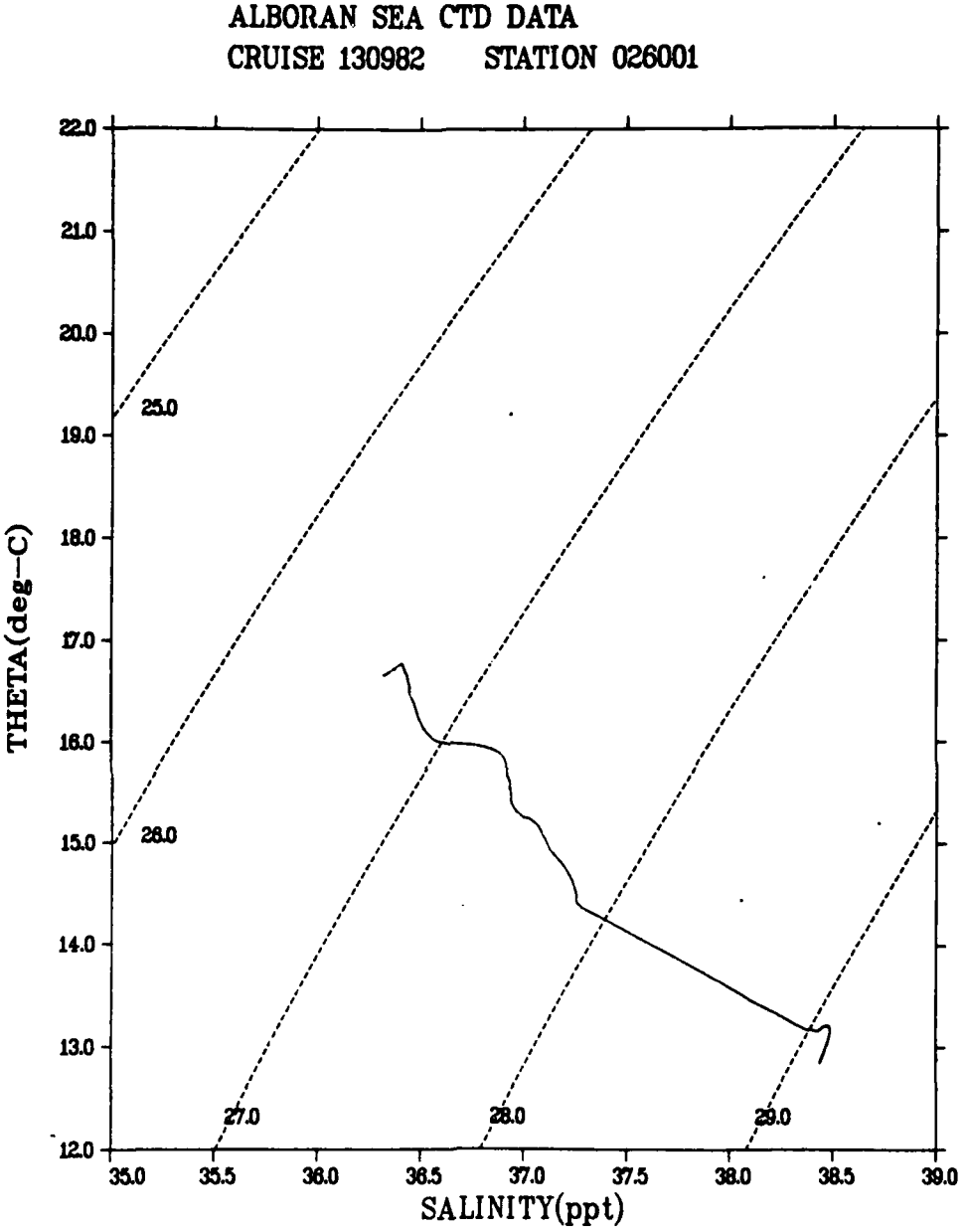

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 026001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 53

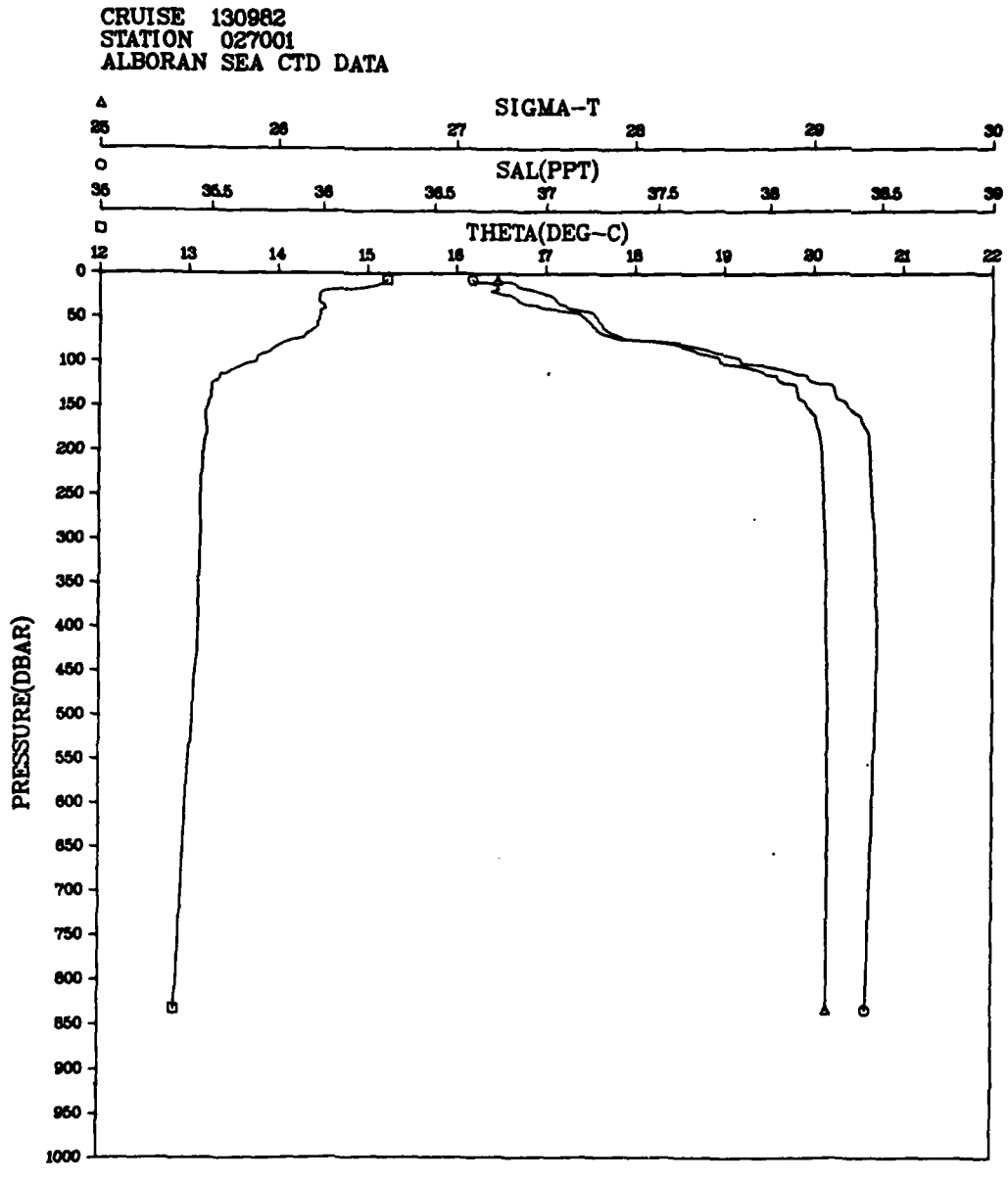

CRUISE 130982
STATION 027001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 54

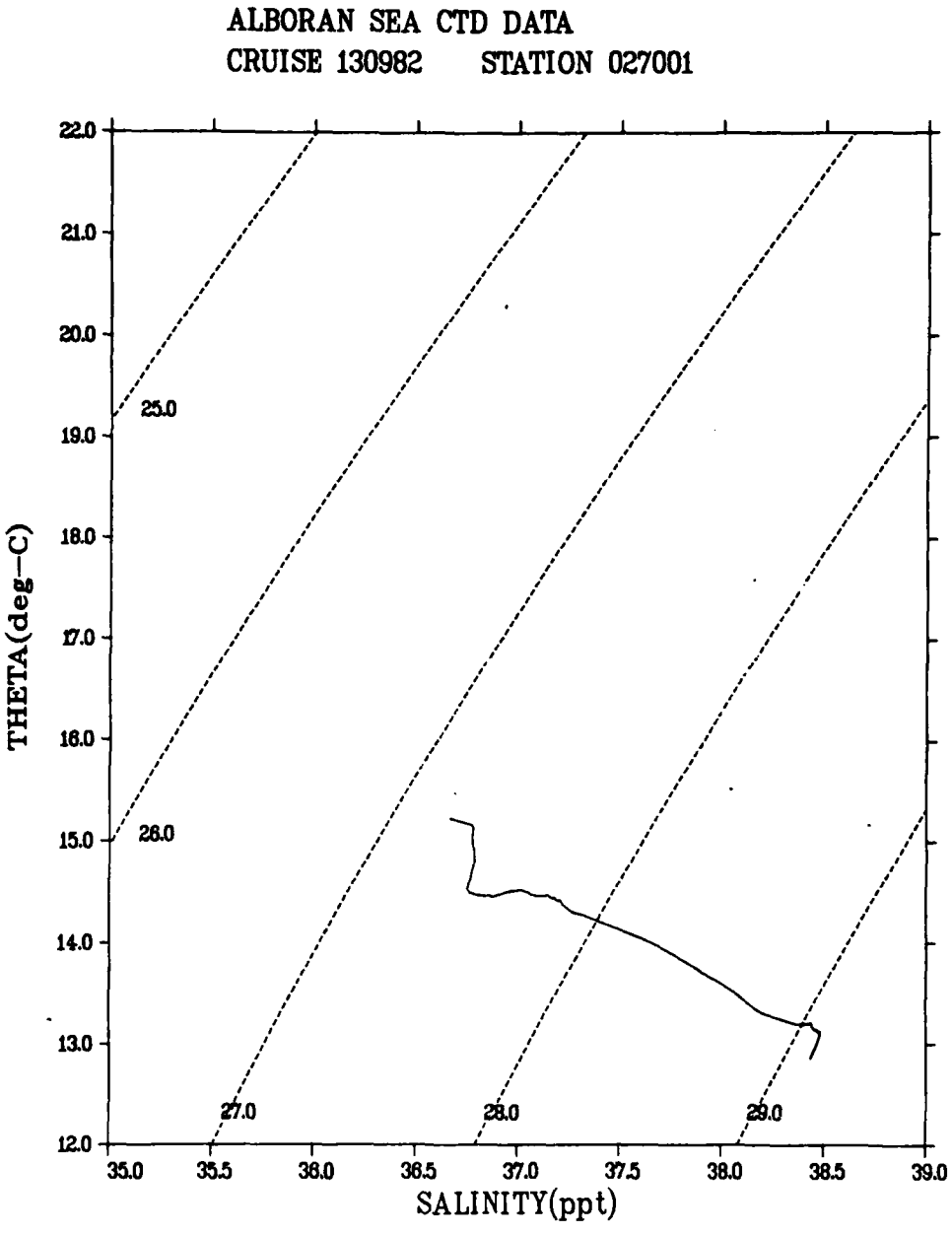

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 027001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 55

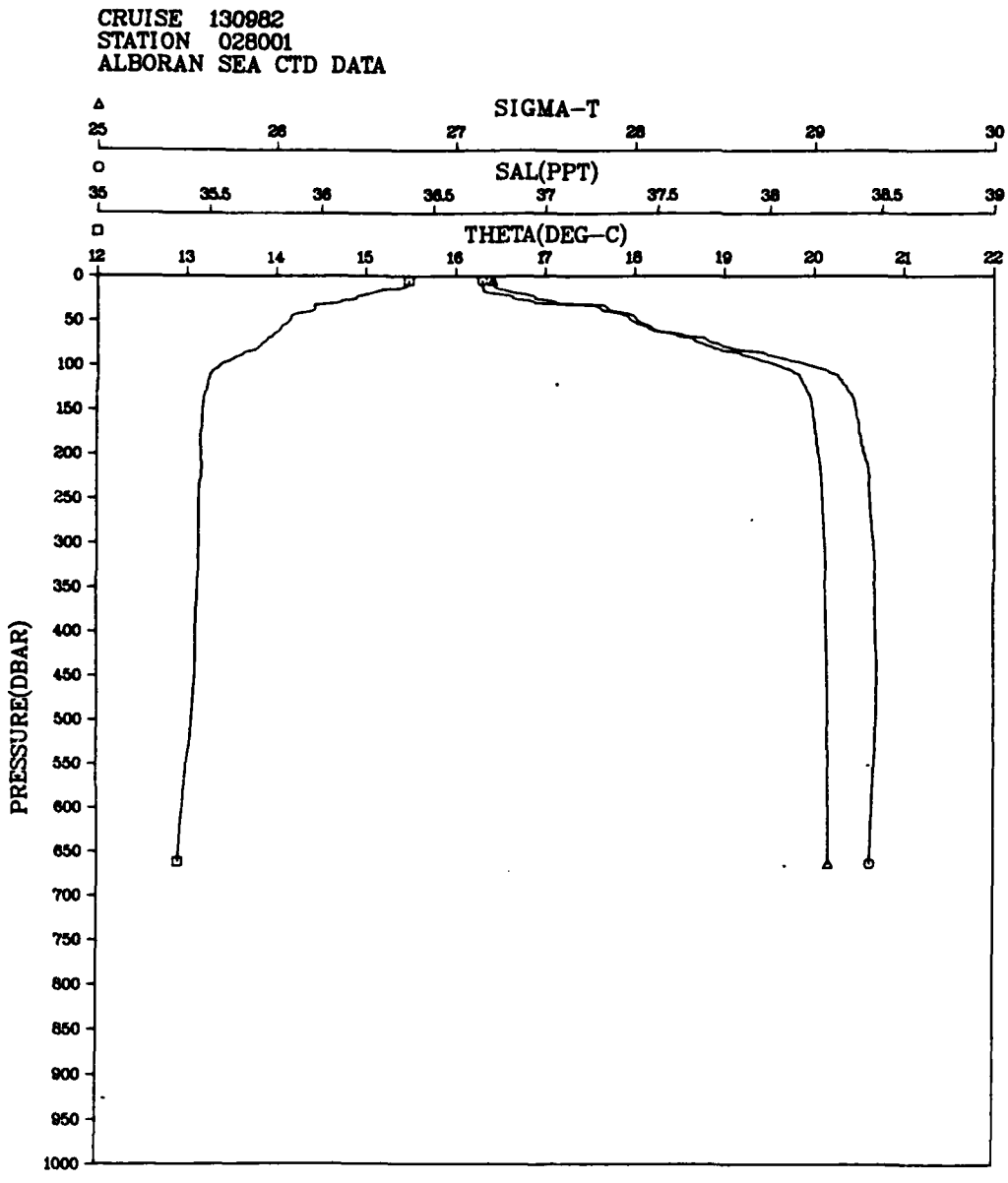

CRUISE 130982
STATION 028001
ALBORAN SEA CTD DATA
SIGMA-T
25 26 27 28 29 30
SAL(PPT)
35 35.5 36 36.5 37 37.5 38 38.5 39
THETA(DEG-C)
12 13 14 15 16 17 18 19 20 21 22
PRESSURE(DBAR)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000

Figure 56

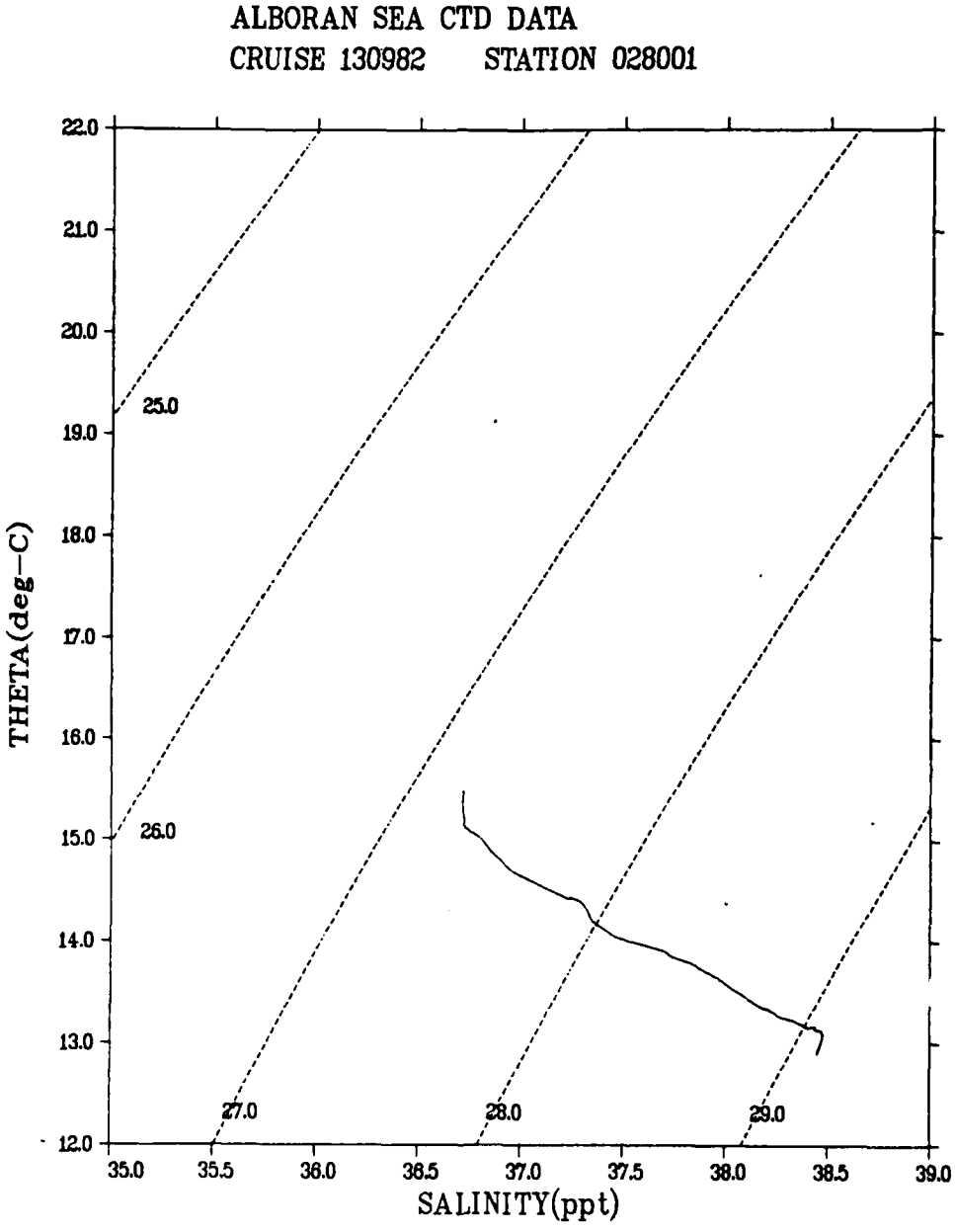

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 028001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 57

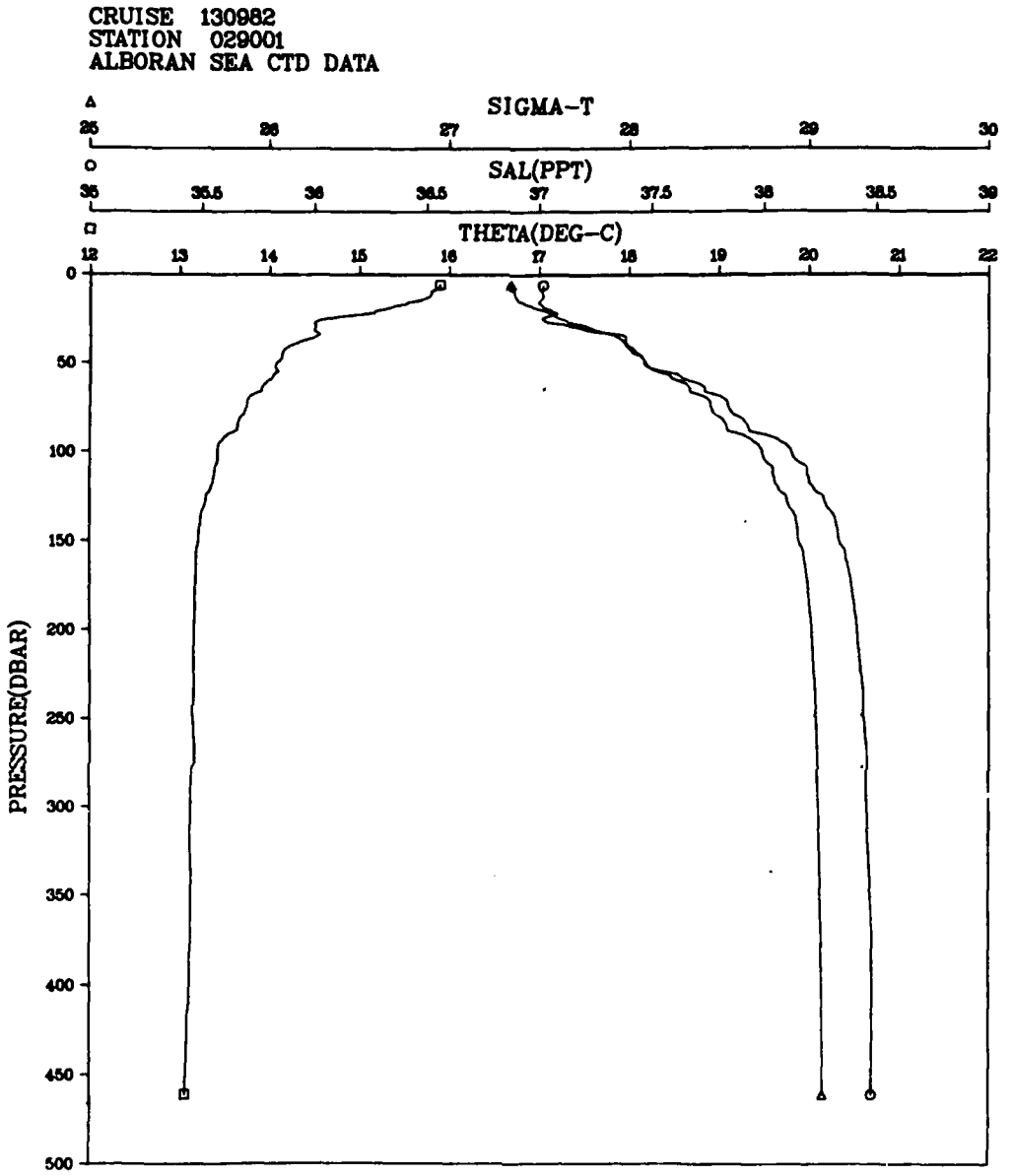

CRUISE 130982
STATION 029001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 58

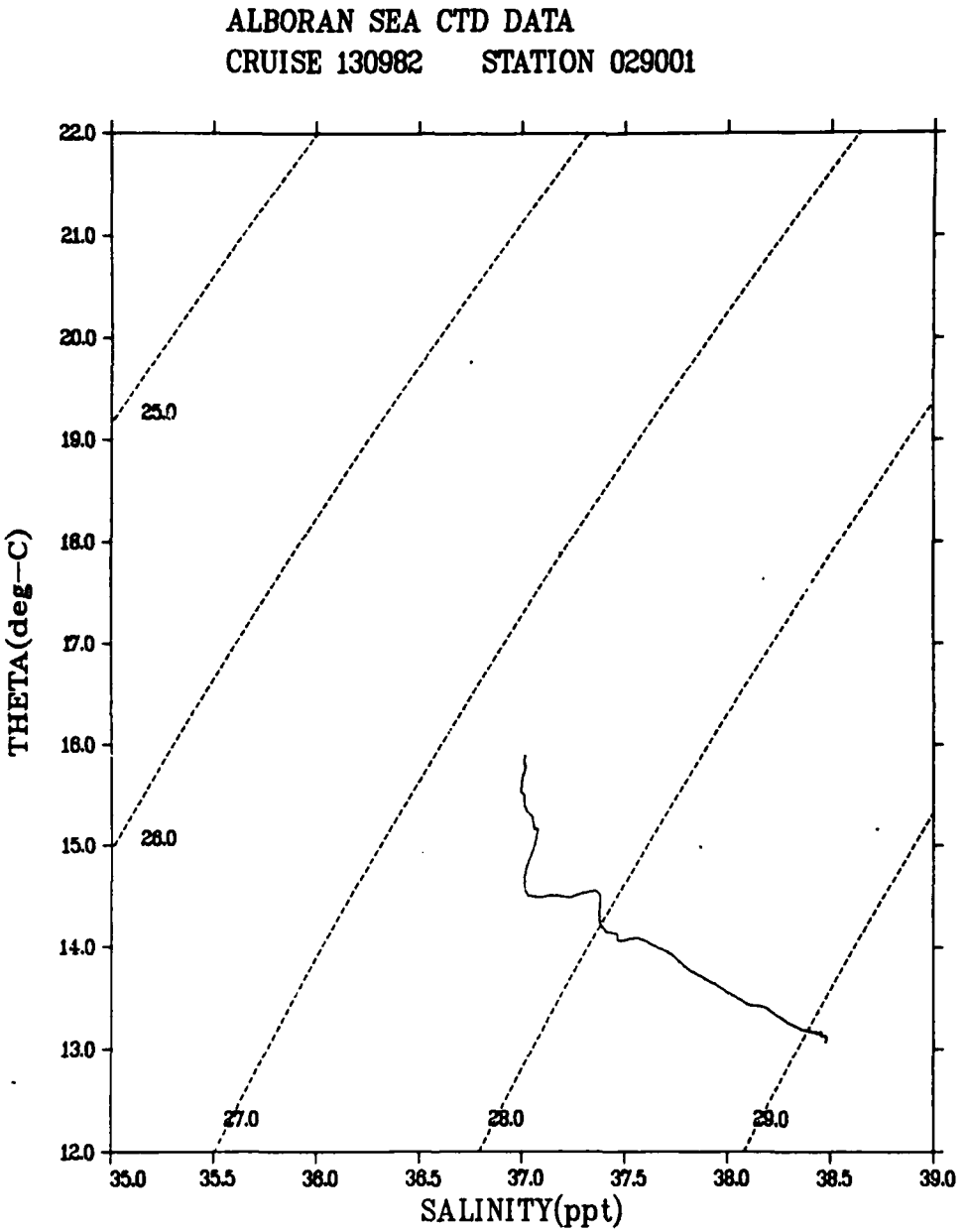

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 029001
THETA(deg—C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 59

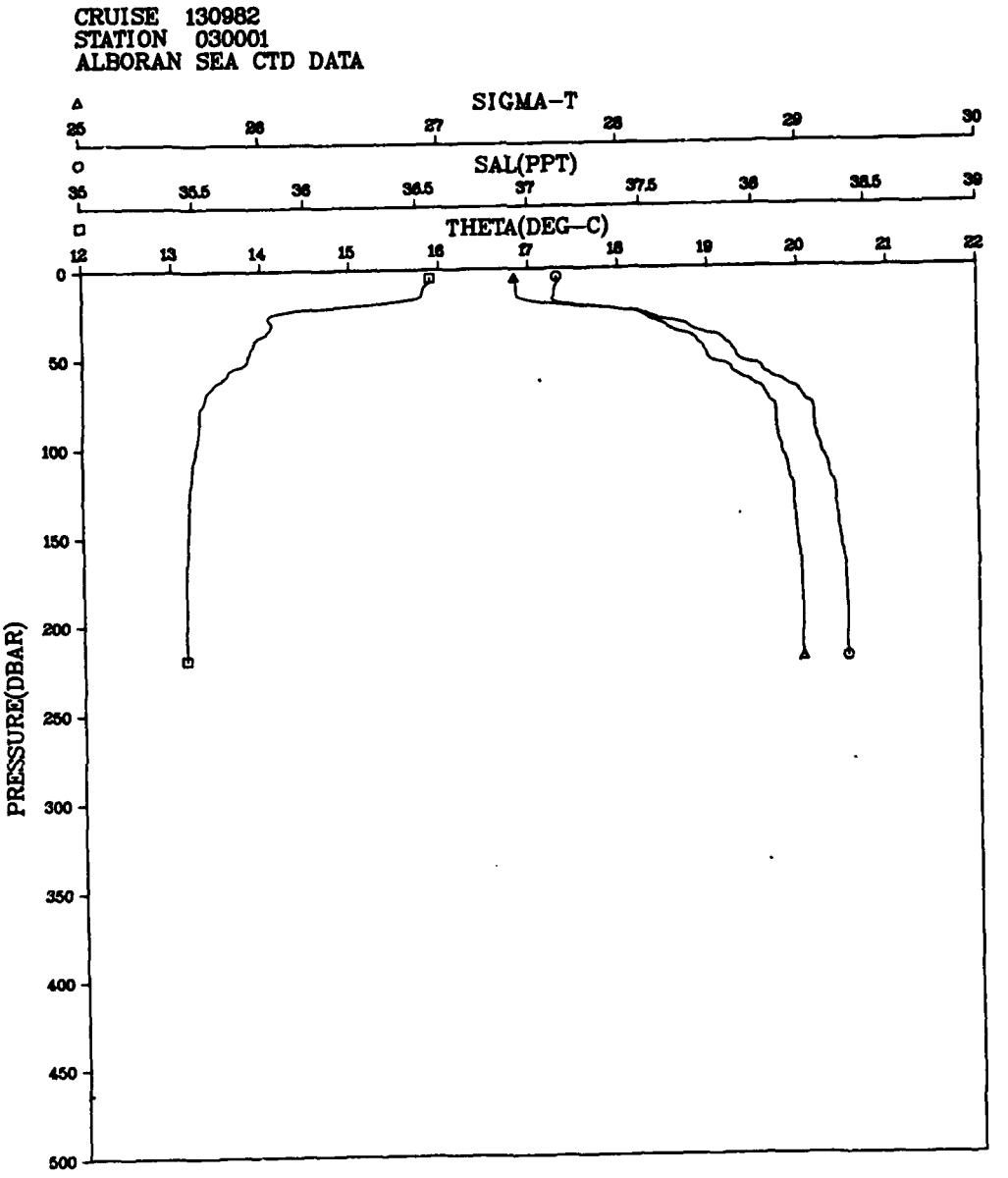

CRUISE 130982
STATION 030001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 60

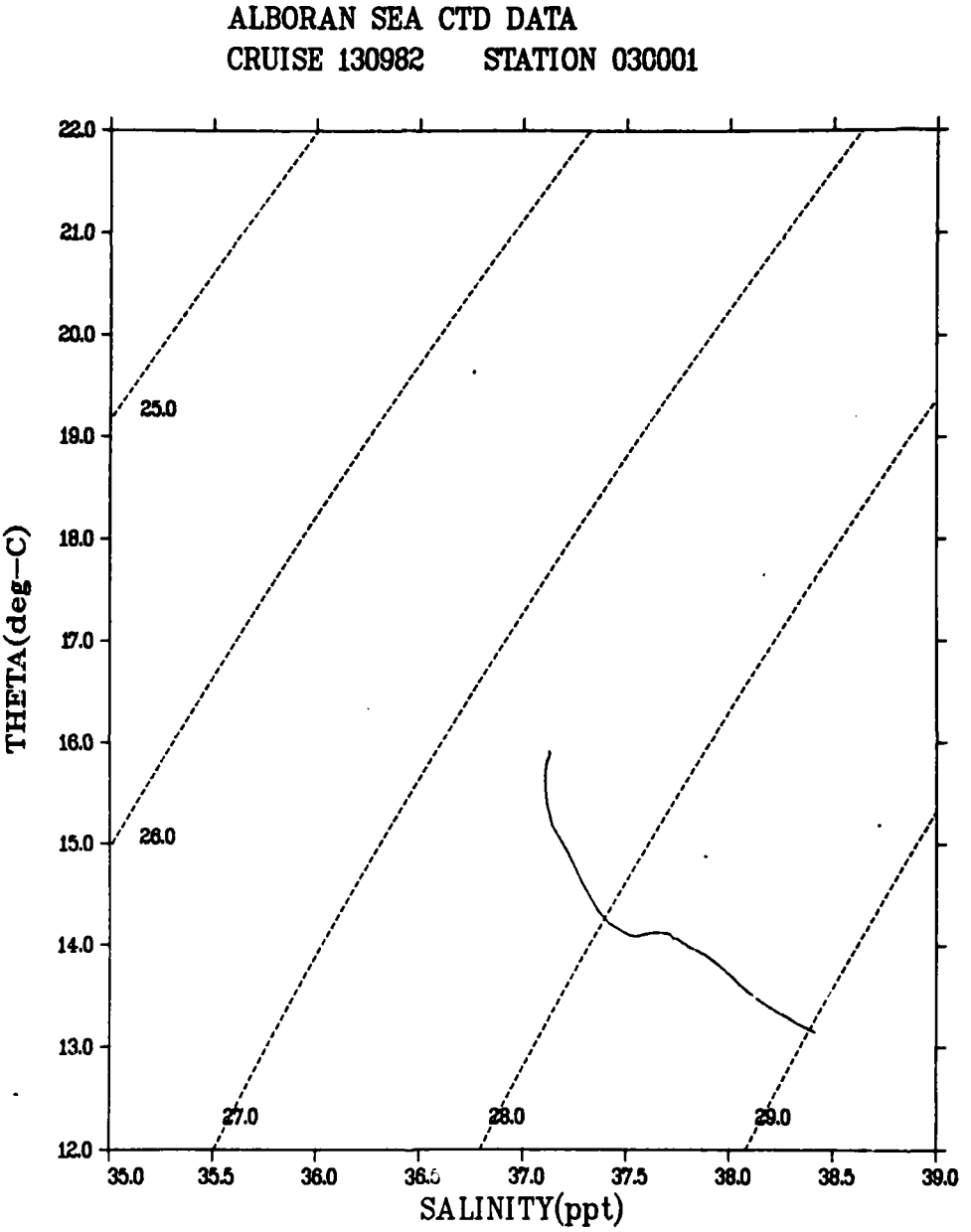

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 030001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 61

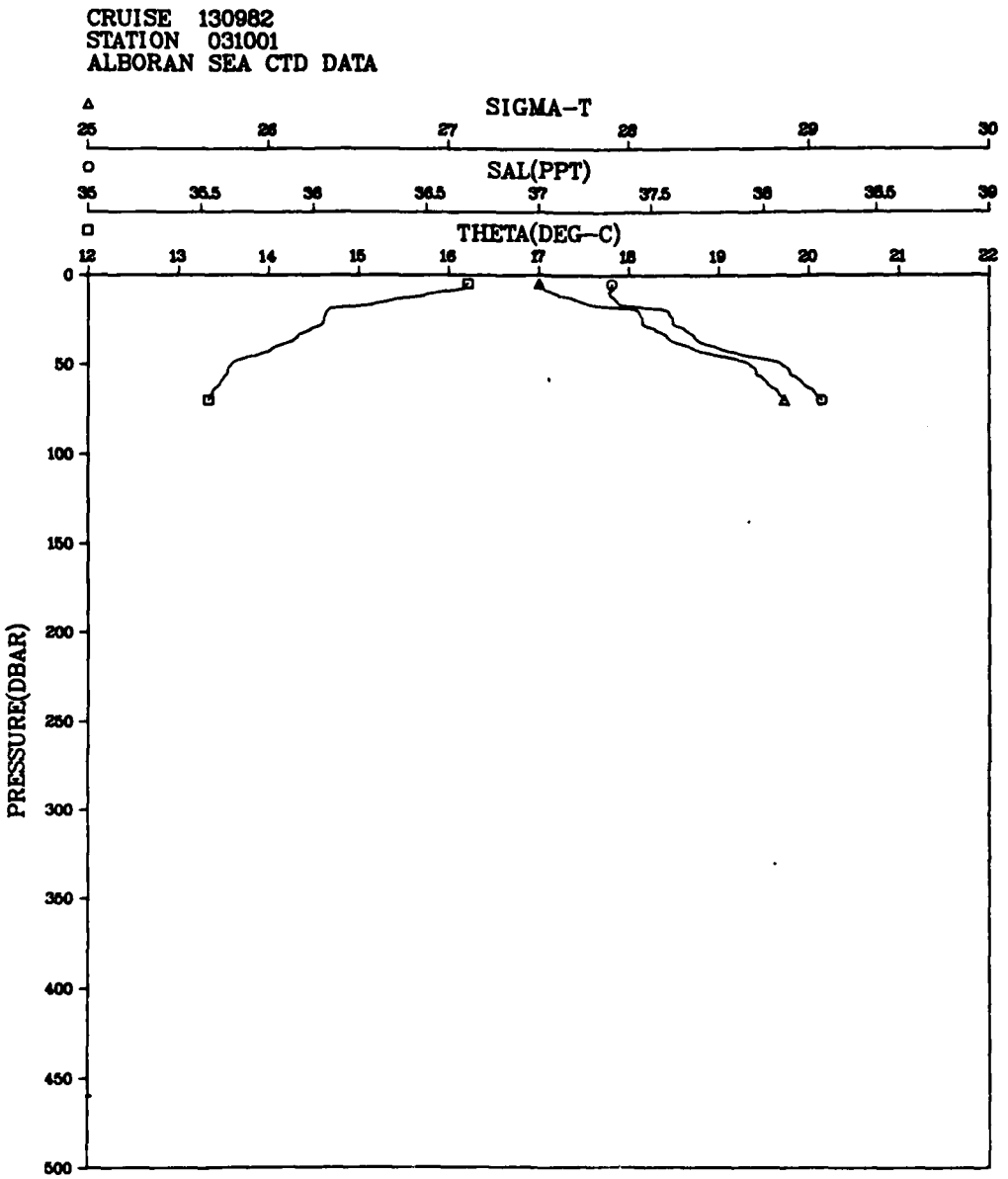

CRUISE 130982
STATION 031001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 62

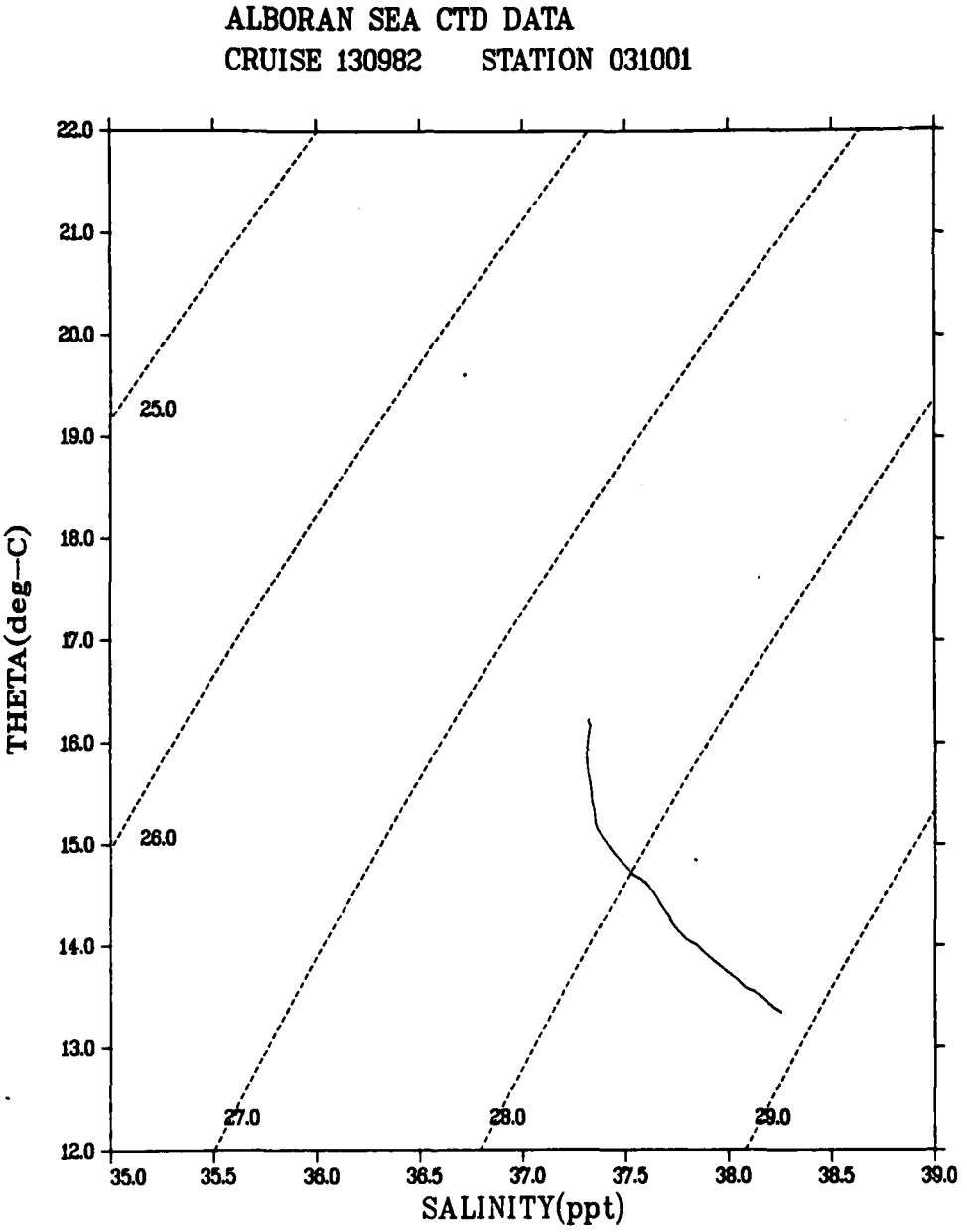

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 031001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 62

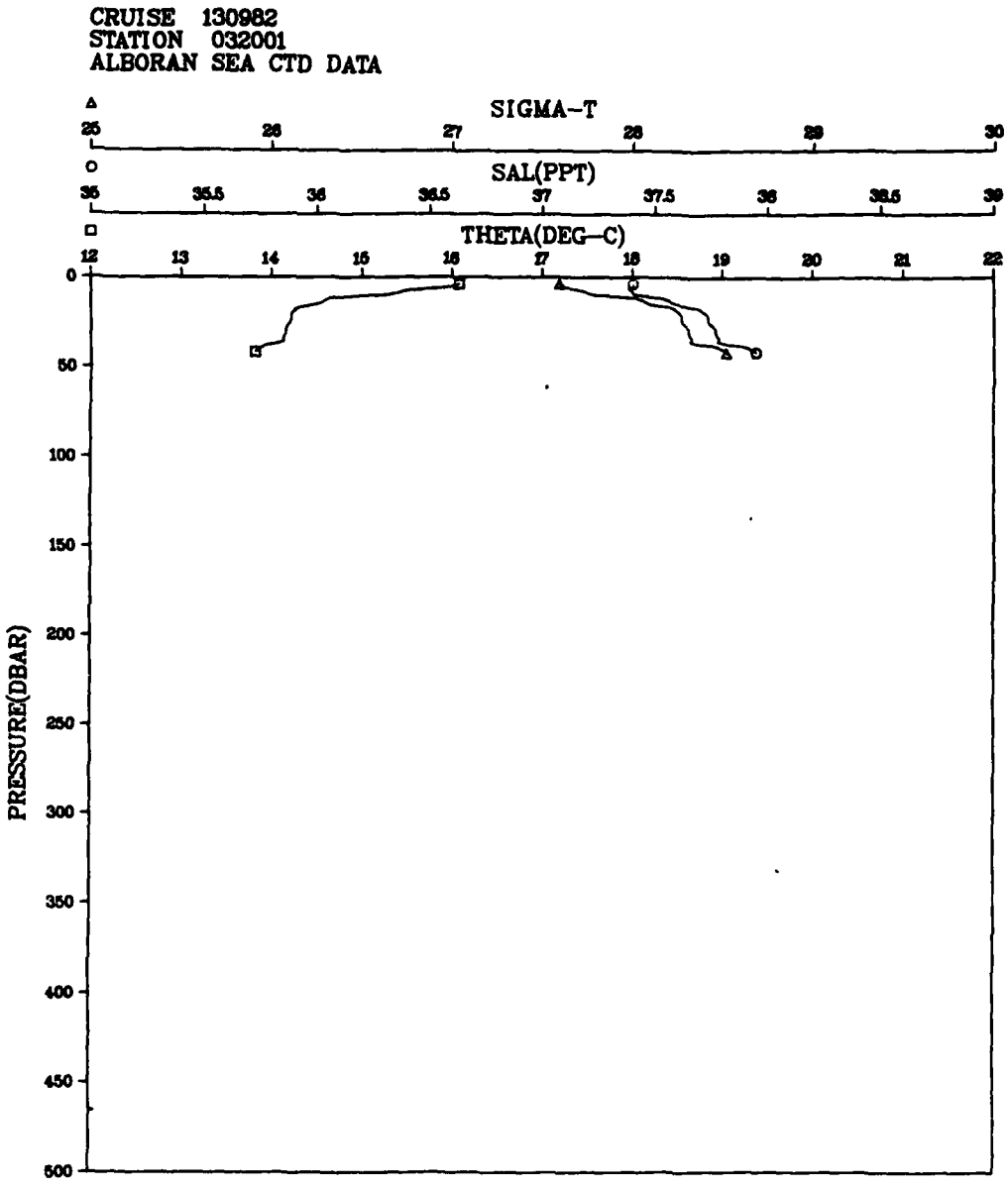

CRUISE 130982
STATION 032001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 64

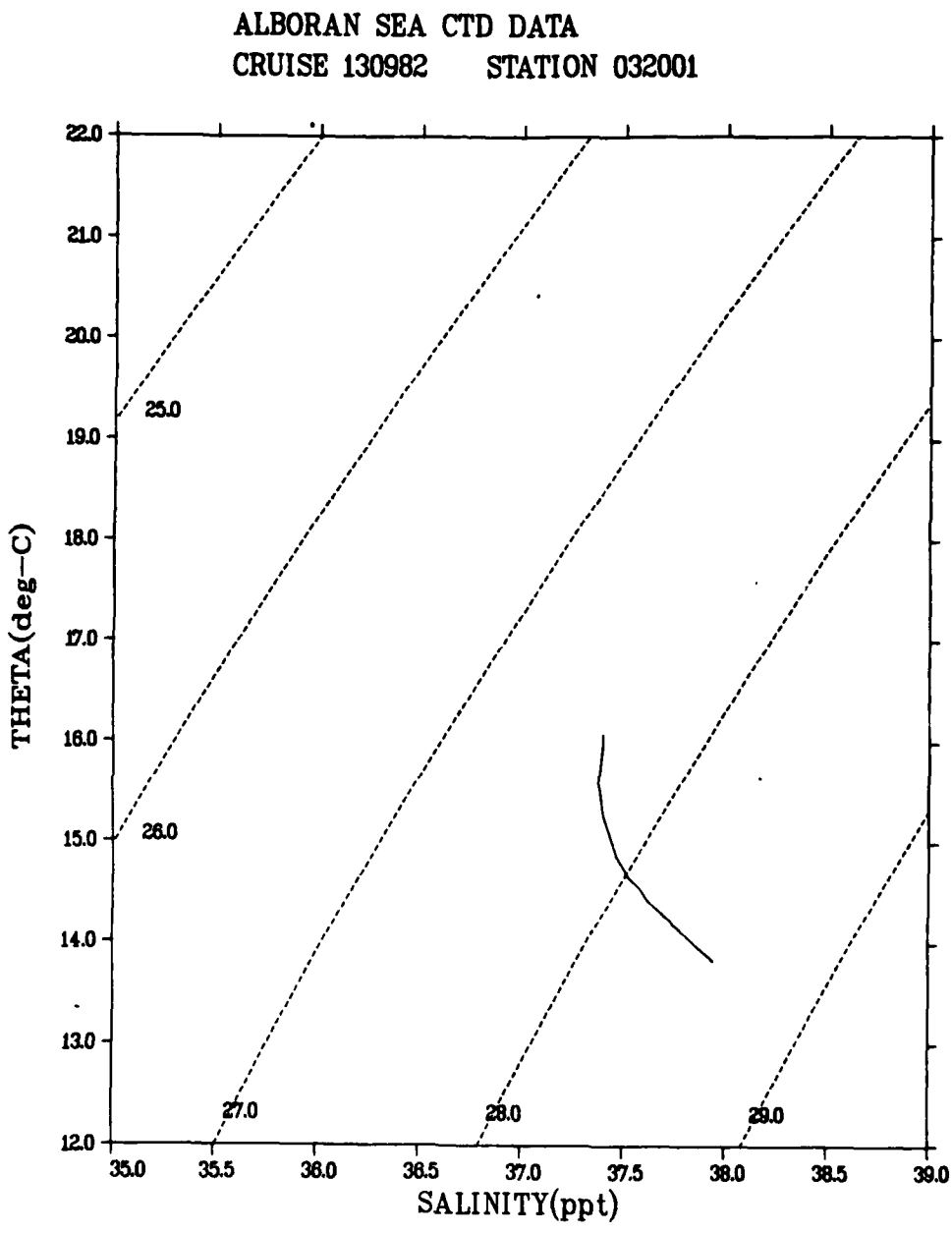

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 032001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 65

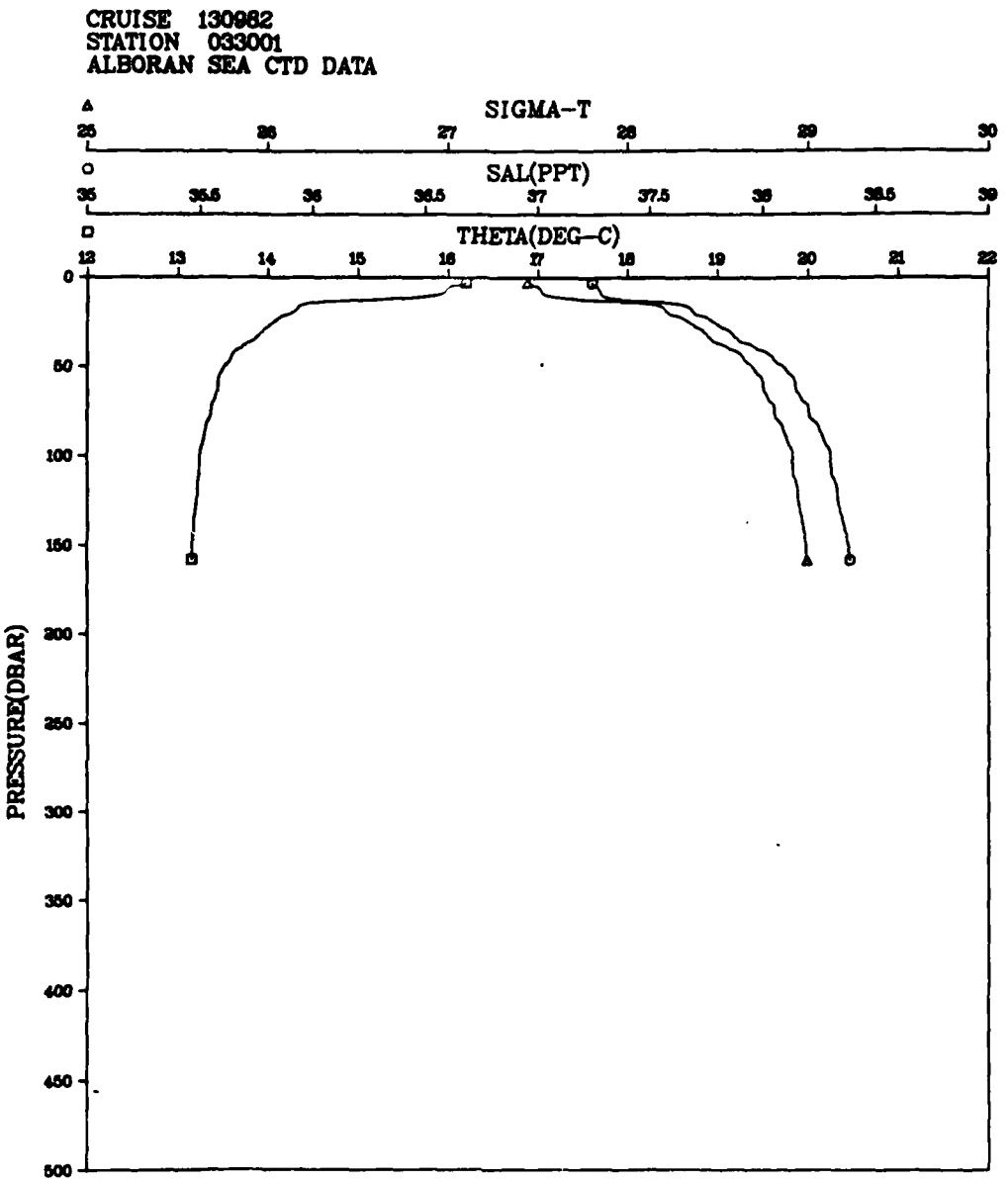

CRUISE 130982
STATION 033001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 66

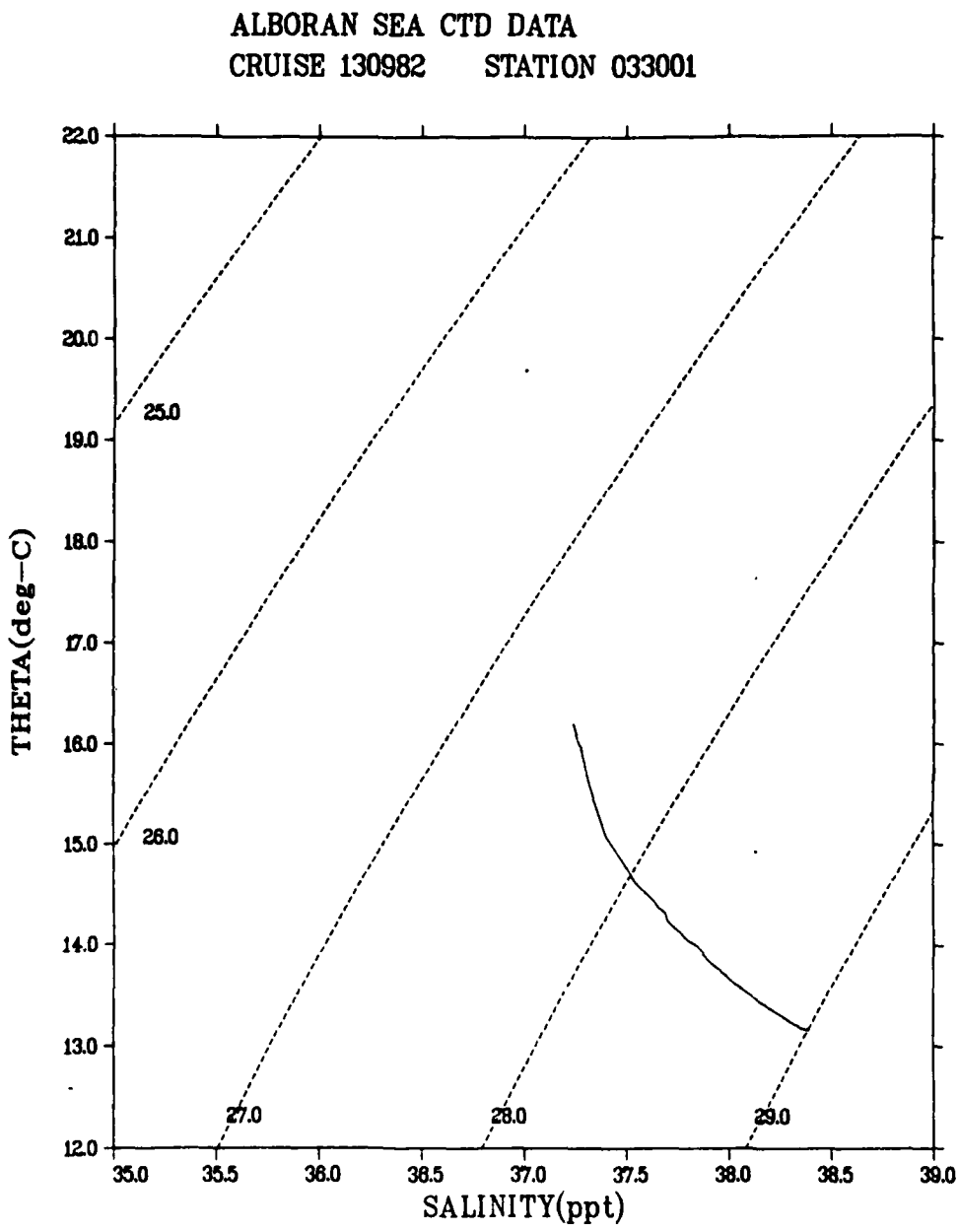

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 033001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 67

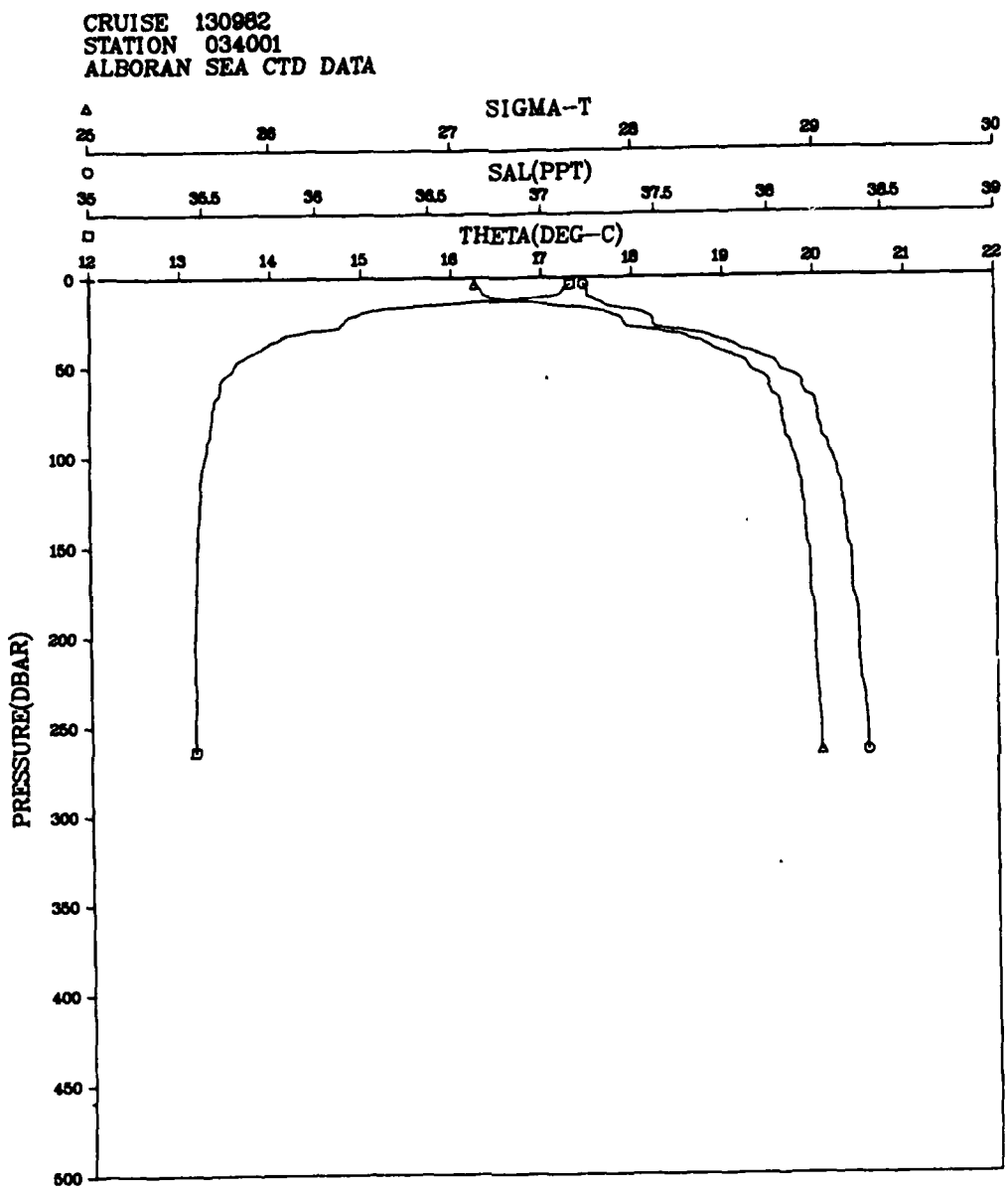

CRUISE 130982
STATION 034001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 68

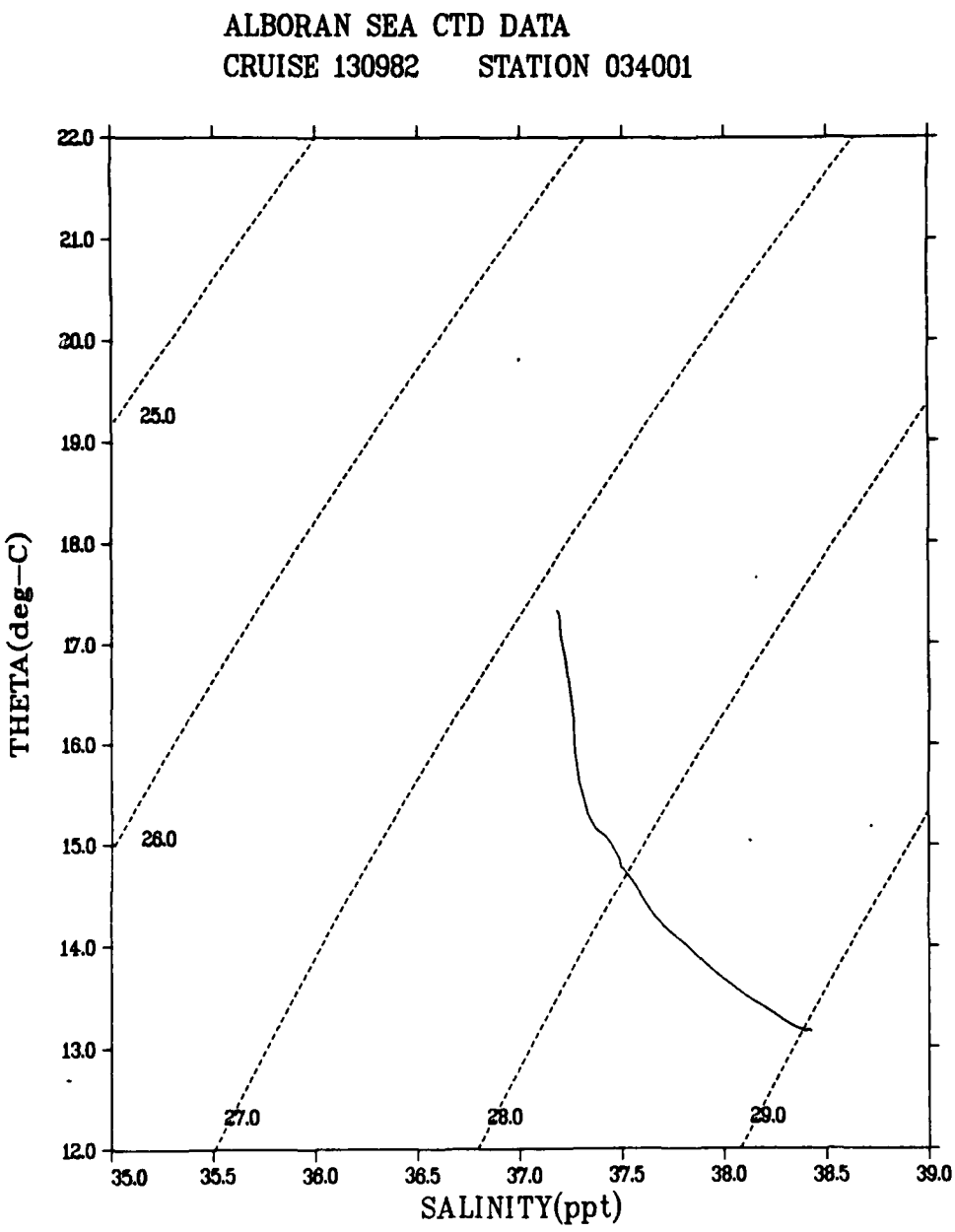

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 034001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 69

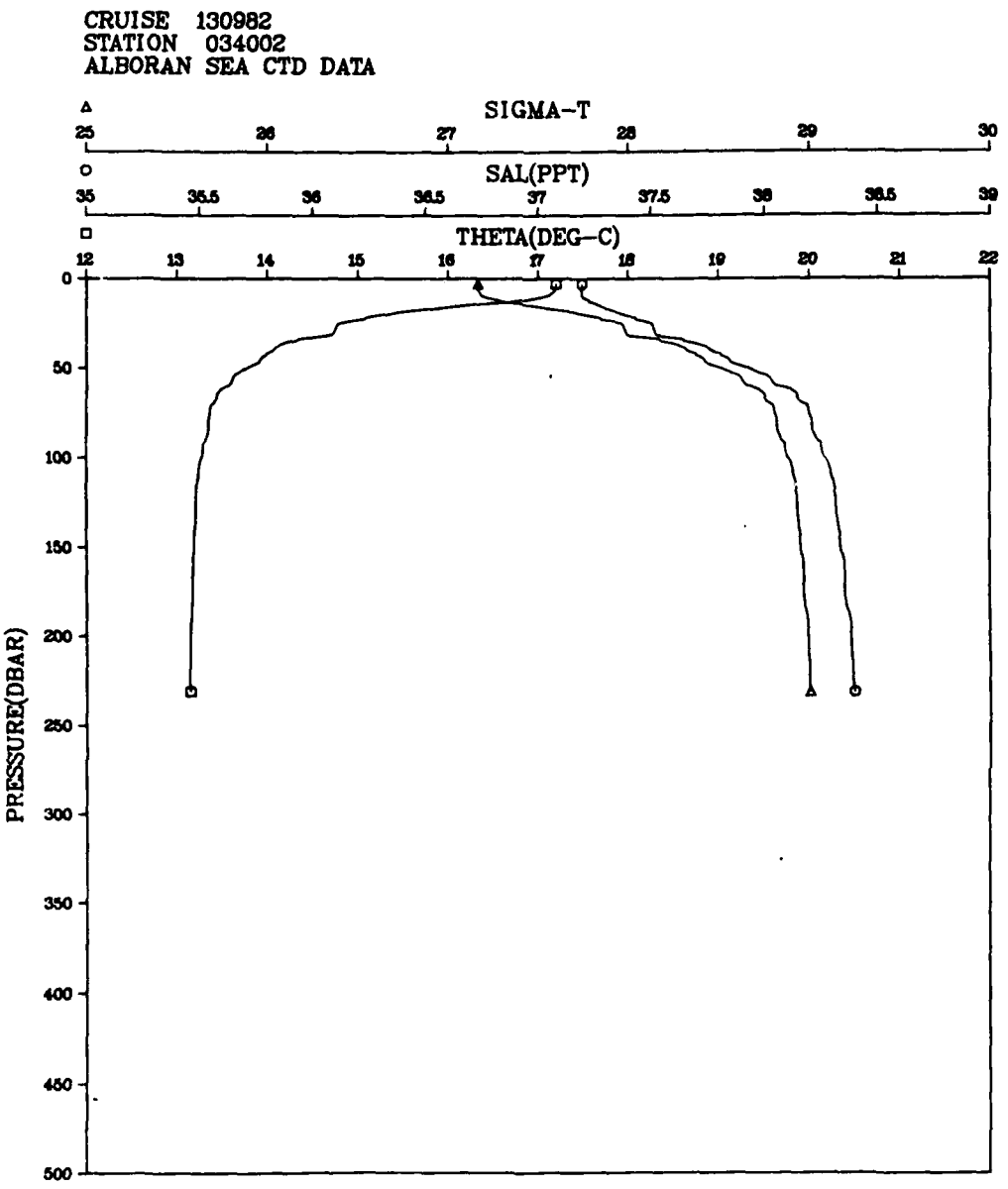

CRUISE 130982
STATION 034002
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 70

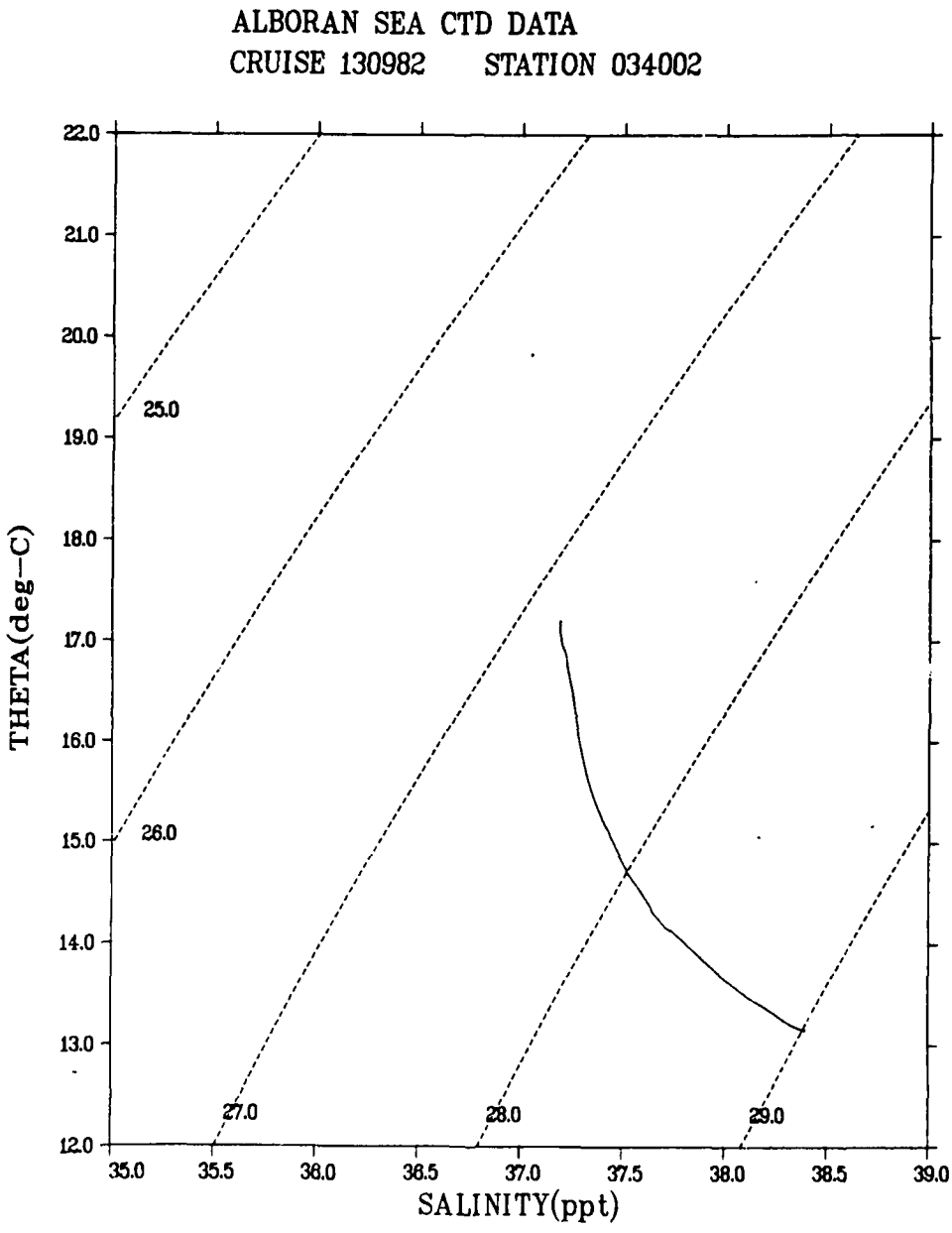

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 034002
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 71

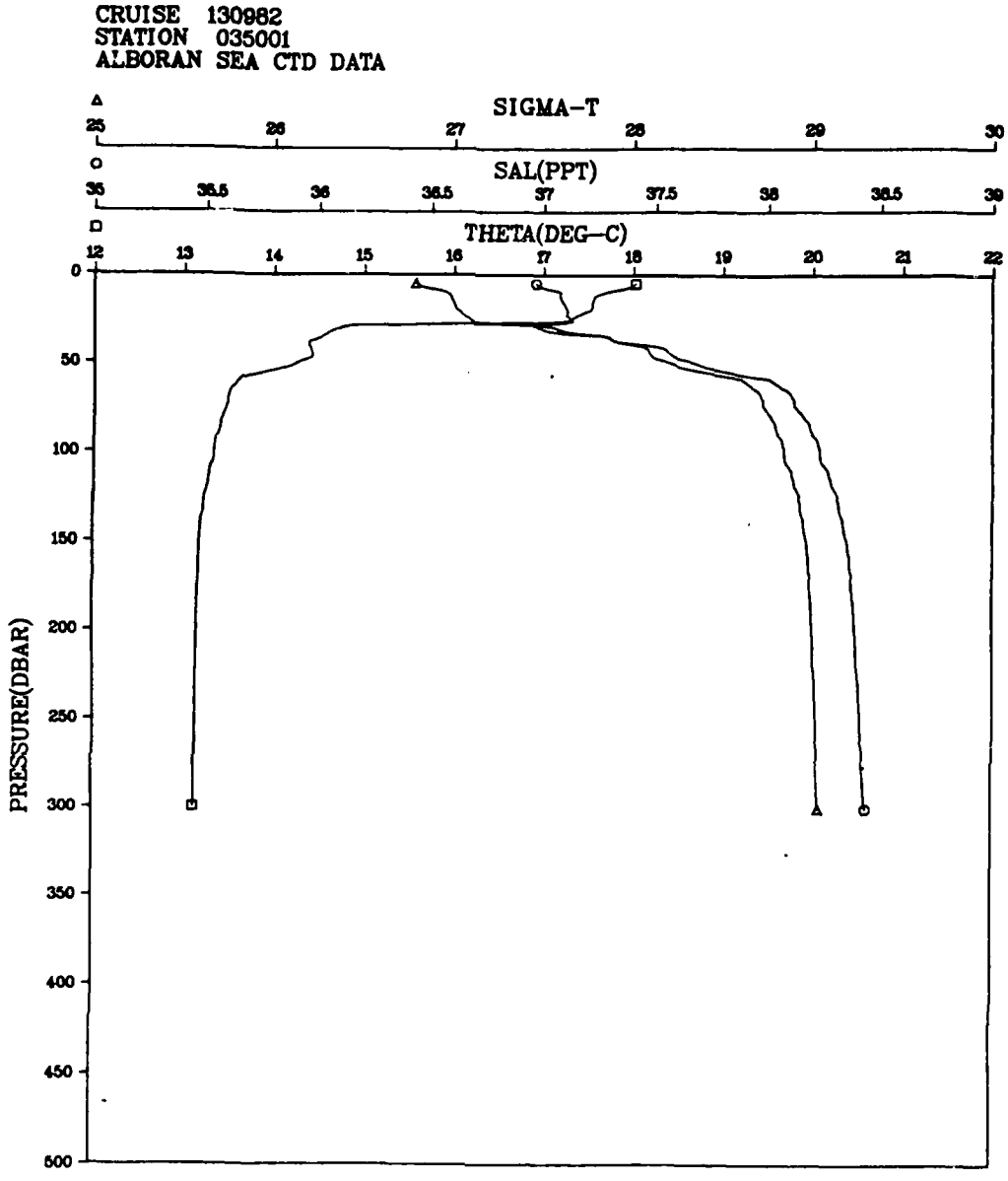

CRUISE 130982
STATION 035001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
36
37
38
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 72

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 035001

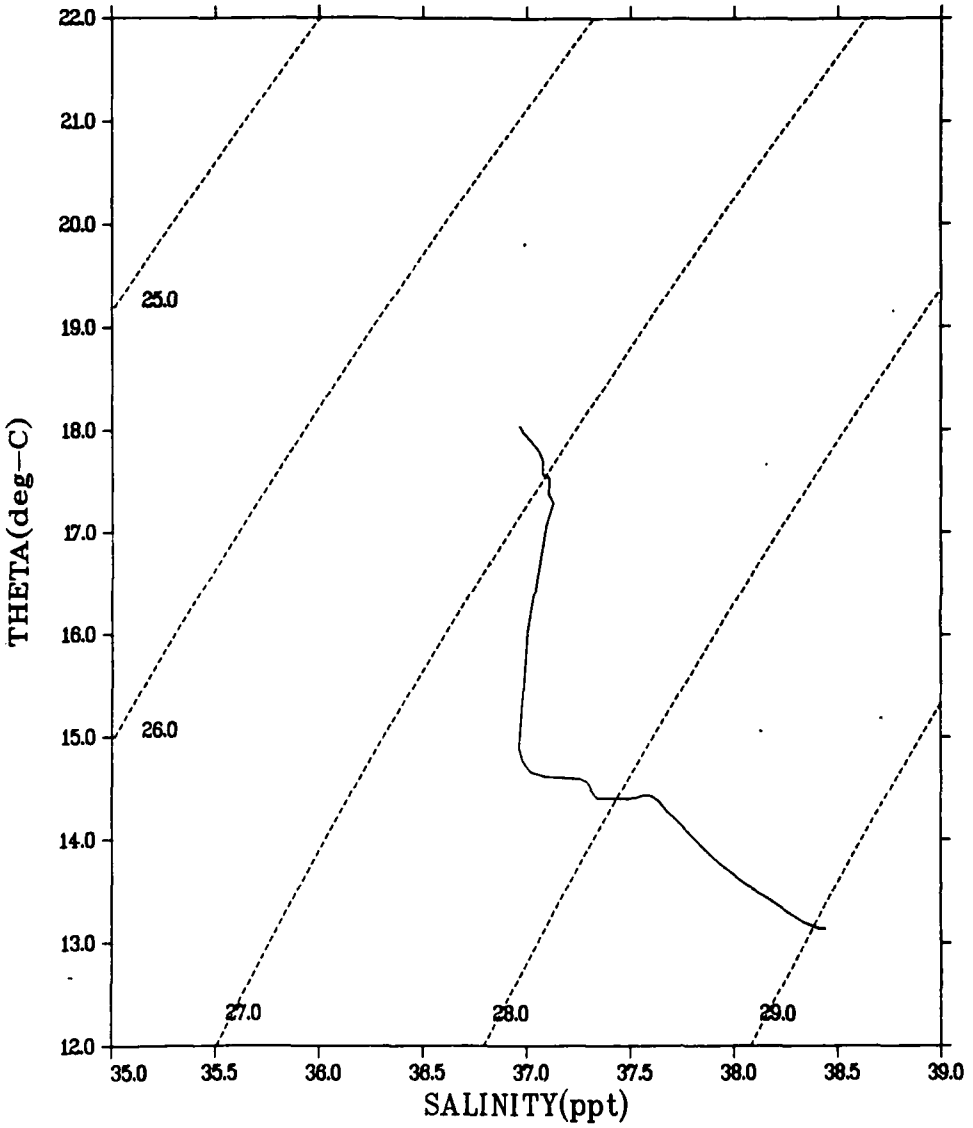


Figure 73

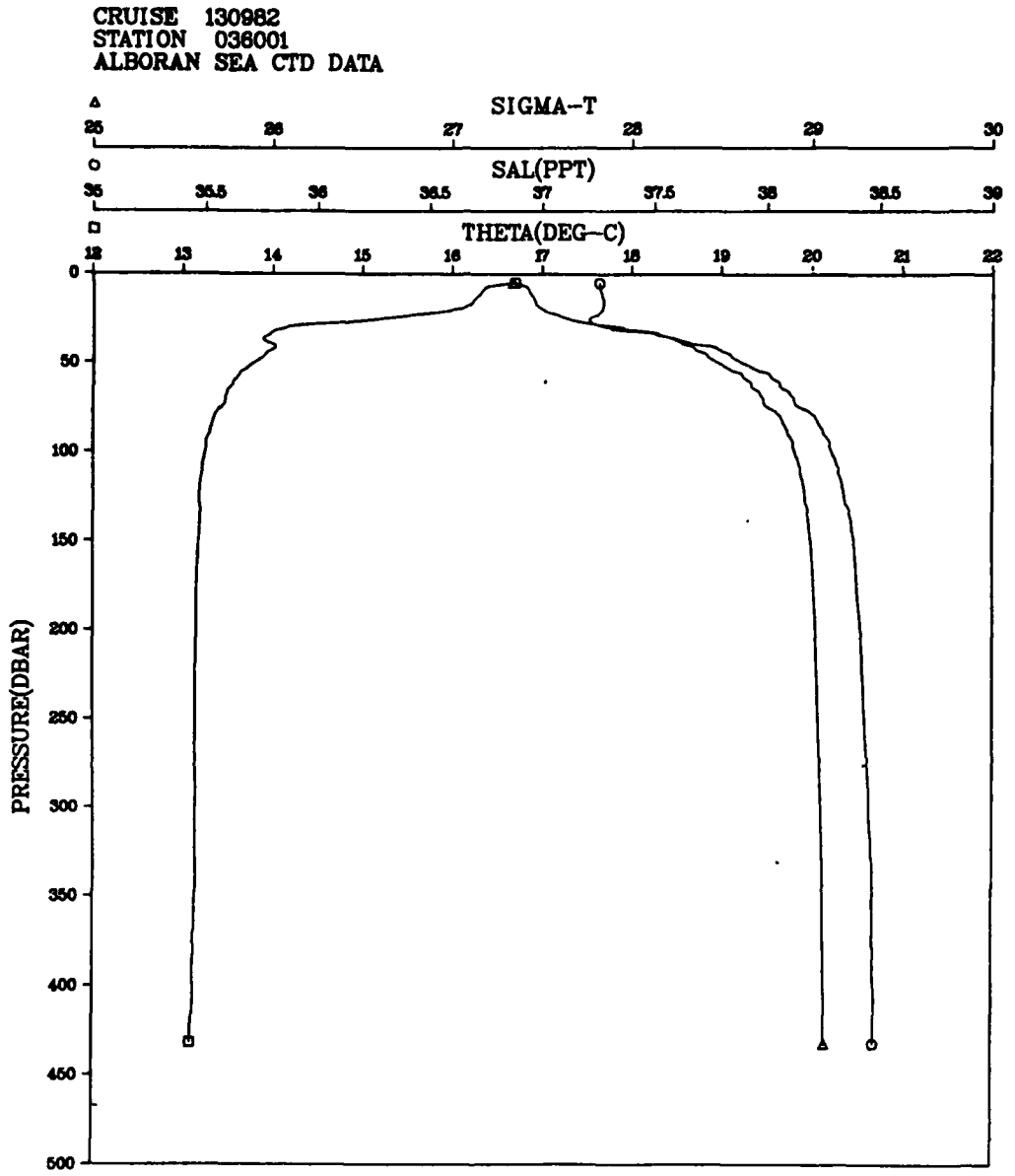

CRUISE 130982
STATION 036001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 74

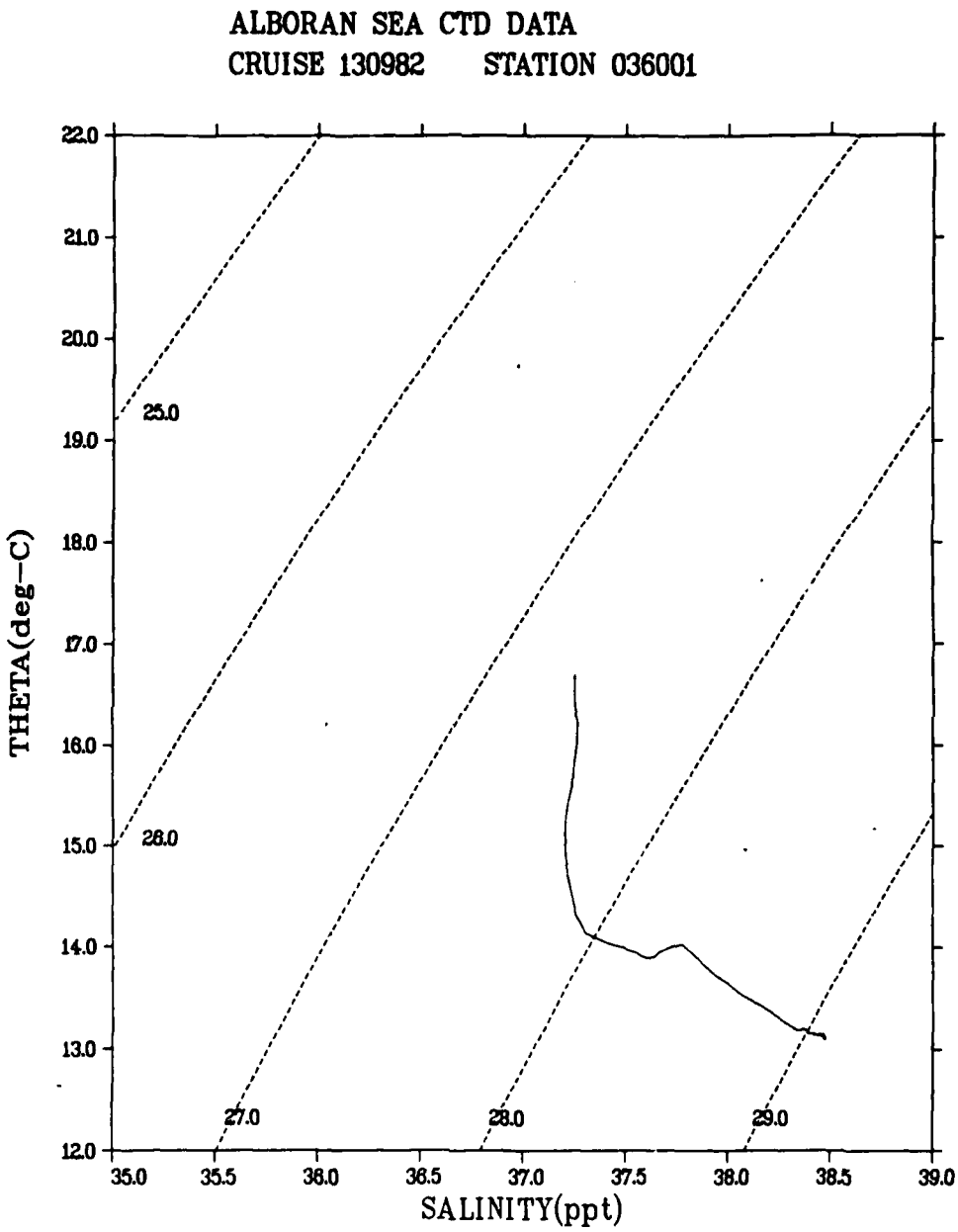

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 036001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 75

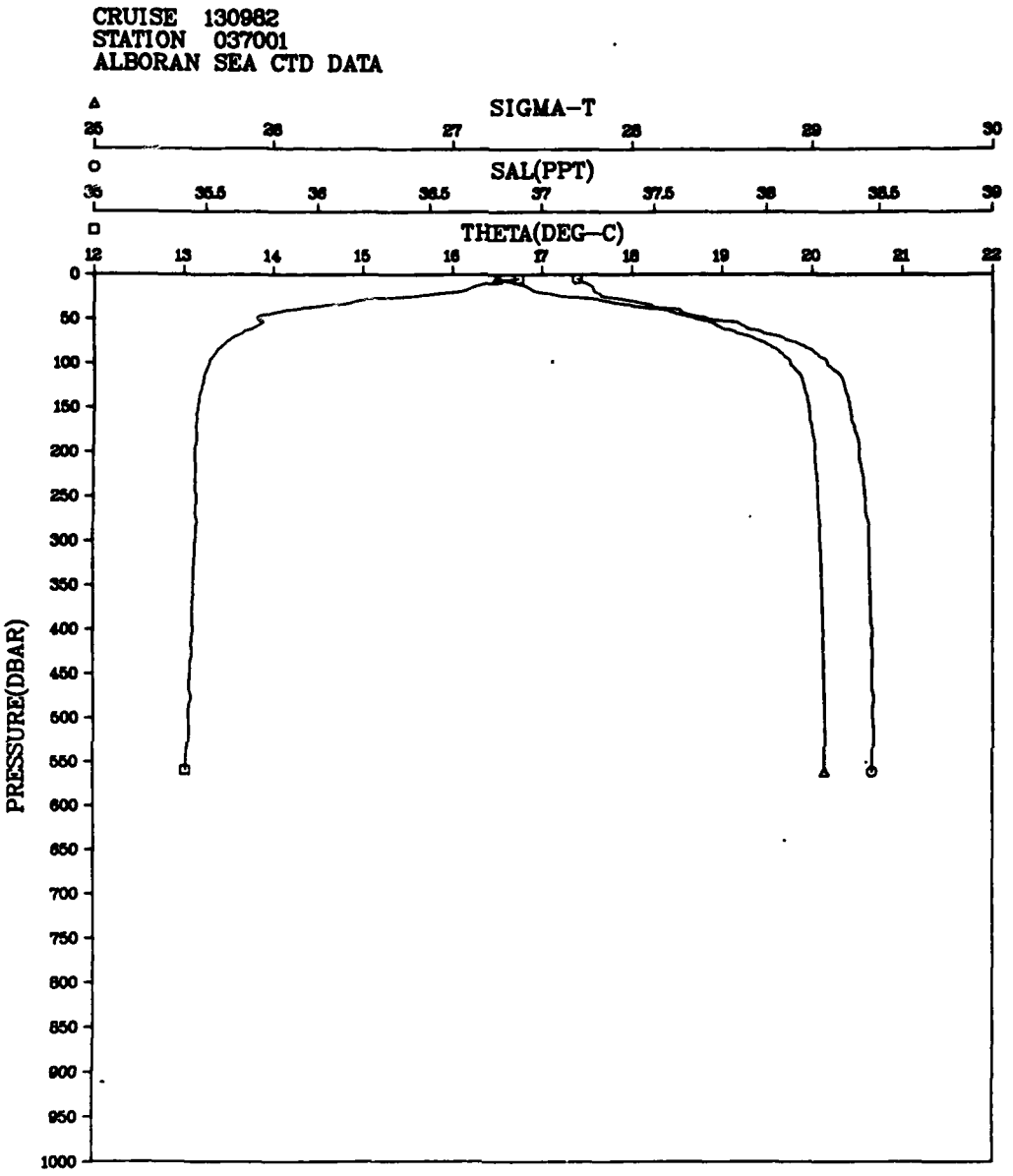

CRUISE 130982
STATION 037001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 76

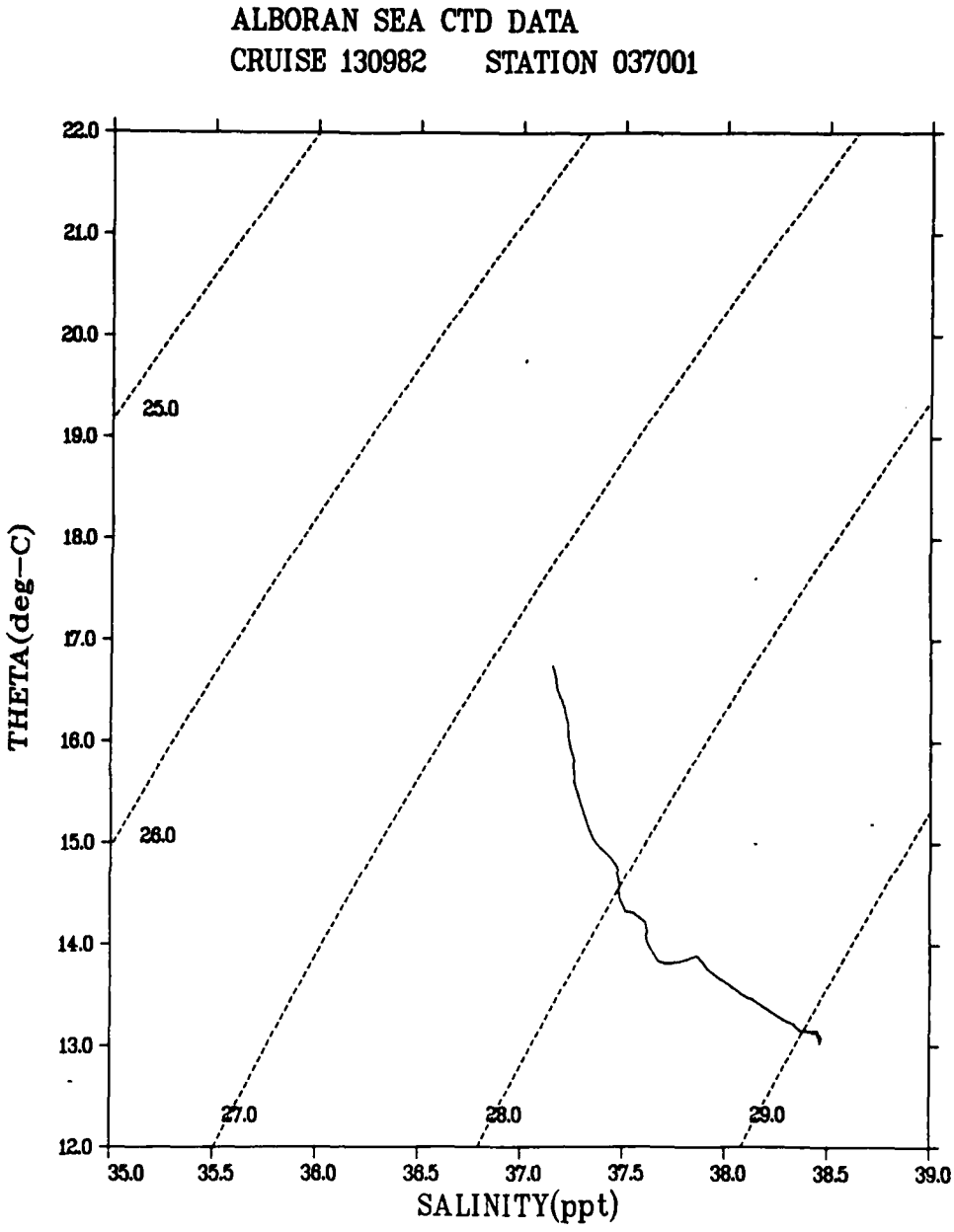

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 037001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 77

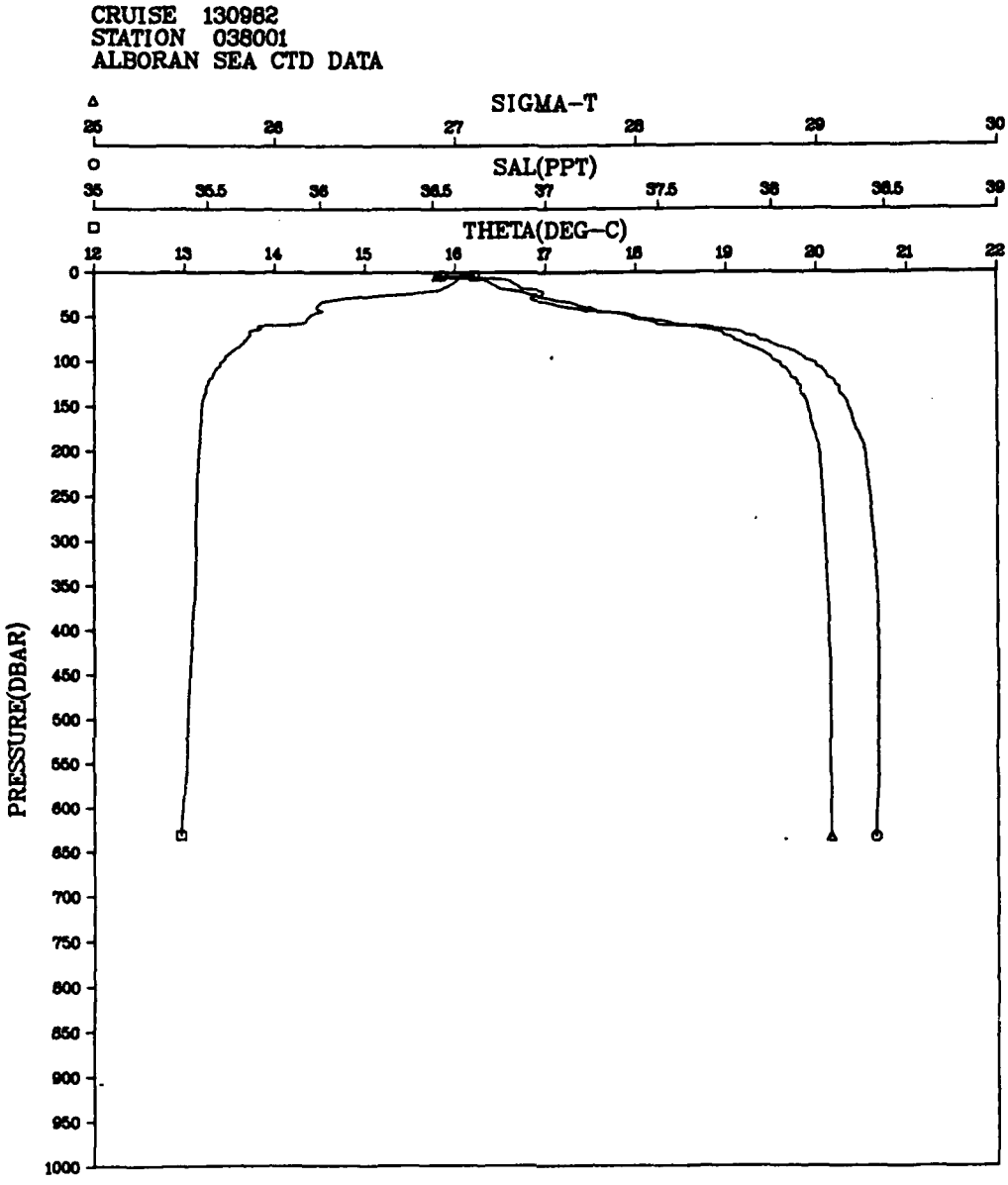

CRUISE 130982
STATION 038001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 78

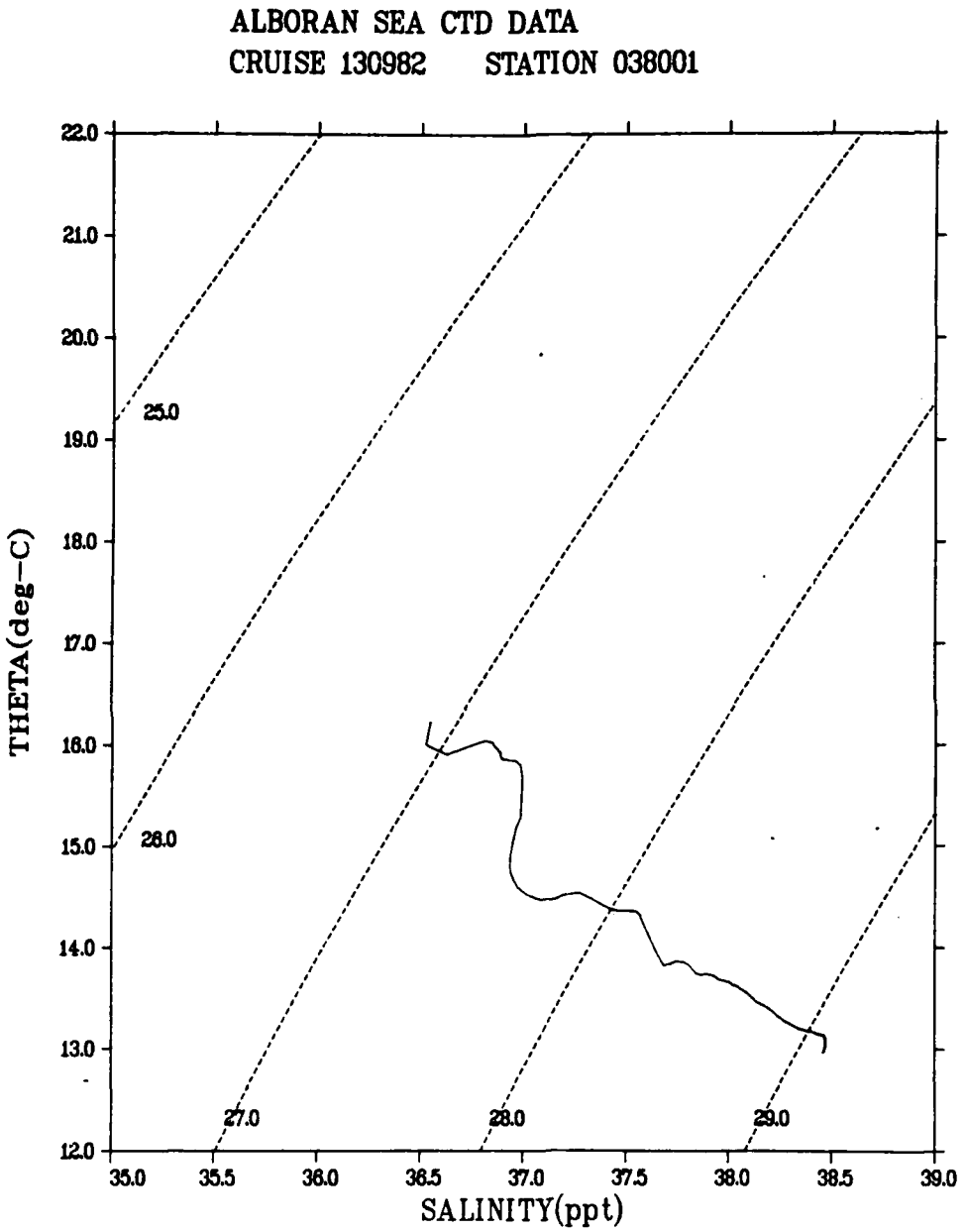

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 038001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 79

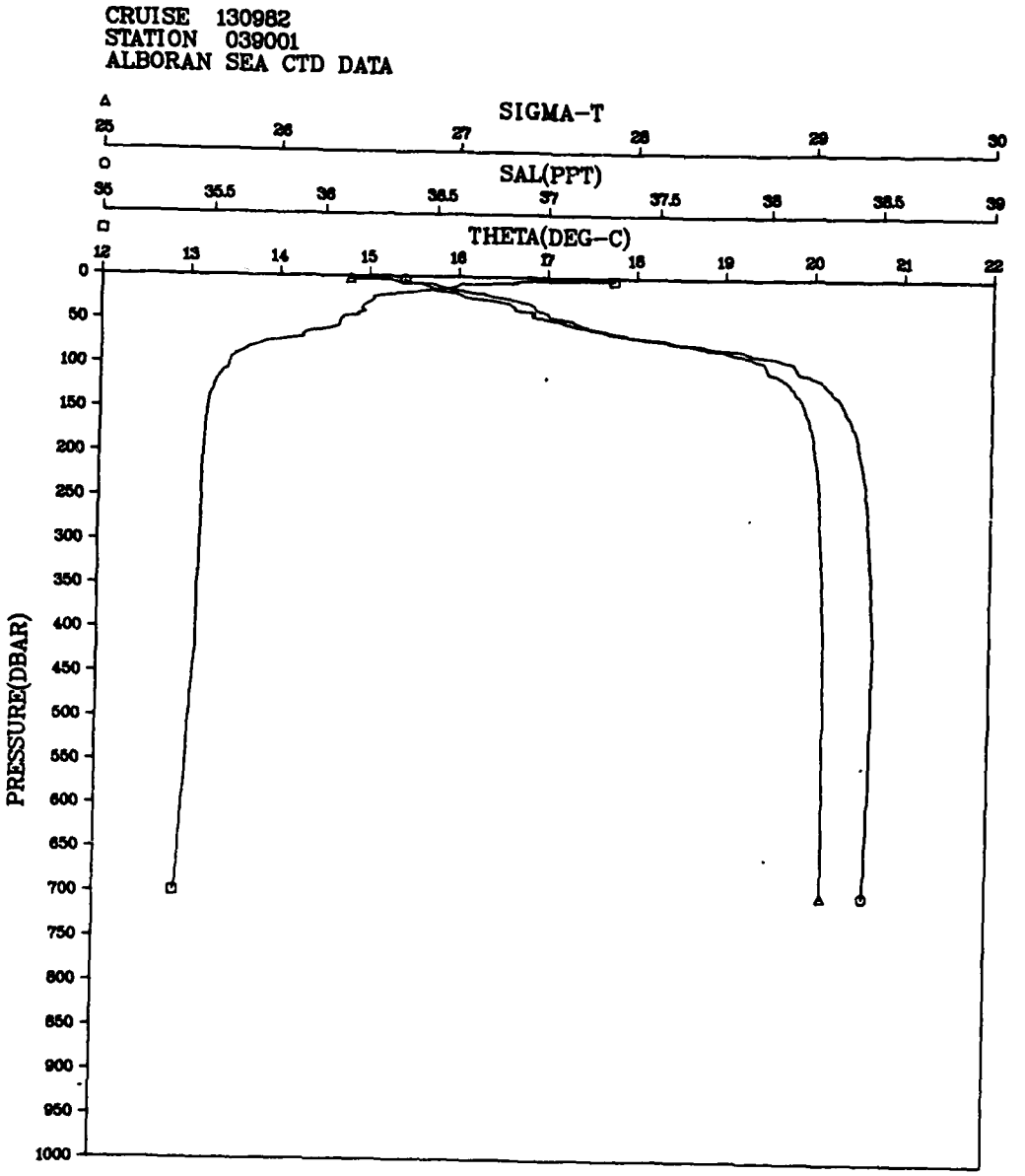

CRUISE 130982
STATION 039001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 80

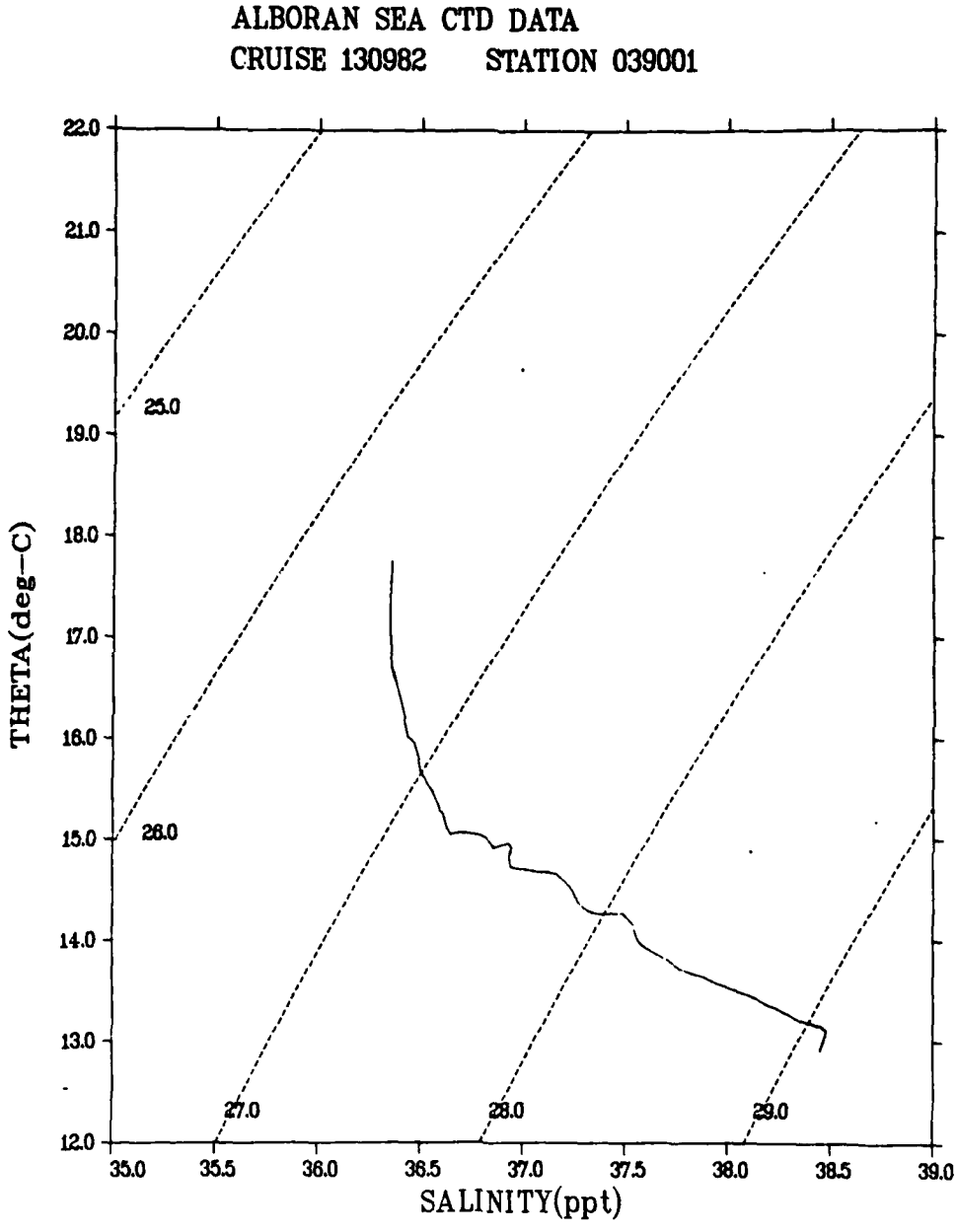

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 039001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 81

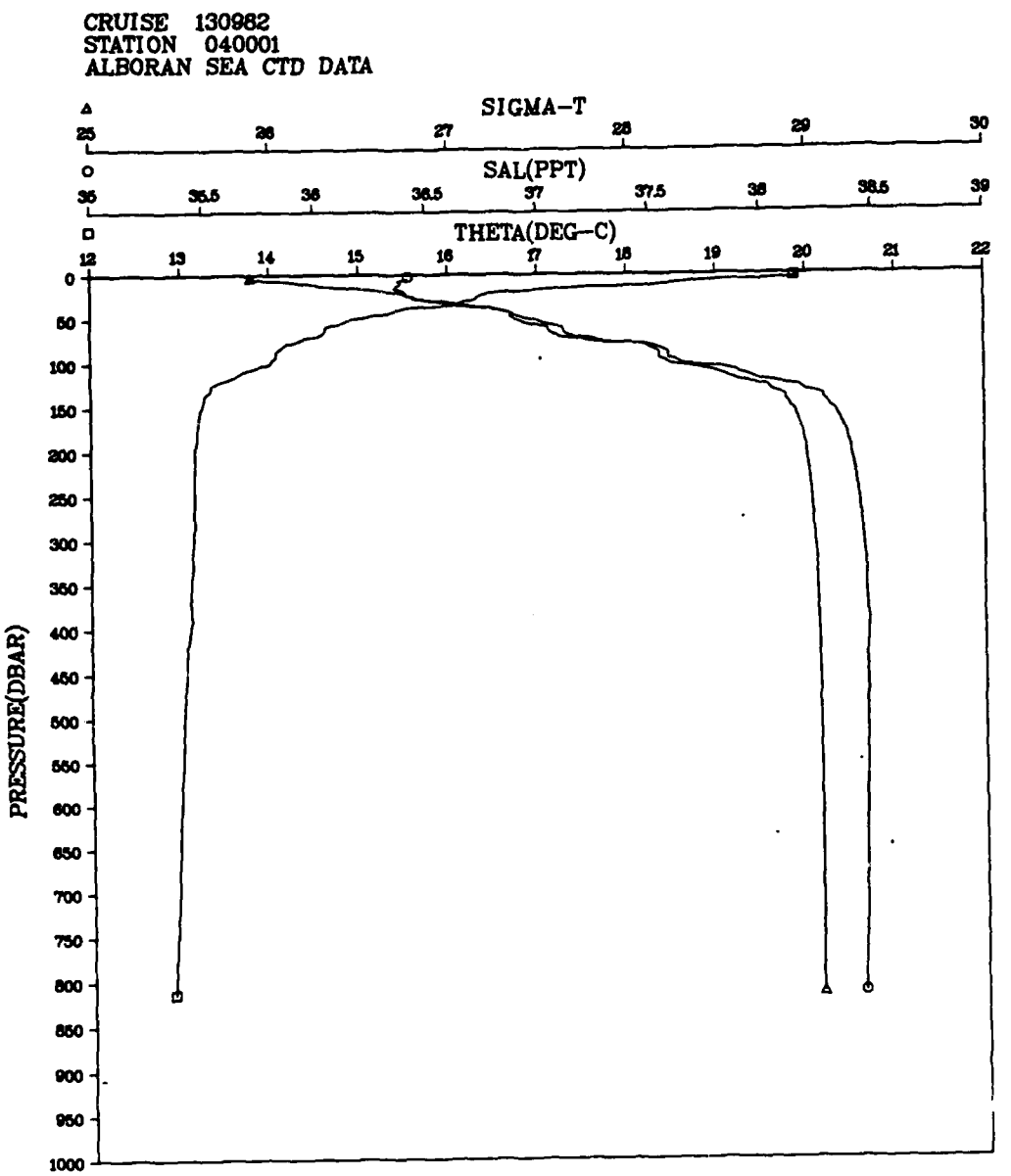
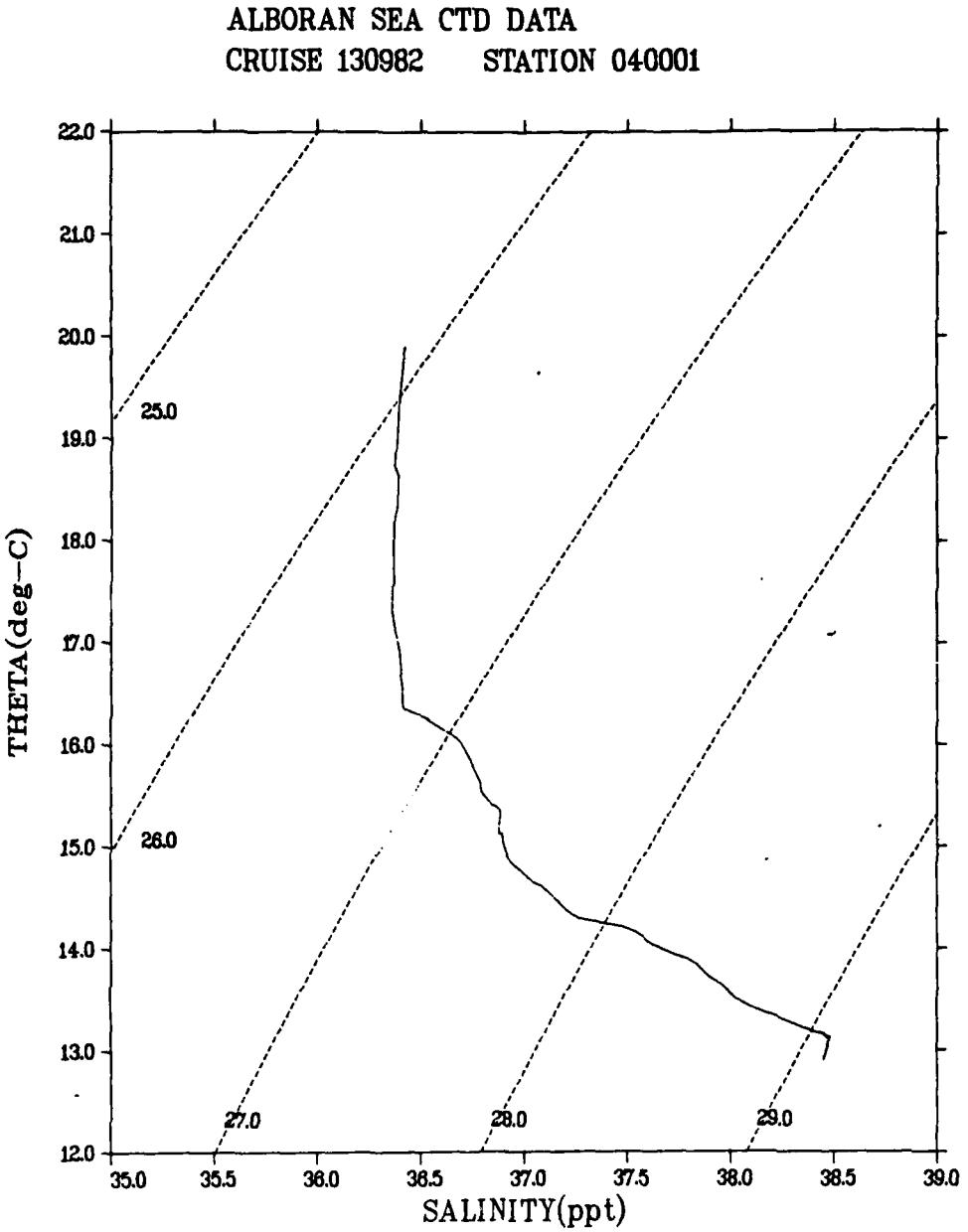

CRUISE 130982
STATION 040001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 82


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 040001
THETA(deg-C)
SALINITY(ppt)
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21.0
20.0
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18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 83

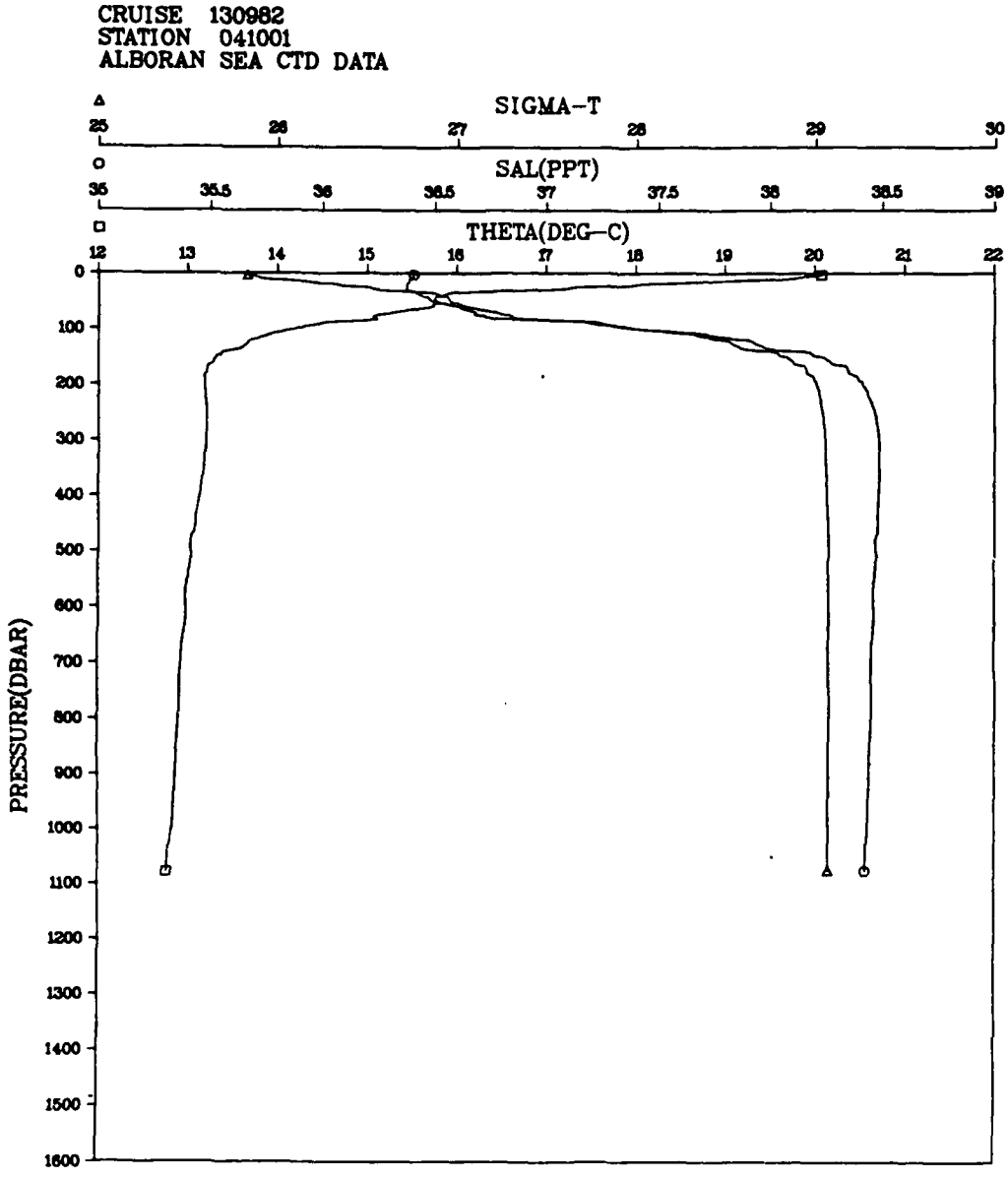
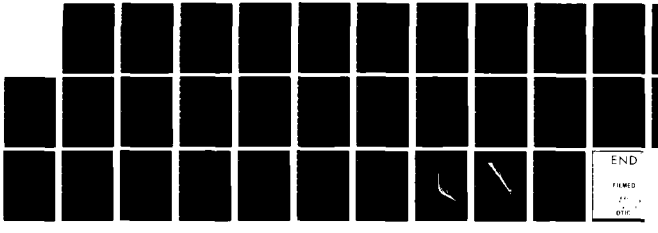
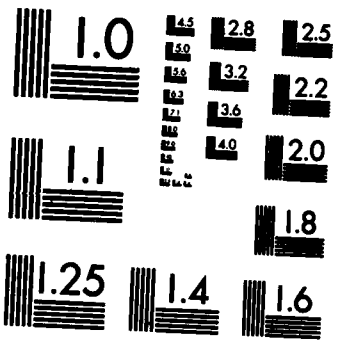

CRUISE 130982
STATION 041001
ALBORAN SEA CTD DATA
SIGMA-T
25 26 27 28 29 30
SAL(PPT)
35 35.5 36 36.5 37 37.5 38 38.5 39
THETA(DEG-C)
12 13 14 15 16 17 18 19 20 21 22
PRESSURE(DBAR)
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600

Figure 84

AD-A126 211 HYDROGRAPHIC MEASUREMENTS IN THE WESTERN ALBORAN SEA JUNE 1982(U) NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY NSTL STATION MS T H KINDER ET AL. FEB 83 2/2

UNCLASSIFIED NORDA-TN-202 F/G 8/10 NL





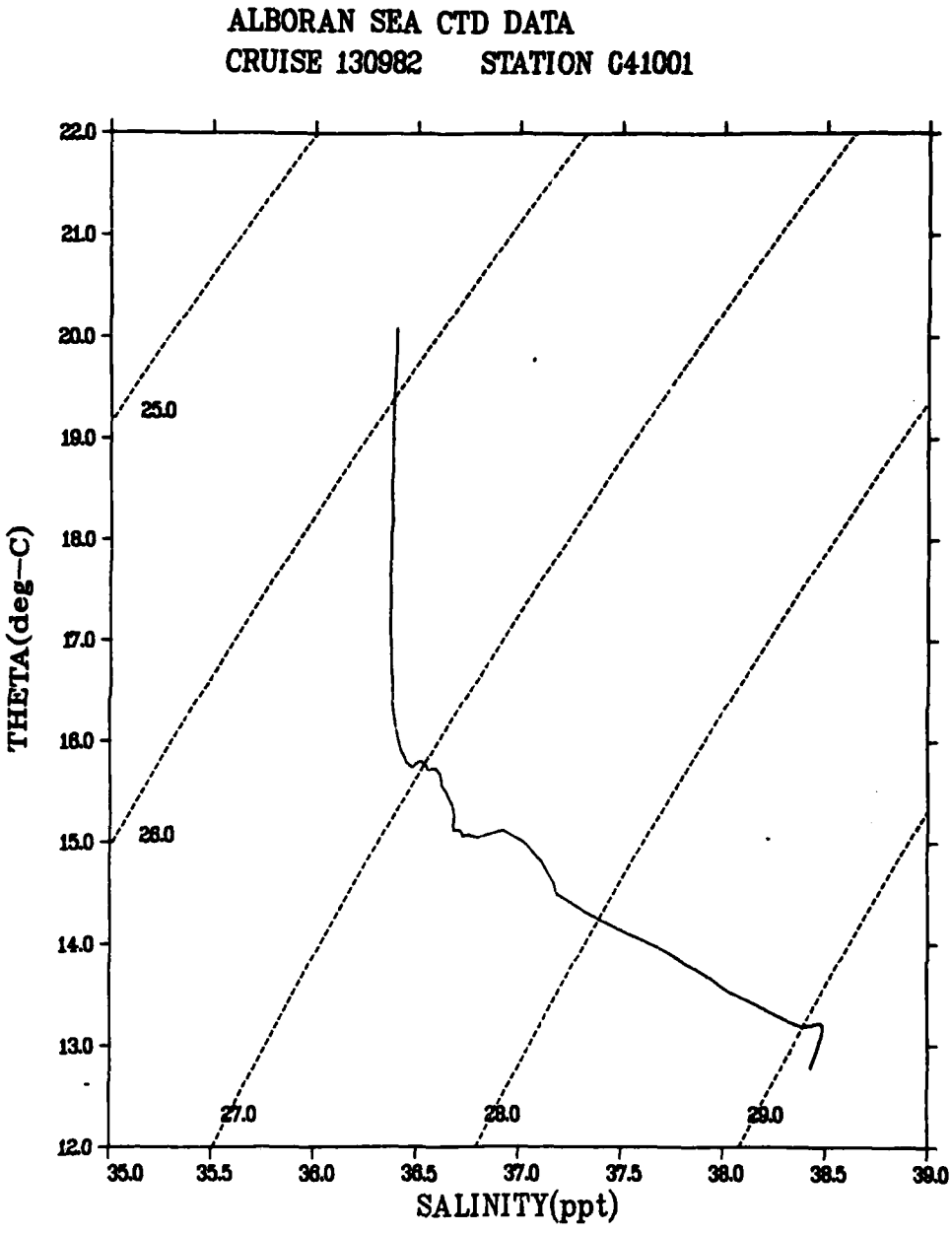

ALBORAN SEA CTD DATA
CRUISE 130982 STATION C41001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 85

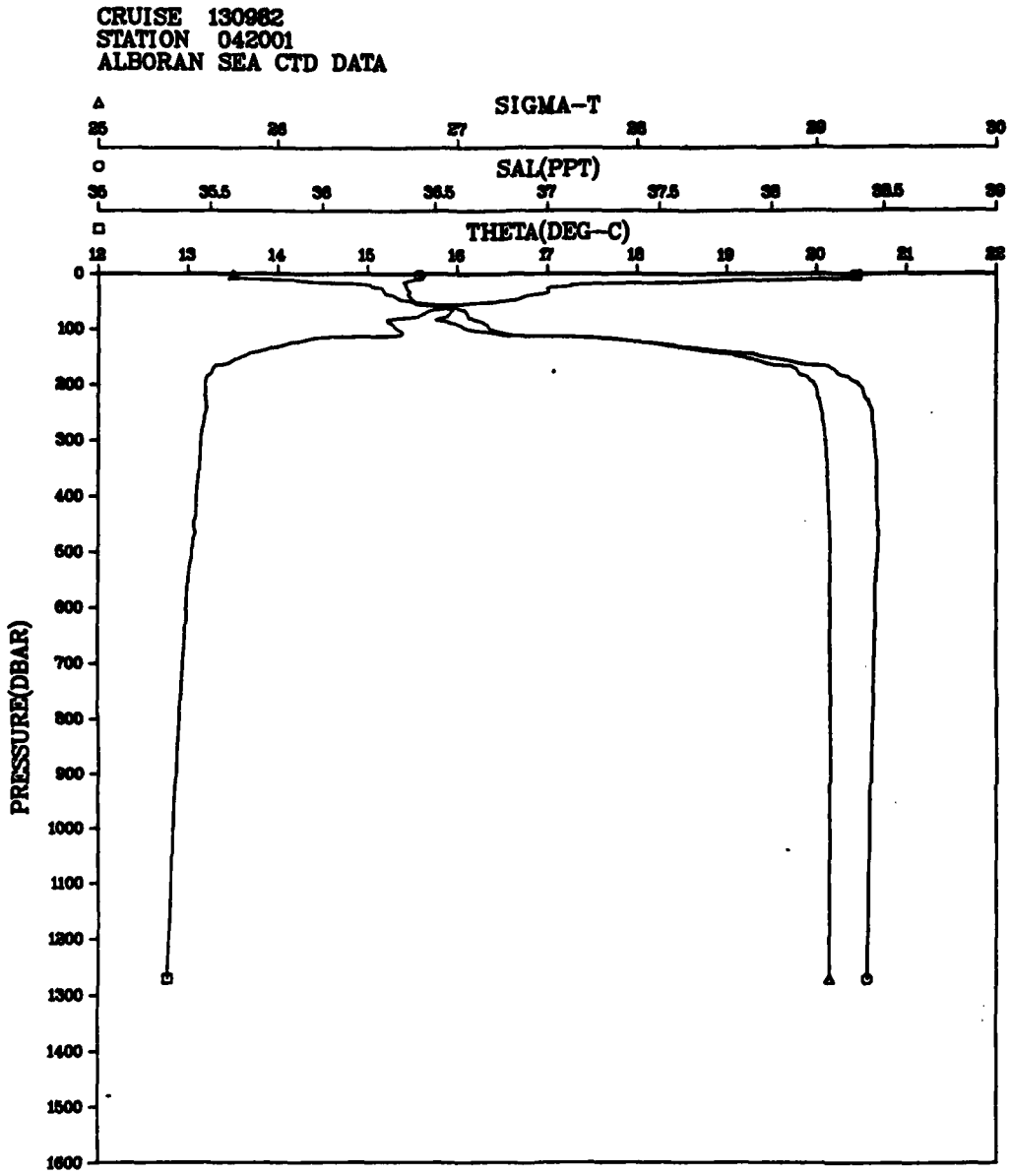

CRUISE 130962
STATION 042001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 86

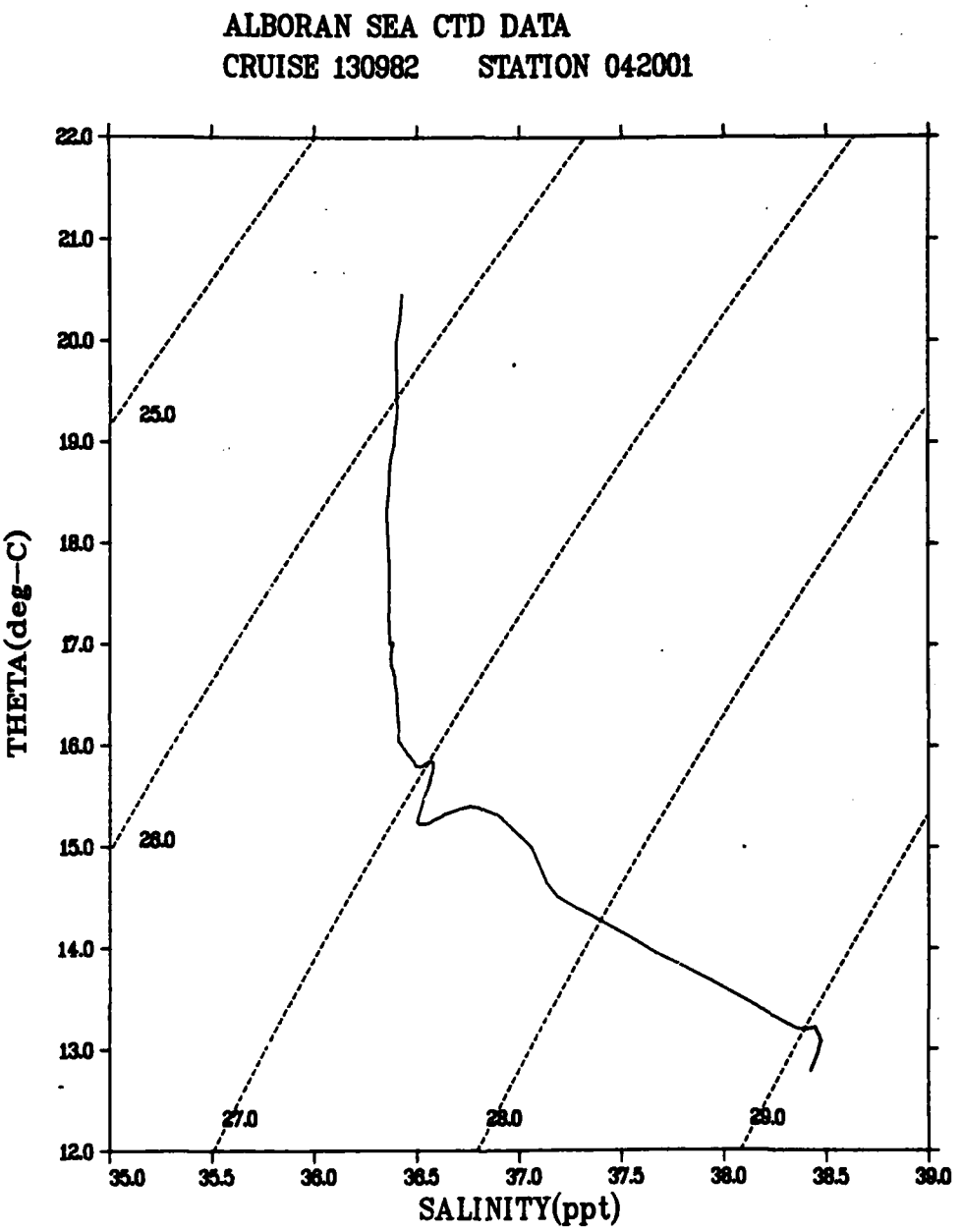

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 042001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 87

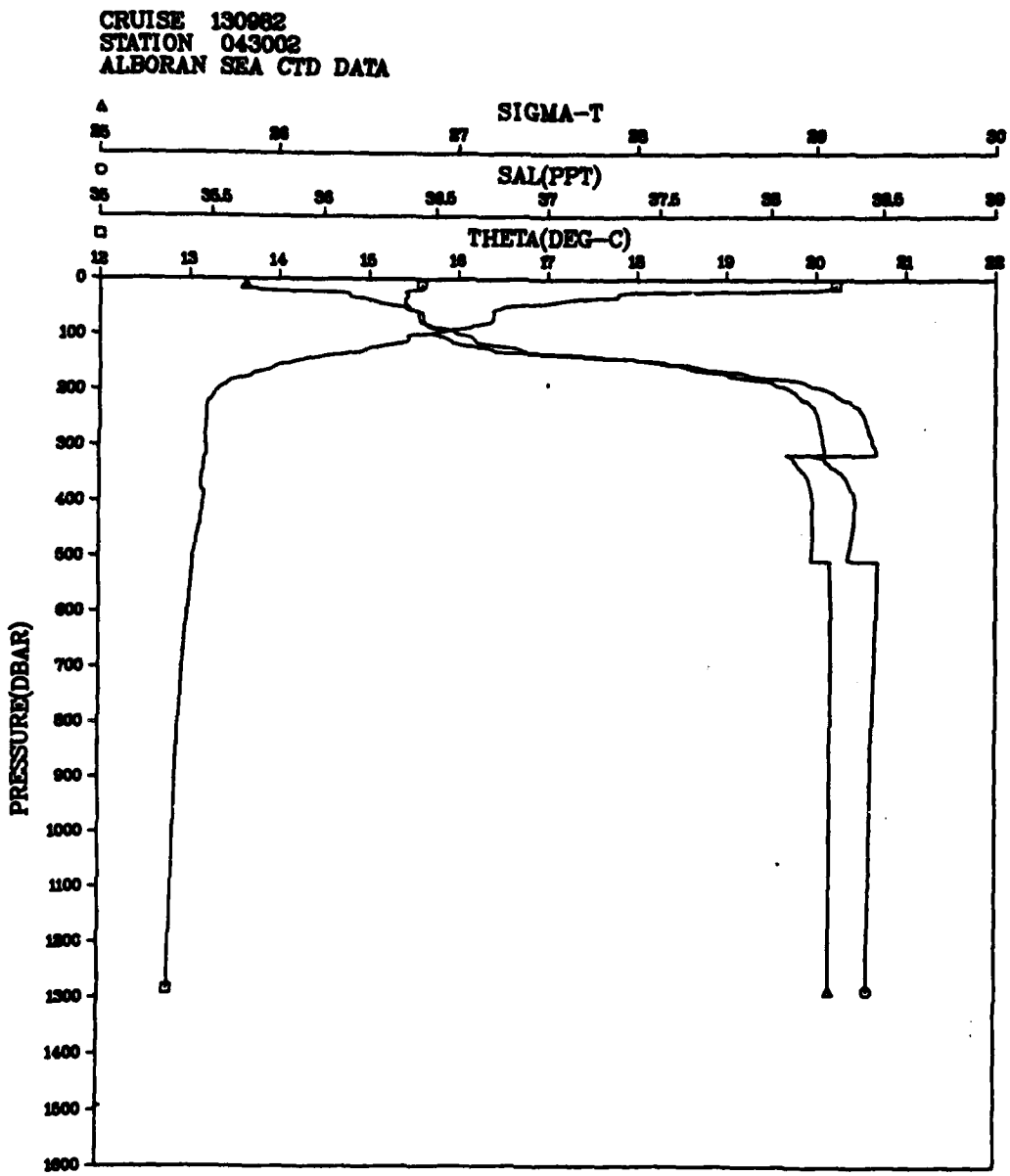

CRUISE 130982
STATION 043002
ALBORAN SEA CTD DATA
SIGMA-T
SAL(PPT)
THETA(DEG-C)
PRESSURE(DBAR)

Figure 88

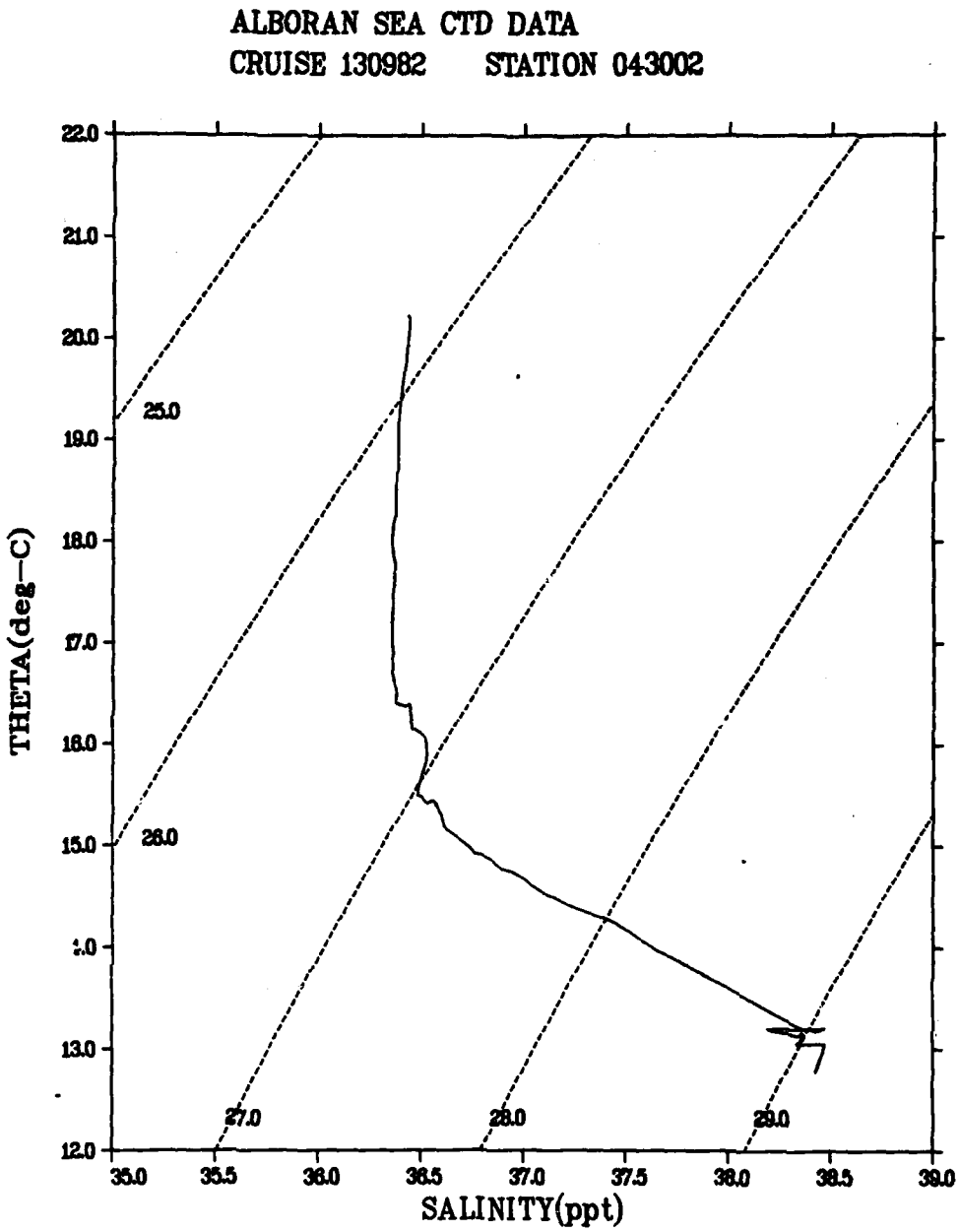

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 043002
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 89

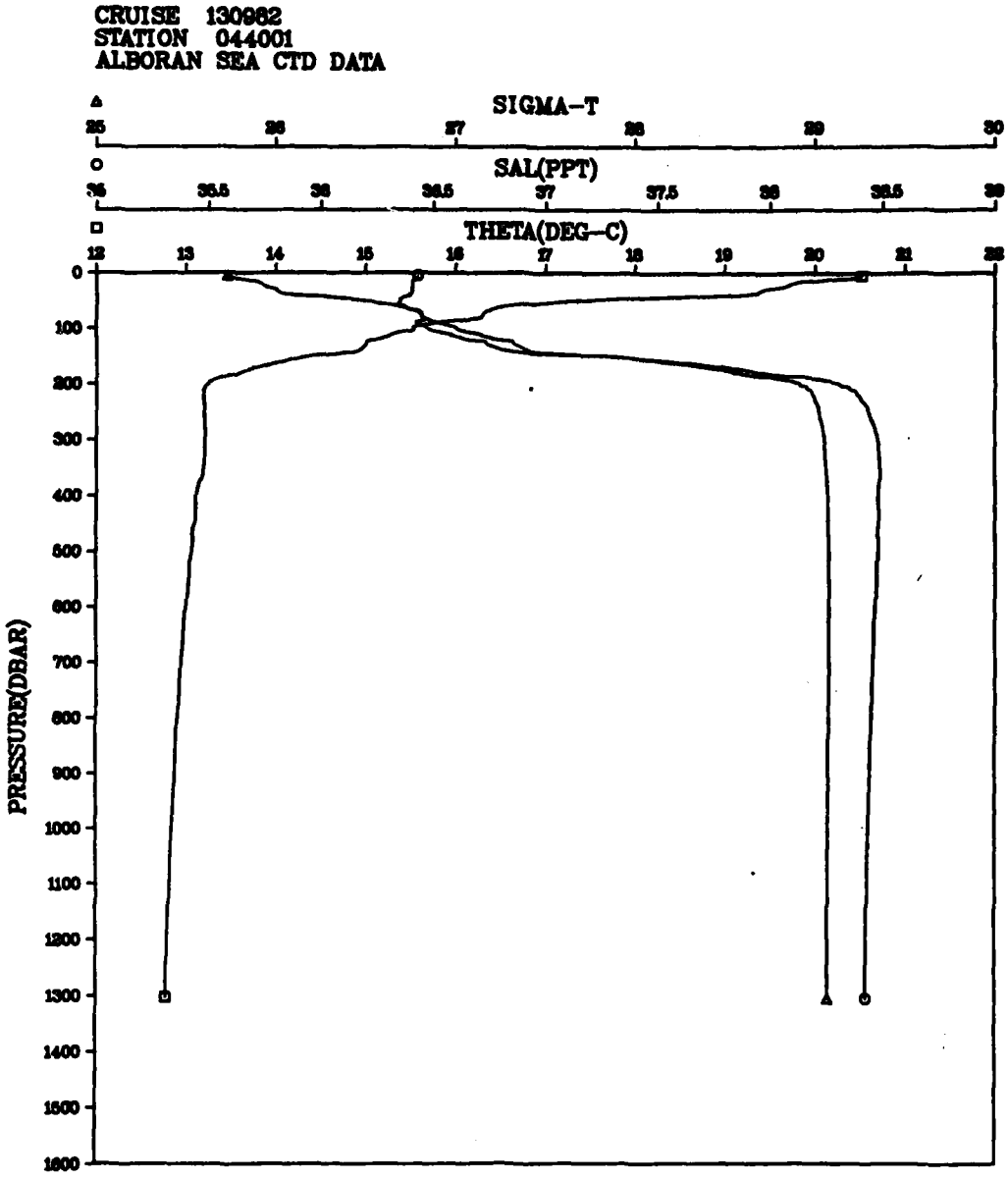

CRUISE 130962
STATION 044001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35.5
36
36.5
37
37.5
38
38.5
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 90

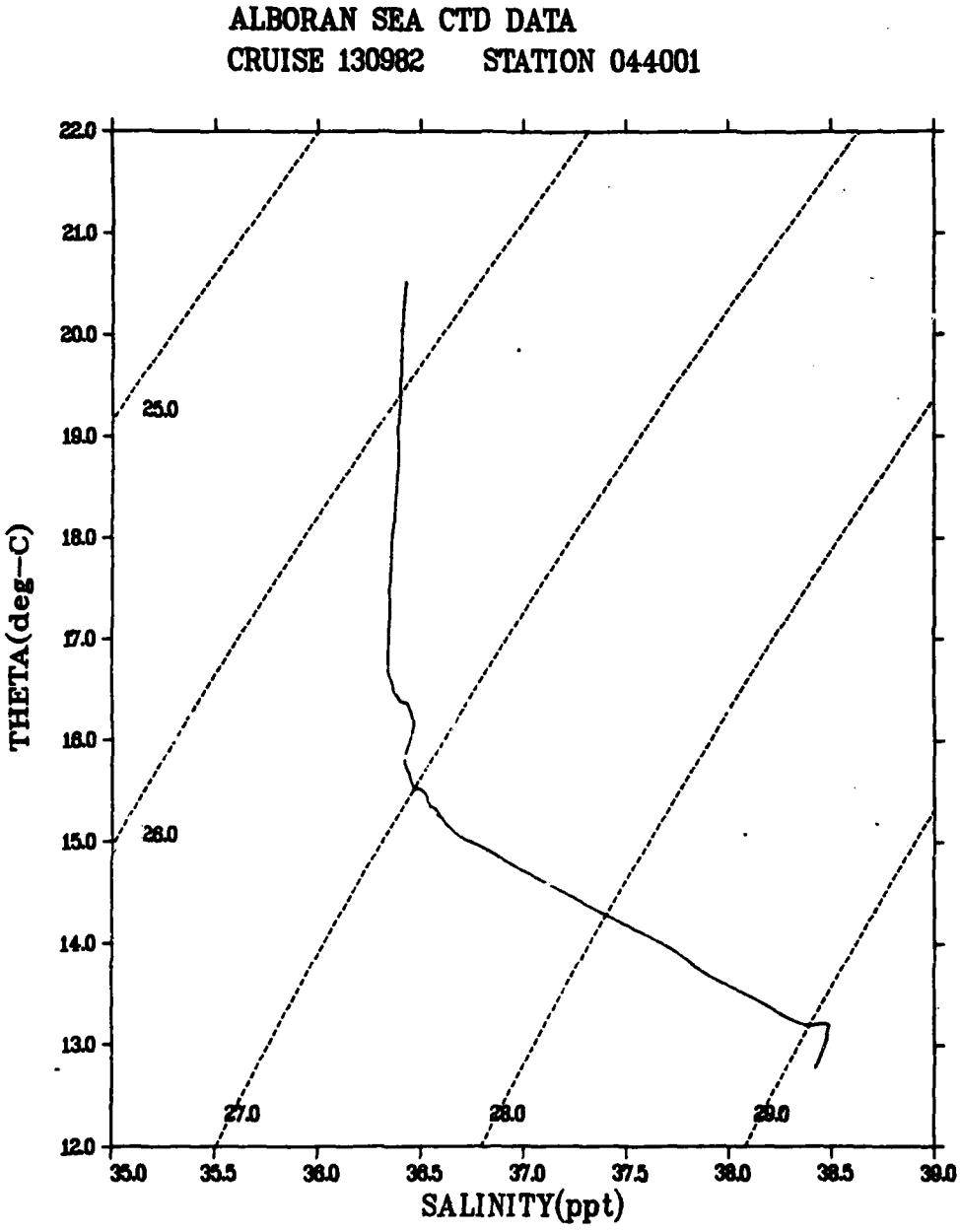

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 044001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 91

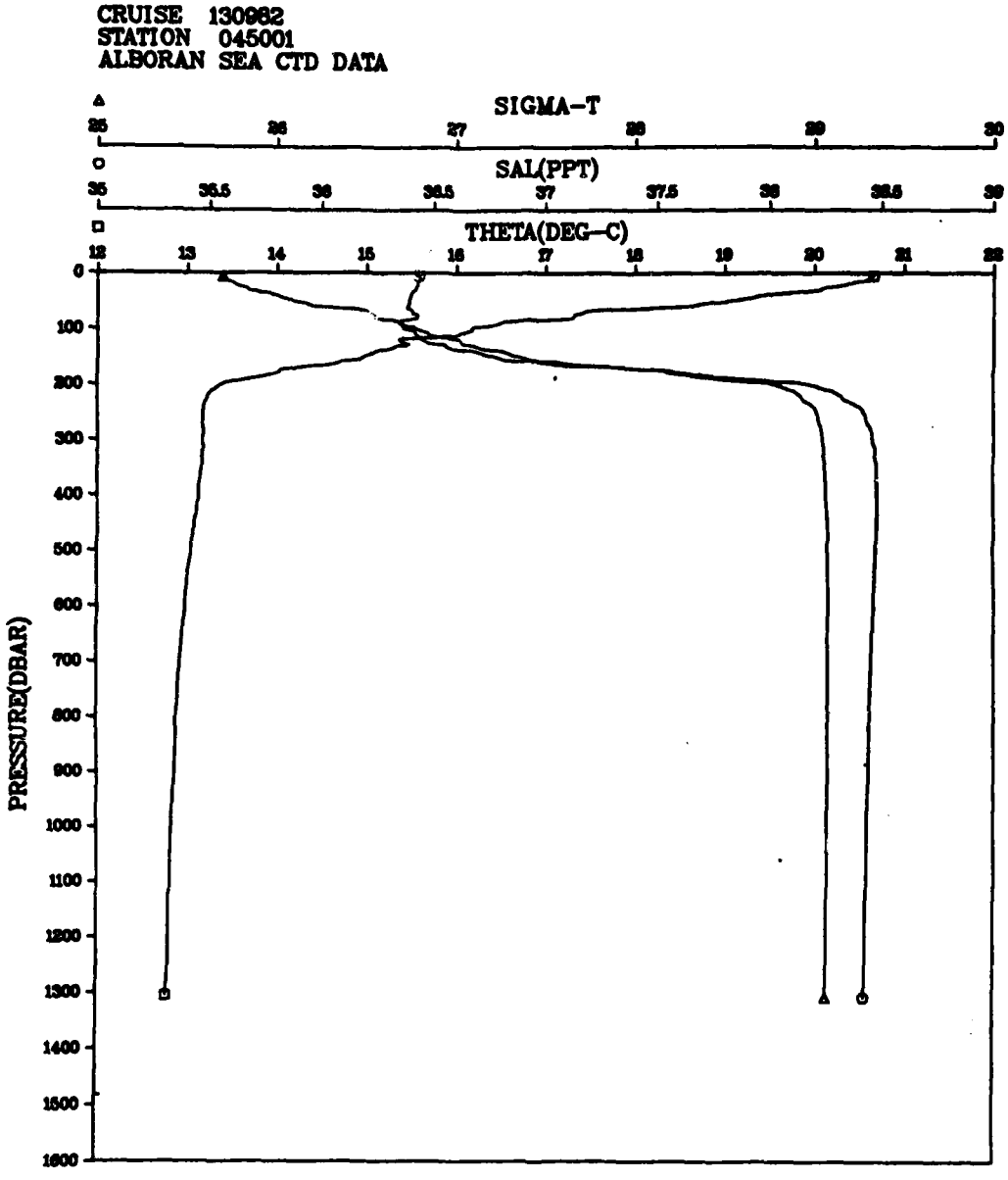

CRUISE 130982
STATION 045001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 92

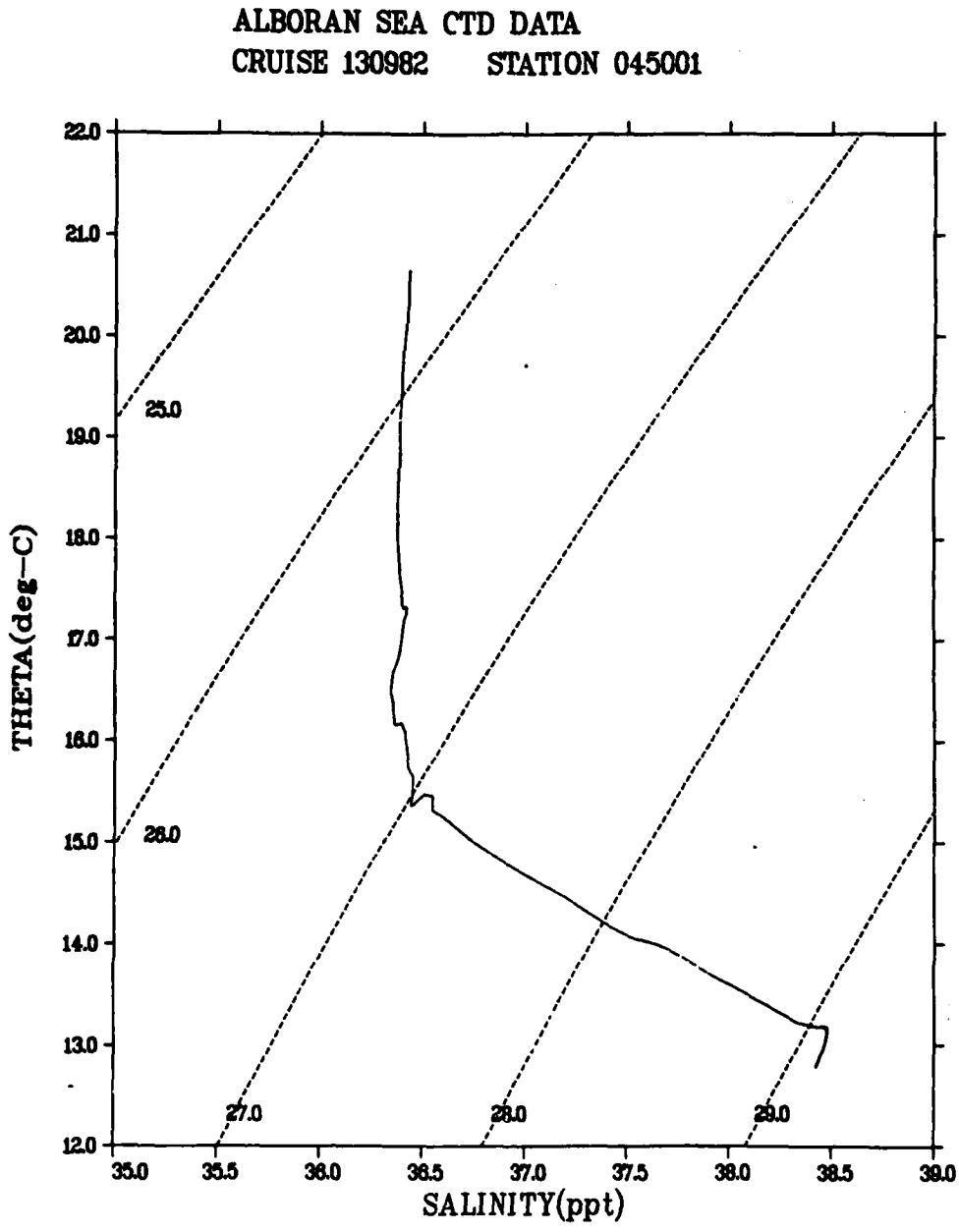

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 045001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 93

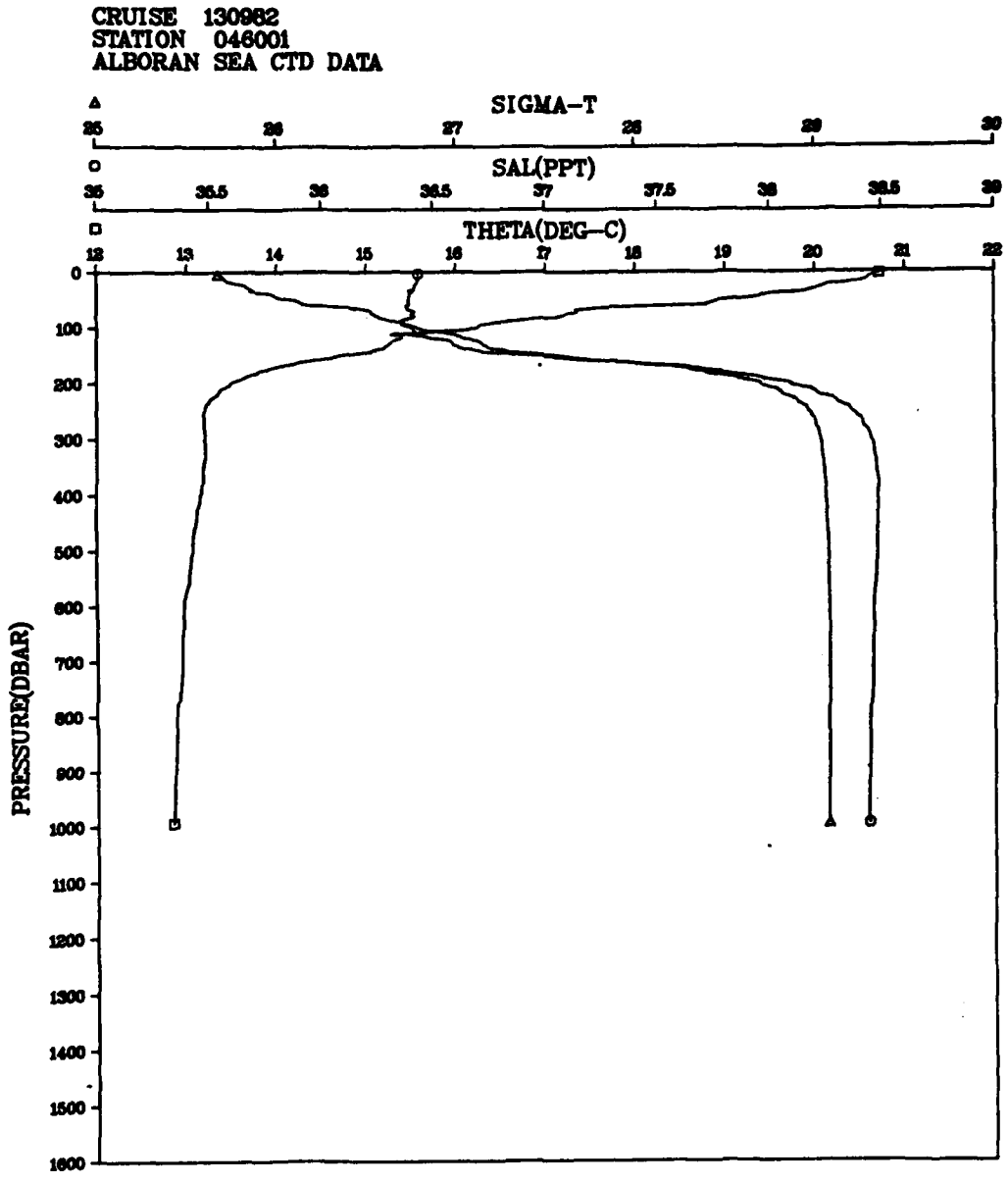

CRUISE 130982
STATION 046001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 94

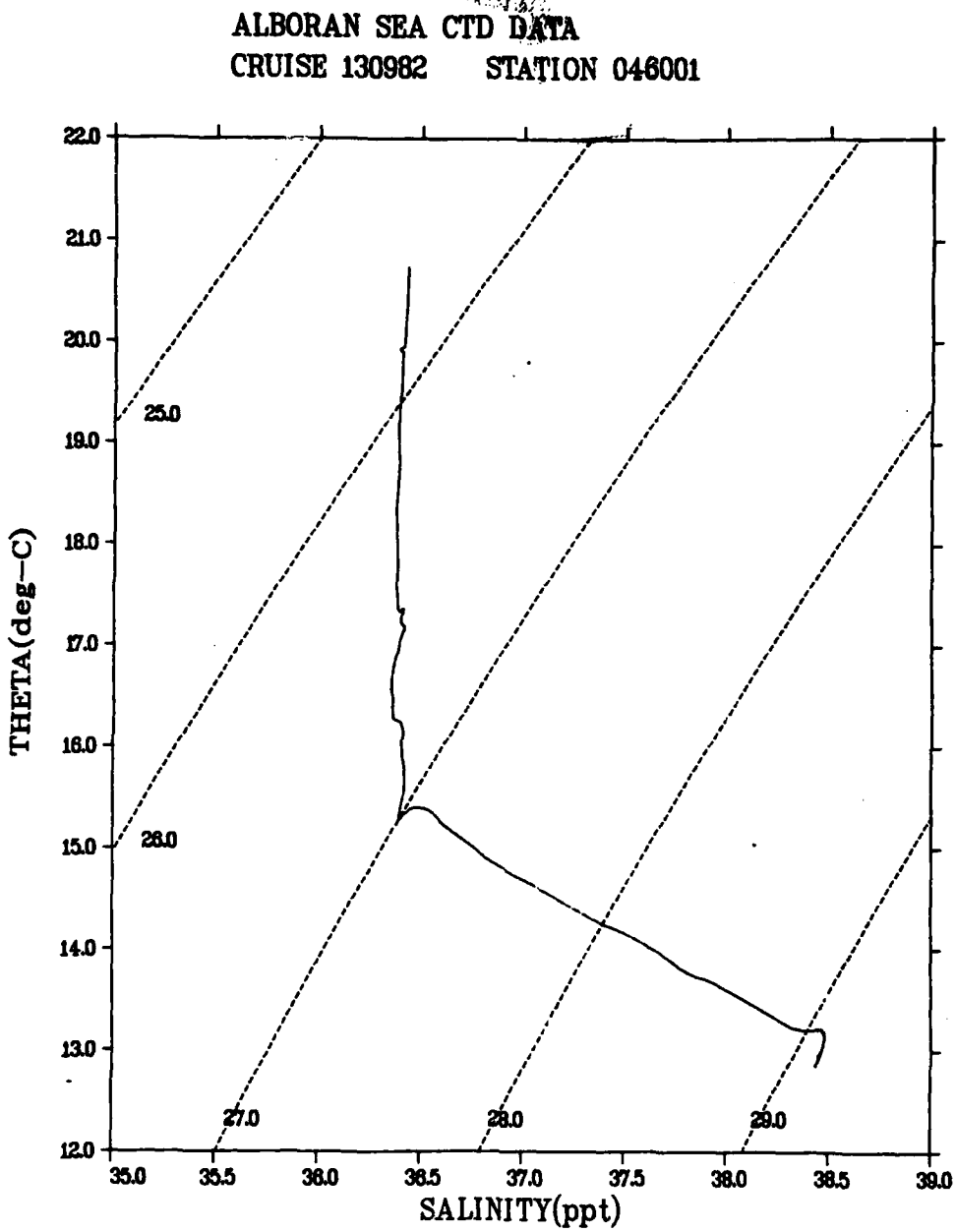

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 046001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 95

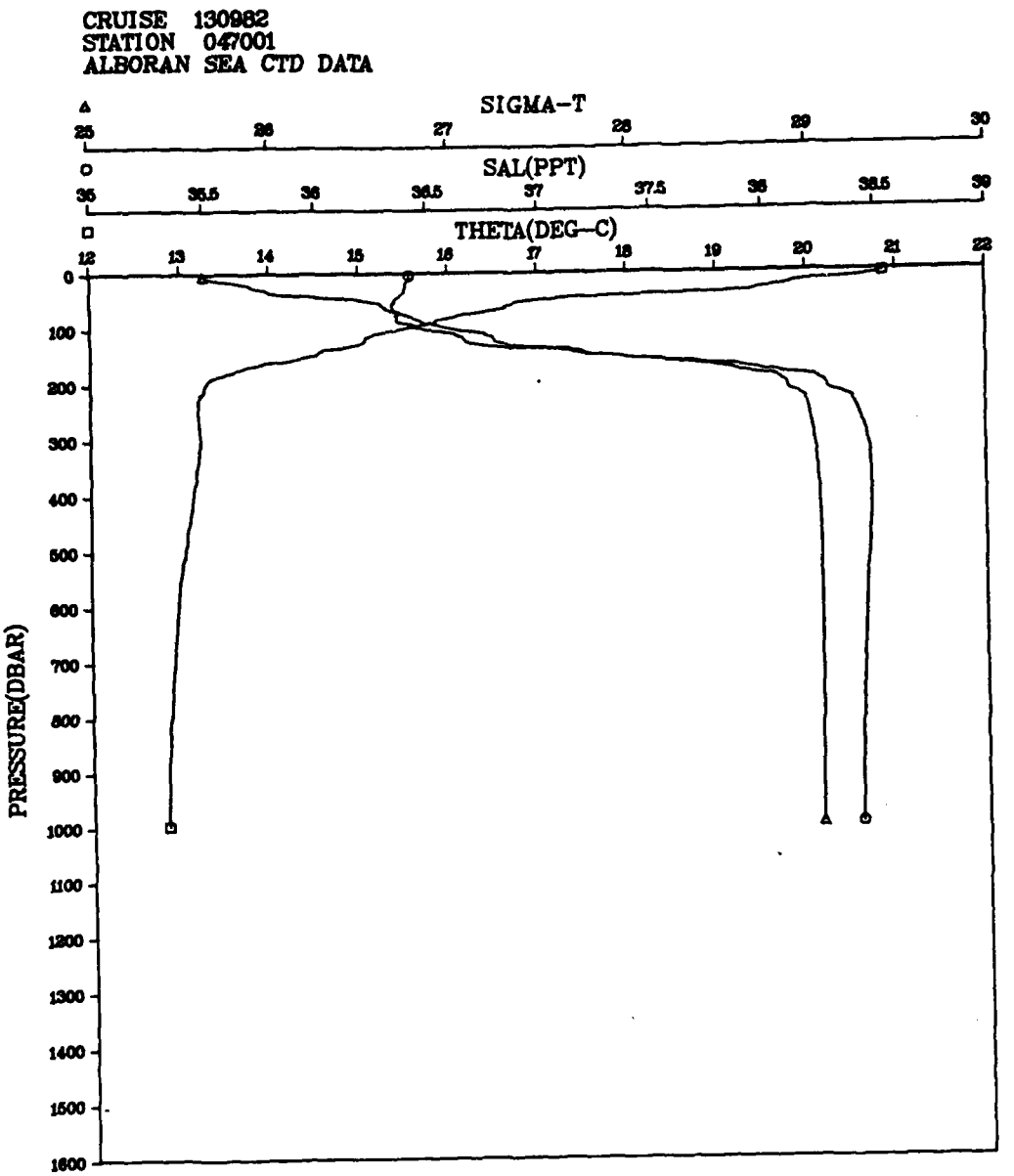

CRUISE 130982
STATION 047001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 96

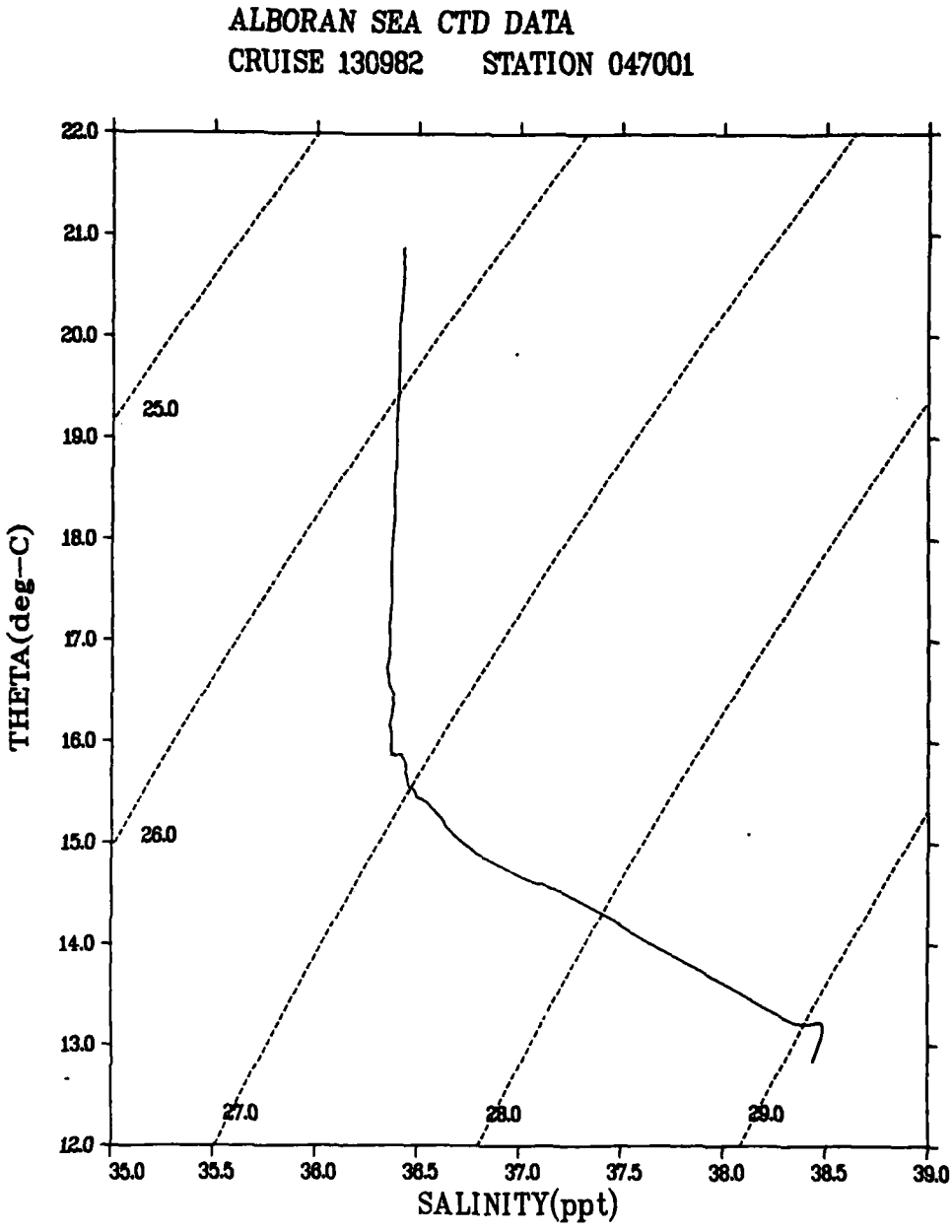

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 047001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 97

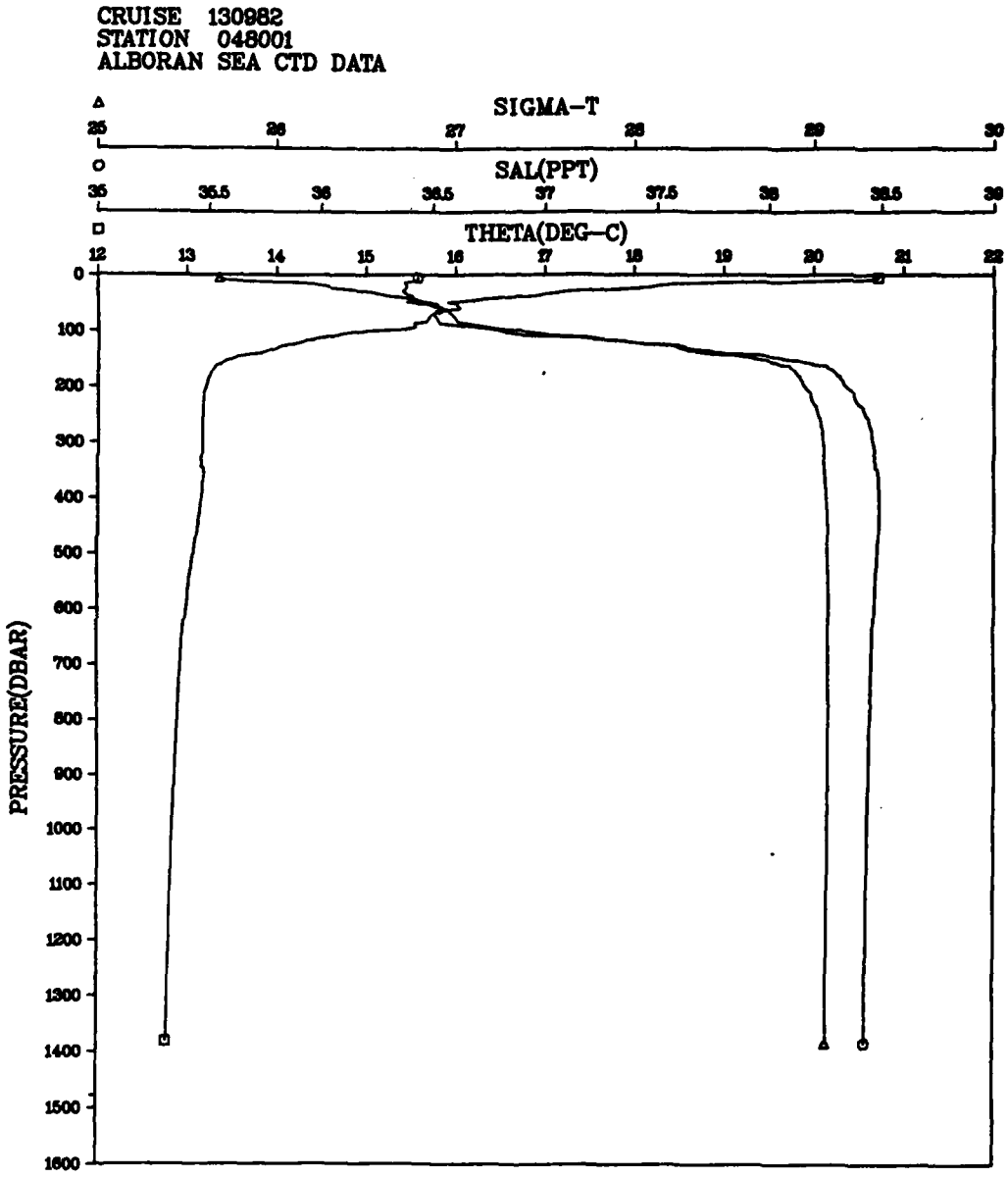

CRUISE 130982
STATION 048001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 98

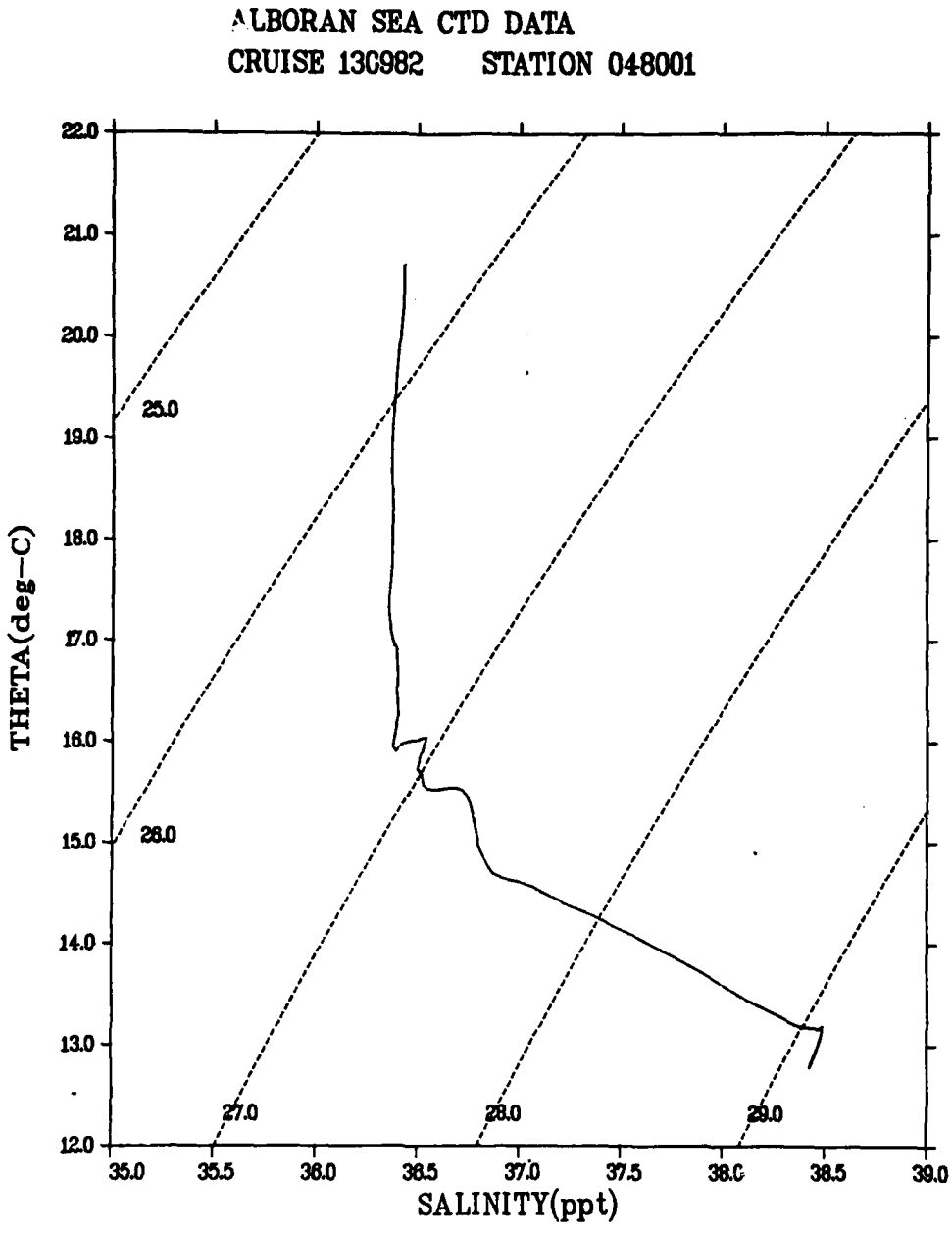

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 048001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 99

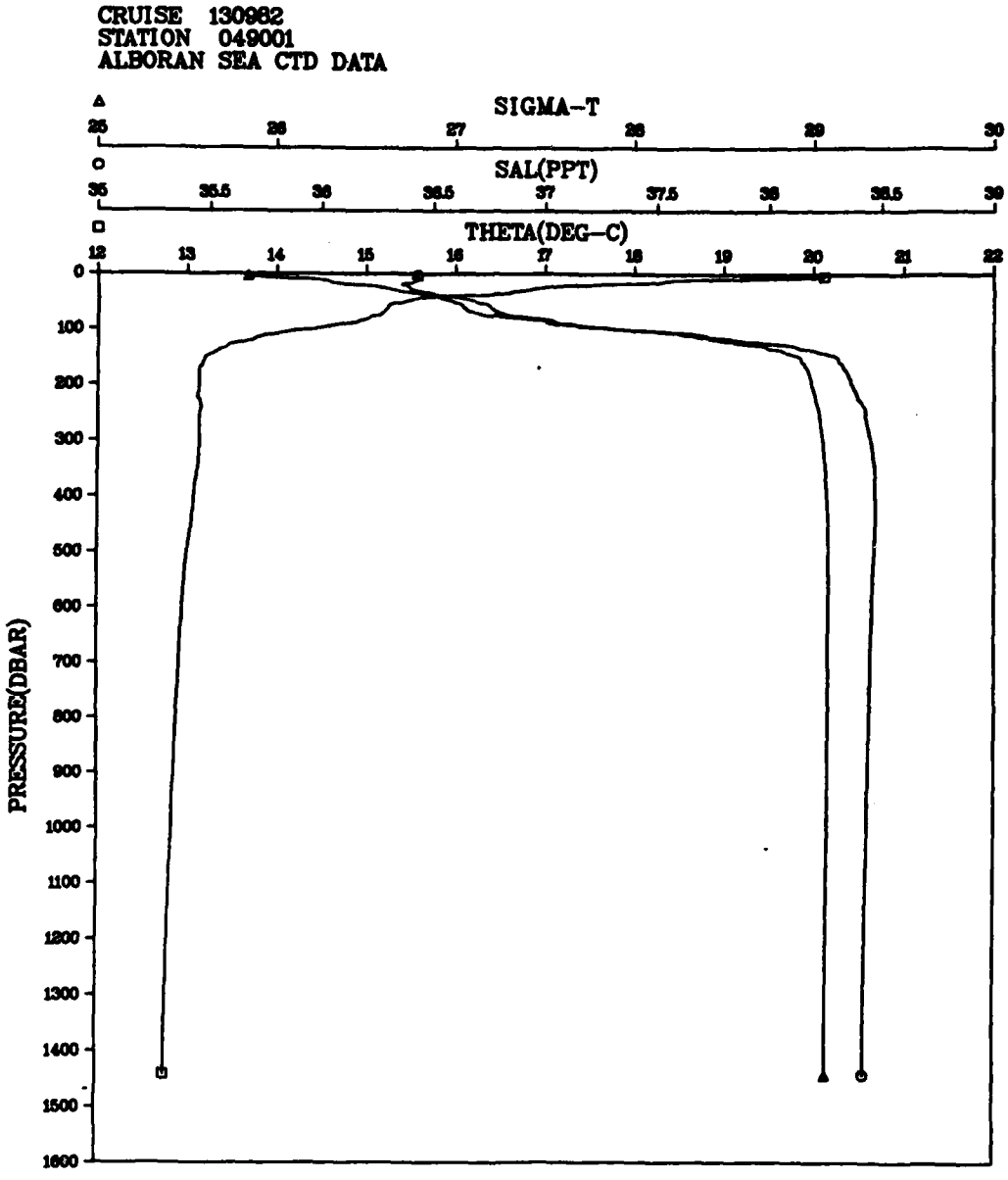

CRUISE 130982
STATION 049001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 100

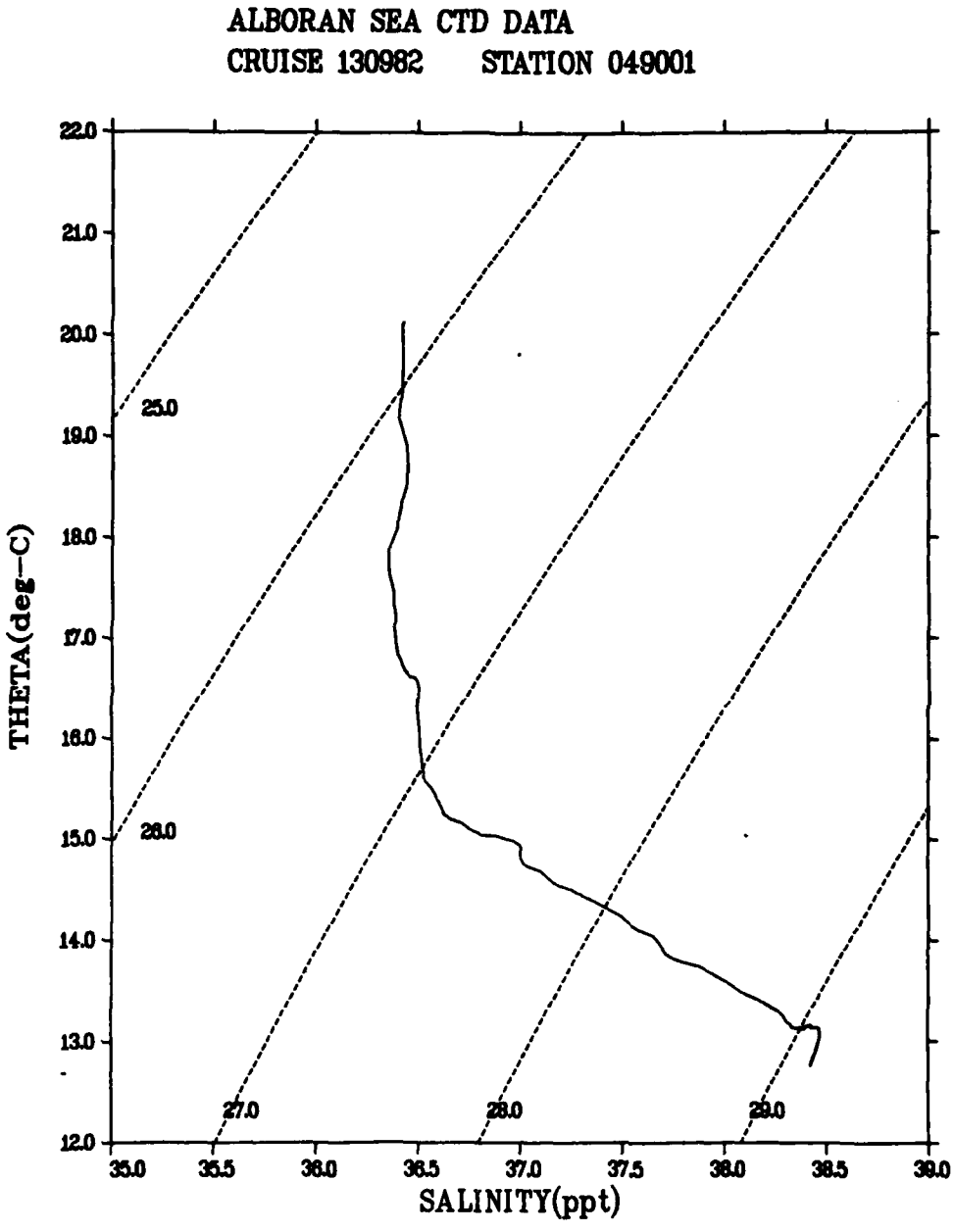

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 049001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 101

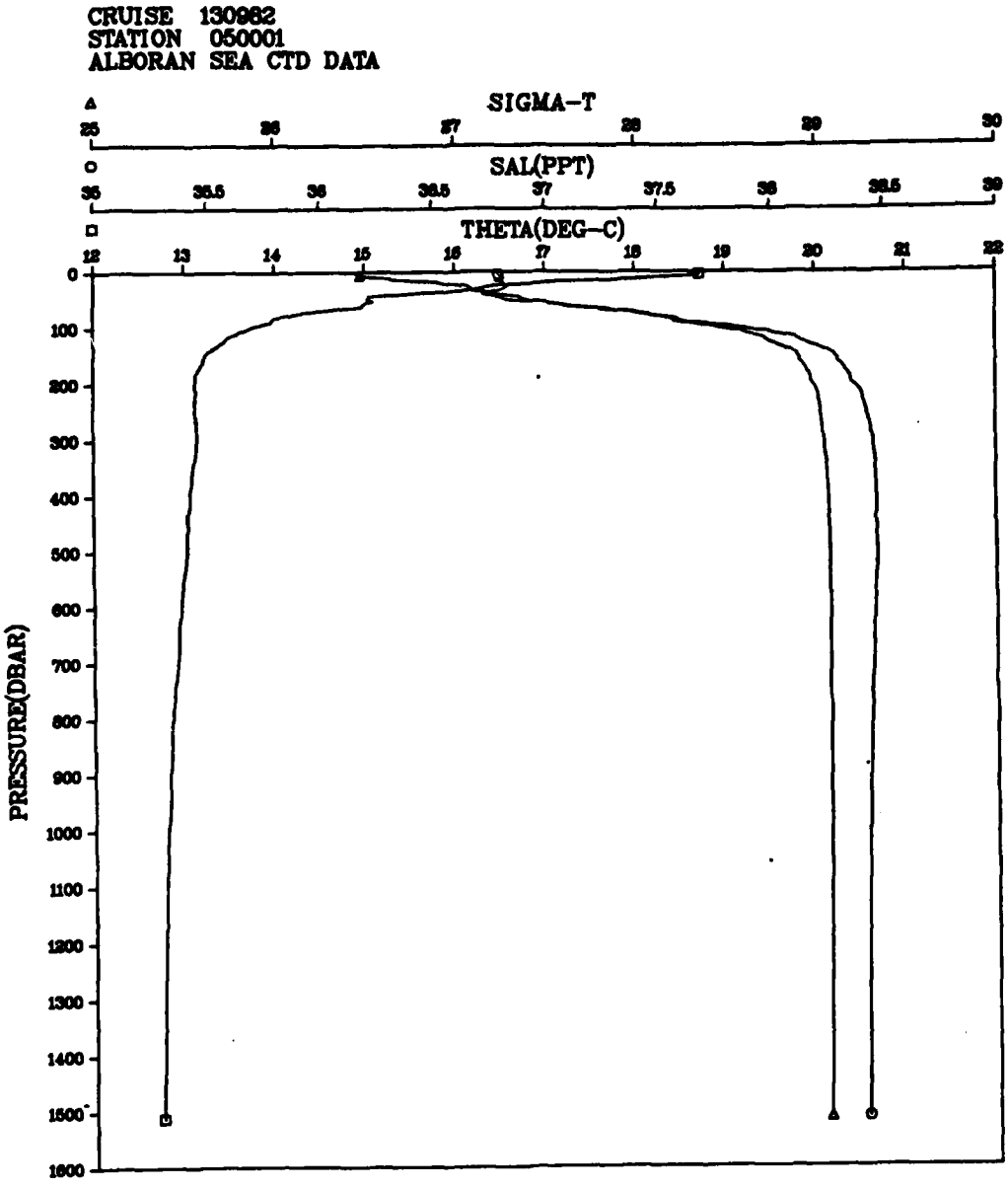

CRUISE 130982
STATION 050001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 102

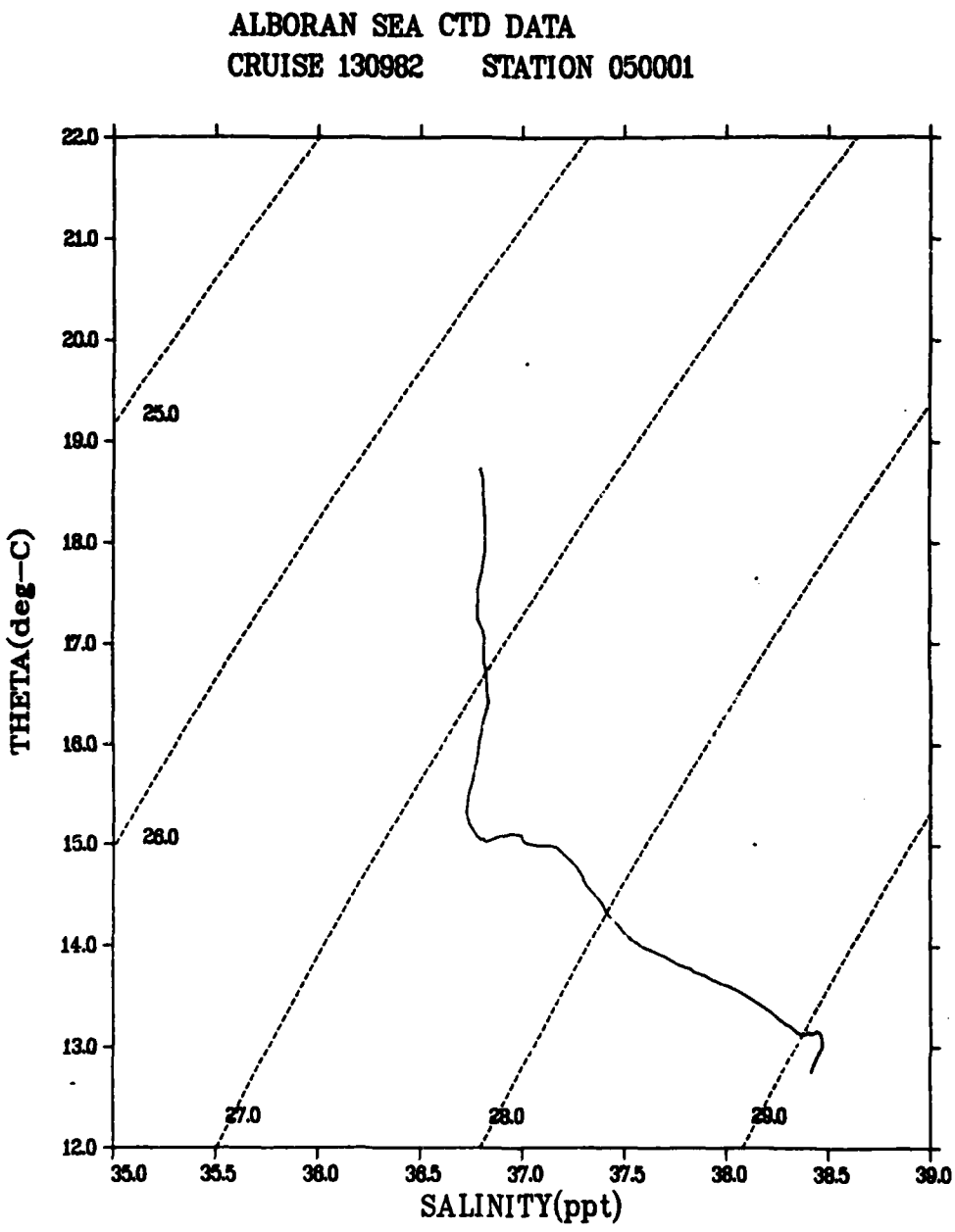

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 050001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 103

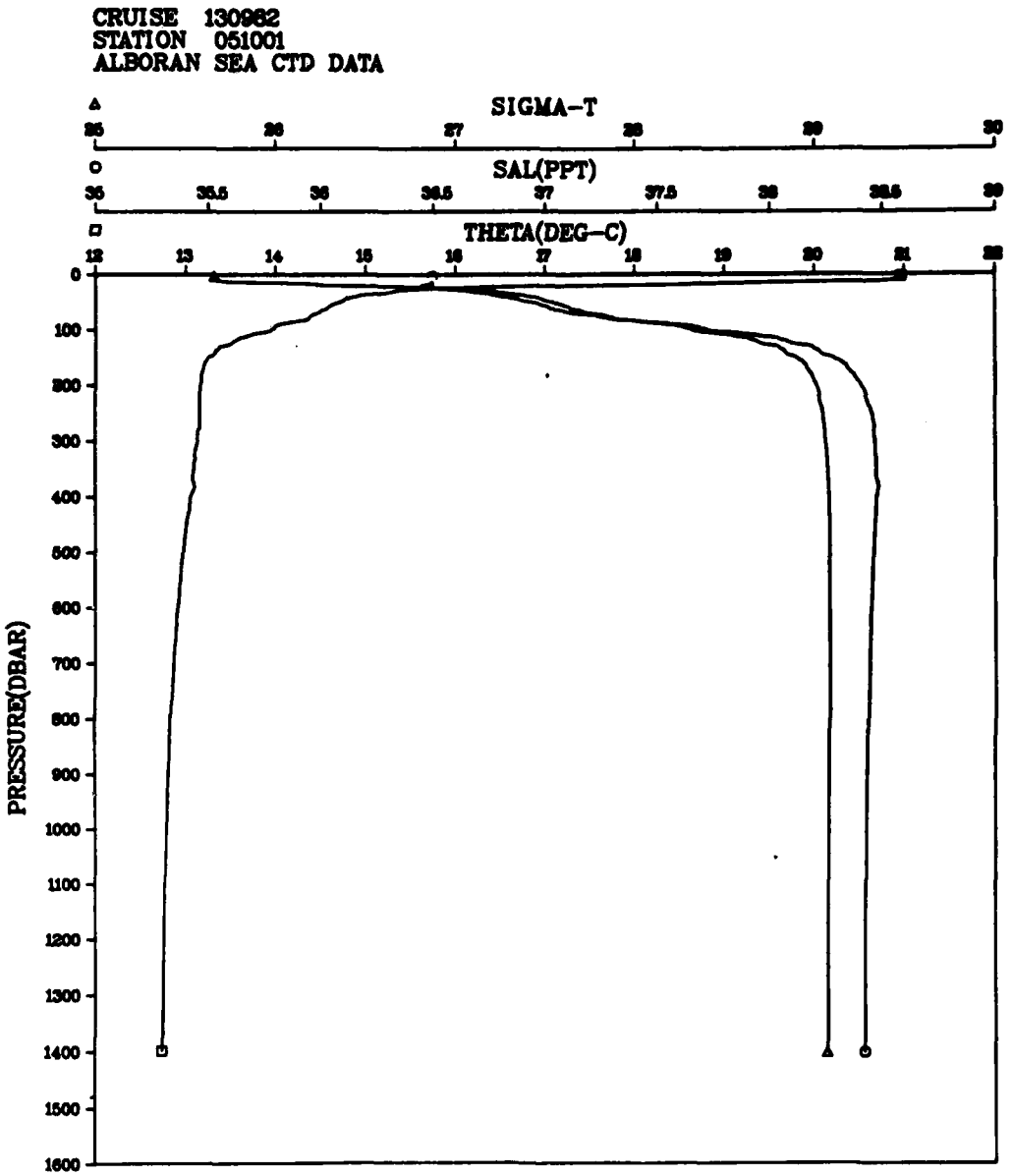
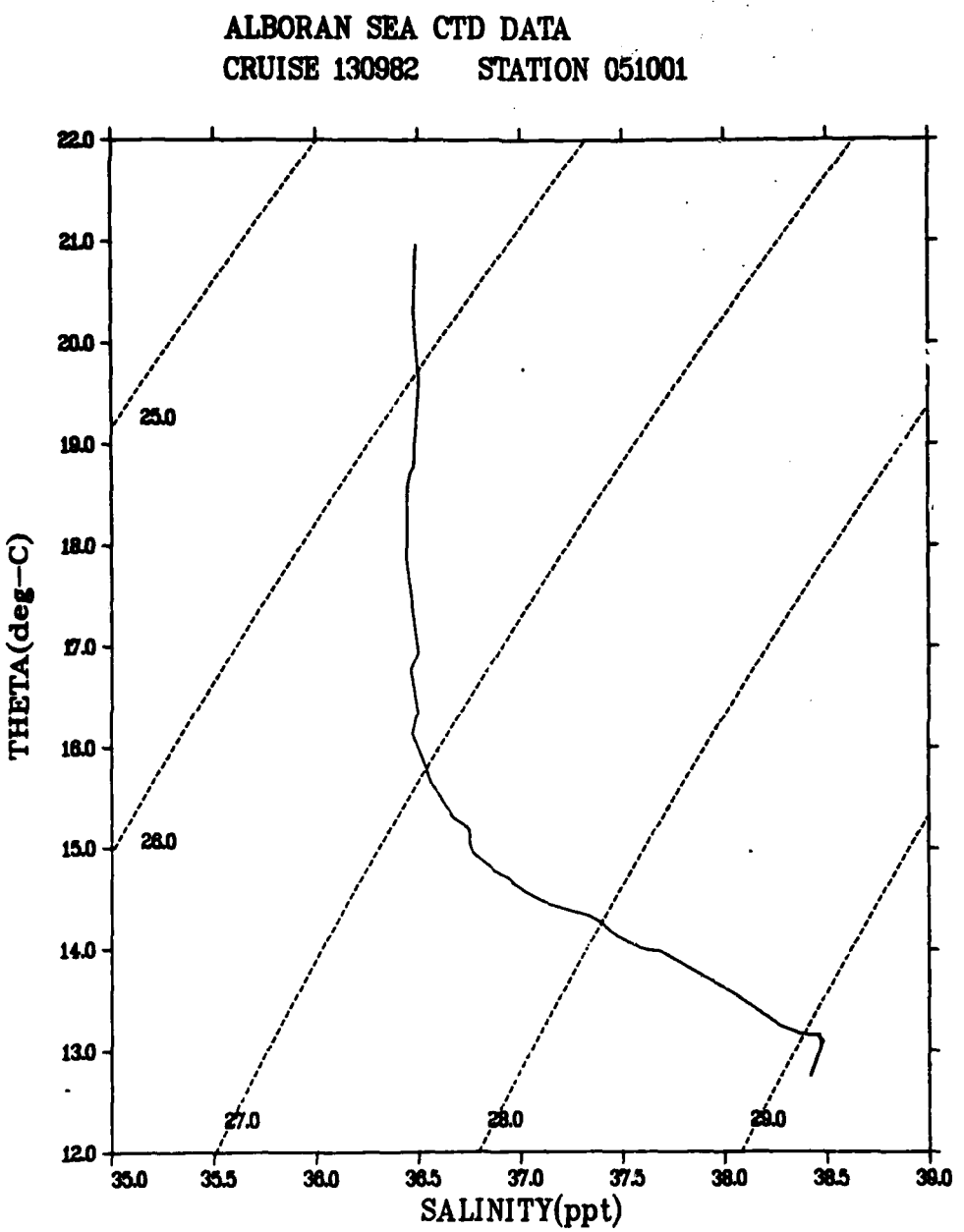

CRUISE 130982
STATION 051001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Figure 104


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 051001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
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16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 105

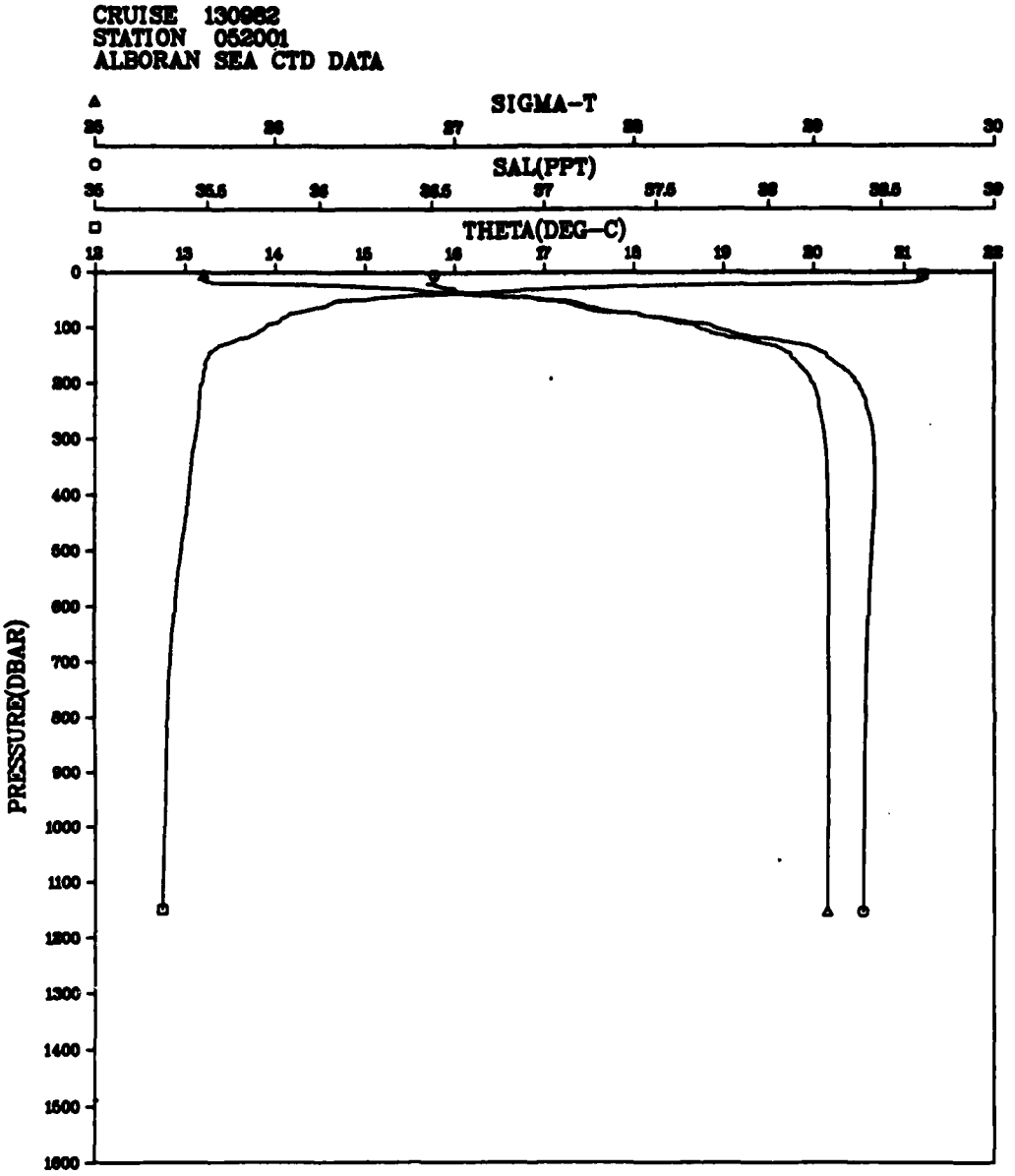
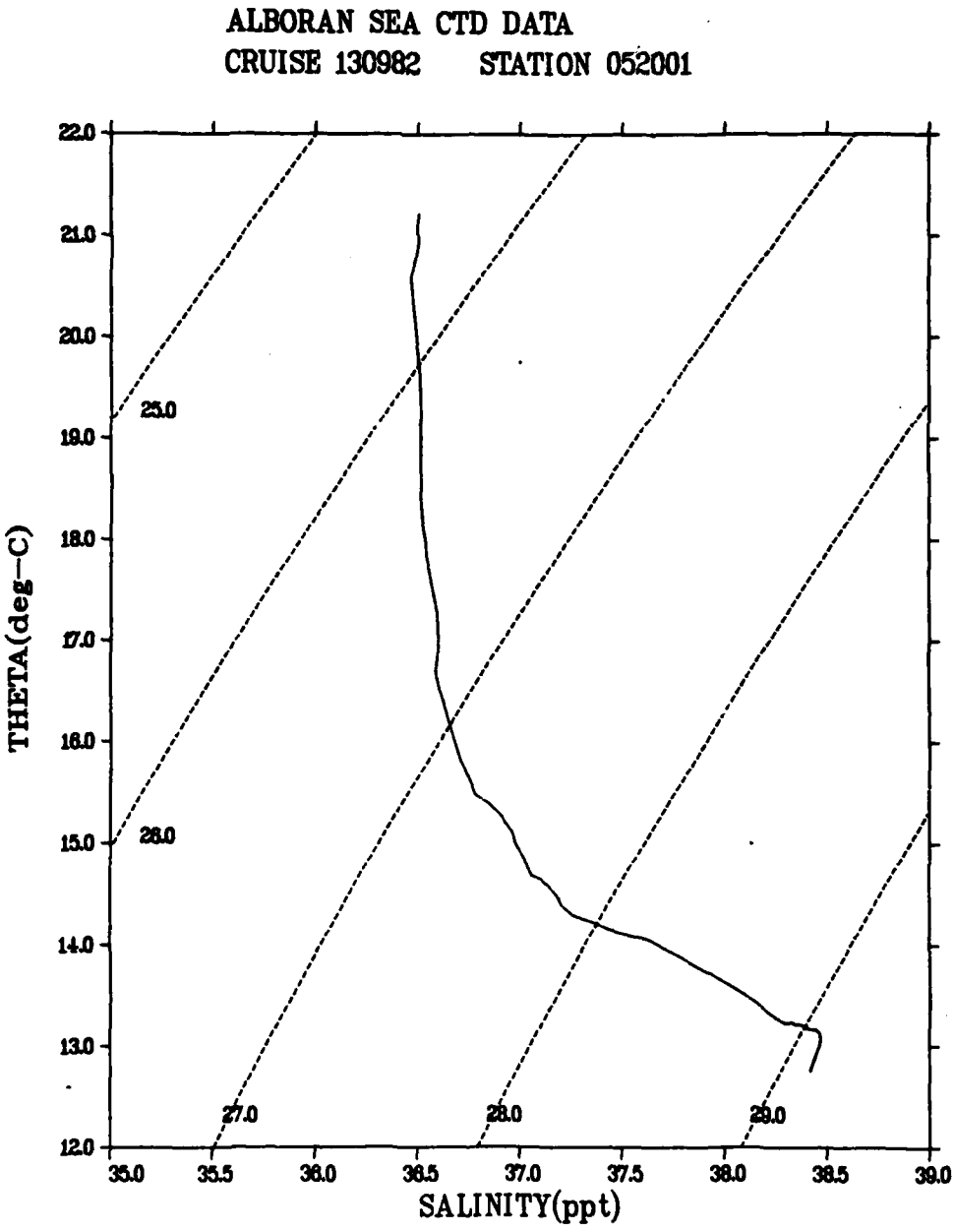

CRUISE 130662
STATION 052001
ALBORAN SEA CTD DATA
SIGMA-T
SAL(PPT)
THETA(DEG-C)
PRESSURE(DBAR)

Figure 106


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 052001
THETA(deg-C)
SALINITY(ppt)
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13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 107

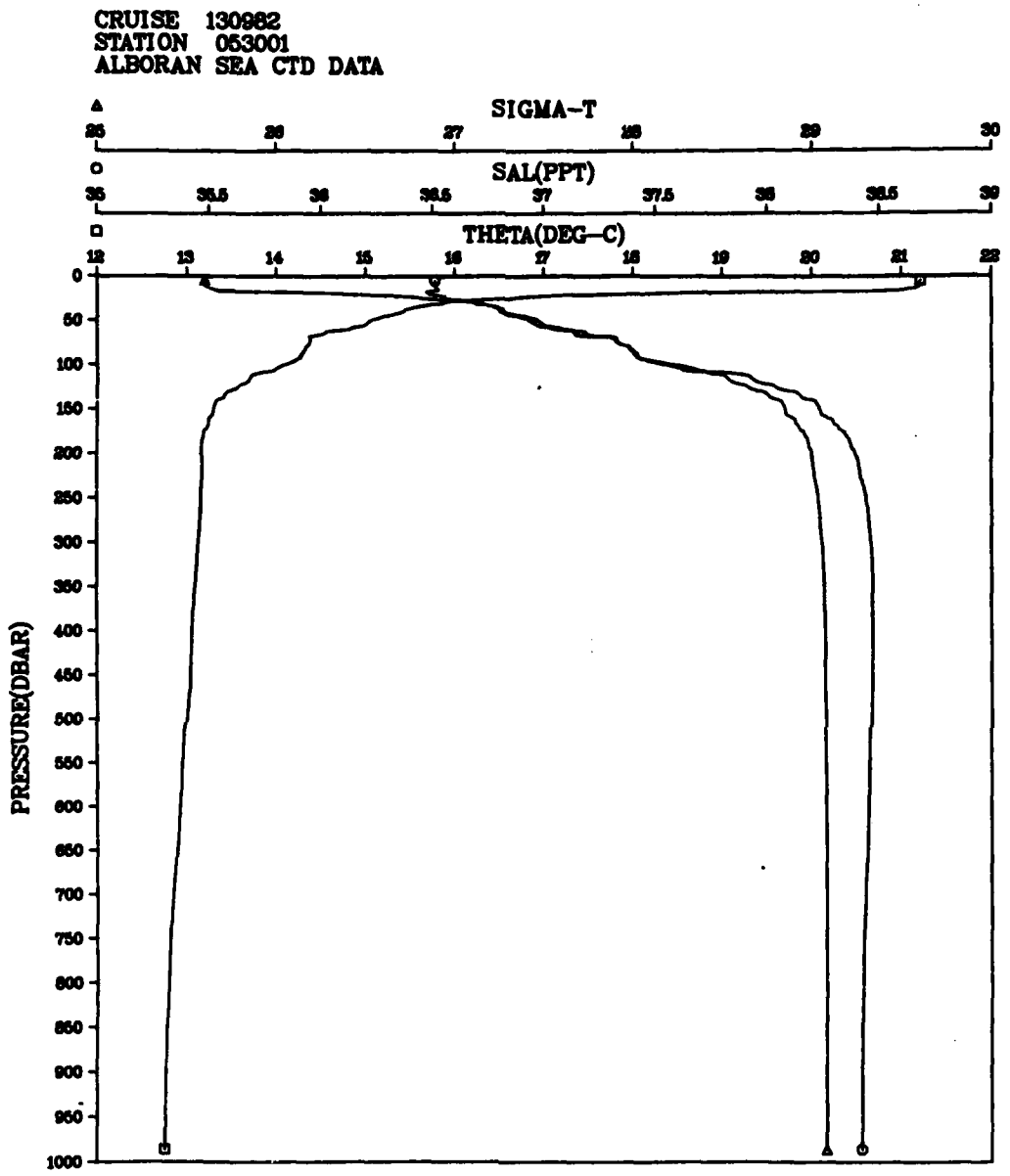
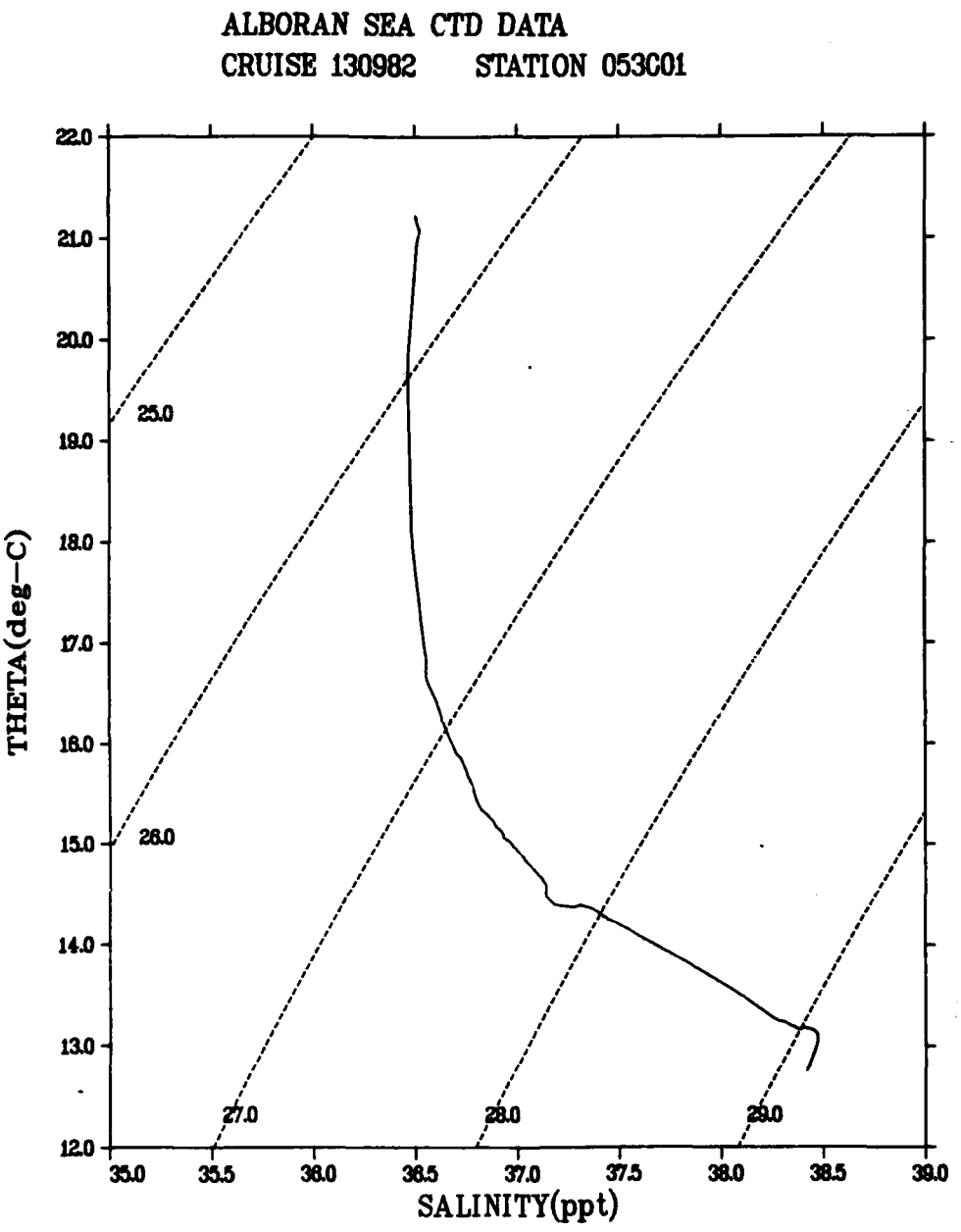

CRUISE 130982
STATION 053001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 108


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 053C01
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
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35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 109

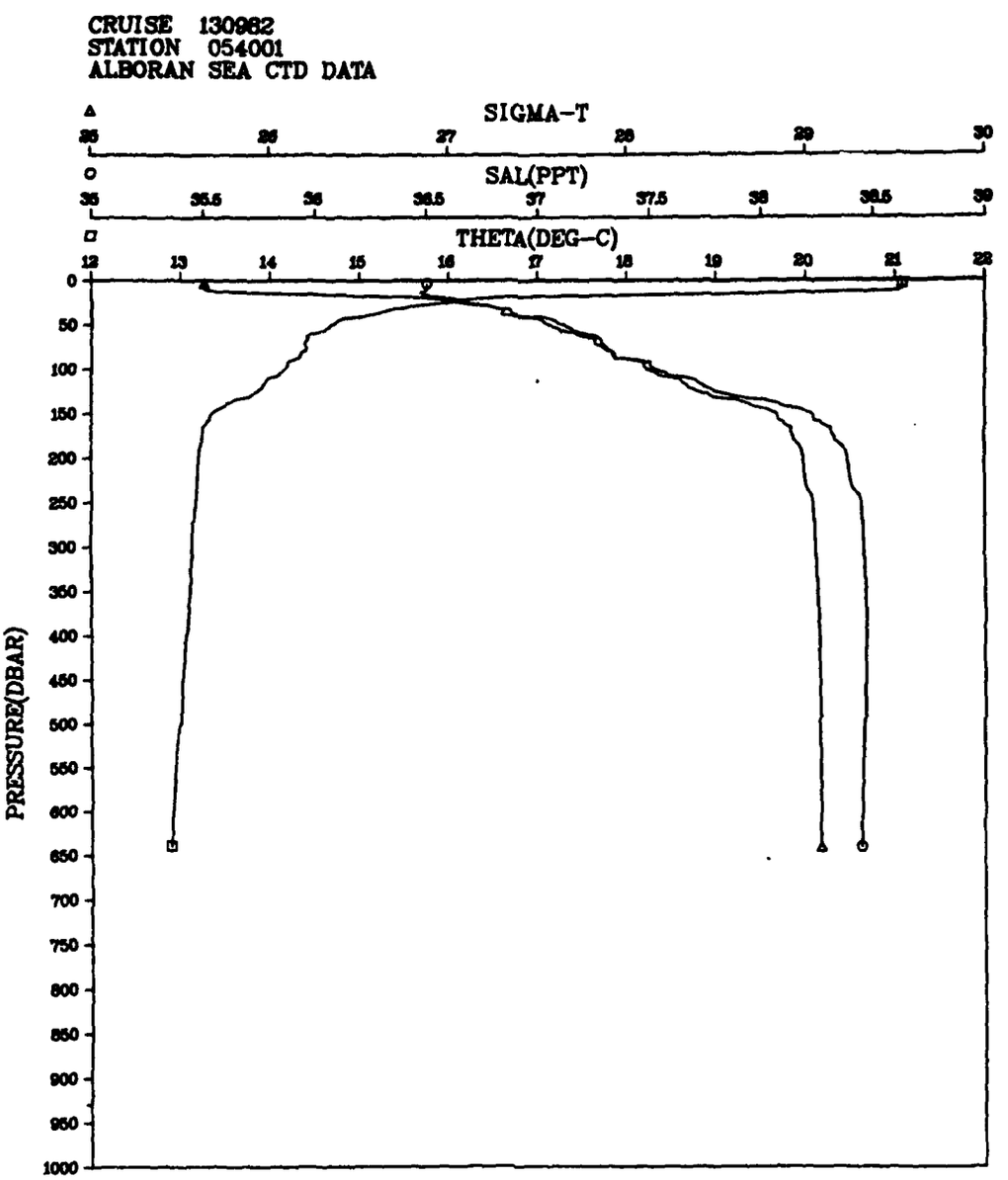

CRUISE 130982
STATION 054001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

Figure 110

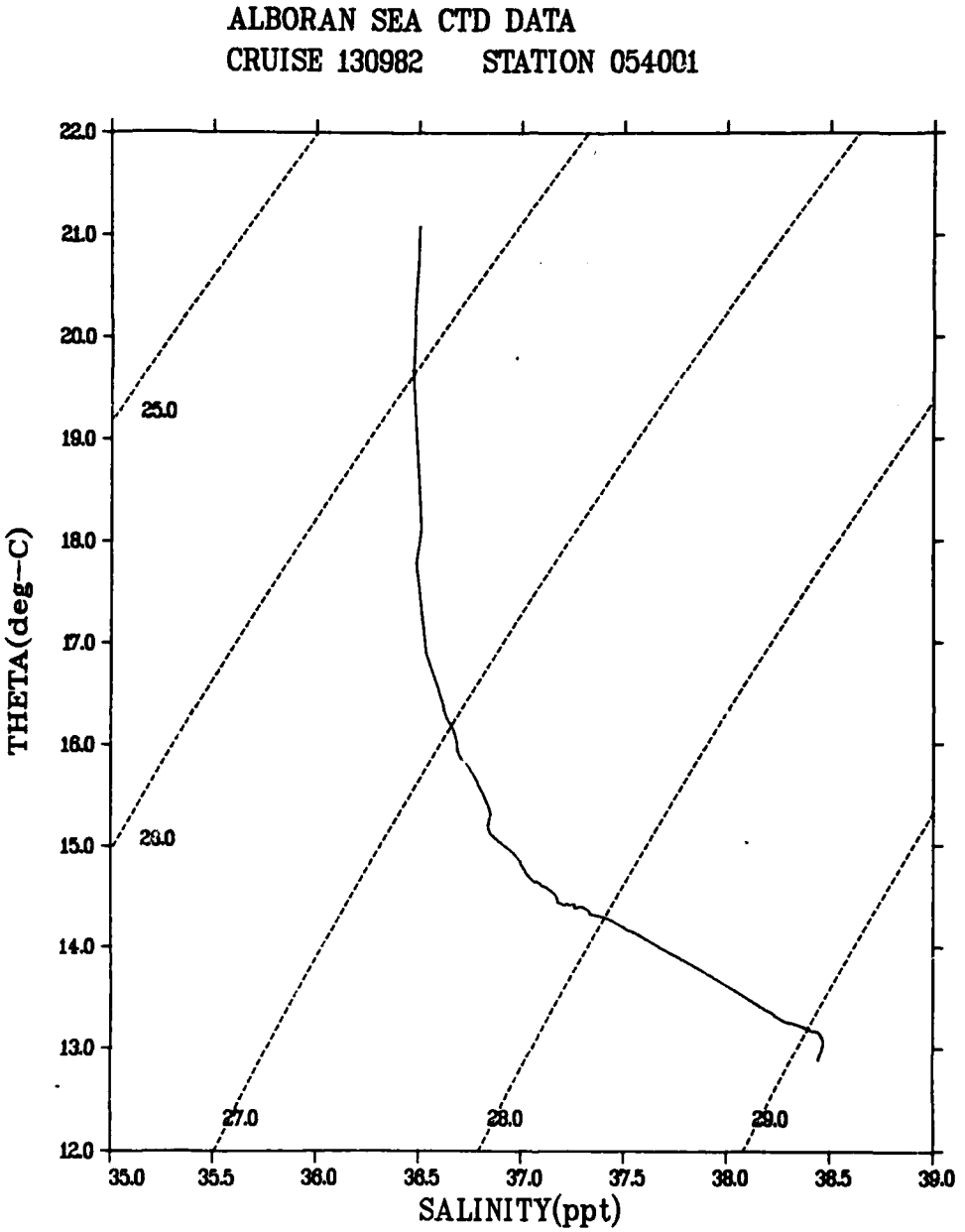

ALBORAN SEA CTD DATA
CRUISE 130982 STATION 054001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 111

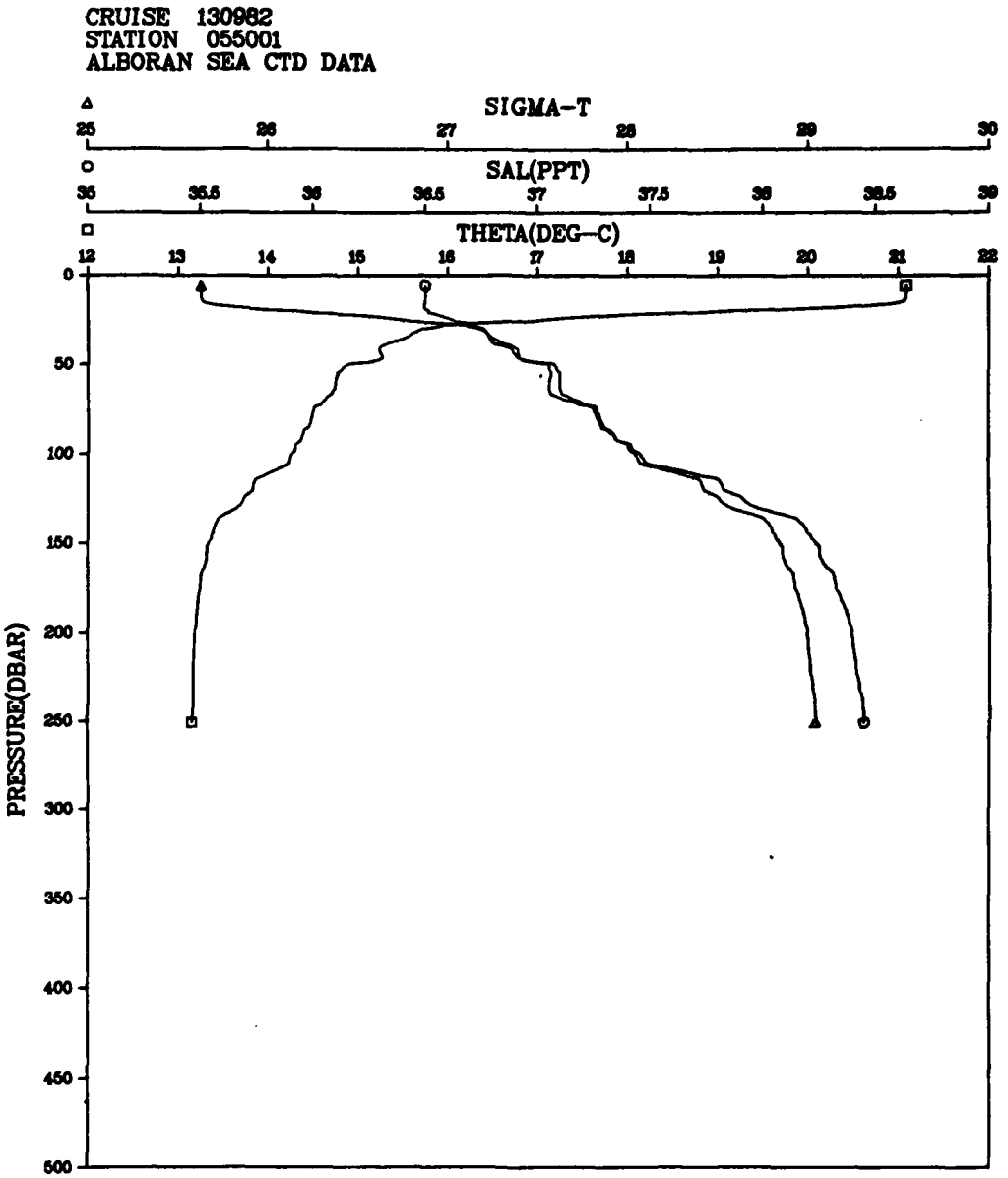
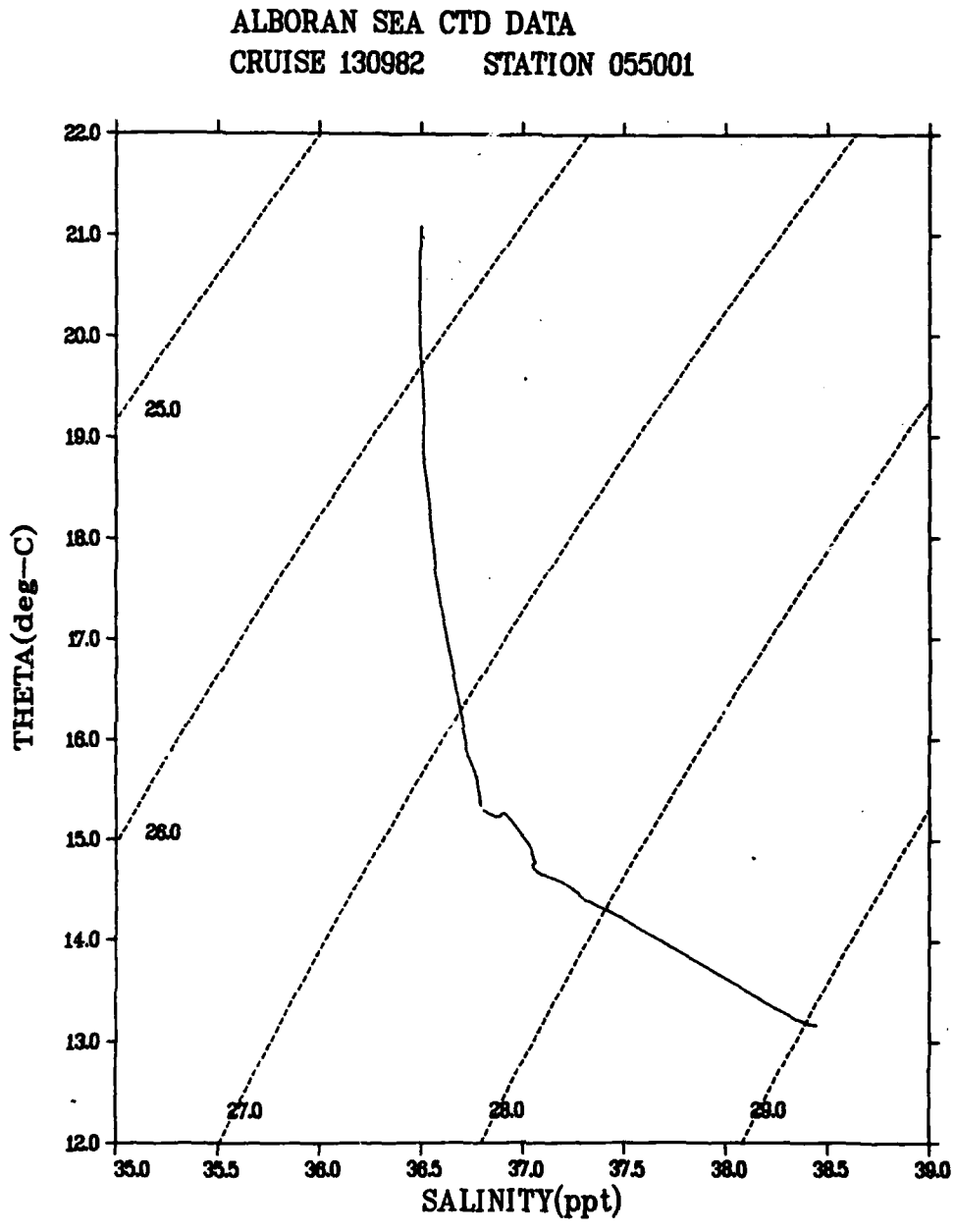

CRUISE 130982
STATION 055001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 112


ALBORAN SEA CTD DATA
CRUISE 130982 STATION 055001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
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37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 113

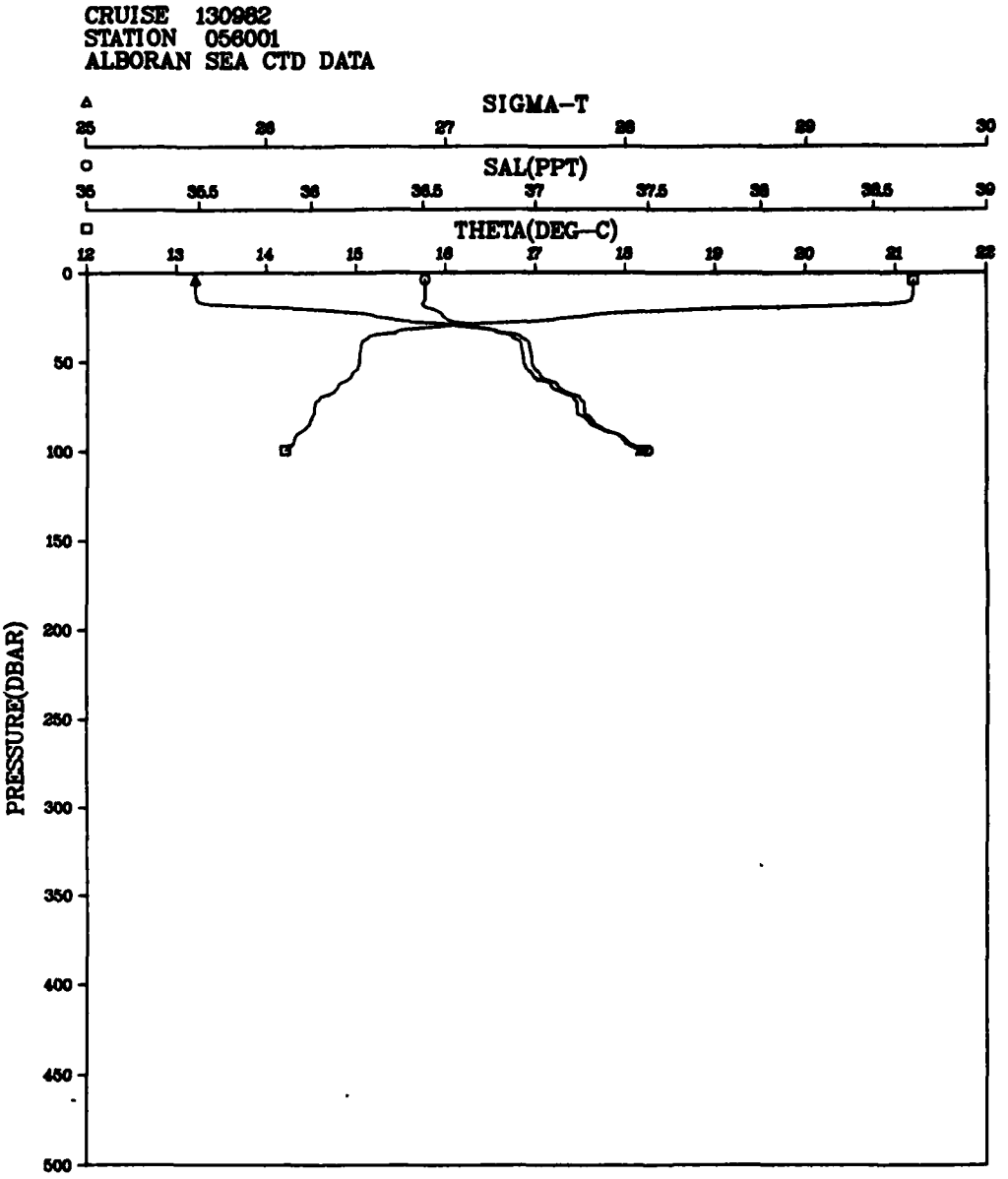
CRUISE 130982
STATION 056001
ALBORAN SEA CTD DATA
SIGMA-T
25
26
27
28
29
30
SAL(PPT)
35
35.5
36
36.5
37
37.5
38
38.5
39
THETA(DEG-C)
12
13
14
15
16
17
18
19
20
21
22
PRESSURE(DBAR)
0
50
100
150
200
250
300
350
400
450
500

Figure 114

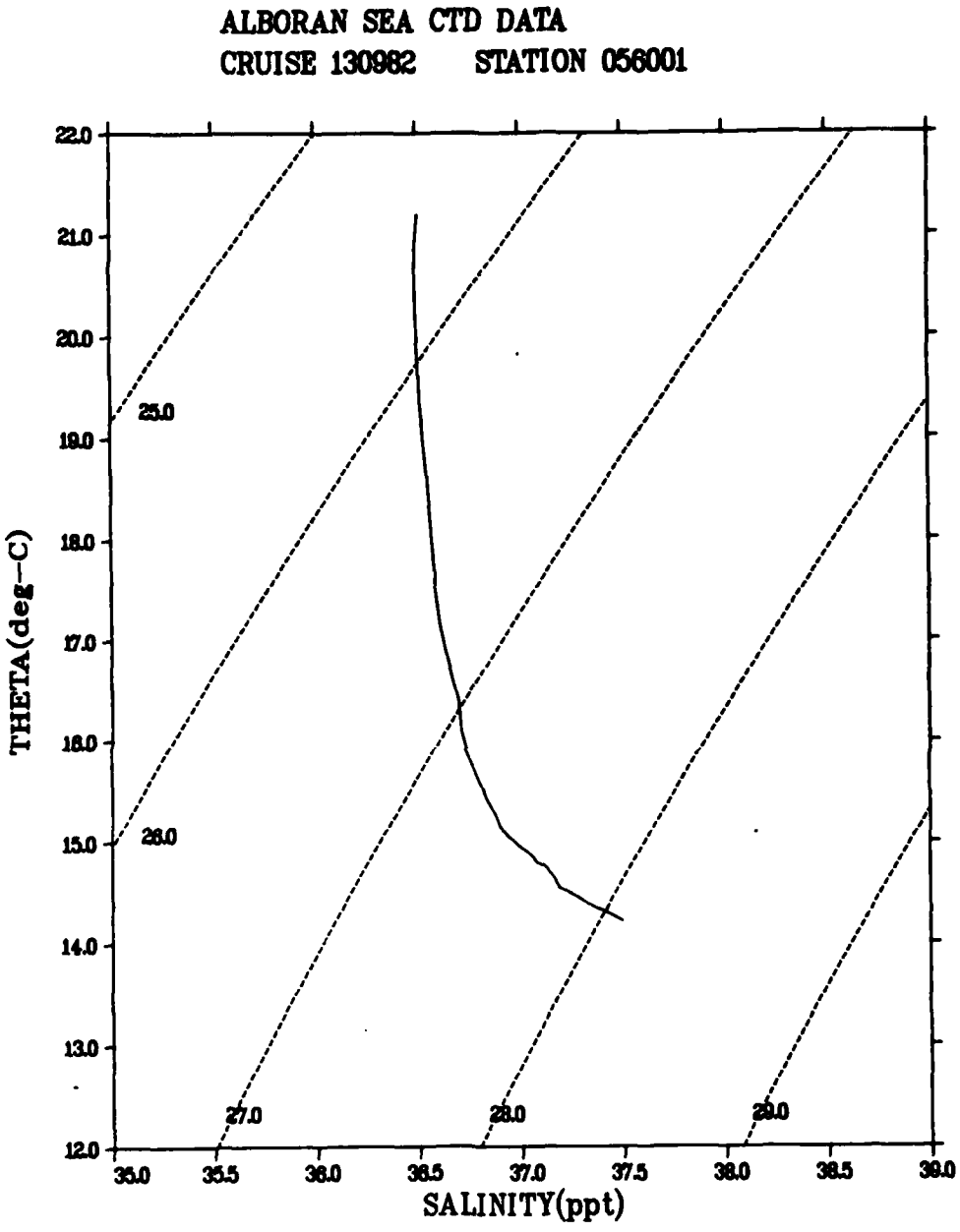
ALBORAN SEA CTD DATA
CRUISE 130982 STATION 056001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0

Figure 115

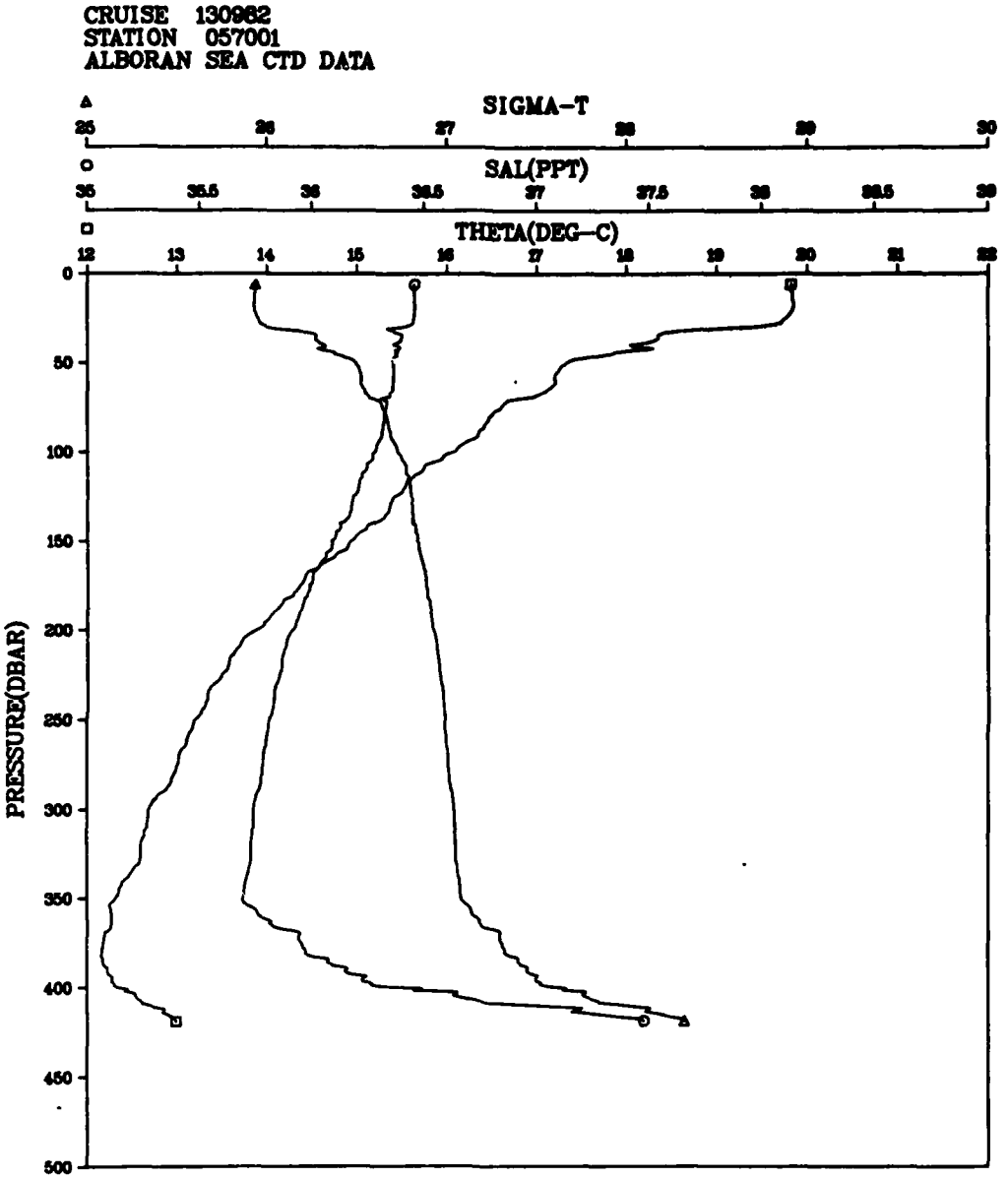
CRUISE 130962
STATION 057001
ALBORAN SEA CTD DATA
SIGMA-T
SAL(PPT)
THETA(DEG-C)
PRESSURE(DBAR)

Figure 116

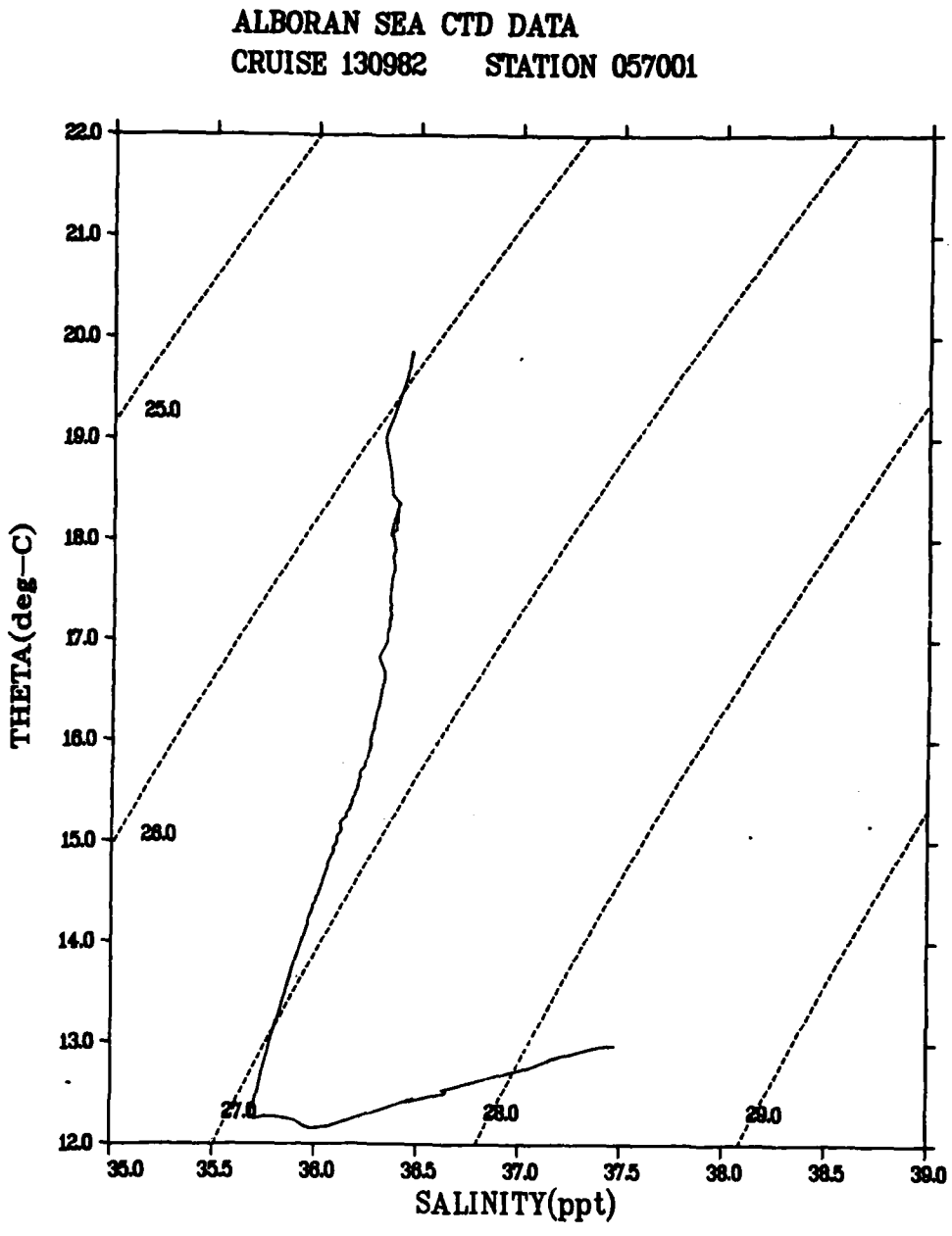
ALBORAN SEA CTD DATA
CRUISE 130982 STATION 057001
THETA(deg-C)
SALINITY(ppt)
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
25.0
26.0
27.0
28.0
29.0

Figure 117

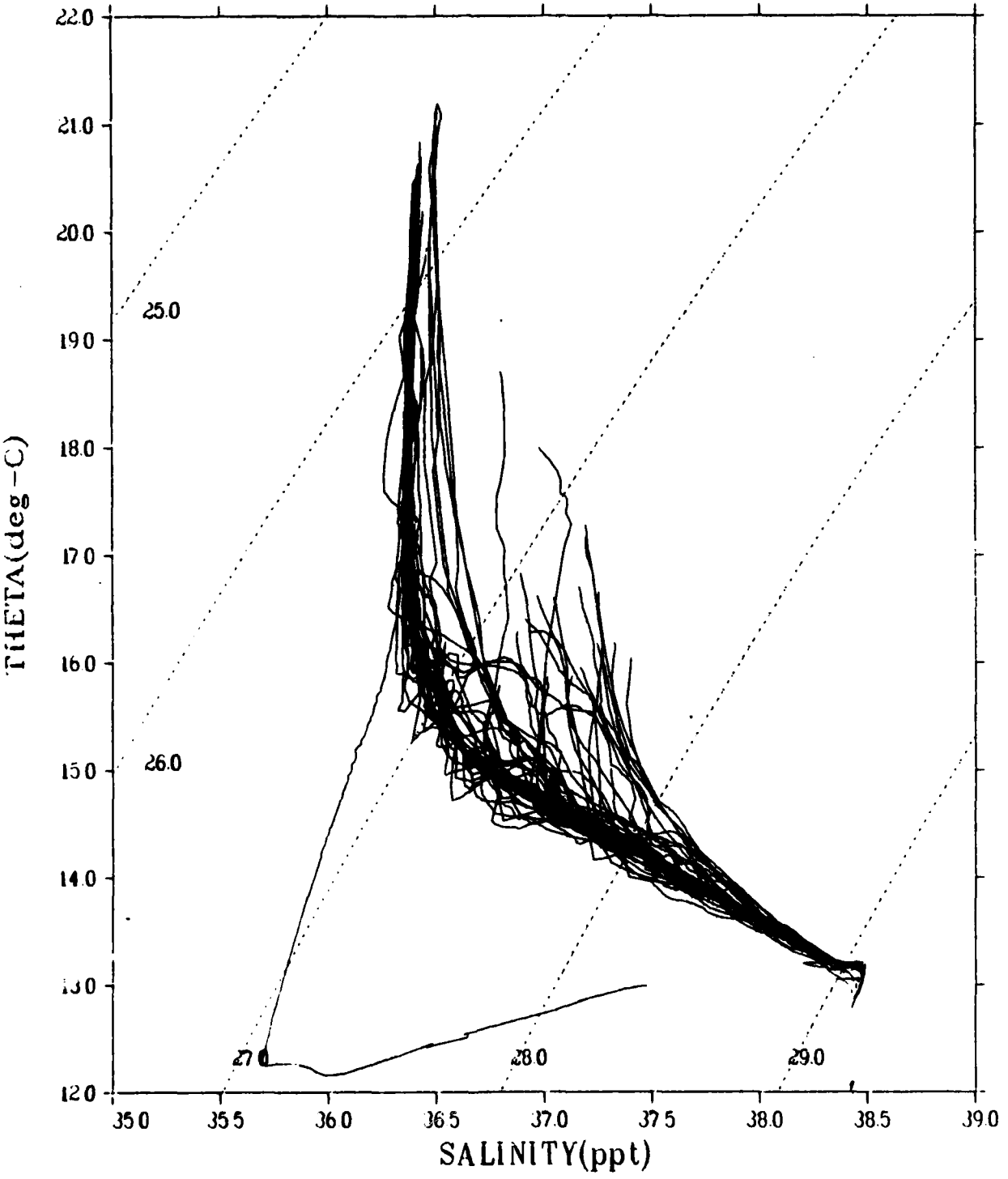
ALBORAN SEA CTD DATA
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
THETA(deg-C)
25.0
26.0
27.0
28.0
29.0
35.0
35.5
36.0
36.5
37.0
37.5
38.0
38.5
39.0
SALINITY(ppt)

Figure 118

ALBORAN SEA CTD DATA

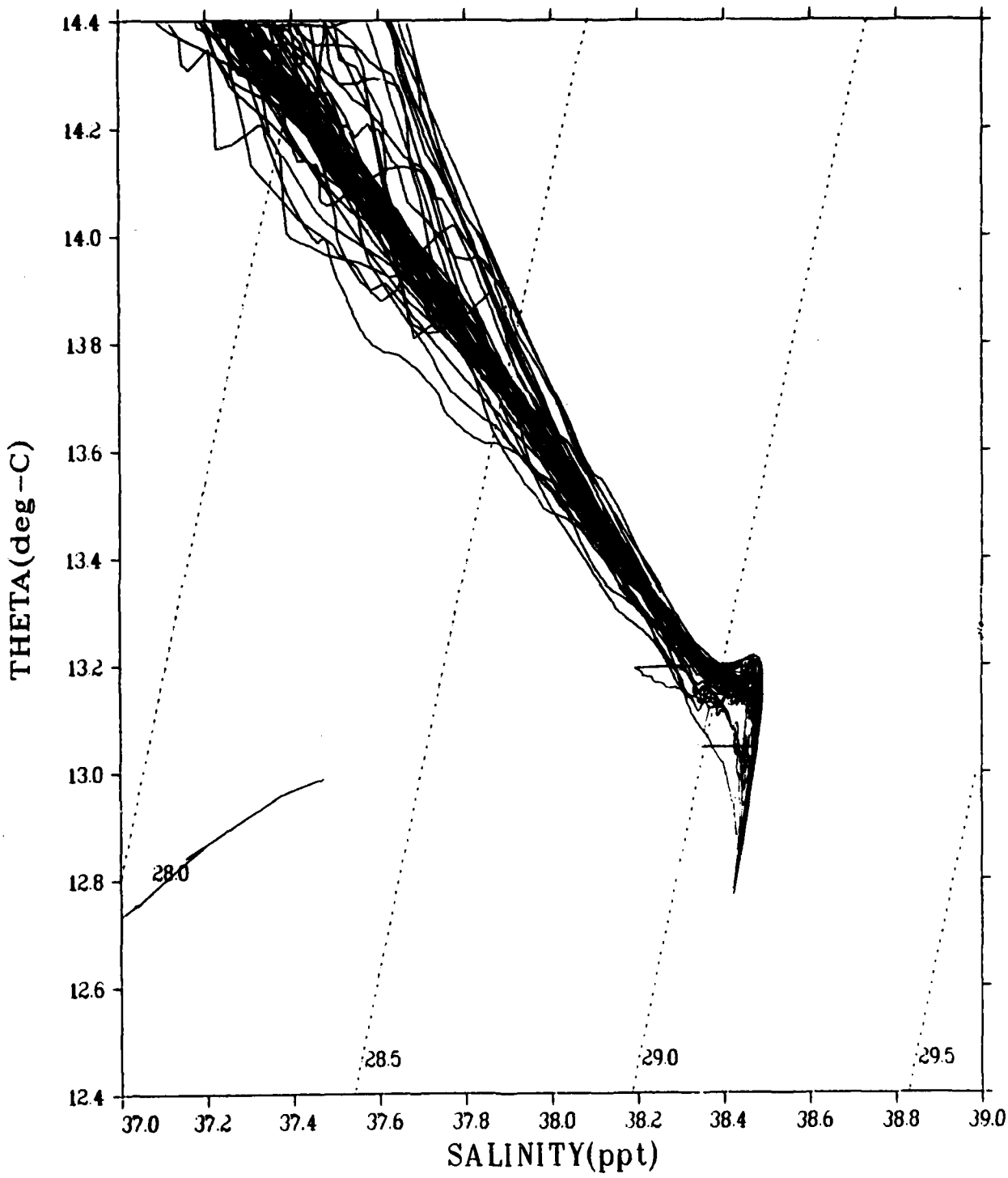

Figure 119

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During June 1982, 57 CTD stations were taken 56 in the northwestern Alboran Sea (western Mediterranean) and one in the Atlantic Ocean just west of the Strait of Gibraltar. Vertical profiles of the potential temperature, salinity, and density are presented along with the potential temperature versus salinity correlation diagrams. A comparison of CTD and water sample salinity data is presented.

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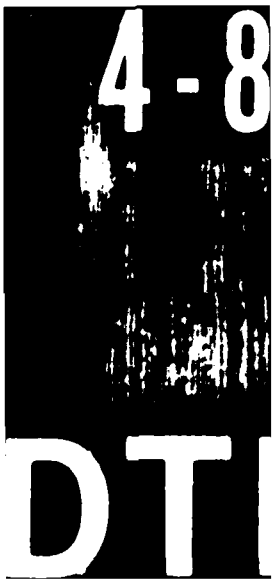
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