



Energy, Mines and
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Earth Physics Branch

Direction de la physique du globe

1 Observatory Crescent
Ottawa Canada
K1A 0Y3

1 Place de l'Observatoire
Ottawa Canada
K1A 0Y3

**Seismological Service
of Canada**

**Service séismologique
du Canada**

1985 ICE ISLAND REFRACTION SURVEY
PHASE I REPORT

by

I. Asudeh and D.A. Forsyth
Earth Physics Branch
Energy, Mines and Resources
1 Observatory Crescent
Ottawa, Ontario K1A 0Y3
Canada

H.R. Jackson
Atlantic Geoscience Centre
Geological Survey of Canada
Bedford Institute of Oceanography
Box 1006, Dartmouth, Nova Scotia B2Y 4A2
Canada

R. Stephenson
Institute of Sedimentary & Petroleum Geology
3303-33rd Street N.W.
Calgary, Alberta T2L 2A7
Canada

D. White
Pacific Geoscience Centre
9860 W. Saanich Road
Box 6000
Sidney, B.C. V8L 4B2
Canada

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Resume

Pendant le levé de sismique réfraction effectué en avril 1985 dans le cadre du projet de l'île de glace, cinq profils inverses parallèles et perpendiculaires à la marge continentale polaire au nord-ouest des îles Ellesmere et Axel Heiberg furent enregistrés. Un total de 31 tirs enregistrés par un total de 61 stations ont fourni 300 km de profils de réfraction avec un espacement de 2.5 km.

La transcription et l'arrangement des données de terrain sont maintenant terminés et les profils présentant les données de l'onde directe et de la sismique crustale sont présentés dans ce volume.

Les études spectrales de tirs d'essai enregistrés par différentes configurations de réseaux de géophones suggèrents que le nombre de géophones à chaque site d'enregistrement peut à l'avenir être réduit de 75 pour-cent.

Abstract

The April 1985 Ice Island seismic refraction survey included five reversed profiles parallel and perpendicular to the polar continental margin northwest of Ellesmere and Axel Heiberg Islands. A total of 31 shots into 61 deployments of recorders yielded 300 km of refraction line with an effective receiver spacing of 2.5 km.

Transformation of the field data to workable formats is now completed and plots of the water wave and crustal seismic data are presented in this volume.

Spectral studies of test shots fired into different configurations of geophone arrays suggest that the number of geophones in each recording array may be reduced by 75 per cent for future surveys.

1 - Introduction

The discovery in 1983 of an ice island off Ellesmere Island in the Arctic Ocean provided a new opportunity to address key geophysical questions about the structure of the Canadian polar margin and the evolution of the Arctic Ocean Basin, and to assess the dimensions of the potential sedimentary basins of the polar continental margin northwest of the Ellesmere and Axel Heiberg Islands.

A seismic refraction experiment was designed and carried out as part of the Frontier Geoscience Program in April 1985, based on an earlier proposal initiated by Weber, Forsyth, Judge and Jackson (1984).

The major participating institutes were the Institute of Sedimentary and Petroleum Geology (Calgary), the Atlantic Geoscience Centre (Dartmouth), and the Earth Physics Branch (Ottawa). The field work was conducted with the help of many individuals (see list, appendix A).

The site of the survey was limited to an operational range of about 300 km from the Ice Island base camp. The refraction profiles were oriented to sample structures along and across the margin, both on the shelf and on the shelf break. The basic refraction spreads were 60 km in length to assure resolution of the more important sedimentary layers in the basin, while shots

fired at offsets of 60, 120 and 180 km provided seismic arrivals from deeper crust and the crust- mantle boundary. The seismometer spacing of 5 km was reduced to an effective value of 2.5 km by compositing records from shots offset by 2.5 km at both ends of the profiles.

A total of 31 shots were fired into 61 deployments of receivers covering 300 km of reversed refraction line. The geometry of the survey is shown in Fig. 1. In this Phase I report, no attempt is made to interpret the data. This is currently underway and results will be made available later through reports and the scientific literature (see Appendix B).

2- Field procedures

2.1 Logistics

The Ice Island '85 refraction survey was carried out from the Ice Camp established on the Island by the Polar Continental Shelf Project, using a Twin Otter fixed wing aircraft, a Bell 205 and a Bell 206 Helicopter. The survey began with a test shot being fired into 4 differently configured geophone arrays to determine the optimum pattern and number of geophones required for future surveys. The survey itself was executed in two day cycles. In day one, up to 80 per cent of the shots were loaded, while in day 2 the rest of the shots were loaded, the recorders were deployed, all shots were fired and finally the recorders were retrieved.

6

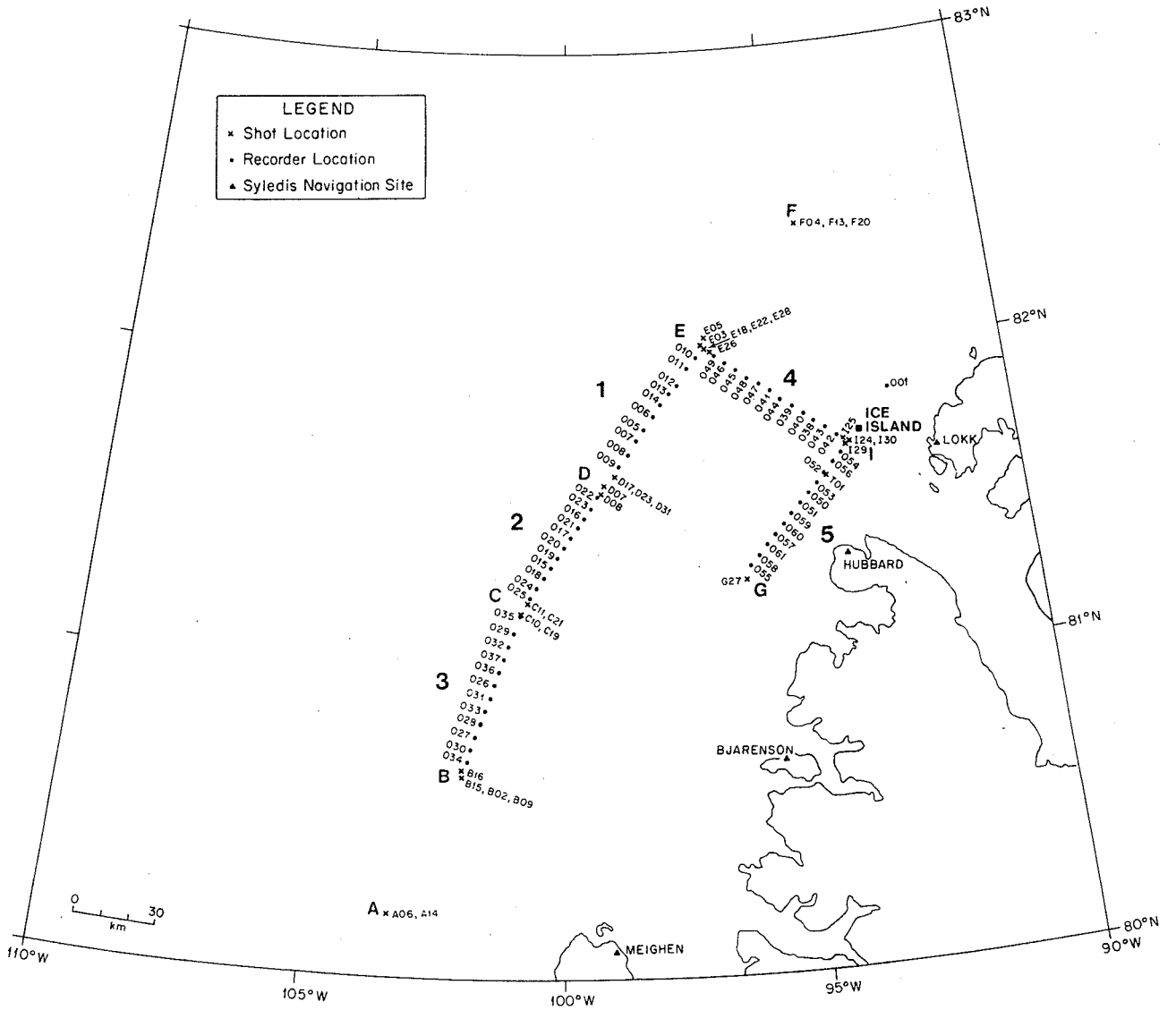


Fig. 1 - The Ice Island 1985 Refraction Survey Location Map

The seismic recorders used during the survey were the Earth Physics Branch instruments (backpacks) deployed inside thermally insulated boxes. Seismic data were recorded digitally on one or two channels at a fixed sample rate of 60 samples per second.

2.2 Navigation

The Ice Island '85 refraction survey was supported by three independent navigation systems. Dynamic navigation was achieved using signals from a land based system called Syledis. Using four land stations based at topographically high locations onshore and two mobile units stationed in the 205 and 206 Helicopters, the field crews were able to navigate to predetermined shot and recorder sites with remarkable precision. The Global Positioning System (GPS) was used to position the four land based stations. Finally, a NAVSAT navigation system was used to continuously monitor the position of the Ice Camp and shot points A and F where the Syledis coverage was poor. The three navigation systems were cross-checked on the Ice Camp when the GPS satellites were in appropriate constellation, and showed remarkable internal consistency.

2.3 Data processing on the Ice

The field parameters were continuously updated during the survey, and new shot and recorder locations were determined

routinely using a Compaq computer and specially designed software systems. Final parameters were logged daily, and due to the high quality of the navigational information, the survey geometry was known before the field crew left the Island. Field logs consisted of a shot file, a recorder file and a navigation file, which were designed as a relational data base, and later provided all necessary input for the processing and plotting of the seismic refraction data. All of the tabulated information printed in this report was derived from the logs that were printed on the Ice Island and distributed among the participants. The recorder log file showing the seismic recorder's statistics is given in Table 1.

2.4 Instrument malfunctions

The field crew of the Ice Island '85 refraction survey experienced instrument malfunctions not normally expected even in harsh Arctic environments. Practically every electronic instrument failed at least once and the technicians made remarkable efforts to repair them using the limited resources available.

The seismic recorders, particularly, had problems during the earlier stages of the experiment, resulting in inadequate coverage for profile DE (line I01). The reason for the backpack malfunctions has not been determined. The overall success rate as shown in Table 1 was about 81 per cent, which is usually considered acceptable for an Arctic expedition.

The shooter boxes failed to detonate charges electronically for shots D07, D08, C10, C11, B15, C19 and C21, resulting in poorly determined shot onset times. However, the shot times were later improved using water wave information.

3- Data processing

3.1 The new EPB seismic refraction processing system

The refraction seismic processing capabilities of the Earth Physics Branch have greatly improved due to the more extensive use of the in-house computing facilities and newly developed software systems. Based on a new format for storing data introduced by the University of Toronto (Northey and West, 1985), a variety of subroutines have been written to facilitate transformation of data from a field to a final work format, referred to here as the Toronto format, and to apply further processing before producing plots of the seismic sections. The computer systems are designed to accommodate any late modification to the survey parameters, such as changes in a shot location, by updating the Toronto format files.

3.2 The naming conventions

During the field survey, the shot points were given names based on their locations and the order they were fired. Repeated shots at the same shot points were given the same names. This naming scheme, though convenient in the field, is not desirable for our automated data processing systems. New

names were given to shots based on: a) the shot points (e.g. A, B etc) they were fired at, and b) the sequential order in which they were fired. For example, shot D07 is the seventh shot of the survey and was fired at shot point D.

The recorder sites were named sequentially in the order they were occupied. For example, the first site used to record the test shot was named 001, and the very last site of the survey was named 061.

The five refraction sections of the survey were named DE, CD, BC, IE and IG and were given line numbers I01, I02, I03, I04 and I05 respectively. The test shot was recorded at a single site only, but for processing convenience, this site was given a section name of TS and a line name of I00. This naming convention is used throughout this document.

3.3 Processing of the Ice Island data

3.3.1 Time corrections

Before the seismic refraction data can be processed, the shooter box and the backpack clock corrections must be applied to the data. In addition, a 16.1 ms delay must also be applied to all shot times to account for the time of travel of shock waves through the 100 meters of primacord that was used to detonate the charges.

The shooter box and backpack clocks were routinely rated against a master clock which was in turn checked against the standard time signals daily. The time corrections for the

backpack clocks are summarized in Table 2. The combined clock correction and primacord delay for all shots are given in Table 3. The time corrections have not been incorporated in the refraction data analysis yet, however they will be applied to the final composite seismic sections.

3.3.2 Water wave data

Although the navigation systems deployed during the Ice Island '85 refraction survey were adequate for accurate positioning of the shot and recorder sites, recording windows were designed to record many seconds of water wave data from each shot. This proved to be useful both for cross-checking the navigational fixes and for making time corrections to shots that were fired manually due to instrument malfunctions.

The water wave data for shots 2 to 31 are shown in Fig. 2A to 31A (Appendix C). For shots fired electronically, no additional correction to the shot time was required as it was confirmed by the zero intercept time of the first arrival water waves (see, for example, Figs. 2A, 13A, and 25A; Appendix C). For manually fired shots (D07, D08, C10, C11, B15, C19 and C21) the shot times were adjusted to a zero intercept for water wave first arrivals. Shot times corrected using this method have a resolution better than ± 0.1 second since the first arrival water waves could be easily identified on all records.

A close examination of water waves showed that the Syledis positions for receiver sites 041 and 059 were slightly in error.

New locations were estimated for these sites based on water wave arrivals. The final positions of all shots and recording sites are given in Tables 3 and 4 and shown in Fig. 1.

3.3.3 NAVSAT data

The survey geometry as shown in Fig. 1 is based on Syledis navigational information for all shot points except for A, B and F where Syledis coverage was poor and NAVSAT data had to be used. Provisional NAVSAT data available in the field were used in Fig. 1. The final NAVSAT data as processed by the Geodynamics group of the Earth Physics Branch is given in Table 5. Incorporation of this data will make minor changes to the position of shot points A, B and F shown in Table 3. This data will be used in the Phase II analysis of the Ice Island refraction experiment.

3.3.4 Seismic sections

The survey information given in Tables 3 and 4 was used to find shot to recorder distances and azimuths required for constructing refraction sections. The final seismic refraction sections for shots 2 to 31 are shown in Figs. 2B to 31B (Appendix C). Detailed information relevant to each section is given in accompanying tables.

4 - Test shot evaluation

During the Ice Island '85 refraction survey, four different

geophone array configurations were tested in order to examine the effects of ice and seismic noise and to find an optimum configuration for future experiments. A linear array of four L-15B geophones connected in series at 15 m spacing was used as a basic configuration and named the 1*4 array. A test shot was fired at a distance of 38.81 km from the test site where four channels on 3 backpacks were used to record 1*4 (linear), 2*4 (cross), 3*4 (star) and 4*4 (star) geophone array configurations. Spectral analysis (see, for example, Jenkins and Watts 1969, Otnes and Enochson 1972) of data recorded from this test shot are shown in Figs. 32A to 32H (Appendix C). The greater number of geophones in the 4*4 array do not show significant increase in signal energy at frequencies above 15 Hz (see Fig. 32H). At lower frequencies, the 1*4 array shows higher signal energy but this is due to a higher instrument gain rather to a preferred geophone configuration. In general, the 1*4 array is probably as useful as the 4*4. For future surveys the 1*4 configuration may be adequate and should provide good signal to noise ratio for similar conditions. Throughout the current survey, however, a 4*4 array of geophones was used.

In addition to the test shot described above, shots E22, D23, I24, I25 and E26 of line I04 were also recorded on two different geophone configurations at site 038. In this case, as well as the standard 4*4 channel, a 1*4 string of geophones was also recorded on a second channel, where the geophones were

deployed on four corners of a square as opposed to a linear shape array. The results of this test are shown in Fig. 33(A,B and C) through 37(A,B and C, Appendix C). Here again, a 1*4 configuration appears to be adequate although in this case the standard 4*4 array yielded more energy in the high frequency band.

5 - Summary

The phase I processing of the Ice Island 1985 seismic refraction data was presented in this report. Transformation of the field data to workable formats is now completed and the Phase II analysis is underway.

Successful navigation has greatly enhanced the quality of the Ice Island data, and new computing systems have been developed to accelerate data processing while minimizing data transformation efforts.

Spectral analysis of test shots presented in this volume suggest that the number of geophones in each recorder array may be reduced by 75 per cent for future Ice Island refraction surveys.

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Otnes, R.K. and Enochson, L. 1972, Digital Time and Series Analysis, John Wiley & Sons, New York.

Jenkins, G.M. and Watts, D.G. 1969, Spectral Analysis And Its Applications, Holden-Day, San Francisco.

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Table 1, part 1 of 2.

Backpack Performance Log

ICE ISLAND REFRACTION SURVEY 1985	BACK PACK LOG	APRIL 19-30, 85
Isa Asudeh	Sept. 85	Last version
Statistics:		
Total number of possible recordings	363	
Total number of successful recordings	293	(80.7%)
Number of backpacks failed to record due to:		
dead backpacks	41	
backpacks not deployed	12	
small shot size	7	
late deployment	6	
incorrect cable connection	4	
Total number of unsuccessful recordings	70	(19.3%)

backpack codes:

* recorded data
n not deployed
c cable connected to a dead channel
d dead backpack (failed to record)
l late deployment, missed shot window
s shot too small to be recorded.
blank not applicable

navigation codes:

N NAVSAT fix
S SYLEDIS fix

other codes:

st shot
sn refraction section
sp shot point
fix navigation fix
window start time of recording
dur length of recording

Table 2, part 1 of 2.

Backpack Clock Corrections

bpl0				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
108 3:20	108 21:51	18.5	0.001	0.05
108 22:21	109 3:13	4.9	-0.004	-0.82
110 6: 6	112 3:37	45.5	-0.047	-1.03
115 11:54	116 4:22	16.5	-0.016	-0.97
118 11:36	118 23: 2	11.4	-0.011	-0.96
119 18:33	120 4:35	10.0	-0.010	-1.00
bpl1				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
108 22:33	109 3:48	5.3	-0.004	-0.76
113 12:11	114 2:43	14.5	-0.012	-0.83
115 12:18	116 3:19	15.0	-0.012	-0.80
118 11:43	118 23:18	11.6	-0.008	-0.69
bpl3				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
108 4: 5	109 2: 0	21.9	0.002	0.09
108 22:43	109 4:19	5.6	-0.001	-0.18
113 12:24	114 2:53	14.5	0.000	0.00
115 12:31	116 4:26	15.9	-0.001	-0.06
118 11:56	118 23: 7	11.2	0.000	0.00
119 18:52	120 4:13	9.3	0.002	0.21
bpl4				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 6:30	112 3:12	44.7	0.007	0.16
113 12:33	114 5:50	17.3	0.003	0.17
115 12:37	116 3:22	14.8	0.022	1.49
118 12: 3	118 23:11	11.1	0.002	0.18
119 18:58	120 4:22	9.4	0.004	0.43
bpl6				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 6:39	112 3:40	45.0	0.133	2.95
113 12:42	114 4:38	15.9	0.001	0.06
119 21: 4	120 5:30	8.4	0.000	0.00

Table 2, part 2 of 2.

Backpack Clock Corrections

bp17				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 6:47	112 3:27	44.7	-0.112	-2.51
113 12:50	114 4:45	15.9	-0.009	-0.57
118 12:18	118 23:14	10.9	-0.006	-0.55
bp18				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
113 12:58	114 3:51	14.9	-0.005	-0.34
115 12:57	116 3:16	14.3	-0.003	-0.21
119 20:24	120 5:40	9.3	-0.001	-0.11
bp19				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 7: 4	112 3: 0	43.9	-0.012	-0.27
113 13: 5	114 4:22	15.3	-0.014	-0.92
115 13: 3	116 3:29	14.4	-0.011	-0.76
118 13:14	118 21: 4	7.8	-0.005	-0.64
bp20				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 7:11	112 3:18	44.1	0.014	0.32
113 13:12	114 5:38	16.4	0.005	0.30
115 13:11	116 4:29	15.3	0.002	0.13
119 20:42	120 4:10	7.5	0.004	0.54
bp21				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 7:22	112 3:33	44.2	0.024	0.54
113 13:19	114 5: 6	15.8	0.007	0.44
115 13:17	116 4:18	15.0	0.008	0.53
118 13:27	118 20:44	7.3	0.003	0.41
119 20:49	120 5:37	8.8	0.007	0.80
bp22				
From	To	Hours	Correction	Rate/hour
day hr:mn	day hr:mn		sec	ms
110 7:31	112 2: 5	42.6	0.003	0.07
113 13:27	114 6: 6	16.7	-0.001	-0.06
115 13:24	116 4:32	15.1	-0.002	-0.13
118 13:35	118 21: 7	7.5	-0.001	-0.13

Table 3, Shot Data Summary

Line	Shot	sn	Lat. N	Long. W	Date	Time	UT	Corr. sec	Depth m	Charges	
					April	hr:mn:sec				#	Kg
I00	T01	TS	81.59778	94.26623	19	1:50:	0.00	0.02	100.0	4	108.00
I01	B02	DE	80.64987	102.05502	20	18:30:	0.00	0.03	100.0	24	652.80
I01	E03	DE	82.04359	96.87483	20	22: 0:	0.00	0.04	100.0	5	136.00
I01	F04	DE	82.41500	94.40195	20	23: 0:	0.00	0.03	100.0	8	217.60
I01	E05	DE	82.06630	96.76367	20	23:30:	0.00	0.04	100.0	5	136.00
I02	A06	CD	80.20583	103.41500	23	19:15:	0.00	0.01	100.0	15	408.00
I02	D07	CD	81.59966	99.15074	23	19:46:	5.00	0.00	100.0	5	136.00
I02	D08	CD	81.57153	99.21977	23	20:16:	4.70	0.00	100.0	5	136.00
I02	B09	CD	80.64987	102.05502	23	20:30:	0.00	0.01	100.0	8	217.60
I02	C10	CD	81.18403	100.93756	23	21: 1:	0.50	0.00	100.0	5	136.00
I02	C11	CD	81.21986	100.82748	23	21:31:	0.65	0.00	100.0	5	136.00
I02	E12	CD	82.03069	96.79432	23	22: 0:	0.00	0.01	100.0	8	217.60
I02	F13	CD	82.41583	94.39083	23	22:45:	0.00	0.01	100.0	16	435.20
I03	A14	BC	80.20583	103.41500	25	19:40:	0.00	0.01	100.0	8	217.60
I03	B15	BC	80.64987	102.05502	25	20:21:	5.10	0.01	100.0	5	136.00
I03	B16	BC	80.67594	102.06402	25	20:41:	0.00	0.01	100.0	5	136.00
I03	D17	BC	81.63134	98.91213	25	21: 0:	0.00	0.01	100.0	8	217.60
I03	E18	BC	82.03069	96.79432	25	21:40:	0.00	0.01	100.0	16	435.20
I03	C19	BC	81.18403	100.93756	25	22: 1:	4.85	0.01	100.0	5	136.00
I03	F20	BC	82.41472	94.39306	25	23: 0:	0.00	0.01	100.0	24	652.80
I03	C21	BC	81.21986	100.82748	25	23: 1:	5.00	0.01	100.0	5	136.00
I04	E22	IE	82.03069	96.79432	28	17: 1:	0.00	0.01	100.0	5	136.00
I04	D23	IE	81.63134	98.91213	28	17:20:	0.00	0.01	100.0	9	244.80
I04	I24	IE	81.69342	93.68399	28	17:41:	0.00	0.01	100.0	5	136.00
I04	I25	IE	81.70398	93.81311	28	18:21:	0.00	0.01	100.0	5	136.00
I04	E26	IE	82.01913	96.61923	28	18:41:	0.00	0.01	100.0	5	136.00
I05	G27	IG	81.27742	96.17306	29	23:31:	0.00	0.01	100.0	5	136.00
I05	E28	IG	82.03069	96.79432	29	23:40:	0.00	0.01	100.0	9	244.80
I05	I29	IG	81.68580	93.77987	30	0:11:	0.00	0.01	100.0	5	136.00
I05	I30	IG	81.69342	93.68399	30	0:31:	0.00	0.01	100.0	5	136.00
I05	D31	IG	81.63134	98.91213	30	0:50:	0.00	0.01	100.0	9	244.80

Table 4, part 1 of 2.

Recorder Site Summary

Line	Site	Section	Lat. N	Long. W	Comments
I00	001	TS	81.85742	92.66051	bp11
I00	001	TS	81.85742	92.66051	bp13
I00	001	TS	81.85742	92.66051	bp10
I01	005	DE	81.77880	98.25804	bp11
I01	006	DE	81.82147	98.01718	bp13
I01	007	DE	81.74163	98.44382	bp14
I01	008	DE	81.69911	98.63943	bp16
I01	009	DE	81.66161	98.84383	bp17
I01	010	DE	82.00562	97.02328	bp18
I01	011	DE	81.97414	97.22220	bp19
I01	012	DE	81.91652	97.45325	bp20
I01	013	DE	81.89283	97.65220	bp21
I01	014	DE	81.85832	97.87447	bp22
I02	015	CD	81.33441	100.34740	bp10
I02	016	CD	81.49670	99.61419	bp11
I02	017	CD	81.43221	99.90630	bp13
I02	018	CD	81.30133	100.47694	bp14
I02	019	CD	81.36705	100.18526	bp16
I02	020	CD	81.39901	100.06778	bp17
I02	021	CD	81.46548	99.75652	bp18
I02	022	CD	81.56461	99.32063	bp19
I02	023	CD	81.52803	99.47859	bp20
I02	024	CD	81.27002	100.62267	bp21
I02	025	CD	81.23571	100.76780	bp22
I03	026	BC	80.95191	101.46529	bp10
I03	027	BC	80.78258	101.83556	bp11
I03	028	BC	80.82467	101.74206	bp12
I03	029	BC	81.12155	101.08638	bp13
I03	030	BC	80.74039	101.92685	bp14
I03	031	BC	80.91032	101.54966	bp16
I03	032	BC	81.07938	101.18800	bp17
I03	033	BC	80.86778	101.64938	bp18
I03	034	BC	80.70045	101.93373	bp19
I03	035	BC	81.17748	100.94619	bp20
I03	036	BC	80.99648	101.36849	bp21
I03	037	BC	81.03681	101.26775	bp22
I04	038	IE	81.77099	94.39476	bp10
I04	039	IE	81.82468	94.87199	bp11
I04	040	IE	81.79905	94.62766	bp12

Table 4, part 2 of 2.

Recorder Site Summary

Line	Site	Section	Lat. N	Long. W	Comments
I04	041	IE	81.88000	95.34509	bp13
I04	042	IE	81.71848	93.93227	bp14
I04	043	IE	81.74648	94.15501	bp16
I04	044	IE	81.85179	95.10975	bp17
I04	045	IE	81.95647	96.07079	bp18
I04	046	IE	81.98278	96.31485	bp19
I04	047	IE	81.90452	95.57881	bp20
I04	048	IE	81.92897	95.83158	bp21
I04	049	IE	82.00719	96.56184	bp22
I05	050	IG	81.54018	94.70343	bp10
I05	051	IG	81.50941	94.90040	bp11
I05	052	IG	81.60184	94.30125	bp12
I05	053	IG	81.57110	94.50098	bp13
I05	054	IG	81.66203	93.89513	bp14
I05	055	IG	81.32352	96.06464	bp16
I05	056	IG	81.63147	94.10854	bp17
I05	057	IG	81.41573	95.49382	bp18
I05	058	IG	81.35308	95.86723	bp19
I05	059	IG	81.47833	95.10000	bp20
I05	060	IG	81.44735	95.27917	bp21
I05	061	IG	81.38394	95.68807	bp22
	062		81.72842	93.40987	ice camp
	063		81.33095	93.96553	hubbard M.
	064		81.64625	91.75078	lokk
	065		80.68572	95.62331	bjarneson
	066		80.08772	99.04539	meighen

Table 5, part 1 of 2

NAVSAT Position Summary

GRDOP TAPE7 SUMMARY FOR ICE STATION Ice Camp

INT	DAY	TIME	NP	LATITUDE	STD	LONGITUDE	STD	HEIGHT	STD	NORTHING	EASTING
2	111	0 0	6	81 43 36.7	8.	266 35 4.0	8.	29.44	2.04	2054814.	1081583.
3	111	6 0	8	81 43 36.8	6.	266 35 2.4	6.	28.48	.92	2054821.	1081587.
4	111	12 0	8	81 43 36.7	6.	266 35 2.8	6.	28.61	.66	2054819.	1081582.
5	111	18 0	9	81 43 36.8	5.	266 35 0.4	5.	27.87	.50	2054830.	1081586.
6	112	0 0	3	81 43 36.8	10.	266 35 1.8	10.	27.43	.49	2054824.	1081586.
7	112	6 0	13	81 43 36.9	4.	266 35 0.7	4.	26.44	.34	2054828.	1081589.
8	113	0 0	5	81 43 36.7	10.	266 35 2.2	9.	26.36	.40	2054822.	1081585.
9	113	6 0	6	81 43 36.9	6.	266 35 1.5	7.	26.05	.36	2054824.	1081591.
10	113	12 0	5	81 43 37.1	7.	266 35 3.5	7.	25.91	.35	2054815.	1081596.
11	113	18 0	11	81 43 37.1	5.	266 35 2.3	5.	25.55	.28	2054821.	1081594.
12	114	0 0	10	81 43 37.0	5.	266 35 3.5	5.	25.11	.25	2054816.	1081592.
13	114	6 0	12	81 43 37.0	4.	266 35 2.1	4.	24.92	.22	2054822.	1081593.
14	114	12 0	8	81 43 37.0	5.	266 35 1.0	6.	24.88	.23	2054826.	1081594.
15	114	18 0	9	81 43 36.9	5.	266 35 1.3	5.	24.81	.22	2054825.	1081590.
16	115	0 0	14	81 43 36.9	4.	266 35 3.1	4.	24.83	.19	2054818.	1081588.
17	115	6 0	10	81 43 36.9	5.	266 35 2.7	5.	25.11	.19	2054819.	1081589.
18	115	12 0	6	81 43 36.8	6.	266 35 1.9	7.	25.17	.22	2054823.	1081588.
19	115	18 0	7	81 43 36.9	6.	266 35 0.6	6.	25.18	.22	2054829.	1081591.

ICE STATION shot point A

INT	DAY	TIME	NP	LATITUDE	STD	LONGITUDE	STD	HEIGHT	STD	NORTHING	EASTING
11	113	18 0	2	80 12 20.8	21.	256 35 8.5	22.	6.44	4.72	2252856.	939793.
12	114	0 0	14	80 12 21.1	4.	256 35 6.1	4.	7.11	.42	2252866.	939805.
13	114	6 0	11	80 12 21.0	5.	256 35 4.6	5.	7.92	.28	2252875.	939806.
14	114	12 0	10	80 12 21.0	5.	256 35 3.9	5.	8.20	.25	2252878.	939807.
15	114	18 0	9	80 12 20.9	5.	256 35 4.4	5.	8.45	.24	2252876.	939802.
16	115	0 0	11	80 12 20.9	5.	256 35 5.5	5.	8.53	.22	2252871.	939800.
17	115	6 0	13	80 12 20.9	4.	256 35 5.3	4.	8.71	.19	2252872.	939801.
18	115	12 0	10	80 12 20.8	5.	256 35 4.8	5.	8.72	.20	2252875.	939799.
19	115	18 0	4	80 12 20.7	9.	256 35 4.5	9.	8.76	.25	2252877.	939796.

ICE STATION shot point B

INT	DAY	TIME	NP	LATITUDE	STD	LONGITUDE	STD	HEIGHT	STD	NORTHING	EASTING
8	113	0 0	2	80 38 59.1	16.	257 56 40.8	16.	9.63	6.32	2217276.	982625.
9	113	6 0	6	80 38 59.4	7.	257 56 39.0	7.	10.86	.74	2217284.	982636.
10	113	12 0	6	80 38 59.6	6.	257 56 40.8	7.	10.92	.47	2217273.	982641.
11	113	18 0	9	80 38 59.5	5.	257 56 39.0	5.	10.97	.33	2217283.	982638.

Table 5, part 2 of 2.

NAVSAT Position Summary

ICE STATION shot point ELA

INT	DAY	TIME	NP	LATITUDE	STD	LONGITUDE	STD	HEIGHT	STD	NORTHING	EASTING
12	114	0 0	12	82 1 47.8	5.	263 12 20.3	5.	16.96	.36	2104847.	1119984.
13	114	6 0	12	82 1 47.8	4.	263 12 17.7	4.	16.82	.24	2104858.	1119987.
14	114	12 0	7	82 1 47.9	6.	263 12 16.2	6.	16.72	.25	2104864.	1119989.
15	114	18 0	8	82 1 47.8	6.	263 12 17.1	6.	16.52	.24	2104861.	1119985.
16	115	0 0	13	82 1 47.7	4.	263 12 18.5	4.	16.41	.20	2104855.	1119982.
17	115	6 0	10	82 1 47.7	5.	263 12 17.8	5.	16.53	.20	2104858.	1119982.
18	115	12 0	6	82 1 47.6	6.	263 12 16.9	7.	16.49	.23	2104862.	1119981.
19	115	18 0	7	82 1 47.7	6.	263 12 16.4	6.	16.42	.22	2104864.	1119985.

ICE STATION shot point F

INT	DAY	TIME	NP	LATITUDE	STD	LONGITUDE	STD	HEIGHT	STD	NORTHING	EASTING
2	111	0 0	7	82 24 53.6	7.	265 35 55.8	8.	21.20	1.99	2064715.	1159176.
3	111	6 0	8	82 24 53.8	6.	265 35 53.7	6.	20.45	.91	2064723.	1159182.
4	111	12 0	8	82 24 53.7	6.	265 35 54.6	6.	20.64	.65	2064720.	1159178.
5	111	18 0	8	82 24 54.1	6.	265 35 51.1	6.	20.10	.51	2064733.	1159191.
6	112	0 0	13	82 24 54.2	5.	265 35 53.8	5.	19.14	.38	2064722.	1159195.
7	112	6 0	14	82 24 54.0	4.	265 35 52.5	4.	18.65	.30	2064727.	1159189.
8	113	0 0	6	82 24 56.2	7.	265 36 15.8	8.	18.55	.33	2064627.	1159248.
9	113	6 0	7	82 24 57.6	6.	265 36 29.7	6.	18.41	.32	2064567.	1159289.
10	113	12 0	6	82 24 57.3	7.	265 36 39.2	7.	18.33	.32	2064529.	1159276.
11	113	18 0	9	82 24 57.0	5.	265 36 37.2	5.	18.14	.29	2064538.	1159269.
12	114	0 0	14	82 24 56.4	4.	265 36 34.7	4.	17.72	.22	2064550.	1159249.
13	114	6 0	12	82 24 55.8	4.	265 36 29.7	4.	17.65	.21	2064572.	1159231.
14	114	12 0	8	82 24 55.6	5.	265 36 27.7	6.	17.68	.23	2064580.	1159226.
15	114	18 0	7	82 24 55.3	6.	265 36 27.7	6.	17.64	.23	2064581.	1159218.
16	115	0 0	11	82 24 54.7	5.	265 36 27.2	5.	17.69	.20	2064584.	1159199.
17	115	6 0	11	82 24 54.2	5.	265 36 24.9	5.	17.99	.19	2064595.	1159184.
18	115	12 0	8	82 24 53.7	6.	265 36 22.9	6.	18.04	.21	2064604.	1159170.
19	115	18 0	7	82 24 53.0	6.	265 36 21.0	6.	18.06	.21	2064614.	1159147.

Appendix A - Participants List

Scientific Staff

Jay Ardai	Lamont Doherty Geological Laboratory
Isa Asudeh	Earth Physics Branch
Jack Davidson	Atlantic Geoscience Centre
Robert Duval	Geodetic Survey of Canada
Dave Forsyth	Earth Physics Branch
Mike Gorveatt	Atlantic Geoscience Centre
Ruth Jackson	Atlantic Geoscience Centre
Robert Schieman	Earth Physics Branch
Mike Schmidt	Earth Physics Branch
Larry Sobczak	Earth Physics Branch
Randell Stephenson	Institute of Sedimentary and Petroleum Geology
Don White	Pacific Geoscience Centre
Morley Wright	Atlantic Geoscience Centre

Air Crews

Twin Otter (Bradley)

Dominic Delucas
Richard Duncan
Dan Haughton
Marc Lacroix
Joe McGrath
Dominic Delucas

Helicopters (Quasar)

205	206
John Currie	Al Singh
Richard Rondeau	Dave Wright

Appendix B - Preliminary Report

Ice Island '85 refraction survey: A preliminary report

I. Asudeh and D. A. Forsyth
Earth Physics Branch, Energy, Mines and Resources
1 Observatory Crescent, Ottawa, Ontario K1A 0Y3, Canada

H. R. Jackson
Atlantic Geoscience Centre
Geological Survey of Canada
Bedford Institute of Oceanography
Box 1006, Dartmouth, Nova Scotia B2Y 4A2, Canada

R. Stephensen
Institute of Sedimentary & Petroleum Geology
3303-33rd Street N.W.
Calgary, Alberta T2L 2A7, Canada

The Ice Island refraction survey of April 1985 consisted of five reversed refraction profiles parallel and perpendicular to the polar continental margin northwest of Ellesmere and Axel Heiberg Islands. A total of 31 shots were fired into 61 deployments of seismic recorders covering 300 km of refraction line with seismometer spacing of about 5 km. Shots offset by 2.5 km at both ends of the profiles yield an effective receiver spacing of 2.5 km.

The preliminary interpretation of the data using 1-D models reveals the following general features of the seismic structure beneath the survey area:

a) For the 60 km long reversed refraction profile on the continental shelf, parallel to the margin (line IG, Fig. 1), the structure appears "truly" one dimensional with 3.5 km of material with velocity of 5.0 km/sec overlying a 5.8 km/sec structure.

b) The 60 km long profile perpendicular to the margin (line IE, Fig. 1) crosses more complex structure, with an upper sedimentary cover of about 6 km thickness and velocity of 4.0-4.5 km/sec overlying a 6.0-6.5 km/sec basement. More detailed information from this profile will be derived using two dimensional modelling.

c) The last three profiles, all parallel to the margin and about 90 km offshore (lines BC, CD, and DE, Fig. 1), share common features. A water layer about 500 m thick, a second low velocity sedimentary layer about 2 km thick and velocity of about 1.8 km/sec, a sedimentary upper layer about 5 km thick with velocities ranging from 3.8 to 4.2 km/sec, and a mid crustal layer with velocities 5.4-6.4 km/sec. The Moho appears to be at depth of about 22 km beneath these profiles.

d) Velocity and intercept times suggest that 5.0 km/sec material is effectively at the surface along profile IG whereas greater intercept times for the 4.0 km/sec material suggest greater sedimentary thickness offshore.

Appendix C - Water Wave and Crustal Sections,
Spectral Analysis Plots

The Refraction Sections and Spectral Analysis Plots are arranged as follows.

a) Water Wave and Crustal Sections:

A table of section specifications followed by water wave and crustal seismic sections are given in Figs. 2(A and B) through 31(A and B). The traces in all sections are normalized by arbitrary scales and do not reflect true amplitudes.

Note that no clock corrections or water depth static corrections have been applied to these data.

b) Spectral Analysis Plots

The Test Shot spectral analysis is given in Figs. 32A through 32H.

The spectral analysis of shots E22, D23, I24, I25 and E26 at site 038 is given in Figs. 33A to 37C.

In the spectral analysis plots, N is the total number of samples and L is the number of samples used for spectral computations.

Line: I01 Shot: B02
** Ice Island 85 ** Field shot point: B Section: DE
Shot time: 1985 APR. 20 18:30: 0.00
Lat.: 80.64987 N, Long.: 102.05502 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 652.8 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
014	81.85832		97.87447		0.0	152.40	25.69	18:29:59.18	0.100	spz	bp22	60
013	81.89283		97.65220		0.0	157.50	26.10	18:29:59.17	0.100	spz	bp21	60
012	81.91652		97.45325		0.0	161.37	26.58	18:29:59.16	0.100	spz	bp20	60
011	81.97414		97.22220		0.0	168.75	26.50	18:29:59.16	0.100	spz	bp19	60
010	82.00562		97.02328		0.0	173.36	26.76	18:29:59.16	0.100	spz	bp18	60

Fig. 2A - Water wave section DE shot B02

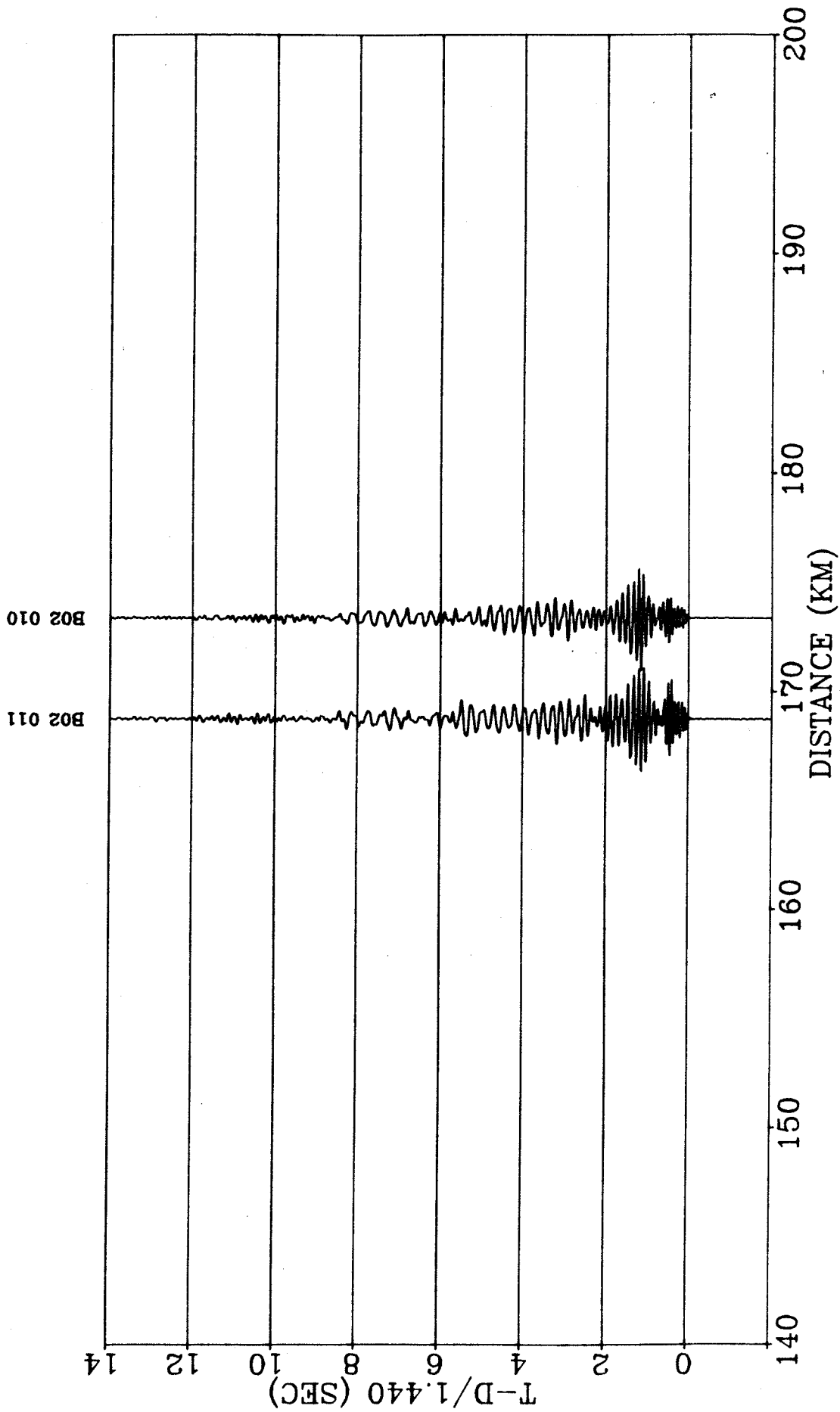
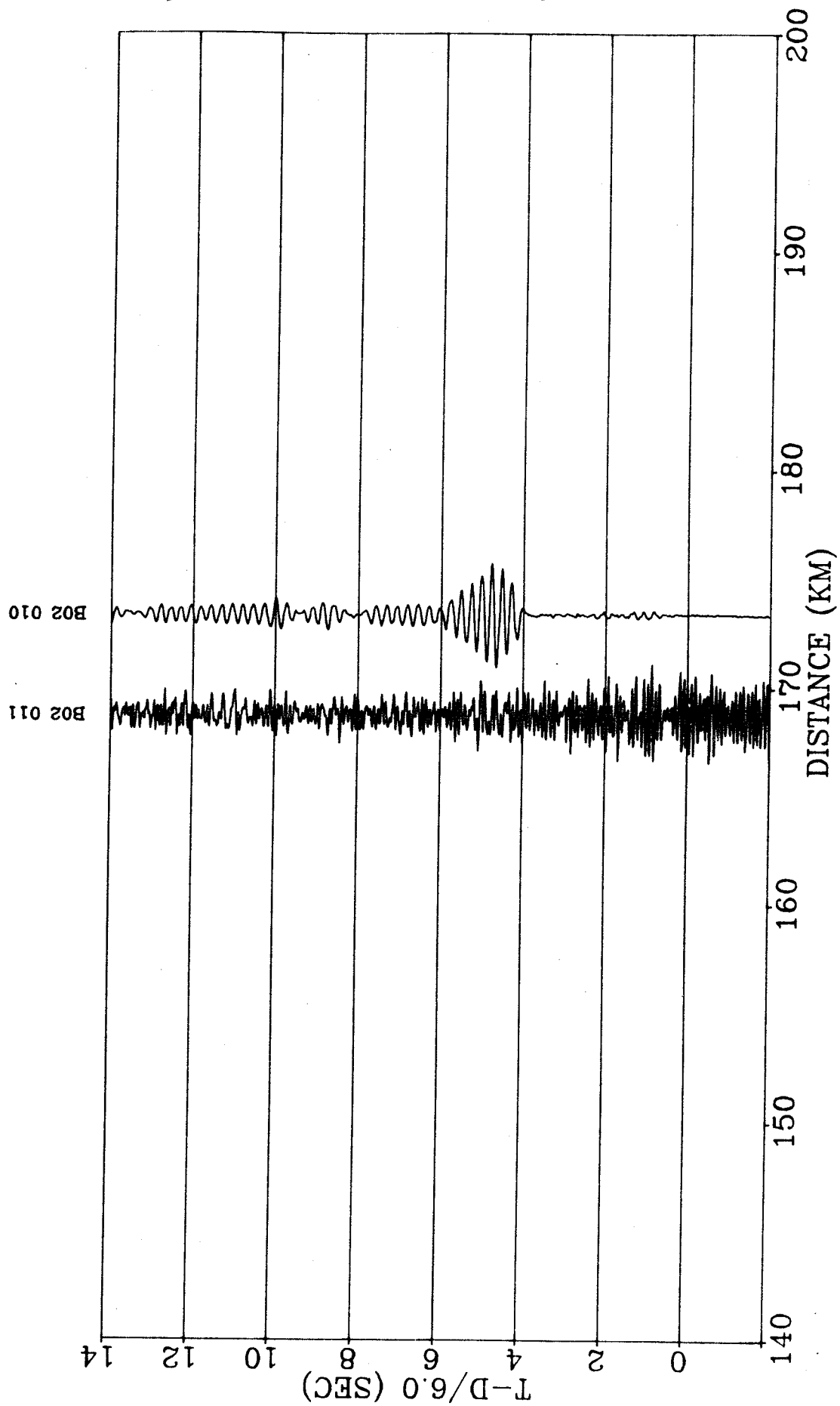


Fig. 2B - Seismic section DE shot B02



Line: I01 Shot: E03
** Ice Island 85 ** Field shot point: El Section: DE
Shot time: 1985 APR. 20 22: 0: 0.00
Lat.: 82.04359 N, Long.: 96.87483 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
010	82.00562		97.02328		0.0	4.82	208.55	21:59:59.17	0.100	spz	bp18	60	
011	81.97414		97.22220		0.0	9.45	214.99	21:59:59.17	0.100	spz	bp19	60	
012	81.91652		97.45325		0.0	16.81	212.71	21:59:59.17	0.100	spz	bp20	60	
013	81.89283		97.65220		0.0	20.75	216.16	21:59:59.17	0.100	spz	bp21	60	
014	81.85832		97.87447		0.0	25.93	217.57	21:59:59.17	0.100	spz	bp22	60	
009	81.66161		98.84383		0.0	52.83	217.13	21:59:59.15	0.100	spz	bp17	60	

Fig. 3A - Water wave section DE shot E03

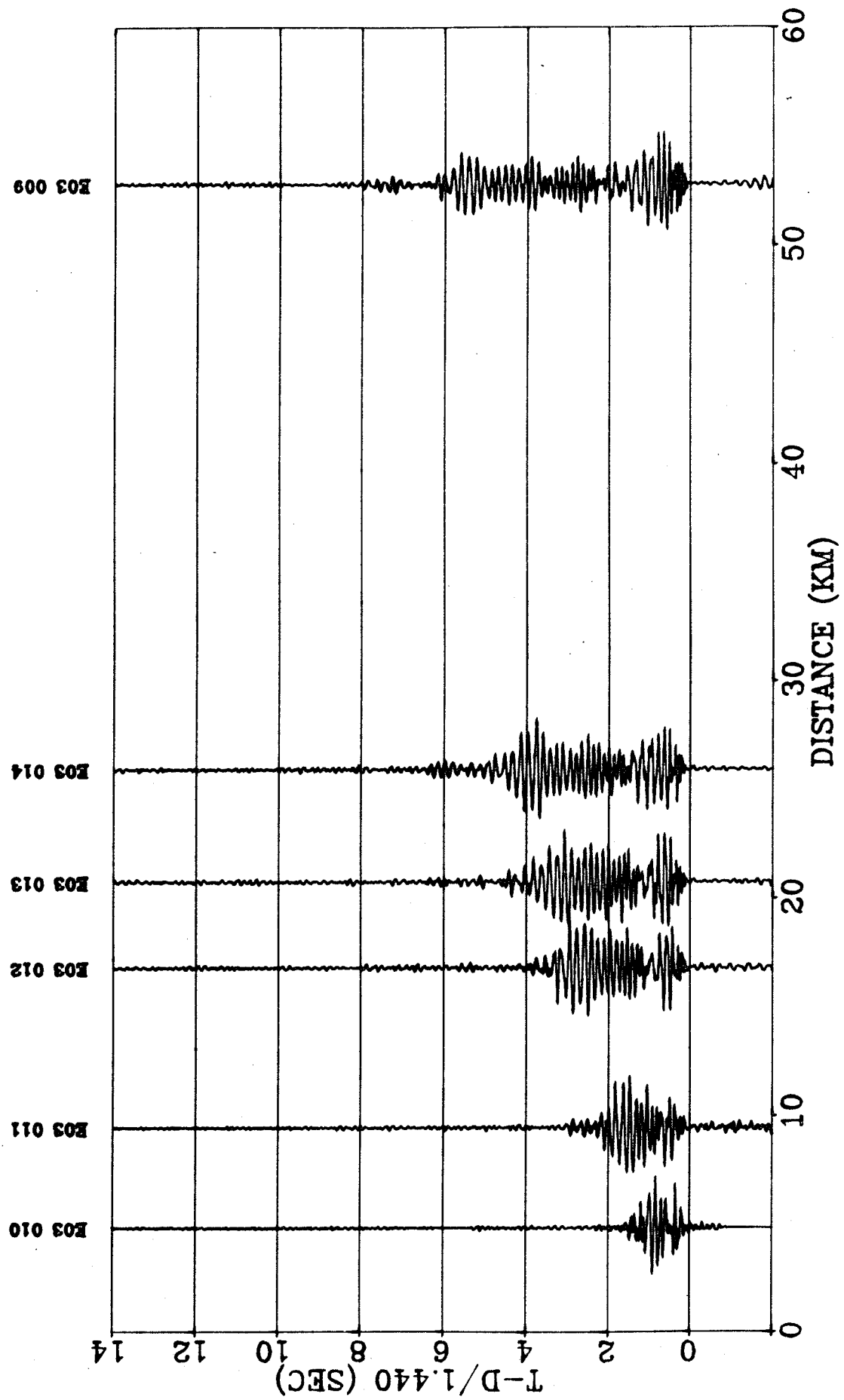
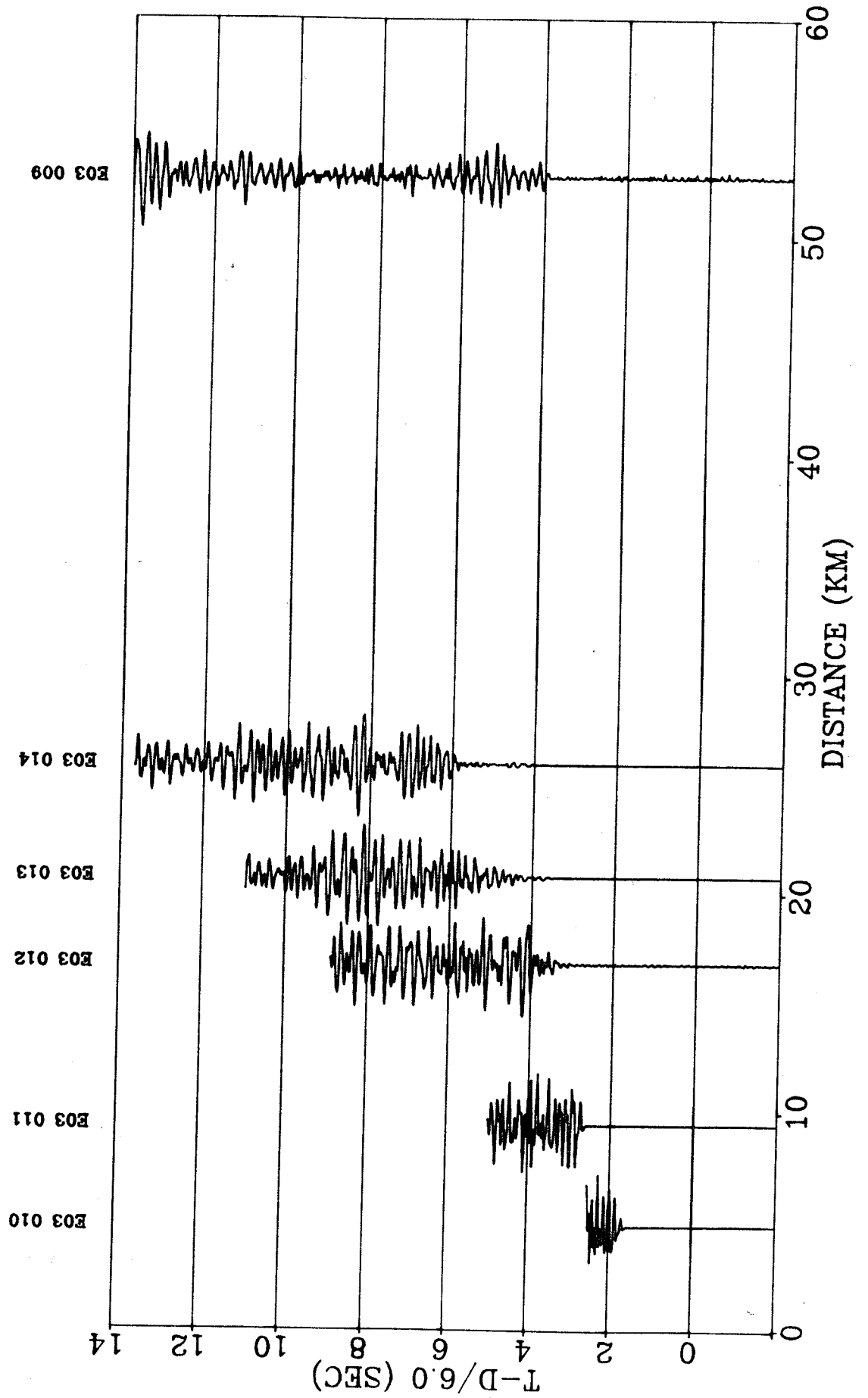


Fig. 3B - Seismic section DE shot E03



Line: I01 Shot: F04
** Ice Island 85 ** Field shot point: F Section: DE
Shot time: 1985 APR. 20 23: 0: 0.00
Lat.: 82.41500 N, Long.: 94.40195 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 217.6 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
010	82.00562		97.02328		0.0	60.53	222.26	22:59:59.17	0.100	spz	bp18	60	
011	81.97414		97.22220		0.0	65.21	222.39	22:59:59.16	0.100	spz	bp19	60	
012	81.91652		97.45325		0.0	72.49	221.36	22:59:59.17	0.100	spz	bp20	60	
013	81.89283		97.65220		0.0	76.51	221.98	22:59:59.17	0.100	spz	bp21	60	
014	81.85832		97.87447		0.0	81.71	222.21	22:59:59.18	0.100	spz	bp22	60	
009	81.66161		98.84383		0.0	108.57	221.45	22:59:59.17	0.100	spz	bp17	60	

Fig. 4A - Water wave section DE shot F04

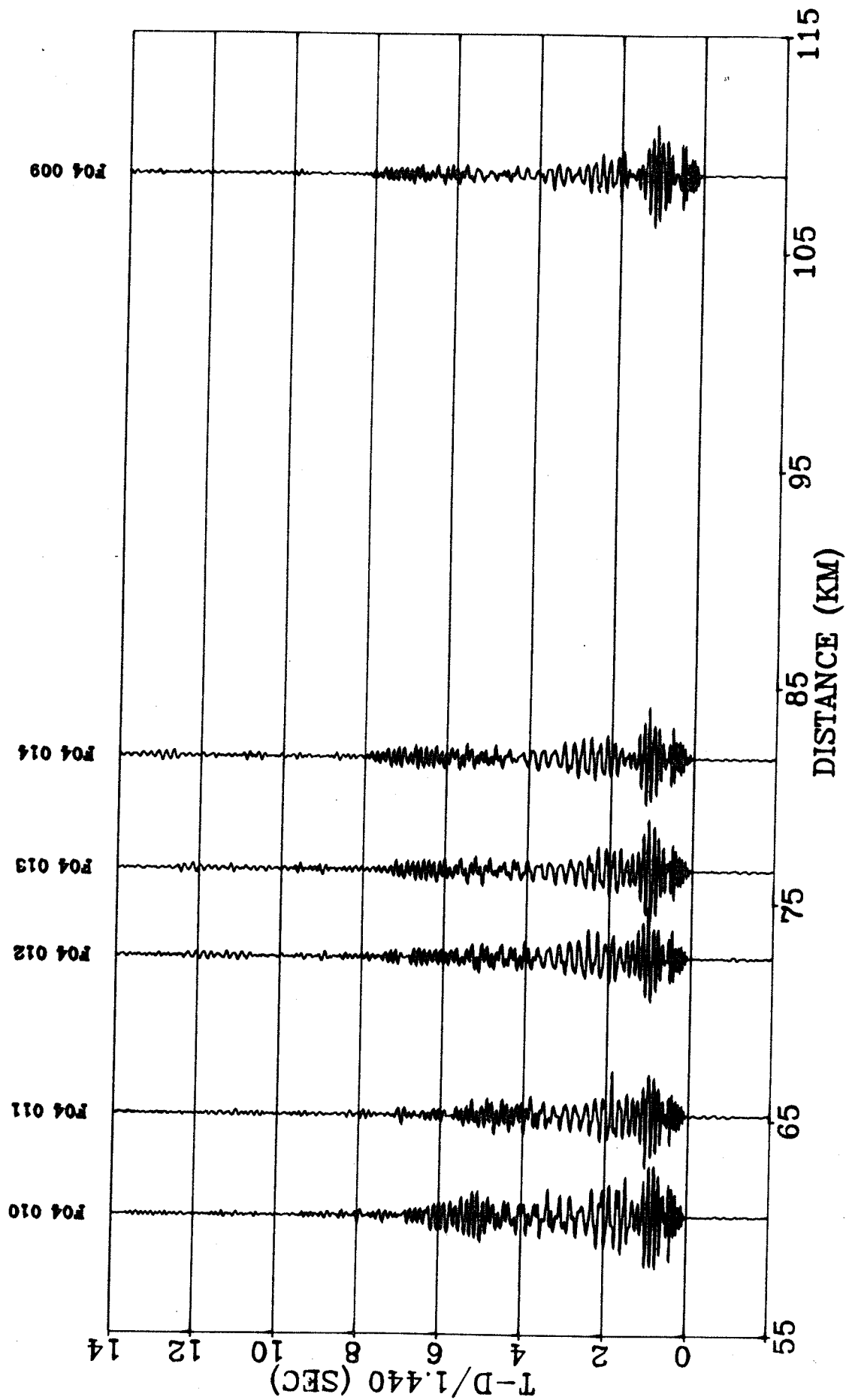
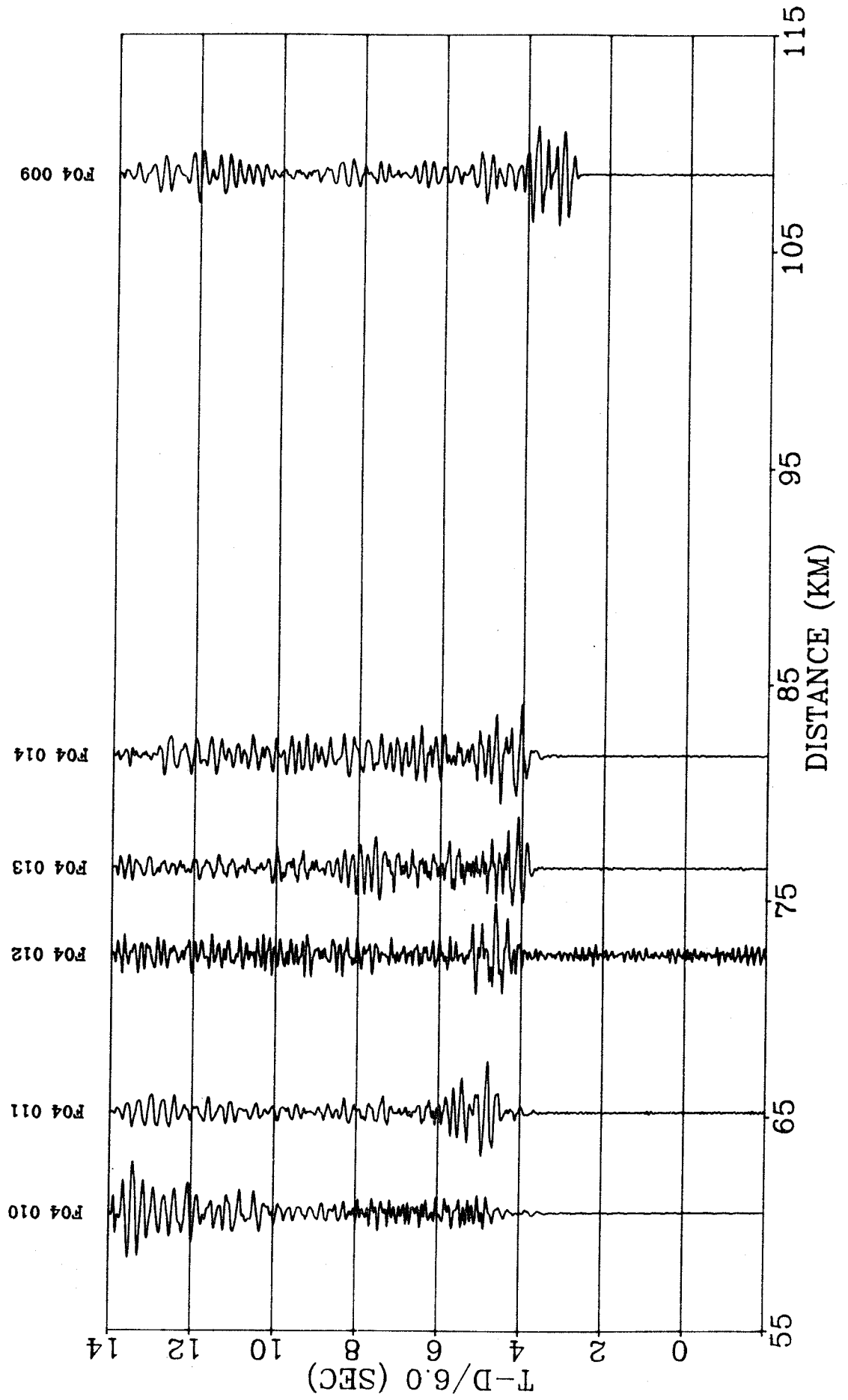


Fig. 4B - Seismic section DE shot F04



Line: I01 Shot: E05
** Ice Island 85 ** Field shot point: E2 Section: DE
Shot time: 1985 APR. 20 23:30: 0.00
Lat.: 82.06630 N, Long.: 96.76367 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
010	82.00562		97.02328		0.0	7.88	210.79	23:29:59.16	0.100	spz	bp18	60	
011	81.97414		97.22220		0.0	12.51	214.86	23:29:59.18	0.100	spz	bp19	60	
012	81.91652		97.45325		0.0	19.87	213.02	23:29:59.17	0.100	spz	bp20	60	
013	81.89283		97.65220		0.0	23.81	216.00	23:29:59.17	0.100	spz	bp21	60	
014	81.85832		97.87447		0.0	28.99	217.31	23:29:59.17	0.100	spz	bp22	60	
009	81.66161		98.84383		0.0	55.88	217.07	23:29:59.17	0.100	spz	bp17	60	

Fig. 5A - Water wave section DE shot E05

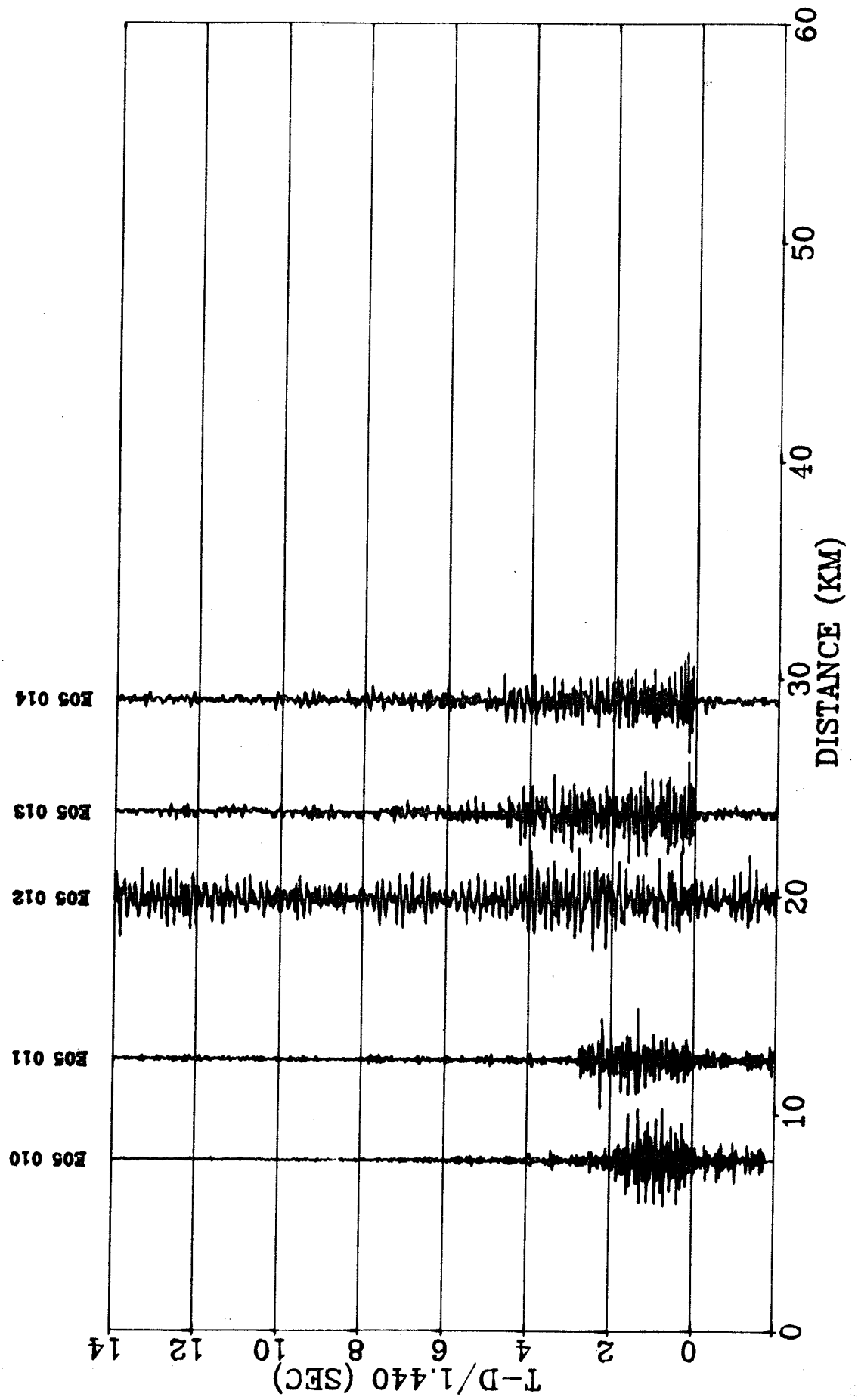
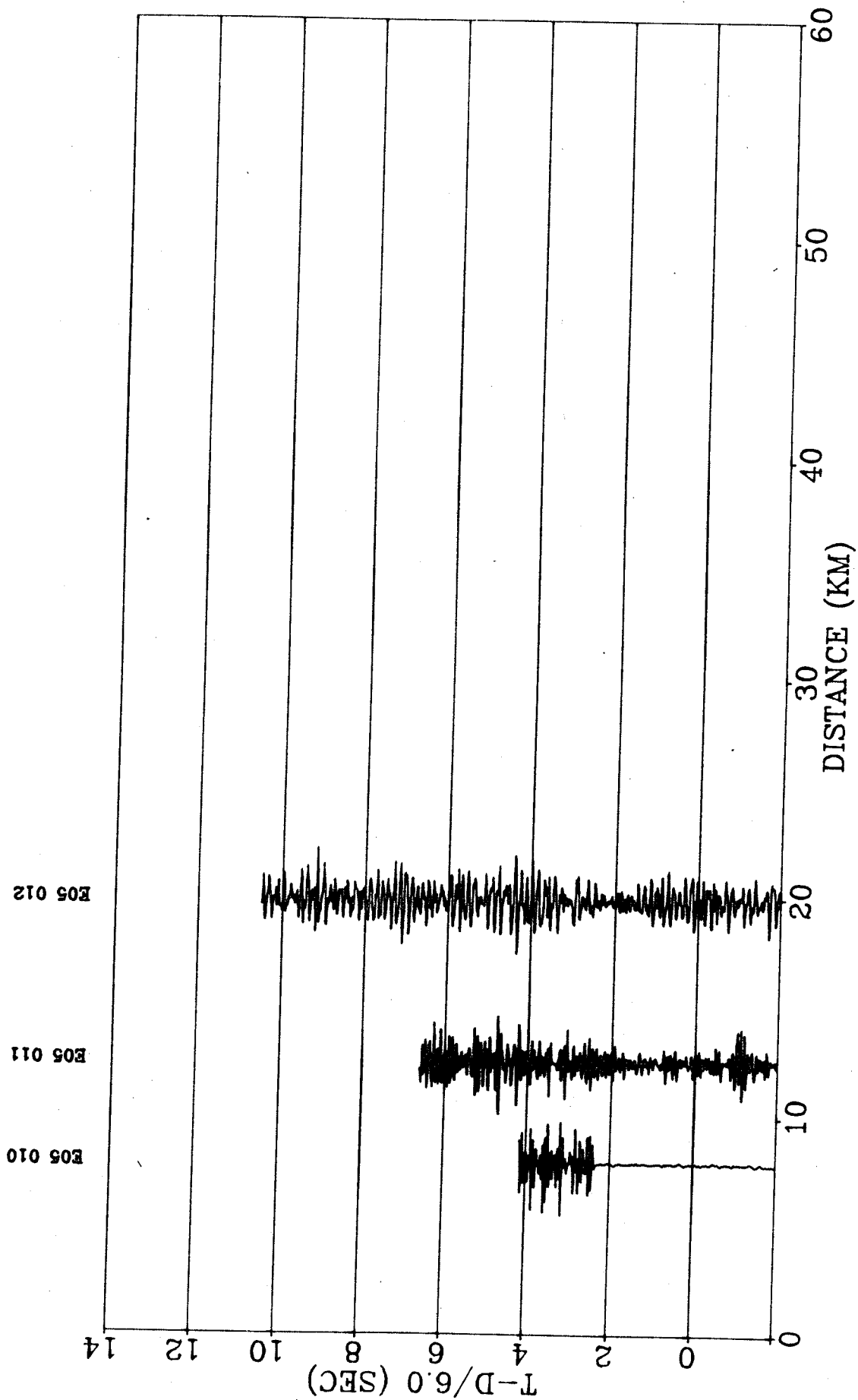


Fig. 5B - Seismic section DE shot E05



Line: I02 Shot: A06
 ** Ice Island 85 ** Field shot point: A Section: CD
 Shot time: 1985 APR. 23 19:15: 0.00
 Lat.: 80.20583 N, Long.: 103.41500 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 408.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
025	81.23571		100.76780		0.0	124.47	21.21	19:14:59.17	0.100	spz	bp22	60	
024	81.27002		100.62267		0.0	128.97	21.53	19:14:59.16	0.100	spz	bp21	60	
018	81.30133		100.47694		0.0	133.17	21.87	19:14:59.18	0.100	spz	bpl4	60	
017	81.43221		99.90630		0.0	150.49	22.82	19:14:59.18	0.100	spz	bpl3	60	
021	81.46548		99.75652		0.0	154.92	23.03	19:15: 7.17	0.100	spz	bpl8	60	
016	81.49670		99.61419		0.0	159.10	23.22	19:14:59.15	0.100	spz	bpl1	60	
023	81.52803		99.47859		0.0	163.23	23.36	19:14:59.16	0.100	spz	bp20	60	
022	81.56461		99.32063		0.0	168.05	23.51	19:15: 7.18	0.100	spz	bpl9	60	

Fig. 6A - Water wave section CD shot A06

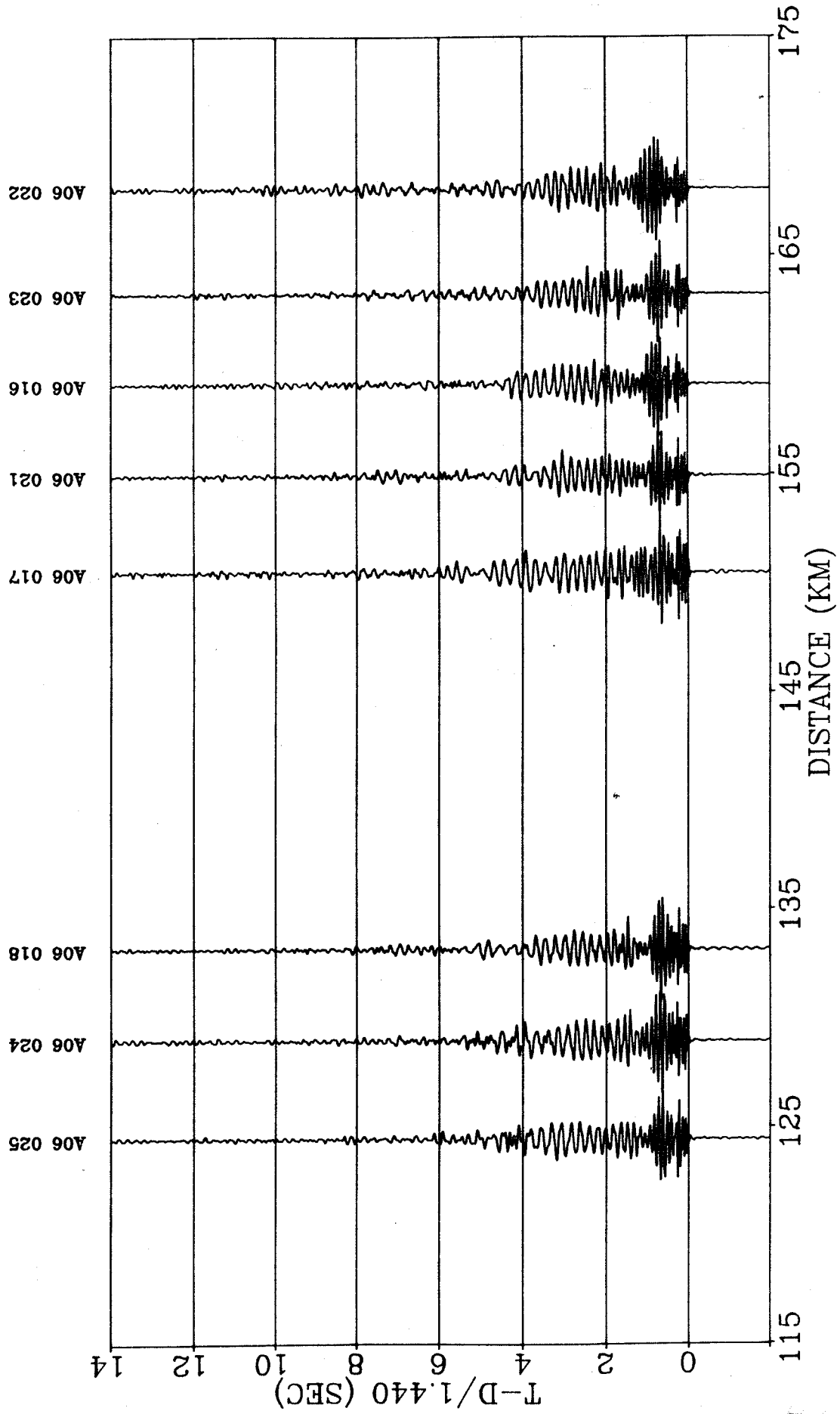
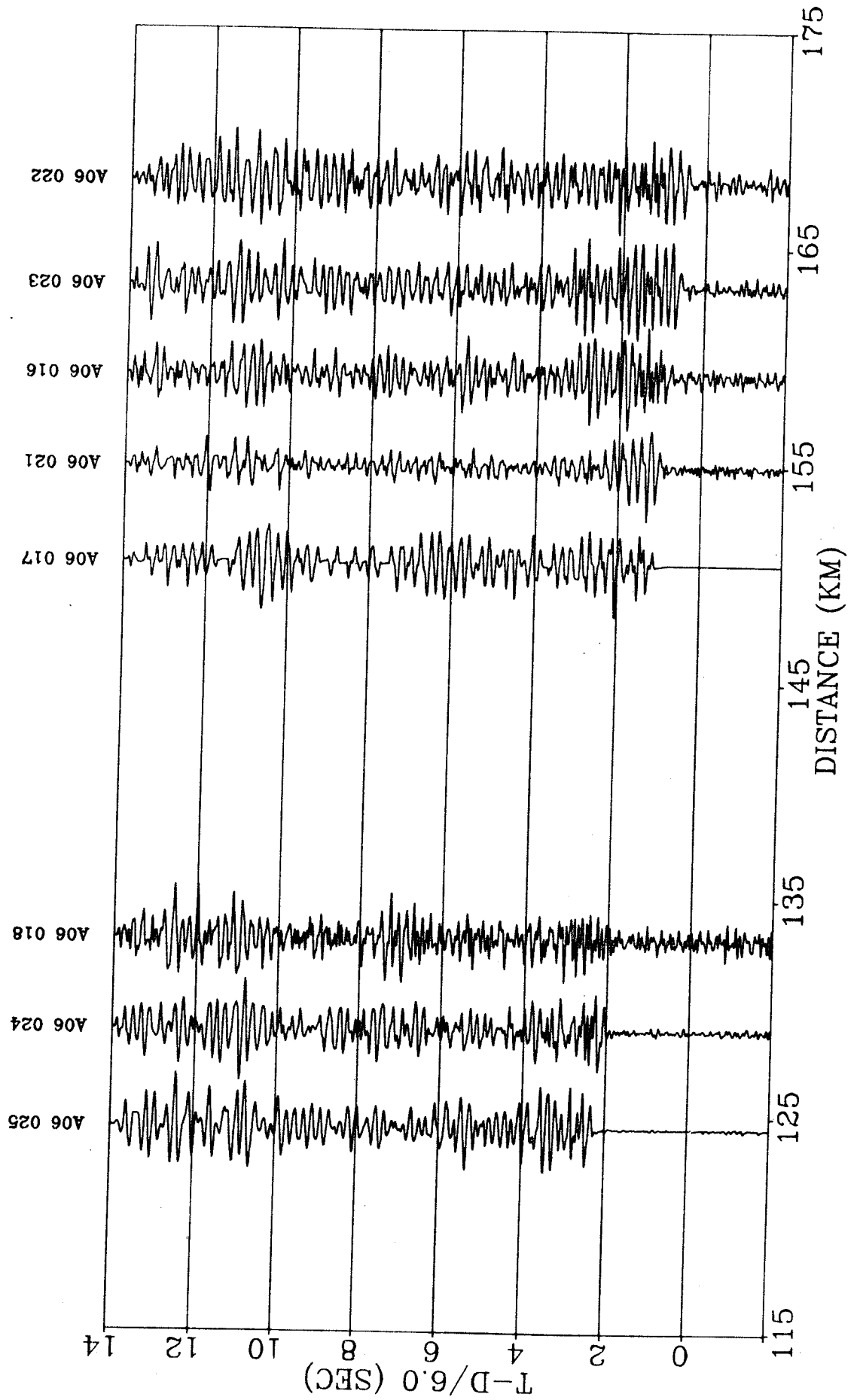


Fig. 6B - Seismic section CD shot A06



Line: I02 Shot: D07
** Ice Island 85 ** Field shot point: D2 Section: CD
Shot time: 1985 APR. 23 19:46: 5.00
Lat.: 81.59966 N, Long.: 99.15074 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
022	81.56461		99.32063		0.0	4.80	215.45	19:44:59.18	0.100	spz	bp19	60	
023	81.52803		99.47859		0.0	9.64	214.05	19:44:59.16	0.100	spz	bp20	60	
016	81.49670		99.61419		0.0	13.79	213.72	19:44:59.17	0.100	spz	bp11	60	
021	81.46548		99.75652		0.0	17.99	213.92	19:44:59.16	0.100	spz	bp18	60	
017	81.43221		99.90630		0.0	22.47	214.03	19:44:59.17	0.100	spz	bp13	60	
018	81.30133	100.47694			0.0	39.93	214.12	19:44:59.18	0.100	spz	bp14	60	
024	81.27002	100.62267			0.0	44.21	214.36	19:44:59.18	0.100	spz	bp21	60	
025	81.23571	100.76780			0.0	48.76	214.35	19:44:59.17	0.100	spz	bp22	60	

Fig. 7A - Water wave section CD shot D07

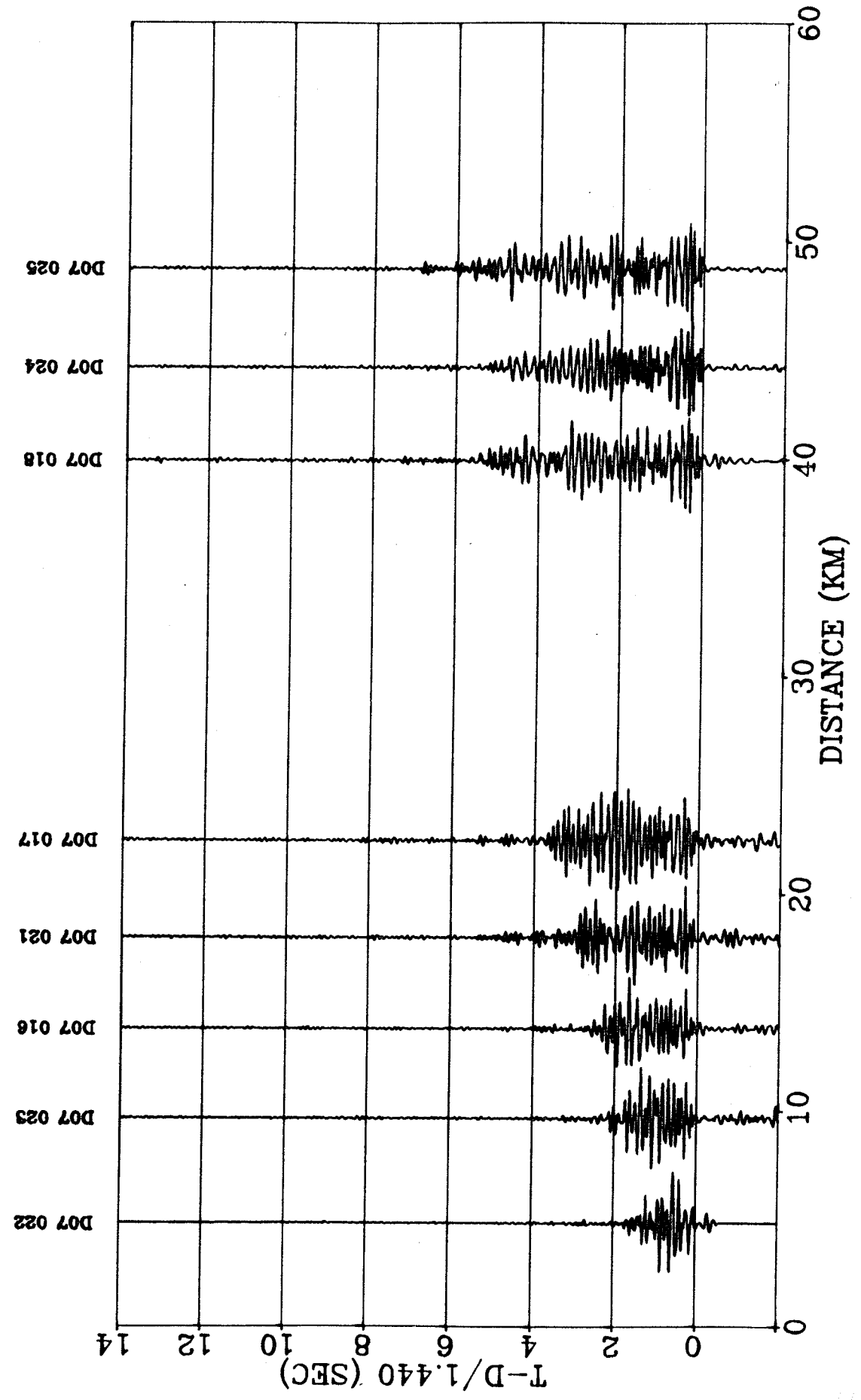
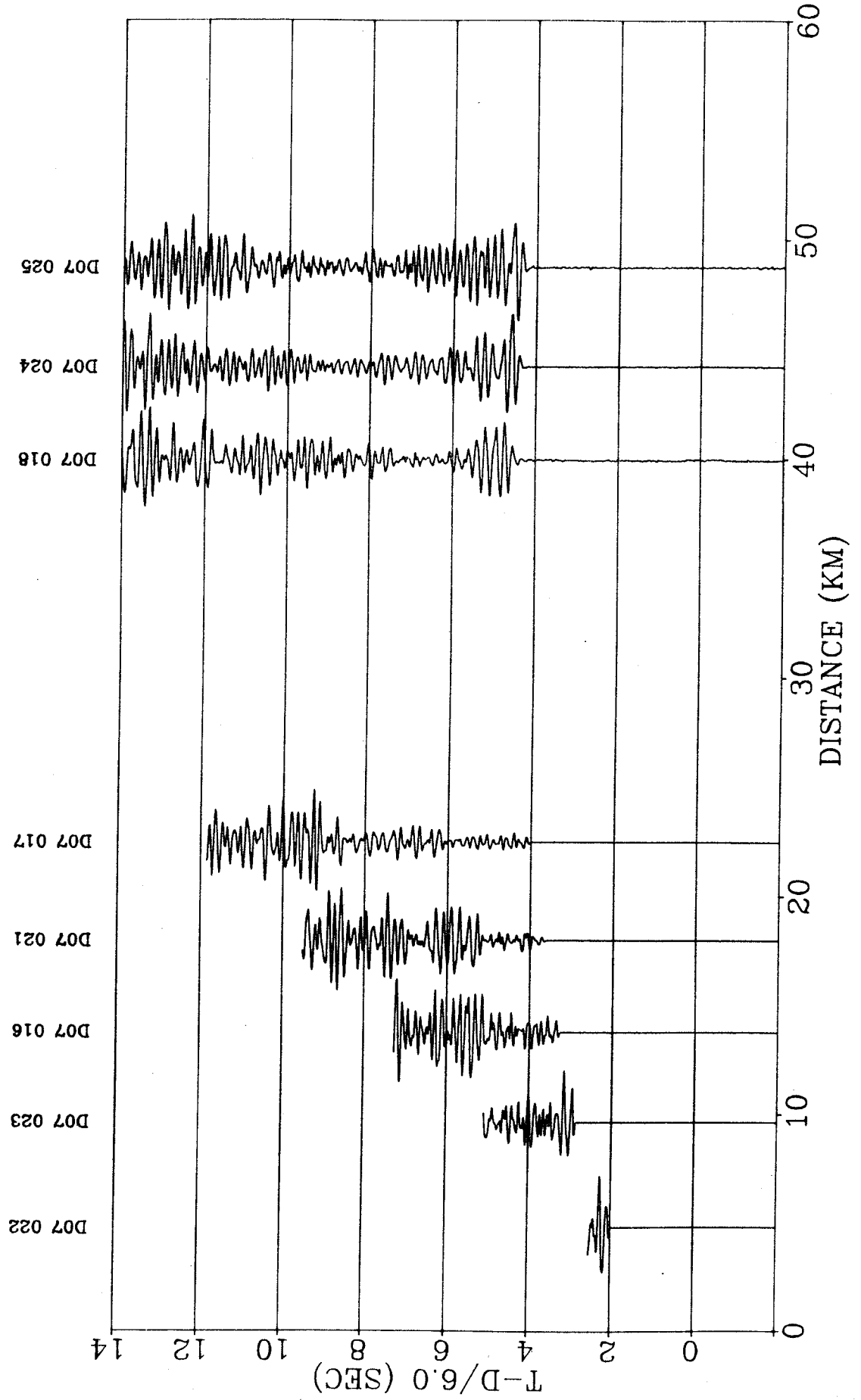


Fig. 7B - Seismic section CD shot D07



Line: I02 Shot: D08
** Ice Island 85 ** Field shot point: D1 Section: CD
Shot time: 1985 APR. 23 20:16: 4.70
Lat.: 81.57153 N, Long.: 99.21977 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
022	81.56461		99.32063		0.0	1.82	244.98	20:14:59.17	0.100	spz	bp19	60	
023	81.52803		99.47859		0.0	6.45	221.29	20:14:59.18	0.100	spz	bp20	60	
016	81.49670		99.61419		0.0	10.58	218.01	20:14:59.16	0.100	spz	bp11	60	
021	81.46548		99.75652		0.0	14.78	217.01	20:14:59.18	0.100	spz	bp18	60	
017	81.43221		99.90630		0.0	19.25	216.40	20:14:59.18	0.100	spz	bp13	60	
018	81.30133	100.47694			0.0	36.71	215.34	20:14:59.18	0.100	spz	bp14	60	
024	81.27002	100.62267			0.0	40.99	215.46	20:14:59.17	0.100	spz	bp21	60	
025	81.23571	100.76780			0.0	45.54	215.34	20:14:59.17	0.100	spz	bp22	60	

Fig. 8A - Water wave section CD shot D08

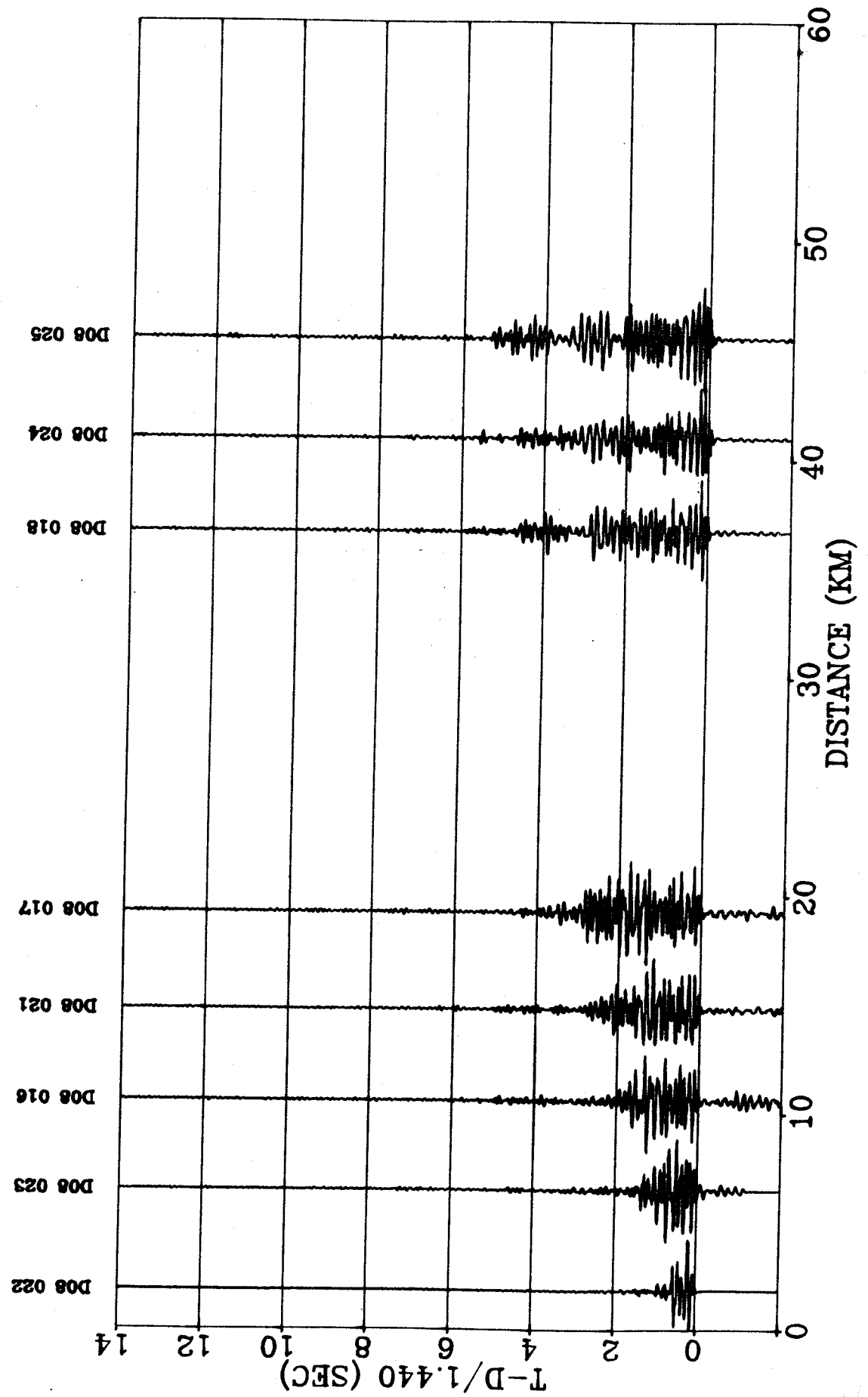
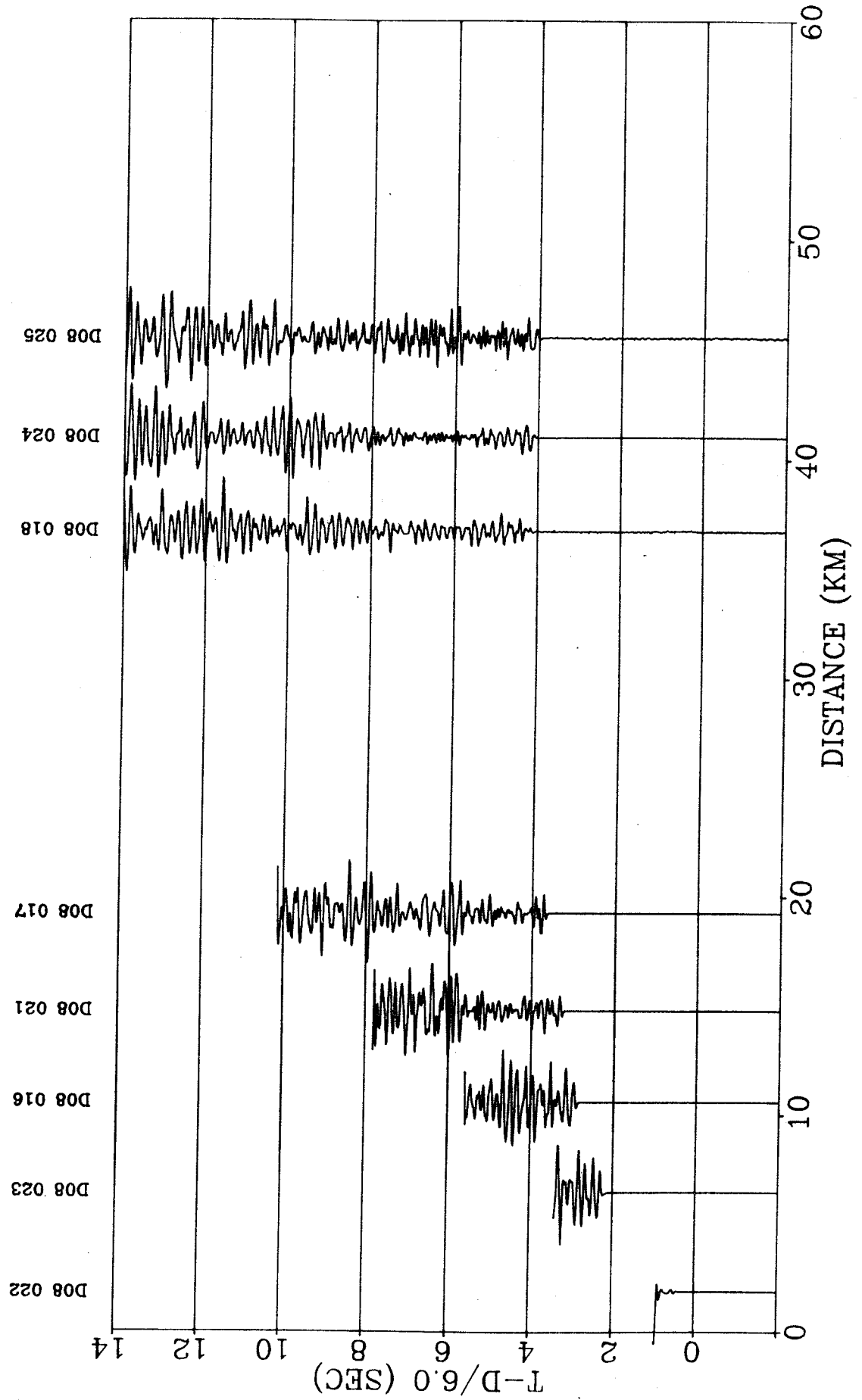


Fig. 8B - Seismic section CD shot D08



Line: I02 Shot: B09
 ** Ice Island 85 ** Field shot point: B Section: CD
 Shot time: 1985 APR. 23 20:30: 0.00
 Lat.: 80.64987 N, Long.: 102.05502 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 217.6 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
025	81.23571	100.76780	0.0	69.22	18.45	20:29:59.17	0.100	spz	bp22	60
024	81.27002	100.62267	0.0	73.67	19.24	20:29:59.17	0.100	spz	bp21	60
018	81.30133	100.47694	0.0	77.82	20.03	20:29:59.16	0.100	spz	bp14	60
017	81.43221	99.90630	0.0	95.01	22.10	20:29:59.18	0.100	spz	bp13	60
021	81.46548	99.75652	0.0	99.42	22.53	20:29:59.18	0.100	spz	bp18	60
016	81.49670	99.61419	0.0	103.58	22.90	20:29:59.18	0.100	spz	bp11	60
023	81.52803	99.47859	0.0	107.70	23.17	20:29:59.18	0.100	spz	bp20	60
022	81.56461	99.32063	0.0	112.51	23.46	20:29:59.18	0.100	spz	bp19	60

Fig. 9A - Water wave section CD shot B09

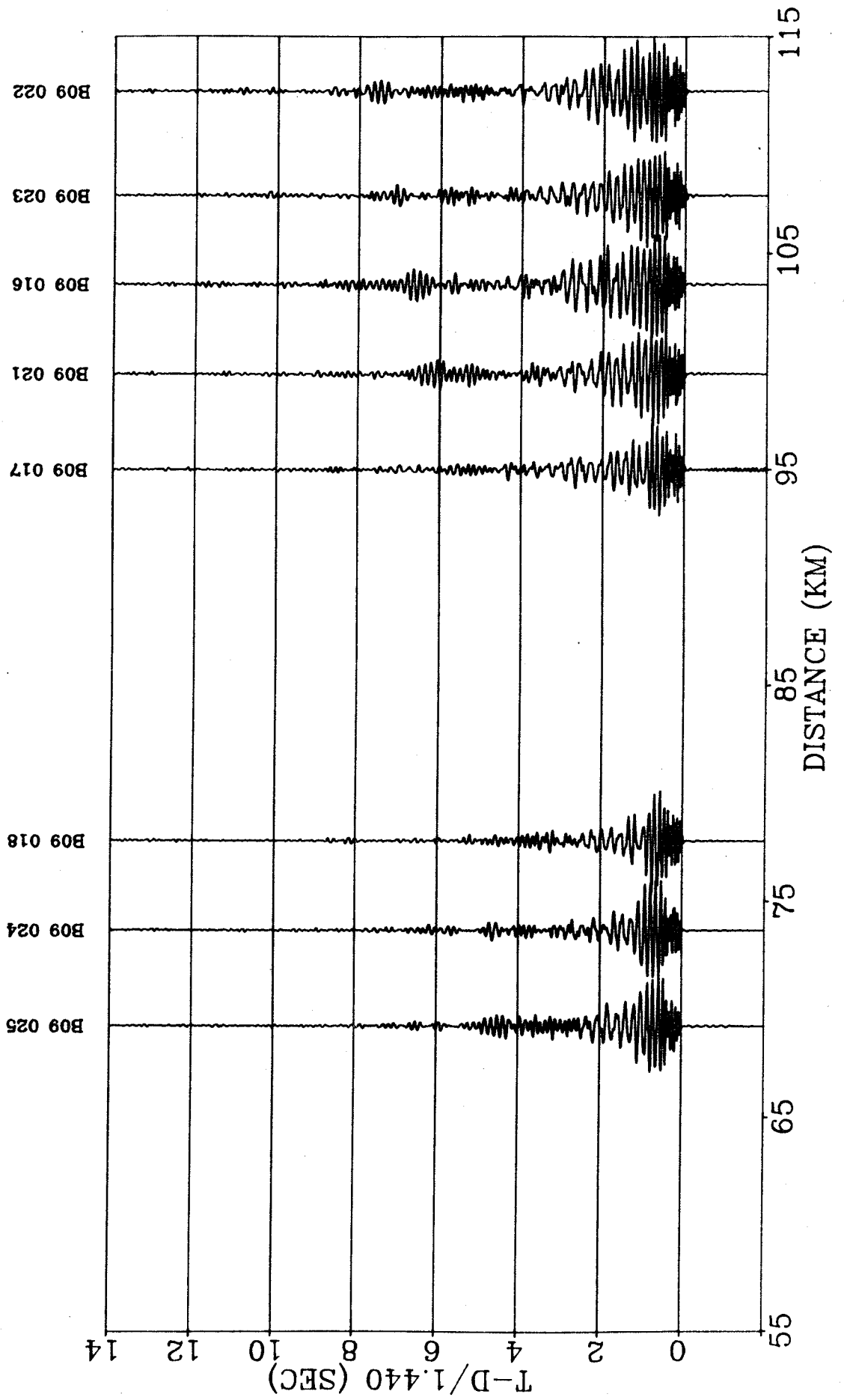
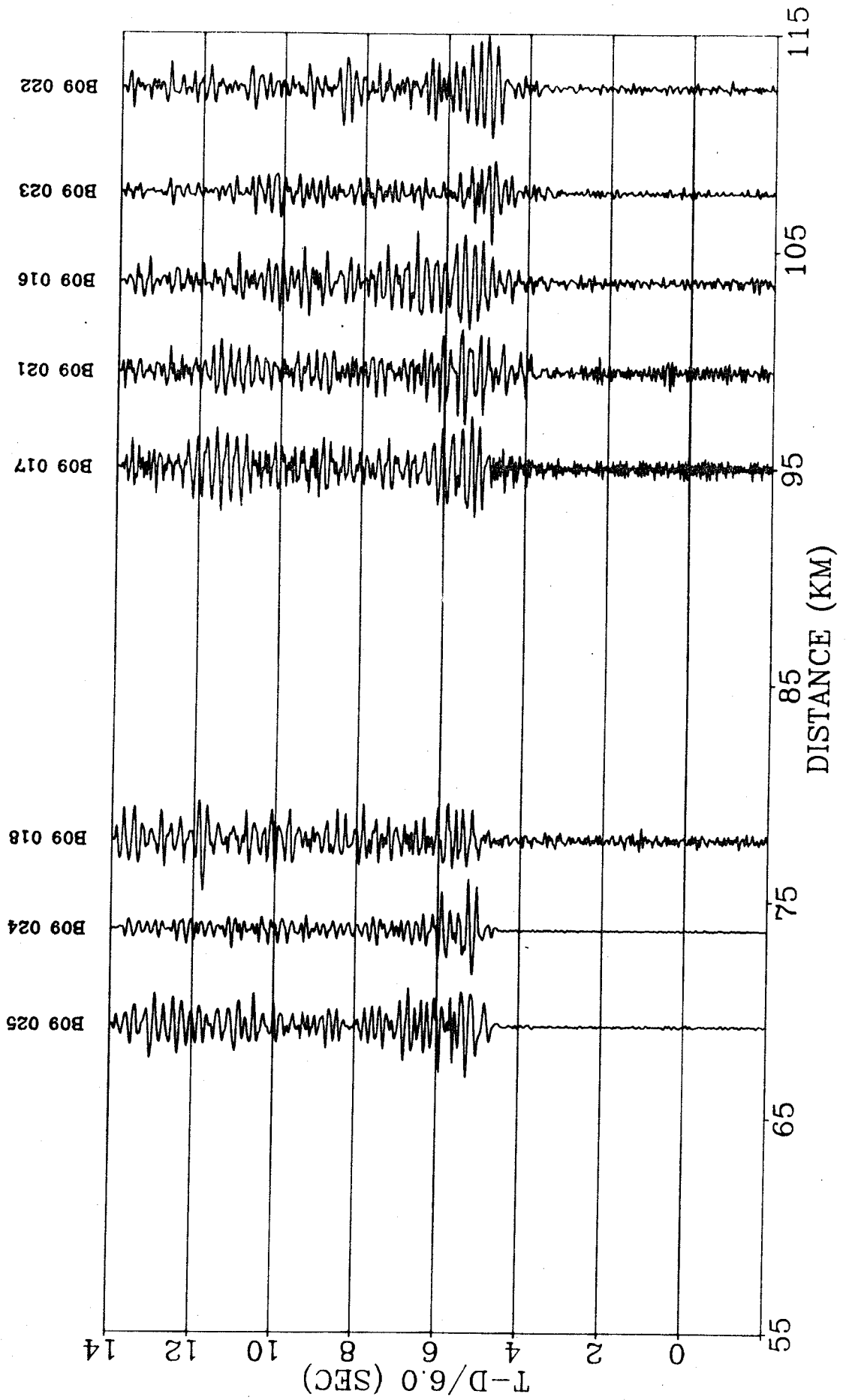


Fig. 9B - Seismic section CD shot B09



Line: I02 Shot: C10
** Ice Island 85 ** Field shot point: C1 Section: CD
Shot time: 1985 APR. 23 21: 1: 0.50
Lat.: 81.18403 N, Long.: 100.93756 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
025	81.23571		100.76780		0.0	6.46	26.57	20:59:59.18	0.100	spz	bp22	60	
024	81.27002		100.62267		0.0	11.00	29.03	20:59:59.17	0.100	spz	bp21	60	
018	81.30133		100.47694		0.0	15.26	30.65	20:59:59.18	0.100	spz	bpl4	60	
017	81.43221		99.90630		0.0	32.73	31.62	20:59:59.19	0.100	spz	bpl3	60	
021	81.46548		99.75652		0.0	37.20	31.75	20:59:59.18	0.100	spz	bpl8	60	
016	81.49670		99.61419		0.0	41.40	31.86	20:59:59.18	0.100	spz	bpl1	60	
023	81.52803		99.47859		0.0	45.56	31.80	20:59:59.18	0.100	spz	bp20	60	
022	81.56461		99.32063		0.0	50.39	31.71	20:59:59.17	0.100	spz	bpl9	60	

Fig. 10A - Water wave section CD shot C10

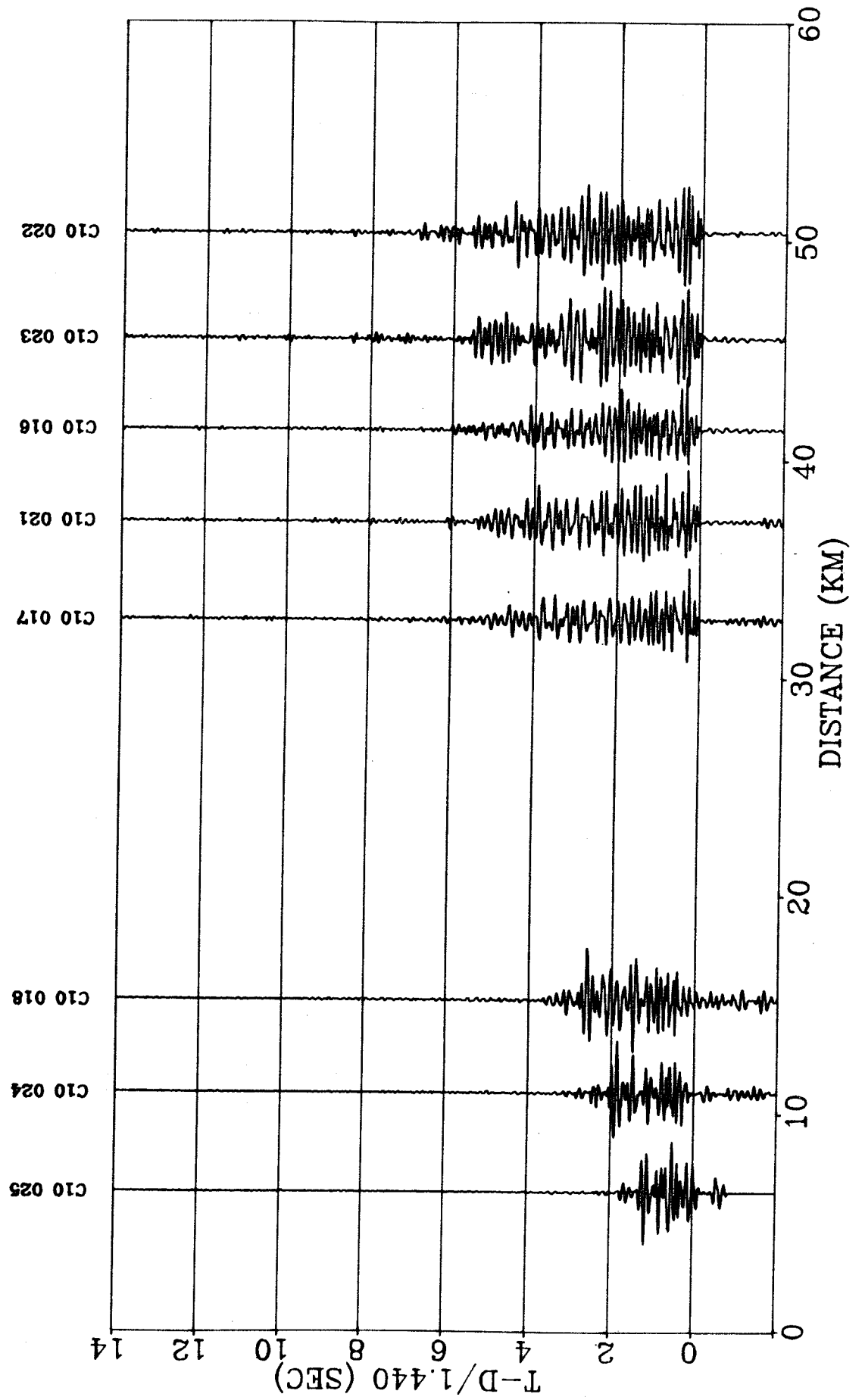
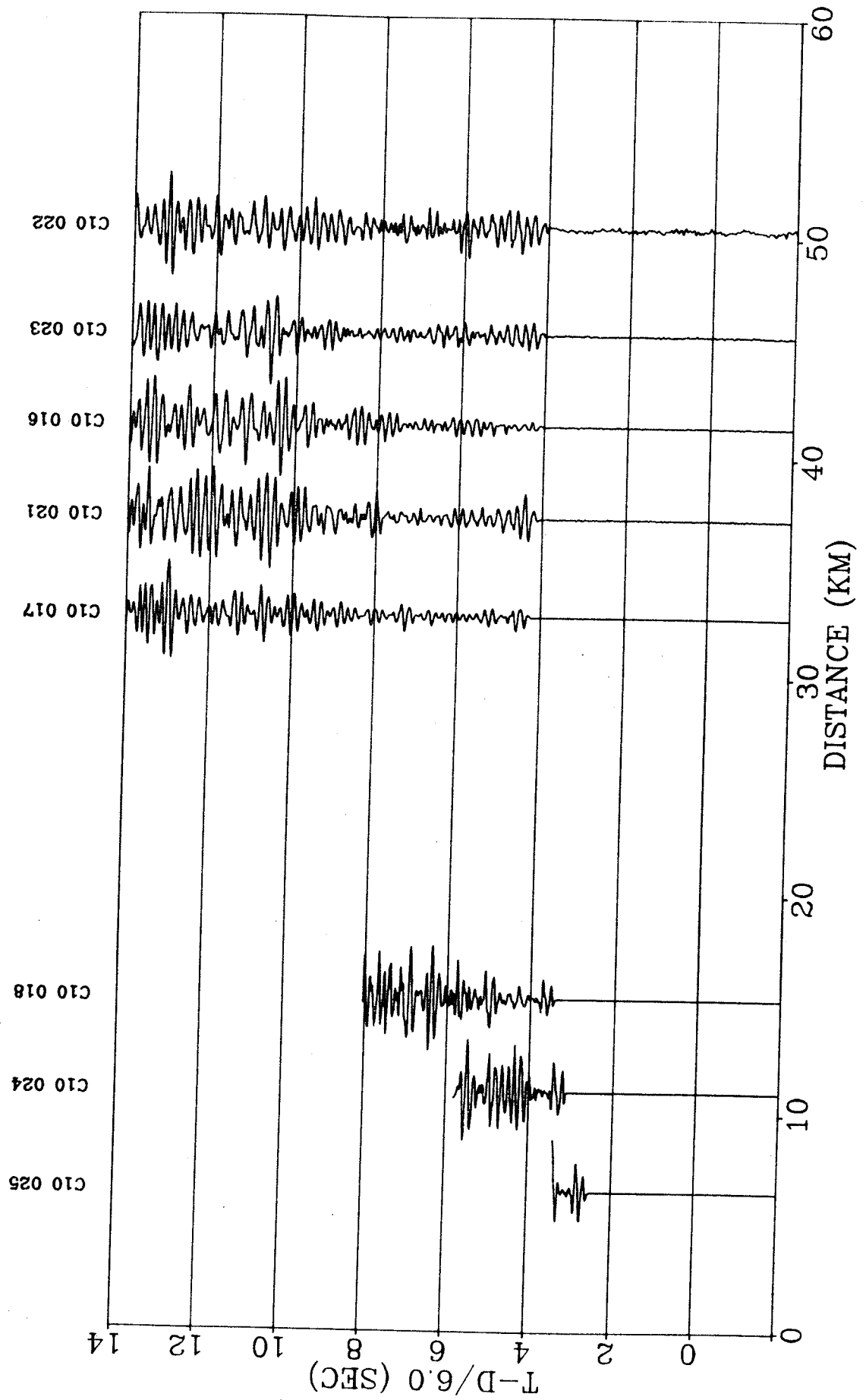


Fig. 10B - Seismic section CD shot C10



Line: I02 Shot: C11
 ** Ice Island 85 ** Field shot point: C2 Section: CD
 Shot time: 1985 APR. 23 21:31: 0.65
 Lat.: 81.21986 N, Long.: 100.82748 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
025	81.23571	100.76780	0.0	2.04	29.84	21:29:59.17	0.100	spz	bp22	60
024	81.27002	100.62267	0.0	6.60	31.76	21:29:59.17	0.100	spz	bp21	60
018	81.30133	100.47694	0.0	10.87	33.00	21:29:59.18	0.100	spz	bp14	60
017	81.43221	99.90630	0.0	28.34	32.74	21:29:59.18	0.100	spz	bp13	60
021	81.46548	99.75652	0.0	32.81	32.75	21:29:59.18	0.100	spz	bp18	60
016	81.49670	99.61419	0.0	37.02	32.77	21:29:59.17	0.100	spz	bp11	60
023	81.52803	99.47859	0.0	41.17	32.62	21:29:59.18	0.100	spz	bp20	60
022	81.56461	99.32063	0.0	46.01	32.45	21:29:59.17	0.100	spz	bp19	60

Fig. 11A - Water wave section CD shot C11

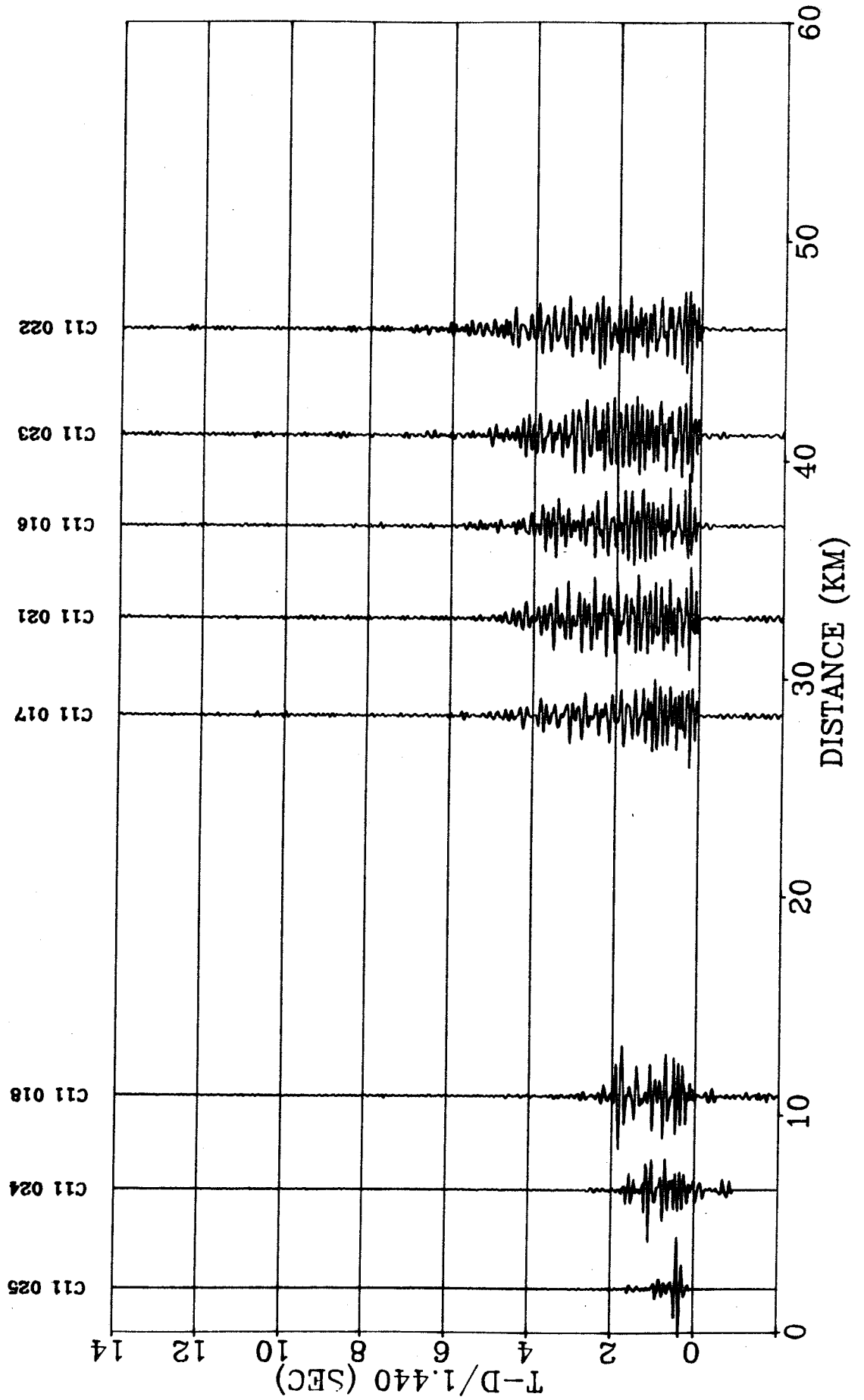
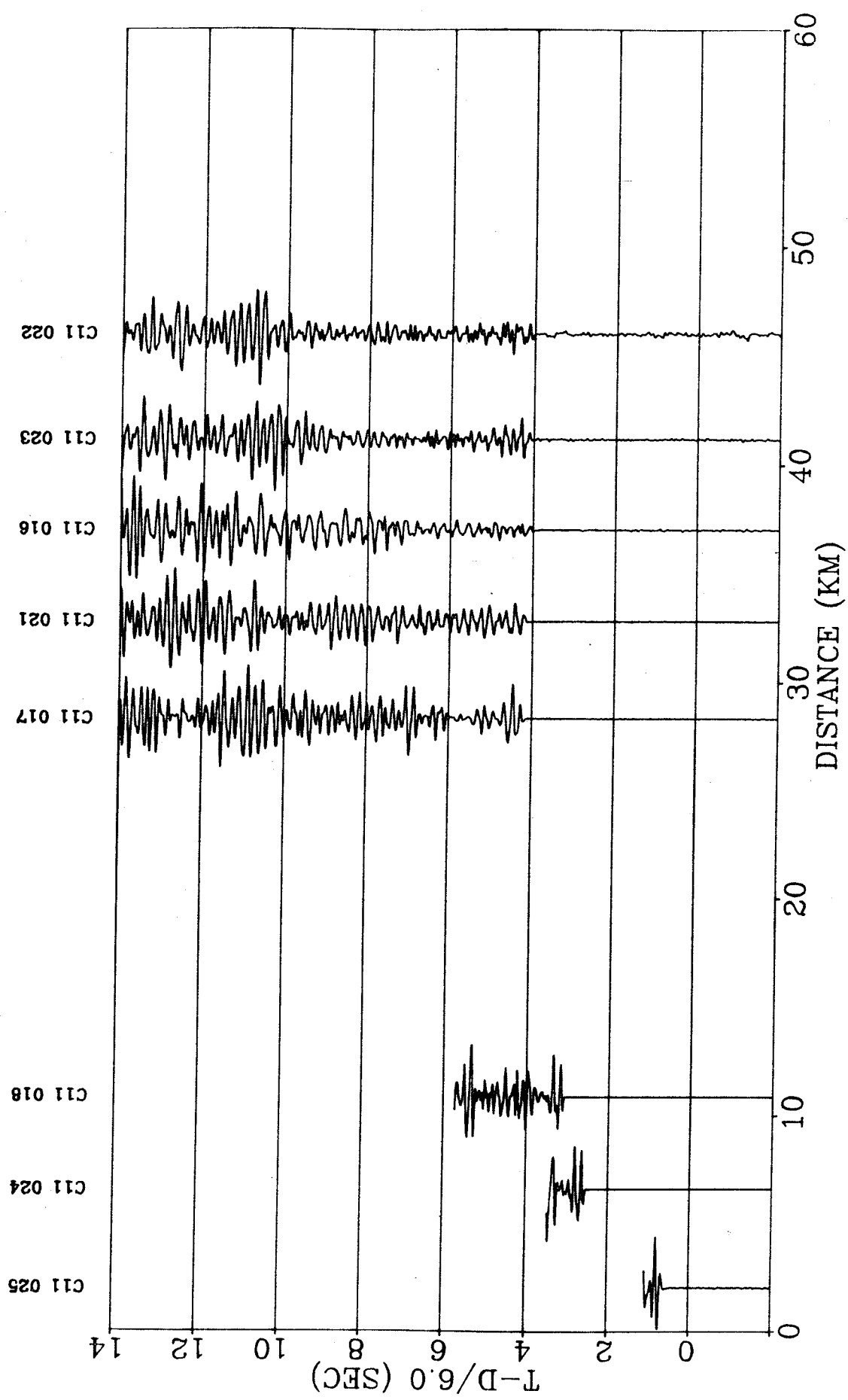


Fig. 11B - Seismic section CD shot C11



Line: I02 Shot: E12
** Ice Island 85 ** Field shot point: ELA Section: CD
Shot time: 1985 APR. 23 22: 0: 0.00
Lat.: 82.03069 N, Long.: 96.79432 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 217.6 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
022	81.56461		99.32063		0.0	65.79	218.97	21:59:59.18	0.100	spz	bp19	60	
023	81.52803		99.47859		0.0	70.62	218.70	21:59:59.17	0.100	spz	bp20	60	
016	81.49670		99.61419		0.0	74.76	218.51	21:59:59.18	0.100	spz	bp11	60	
021	81.46548		99.75652		0.0	78.97	218.43	21:59:59.18	0.100	spz	bp18	60	
017	81.43221		99.90630		0.0	83.44	218.34	21:59:59.17	0.100	spz	bp13	60	
018	81.30133	100.47694			0.0	100.90	218.03	21:59:59.18	0.100	spz	bp14	60	
024	81.27002	100.62267			0.0	105.18	218.07	21:59:59.16	0.100	spz	bp21	60	
025	81.23571	100.76780			0.0	109.73	218.01	21:59:59.17	0.100	spz	bp22	60	

Fig. 12A - Water wave section CD shot E12

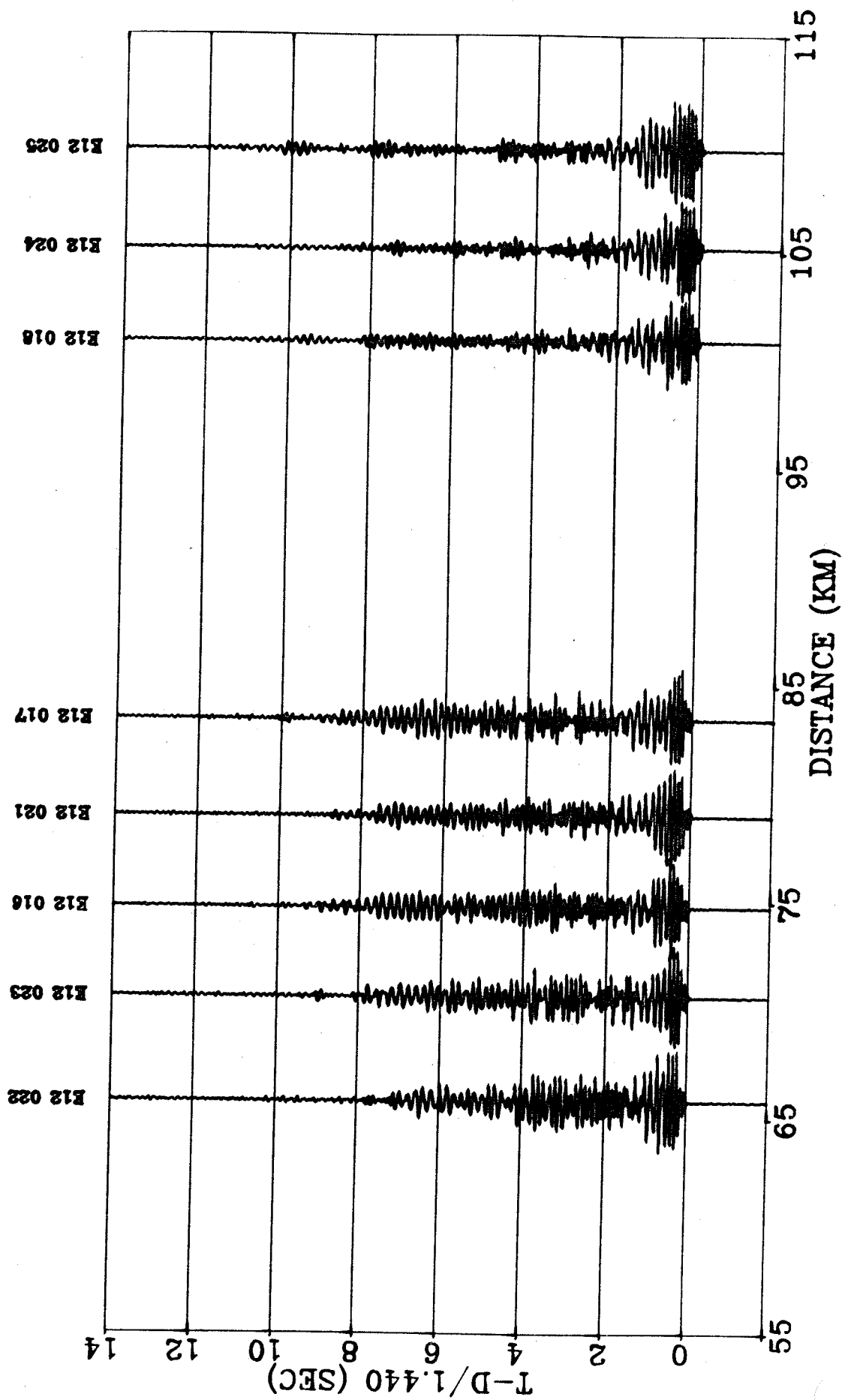
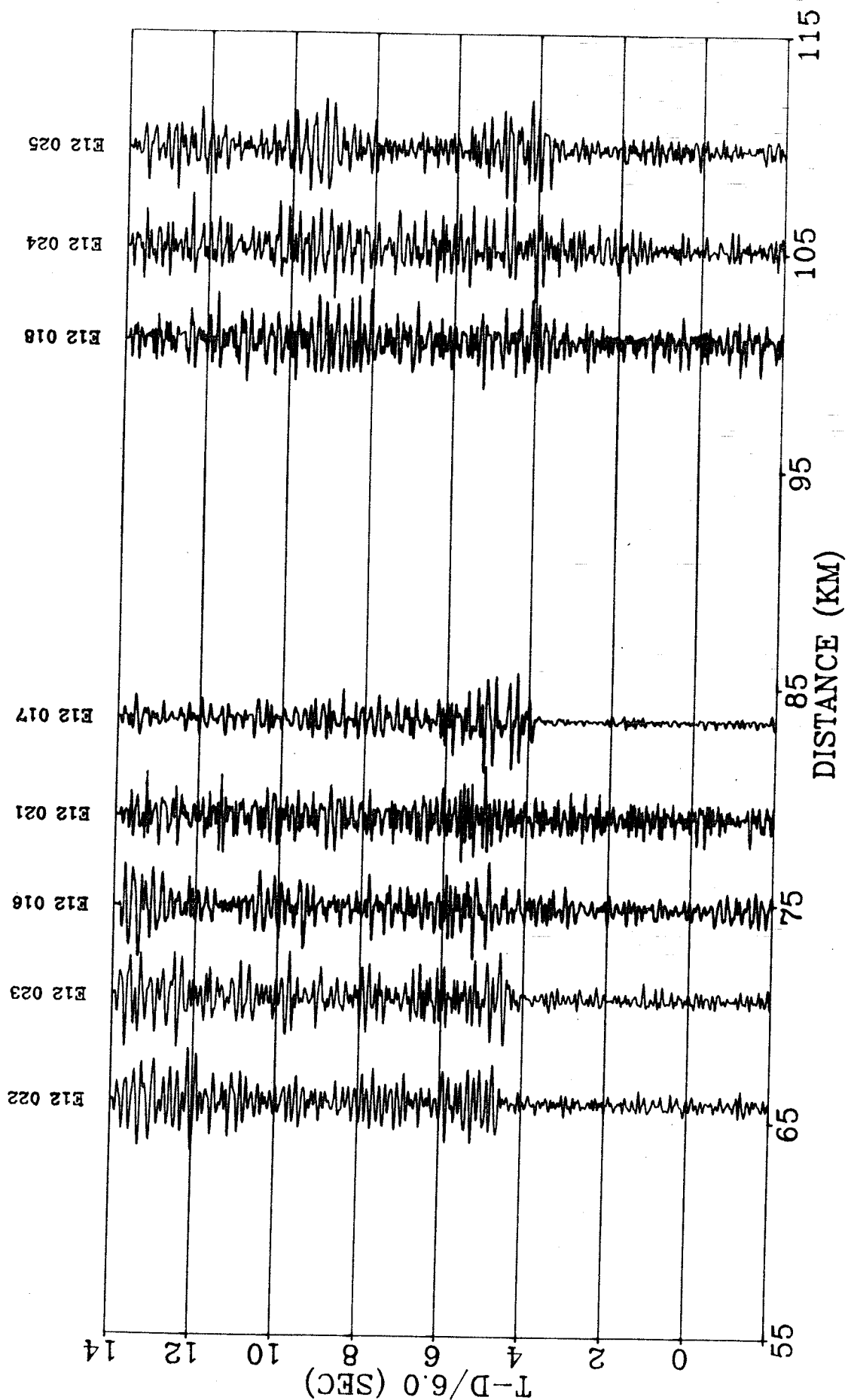


Fig. 12B - Seismic section CD shot E12



Line: I02 Shot: F13
 ** Ice Island 85 ** Field shot point: F Section: CD
 Shot time: 1985 APR. 23 22:45: 0.00
 Lat.: 82.41583 N, Long.: 94.39083 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 435.2 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
022	81.56461	99.32063	0.0	122.08	221.37	22:44:59.17	0.100	spz	bpl9	60
023	81.52803	99.47859	0.0	126.91	221.21	22:44:59.16	0.100	spz	bp20	60
016	81.49670	99.61419	0.0	131.05	221.10	22:44:59.17	0.100	spz	bpl1	60
021	81.46548	99.75652	0.0	135.26	221.04	22:44:59.18	0.100	spz	bpl8	60
017	81.43221	99.90630	0.0	139.73	220.99	22:44:59.17	0.100	spz	bpl3	60
018	81.30133	100.47694	0.0	157.18	220.76	22:44:59.17	0.100	spz	bpl4	60
024	81.27002	100.62267	0.0	161.46	220.77	22:44:59.16	0.100	spz	bp21	60
025	81.23571	100.76780	0.0	166.02	220.72	22:44:59.16	0.100	spz	bp22	60

Fig. 13A - Water wave section CD shot F13

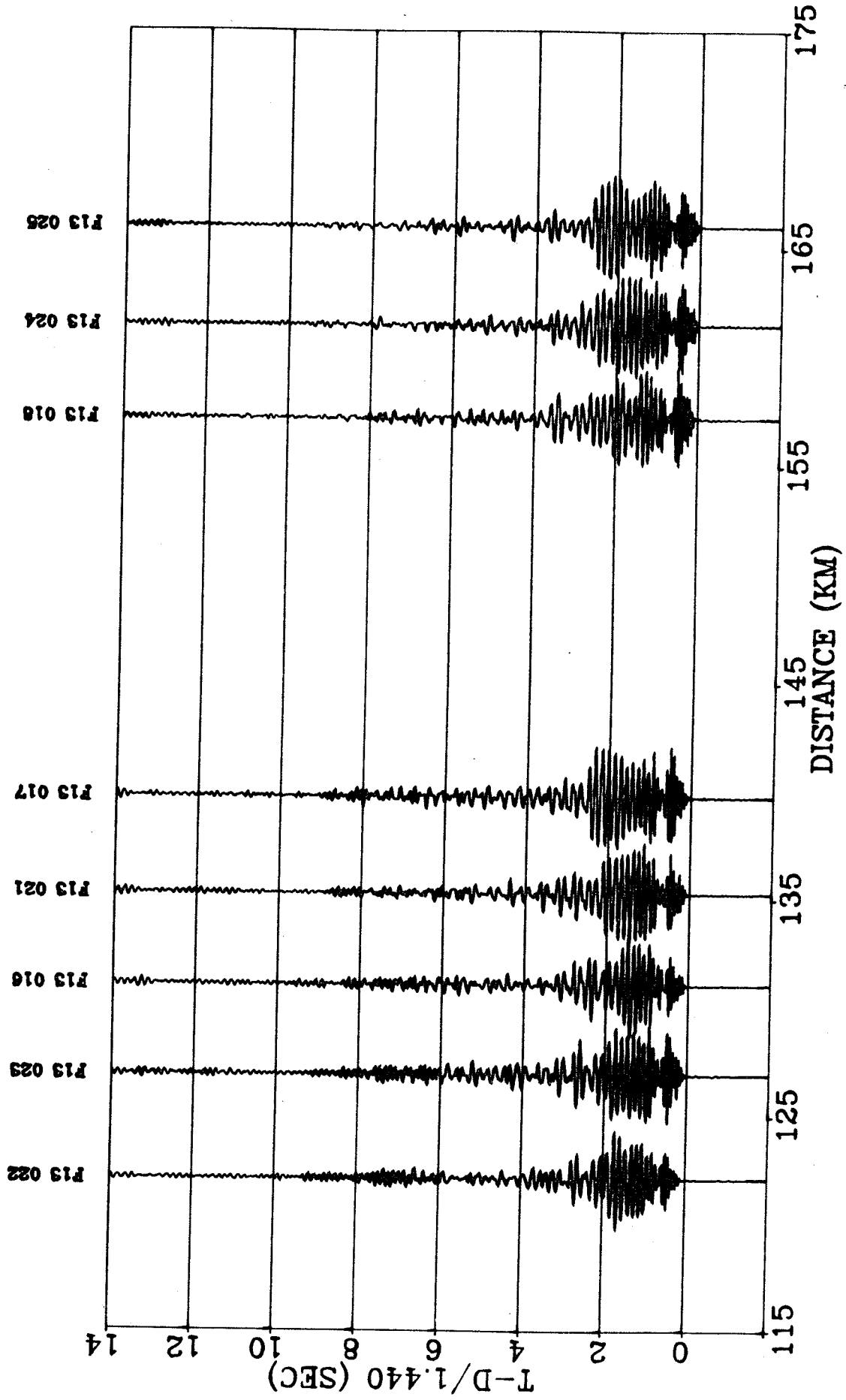
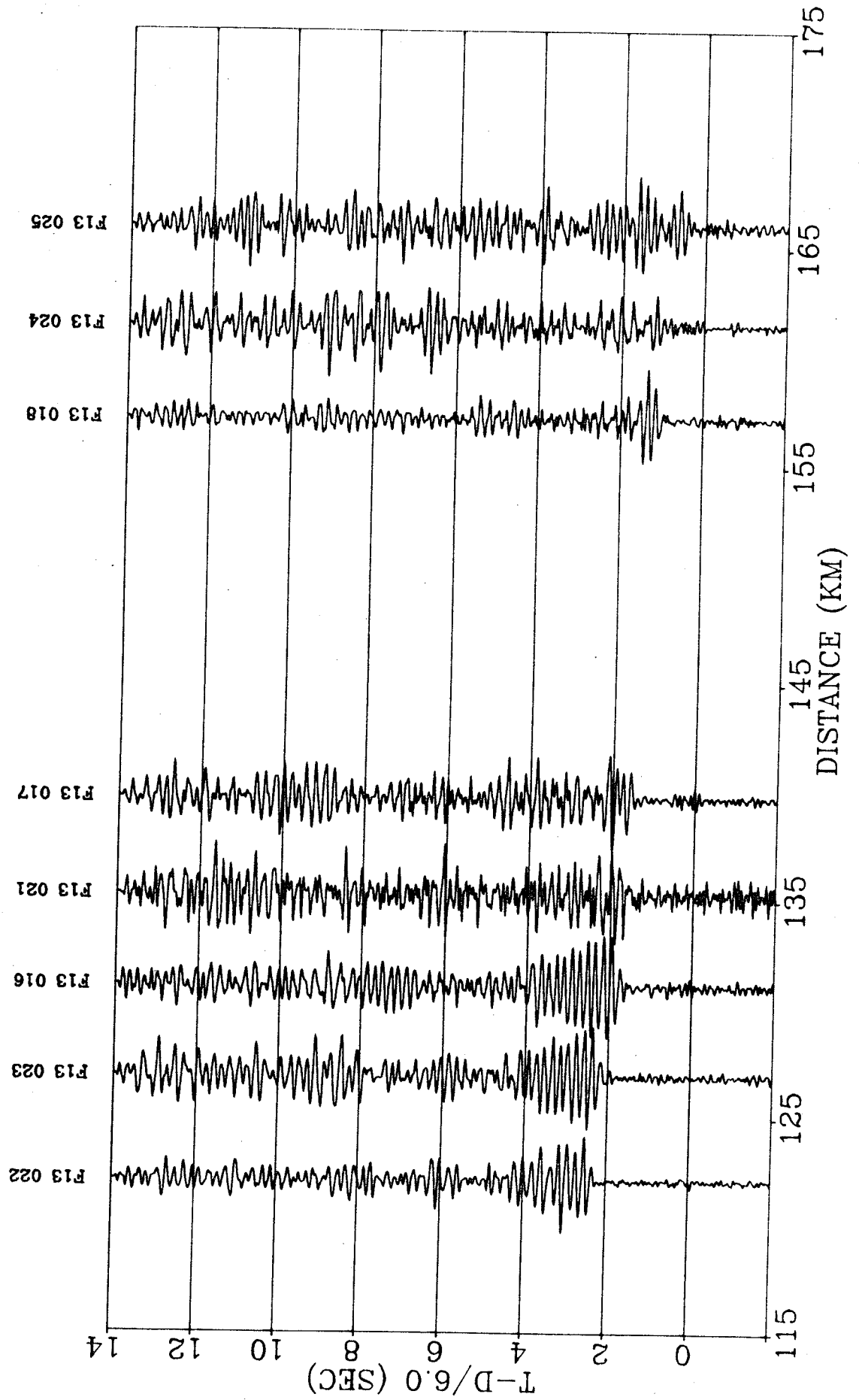


Fig. 13B - Seismic section CD shot F13



Line: I03 Shot: A14
 ** Ice Island 85 ** Field shot point: A Section: BC
 Shot time: 1985 APR. 25 19:40: 0.00
 Lat.: 80.20583 N, Long.: 103.41500 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 217.6 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
034	80.70045		101.93373		0.0	61.67	25.69	19:39:59.17	0.100	spz	bp19	60	
030	80.74039		101.92685		0.0	65.72	24.01	19:39:59.16	0.100	spz	bp14	60	
027	80.78258		101.83556		0.0	70.68	23.56	19:39:59.15	0.100	spz	bp11	60	
028	80.82467		101.74206		0.0	75.65	23.19	19:39:59.16	0.100	spz	bp12	60	
033	80.86778		101.64938		0.0	80.71	22.81	19:39:59.16	0.100	spz	bp18	60	
031	80.91032		101.54966		0.0	85.76	22.56	19:39:59.17	0.100	spz	bp16	60	
026	80.95191		101.46529		0.0	90.61	22.20	19:39:59.17	0.100	spz	bp10	60	
036	80.99648		101.36849		0.0	95.84	21.91	19:39:59.15	0.100	spz	bp21	60	
037	81.03681		101.26775		0.0	100.67	21.78	19:39:59.17	0.100	spz	bp22	60	
032	81.07938		101.18800		0.0	105.58	21.42	19:39:59.17	0.100	spz	bp17	60	
029	81.12155		101.08638		0.0	110.60	21.28	19:39:59.15	0.100	spz	bp13	60	
035	81.17748		100.94619		0.0	117.29	21.13	19:39:59.17	0.100	spz	bp20	60	

Fig. 14A - Water wave section BC shot A14

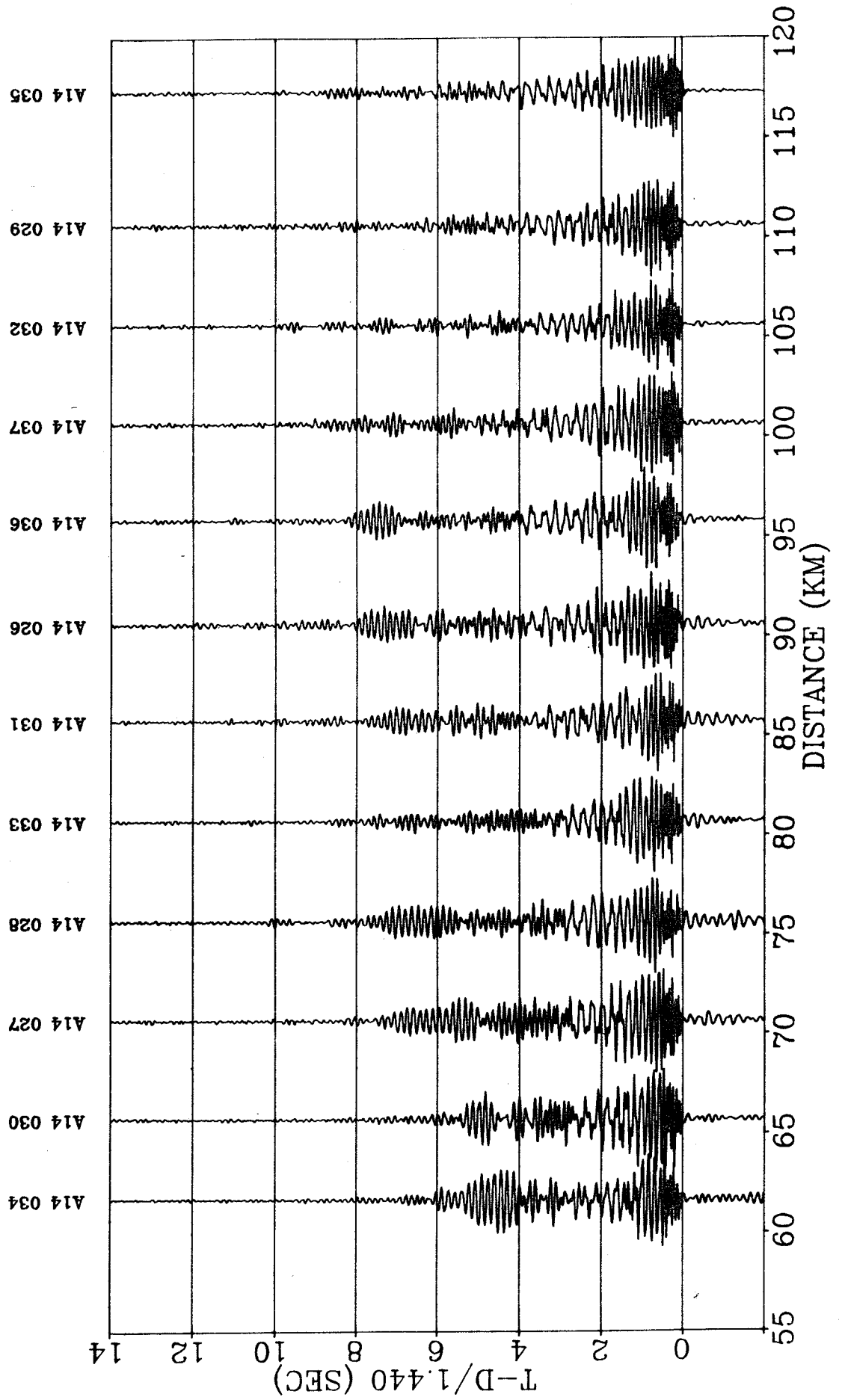
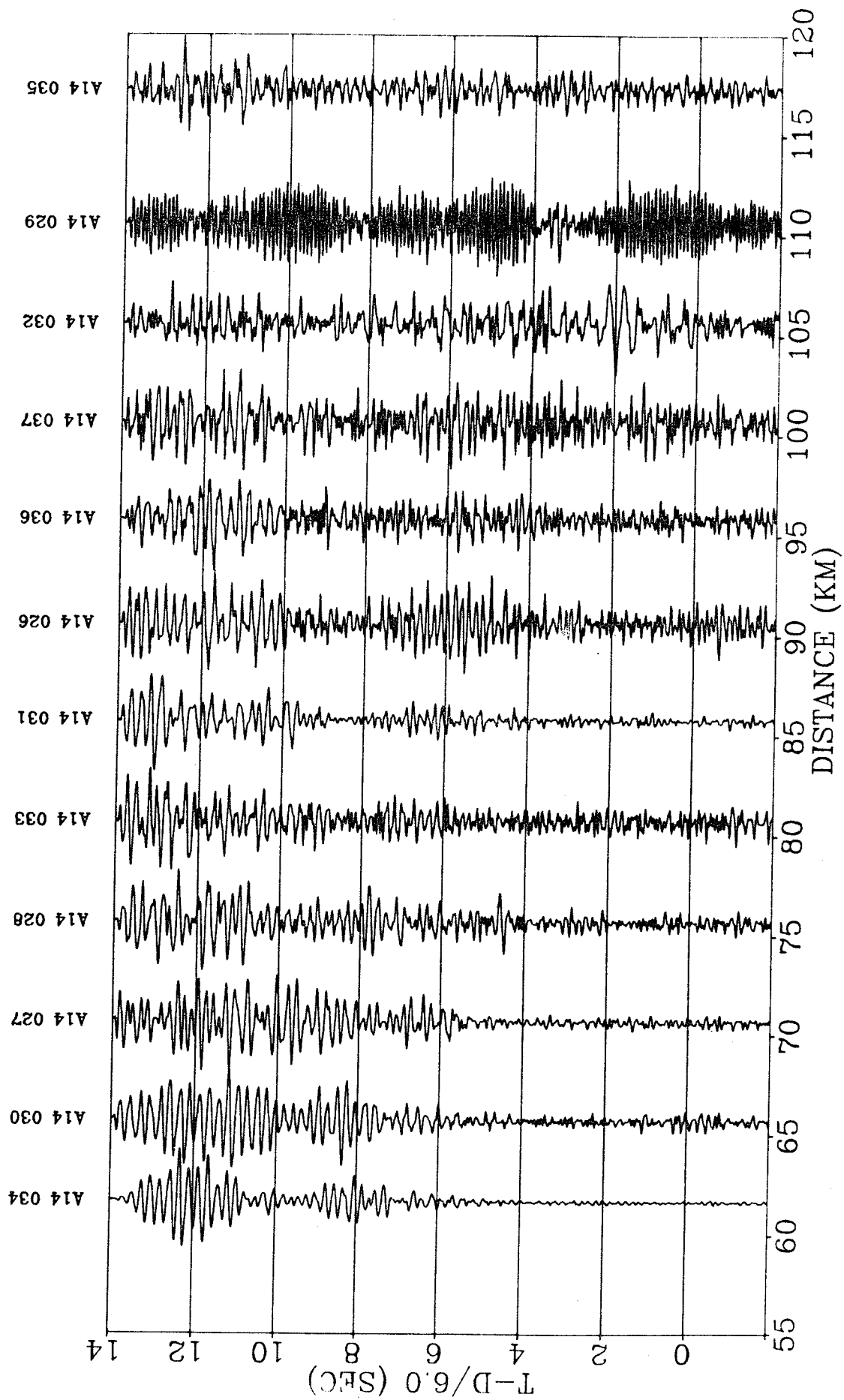


Fig. 14B - Seismic section BC shot A14



Line: I03 Shot: B15
 ** Ice Island 85 ** Field shot point: B2 Section: BC
 Shot time: 1985 APR. 25 20:21: 5.10
 Lat.: 80.64987 N, Long.: 102.05502 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
034	80.70045		101.93373		0.0	6.06	21.18	20:19:59.17	0.100		spz	bp19	60
030	80.74039		101.92685		0.0	10.37	12.83	20:19:59.16	0.100		spz	bp14	60
027	80.78258		101.83556		0.0	15.34	14.83	20:19:59.17	0.100		spz	bp11	60
028	80.82467		101.74206		0.0	20.31	15.92	20:19:59.18	0.100		spz	bp12	60
033	80.86778		101.64938		0.0	25.40	16.45	20:19:59.17	0.100		spz	bp18	60
031	80.91032		101.54966		0.0	30.46	17.02	20:19:59.18	0.100		spz	bp16	60
026	80.95191		101.46529		0.0	35.33	17.05	20:19:59.17	0.100		spz	bp10	60
036	80.99648		101.36849		0.0	40.59	17.19	20:19:59.17	0.100		spz	bp21	60
037	81.03681		101.26775		0.0	45.42	17.56	20:19:59.17	0.100		spz	bp22	60
032	81.07938		101.18800		0.0	50.37	17.35	20:19:59.18	0.100		spz	bp17	60
029	81.12155		101.08638		0.0	55.39	17.54	20:19:59.17	0.100		spz	bp13	60
035	81.17748		100.94619		0.0	62.08	17.82	20:19:59.17	0.100		spz	bp20	60

Fig. 15A - Water wave section BC shot B15

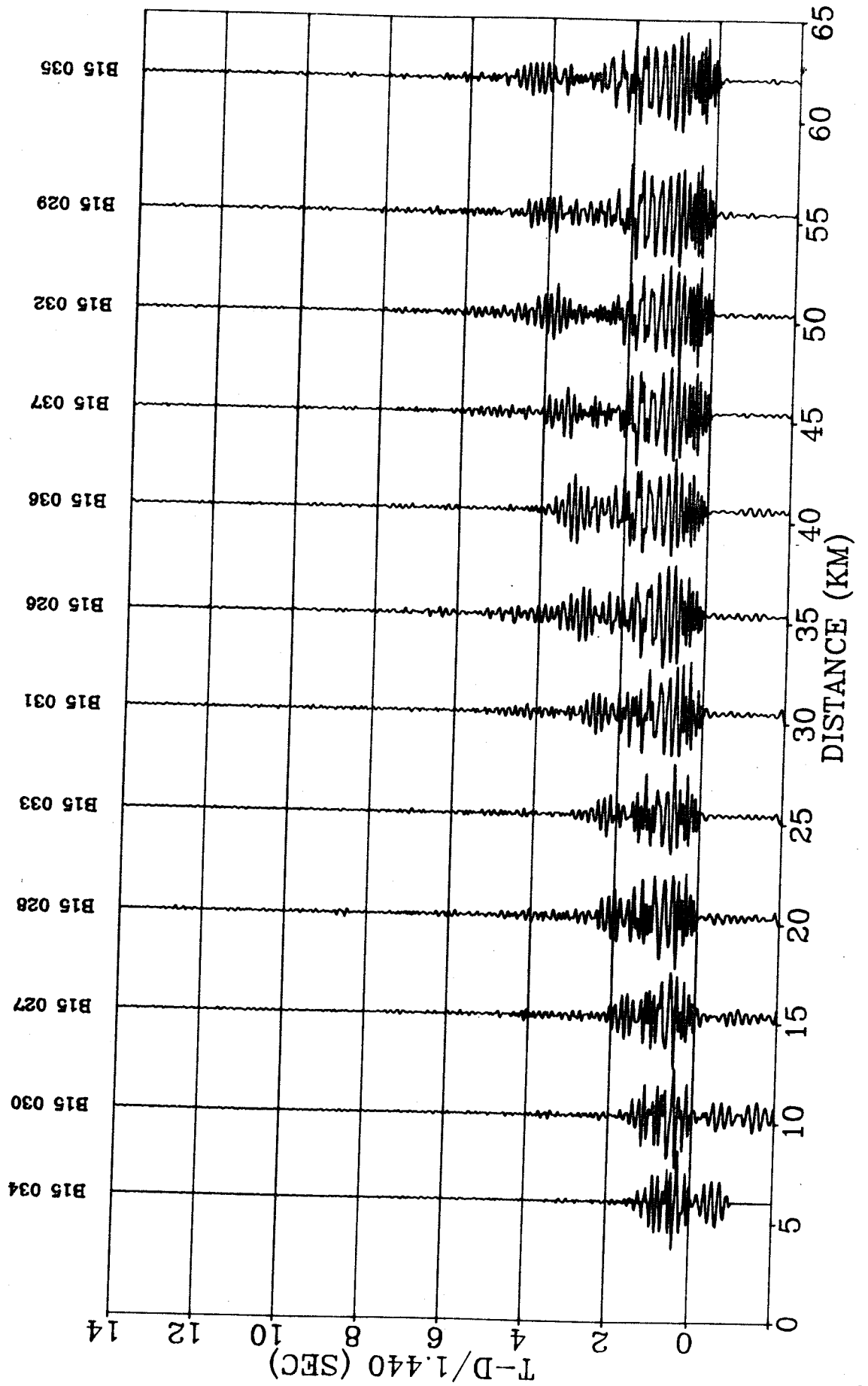
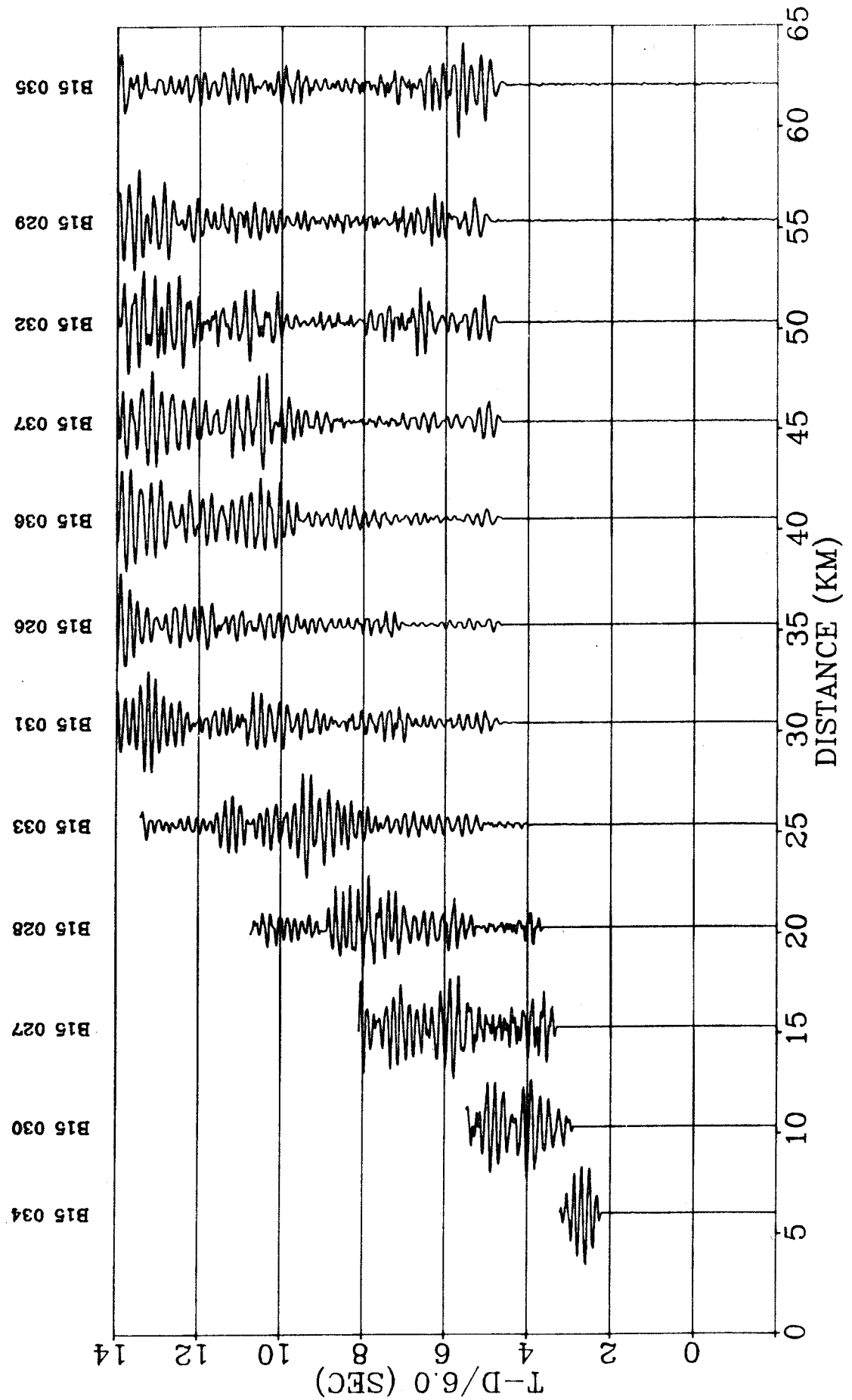


Fig. 15B - Seismic section BC shot B15



Line: I03 Shot: B16
 ** Ice Island 85 ** Field shot point: B3 Section: BC
 Shot time: 1985 APR. 25 20:41: 0.00
 Lat.: 80.67594 N, Long.: 102.06402 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
034	80.70045	101.93373	0.0	3.61	40.64	20:39:59.17	0.100	spz	bp19	60
030	80.74039	101.92685	0.0	7.61	18.90	20:39:59.17	0.100	spz	bp14	60
027	80.78258	101.83556	0.0	12.60	18.93	20:39:59.17	0.100	spz	bp11	60
028	80.82467	101.74206	0.0	17.59	19.03	20:39:59.16	0.100	spz	bp12	60
033	80.86778	101.64938	0.0	22.67	18.92	20:39:59.17	0.100	spz	bp18	60
031	80.91032	101.54966	0.0	27.74	19.10	20:39:59.18	0.100	spz	bp16	60
026	80.95191	101.46529	0.0	32.61	18.81	20:39:59.16	0.100	spz	bp10	60
036	80.99648	101.36849	0.0	37.87	18.72	20:39:59.17	0.100	spz	bp21	60
037	81.03681	101.26775	0.0	42.70	18.93	20:39:59.18	0.100	spz	bp22	60
032	81.07938	101.18800	0.0	47.65	18.57	20:39:59.16	0.100	spz	bp17	60
029	81.12155	101.08638	0.0	52.67	18.66	20:39:59.17	0.100	spz	bp13	60
035	81.17748	100.94619	0.0	59.36	18.82	20:39:59.17	0.100	spz	bp20	60

Fig. 16A - Water wave section BC shot B16

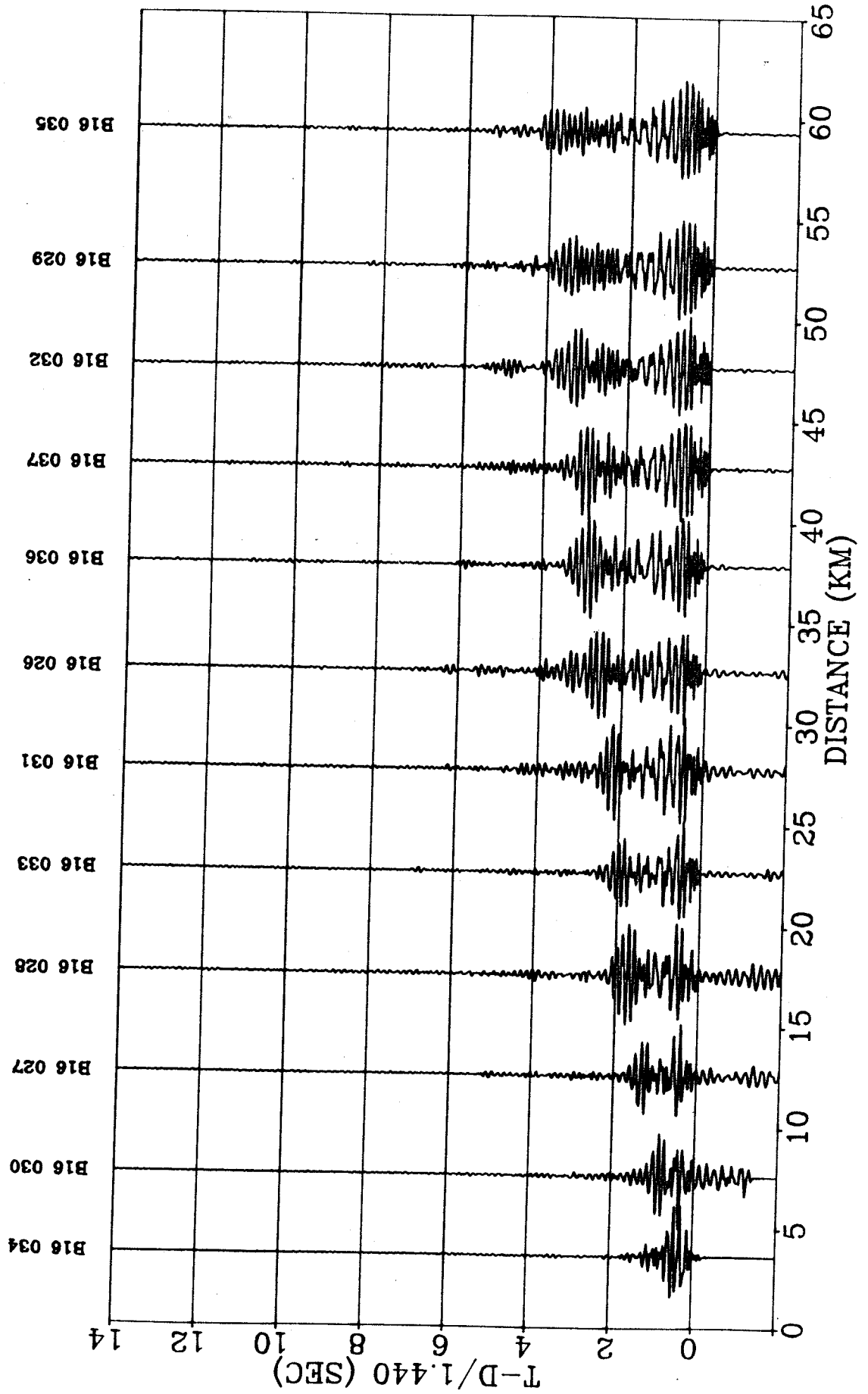
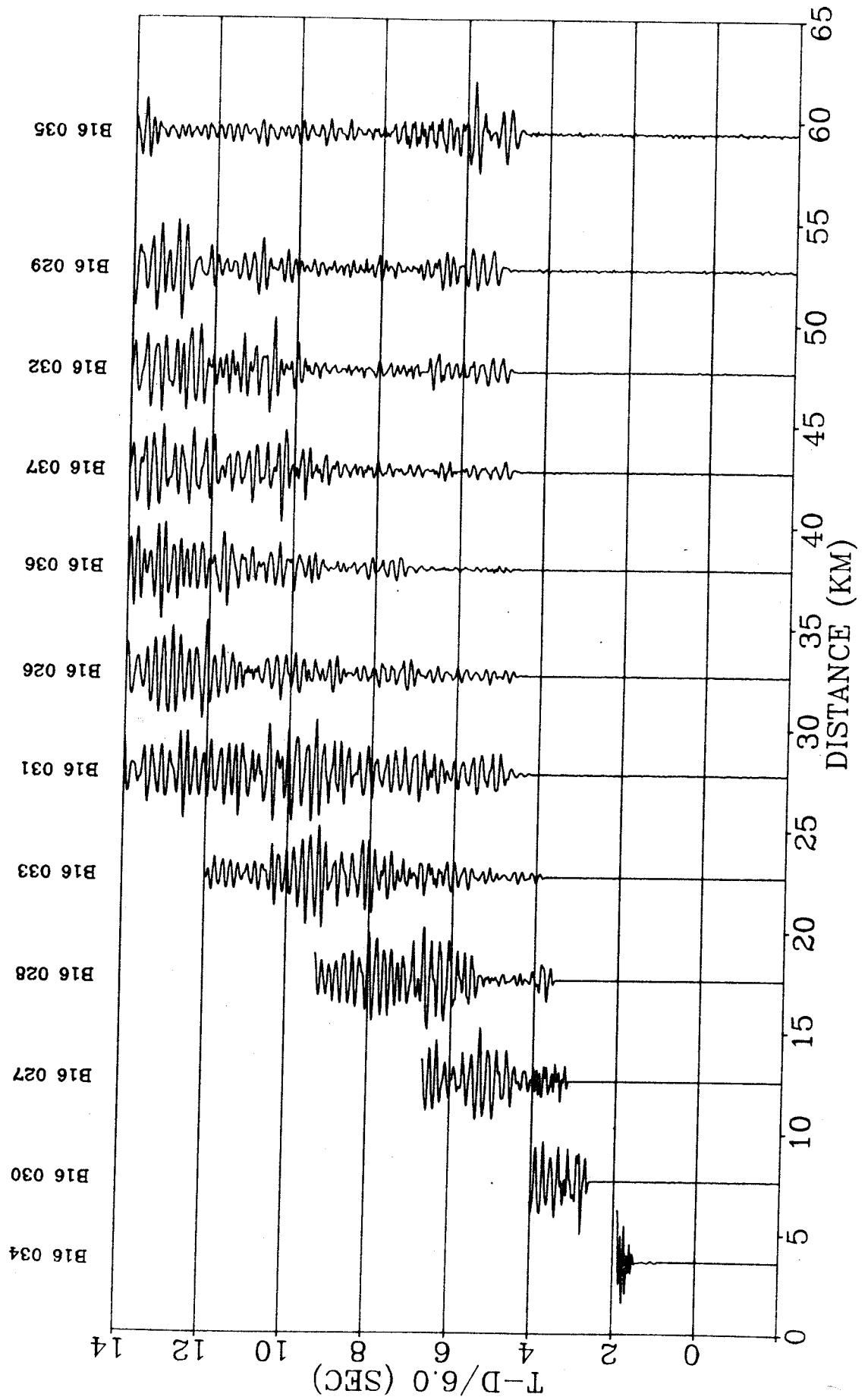


Fig. 16B - Seismic section BC shot B16



Line: I03 Shot: D17
 ** Ice Island 85 ** Field shot point: D2A Section: BC
 Shot time: 1985 APR. 25 21: 0: 0.00
 Lat.: 81.63134 N, Long.: 98.91213 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 217.6 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
035	81.17748	100.94619	0.0	61.00	214.83	20:59:59.16	0.100	spz	bp20	60
029	81.12155	101.08638	0.0	67.57	213.68	20:59:59.15	0.100	spz	bpl3	60
032	81.07938	101.18800	0.0	72.51	212.92	20:59:59.17	0.100	spz	bpl7	60
037	81.03681	101.26775	0.0	77.31	212.01	20:59:59.17	0.100	spz	bp22	60
036	80.99648	101.36849	0.0	82.10	211.52	20:59:59.17	0.100	spz	bp21	60
026	80.95191	101.46529	0.0	87.28	210.91	20:59:59.17	0.100	spz	bpl0	60
031	80.91032	101.54966	0.0	92.08	210.35	20:59:59.16	0.100	spz	bpl6	60
033	80.86778	101.64938	0.0	97.11	209.97	20:59:59.15	0.100	spz	bpl8	60
028	80.82467	101.74206	0.0	102.14	209.55	20:59:59.18	0.100	spz	bpl2	60
027	80.78258	101.83556	0.0	107.09	209.22	20:59:59.17	0.100	spz	bpl1	60
030	80.74039	101.92685	0.0	112.04	208.91	20:59:59.17	0.100	spz	bpl4	60
034	80.70045	101.93373	0.0	116.12	208.00	20:59:59.15	0.100	spz	bpl9	60

Fig. 17A - Water wave section BC shot D17

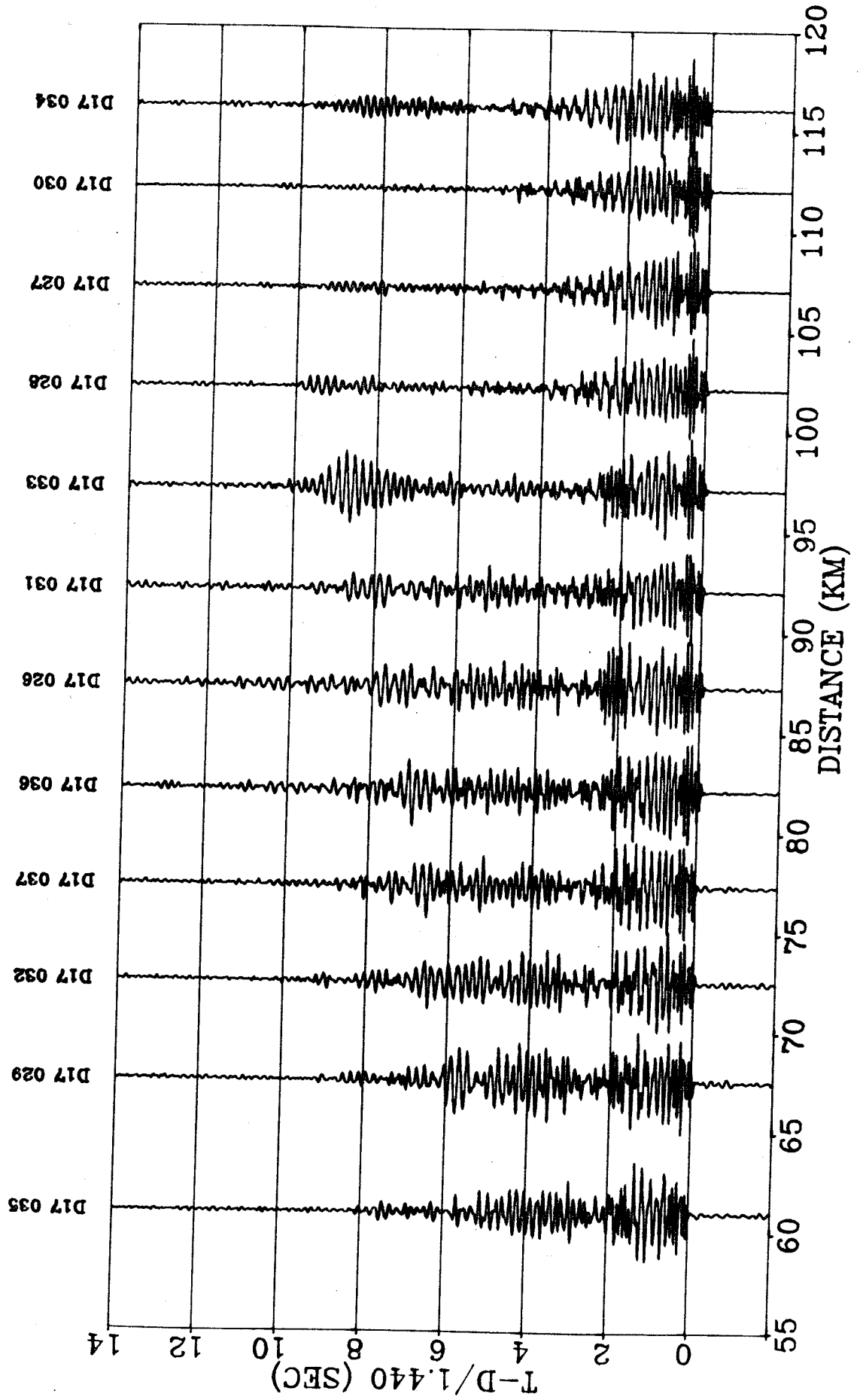
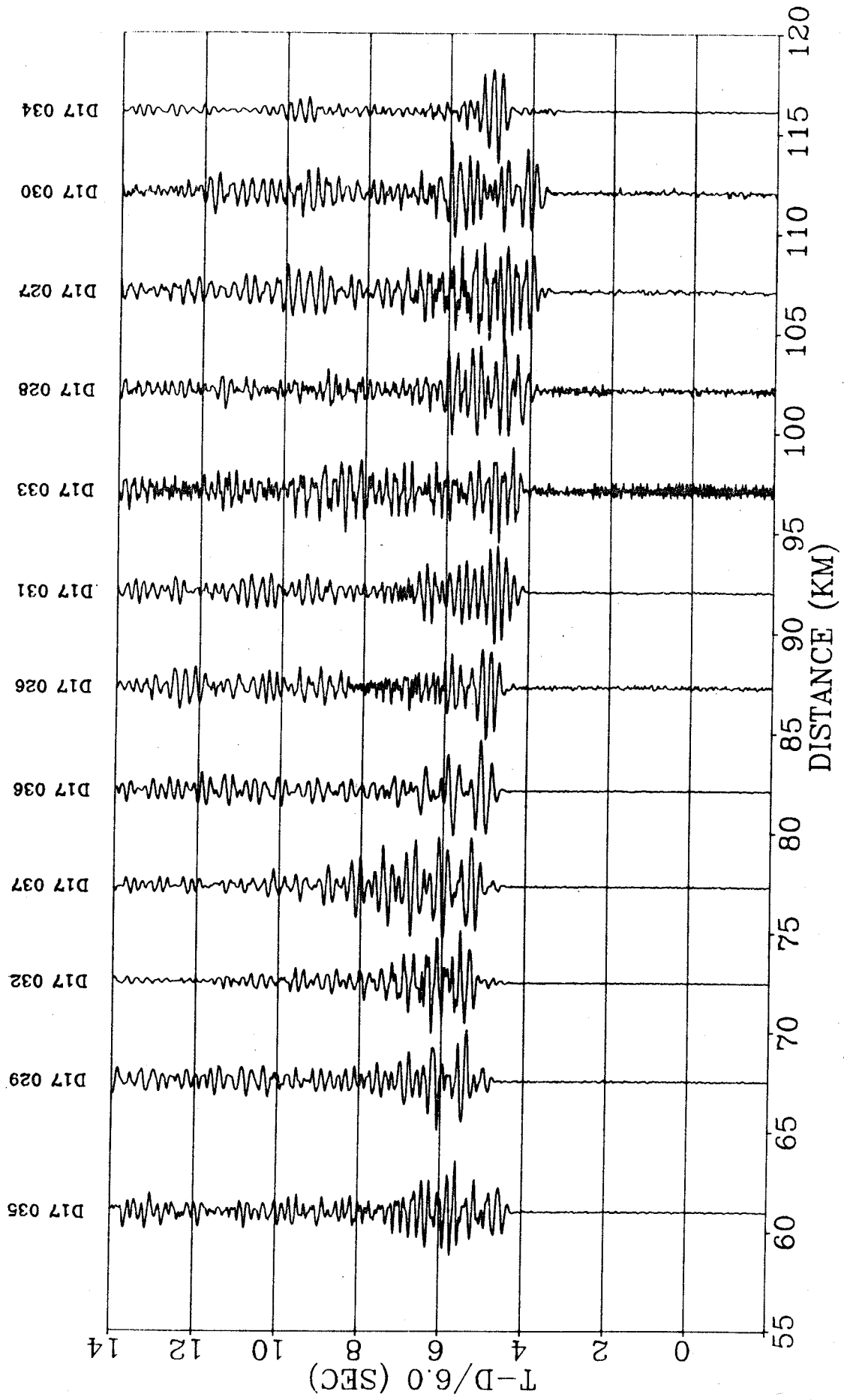


Fig. 17B - Seismic section BC shot D17



Line: I03 Shot: E18
 ** Ice Island 85 ** Field shot point: ELA Section: BC
 Shot time: 1985 APR. 25 21:40: 0.00
 Lat.: 82.03069 N, Long.: 96.79432 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 435.2 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
035	81.17748		100.94619		0.0	116.83	217.46	21:39:59.17	0.100	spz	bp20	60	
029	81.12155		101.08638		0.0	123.38	216.81	21:39:59.17	0.100	spz	bp13	60	
032	81.07938		101.18800		0.0	128.30	216.34	21:39:59.15	0.100	spz	bp17	60	
037	81.03681		101.26775		0.0	133.08	215.76	21:39:59.16	0.100	spz	bp22	60	
036	80.99648		101.36849		0.0	137.84	215.41	21:39:59.17	0.100	spz	bp21	60	
026	80.95191		101.46529		0.0	142.99	214.97	21:39:59.18	0.100	spz	bp10	60	
031	80.91032		101.54966		0.0	147.75	214.56	21:39:59.17	0.100	spz	bp16	60	
033	80.86778		101.64938		0.0	152.75	214.25	21:39:59.15	0.100	spz	bp18	60	
028	80.82467		101.74206		0.0	157.76	213.91	21:39:59.16	0.100	spz	bp12	60	
027	80.78258		101.83556		0.0	162.68	213.63	21:39:59.17	0.100	spz	bp11	60	
030	80.74039		101.92685		0.0	167.60	213.35	21:39:59.17	0.100	spz	bp14	60	
034	80.70045		101.93373		0.0	171.60	212.68	21:39:59.15	0.100	spz	bp19	60	

Fig. 18A - Water wave section BC shot E18

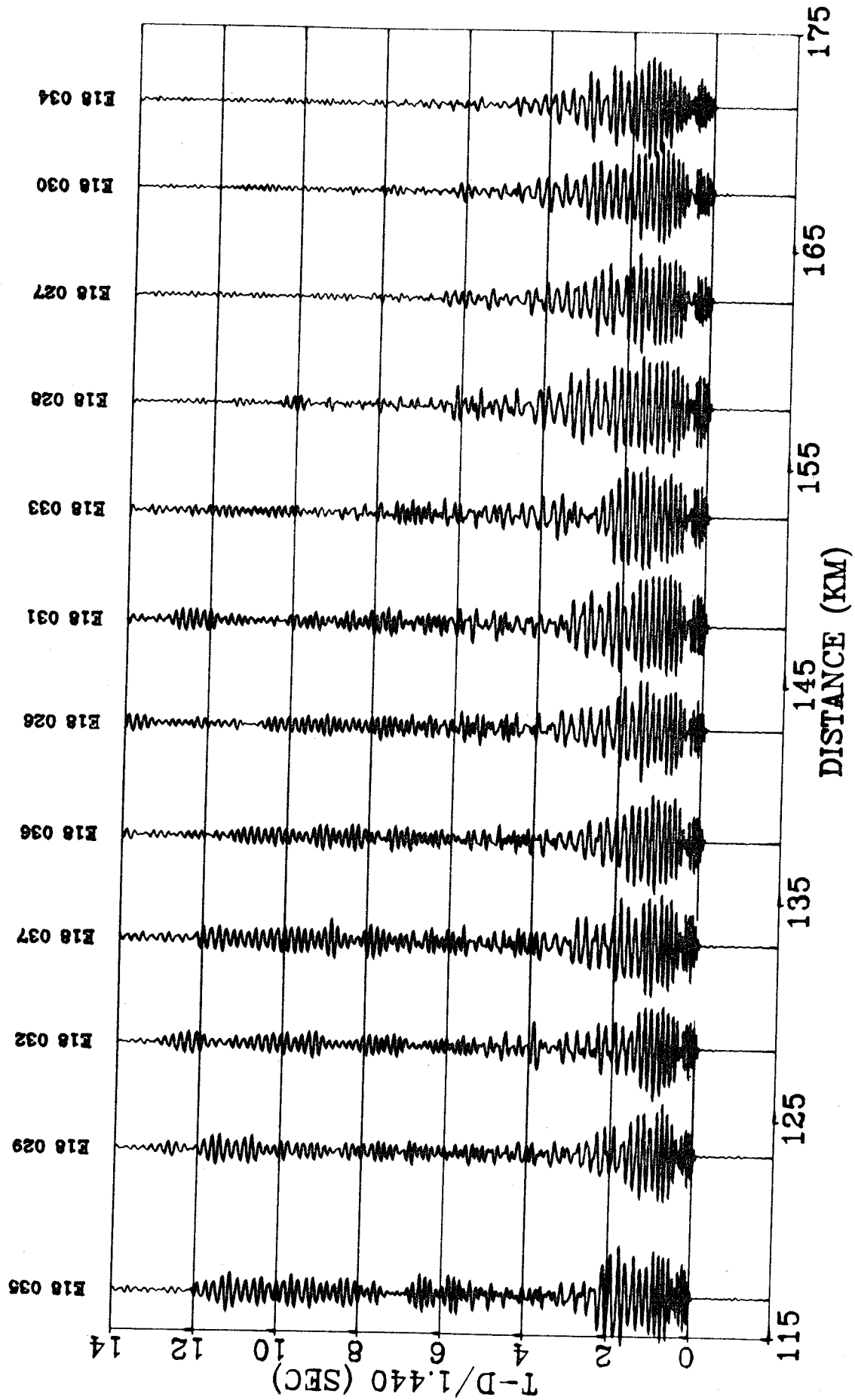
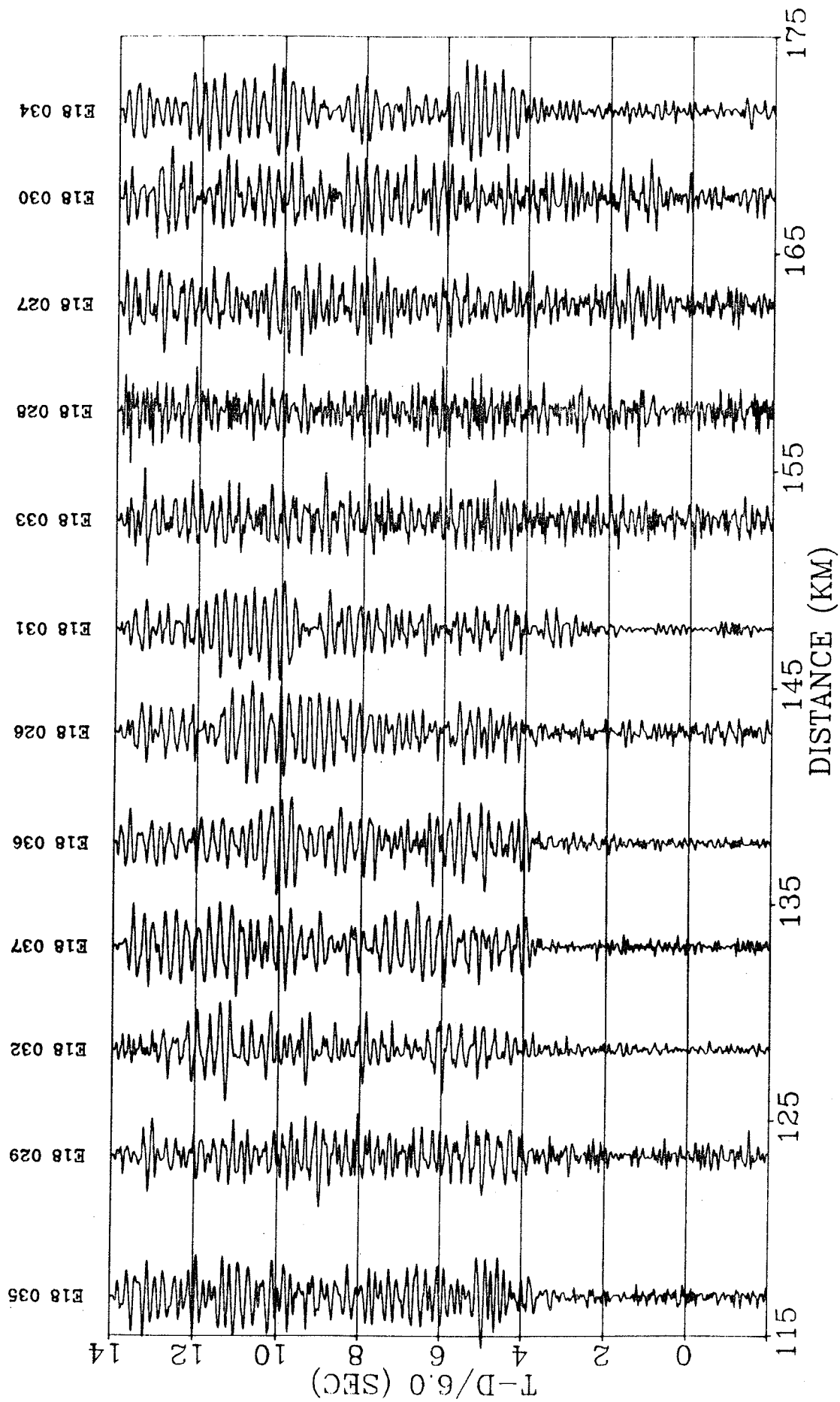


Fig. 18B - Seismic section BC shot E18



Line: I03 Shot: C19
 ** Ice Island 85 ** Field shot point: C1 Section: BC
 Shot time: 1985 APR. 25 22: 1: 4.85
 Lat.: 81.18403 N, Long.: 100.93756 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
035	81.17748	100.94619	0.0	0.75	191.43	21:59:59.18	0.100	spz	bp20	60
029	81.12155	101.08638	0.0	7.43	200.20	21:59:59.17	0.100	spz	bp13	60
032	81.07938	101.18800	0.0	12.46	200.38	21:59:59.18	0.100	spz	bp17	60
037	81.03681	101.26775	0.0	17.40	199.28	21:59:59.16	0.100	spz	bp22	60
036	80.99648	101.36849	0.0	22.23	199.80	21:59:59.17	0.100	spz	bp21	60
026	80.95191	101.46529	0.0	27.49	199.71	21:59:59.16	0.100	spz	bp10	60
031	80.91032	101.54966	0.0	32.36	199.49	21:59:59.17	0.100	spz	bp16	60
033	80.86778	101.64938	0.0	37.43	199.70	21:59:59.17	0.100	spz	bp18	60
028	80.82467	101.74206	0.0	42.52	199.69	21:59:59.16	0.100	spz	bp12	60
027	80.78258	101.83556	0.0	47.51	199.77	21:59:59.17	0.100	spz	bp11	60
030	80.74039	101.92685	0.0	52.49	199.80	21:59:59.16	0.100	spz	bp14	60
034	80.70045	101.93373	0.0	56.77	198.46	21:59:59.16	0.100	spz	bp19	60

Fig. 19A - Water wave section BC shot C19

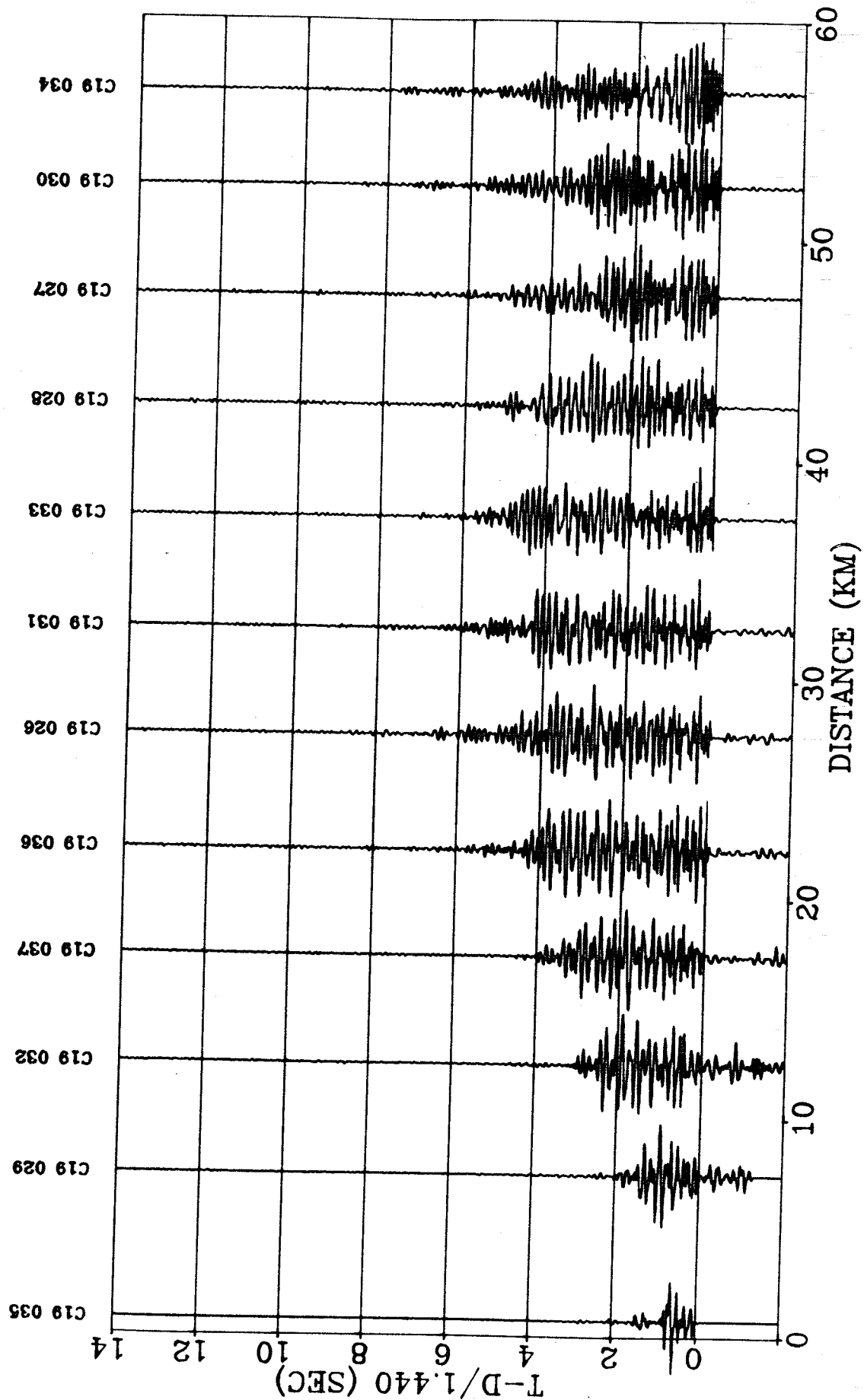
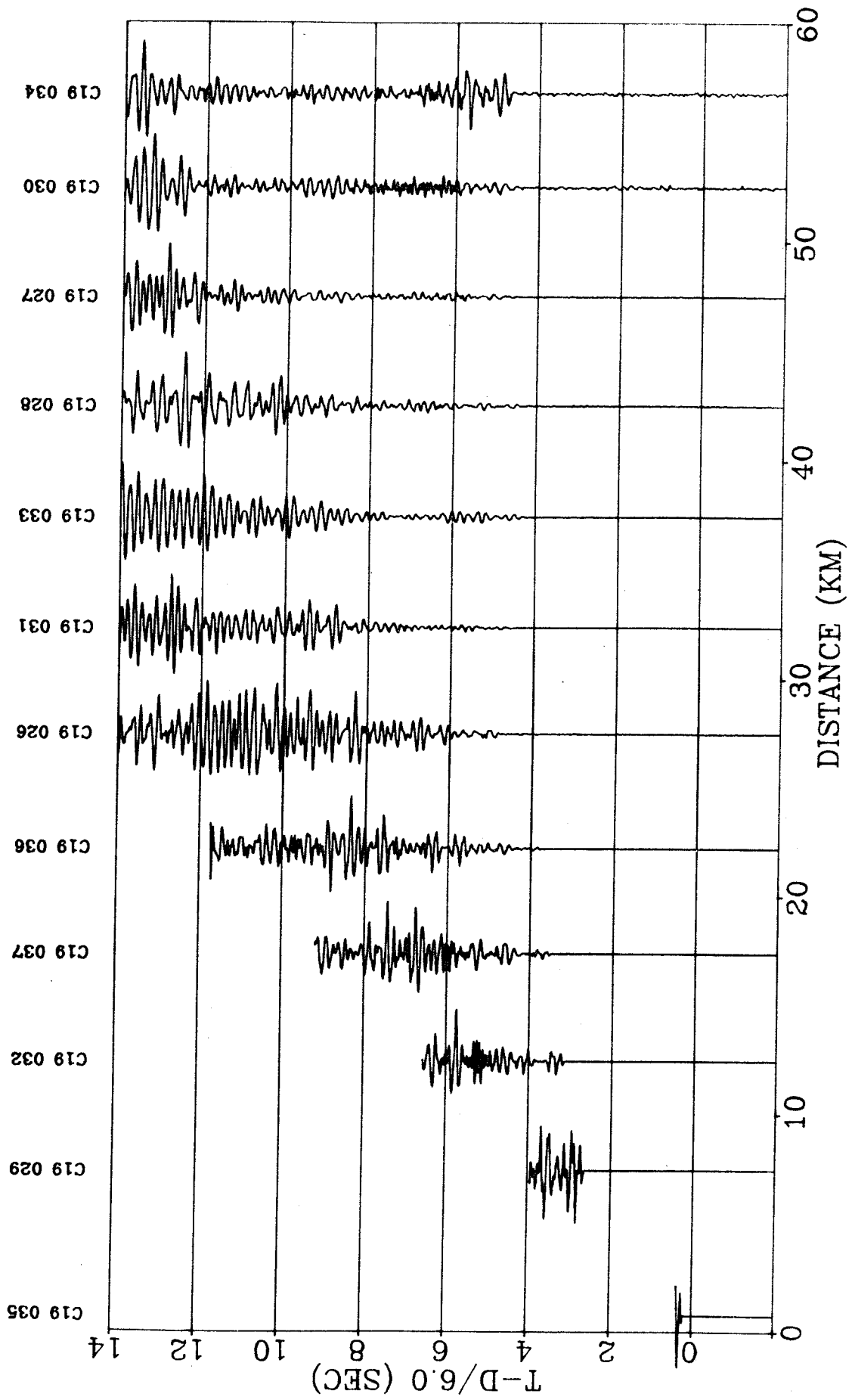


Fig. 19B - Seismic section BC shot C19



Line: I03 Shot: F20
 ** Ice Island 85 ** Field shot point: F Section: BC
 Shot time: 1985 APR. 25 23: 0: 0.00
 Lat.: 82.41472 N, Long.: 94.39306 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 652.8 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
035	81.17748	100.94619	0.0	172.99	220.36	22:59:59.17	0.100	spz	bp20	60
029	81.12155	101.08638	0.0	179.53	219.89	22:59:59.16	0.100	spz	bp13	60
032	81.07938	101.18800	0.0	184.43	219.54	22:59:59.17	0.100	spz	bp17	60
037	81.03681	101.26775	0.0	189.18	219.12	22:59:59.16	0.100	spz	bp22	60
036	80.99648	101.36849	0.0	193.93	218.85	22:59:59.18	0.100	spz	bp21	60
026	80.95191	101.46529	0.0	199.06	218.50	22:59:59.19	0.100	spz	bp10	60
031	80.91032	101.54966	0.0	203.80	218.18	22:59:59.17	0.100	spz	bp16	60
033	80.86778	101.64938	0.0	208.78	217.92	22:59:59.16	0.100	spz	bp18	60
028	80.82467	101.74206	0.0	213.76	217.64	22:59:59.17	0.100	spz	bp12	60
027	80.78258	101.83556	0.0	218.67	217.40	22:59:59.17	0.100	spz	bp11	60
030	80.74039	101.92685	0.0	223.57	217.16	22:59:59.18	0.100	spz	bp14	60
034	80.70045	101.93373	0.0	227.51	216.63	22:59:59.16	0.100	spz	bp19	60

Fig. 20A - Water wave section BC shot F20

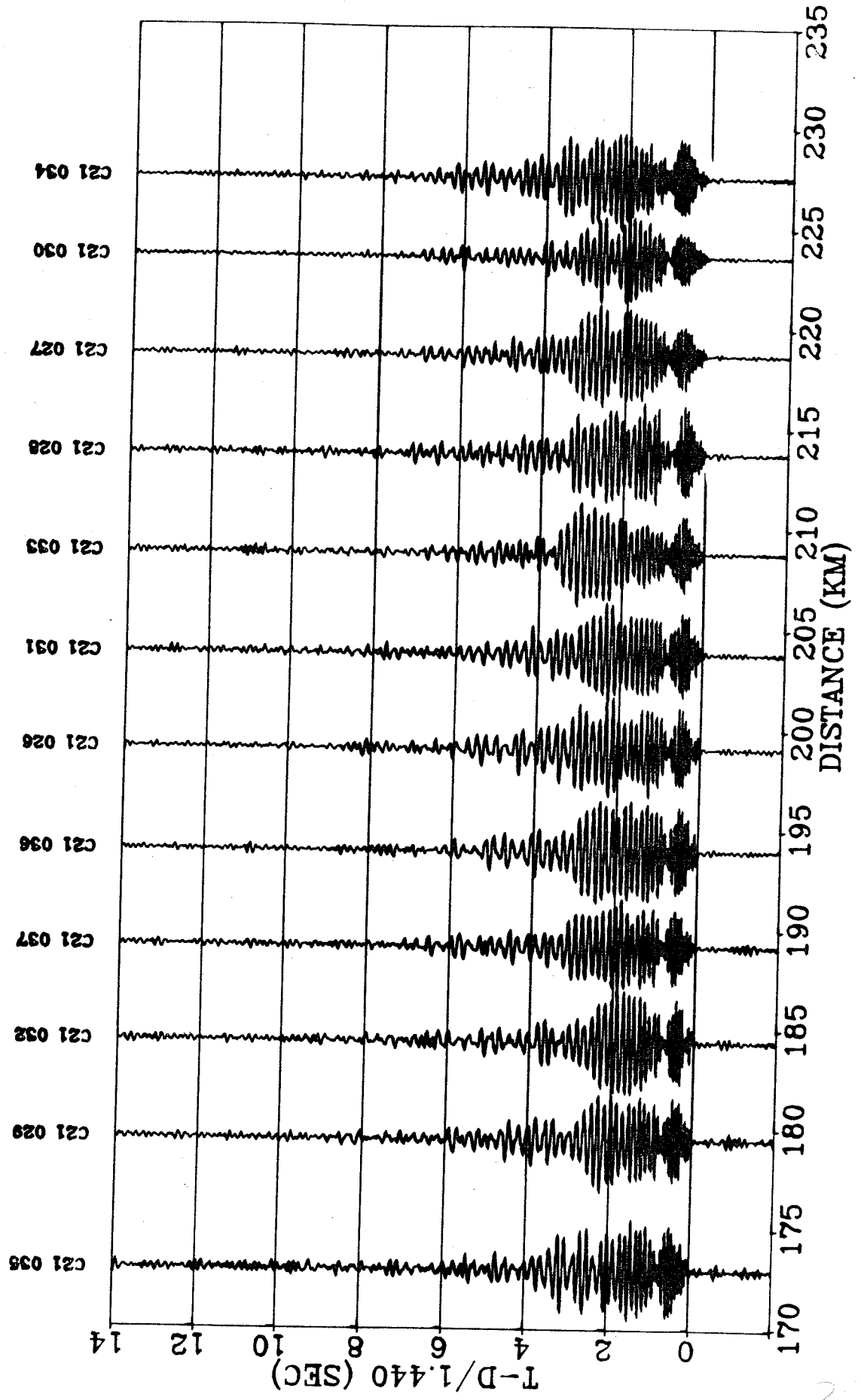
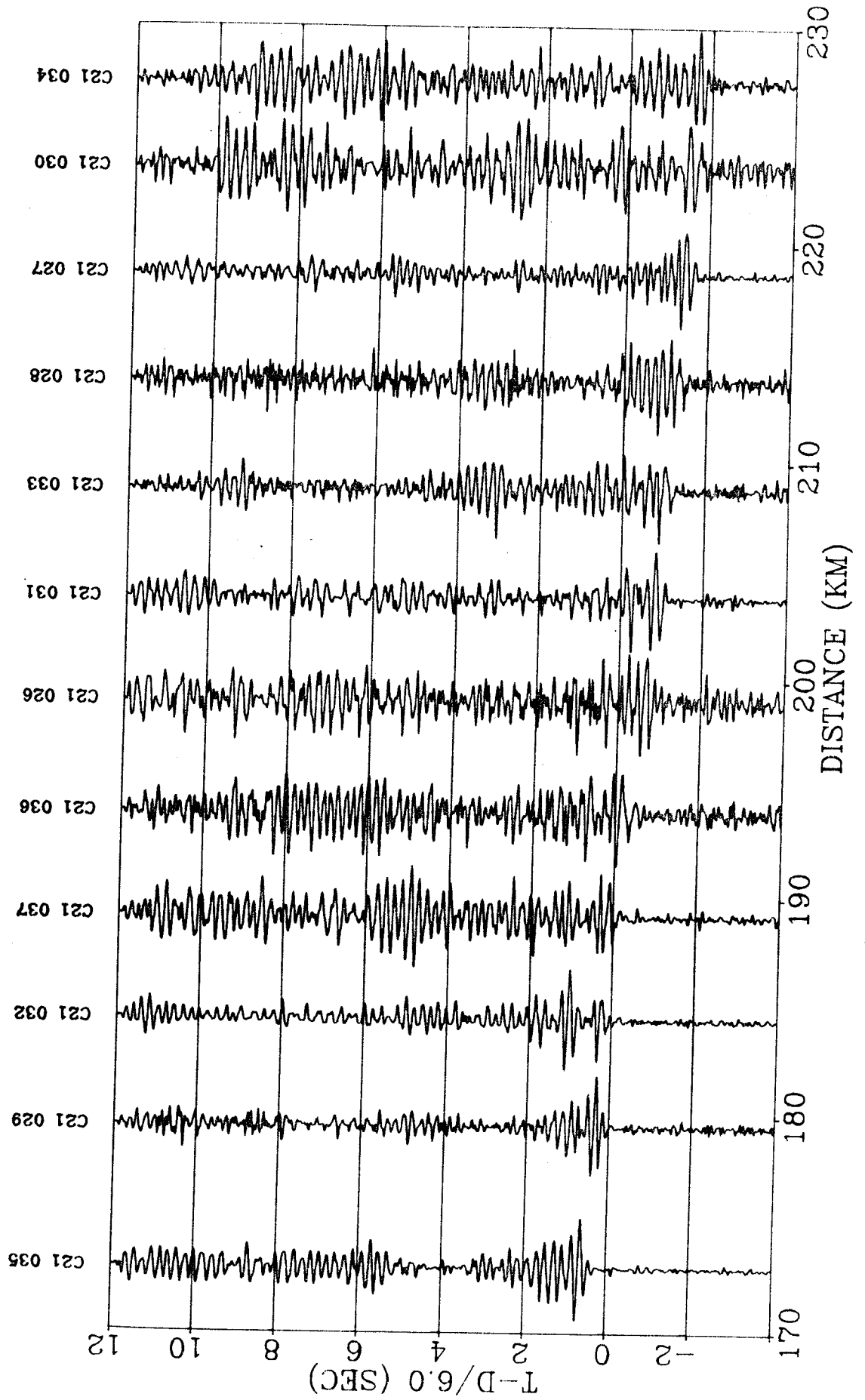


Fig. 20B - Seismic section BC shot F20



Line: I03 Shot: C21
 ** Ice Island 85 ** Field shot point: C2 Section: BC
 Shot time: 1985 APR. 25 23: 1: 5.00
 Lat.: 81.21986 N, Long.: 100.82748 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
035	81.17748		100.94619		0.0	5.15	203.26	22:59:59.17	0.100	spz	bp20	60	
029	81.12155		101.08638		0.0	11.84	202.14	22:59:59.16	0.100	spz	bp13	60	
032	81.07938		101.18800		0.0	16.87	201.73	22:59:59.17	0.100	spz	bp17	60	
037	81.03681		101.26775		0.0	21.80	200.57	22:59:59.16	0.100	spz	bp22	60	
036	80.99648		101.36849		0.0	26.64	200.79	22:59:59.18	0.100	spz	bp21	60	
026	80.95191		101.46529		0.0	31.89	200.56	22:59:59.19	0.100	spz	bp10	60	
031	80.91032		101.54966		0.0	36.77	200.28	22:59:59.17	0.100	spz	bp16	60	
033	80.86778		101.64938		0.0	41.83	200.38	22:59:59.16	0.100	spz	bp18	60	
028	80.82467		101.74206		0.0	46.92	200.31	22:59:59.17	0.100	spz	bp12	60	
027	80.78258		101.83556		0.0	51.91	200.33	22:59:59.17	0.100	spz	bp11	60	
030	80.74039		101.92685		0.0	56.90	200.32	22:59:59.18	0.100	spz	bp14	60	
034	80.70045		101.93373		0.0	61.16	199.05	22:59:59.16	0.100	spz	bp19	60	

Fig. 21A - Water wave section BC shot C21

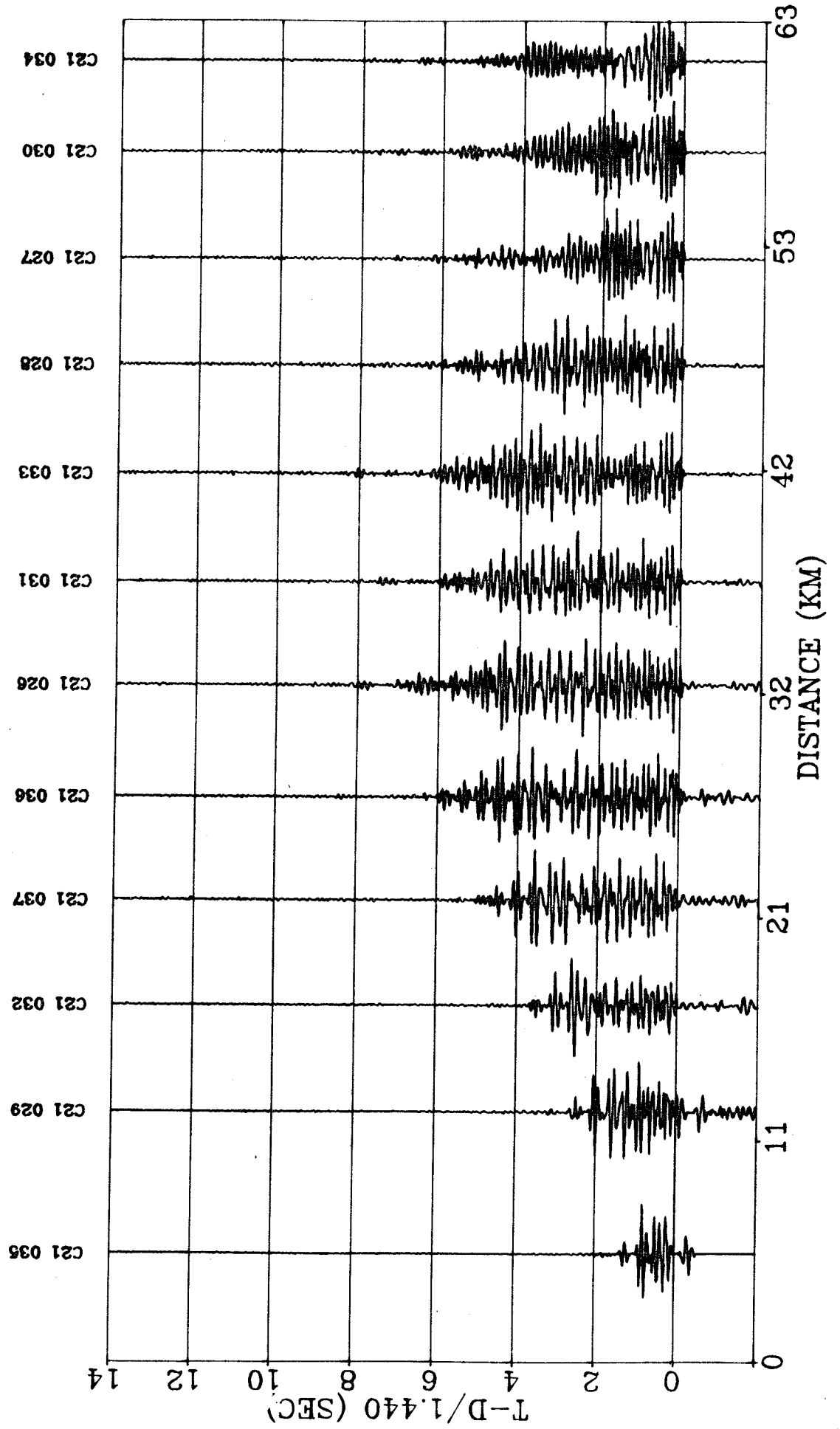
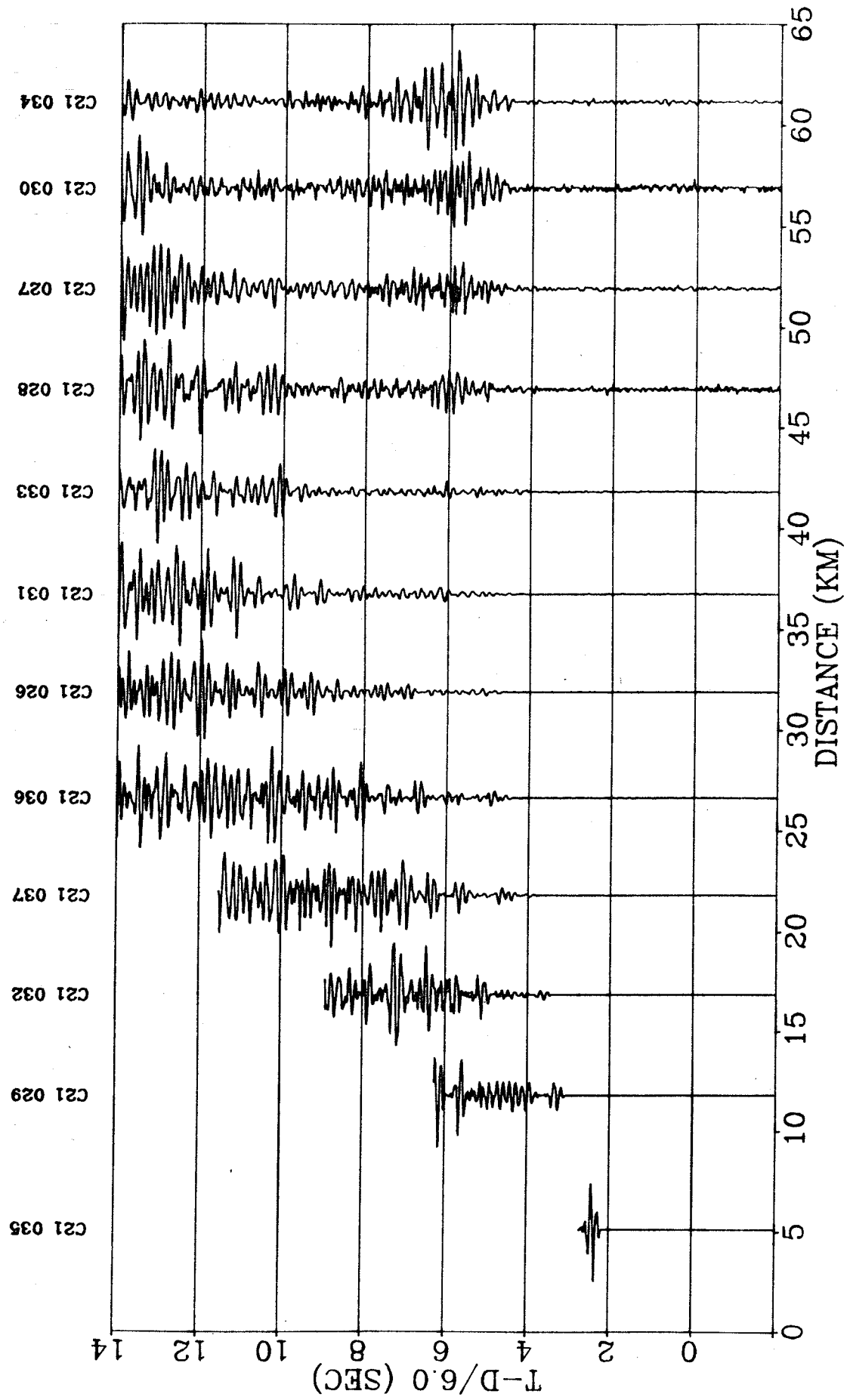


Fig. 21B - Seismic section BC shot C21



Line: I04 Shot: E22
 ** Ice Island 85 ** Field shot point: ELA Section: IE
 Shot time: 1985 APR. 28 17: 1: 0.00
 Lat.: 82.03069 N, Long.: 96.79432 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
049	82.00719	96.56184	0.0	4.46	125.94	16:59:59.17	0.100	spz	bp22	60
046	81.98278	96.31485	0.0	9.17	125.46	16:59:59.17	0.100	spz	bpl9	60
045	81.95647	96.07079	0.0	13.98	126.01	16:59:59.18	0.100	spz	bpl8	60
048	81.92897	95.83158	0.0	18.82	126.66	16:59:59.18	0.100	spz	bp21	60
047	81.90452	95.57881	0.0	23.63	126.00	16:59:59.17	0.100	spz	bp20	60
041	81.88000	95.34509	0.0	28.22	125.89	16:59:59.17	0.100	spz	bpl3	60
044	81.85179	95.10975	0.0	33.09	126.31	16:59:59.16	0.100	spz	bpl7	60
039	81.82468	94.87199	0.0	37.92	126.39	16:59:59.17	0.100	spz	bpl1	60
040	81.79905	94.62766	0.0	42.75	126.16	16:59:59.18	0.100	spz	bpl2	60
038	81.77099	94.39476	0.0	47.61	126.34	16:59:59.16	0.100	spz	bpl0	60
042	81.71848	93.93227	0.0	57.06	126.23	16:59:59.17	0.100	spz	bpl4	60

Fig. 22A - Water wave section IE shot E22

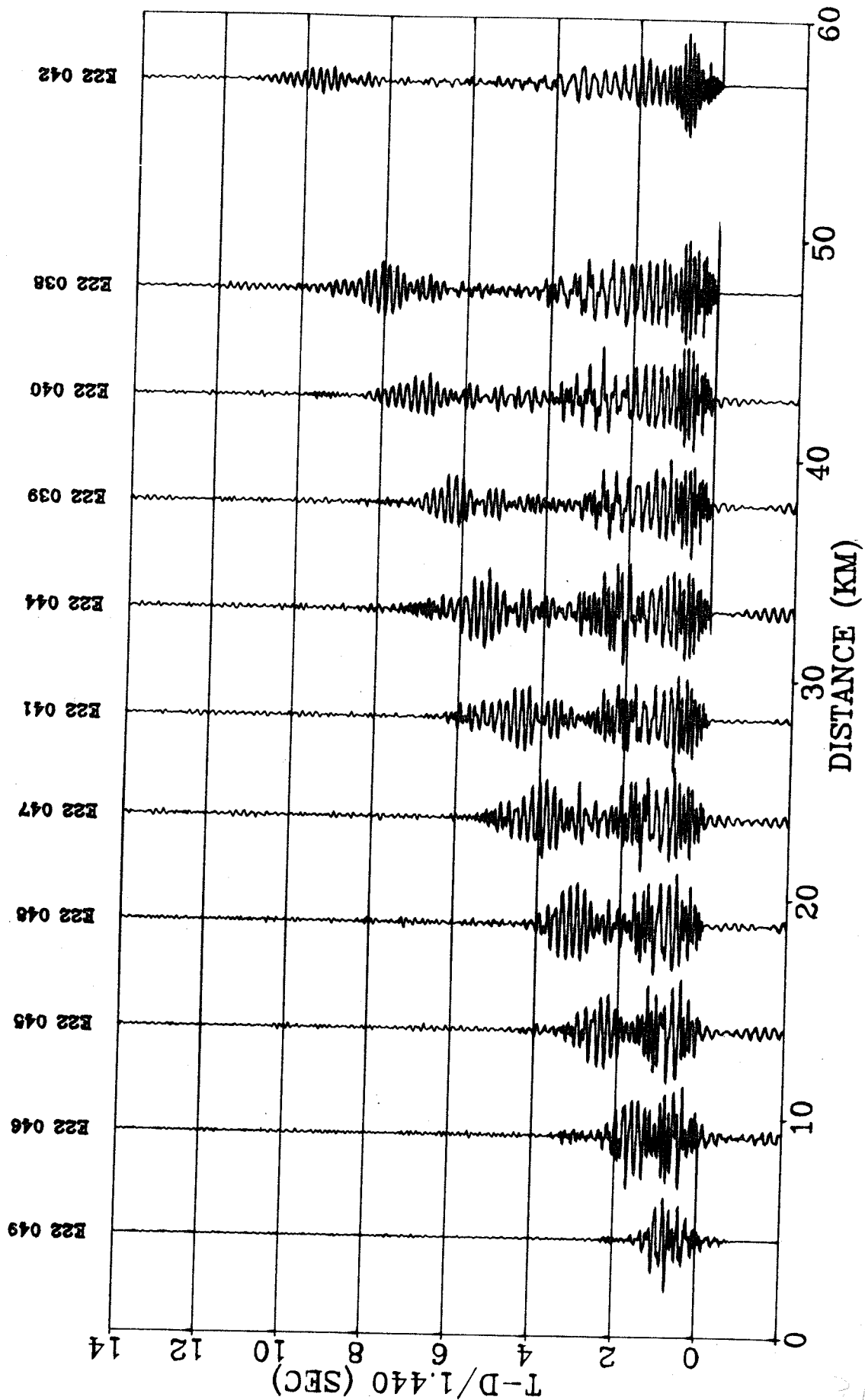
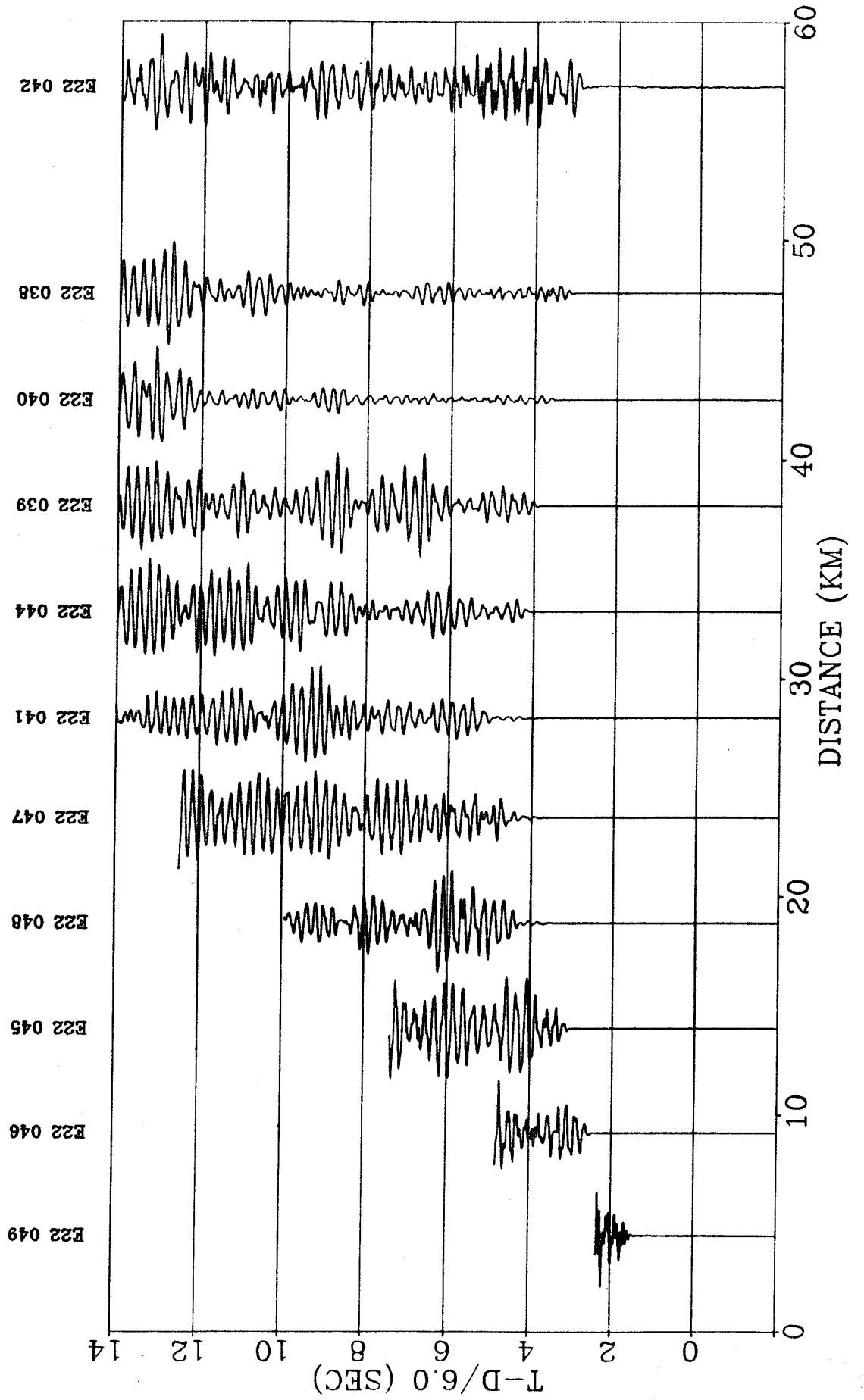


Fig. 22B - Seismic section IE shot E22



Line: I04 Shot: D23
 ** Ice Island 85 ** Field shot point: D2A Section: IE
 Shot time: 1985 APR. 28 17:20: 0.00
 Lat.: 81.63134 N, Long.: 98.91213 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 244.8 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
049	82.00719	96.56184	0.0	56.18	40.51	17:19:59.17	0.100	spz	bp22	60	
046	81.98278	96.31485	0.0	56.99	45.21	17:19:59.15	0.100	spz	bp19	60	
045	81.95647	96.07079	0.0	58.04	49.89	17:19:59.16	0.100	spz	bp18	60	
048	81.92897	95.83158	0.0	59.36	54.44	17:19:59.18	0.100	spz	bp21	60	
047	81.90452	95.57881	0.0	61.41	58.58	17:19:59.16	0.100	spz	bp20	60	
041	81.88000	95.34509	0.0	63.51	62.32	17:19:59.15	0.100	spz	bp13	60	
044	81.85179	95.10975	0.0	65.77	66.15	17:19:59.15	0.100	spz	bp17	60	
039	81.82468	94.87199	0.0	68.40	69.61	17:19:59.18	0.100	spz	bp11	60	
040	81.79905	94.62766	0.0	71.43	72.69	17:19:59.17	0.100	spz	bp12	60	
038	81.77099	94.39476	0.0	74.46	75.68	17:19:59.18	0.100	spz	bp10	60	
042	81.71848	93.93227	0.0	81.09	80.65	17:19:59.17	0.100	spz	bp14	60	

Fig. 23A - Water wave section IE fan shot D23

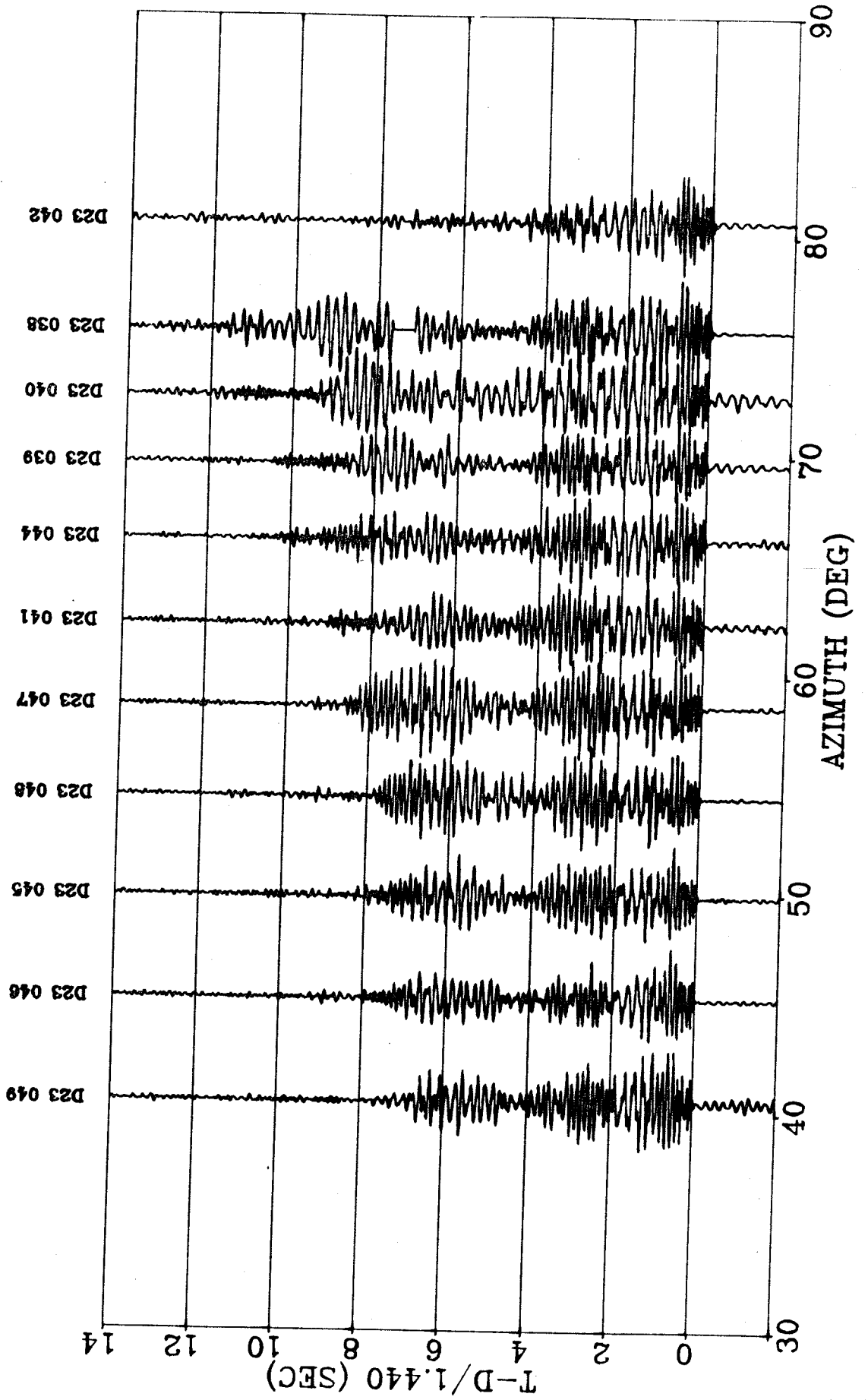
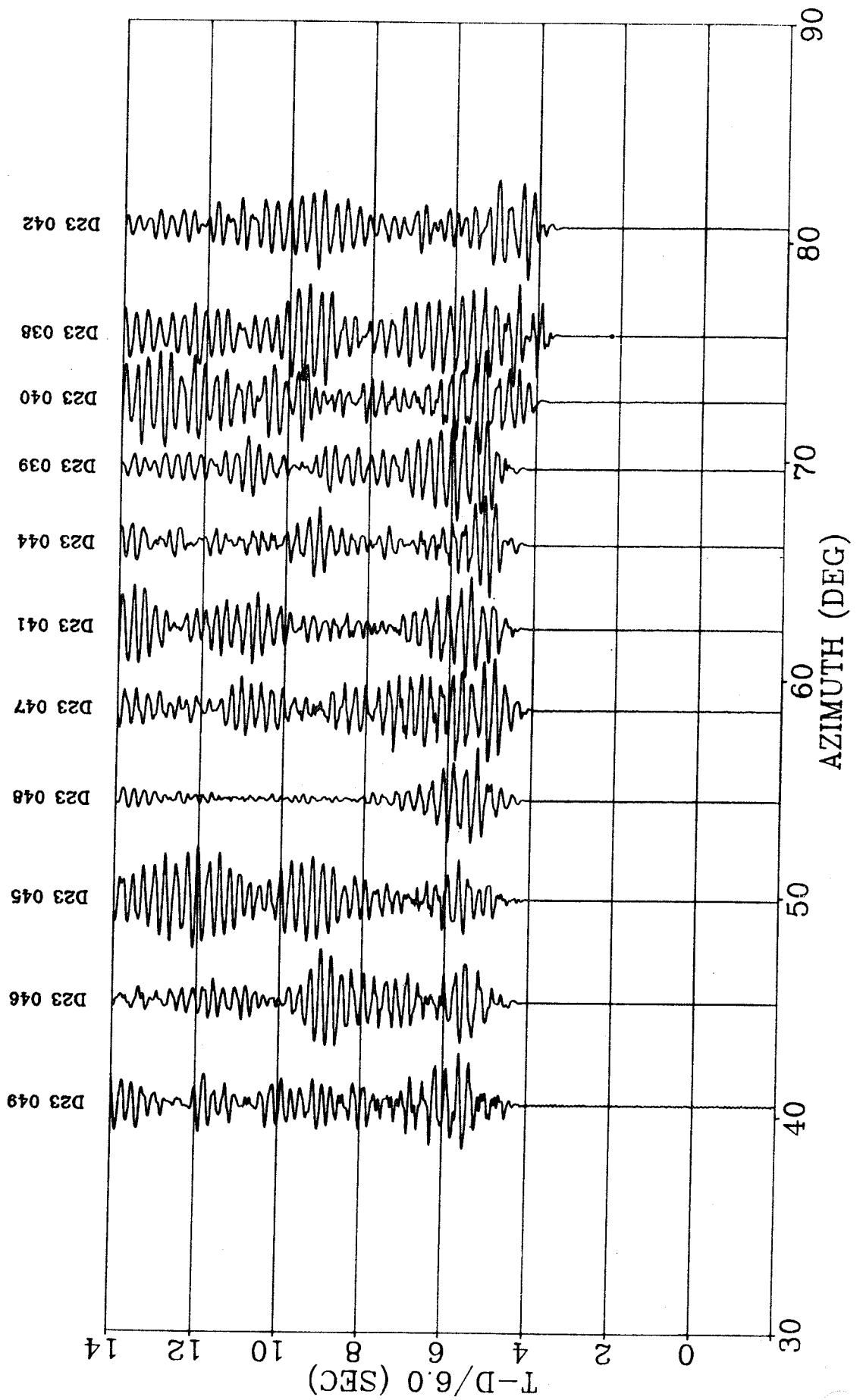


Fig. 23B - Seismic section IE fan shot D23



Line: I04 Shot: I24
 ** Ice Island 85 ** Field shot point: I1 Section: IE
 Shot time: 1985 APR. 28 17:41: 0.00
 Lat.: 81.69342 N, Long.: 93.68399 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
042	81.71848		93.93227		0.0	4.88	305.10	17:39:59.17	0.100	spz	bpl4	60	
038	81.77099		94.39476		0.0	14.33	307.54	17:39:59.17	0.100	spz	bpl0	60	
040	81.79905		94.62766		0.0	19.19	308.41	17:39:59.17	0.100	spz	bpl2	60	
039	81.82468		94.87199		0.0	24.01	308.21	17:39:59.17	0.100	spz	bpl1	60	
044	81.85179		95.10975		0.0	28.85	308.52	17:39:59.15	0.100	spz	bpl7	60	
041	81.88000		95.34509		0.0	33.71	308.99	17:39:59.17	0.100	spz	bpl3	60	
047	81.90452		95.57881		0.0	38.30	308.92	17:39:59.16	0.100	spz	bp20	60	
048	81.92897		95.83158		0.0	43.11	308.65	17:39:59.16	0.100	spz	bp21	60	
045	81.95647		96.07079		0.0	47.95	308.95	17:39:59.15	0.100	spz	bpl8	60	
046	81.98278		96.31485		0.0	52.76	309.06	17:39:59.17	0.100	spz	bpl9	60	
049	82.00719		96.56184		0.0	57.47	308.98	17:39:59.16	0.100	spz	bp22	60	

Fig. 24A - Water wave section IE shot I24

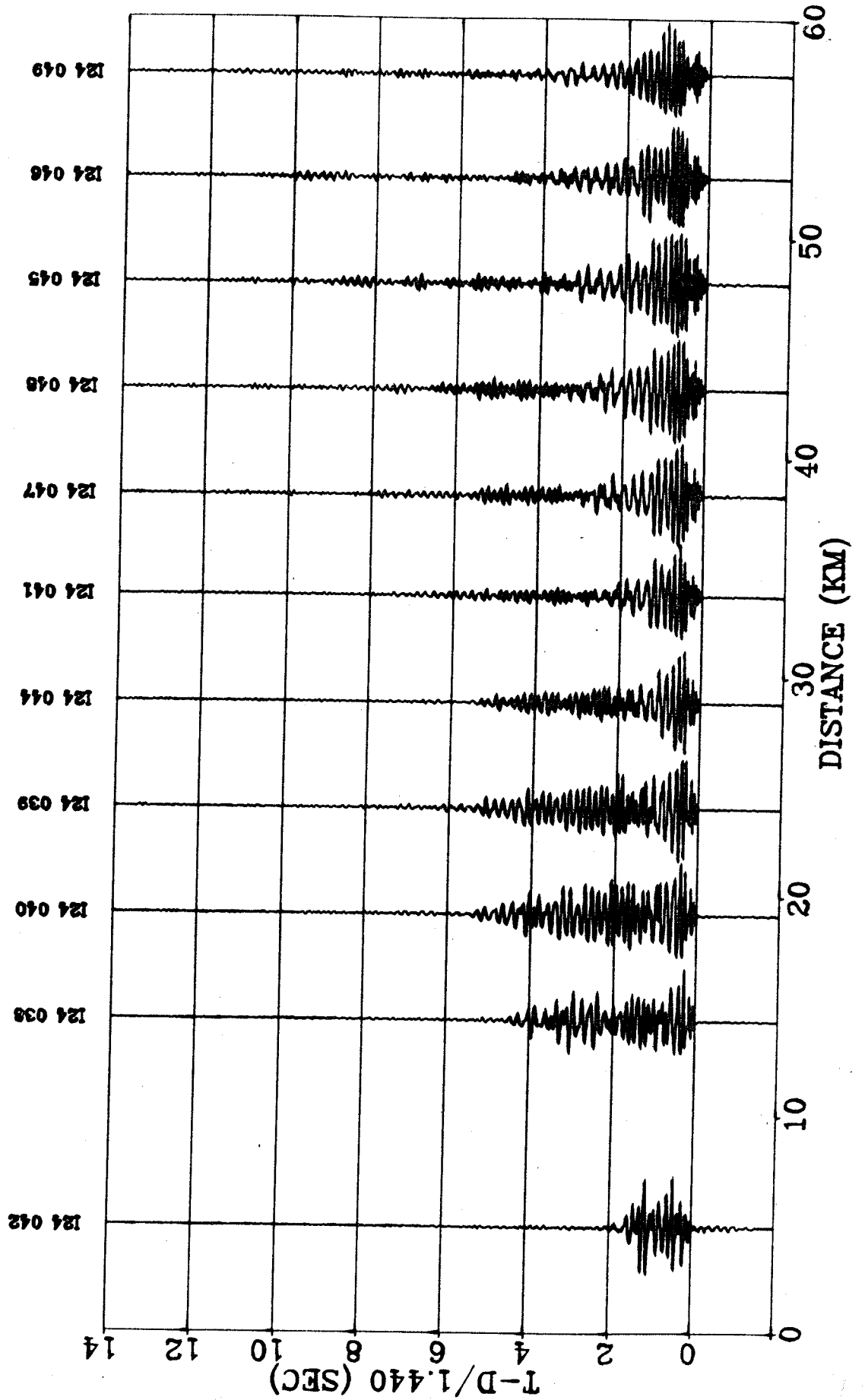
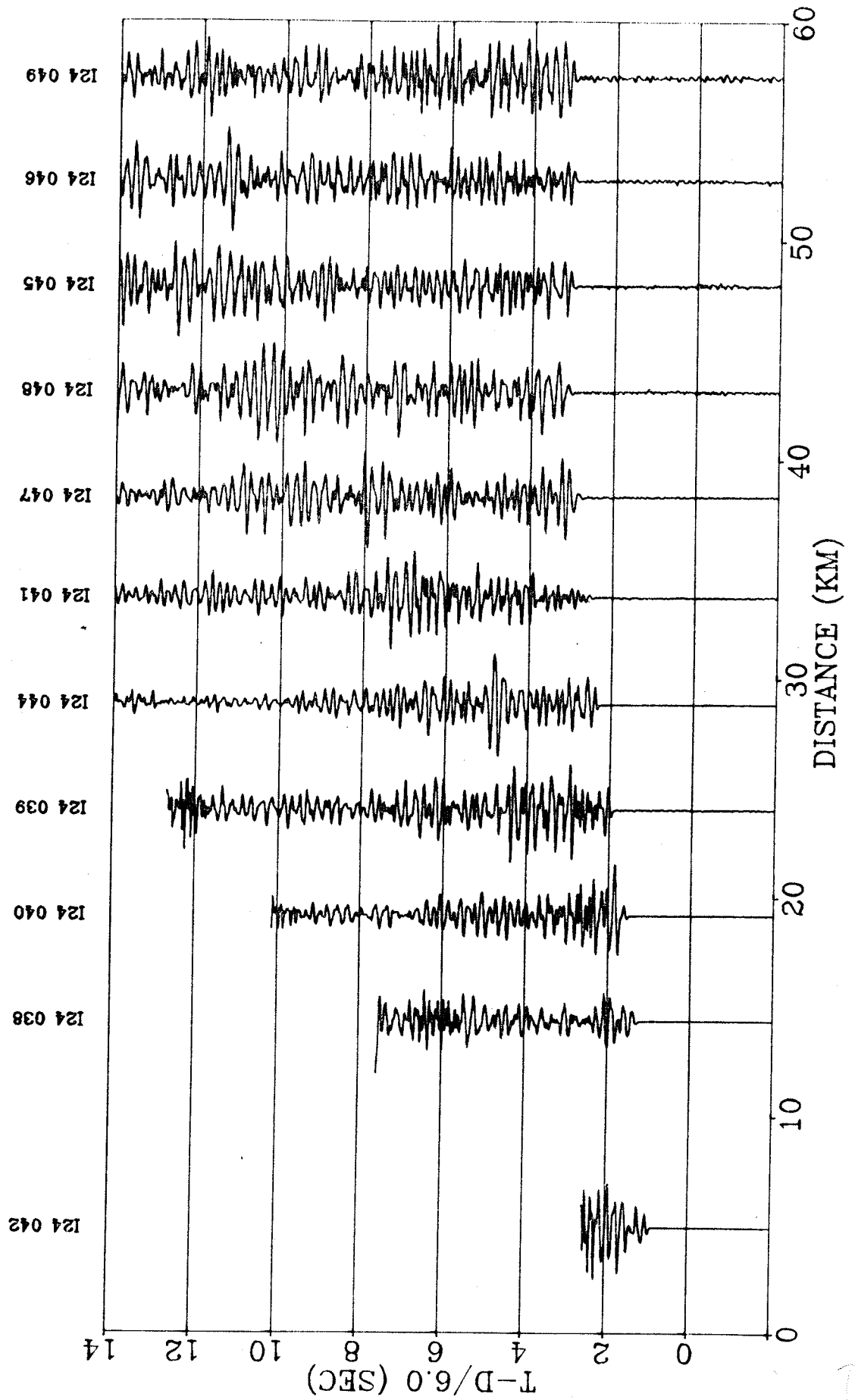


Fig. 24B - Seismic section IE shot I24



Line: I04 Shot: I25
 ** Ice Island 85 ** Field shot point: I2 Section: IE
 Shot time: 1985 APR. 28 18:21: 0.00
 Lat.: 81.70398 N, Long.: 93.81311 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat.	N	Long.	W	Elev.	Dist.	Az.	Time	UT	GN	CMP	Ins.	SR
042	81.71848		93.93227		0.0	2.51	310.23	18:19:59.17	0.100	spz	bp14	60	
038	81.77099		94.39476		0.0	11.96	309.00	18:19:59.17	0.100	spz	bp10	60	
040	81.79905		94.62766		0.0	16.82	309.53	18:19:59.17	0.100	spz	bp12	60	
039	81.82468		94.87199		0.0	21.65	309.03	18:19:59.16	0.100	spz	bp11	60	
044	81.85179		95.10975		0.0	26.48	309.20	18:19:59.16	0.100	spz	bp17	60	
041	81.88000		95.34509		0.0	31.35	309.58	18:19:59.17	0.100	spz	bp13	60	
047	81.90452		95.57881		0.0	35.94	309.41	18:19:59.17	0.100	spz	bp20	60	
048	81.92897		95.83158		0.0	40.75	309.06	18:19:59.15	0.100	spz	bp21	60	
045	81.95647		96.07079		0.0	45.59	309.31	18:19:59.18	0.100	spz	bp18	60	
046	81.98278		96.31485		0.0	50.40	309.38	18:19:59.18	0.100	spz	bp19	60	
049	82.00719		96.56184		0.0	55.11	309.26	18:19:59.17	0.100	spz	bp22	60	

Fig. 25A - Water wave section IE shot I25

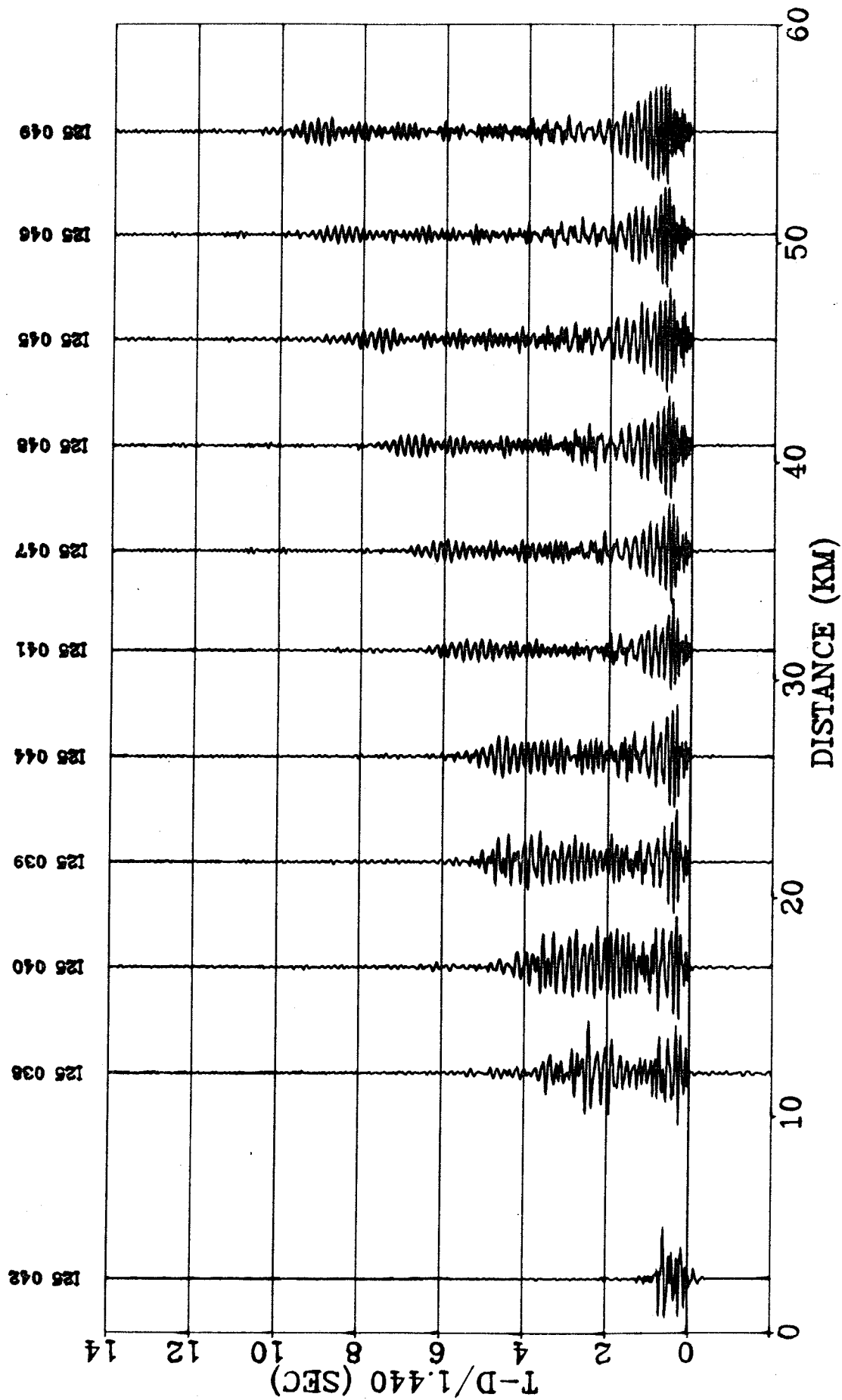
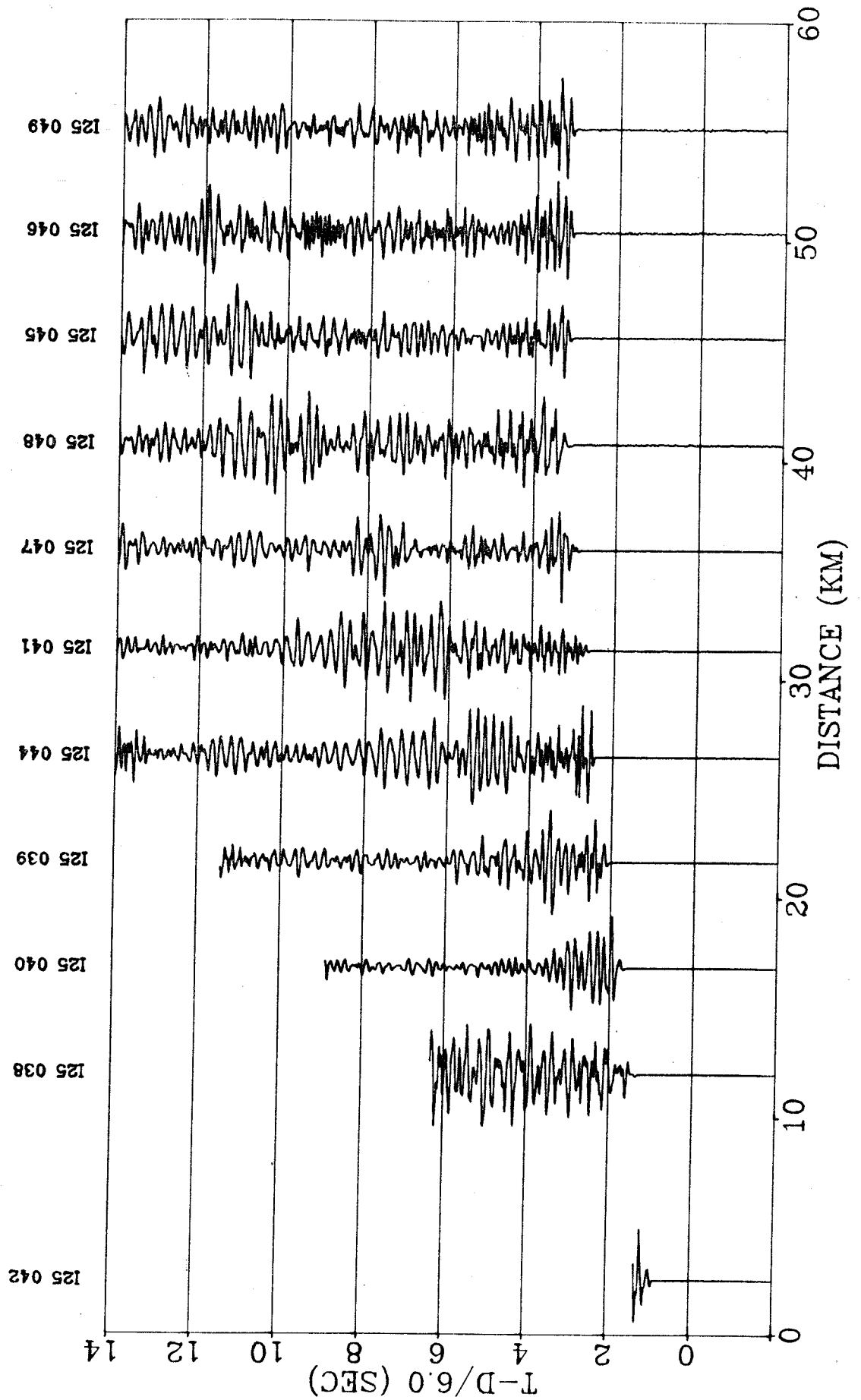


Fig. 25B - Seismic section IE shot I25



Line: I04 Shot: E26
** Ice Island 85 ** Field shot point: E3 Section: IE
Shot time: 1985 APR. 28 18:41: 0.00
Lat.: 82.01913 N, Long.: 96.61923 W, Elev.: 0.0 m
Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
049	82.00719	96.56184	0.0	1.60	146.23	18:39:59.16	0.100	spz	bp22	60
046	81.98278	96.31485	0.0	6.23	130.48	18:39:59.17	0.100	spz	bpl9	60
045	81.95647	96.07079	0.0	11.04	129.07	18:39:59.17	0.100	spz	bpl8	60
048	81.92897	95.83158	0.0	15.88	128.95	18:39:59.17	0.100	spz	bp21	60
047	81.90452	95.57881	0.0	20.68	127.71	18:39:59.16	0.100	spz	bp20	60
041	81.88000	95.34509	0.0	25.27	127.31	18:39:59.15	0.100	spz	bpl3	60
044	81.85179	95.10975	0.0	30.14	127.56	18:39:59.15	0.100	spz	bpl7	60
039	81.82468	94.87199	0.0	34.98	127.51	18:39:59.18	0.100	spz	bpl1	60
040	81.79905	94.62766	0.0	39.80	127.15	18:39:59.17	0.100	spz	bpl2	60
038	81.77099	94.39476	0.0	44.66	127.24	18:39:59.18	0.100	spz	bpl0	60
042	81.71848	93.93227	0.0	54.11	127.01	18:39:59.15	0.100	spz	bpl4	60

Fig. 26A - Water wave section IE shot E26

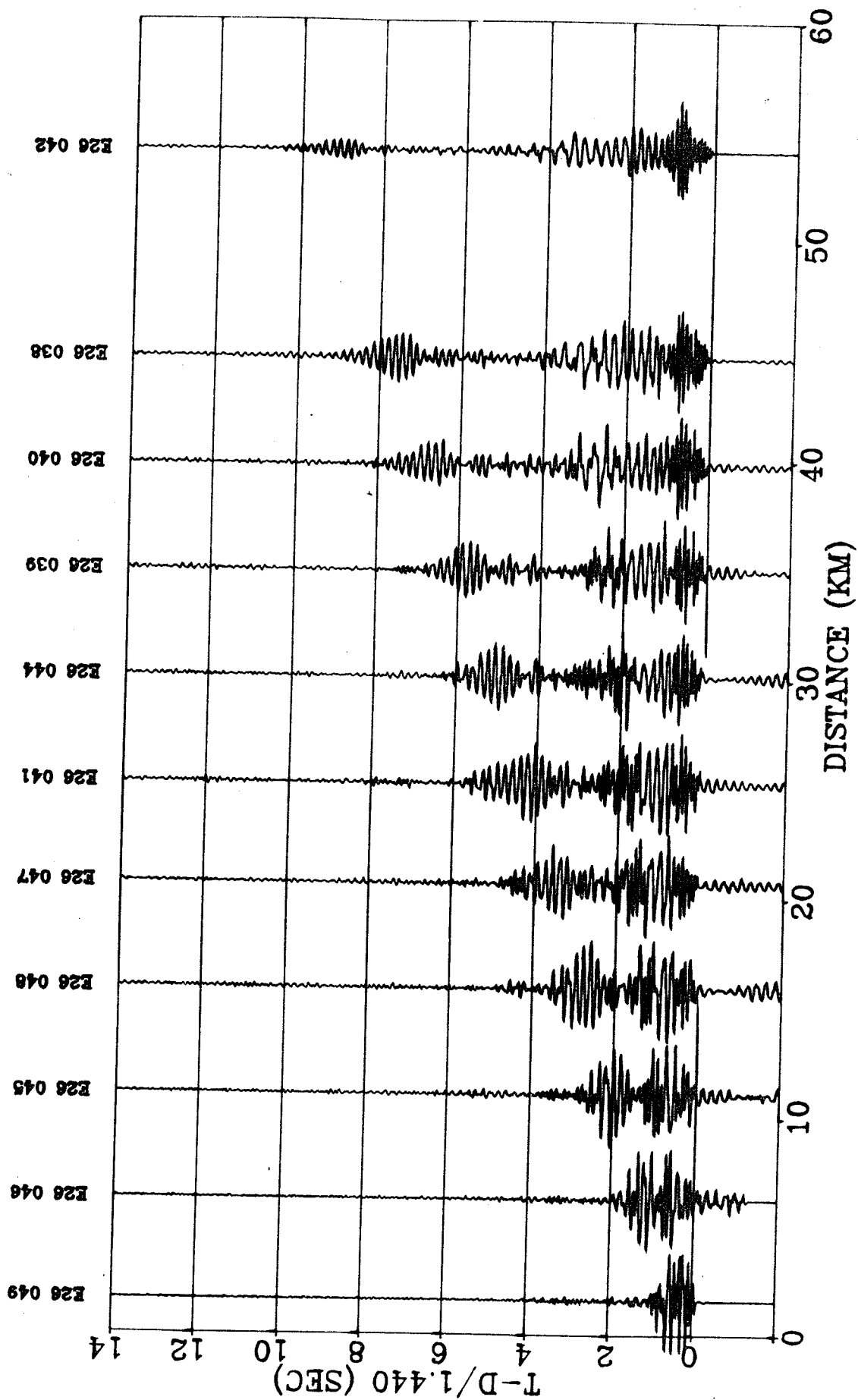
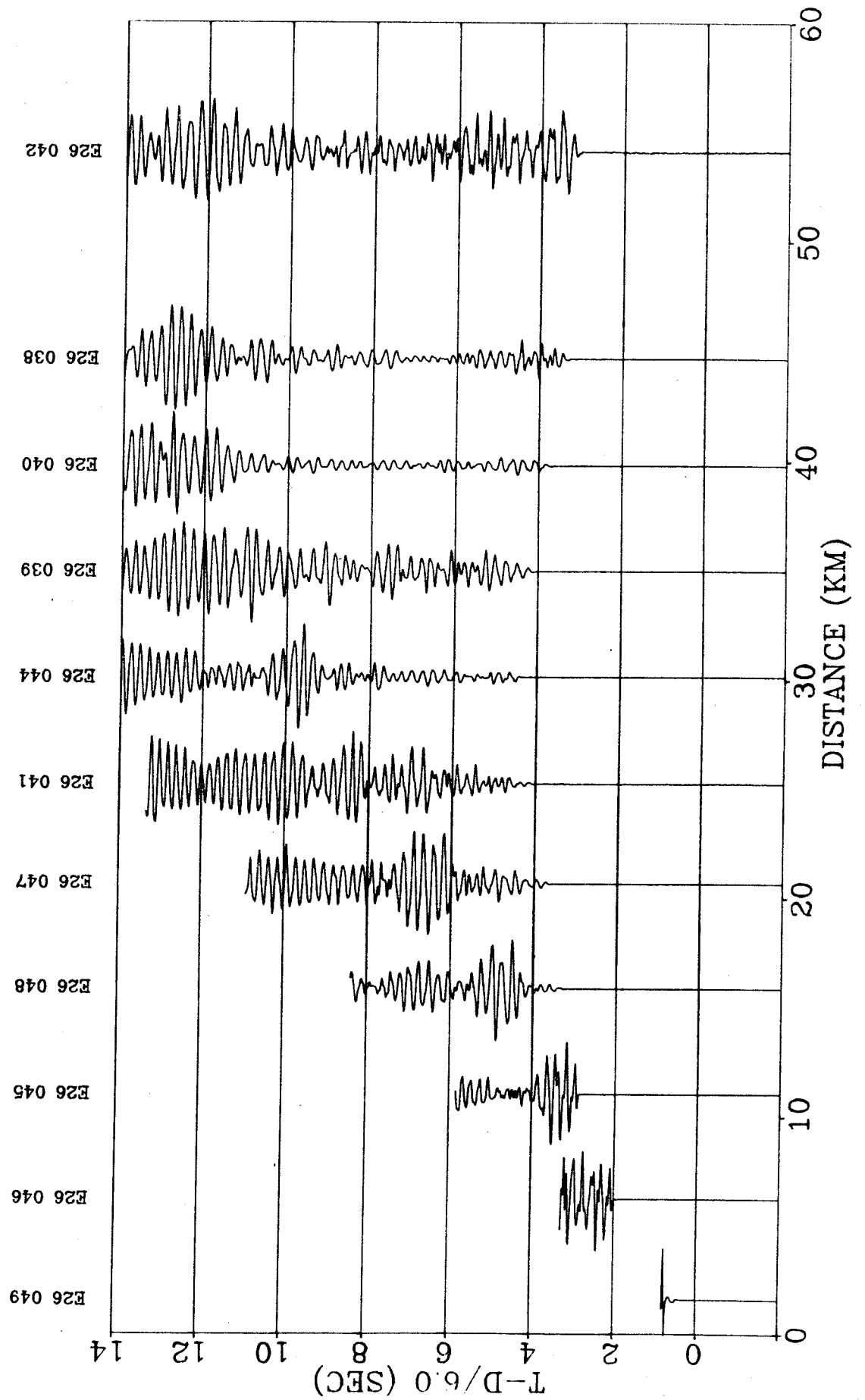


Fig. 26B - Seismic section IE shot E26



Line: I05 Shot: G27
 ** Ice Island 85 ** Field shot point: G1 Section: IG
 Shot time: 1985 APR. 29 23:31: 0.00
 Lat.: 81.27742 N, Long.: 96.17306 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
055	81.32352	96.06464	0.0	5.46	19.53	23:29:59.16	0.100	spz	bpl6	60
058	81.35308	95.86723	0.0	9.90	31.25	23:29:59.17	0.100	spz	bpl9	60
061	81.38394	95.68807	0.0	14.43	34.23	23:29:59.39	0.100	spz	bp22	60
057	81.41573	95.49382	0.0	19.20	36.13	23:29:59.16	0.100	spz	bpl8	60
060	81.44735	95.27917	0.0	24.18	37.87	23:29:59.16	0.100	spz	bp21	60
059	81.47833	95.10000	0.0	28.74	38.16	23:29:59.16	0.100	spz	bp20	60
051	81.50941	94.90040	0.0	33.52	38.76	23:30: 7.16	0.100	spz	bpl1	60
050	81.54018	94.70343	0.0	38.24	39.16	23:29:59.16	0.100	spz	bpl0	60
053	81.57110	94.50098	0.0	43.02	39.51	23:29:59.18	0.100	spz	bpl3	60
052	81.60184	94.30125	0.0	47.76	39.74	23:29:59.18	0.100	spz	bpl2	60
056	81.63147	94.10854	0.0	52.31	39.89	23:30:15.17	0.100	spz	bpl7	60
054	81.66203	93.89513	0.0	57.17	40.18	23:29:59.18	0.100	spz	bpl4	60

Fig. 27A - Water wave section IG shot G27

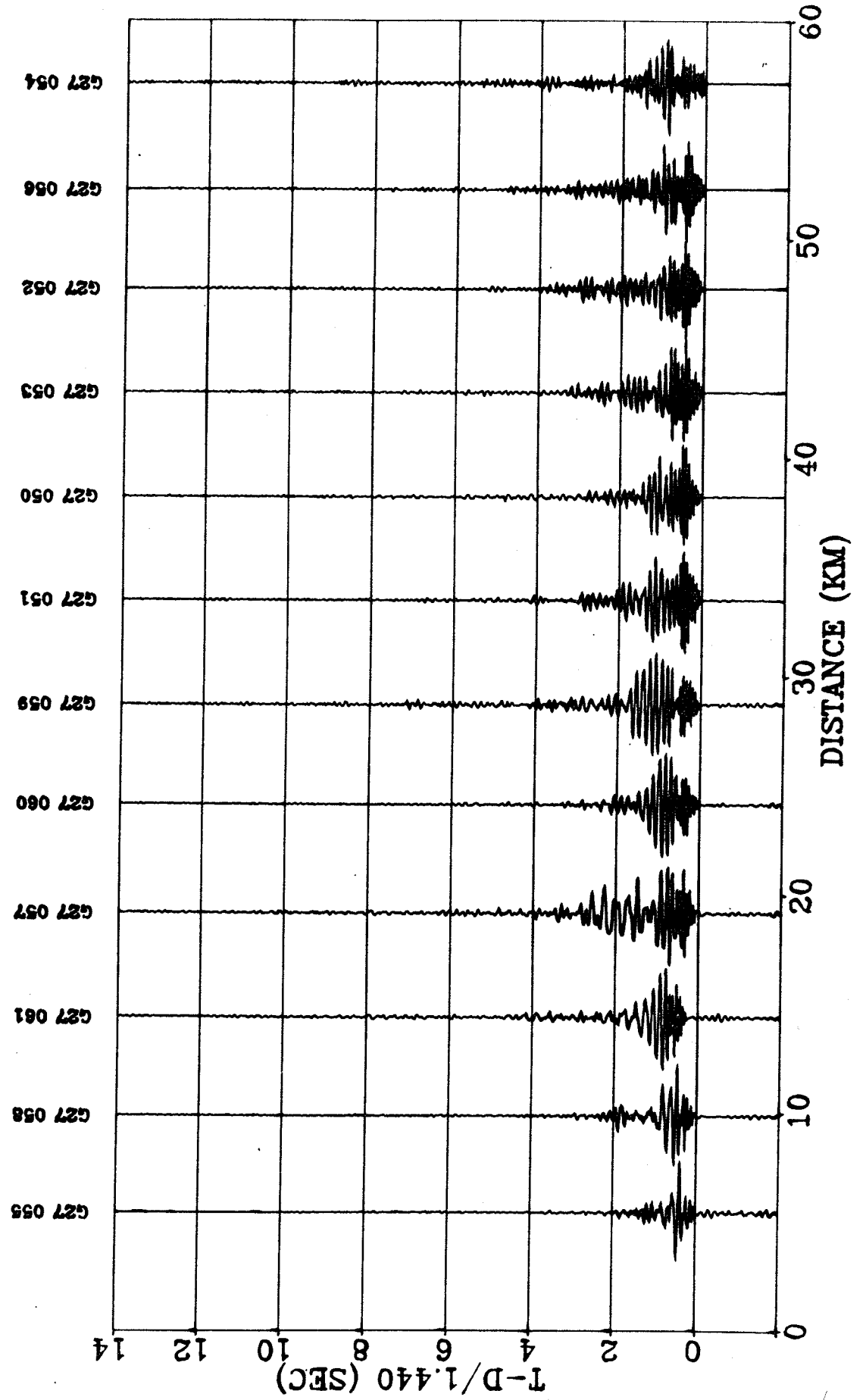
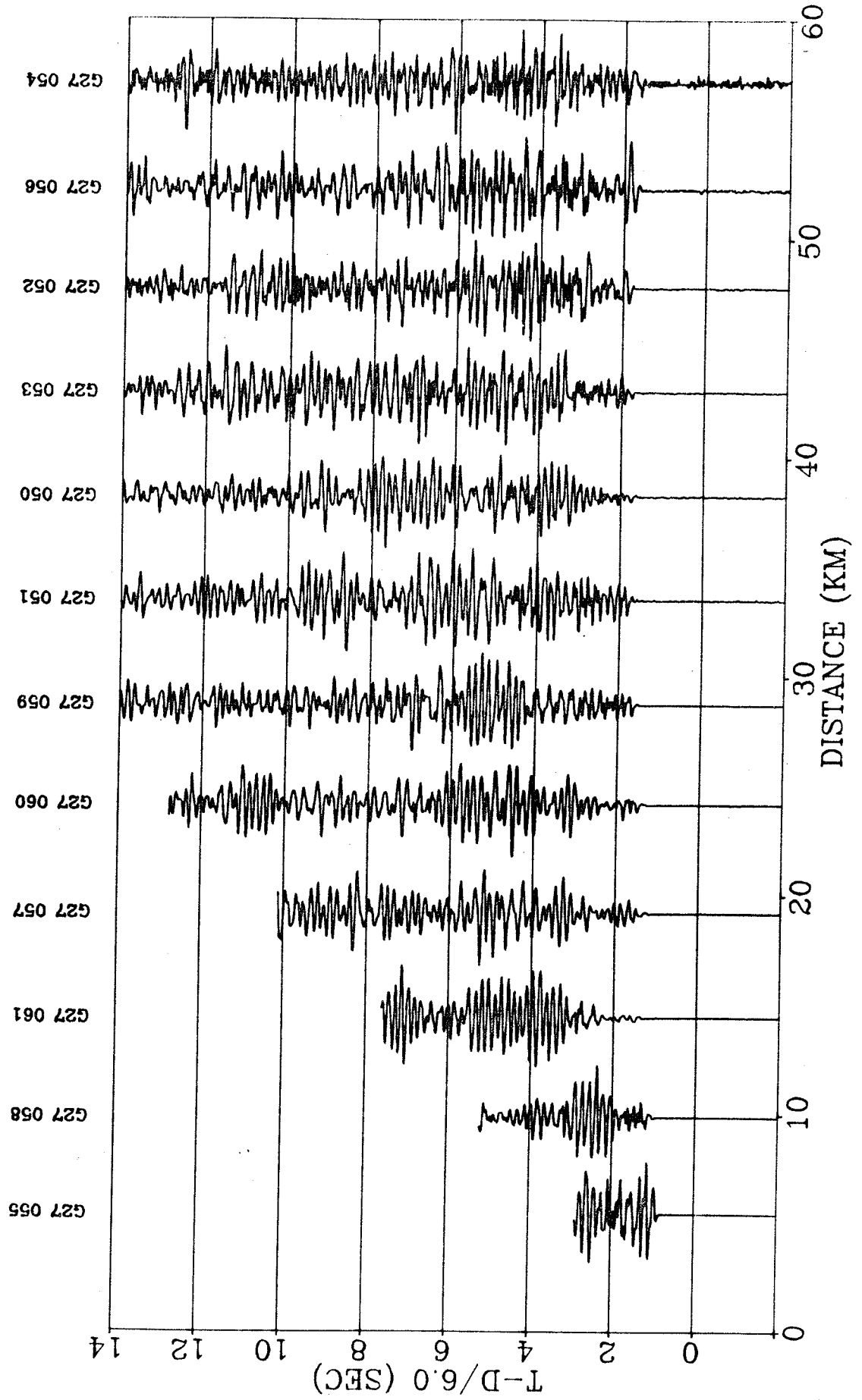


Fig. 27B - Seismic section IG shot G27



Line: I05 Shot: E28
 ** Ice Island 85 ** Field shot point: ELA Section: IG
 Shot time: 1985 APR. 29 23:40: 0.00
 Lat.: 82.03069 N, Long.: 96.79432 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 244.8 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
054	81.66203	93.89513	0.0	61.67	130.43	23:39:59.17	0.100	spz	bpl4	60
056	81.63147	94.10854	0.0	61.67	134.95	23:39:59.16	0.100	spz	bpl7	60
052	81.60184	94.30125	0.0	62.16	139.15	23:39:59.18	0.100	spz	bpl2	60
053	81.57110	94.50098	0.0	62.99	143.42	23:39:59.17	0.100	spz	bpl3	60
050	81.54018	94.70343	0.0	64.13	147.62	23:39:59.17	0.100	spz	bpl0	60
051	81.50941	94.90040	0.0	65.61	151.58	23:39:59.18	0.100	spz	bpl1	60
059	81.47833	95.10000	0.0	67.39	155.41	23:39:59.16	0.100	spz	bp20	60
060	81.44735	95.27917	0.0	69.53	158.78	23:39:59.16	0.100	spz	bp21	60
057	81.41573	95.49382	0.0	71.79	162.42	23:39:59.18	0.100	spz	bpl8	60
061	81.38394	95.68807	0.0	74.39	165.59	23:39:59.16	0.100	spz	bp22	60
058	81.35308	95.86723	0.0	77.14	168.36	23:39:59.18	0.100	spz	bpl9	60
055	81.32352	96.06464	0.0	79.85	171.14	23:39:59.15	0.100	spz	bpl6	60

Fig. 28A - Water wave section IG fan shot E28

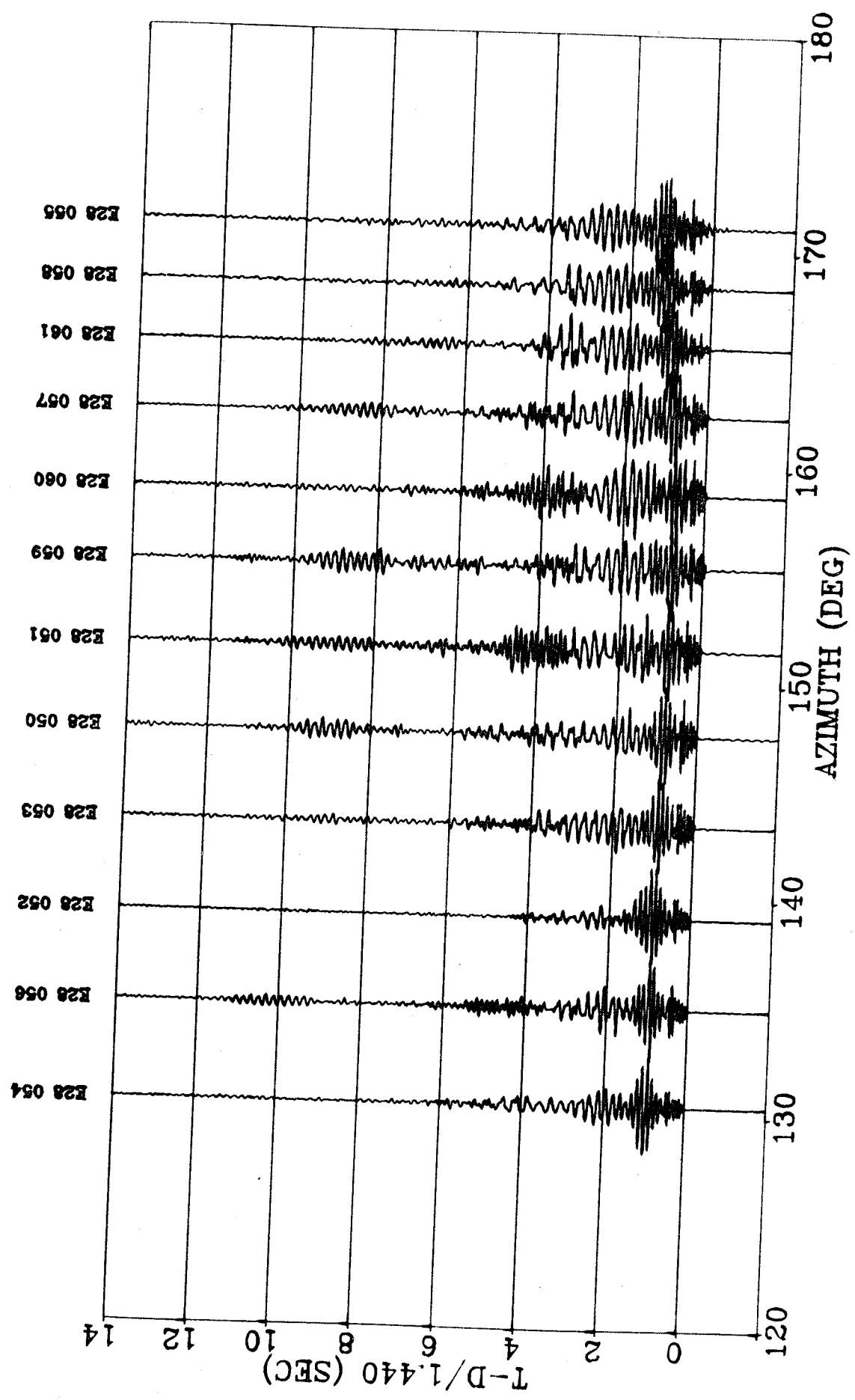
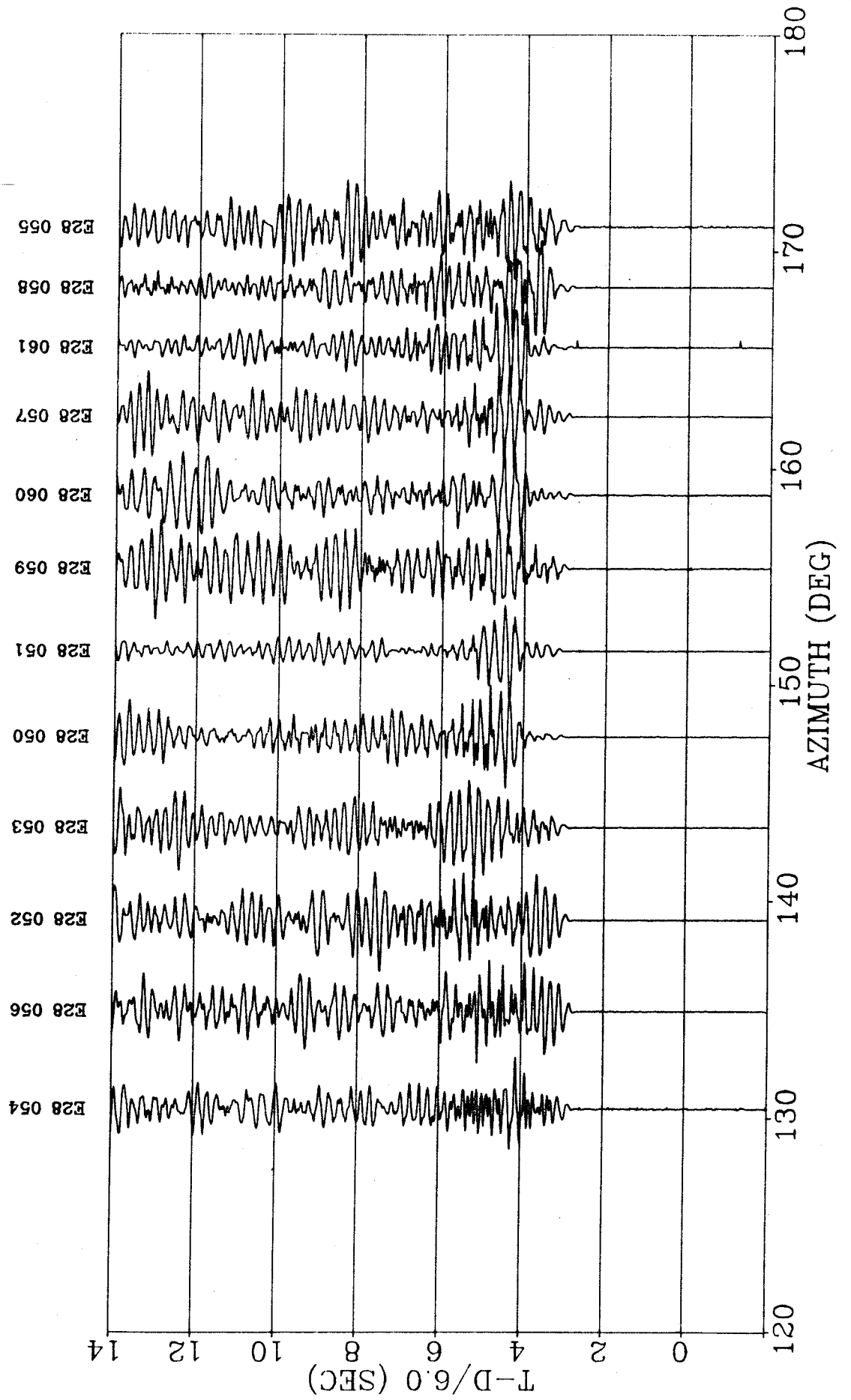


Fig. 28B - Seismic section IC fan shot E28



Line: I05 Shot: I29
 ** Ice Island 85 ** Field shot point: I3 Section: IG
 Shot time: 1985 APR. 30 0:11: 0.00
 Lat.: 81.68580 N, Long.: 93.77987 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
054	81.66203	93.89513	0.0	3.24	215.13	0: 9:59.18	0.100	spz	bpl4	60
056	81.63147	94.10854	0.0	8.07	221.44	0: 9:59.17	0.100	spz	bpl7	60
052	81.60184	94.30125	0.0	12.63	222.33	0: 9:59.16	0.100	spz	bpl2	60
053	81.57110	94.50098	0.0	17.37	222.83	0: 9:59.15	0.100	spz	bpl3	60
050	81.54018	94.70343	0.0	22.15	223.23	0: 9:59.17	0.100	spz	bpl0	60
051	81.50941	94.90040	0.0	26.88	223.43	0: 9:59.17	0.100	spz	bpl1	60
059	81.47833	95.10000	0.0	31.66	223.63	0: 9:59.16	0.100	spz	bp20	60
060	81.44735	95.27917	0.0	36.22	223.43	0: 9:59.16	0.100	spz	bp21	60
057	81.41573	95.49382	0.0	41.24	223.85	0: 9:59.17	0.100	spz	bpl8	60
061	81.38394	95.68807	0.0	46.05	223.89	0: 9:59.17	0.100	spz	bp22	60
058	81.35308	95.86723	0.0	50.62	223.81	0: 9:59.17	0.100	spz	bpl9	60
055	81.32352	96.06464	0.0	55.29	224.11	0: 9:59.17	0.100	spz	bpl6	60

Fig. 29A - Water wave section IG shot I29

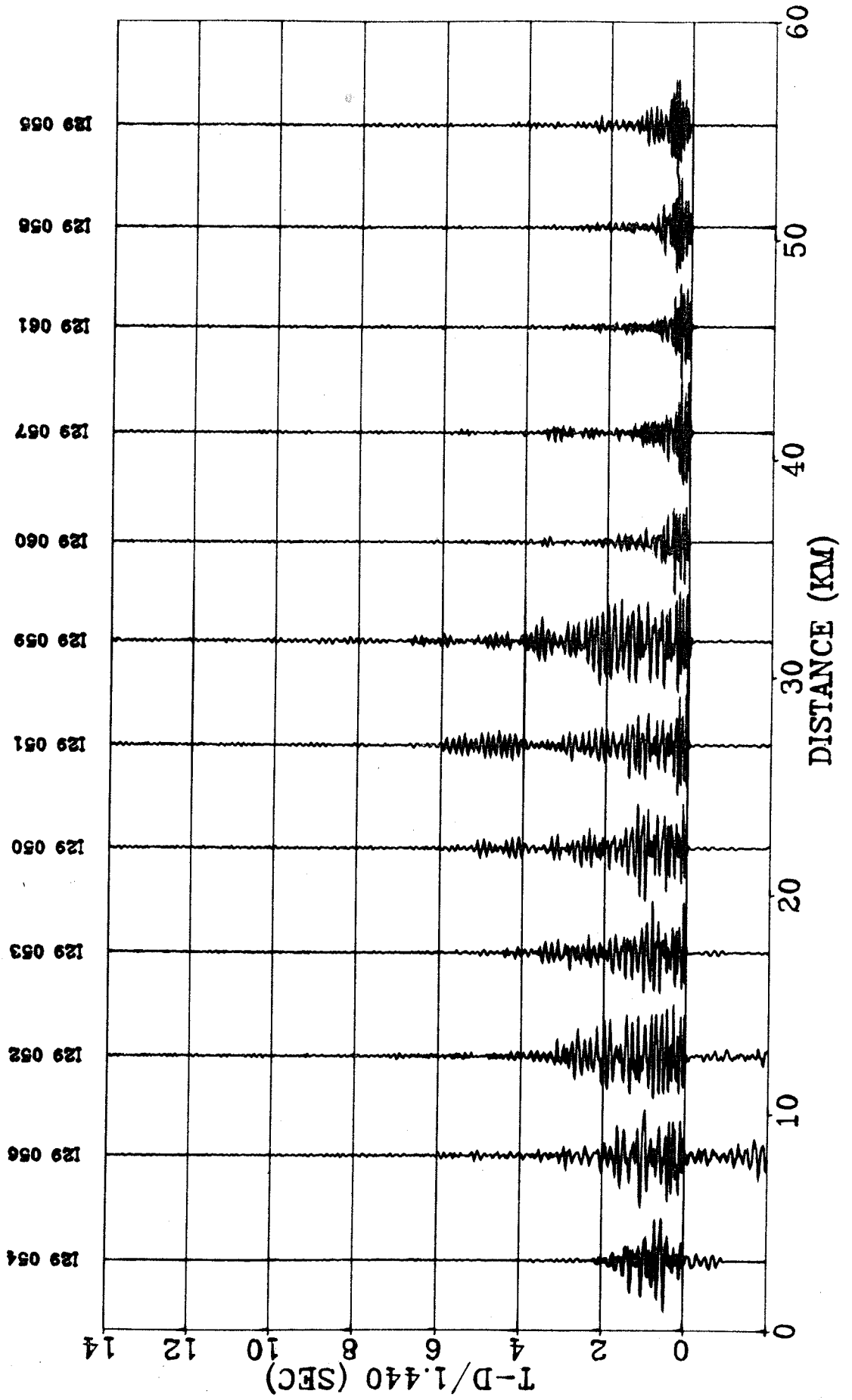
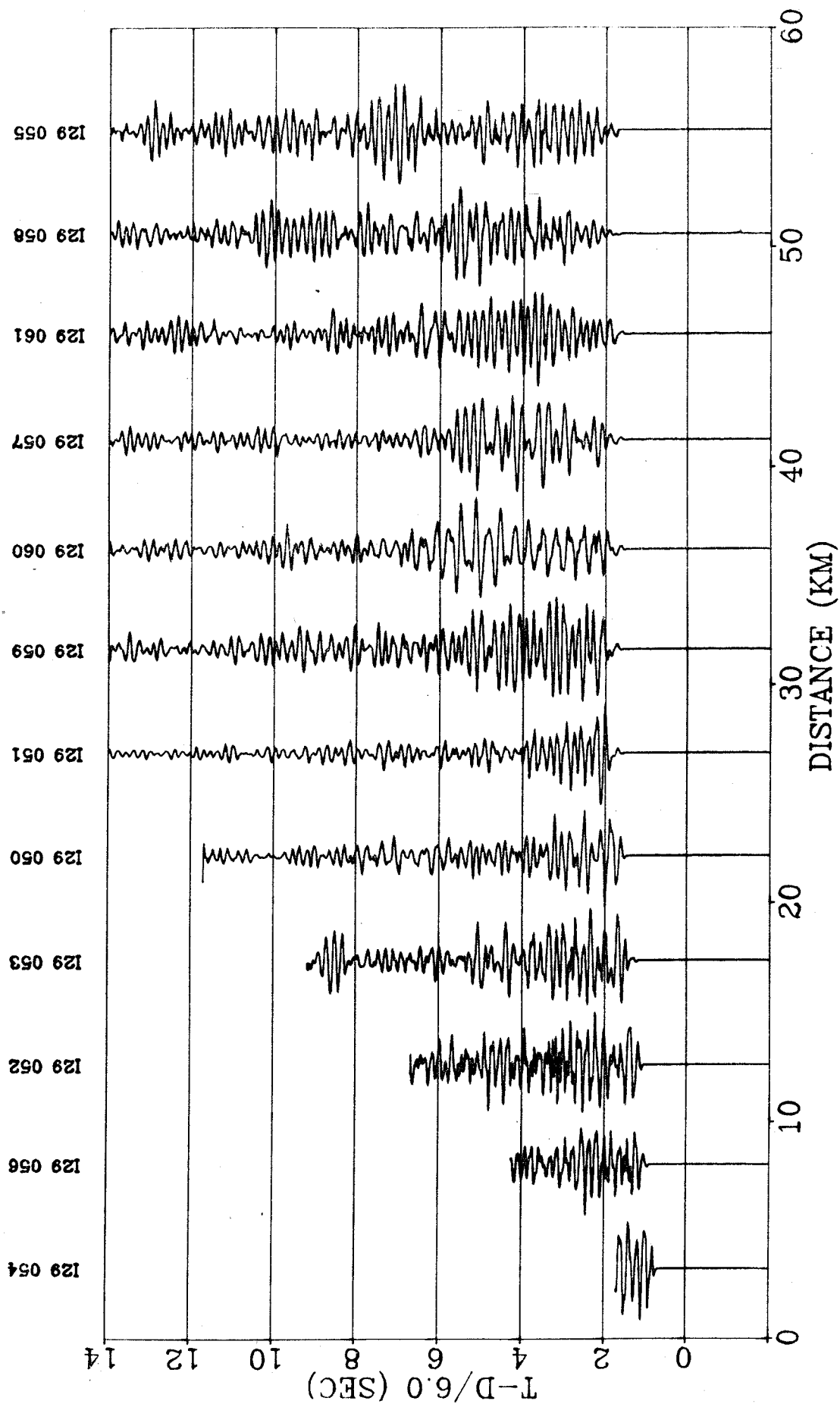


Fig. 29B - Seismic section IG shot I29



Line: I05 Shot: I30
 ** Ice Island 85 ** Field shot point: I1 Section: IG
 Shot time: 1985 APR. 30 0:31: 0.00
 Lat.: 81.69342 N, Long.: 93.68399 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 136.0 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
054	81.66203	93.89513	0.0	4.89	224.34	0:29:59.16	0.100	spz	bp14	60
056	81.63147	94.10854	0.0	9.75	225.03	0:29:59.17	0.100	spz	bp17	60
052	81.60184	94.30125	0.0	14.31	224.71	0:29:59.17	0.100	spz	bp12	60
053	81.57110	94.50098	0.0	19.05	224.59	0:29:59.16	0.100	spz	bp13	60
050	81.54018	94.70343	0.0	23.84	224.63	0:29:59.16	0.100	spz	bp10	60
051	81.50941	94.90040	0.0	28.57	224.60	0:29:59.17	0.100	spz	bp11	60
059	81.47833	95.10000	0.0	33.35	224.64	0:29:59.16	0.100	spz	bp20	60
060	81.44735	95.27917	0.0	37.91	224.34	0:29:59.16	0.100	spz	bp21	60
057	81.41573	95.49382	0.0	42.93	224.65	0:29:59.17	0.100	spz	bp18	60
061	81.38394	95.68807	0.0	47.74	224.61	0:29:59.16	0.100	spz	bp22	60
058	81.35308	95.86723	0.0	52.31	224.49	0:29:59.16	0.100	spz	bp19	60
055	81.32352	96.06464	0.0	56.98	224.73	0:29:59.17	0.100	spz	bp16	60

Fig. 30A - Water wave section IG shot I30

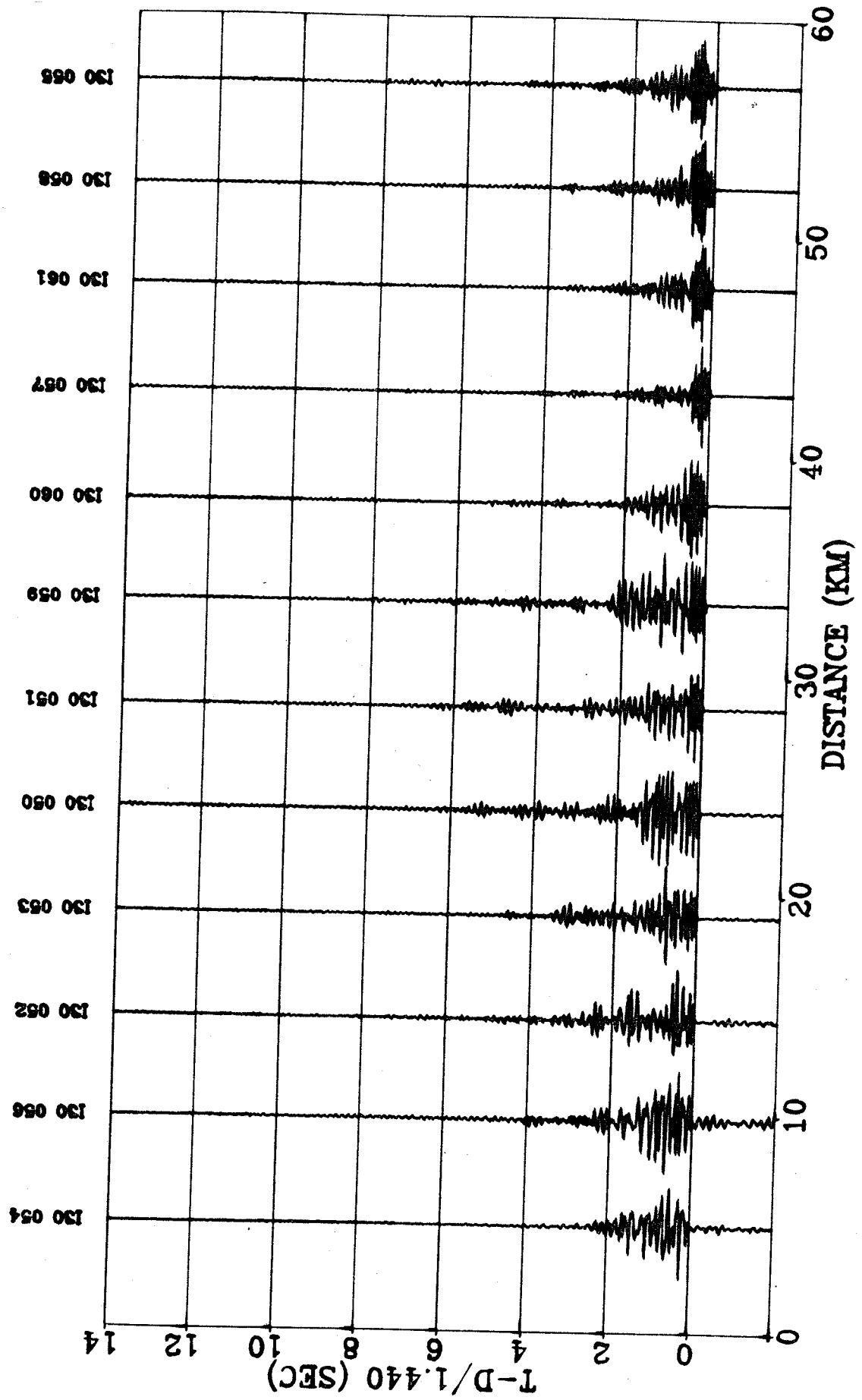
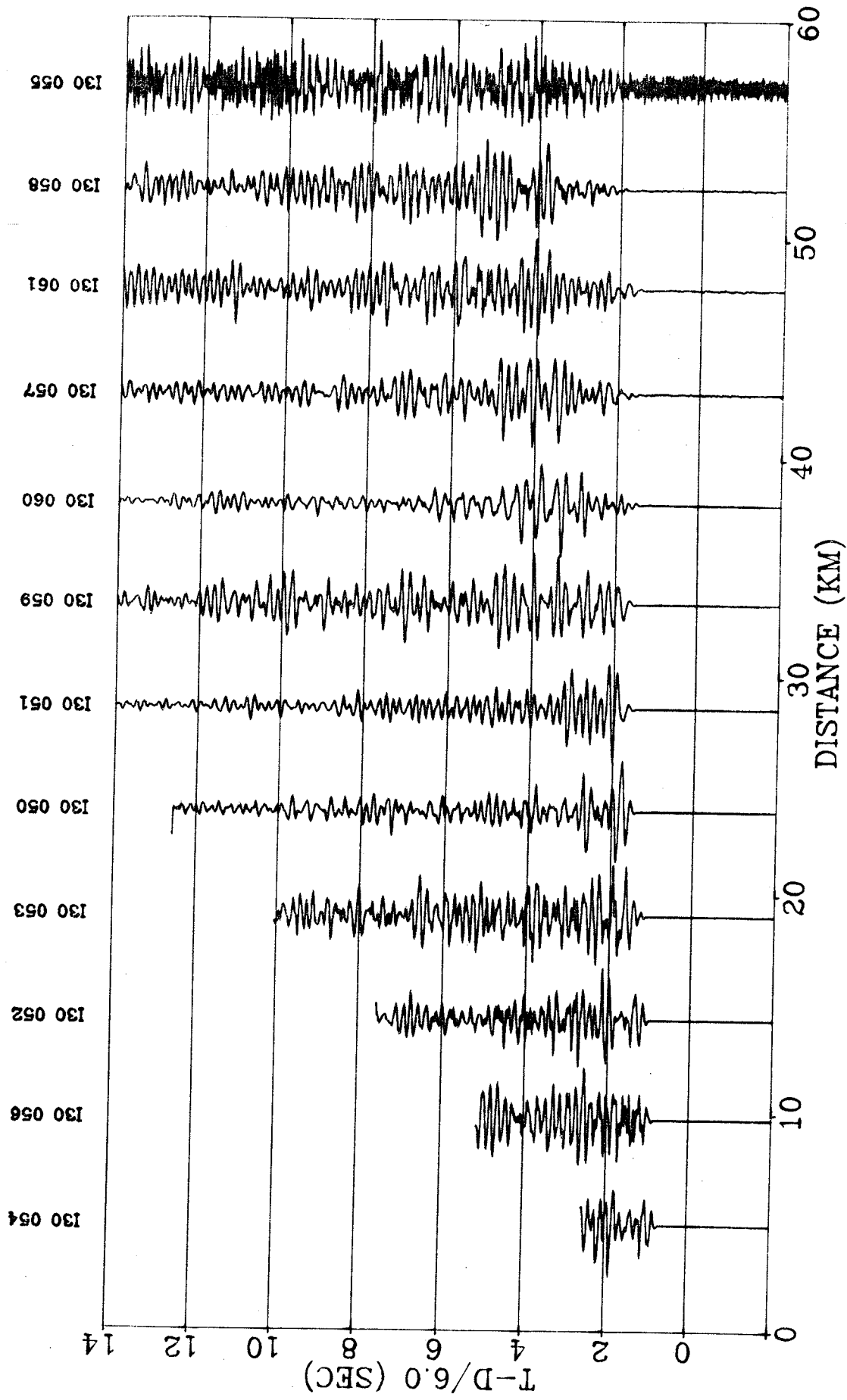


Fig. 30B - Seismic section IG shot I30



Line: I05 Shot: D31
 ** Ice Island 85 ** Field shot point: D2A Section: IG
 Shot time: 1985 APR. 30 0:50: 0.00
 Lat.: 81.63134 N, Long.: 98.91213 W, Elev.: 0.0 m
 Depth: 100.0 m, Size: 244.8 kg.

Site	Lat. N	Long. W	Elev.	Dist.	Az.	Time	UT GN	CMP	Ins.	SR
054	81.66203	93.89513	0.0	81.45	85.11	0:49:59.15	0.100	spz	bp14	60
056	81.63147	94.10854	0.0	78.06	87.61	0:49:59.18	0.100	spz	bp17	60
052	81.60184	94.30125	0.0	75.14	90.23	0:49:59.17	0.100	spz	bp12	60
053	81.57110	94.50098	0.0	72.26	93.16	0:49:59.16	0.100	spz	bp13	60
050	81.54018	94.70343	0.0	69.52	96.33	0:49:59.17	0.100	spz	bp10	60
051	81.50941	94.90040	0.0	67.07	99.72	0:49:59.18	0.100	spz	bp11	60
059	81.47833	95.10000	0.0	64.81	103.39	0:49:59.15	0.100	spz	bp20	60
060	81.44735	95.27917	0.0	63.13	107.19	0:49:59.18	0.100	spz	bp21	60
057	81.41573	95.49382	0.0	61.20	111.47	0:49:59.17	0.100	spz	bp18	60
061	81.38394	95.68807	0.0	59.92	115.85	0:49:59.16	0.100	spz	bp22	60
058	81.35308	95.86723	0.0	59.13	120.19	0:49:59.17	0.100	spz	bp19	60
055	81.32352	96.06464	0.0	58.33	124.69	0:49:59.16	0.100	spz	bp16	60

Fig. 31A - Water wave section IG fan shot D31

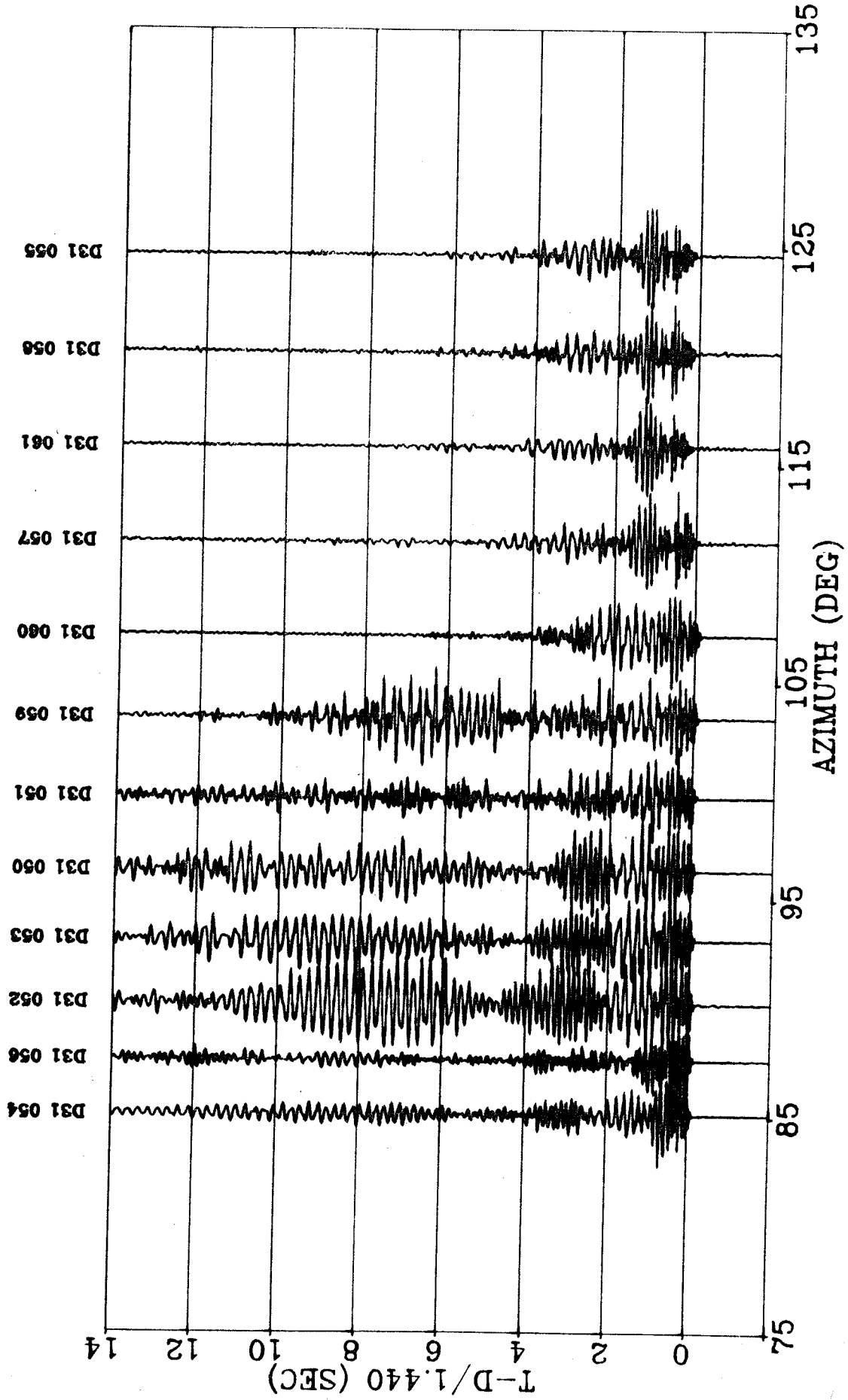


Fig. 31B - Seismic section IG fan shot D31

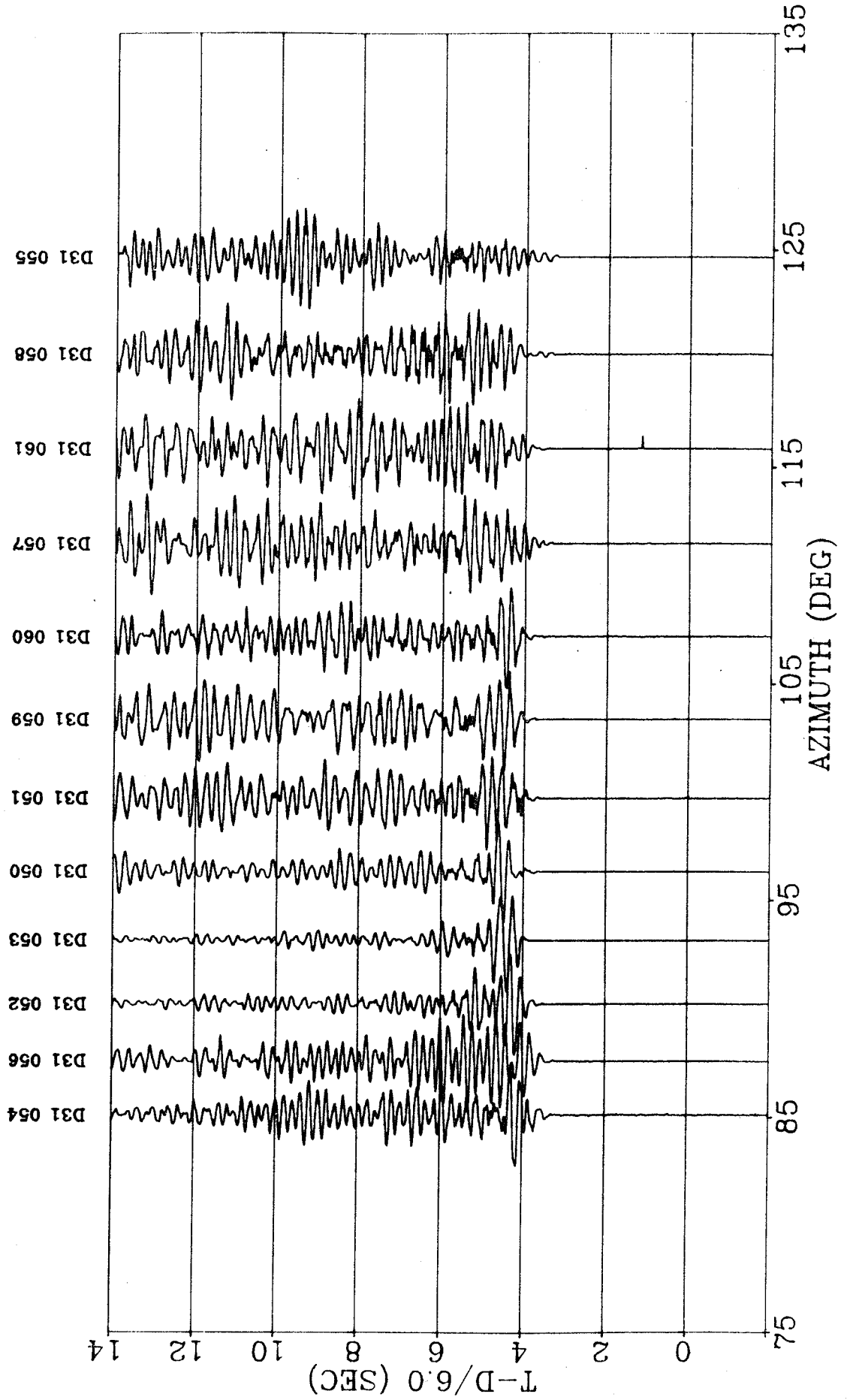


Fig. 32A - Spectral analysis of 1*4 geophone array

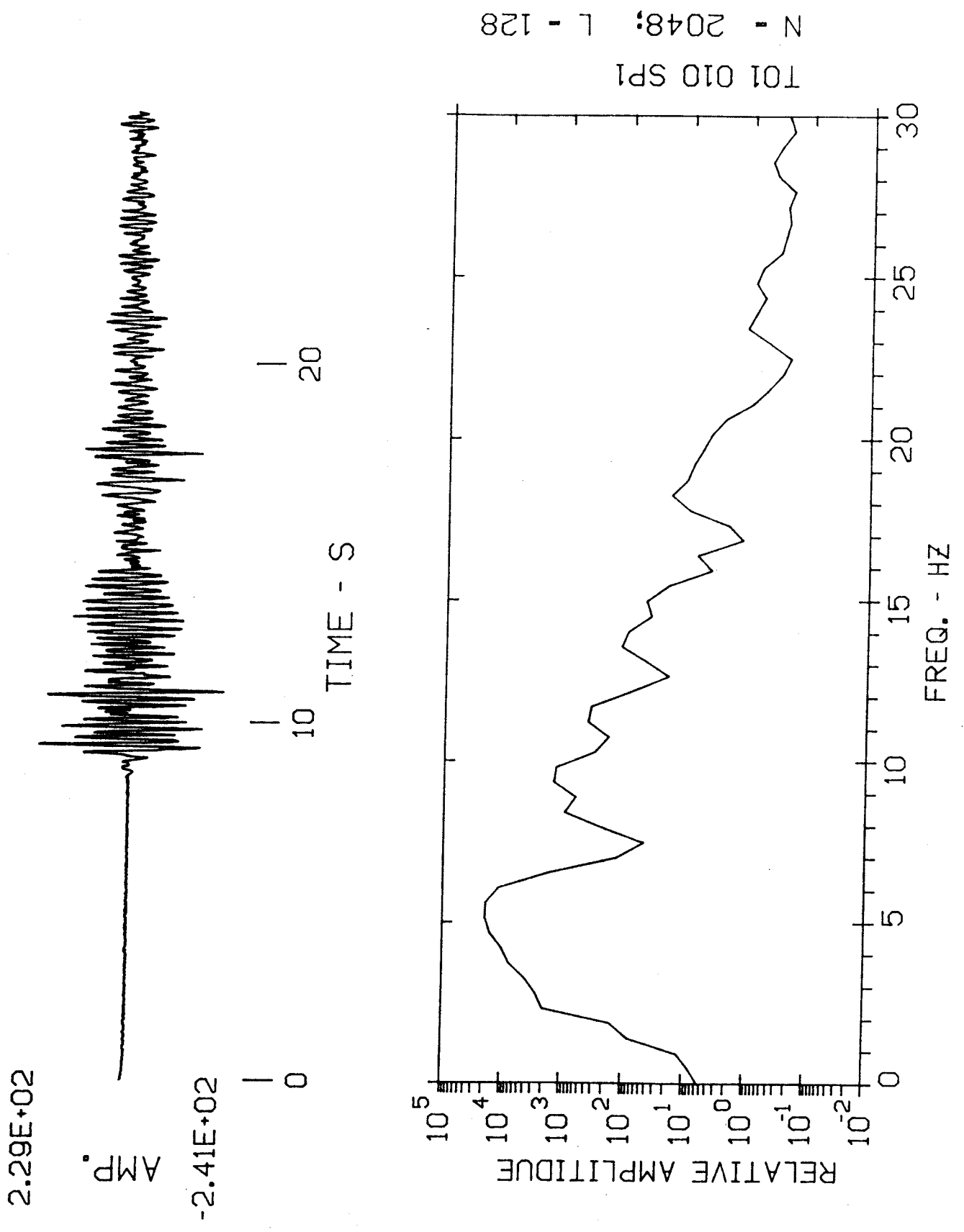


Fig. 32B - Spectral analysis of 2*4 geophone array

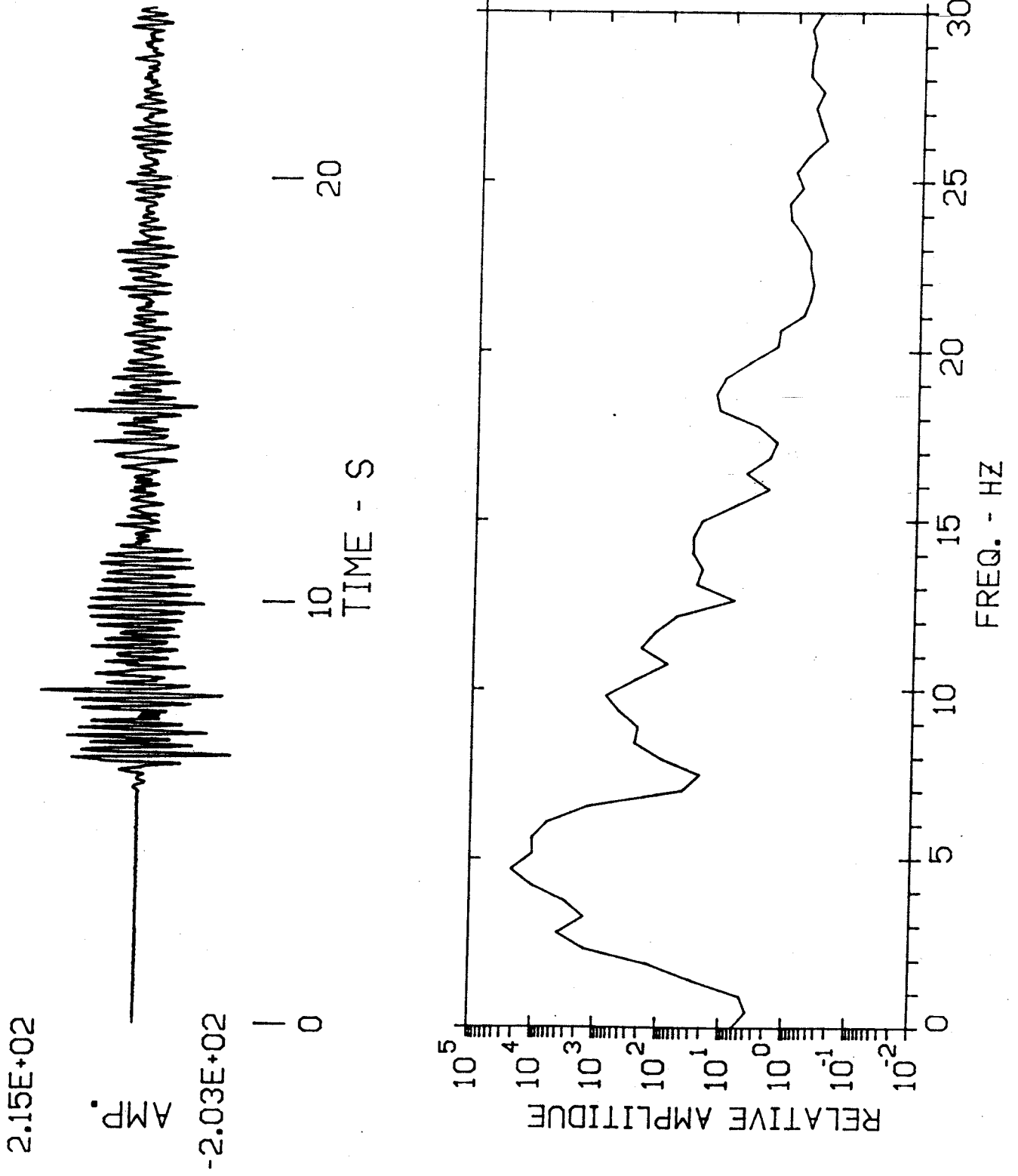


Fig. 32C - Spectral analysis of 3*4 geophone array

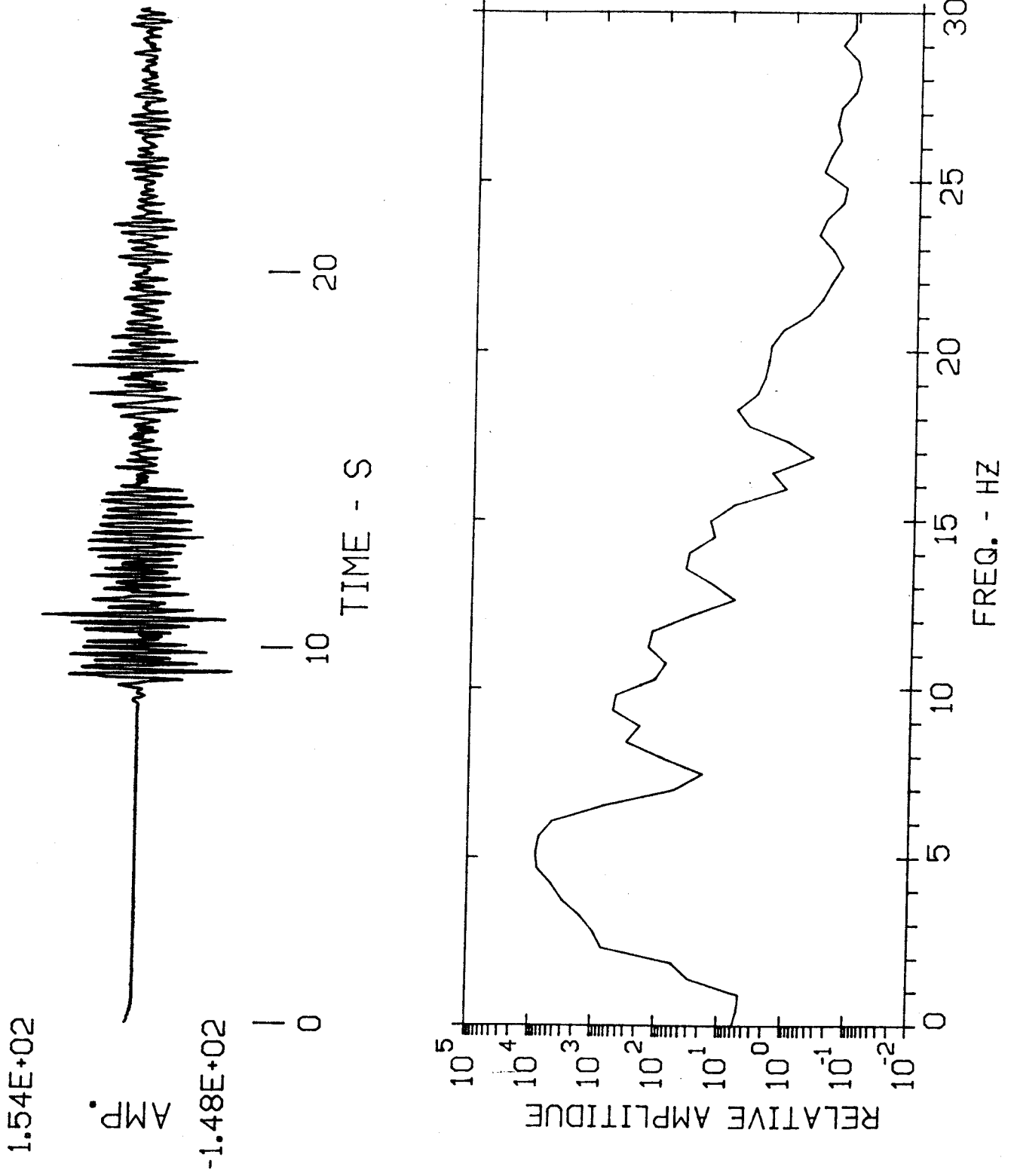


Fig. 32D - Spectral analysis of 4*4 geophone array

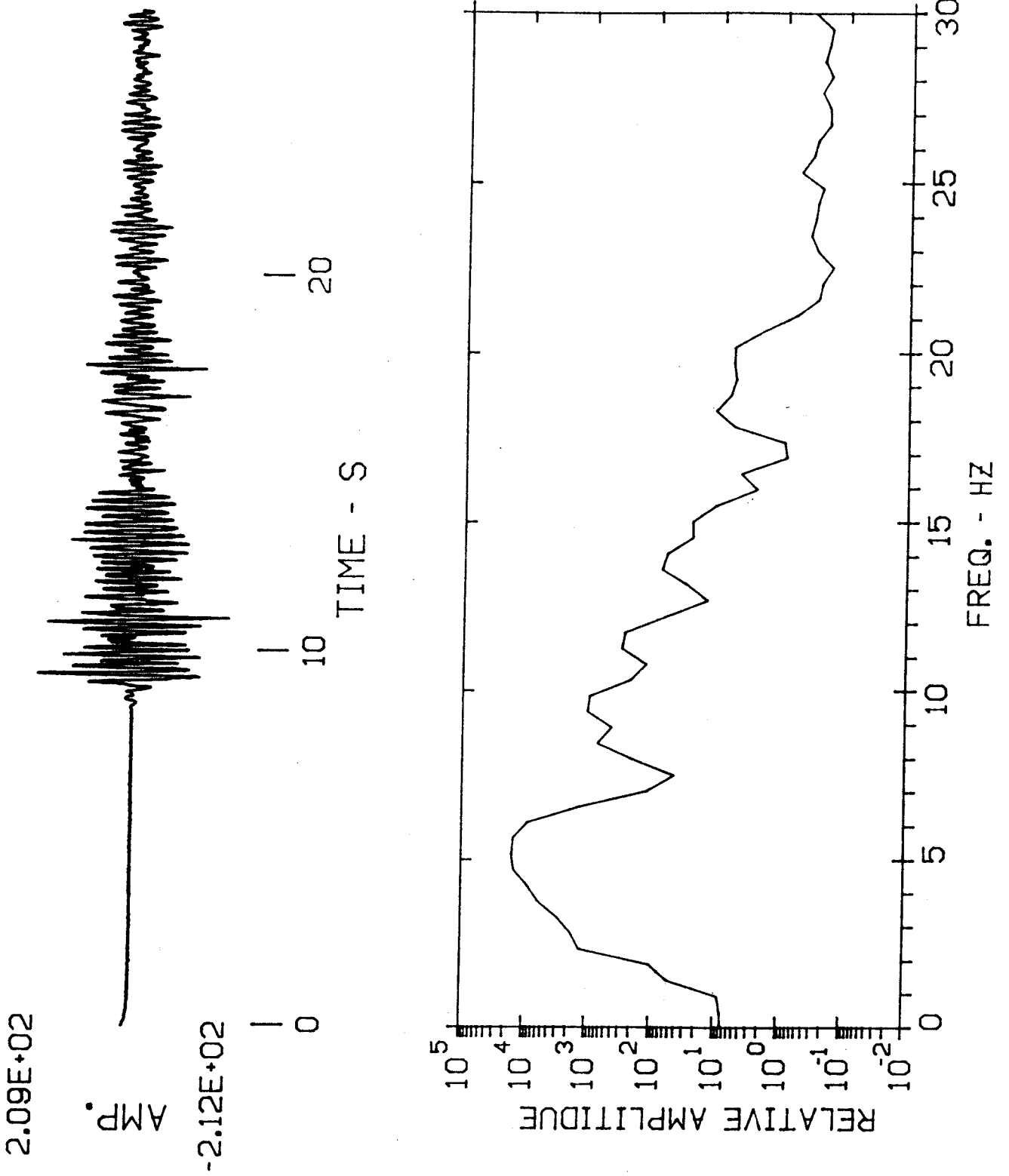


Fig. 32E - Spectral ratio of 1*4 and 3*4 geophone arrays

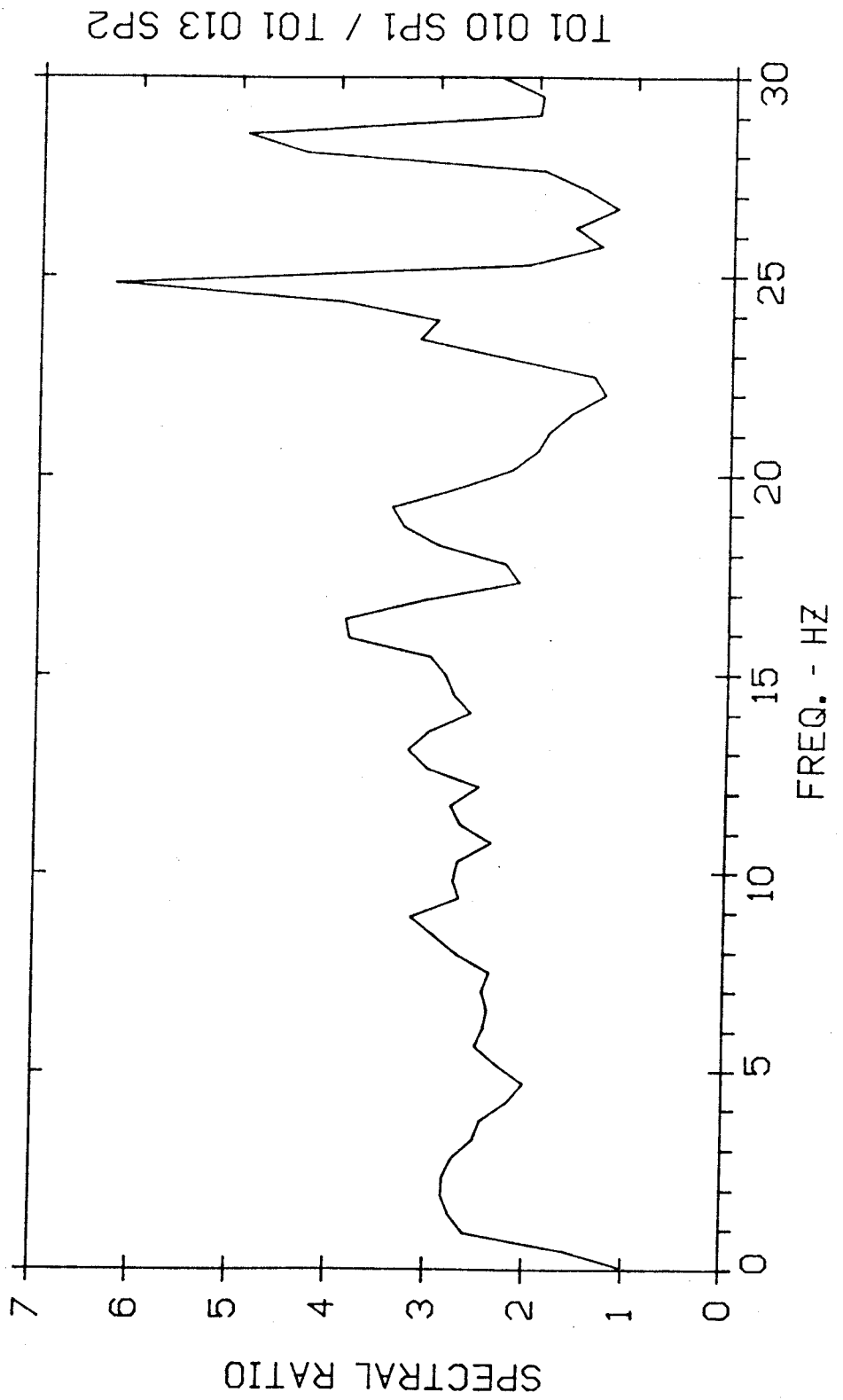


Fig. 32F - Spectral ratio of 2*4 and 3*4 geophone arrays

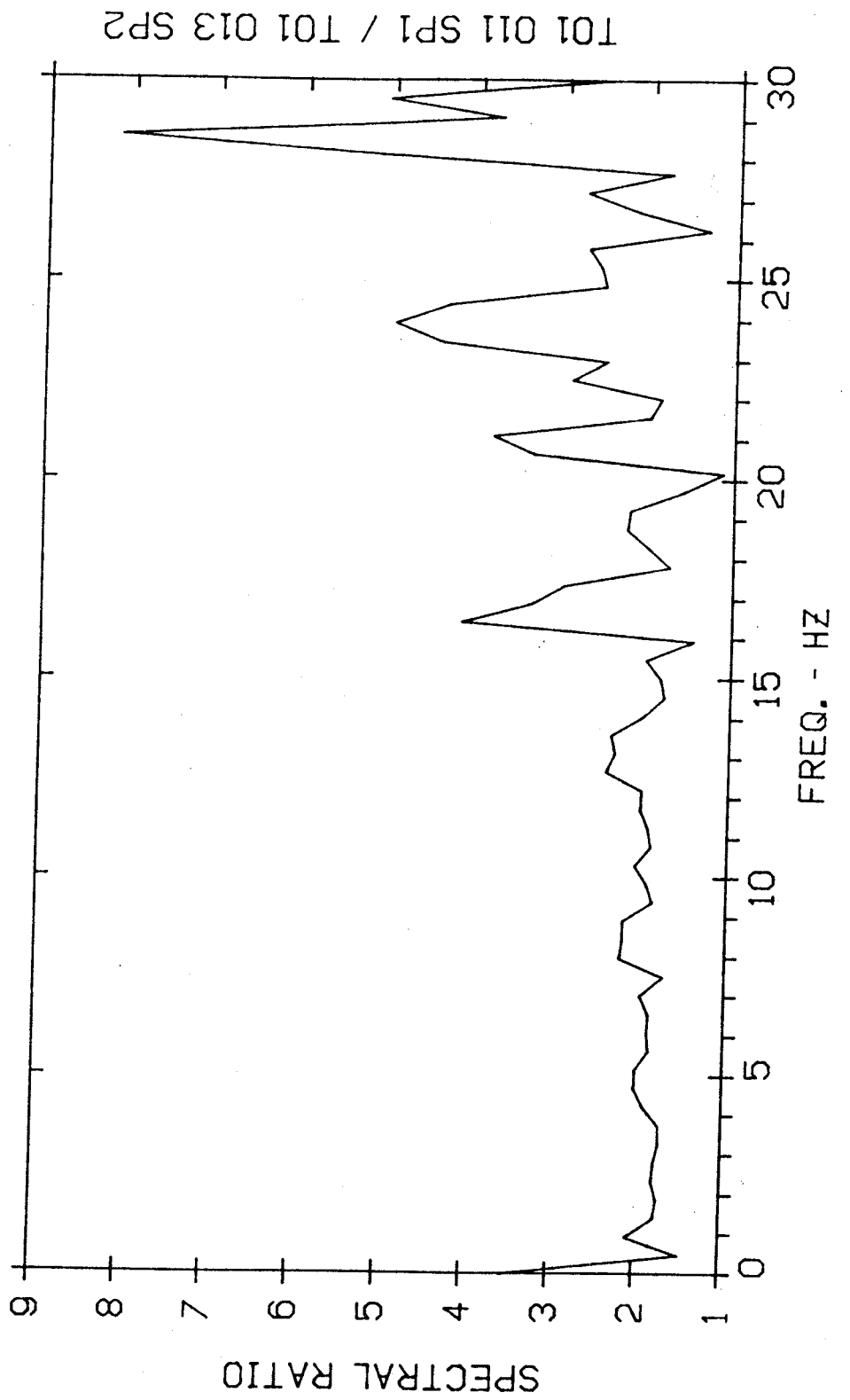
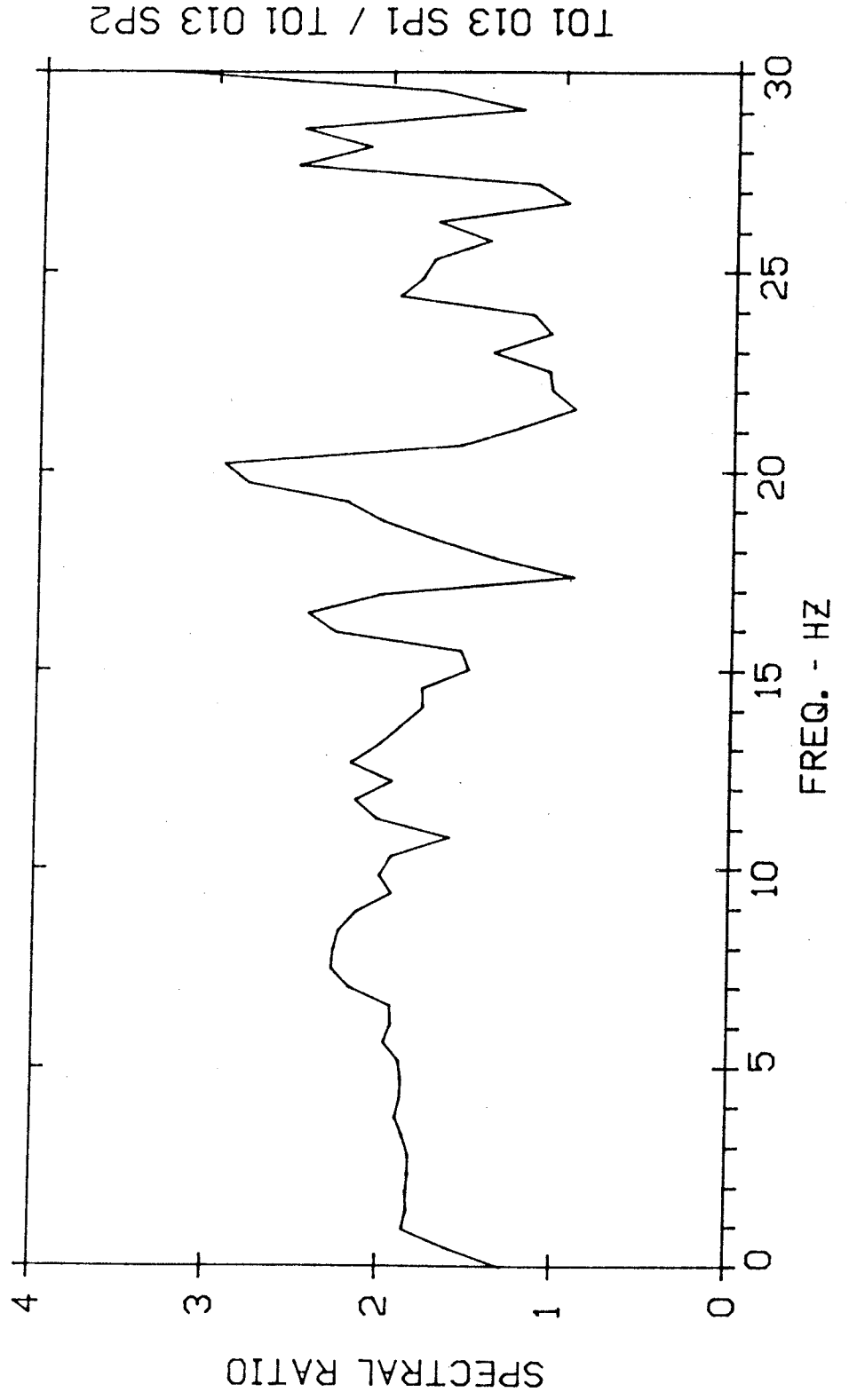


Fig. 32G - Spectral ratio of 4*4 and 3*4 geophone arrays



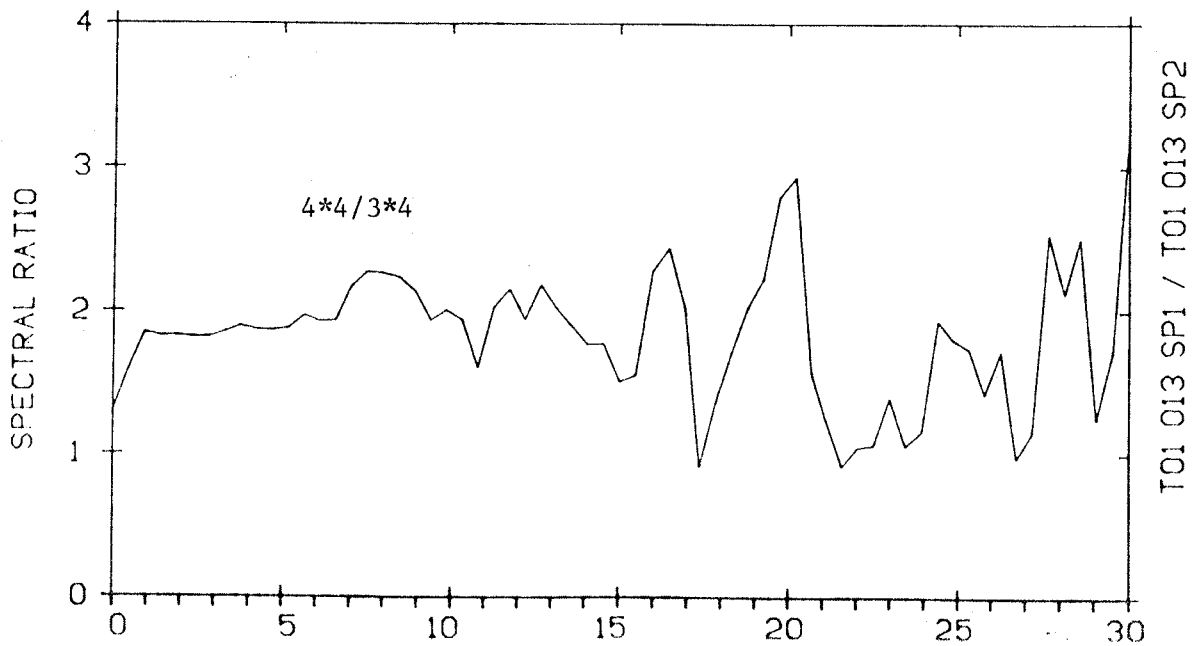
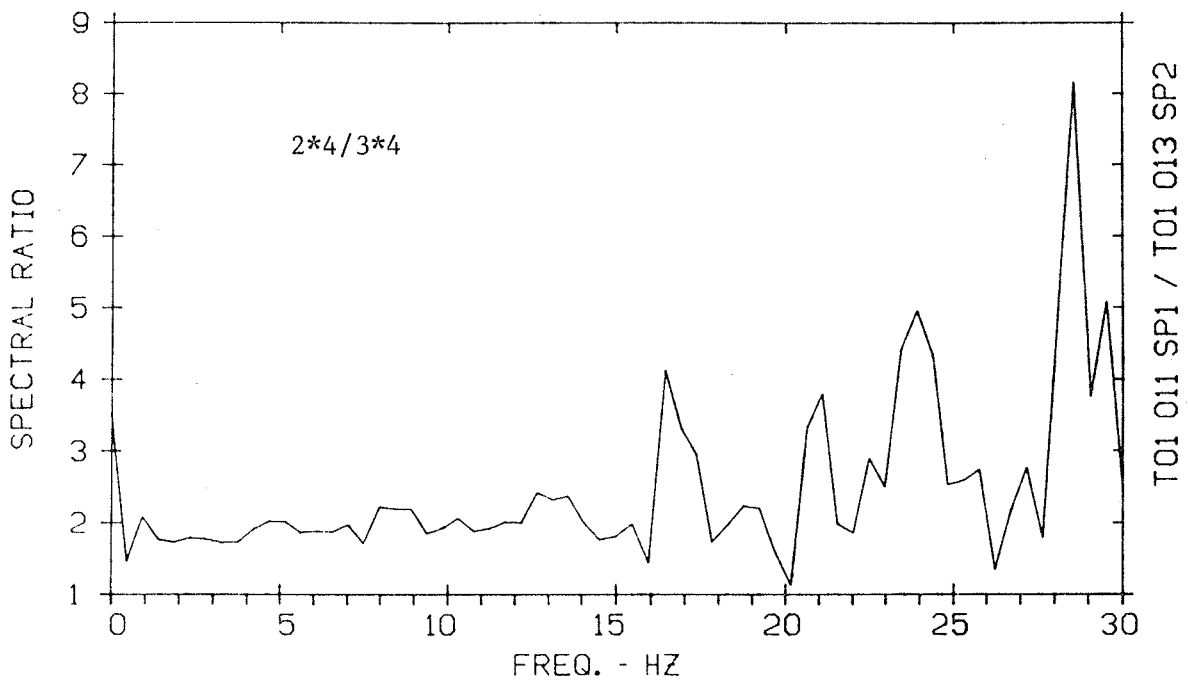
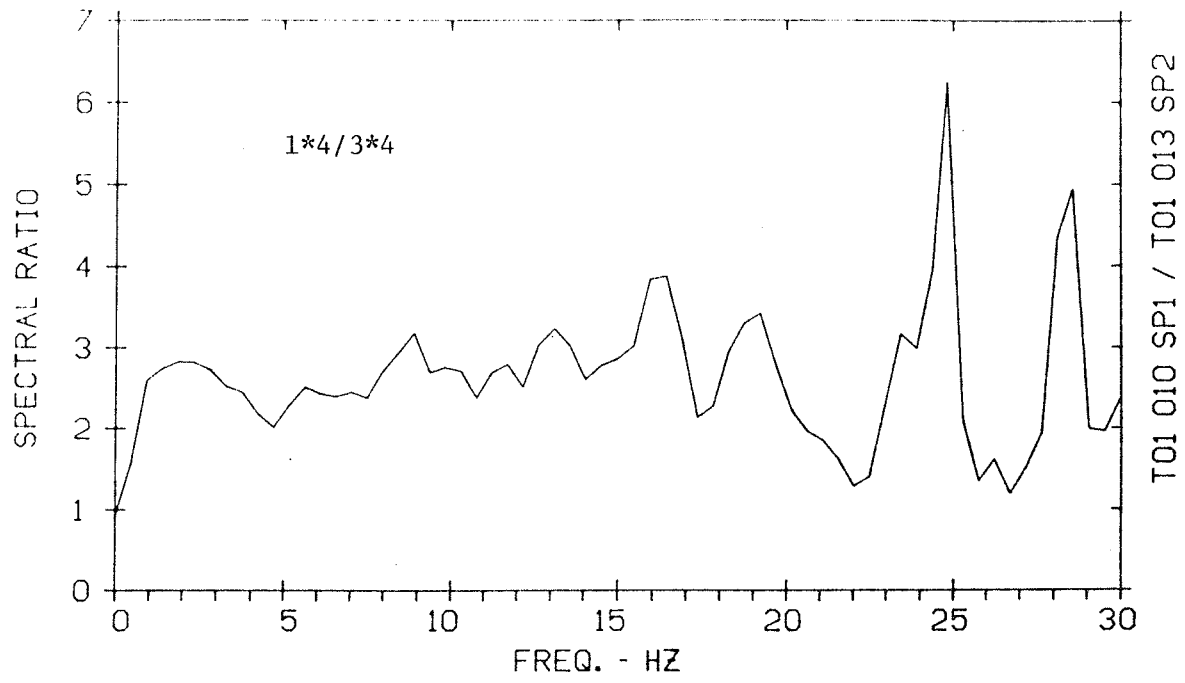
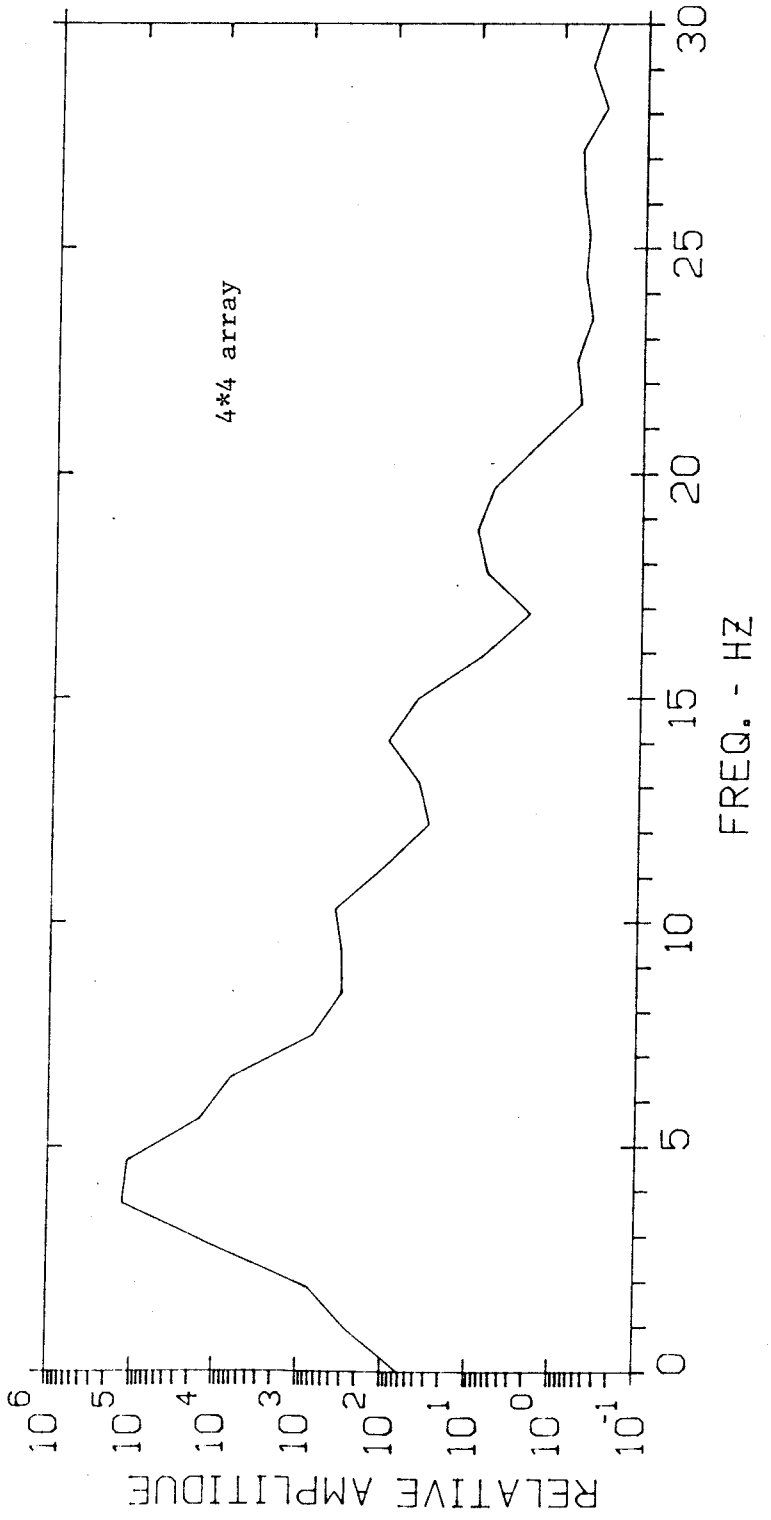
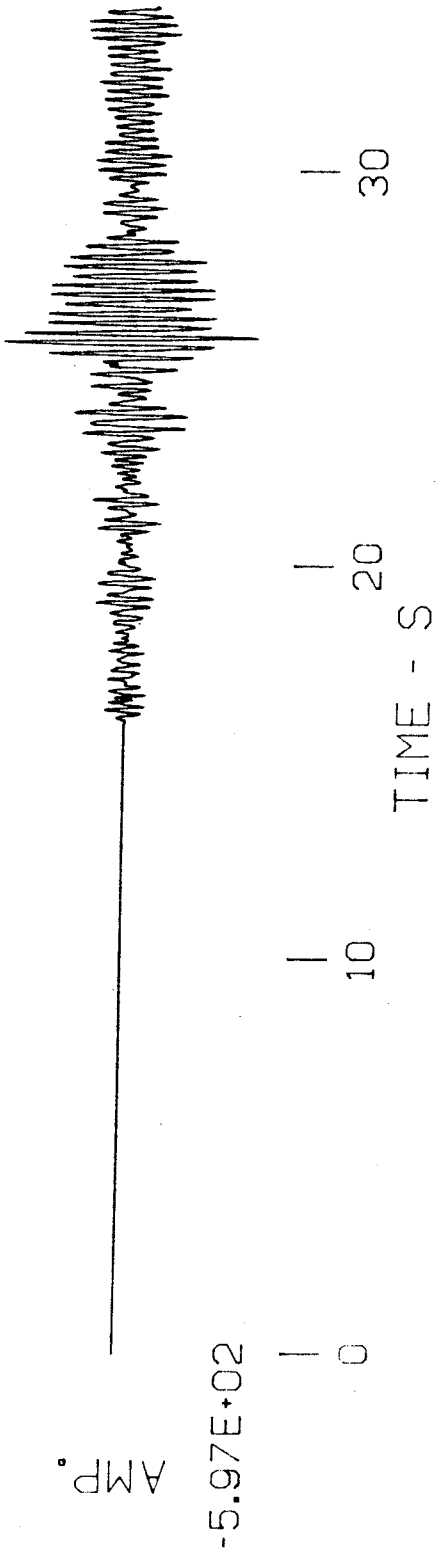


Fig. 32H - Spectral ratio summary

Fig. 33A

5.85E+02

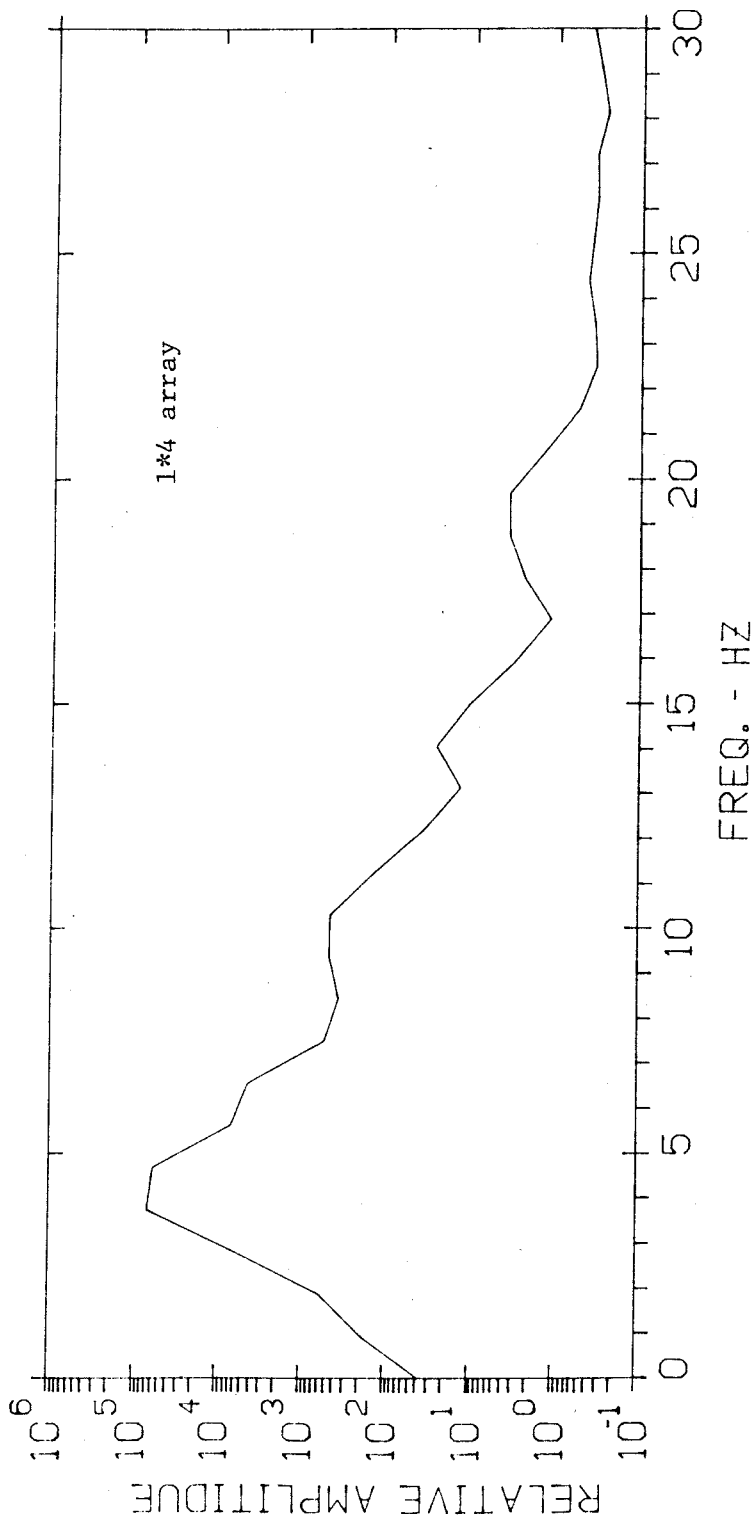
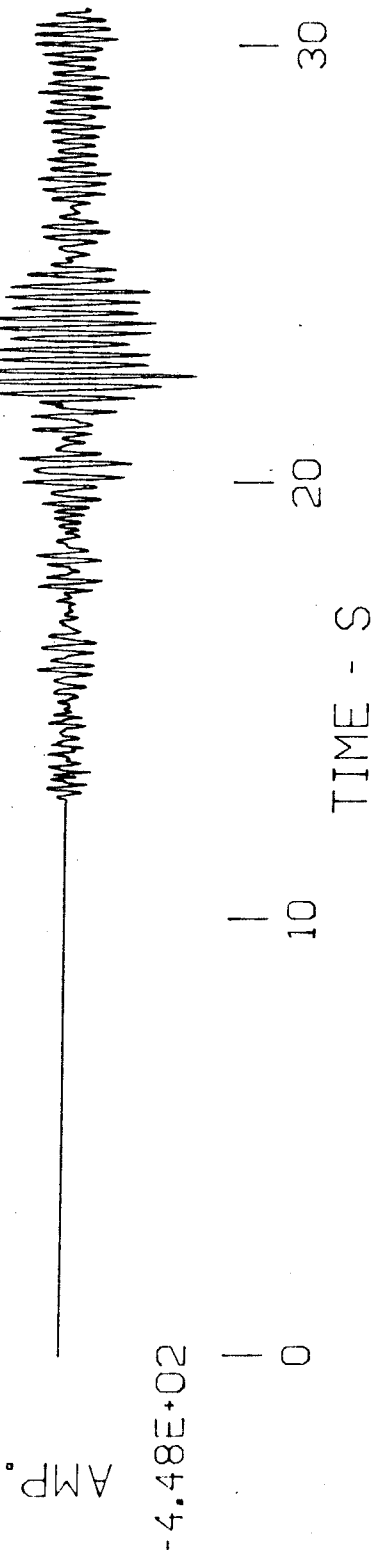


E22 038 SP1

N = 2048; L = 64

Fig. 33B

4.59E+02



E22 038 SP2
N = 2048; L = 64

Fig. 33C

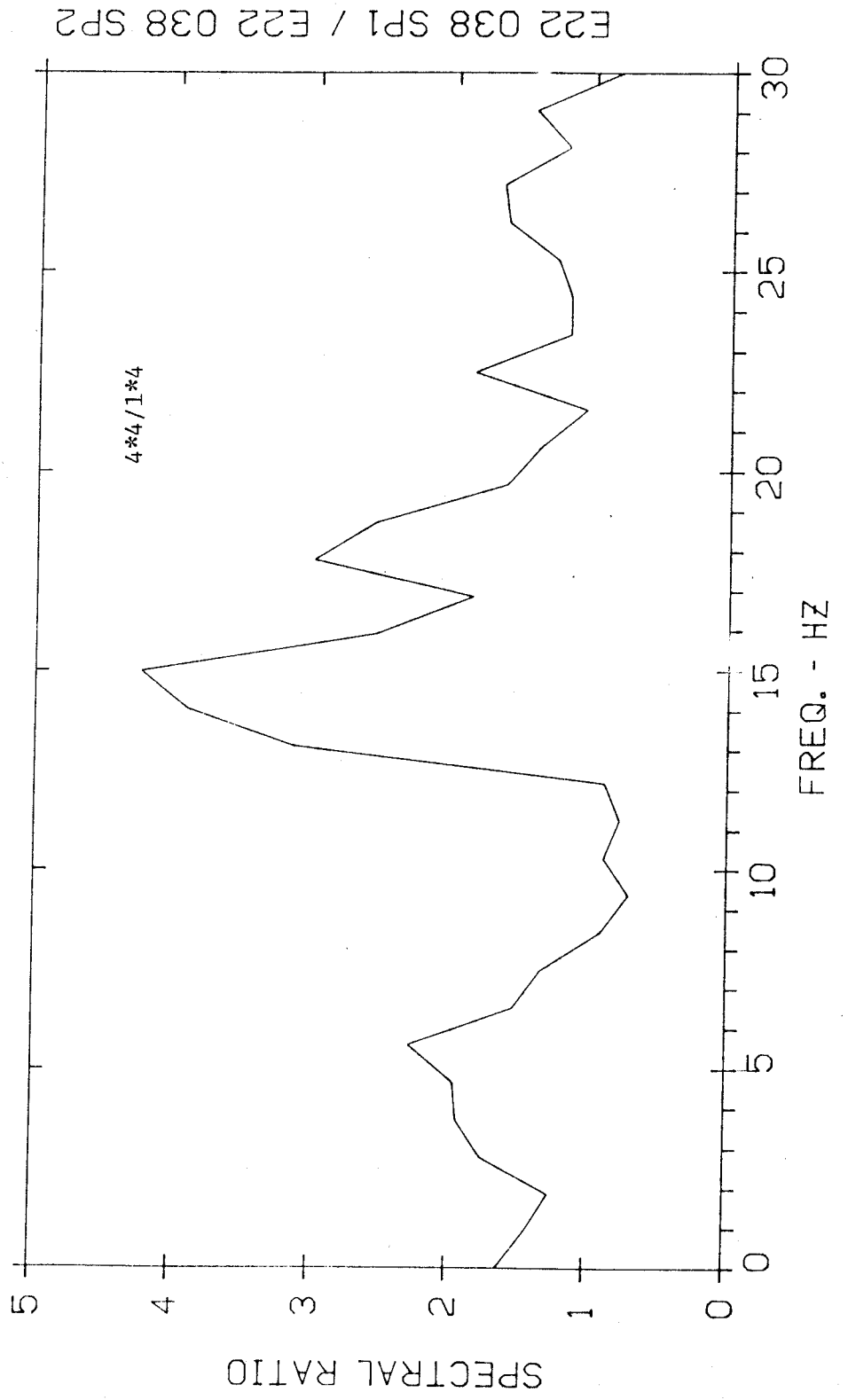


Fig. 34A

1.44E+02

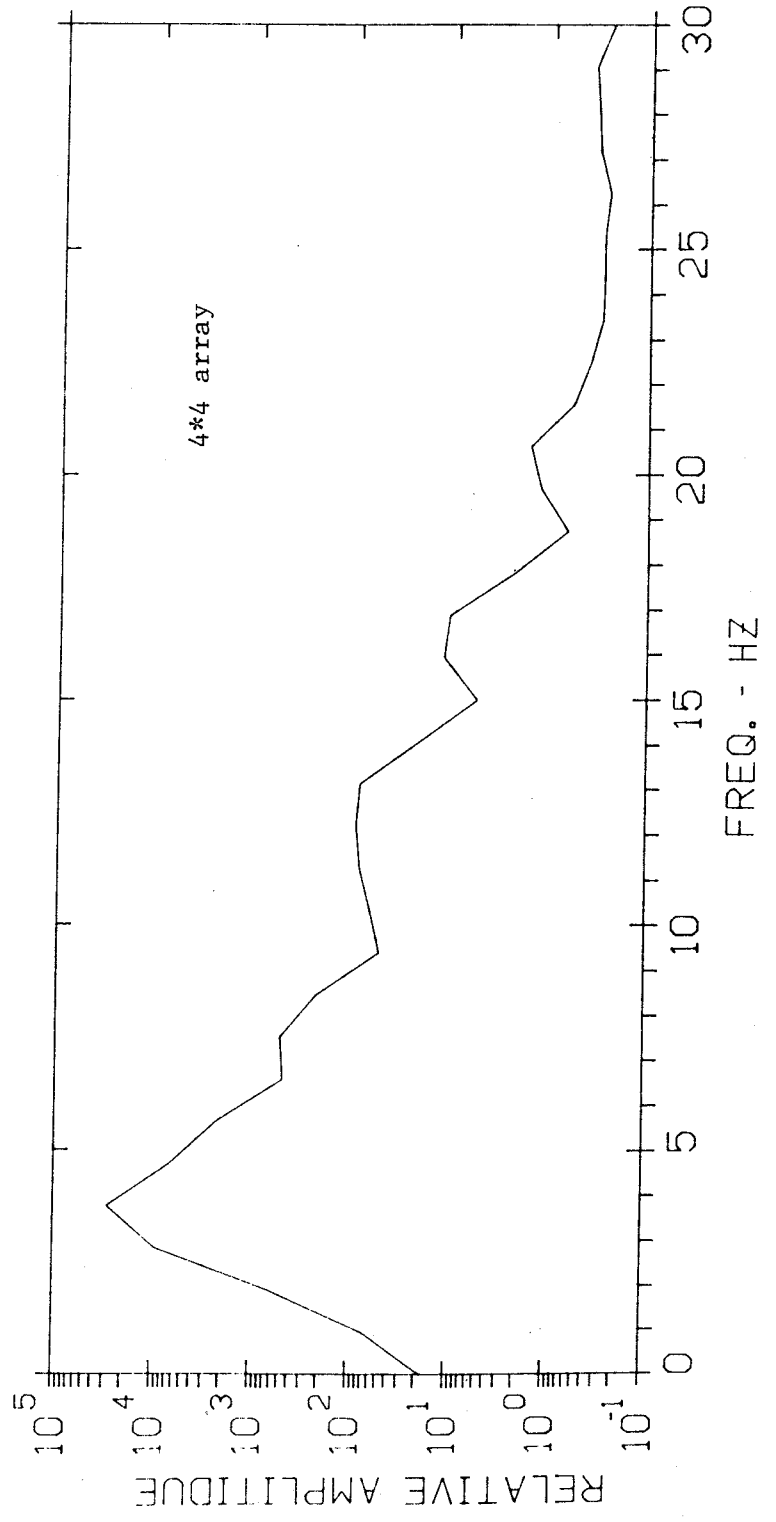
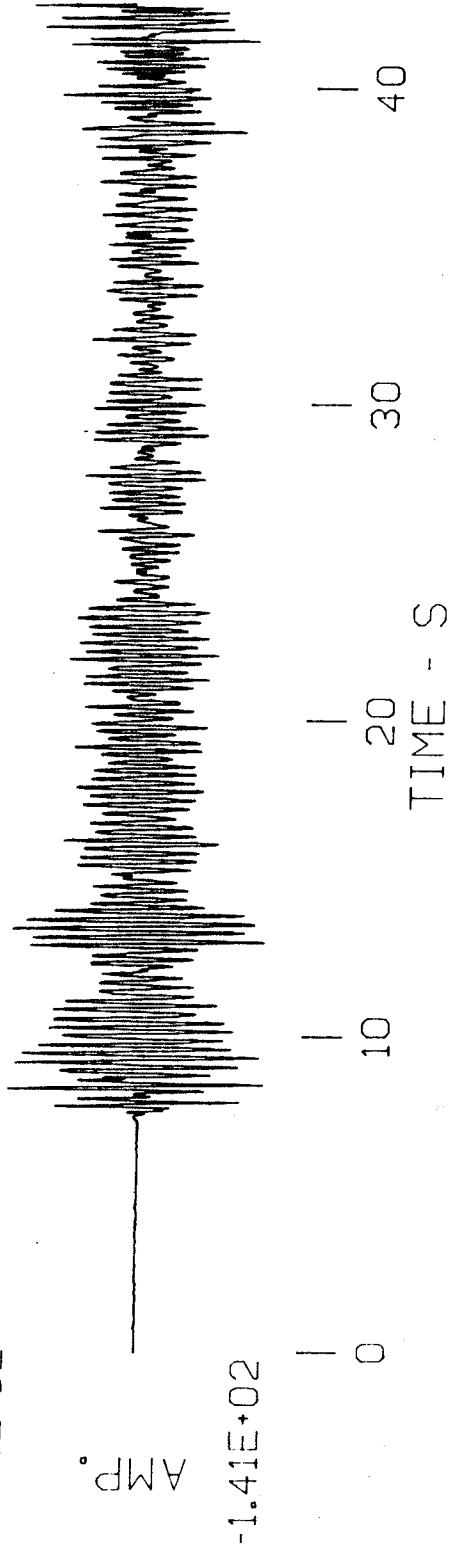
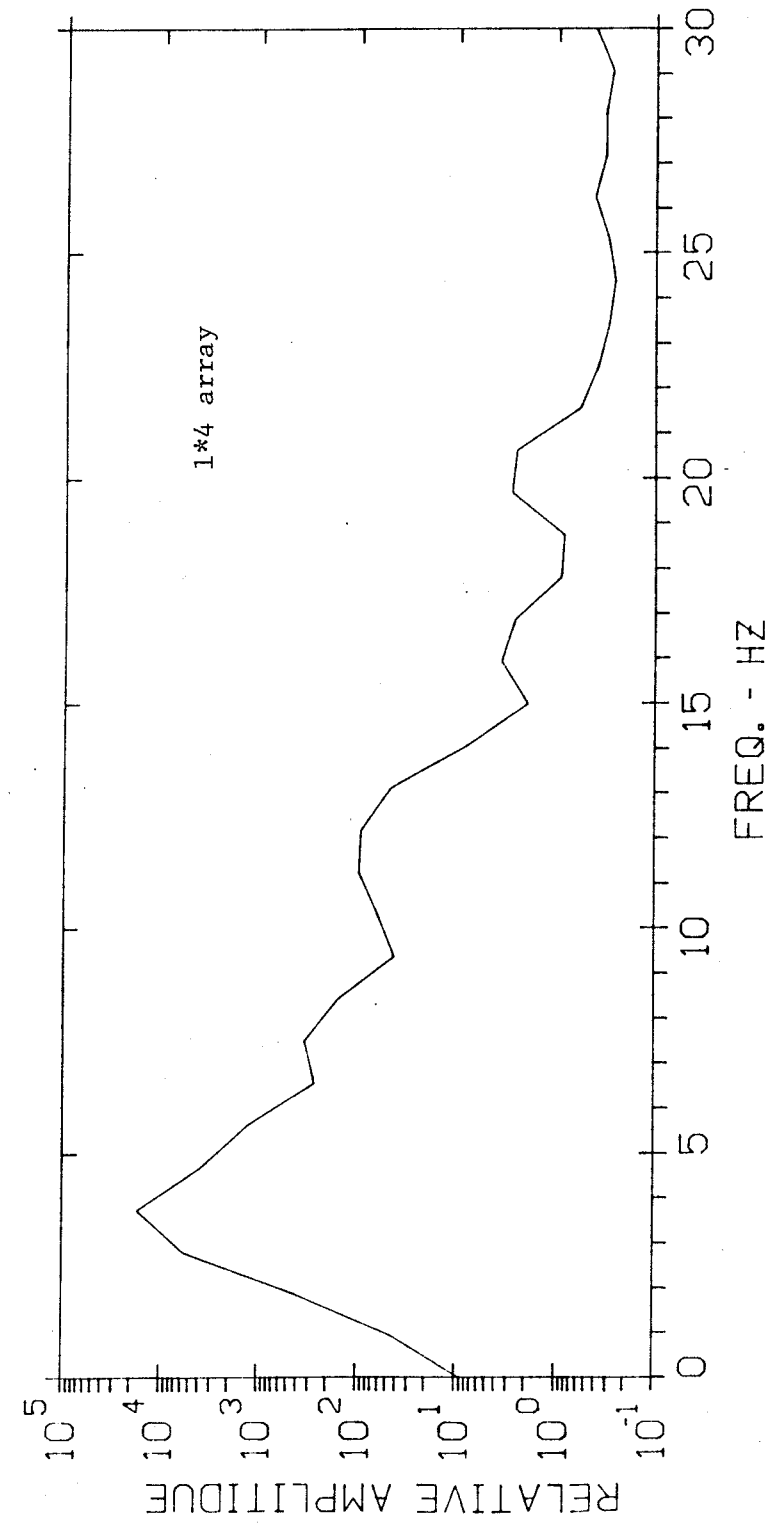
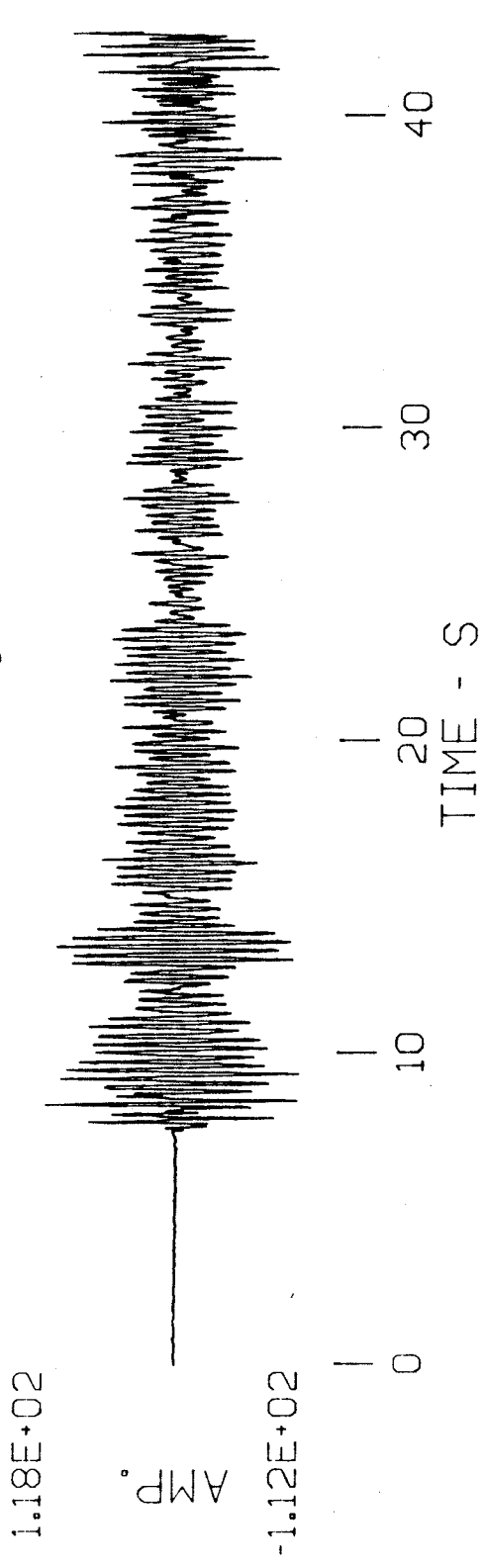


Fig. 34B



D23 038 SP2
N = 2560; L = 64

Fig. 34C

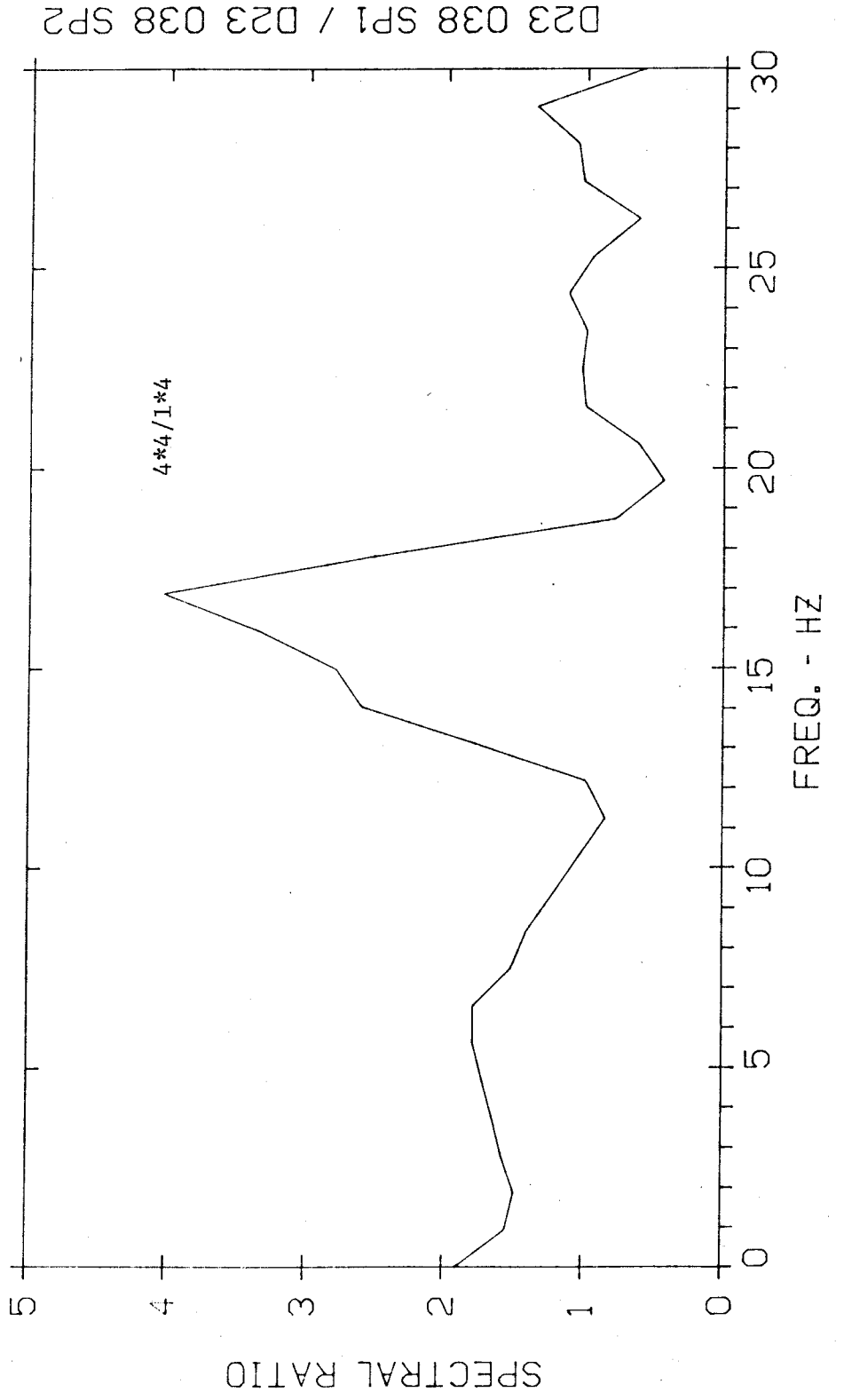


Fig. 35A

3.11E+02

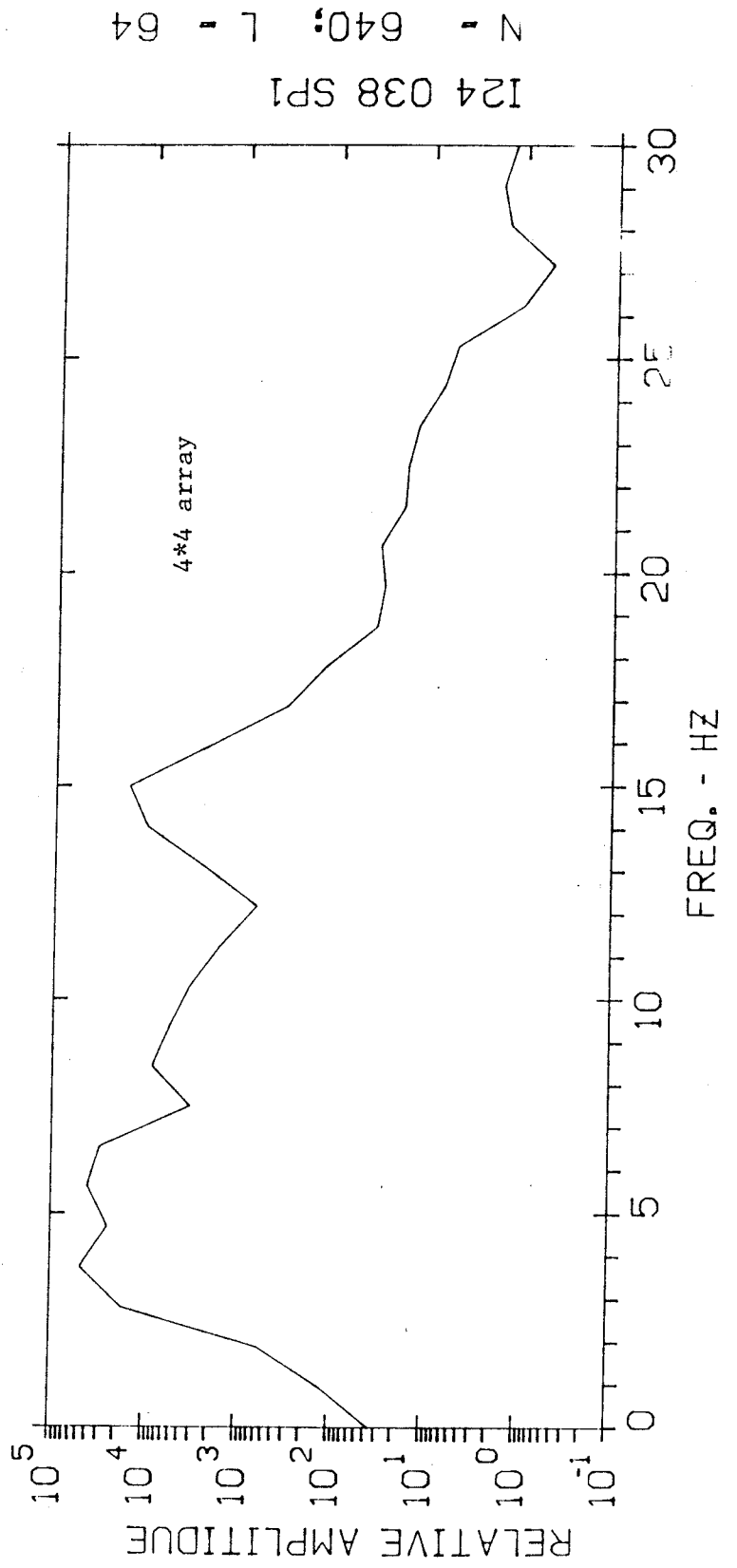
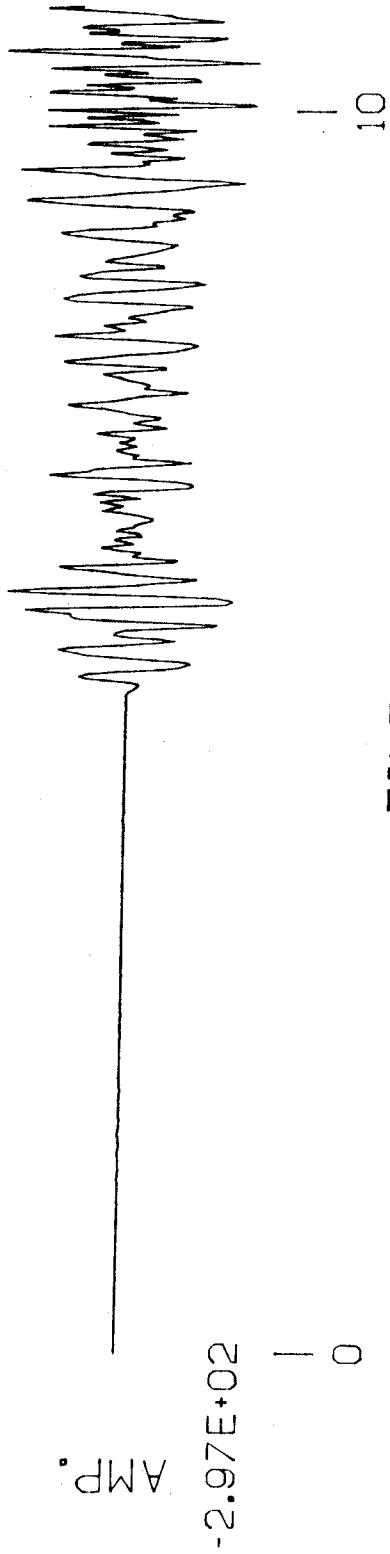
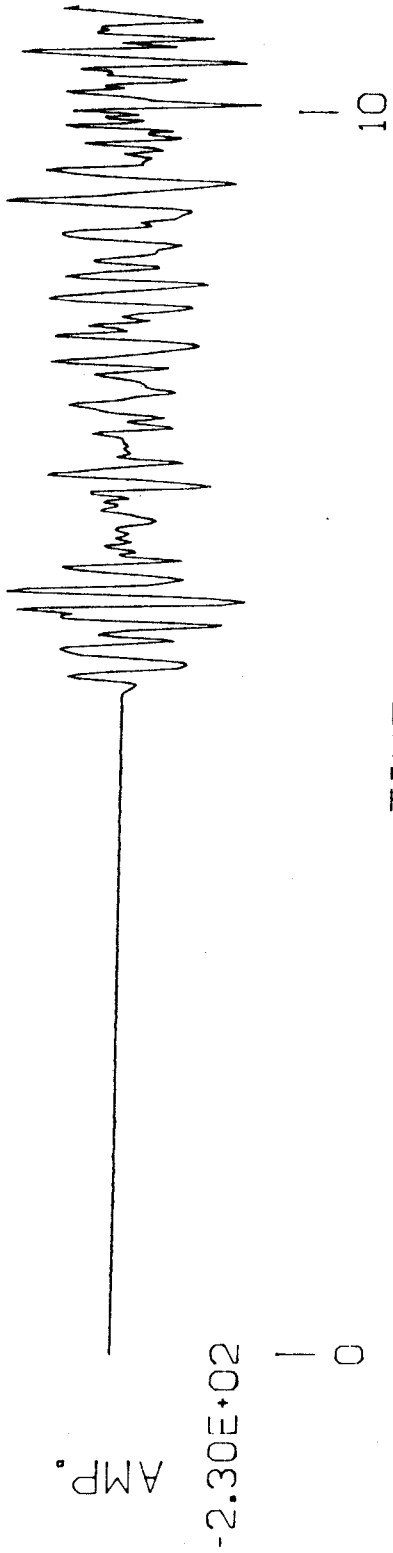


Fig. 35B

2.23E+02



I24 038 SP2
N = 640; L = 64

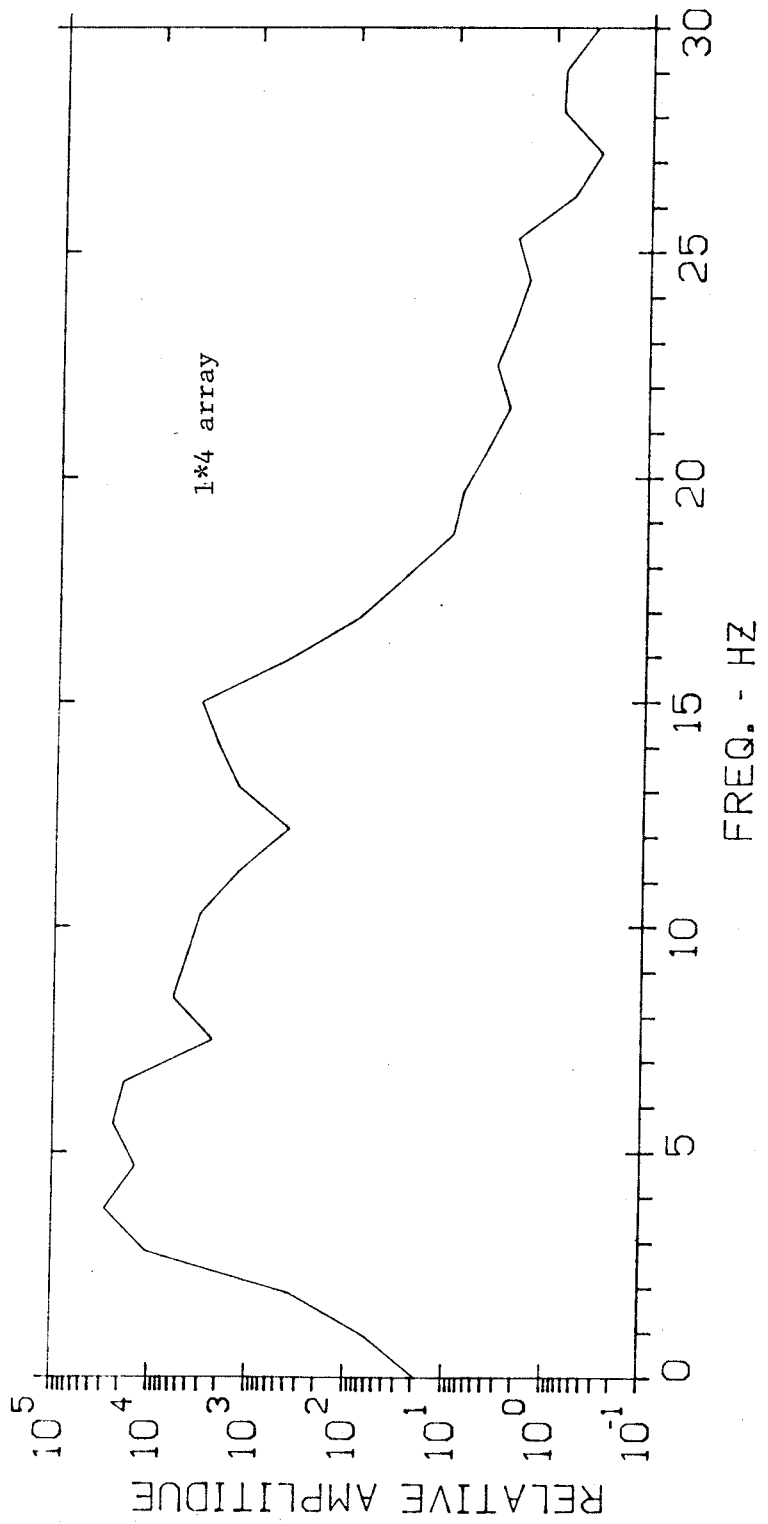


Fig. 35C

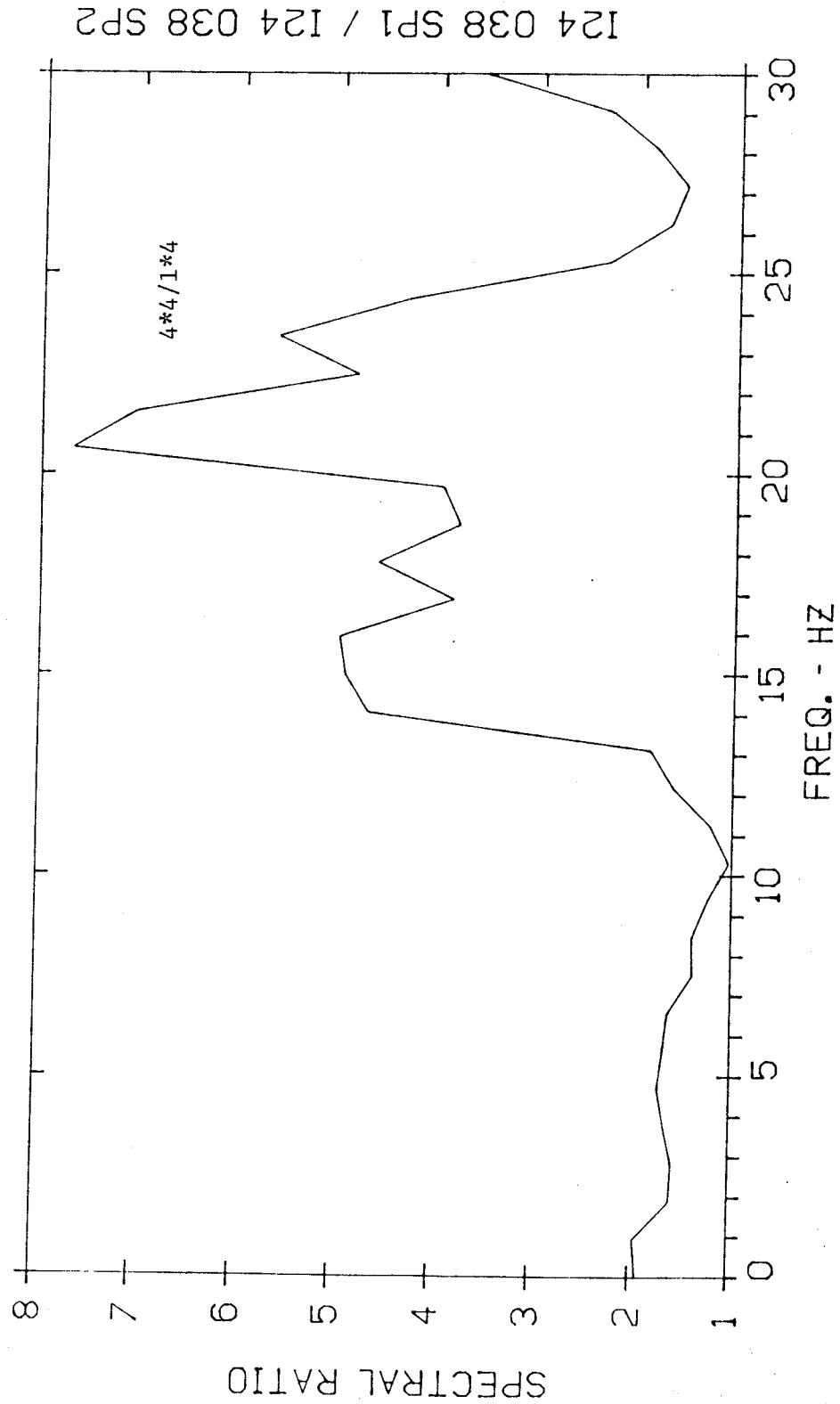
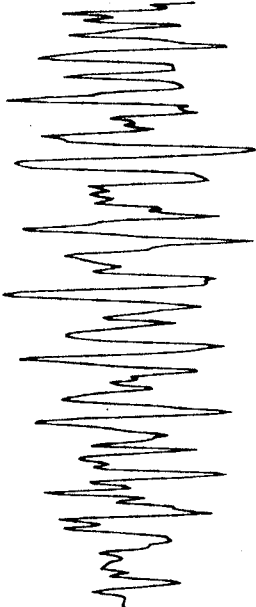


Fig. 36A

7.69E+02

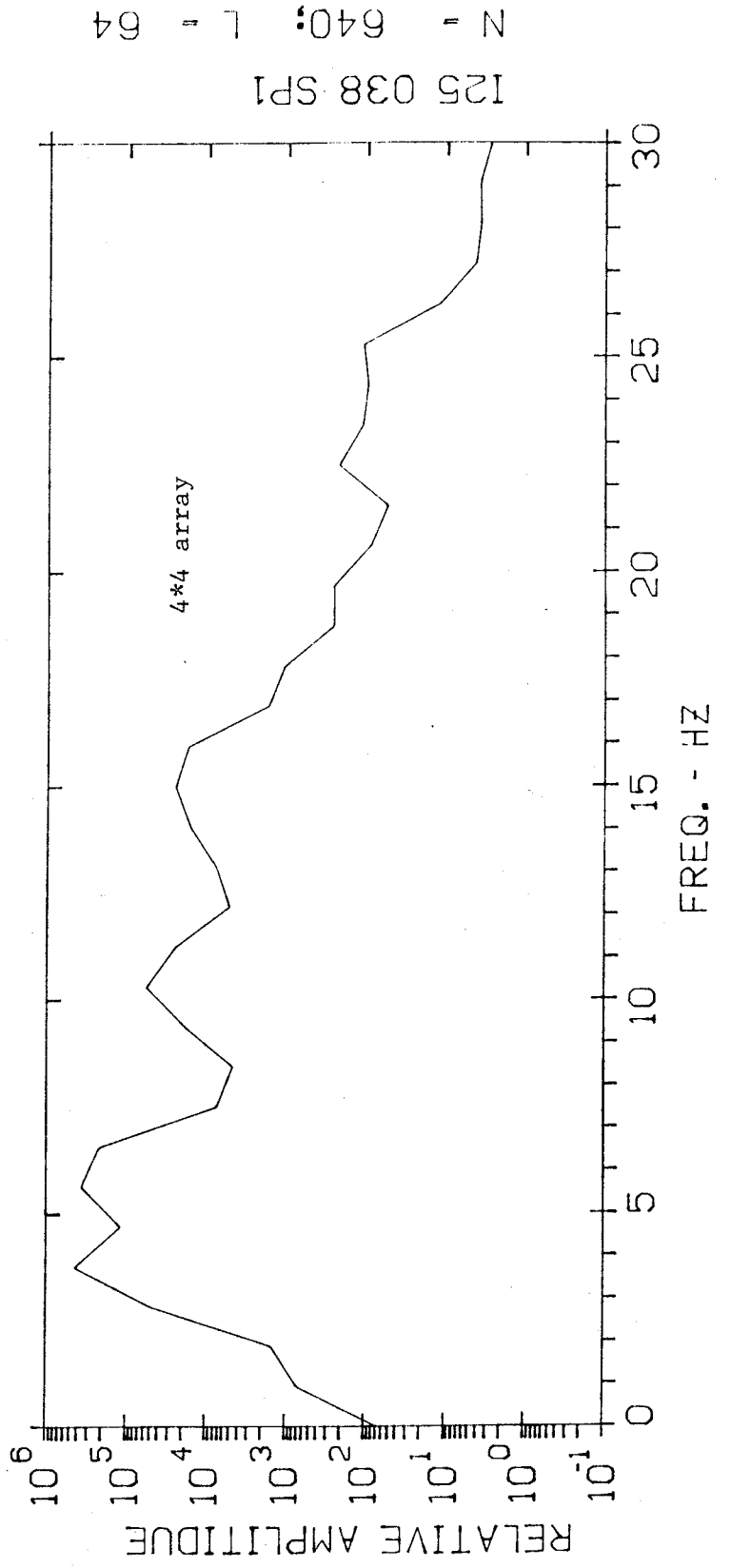
AMP.

-7.97E+02



0 10

TIME - S



RELATIVE AMPLITUDE

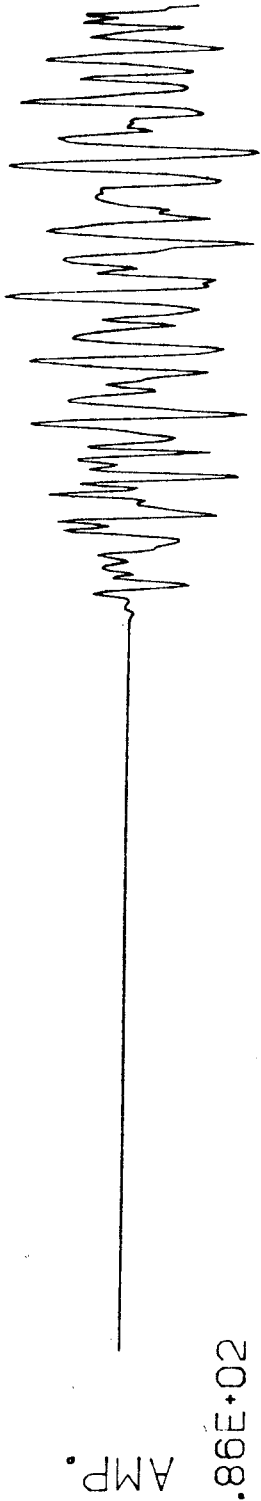
FREQ. - HZ

125 038 SP1

N = 640; L = 64

Fig. 36B

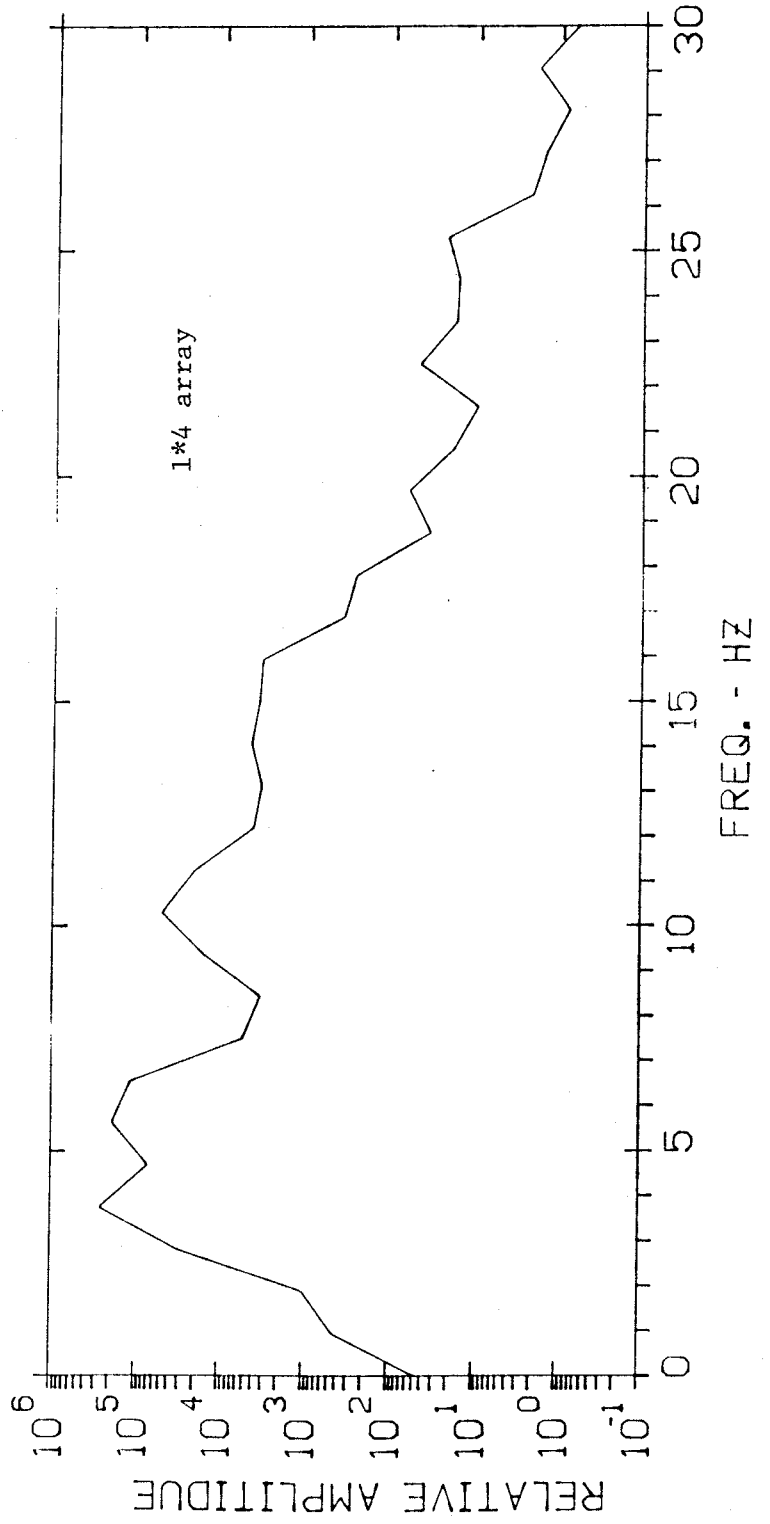
5.94E+02



0

10

TIME - S



125 038 SP2
N = 640; L = 64

Fig. 36C

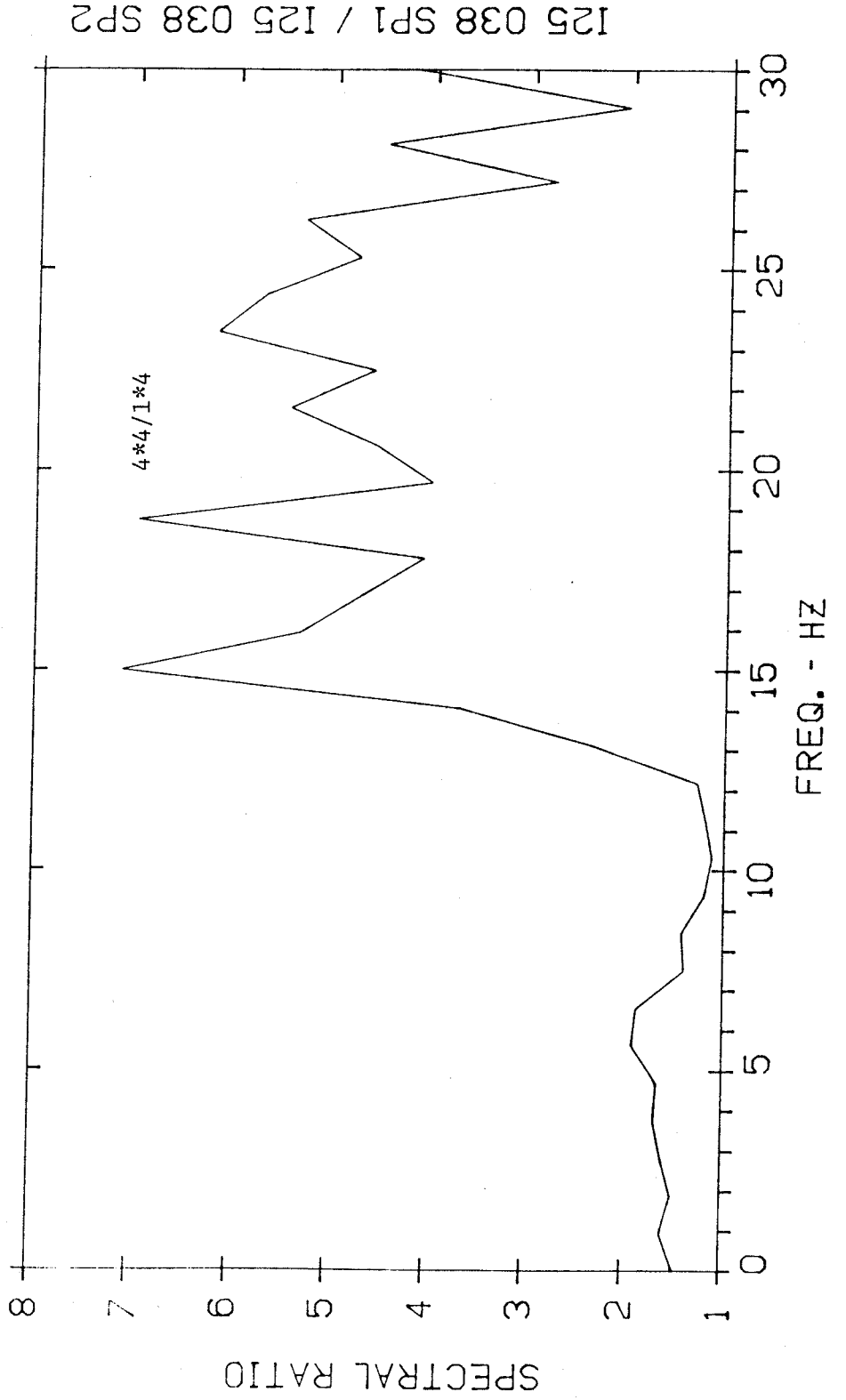
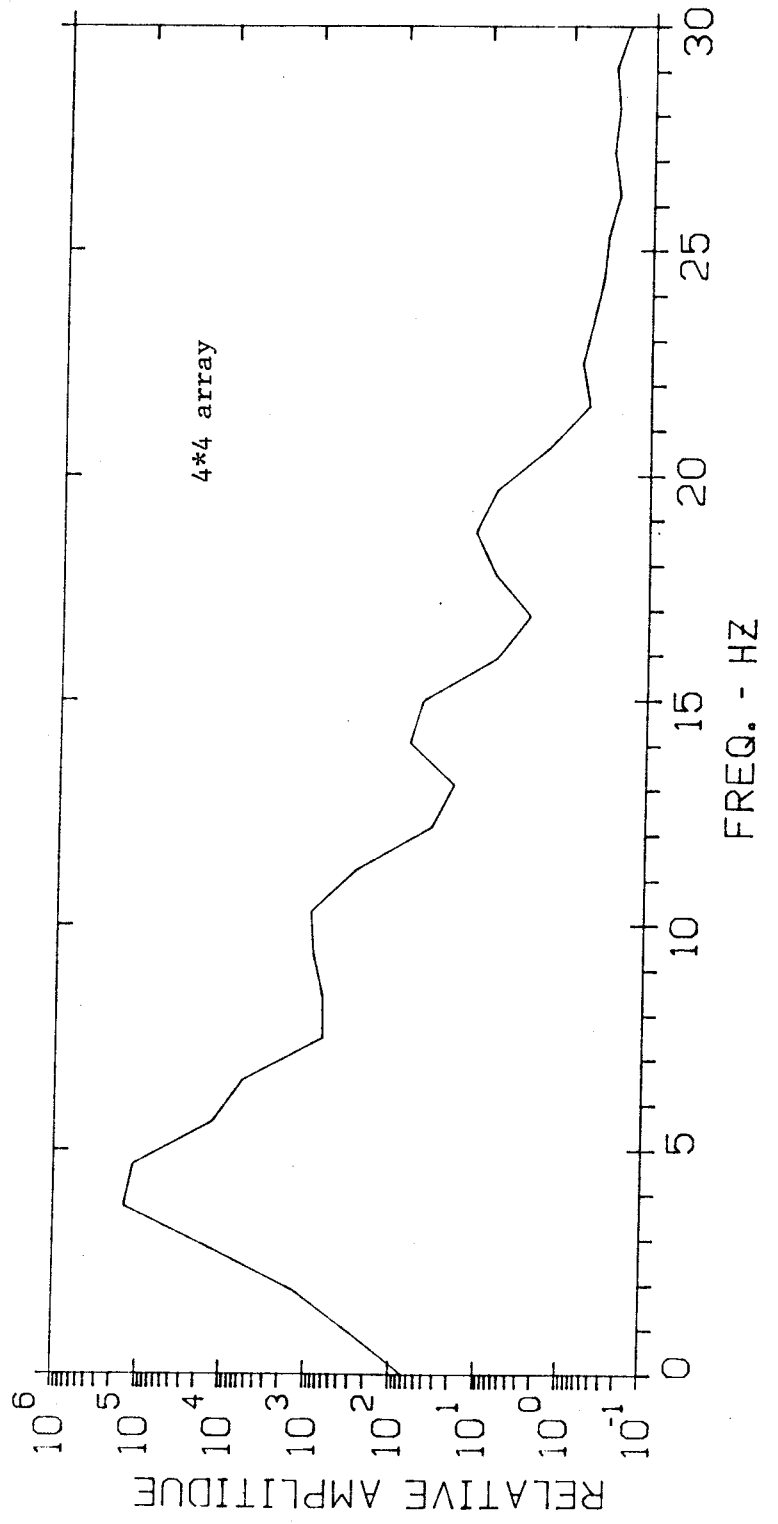
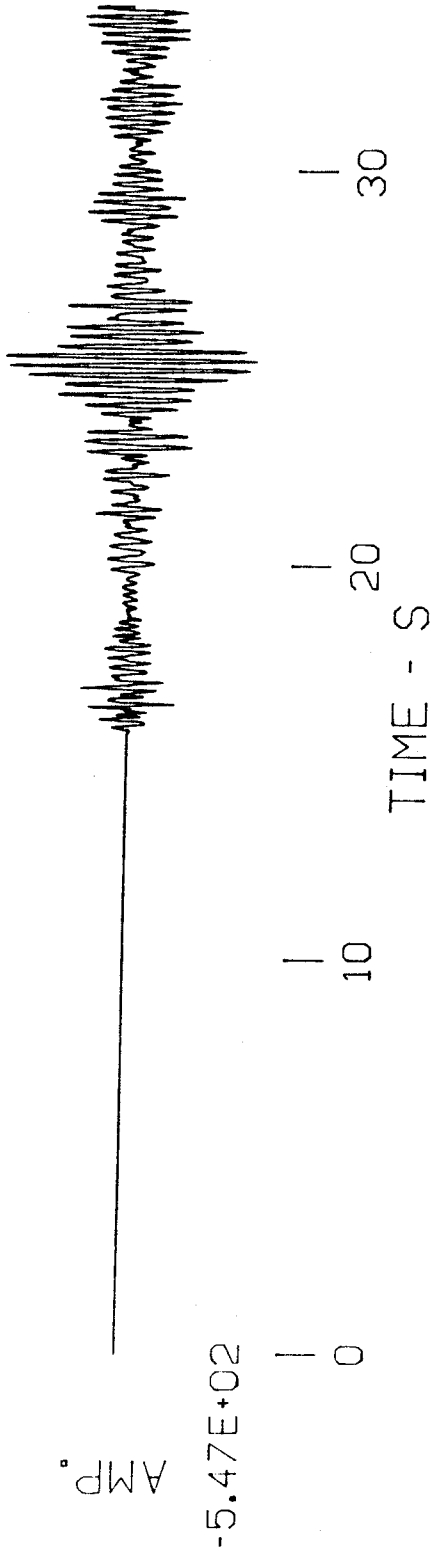


Fig. 37A

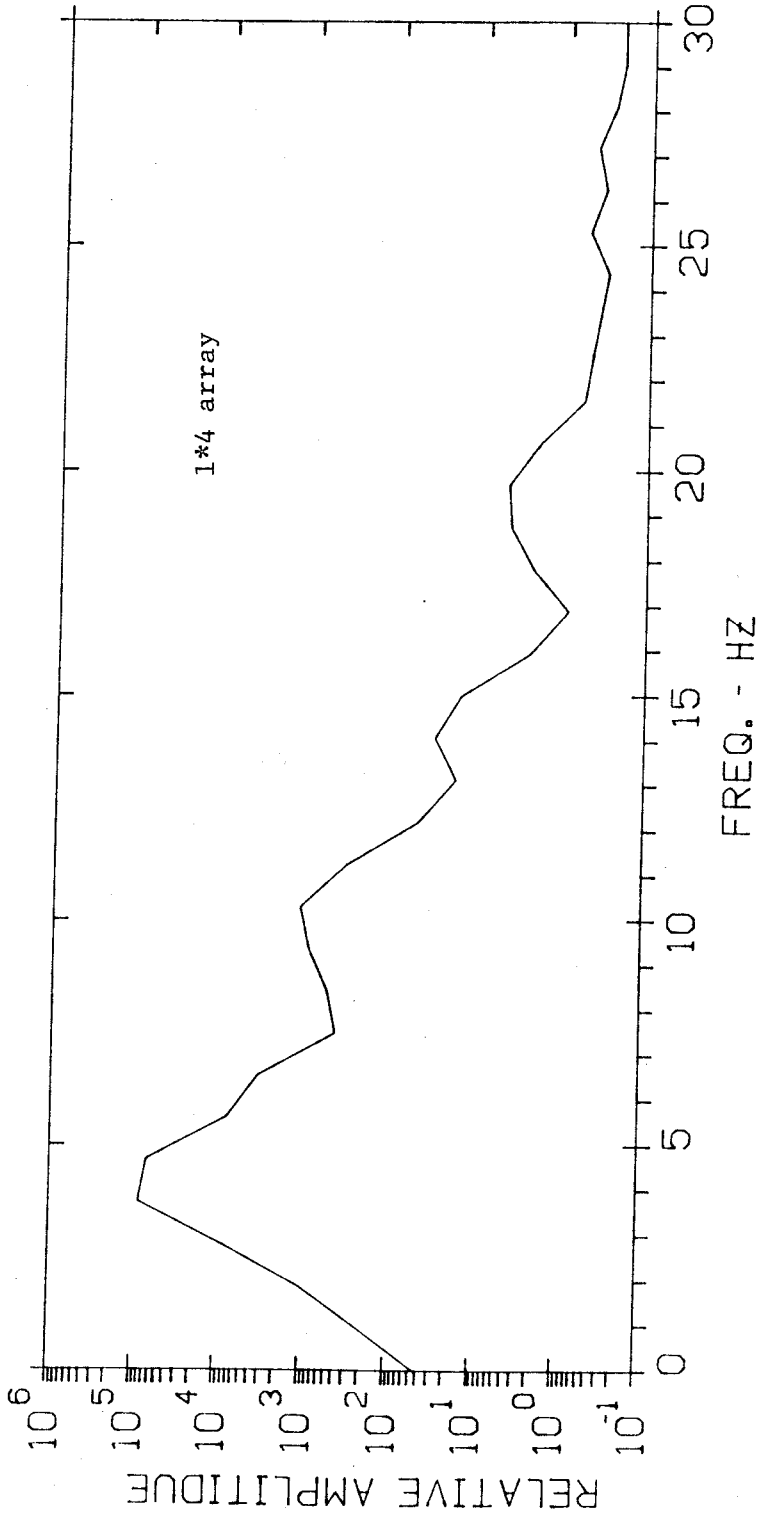
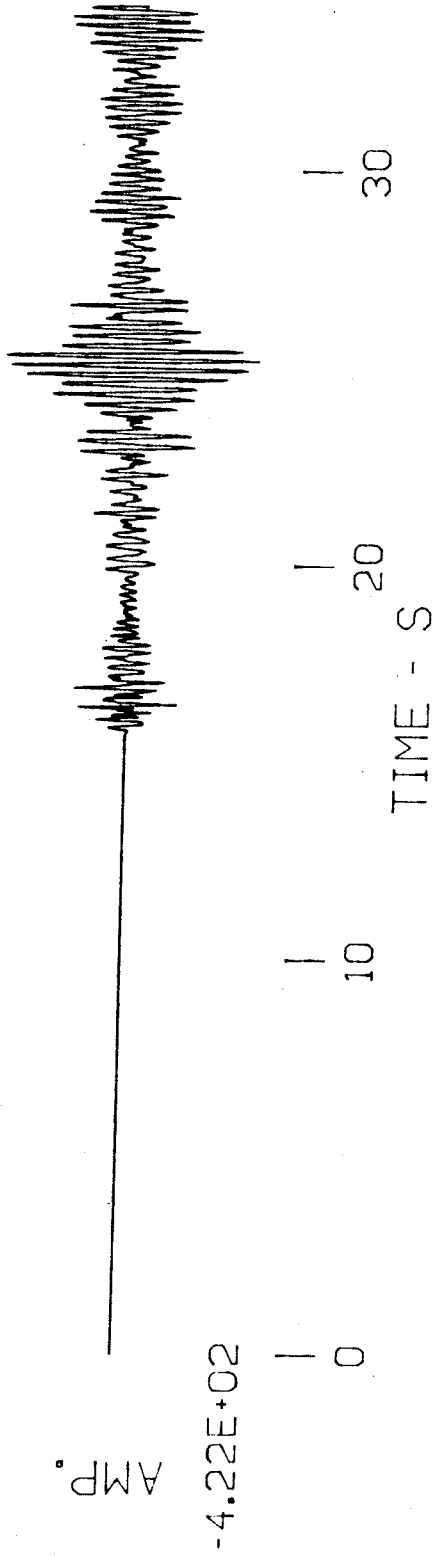
5.55E+02



E26 038 SP1
N = 2048; L = 64

Fig. 37B

4.16E+02



E26 038 SP2
N - 2048; L - 64

Fig. 37C

