NWRI CONTRIBUTION 85-03
Skafel (27)
Study 84-321

OFFSHORE WIND AND WAVE DATA, 1984
STANHOPE BEACH, P.E.I.
CCIW WAVE DIRECTION BUOY

by

M.G. Skafel

Shore Processes Section
Hydraulics Division
National Water Research Institute
Canada Centre for Inland Waters

January 1985

Errata

1. The magnetic declination for the waves only was calculated incorrectly. To calculate the true bearing for all wave directions presented, subtract 14° from the reported values. Wind directions are correct as given.

2. Digital filter computations on the wave data were slightly in error. A check of fourteen records has established the following for the reported values in the report:

   - the characteristic wave height is on average 5.1% low (standard deviation of the 14 : 1.3%). The reported values are within the 90% confidence limits of the corrected values.

   - the peak frequency is unchanged in 13 of 14 cases, and was different by 0.02 Hz in one case. (The frequency increment for the spectral values is 0.02 Hz.)

   - the mean direction of the peak is on average low by 0.5° (s.d.: 2.0°).

   - the rms spread is high by 1.4% on average (s.d.: 1.8%).

   - the parameter s is low by 0.06 on average (s.d.: 0.2).

   - the spectral shapes are similar.

ABSTRACT

The CCIW Wave Direction Buoy was deployed off Stanhope Beach, P.E.I., from 28 September to 8 November 1984, in support of the Canadian Coastal Sediment Study experiment. Summary wind and wave data and sample spectral plots are contained in this report. All of the analyzed data is archived at the National Research Council and is also available from the author.

RESUME

La bouée de direction d'onde du CCEI a été déployée au large de Stanhope Beach (l'Ile-du-Prince-Edouard) du 28 septembre au 8 novembre 1984 pour les besoins de l'Étude canadienne des sédiments littoraux. Le rapport renferme des données sommaires concernant le vent et les vagues ainsi que des échantillons de rapports spectraux. Toutes les données analysées sont archivées au Conseil national de recherches du Canada et on peut aussi les obtenir en s'adressant à l'auteur.

MANAGEMENT PERSPECTIVE

Wave data in this report, in conjunction with other shore experiments run concurrently at the same location, provides a means to test both theories and instruments for the nearshore physical environment.

The development of measuring methods and theories to predict shore evolution and sediment transport will provide economic benefits in the operation of ports, harbours of refuge and in the protection of valuable lands from erosion.

T. Milne Dick
Chief
Hydraulics Division

PERSPECTIVE-GESTION

Les données sur les vagues contenues dans le présent rapport, qui s'ajoutent aux résultats d'autres expériences sur le littoral menées simultanément et au même endroit, fournissent un moyen de vérifier les théories et de mettre à l'essai les instruments qui ont été mis au point sur le milieu littoral.

L'élaboration de méthodes de mesure et de théories permettant de prévoir l'évolution du littoral et le transport des sédiments entraînera des avantages financiers pour l'exploitation des ports, des ports de refuge et pour la protection des bonnes terres contre l'érosion.

T. Milne Dick
Le chef de la Division de l'hydraulique

1.0 INTRODUCTION

The Associate Committee for Shoreline Erosion and Sedimentation of the National Research Council is conducting the Canadian Coastal Sediment Study (C^2S^2) to assess the existing engineering procedures for the estimation of sediment transport in the coastal zone. A field experiment was conducted at Stanhope Beach, P.E.I., in 1984, to collect a data set in support of this assessment and to support fundamental research of oceanographic, hydrodynamic and geological processes in the nearshore region.

The Hydraulics Division, National Water Research Institute (NWRI) participated in the field experiment by measuring waves offshore from the experimental site. A buoy capable of measuring roll, pitch, and heave was deployed by the Technical Operations Division, NWRI, offshore from the experimental site in intermediate depth water. This buoy, called the CCIW Wave Direcion Buoy (Skafel and Donelan, 1983), also measured wind speed and direction. The buoy was originally assembled to support the research program of NWRI and was used on Lakes Erie and Ontario in that role. Subsequently, it was used in support of the Atlantic Remote Sensing Land Ocean Experiment (ARSLOE) sponsored by the U.S. Army Corps of Engineers Coastal Engineering Research Center (CERC) and the National Oceanic and Atmospheric Administration, and conducted at the CERC Field Research Facility, Duck, North Carolina, in 1980 (Skafel, 1982; Skafel and Donelan 1983), and at the Canadian Coastal Sediment Study experiment at Pte-Sapin, N.B. in 1983 (Skafel, 1984).

The buoy was located in 14.6 m of water at 46° 26' 48" N and 63° 06' 00" W, approximately 2.3 km north of Stanhope Beach. The buoy was deployed on 28 September 1984 and retrieved on 9 November 1984. Useful data were collected from 28 September 1984 to 8 November 1984.

This report contains a brief description of the buoy and the instruments, data summary tables, sample spectral plots, and a description of the format of the magnetic tape containing the analyzed data.

2.0 SYSTEMS DESCRIPTION

The buoy used as the platform for the instruments is a Geodyne model A-92 toroidal buoy of expanded styrafoam encased in fiberglass with upper and lower tripods. It has a long and successful history at the Canada Centre for Inland Waters (CCIW) as a platform for meteorological sensors on the Great Lakes (Elder and Brady, 1972; Der and Bull, 1981).

The instrument package for the Stanhope Beach experiment was made up of:

Sea Data Model 1250 data logger,
three Sunstrand data control model 305 B servo accelerometers;
Humphrey 400 Hz roll-pitch gyroscope;
Digicourse digital magnetic compass, model 101;
two R.M. Young cup anemometers (located 4 m above the water level);
miscellaneous electronics, batteries, solar panel.

The buoy was equipped with a large vane causing it to orientate into the wind. The buoy orientation was used to measure the wind direction.

The data from the sensors were sampled at 2 Hz per channel for 26 minute intervals four times per day. The data were stored on cassettes on the Sea Data logger. Cassettes were changed at least every twelve days. The information was transcribed to standard computer tapes and processed.

Each 26 minute record was subsequently divided into three more or less equally lengthed samples of eight minutes and 32 seconds. Spectra for each sample were calculated. The final results for any given time are averages of the three subsets. The spectra are grouped into frequency bands 0.02 Hz wide and therefore have 60

degrees of freedom per band and consequently 90% confidence limits of 0.76 and 1.39. Where fewer degrees of freedom are reported, the reason is due to a reduced record length. Typically, record lengths were reduced because of extended startup transients evident during quality inspection of the time series of some instruments. Only the steady state values of the data were used.

All sensors were calibrated at NWRI before and after the field experiment, and the average of the pre- and post-field calibrations were used for all sensors.

3.0 DATA PRESENTATION

From the period the buoy was deployed, 132 runs of data were obtained. The data are presented in three formats: summary tables, spectral plots, and tables on magnetic tape.

The summary tables containing information for all 132 runs are given as Appendix 1 of this report. In these tables the Wind Speed 1 and Wind Speed 2 are wind speeds measured by two anemometers. The direction for both the wind and the waves has the same convention: it is the direction from which either is approaching, and is reported in terms of bearing from true north.

The characteristic wave height (four times the square root of the variance) is given by H_c. The frequency at the peak of the spectrum is given by F_{pk}. The mean wave direction is $\tan^{-1} B_1/A_1$, where A_1 and B_1 are the first sine and cosine coefficients in the spatial Fourier series. The RMS Spread is an estimate of the root mean square directional spread given by

$$\text{RMS Spread} = (2 - 2r)^{1/2}, \text{ where } r = A_1^2 + B_1^2$$

(See Hasselman et al 1980).

The parameter S, multiplied by two, is the power to which the cosine is raised in the directional distribution model of the form

$$\cos^{2s}\left(\frac{\theta-\bar{\theta}}{2}\right)$$

where θ is the wave direction, and $\bar{\theta}$ the mean direction (Hasselman et al 1980; Mitsuyasu, 1981).

The degrees of freedom (calculated by 2x frequency increment x length of time series) are usually 60. Smaller values indicate shorter records.

Files and Number, Job No., and Run No. columns are simply bookkeeping columns. It is sufficient for the user to know that the runs are listed on the magnetic tape in the order given in the table.

No data were recorded from 25 to 31 October, and three runs of data from 7 and 8 November had to be eliminated because of poor data quality.

Selected spectra are contained in Appendix 2. They correspond to the following dates:

2 - 7 October 1984
9 - 10 October 1984
12 - 13 October 1984
16 - 19 October 1983
1 November 1984
3 - 4 November 1984
7 - 8 November 1984

The variance spectral density of the vertical displacement and the mean direction of the waves for one run is plotted on each page. The year, month, day, hour, minute and second of the run is given at the top of each page. The spectral density is in units of m^2/Hz, and the direction of the waves is that from which the waves are coming.

All of the spectra not included in Appendix 2 are available from the author.

Complete data sets for all of the runs listed in Appendix 1 have been copied onto magnetic tape and may be obtained from the National Research Council. An explanation of the tape format, a copy of the Fortran program used to generate the tape, and a listing of one run are given in Appendix 3.

ACKNOWLEDGEMENTS

Mr. D. Beesley, Hydraulics Division, NWRI, prepared the buoy for the field, reduced the data, and instructed C^2S^2 personnel on its operation; personnel from the Technical Operations Division, NWRI, provided logistical support. Mr. P. Daniel, C^2S^2, provided routine service while the buoy was deployed.

REFERENCES

Der, C.Y. and J. Bull. 1981. Comparison of Wind Speed and Direction Measurements from Various Meteorological Buoys and Sensors. National Water Research Institute , Rep. ES-519.

Elder, F.C. and B. Brady. 1972. A Meteorological Buoy System for Great Lakes Study. Environment Canada, Canada Centre for Inland Waters, Tech. Bull. 71.

Hasselman, D.E., M. Dunckel, J.A. Ewing. 1980. Directional Wave Spectra Observed During JONSWAP 1973. J. of Physical Oceanography 10, pp 1264-1280.

Long, R.B. 1980. The Statistical Evaluation of Directional Spectrum Estimates Derived from Pitch/Roll Buoy Data. J. of Physical Oceanography 10 (6) June, pp 944-952.

Skafel, M.G. 1982. The Motion Package Buoy at ARSLOE: Data Summary. National Water Resarch Institute.

Skafel, M.G. and M.A. Donelan. 1983. Performance of the CCIW Wave Direction Buoy at ARSLOE. IEEE J. of Oceanic Engineering, OE-8 (4), pp 221-225.

Skafel, M.G. 1984. Offshore Wind and Wave Data, 1983, Pointe-Sapin, New Brunswick, CCIW Wave Direction Buoy, Canadian Coastal Sediment Study, National Water Research Institute, March.

APPENDIX I

Offshore wind and wave data at Stanhope Beach, collected in 1984 using the CCIW Wave Direction Buoy

Appendix 1. Offshore Wave Data, Stanhope Beach, 1984

Date			Wind			Waves								
								Direction						
Day/ Month	Julian Day	Time GMT	Speed 1 m/s	Speed 2 m/s	Direction °T	H_c m	F_{pk} Hz	Mean °T	RMS Spread °	S	Degrees of Freedom	Disc File and Number	Job No.	Run No.
												PEI		
28/9	272	18:01	9.21	9.11	244.2	.519	.26	342.6	34.9	4.4	55	D1,1	AAZ	1
28/9	272	23:59	6.94	6.88	222.8	.331	.24	349.4	32.6	5.2	60	2	AAZ	2
29/9	273	05:59	5.28	5.27	244.8	.366	.32	327.7	33.3	4.9	60	3	AAZ	3
29/9	273	11:59	4.48	4.48	254.9	.402	.24	6.8	30.3	6.2	60	4	AAZ	4
29/9	273	17:58	5.66	5.61	244.8	.262	.18	40.7	28.7	7.0	61	D1,5	ATP	5
29/9	273	23:59	2.70	2.72	203.9	.124	.16	48.4	36.0	4.1	60	6	ATP	6
30/9	274	05:59	1.95	2.00	248.9	.095	.18	30.4	38.6	3.4	60	7	ATP	7
30/9	274	11:59	6.30	6.25	27.2	.425	.30	24.7	41.9	2.7	60	8	ATP	8
30/9	274	17:59	6.66	6.60	38.6	.715	.24	43.7	36.5	3.9	60	9	ATP	9
30/9	274	23:59	5.24	5.25	41.7	.554	.22	63.9	35.8	4.1	60	D1,10	DWT	10
1/10	275	05:59	5.28	5.30	58.2	.354	.26	44.8	38.2	3.5	60	11	DWT	11
1/10	275	11:59	4.01	4.05	90.5	.244	.26	42.2	38.1	3.5	60	12	DWT	12
1/10	275	17:59	6.08	6.07	60.2	.396	.30	73.0	34.7	4.5	60	13	DWT	13
1/10	275	23:59	4.32	4.34	89.0	.204	.24	39.3	32.3	5.3	60	14	DWT	14
2/10	276	06:01	4.96	4.94	18.5	.168	.08	231.6	78.4	0.1	56	D1,15	EHO	15
2/10	276	11:59	8.87	8.80	41.5	.595	.28	59.5	35.2	4.3	60	16	EHO	16
2/10	276	17:59	8.71	8.63	68.7	1.001	.16	348.0	33.8	4.7	60	17	EHO	17
3/10	277	00:02	7.41	7.39	69.4	1.041	.18	18.0	41.1	2.9	54	18	EHO	18
3/10	277	05:59	11.35	11.25	76.0	1.333	.18	52.4	41.3	2.8	60	19	EHO	19
3/10	277	11:59	6.51	6.52	218.5	.674	.16	62.8	21.9	12.7	60	D1,20	ERD	20
3/10	277	17:59	7.94	7.88	255.9	.715	.14	67.9	29.3	6.6	60	21	ERD	21
3/10	277	23:59	3.74	3.74	231.4	.468	.16	65.6	28.0	7.4	60	22	ERD	22
4/10	278	05:59	5.31	5.29	217.8	.464	.10	43.4	36.9	3.8	60	23	ERD	23
4/10	278	11:59	5.74	5.76	231.8	.264	.10	41.9	56.5	1.1	60	24	ERD	24
4/10	278	18:01	9.71	9.64	286.2	.693	.24	332.6	32.2	5.3	56	D1,25	ASQ	25
4/10	278	23:59	15.33	15.31	281.8	2.622	.14	357.8	50.6	1.6	60	26	ASQ	26
5/10	279	05:59	12.72	12.62	278.4	2.106	.14	353.3	42.0	2.7	60	27	ASQ	27

Appendix 1. Offshore Wave Data, Stanhope Beach, 1984 (Cont'd)

Date			Wind			Waves								
								Direction						
Day/ Month	Julian Day	Time GMT	Speed 1 m/s	Speed 2 m/s	Direction °T	H_c m	F_{pk} Hz	Mean °T	RMS Spread °	S	Degrees of Freedom	Disc File and Number	Job No.	Run No.
5/10	279	11:59	6.08	6.11	277.1	1.052	.14	9.4	29.4	6.6	60	PEI 28	ASQ	28
5/10	279	17:59	14.03	13.87	293.5	1.767	.16	354.2	47.1	2.0	59	29	ASQ	29
5/10	279	23:59	14.11	14.07	278.9	1.957	.14	356.5	43.6	2.5	60	D1,30	EZG	30
6/10	280	05:59	13.79	13.69	276.9	1.885	.14	357.0	48.1	1.8	60	31	EZG	31
6/10	280	11:59	12.28	12.25	275.7	1.923	.14	0.3	41.1	2.9	60	32	EZG	32
6/10	280	17:59	11.64	11.58	305.0	2.123	.12	16.5	44.7	2.3	60	33	EZG	33
6/10	280	23:59	8.87	8.84	335.2	1.961	.12	23.0	32.4	5.3	60	34	EZG	34
7/10	281	05:59	4.59	4.65	331.1	1.284	.14	17.8	30.8	5.9	60	D1,35	FST	35
7/10	281	12:03	5.85	5.89	263.2	.915	.16	17.6	30.9	5.9	41	36	FST	36
7/10	281	17:59	8.05	7.98	230.4	.416	.18	22.3	34.6	4.5	60	37	FST	37
7/10	281	23:59	7.98	7.95	239.6	.349	.26	343.2	31.1	5.8	60	38	FST	38
8/10	282	06:00	7.01	7.02	256.3	.436	.26	331.6	33.7	4.8	58	39	FST	39
8/10	282	11:59	3.97	4.04	255.6	.298	.32	325.5	34.0	4.7	60	D1,40	IYB	40
8/10	282	18:94	1.60	1.70	38.7	.241	.14	2.7	33.8	4.7	41	41	IYB	41
8/10	282	23:59	5.35	5.35	244.9	.237	.16	21.0	31.6	5.6	60	42	IYB	42
9/10	283	06:04	0.87	0.98	355.4	.201	.20	21.4	32.9	5.0	41	43	IYB	43
9/10	283	11:59	7.10	7.12	345.3	.580	.28	1.2	35.1	4.3	60	44	IYB	44
9/10	283	17:59	8.86	8.79	336.3	.913	.20	7.8	36.1	4.0	60	45	IYB	45
9/10	283	23:59	6.25	6.26	3.9	.627	.22	10.2	37.7	3.6	60	46	IYB	46
10/10	284	05:59	5.95	5.94	332.9	.785	.20	25.9	38.7	3.4	60	D1,47	KNZ	47
10/10	284	12:00	4.85	4.85	321.2	.726	.18	22.2	35.7	4.1	60	48	KNZ	48
10/10	284	17:59	2.59	2.63	300.7	.612	.18	47.6	43.5	2.5	60	49	KNZ	49
10/10	284	23:59	3.70	3.72	188.8	.295	.20	37.6	33.2	5.0	60	50	KNZ	50
11/10	285	05:59	3.21	3.24	234.6	.200	.20	68.9	28.0	7.4	60	51	KNZ	51
11/10	285	12:02	5.02	5.03	272.3	.249	.34	330.2	35.2	4.3	55	52	KNZ	52
11/10	285	18:00	3.88	3.89	294.9	.159	.20	73.5	30.7	5.9	60	D2,1	VEW	53
12/10	286	00:00	7.03	6.99	261.5	.185	.40	327.0	42.0	2.7	60	2	VEW	54

Appendix 1. Offshore Wave Data, Stanhope Beach, 1984 (Cont'd)

Date		Time	Wind			Waves						Disc		
								Direction						
Day/ Month	Julian Day	GMT	Speed 1 m/s	Speed 2 m/s	Direction °T	H_c m	F_{pk} Hz	Mean °T	RMS Spread °	S	Degrees of Freedom	File and Number	Job No.	Run No.
												PEI		
12/10	286	06:00	8.79	8.78	303.9	.620	.26	334.8	34.3	4.6	60	3	VEW	55
12/10	286	12:00	11.68	11.61	359.8	1.028	.22	23.3	40.9	2.9	60	4	VEW	56
12/10	286	18:00	9.54	9.48	22.4	1.745	.14	25.8	42.8	2.6	60	5	VEW	57
13/10	287	00:00	4.88	4.91	34.4	1.283	.14	33.8	34.5	4.5	60	6	VEW	58
13/10	287	06:00	2.48	2.56	256.1	1.332	.10	37.1	24.0	10.4	60	7	VEW	59
13/10	287	12:04	2.67	2.74	242.1	.839	.12	44.2	18.9	17.5	41	D2,8	VZA	60
13/10	287	18:05	2.46	2.50	19.7	.388	.14	36.6	27.1	8.0	41	9	VZA	61
14/10	288	00:05	3.99	3.98	185.9	.220	.16	43.5	27.6	7.6	41	10	VZA	62
14/10	288	06:00	2.89	2.95	209.2	.152	.16	46.0	22.6	11.9	60	11	VZA	63
14/10	288	12:00	4.00	3.99	216.6	.117	.16	62.0	29.8	6.4	60	12	VZA	64
14/10	288	18:00	3.47	3.49	192.2	.110	.18	54.1	27.5	7.7	61	13	VZA	65
15/10	289	00:00	1.87	1.92	80.9	.101	.20	23.1	34.1	4.6	60	14	VZA	66
15/10	289	06:00	1.20	1.20	253.0	.066	.22	33.0	34.0	4.7	60	15	VZA	67
15/10	289	12:00	1.09	1.16	216.4	.063	.08	33.2	53.1	1.3	60	D2,16	WVU	68
15/10	289	18:00	3.98	3.99	11.3	.102	.08	14.5	77.5	0.1	60	17	WVU	69
16/10	290	00:00	6.01	6.00	34.3	.401	.30	25.8	34.4	4.6	60	15	WVU	70
16/10	290	06:05	10.16	10.11	43.1	1.036	.22	52.7	39.8	3.2	41	19	WVU	71
16/10	290	12:00	12.68	12.63	25.9	1.931	.14	45.5	43.7	2.4	60	20	WVU	72
16/10	290	18:00	11.13	11.05	21.6	1.872	.14	44.2	42.3	2.7	60	21	WVU	73
17/10	291	00:00	10.95	10.88	28.9	1.788	.16	44.5	39.0	3.3	60	22	WVU	74
17/10	291	06:00	10.65	10.57	25.7	1.906	.14	47.1	40.1	3.1	60	23	WVU	75
17/10	291	12:00	10.39	10.36	23.6	1.738	.14	45.8	41.6	2.8	60	D2,24	ABW	76
17/10	291	18:01	9.25	9.20	17.6	1.669	.14	37.6	38.5	3.4	58	25	ABW	77
18/10	292	00:00	8.63	8.62	4.6	1.393	.14	44.1	35.7	4.1	60	26	ABW	78
18/10	292	06:00	9.13	9.12	21.8	1.690	.14	42.7	37.0	3.8	60	27	ABW	79
18/10	292	12:00	7.49	7.48	28.2	1.429	.16	46.4	33.3	4.9	60	D2,28	ABW	80
18/10	292	18:00	8.59	8.53	16.3	1.081	.18	33.6	38.6	3.4	61	29	ABW	81

Appendix 1. Offshore Wave Data, Stanhope Beach, 1984 (Cont'd)

Date		Time	Wind			Waves						Disc	Job	Run
								Direction						
Day/ Month	Julian Day	GMT	Speed 1 m/s	Speed 2 m/s	Direction °T	H_c m	F_{pk} Hz	Mean °T	RMS Spread °	S	Degrees of Freedom	File and Number	No.	No.
												PEI		
19/10	293	00:00	6.03	6.06	27.2	1.085	.18	49.4	41.5	2.8	38	30	ABW	82
19/10	293	00:16	5.61	5.61	20.1	1.180	.18	53.0	39.0	3.3	20	D2,31	ANW	83
19/10	293	06:00	2.86	2.81	355.2	.622	.18	49.3	34.1	4.7	60	32	ANW	84
19/10	293	12:00	4.30	4.27	282.0	.425	.22	33.7	34.8	4.4	60	33	ANW	85
19/10	293	18:00	1.77	1.82	16.2	.321	.28	356.3	43.3	2.5	61	34	ANW	86
20/10	294	00:00	1.43	1.51	247.1	.246	.14	77.6	19.4	16.4	60	35	ANW	87
20/10	294	06:00	3.24	3.33	308.8	.178	.10	26.0	79.6	0.0	60	36	ANW	88
20/10	294	12:00	1.71	1.82	172.0	.392	.16	23.5	31.2	5.7	60	37	ANW	89
20/10	294	18:00	4.50	4.52	195.7	.366	.20	28.0	25.4	9.2	60	38	ANW	90
21/10	295	00:00	4.42	4.43	230.9	.142	.20	35.6	27.1	7.9	60	D2,39	BKJ	91
21/10	295	06:00	6.75	6.71	268.2	.280	.32	325.8	34.8	4.4	60	40	BKJ	92
21/10	295	12:00	8.93	8.93	285.4	.449	.26	335.6	32.1	5.4	60	41	BKJ	93
21/10	295	18:00	1.77	1.86	324.3	.723	.20	348.3	28.8	6.9	61	42	BKJ	94
22/10	296	00:00	2.98	3.01	155.6	.289	.20	335.1	31.9	5.5	60	43	BKJ	95
22/10	296	06:00	5.95	5.93	179.6	.192	.18	31.5	21.0	13.8	60	44	BKJ	96
22/10	296	12:00	7.62	7.59	225.8	.185	.08	259.5	69.9	0.3	60	45	BKJ	97
22/10	296	18:00	5.65	5.64	235.9	.096	.08	321.4	69.8	0.3	60	46	BKJ	98
22/10	297	00:00	3.52	3.59	33.0	.316	.32	347.8	36.8	3.8	60	D2,47	BTL	99
23/10	297	06:00	1.93	2.04	187.6	.192	.28	37.7	34.5	4.5	60	D2,48	BTL	100
23/10	297	12:00	5.83	5.87	103.8	.260	.22	325.1	34.3	4.6	41	49	BTL	101
23/10	297	18:01	2.03	2.13	310.1	.212	.20	17.7	38.0	3.5	60	50	BTL	102
24/10	298	00:01	3.36	3.43	237.5	.140	.20	21.5	37.0	3.8	60	51	BTL	103
24/10	298	06:04	4.92	4.97	243.7	.156	.08	251.4	71.1	0.3	41	52	BTL	104
24/10	298	12:01	5.00	5.04	268.5	.244	.34	326.0	35.9	4.1	60	53	BTL	105
01/11	306	00:17	11.49	11.43	332.9	1.912	.16	358.2	40.0	3.1	20	D3,1	EWF	106
01/11	306	06:01	6.84	6.88	349.9	1.556	.12	22.6	30.1	6.3	60	2	EWF	107
01/11	306	12:01	2.66	2.80	20.4	1.052	.16	13.3	38.5	3.4	60	3	EWF	108

Appendix 1. Offshore Wave Data, Stanhope Beach, 1984 (Cont'd)

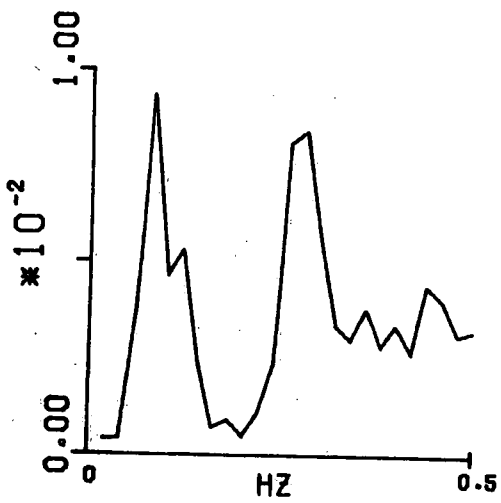
Date			Wind			Waves								
								Direction						
Day/ Month	Julian Day	Time GMT	Speed 1 m/s	Speed 2 m/s	Direction °T	H_c m	F_{pk} Hz	Mean °T	RMS Spread °	S	Degrees of Freedom	Disc File and Number	Job No.	Run No.
01/11	306	18:03	2.07	2.13	35.7	.665	.18	13.7	36.8	3.8	55	PEI 4	EWF	109
02/11	307	00:01	5.41	5.43	174.4	.403	.16	25.4	23.6	10.8	60	5	EWF	110
02/11	307	06:01	10.23	10.19	174.8	.227	.44	171.3	51.8	1.4	60	6	EWF	111
02/11	307	12:01	13.92	13.89	190.2	.445	.38	189.1	41.5	2.8	61	7	EWF	112
02/11	307	18:01	9.97	9.90	225.3	.254	.44	261.6	52.4	1.4	60	8	EWF	113
03/11	308	00:01	13.66	13.58	293.5	1.777	.18	340.5	41.7	2.8	60	D3,9	FFW	114
03/11	308	06:07	12.77	12.73	279.1	2.379	.12	2.3	39.0	3.3	41	10	FFW	115
03/11	308	12:01	11.44	11.38	285.1	1.617	.14	357.0	38.1	3.5	60	11	FFW	116
03/11	308	18:01	7.33	7.29	278.2	1.208	.16	351.6	34.5	4.5	60	12	FFW	117
04/11	309	00:01	3.48	3.55	239.8	.825	.16	1.5	30.7	6.0	60	13	FFW	118
04/11	309	06:06	3.58	3.64	258.5	.819	.14	19.4	28.9	6.8	41	14	FFW	119
04/11	309	12:01	3.51	3.58	216.6	.537	.18	18.8	28.8	6.9	60	15	FFW	120
04/11	309	18:01	5.38	5.38	179.0	.300	.16	21.8	22.0	12.6	60	16	FFW	121
05/11	310	00:01	4.24	4.29	175.9	.120	.18	41.2	30.3	6.2	60	D3,17	FPC	122
05/11	310	06:01	7.00	7.04	123.1	.128	.08	91.5	72.1	0.3	60	18	FPC	123
05/11	310	12:06	6.98	7.01	166.4	.150	.08	116.6	74.5	0.2	41	19	FPC	124
05/11	310	18:01	3.59	3.63	104.6	.151	.30	55.8	27.6	7.6	60	20	FPC	125
06/11	311	00:01	5.97	6.02	165.8	.185	.34	83.1	35.0	4.4	61	21	FPC	126
06/11	311	06:01	7.29	7.32	240.2	.171	.08	233.1	66.5	0.5	60	22	FPC	127
06/11	311	12:01	1.78	1.89	282.8	.163	.20	60.9	26.5	8.4	60	23	FPC	128
06/11	311	18:08	1.52	1.67	342.3	.195	.18	72.5	30.1	6.3	41	24	FPC	129
07/11	312	00:08	2.10	2.21	328.1	.129	.14	36.7	24.0	10.4	41	D3,25	FUQ	130
07/11	312	18:01	10.78	10.75	320.5	1.718	.14	1.6	37.0	3.8	60	28	FUQ	133
08/11	313	00:01	12.34	12.28	318.4	1.877	.12	28.3	52.2	1.4	60	29	FUQ	134

APPENDIX 2

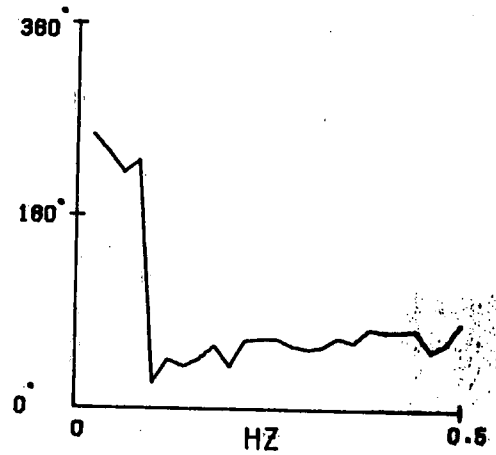
Sample spectra for the Stanhope Beach data. The numbers at the top of the figure are year, month, day, hour, minute, and second (GMT) of the start of the record. The left hand figure is the variance spectral density of the vertical displacement. The units of the ordinate are m^2/Hz. The right hand figure is the average wave direction for each frequency. The bearing is the direction, degrees true, from which the waves are coming.

1984 10 2 6 1 16

Z-D

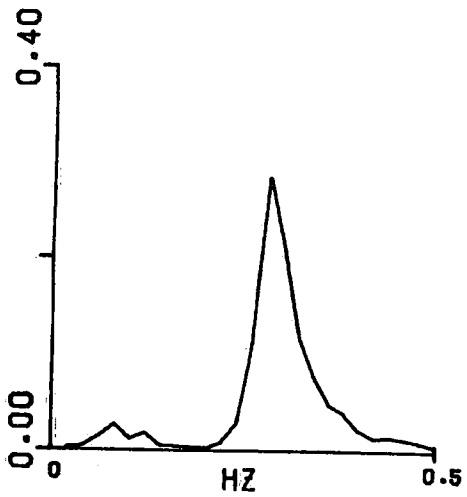


BEARING

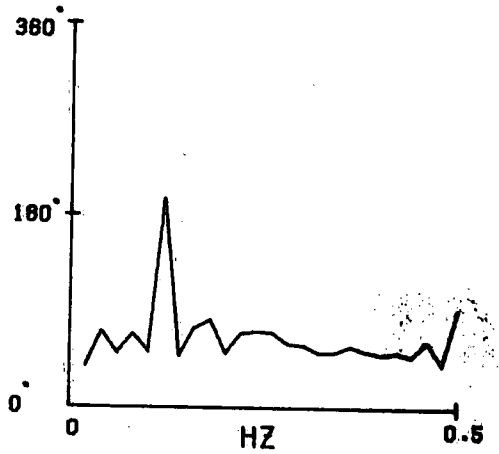


1984 10 2 11 59 19

Z-D

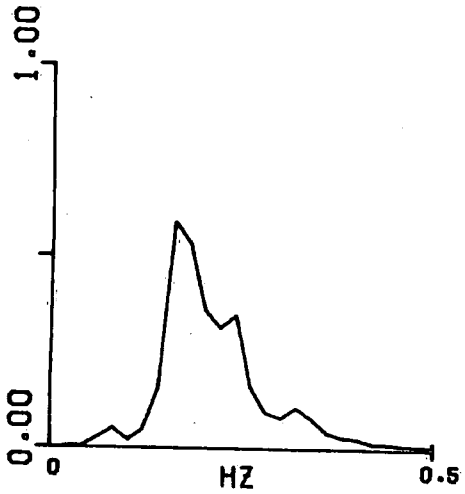


BEARING

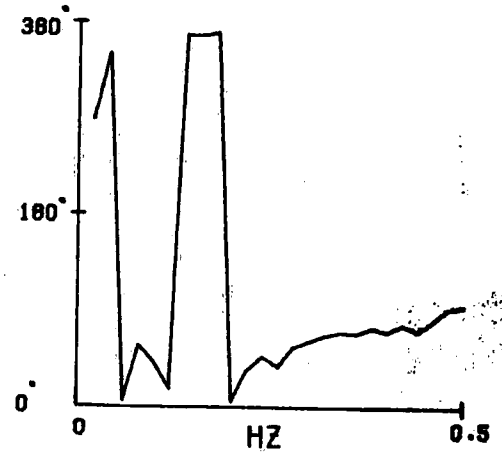


1984 10 2 17 59 20

Z-D

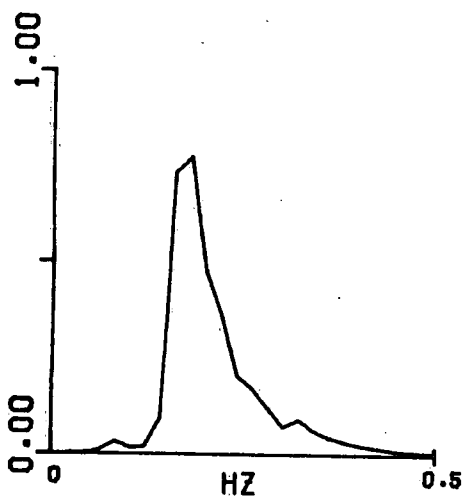


BEARING

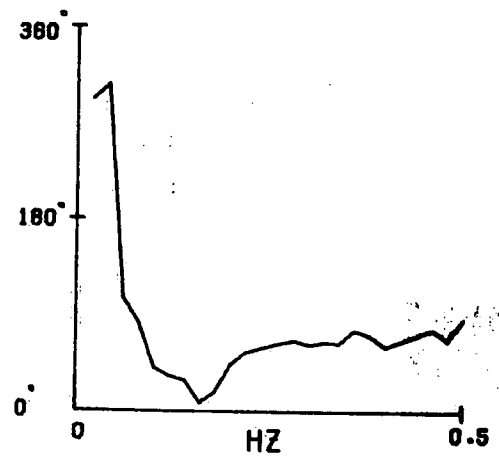


1984 10 3 0 2 9

Z-D

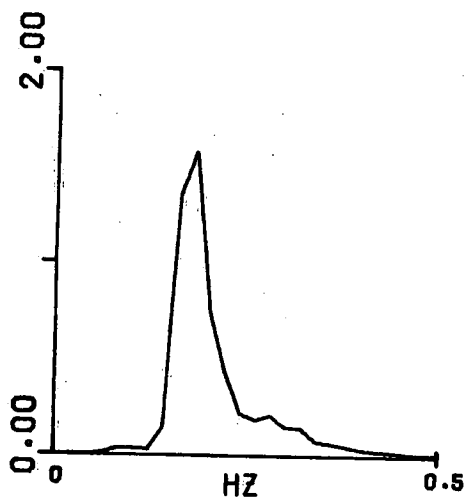


BEARING

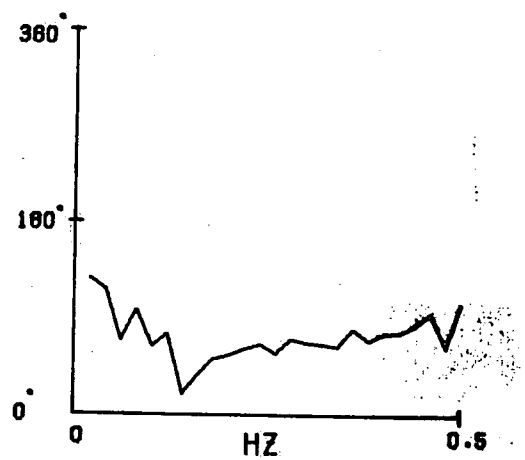


1984 10 3 5 59 30

Z-D

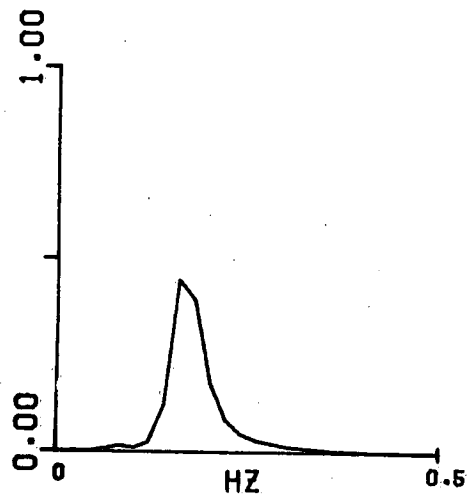


BEARING

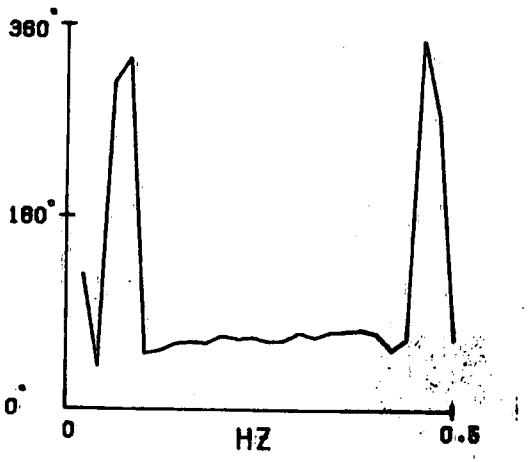


1984 10 3 11 59 31

Z-D

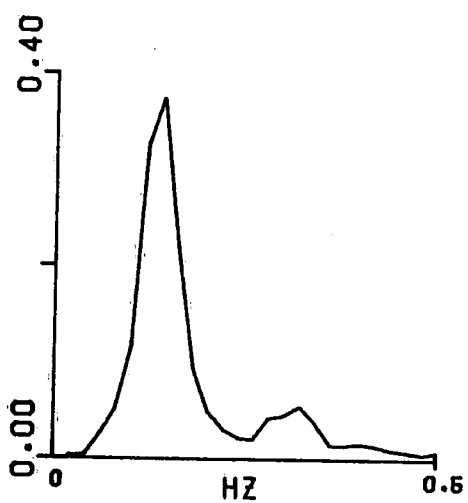


BEARING

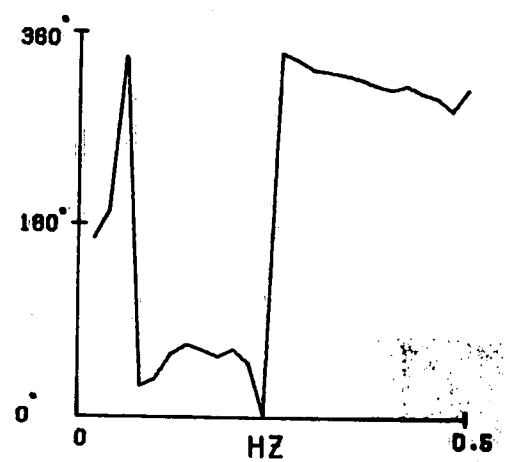


1984 10 3 17 59 31

Z-D

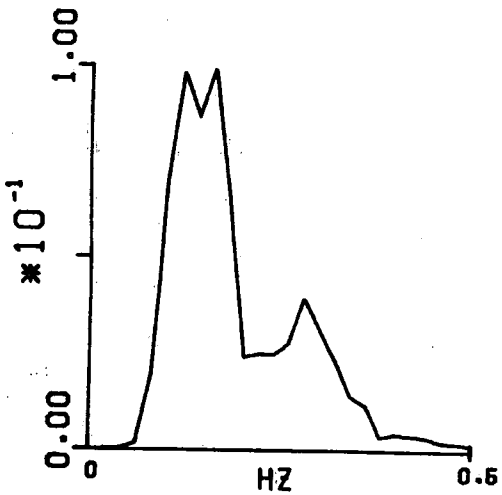


BEARING

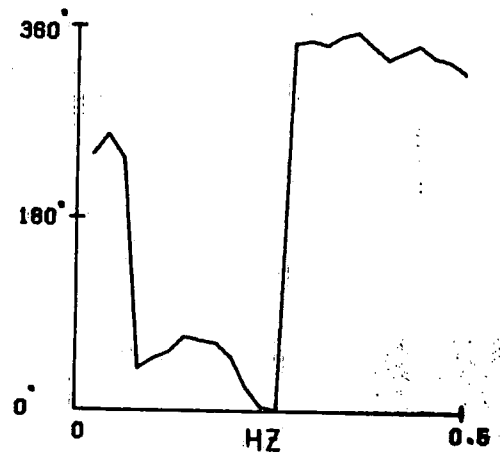


1984 10 3 23 59 34

Z-D

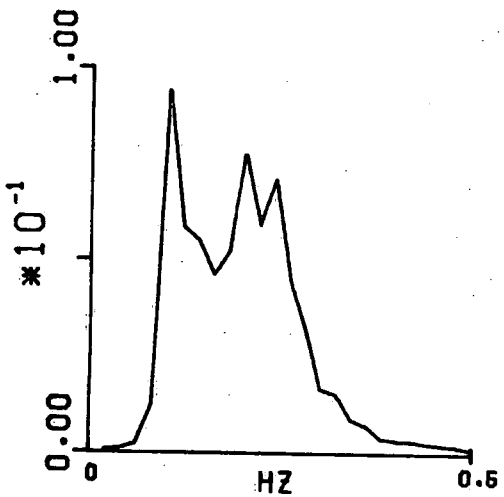


BEARING

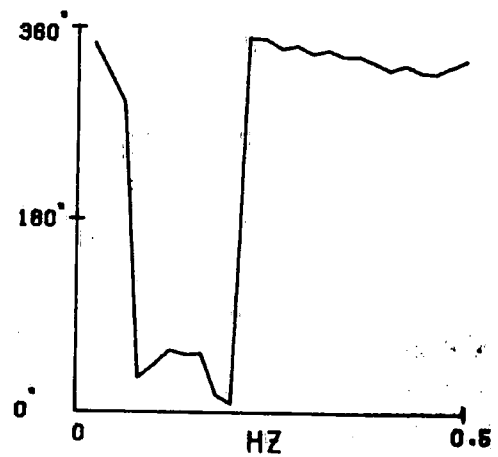


1984 10 4 5 59 26

Z-D

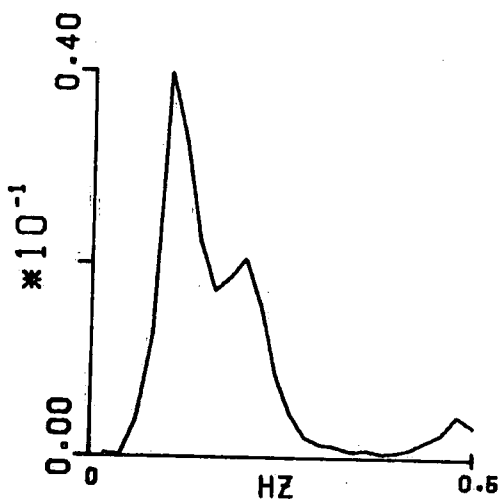


BEARING

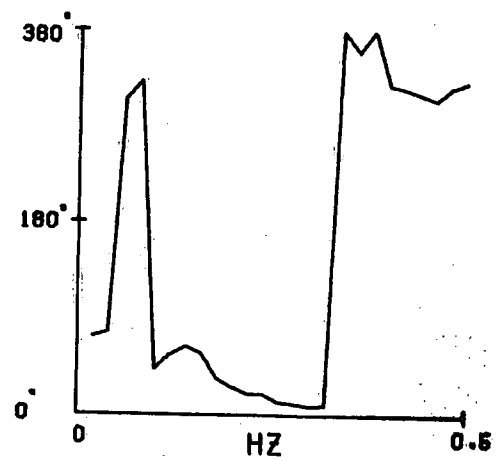


1984 10 4 11 59 30

Z-D

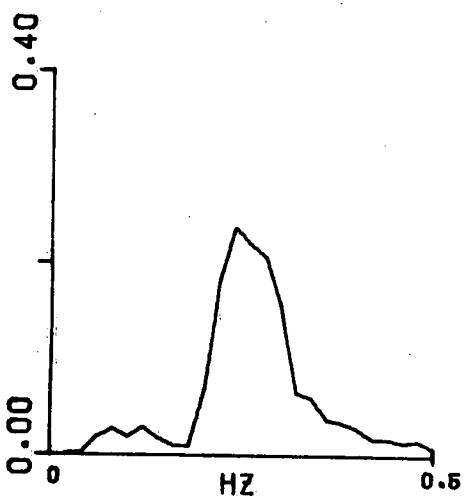


BEARING

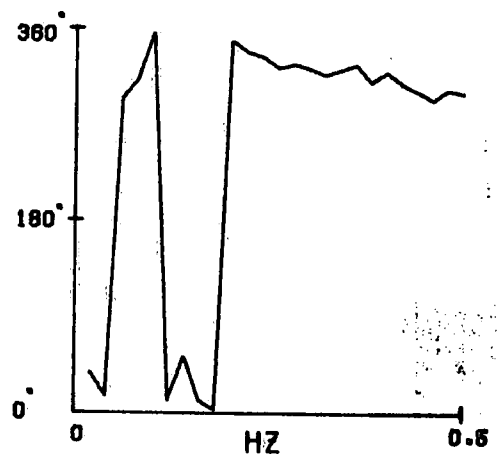


1984 10 4 18 1 12

Z-D

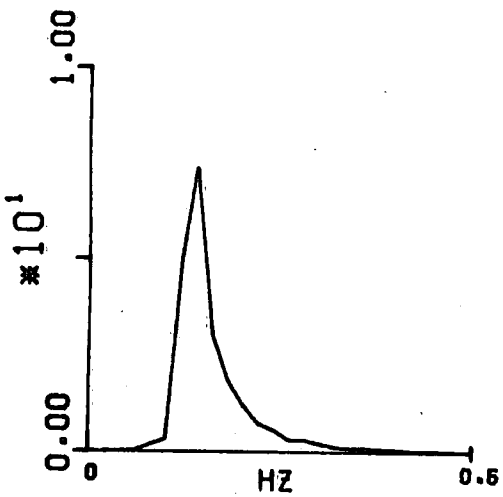


BEARING

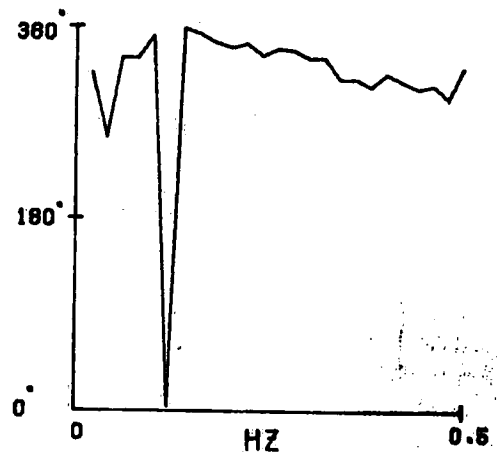


1984 10 4 23 59 42

Z-D

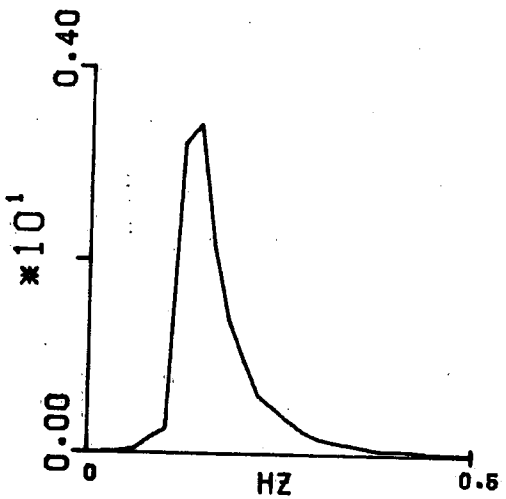


BEARING

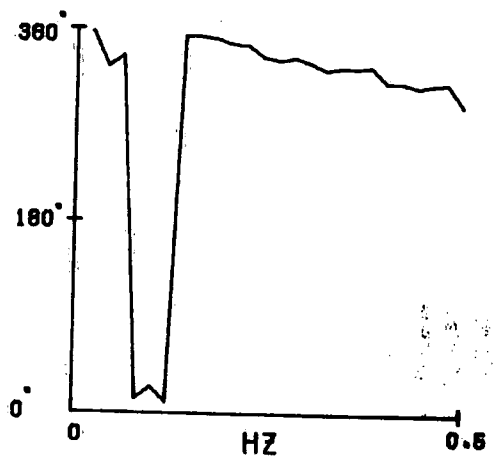


1984 10 5 5 59 40

Z-D

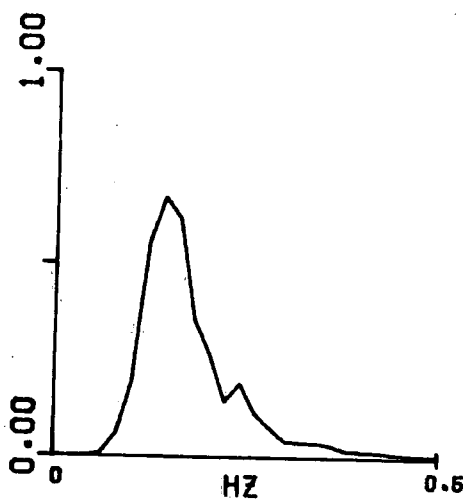


BEARING

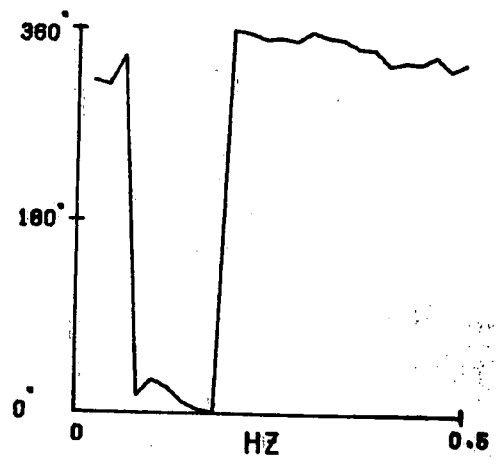


1984 10 5 11 59 38

Z-D

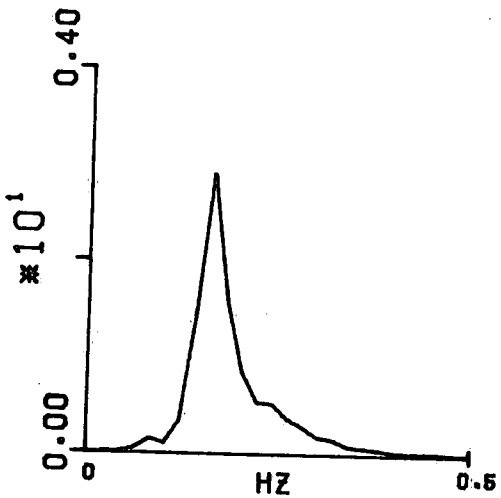


BEARING

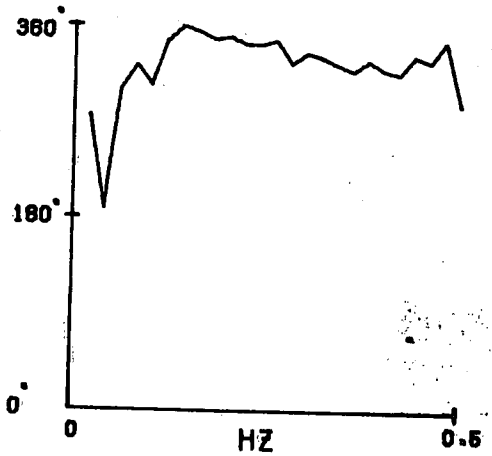


1984 10 5 17 59 49

Z-D

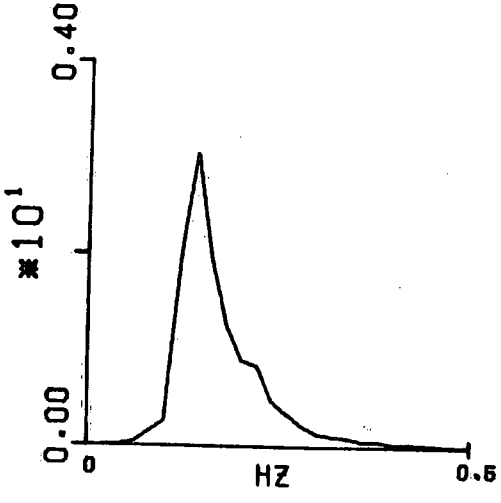


BEARING

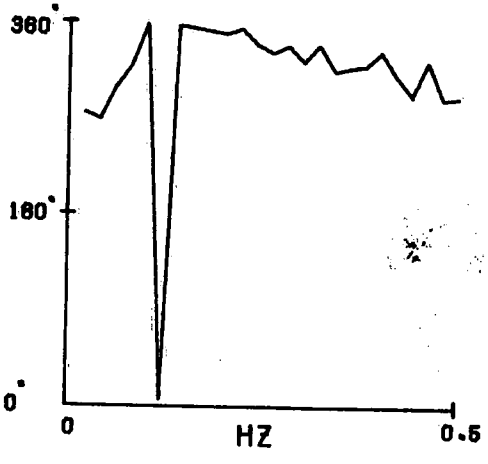


1984 10 5 23 59 42

Z-D

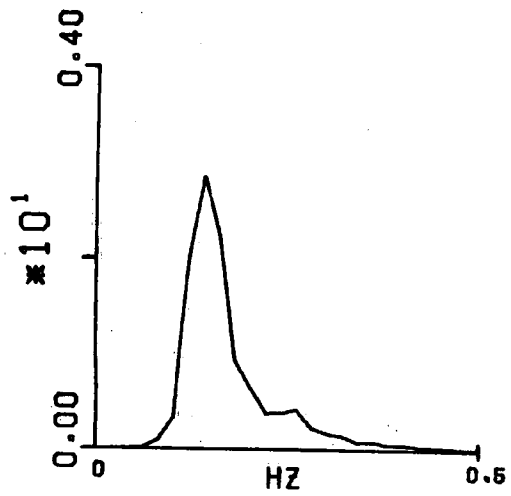


BEARING

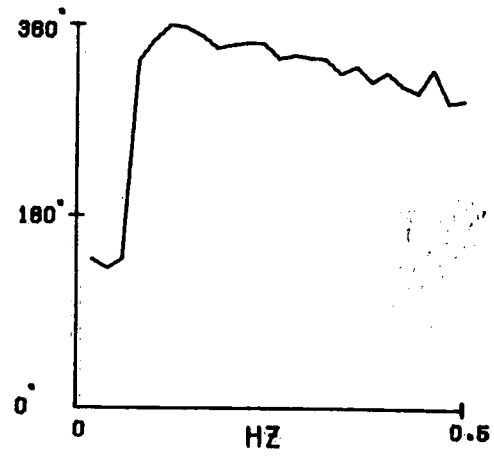


1984 10 6 5 59 41

Z-D

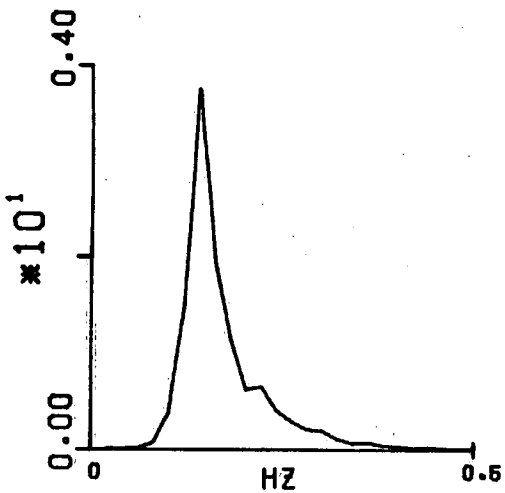


BEARING

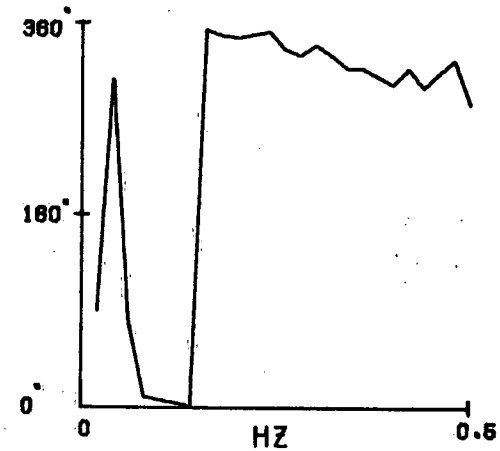


1984 10 6 11 59 53

Z-D

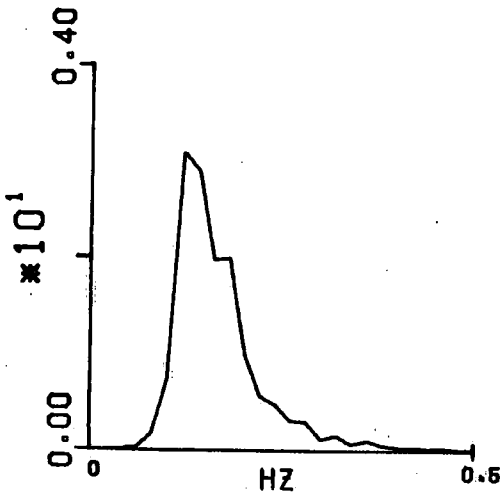


BEARING

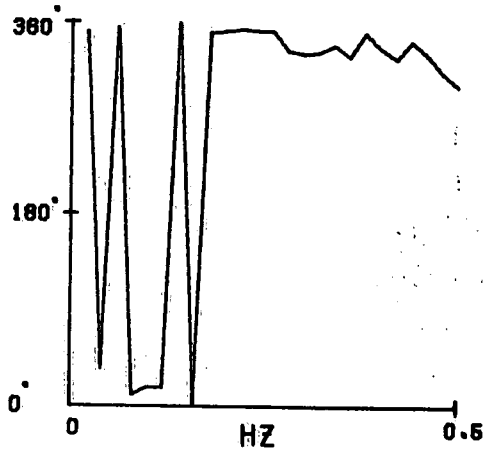


1984 10 6 17 59 47

Z-D

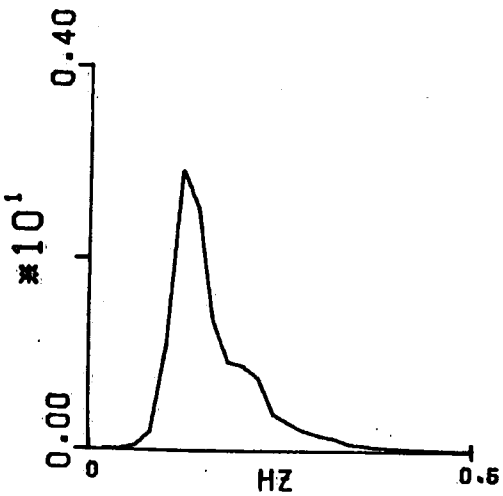


BEARING

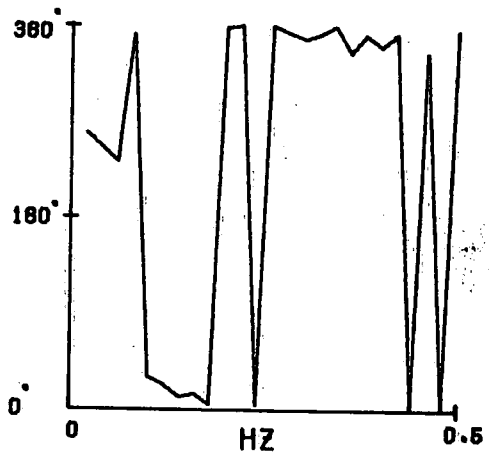


1984 10 6 23 59 40

Z-D

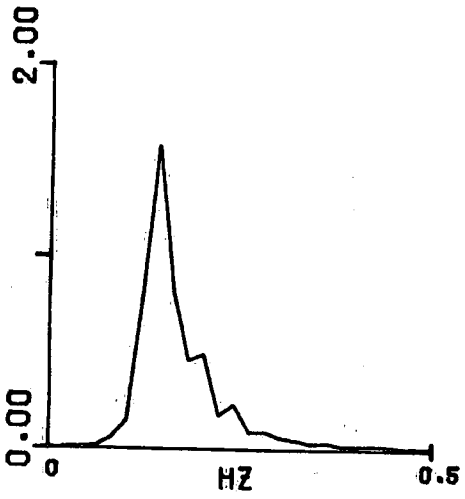


BEARING

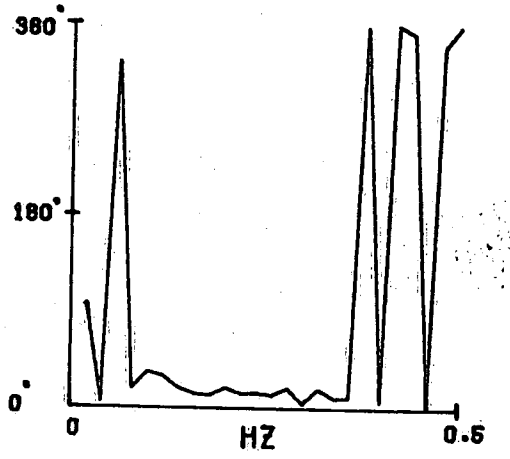


1984 10 7 5 59 47

Z-D

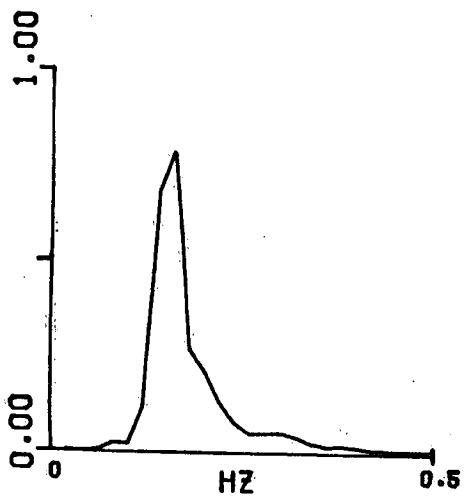


BEARING

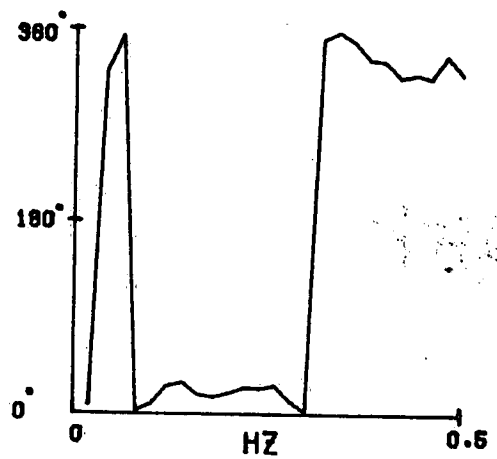


1984 10 7 12 3 13

Z-D

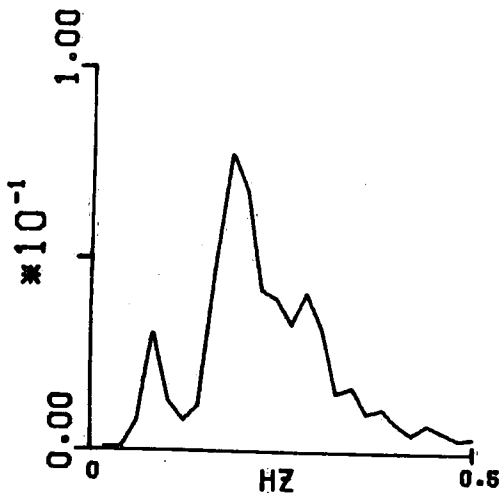


BEARING

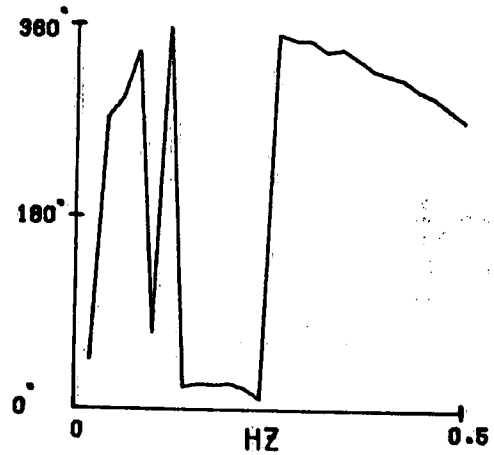


1984 10 7 17 59 45

Z-D

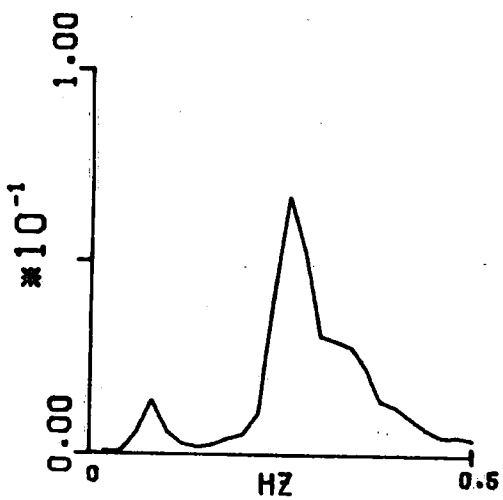


BEARING

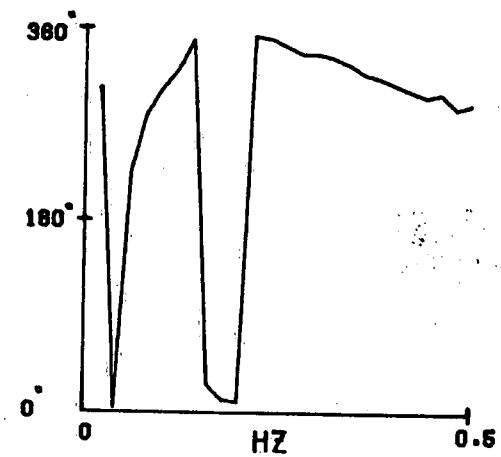


1984 10 7 23 59 49

Z-D

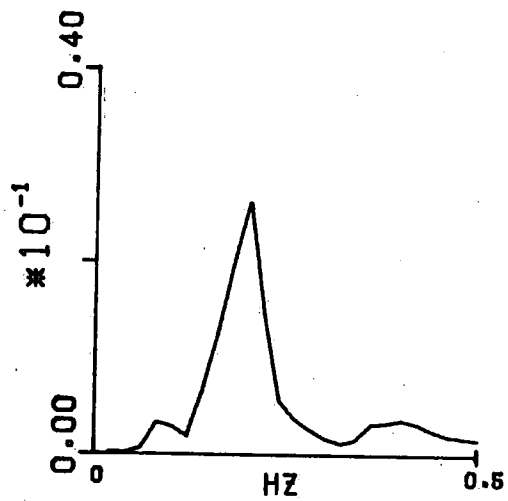


BEARING

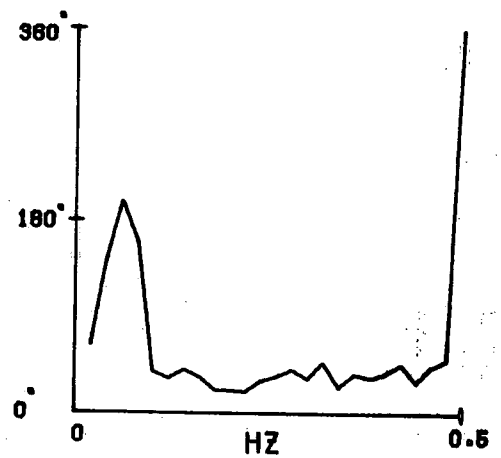


1984 10 9 6 4 55

Z-D

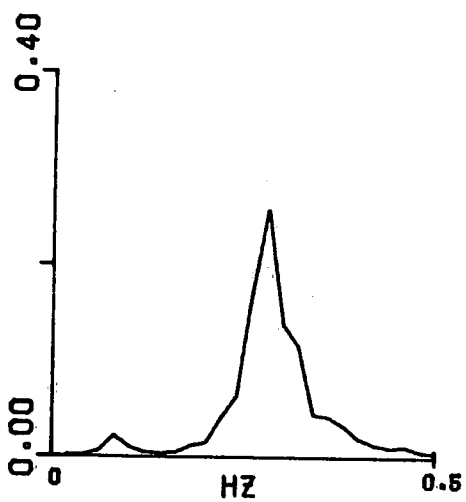


BEARING

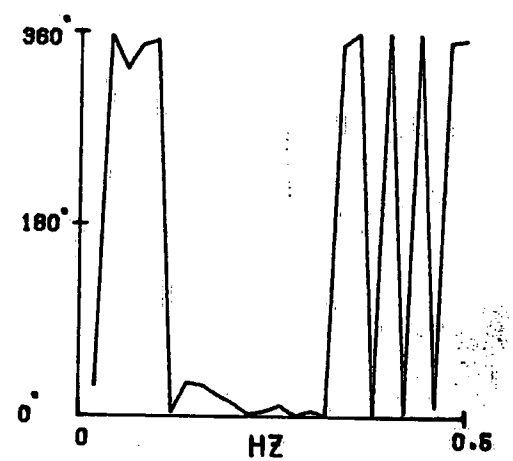


1984 10 9 11 59 48

Z-D

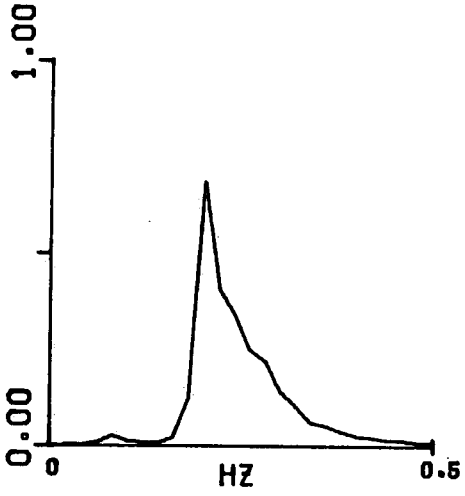


BEARING

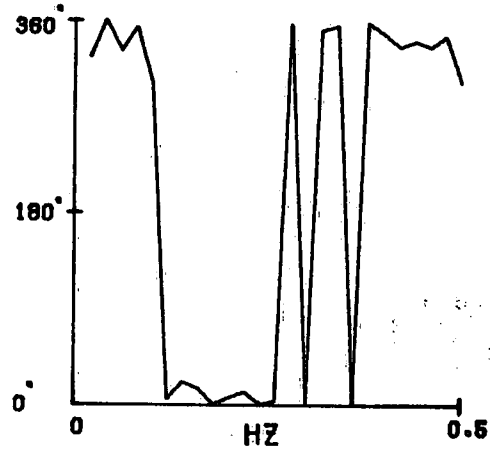


1984 10 9 17 59 50

Z-D

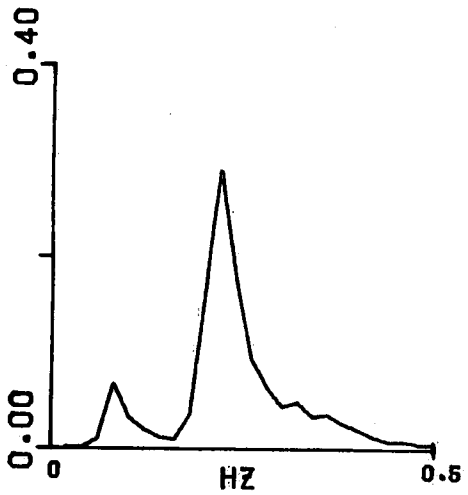


BEARING

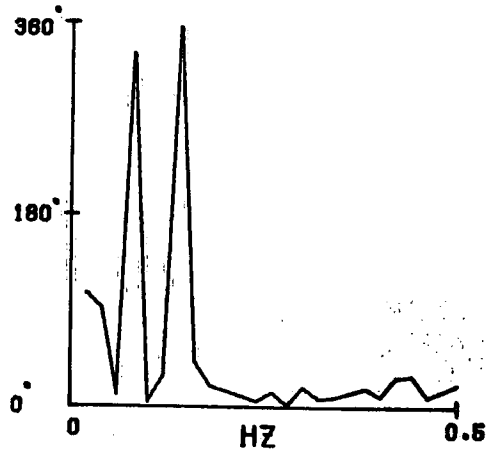


1984 10 9 23 59 58

Z-D

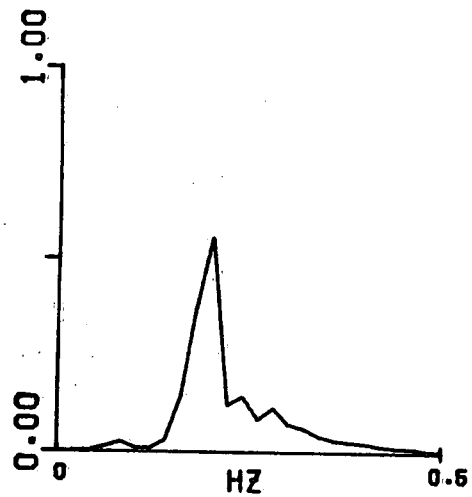


BEARING

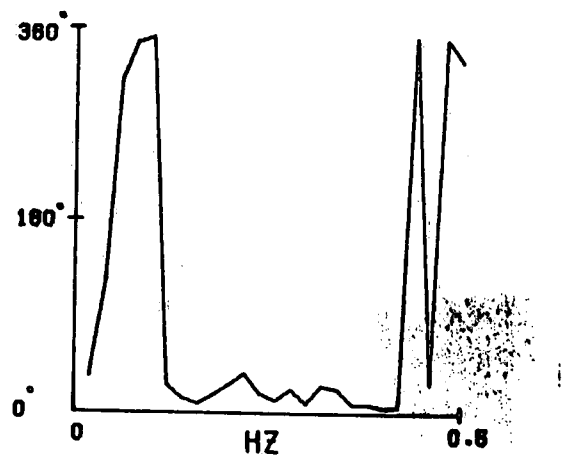


1984 10 10 5 59 54

Z-D

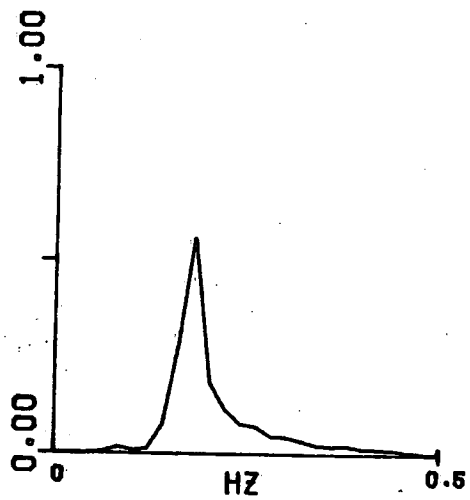


BEARING

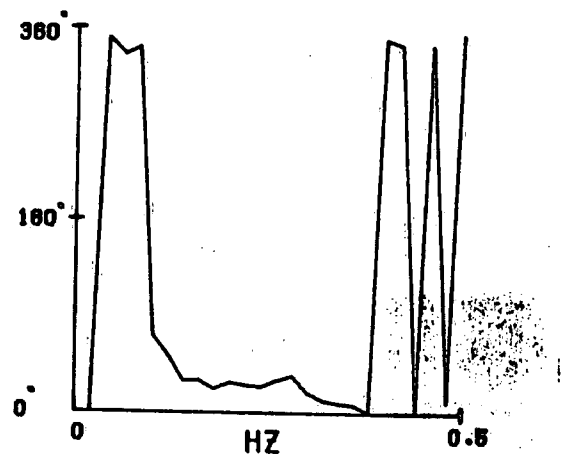


1984 10 10 12 0 0

Z-D

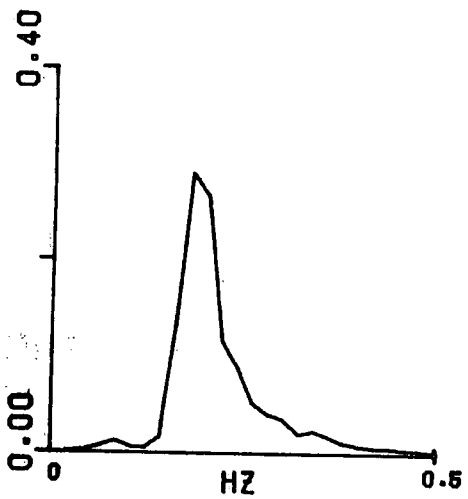


BEARING

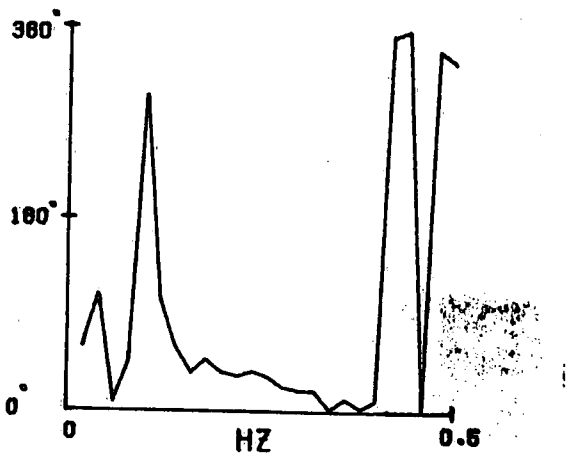


1984 10 10 17 59 47

Z-D

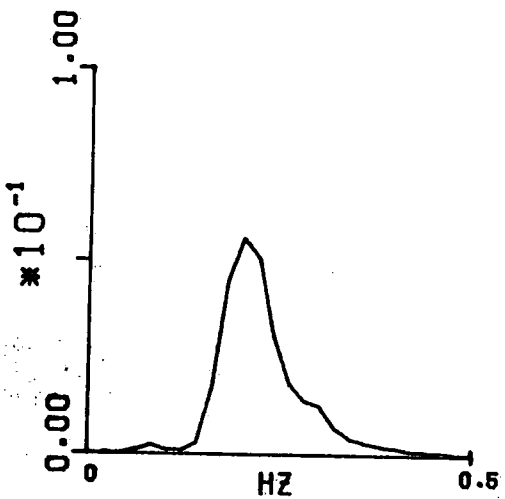


BEARING

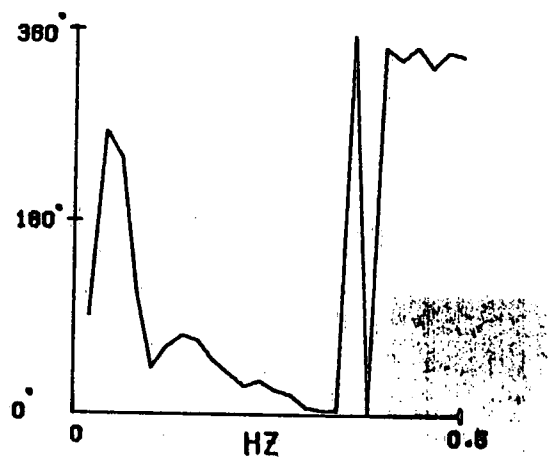


1984 10 10 23 59 53

Z-D

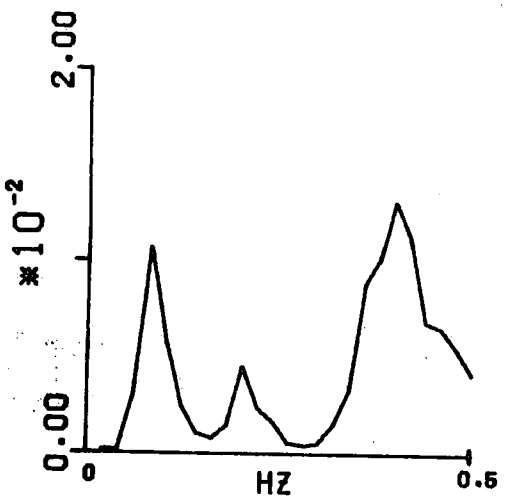


BEARING

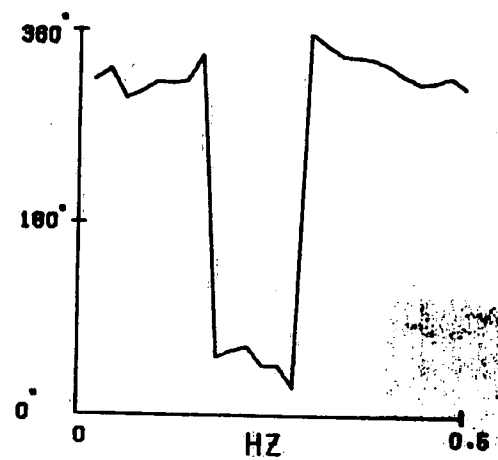


1984 10 12 0 0 11

Z-D

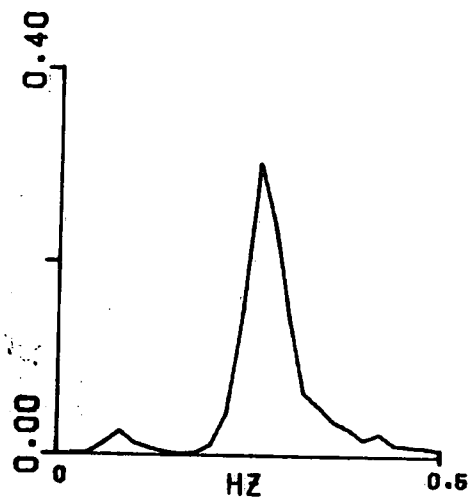


BEARING

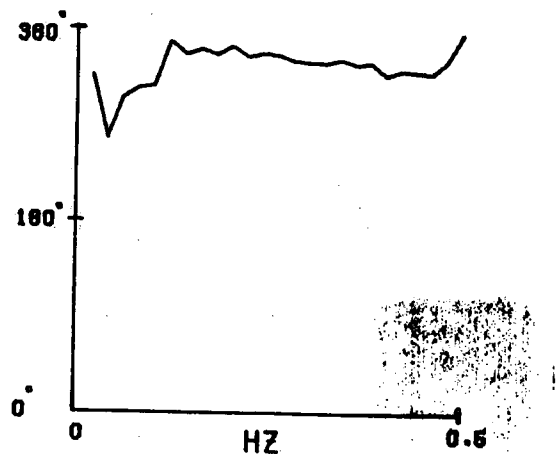


1984 10 12 6 0 10

Z-D

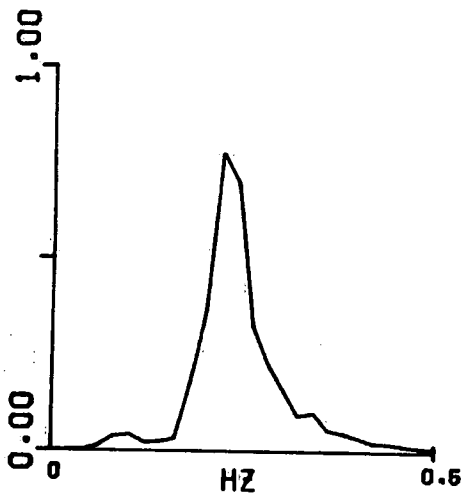


BEARING

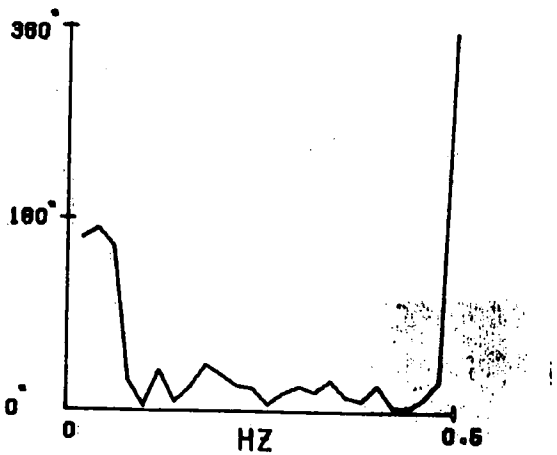


1984 10 12 12 0 13

Z-D

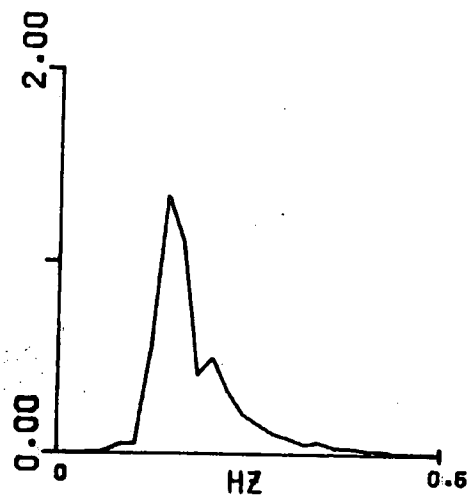


BEARING

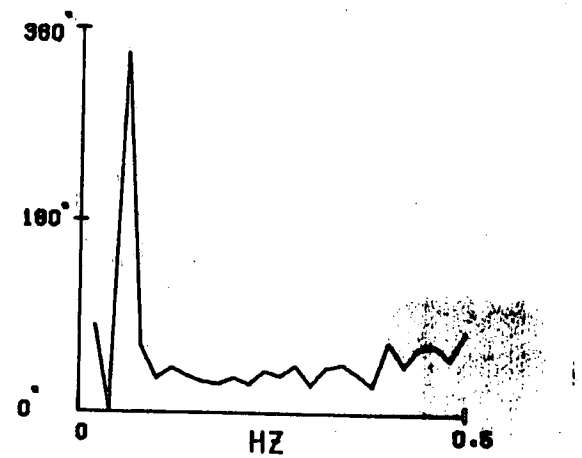


1984 10 13 0 0 24

Z-D

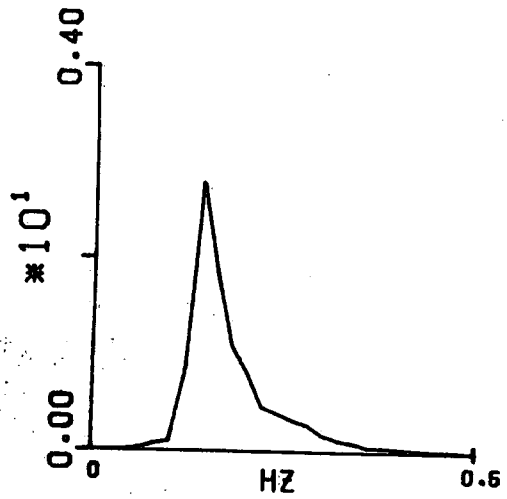


BEARING

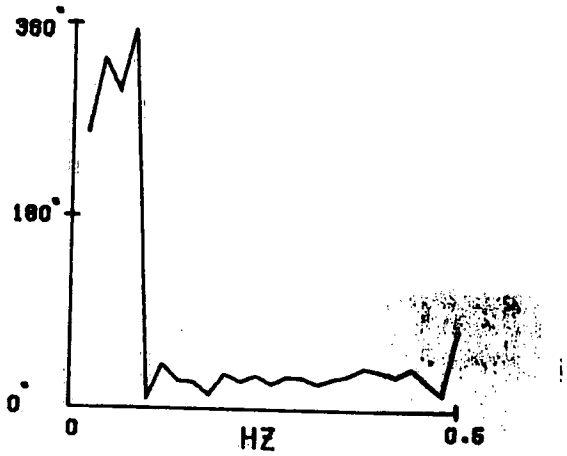


1984 10 12 18 0 17

Z-D

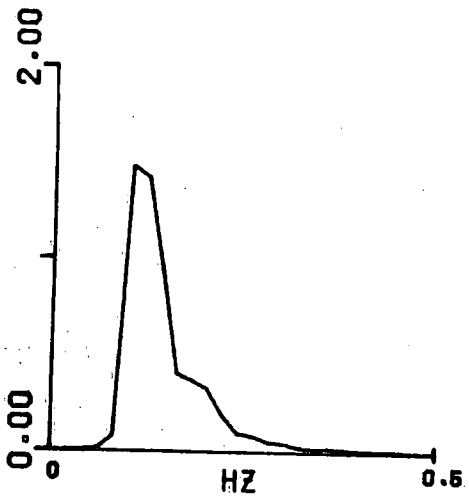


BEARING

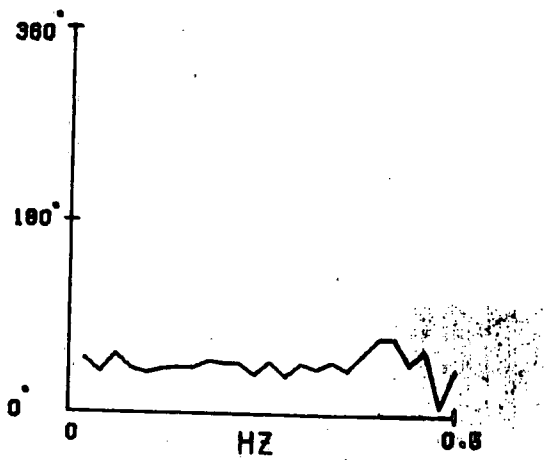


1984 10 13 6 0 19

Z-D

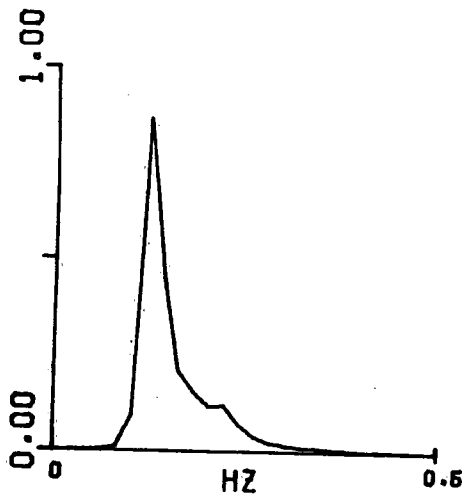


BEARING

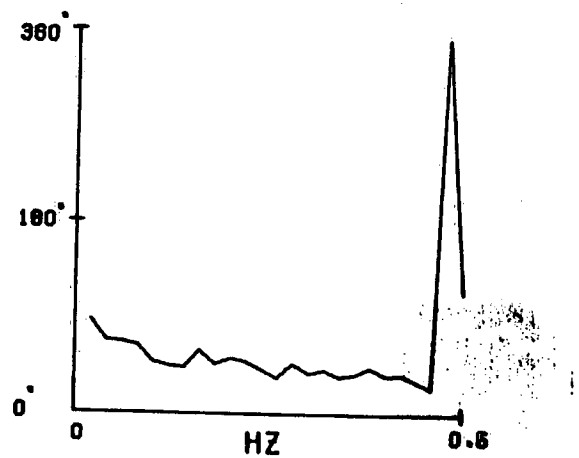


1984 10 13 12 4 15

Z-D

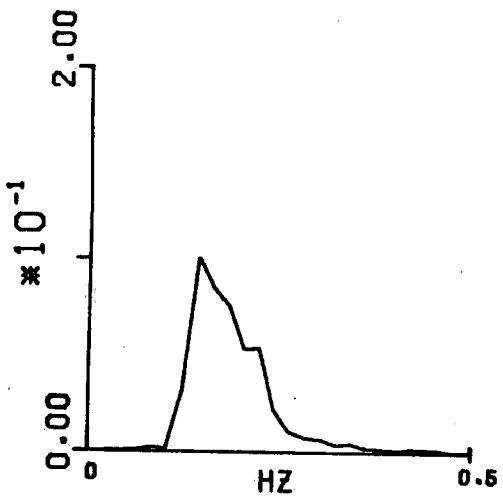


BEARING

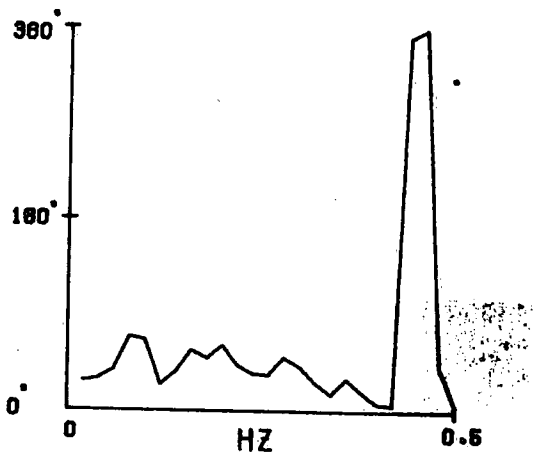


1984 10 13 18 5 55

Z-D

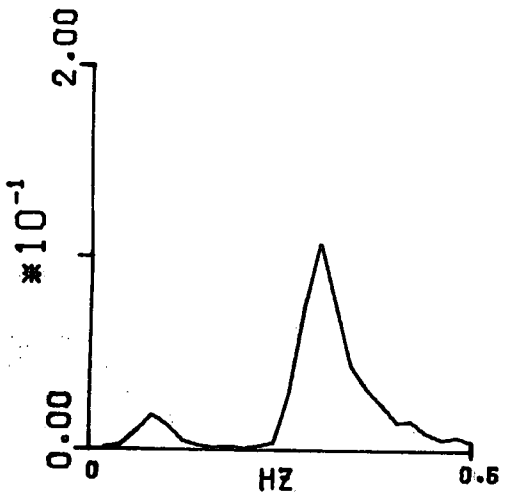


BEARING

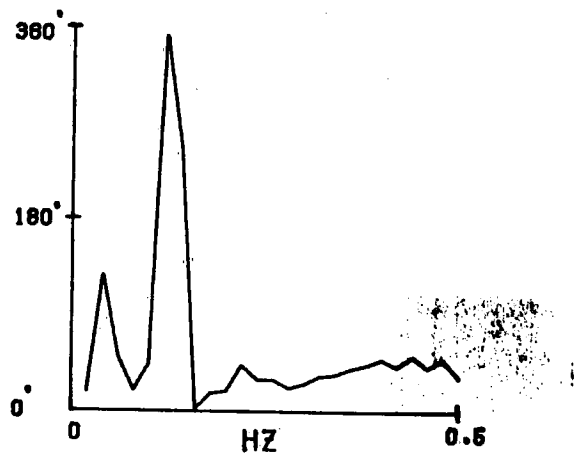


1984 10 16 0 0 32

Z-D

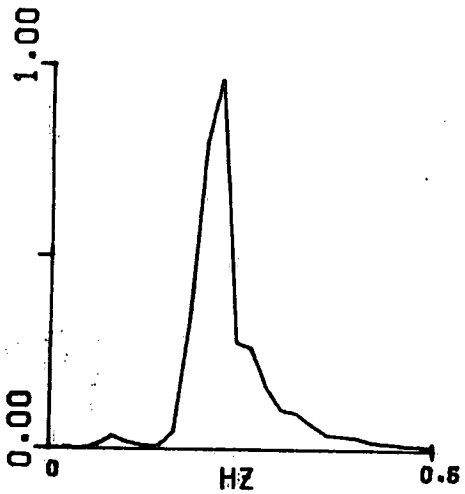


BEARING

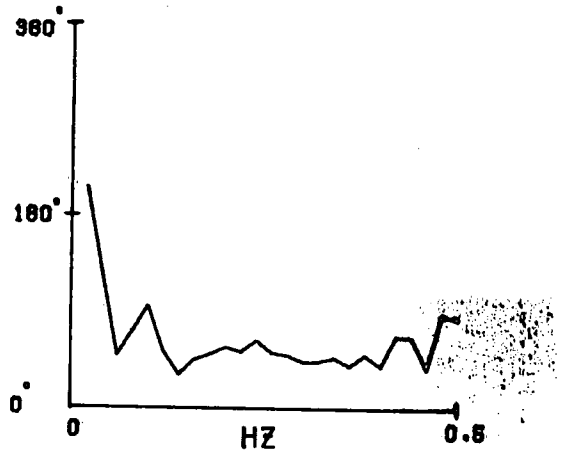


1984 10 16 6 5 16

Z-D

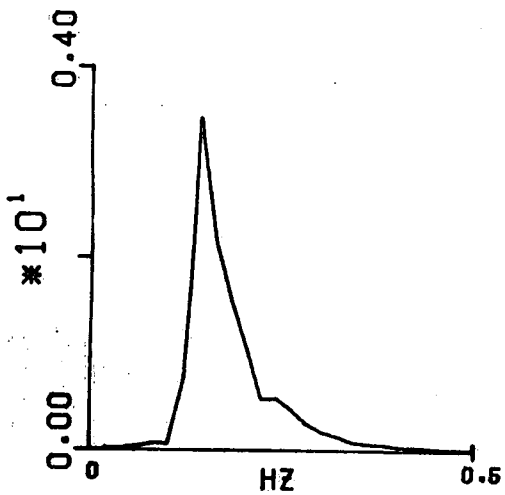


BEARING

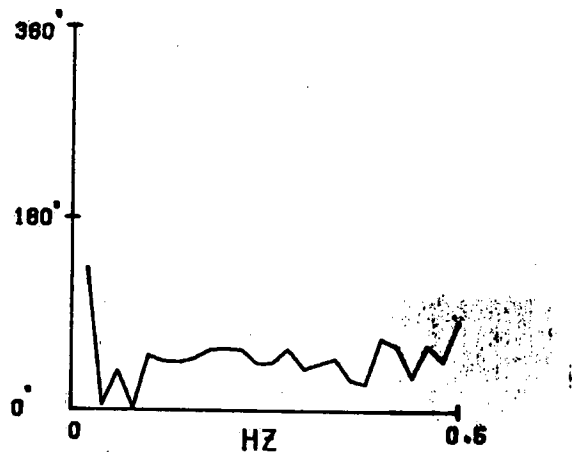


1984 10 16 12 0 28

Z-D

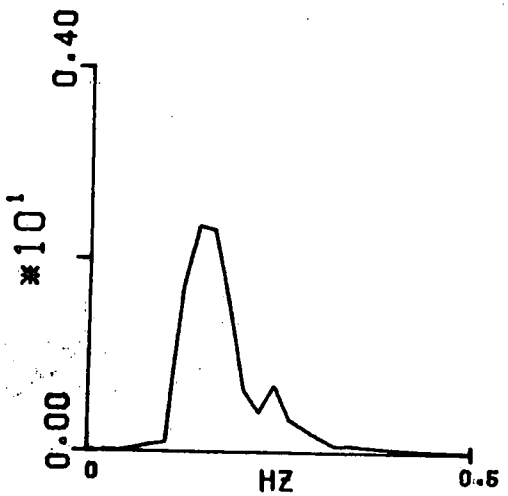


BEARING

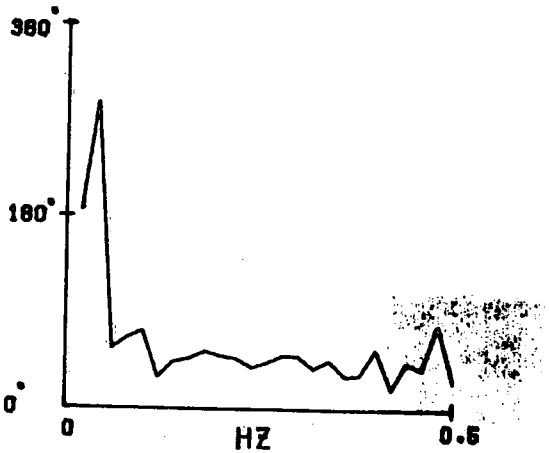


1984 10 16 18 0 34

Z-D

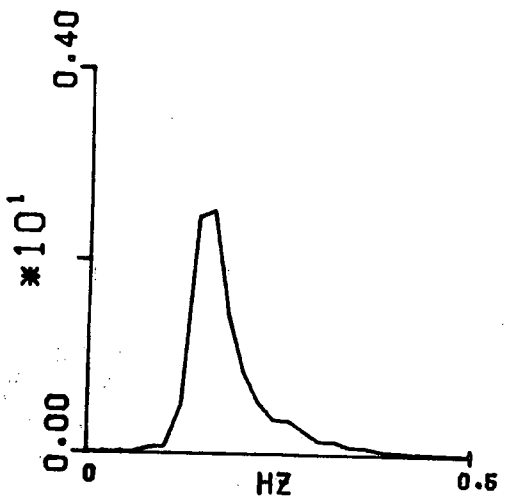


BEARING

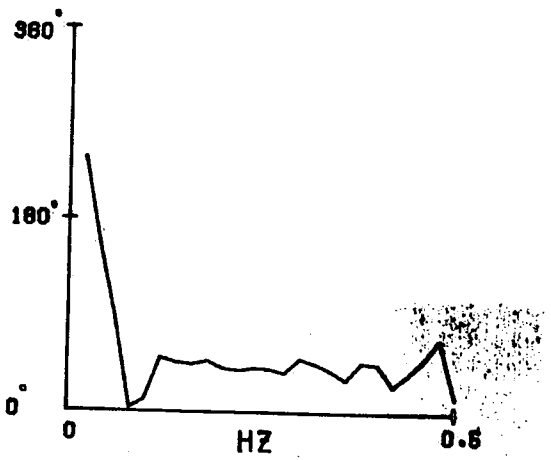


1984 10 17 0 0 40

Z-D

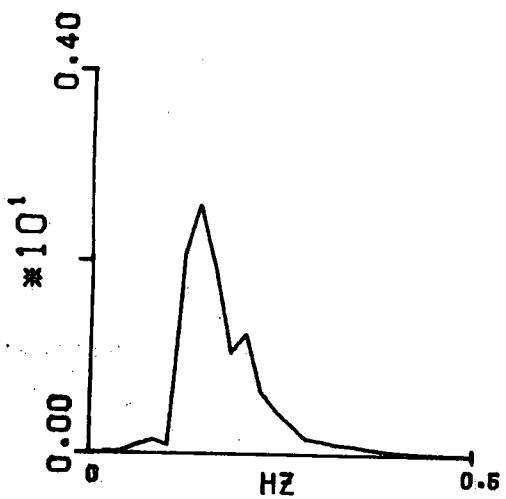


BEARING

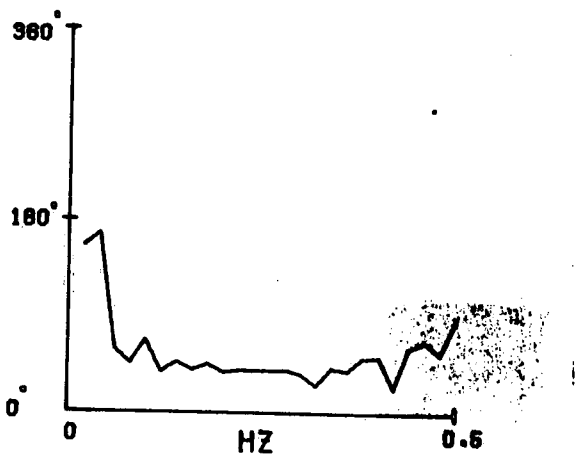


1984 10 17 6 0 33

Z-D

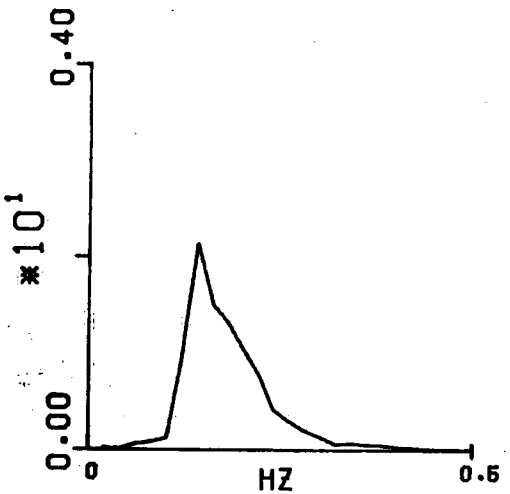


BEARING

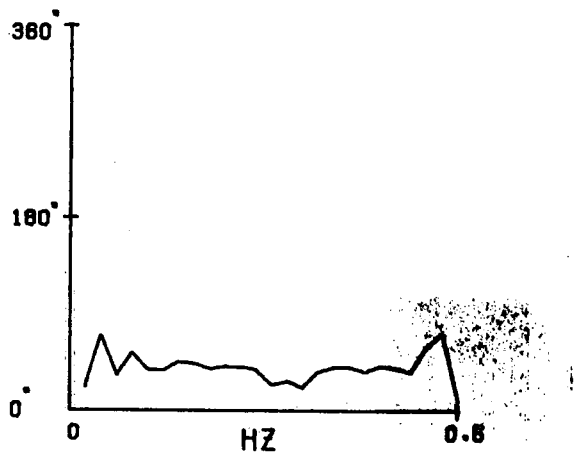


1984 10 17 12 0 39

Z-D

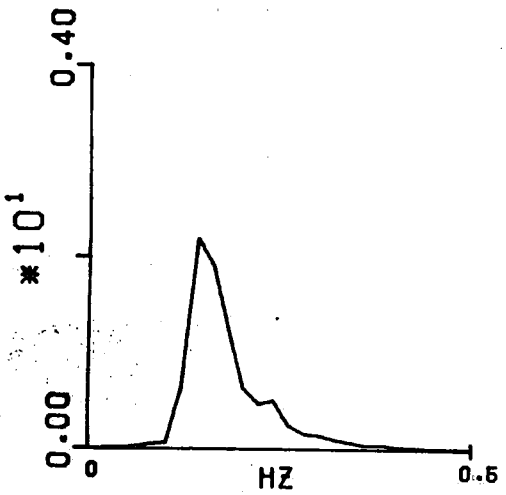


BEARING

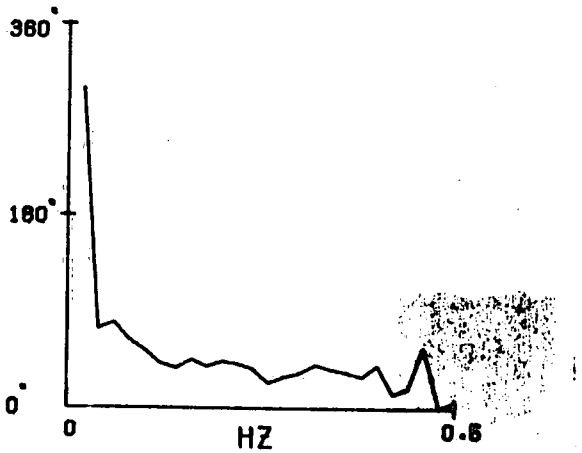


1984 10 17 18 1 33

Z-D

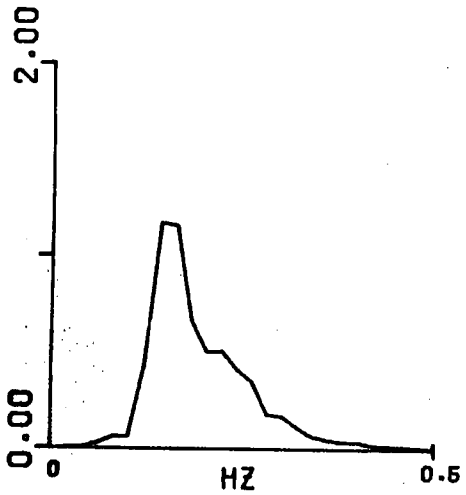


BEARING

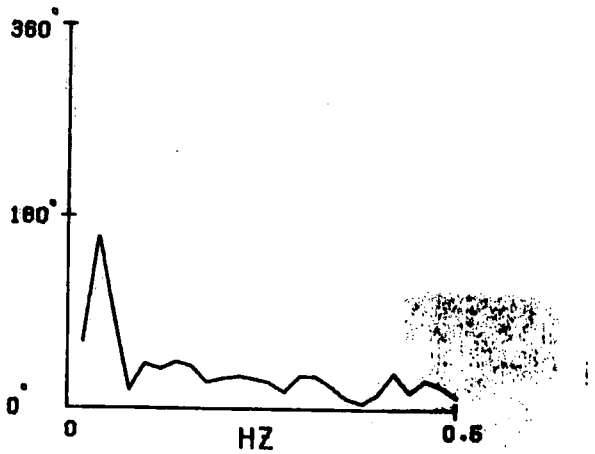


1984 10 18 0 0 36

Z-D

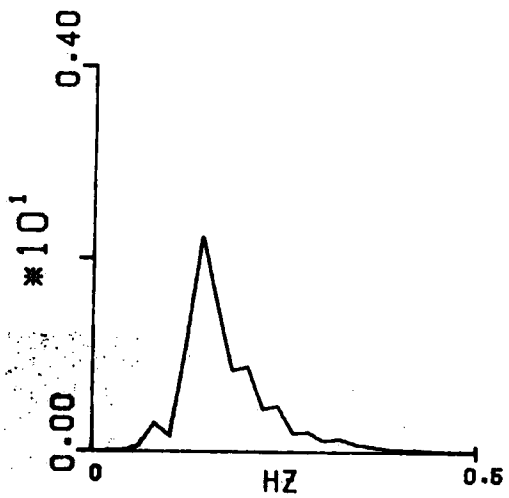


BEARING

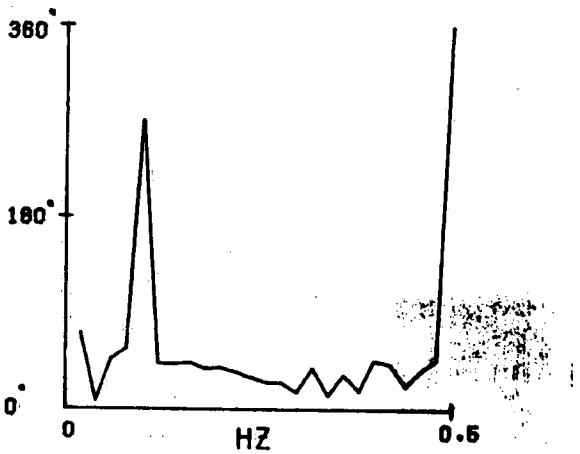


1984 10 18 6 0 41

Z-D

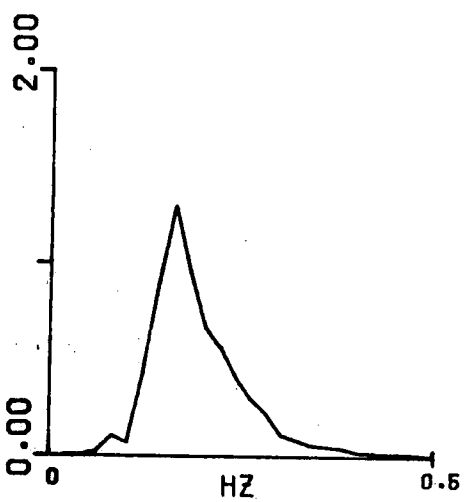


BEARING

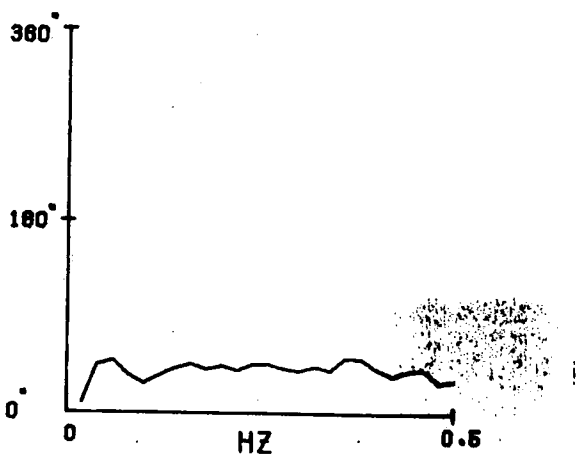


1984 10 18 12 0 45

Z-D

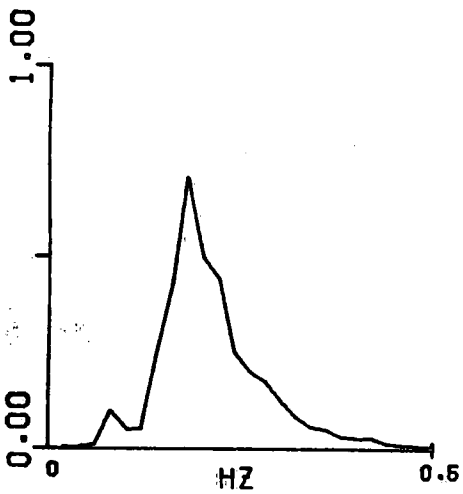


BEARING

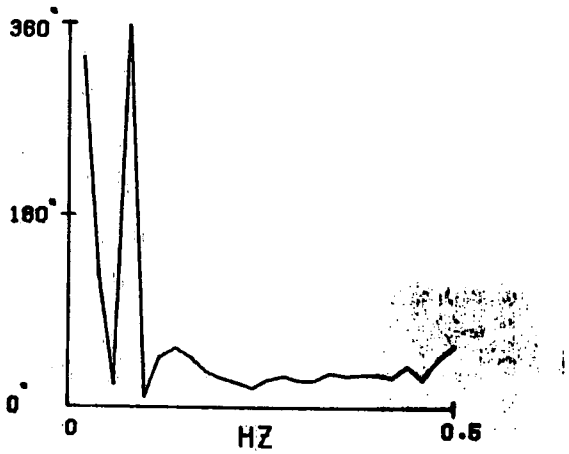


1984 10 18 18 0 31

Z-D

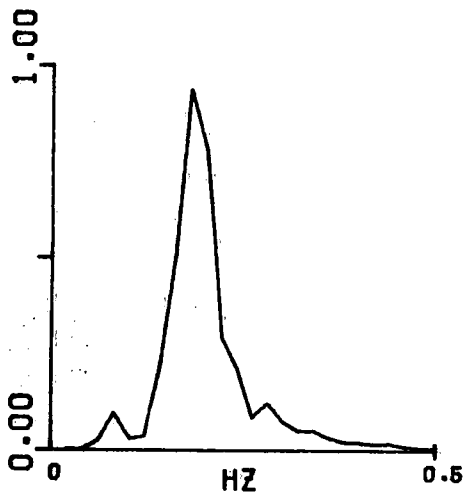


BEARING

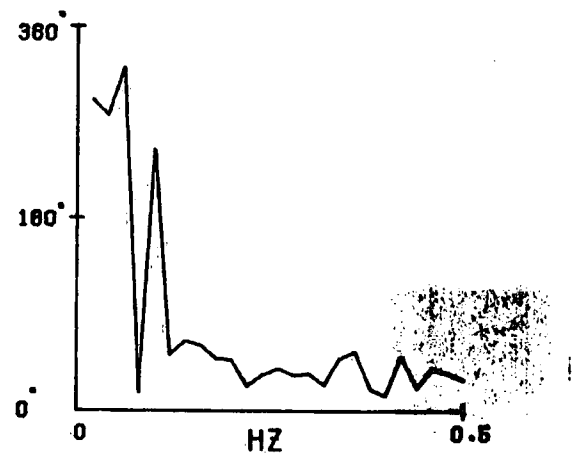


1984 10 19 0 0 47

Z-D

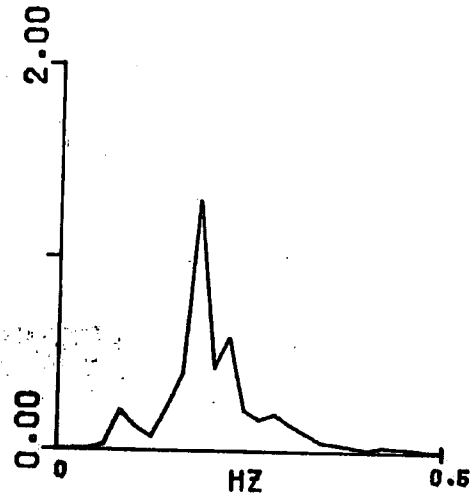


BEARING

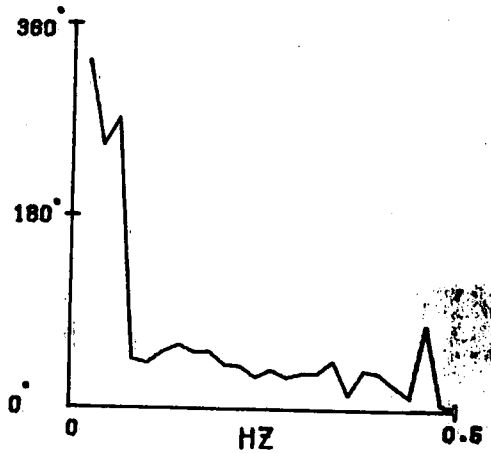


1984 10 19 0 16 49

Z-D

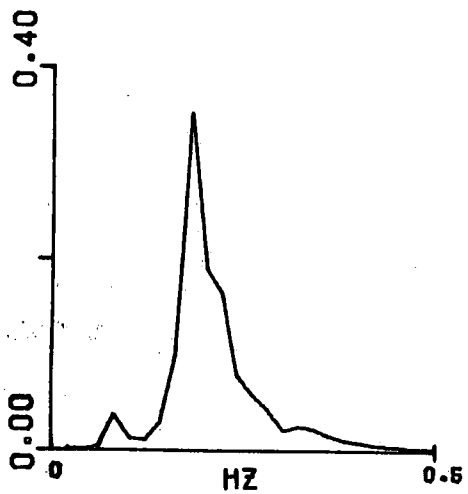


BEARING

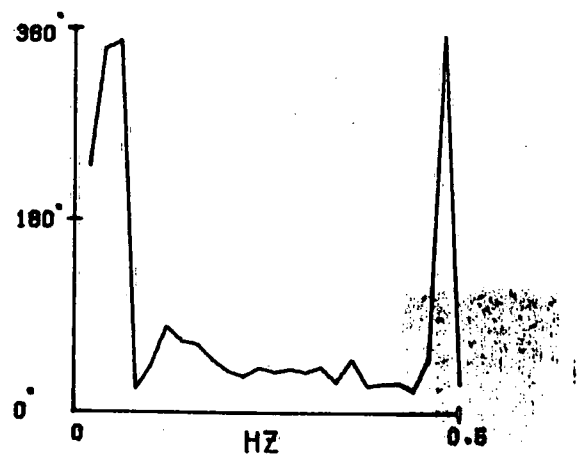


1984 10 19 6 0 39

Z-D

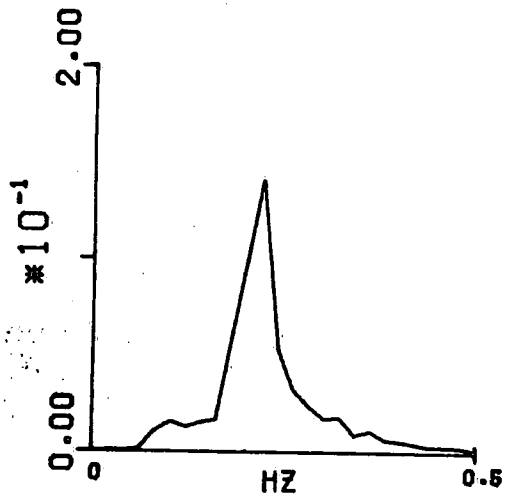


BEARING

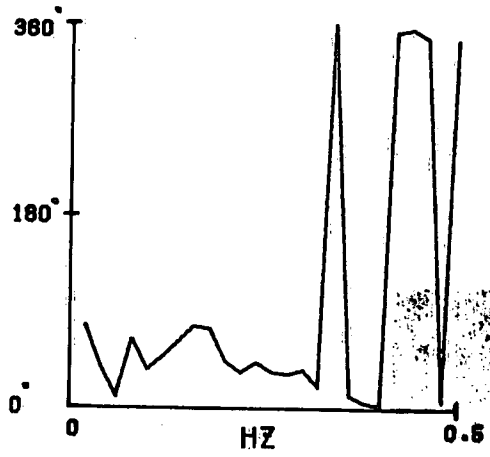


1984 10 19 12 0 42

Z-D

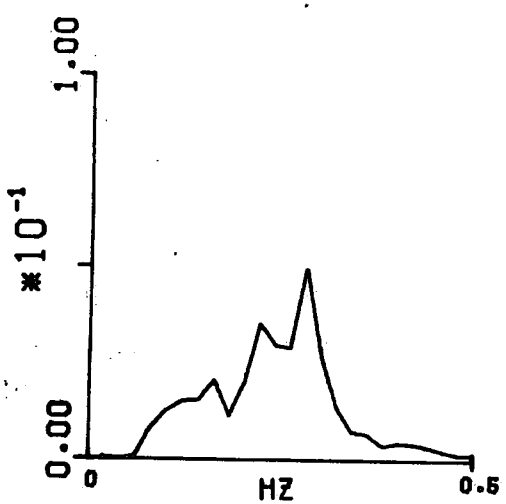


BEARING

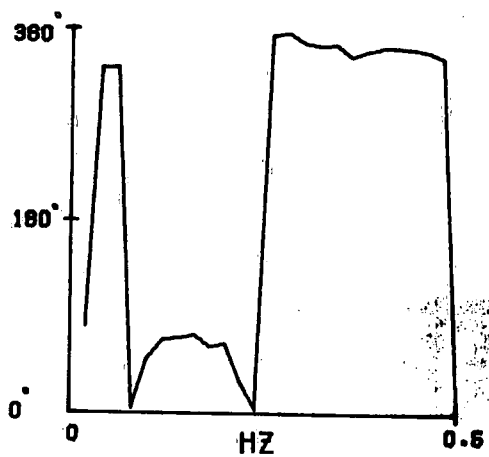


1984 10 19 18 0 35

Z-D

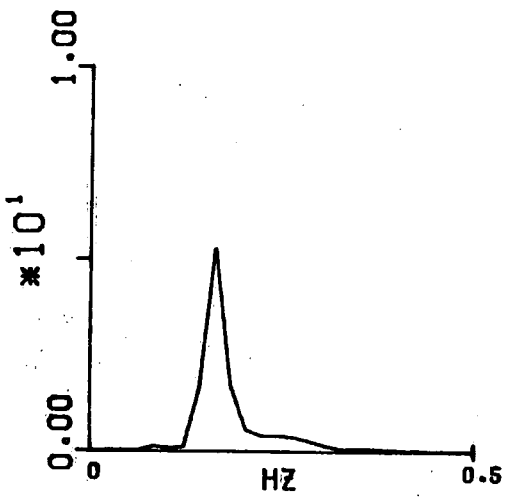


BEARING

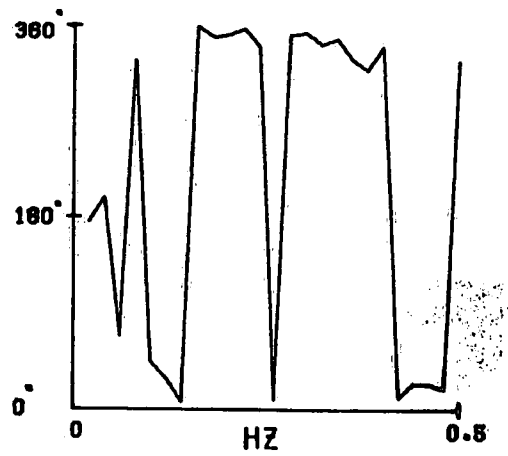


1984 11 1 0 17 29

Z-D

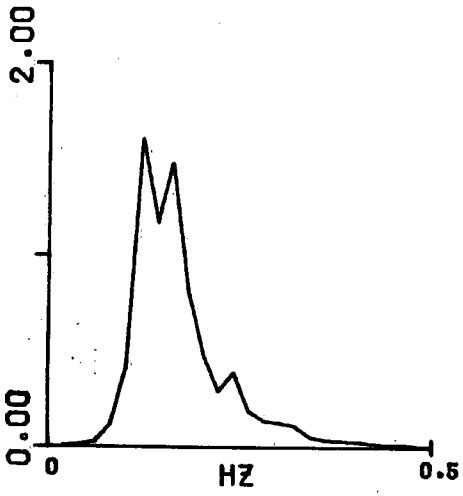


BEARING

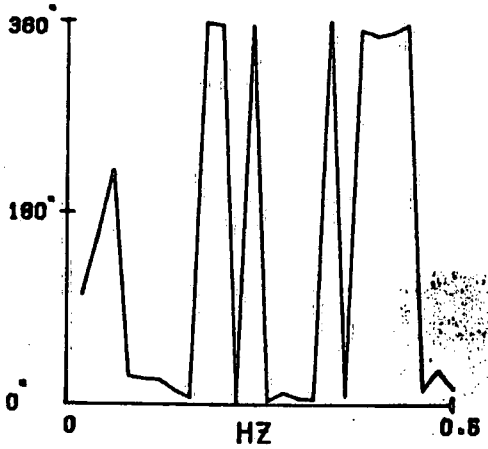


1984 11 1 6 1 11

Z-D

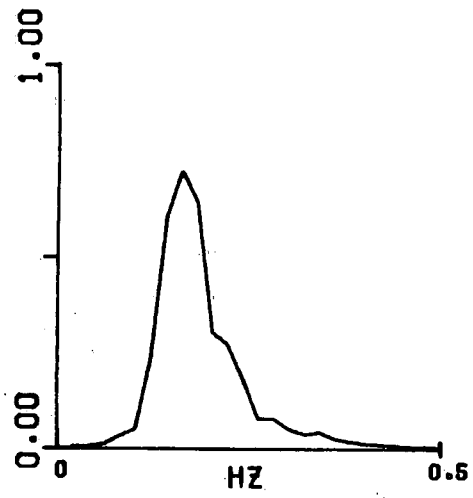


BEARING

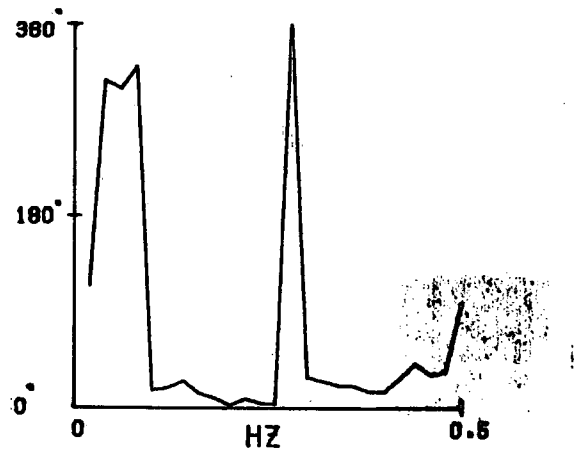


1984 11 1 12 1 20

Z-D

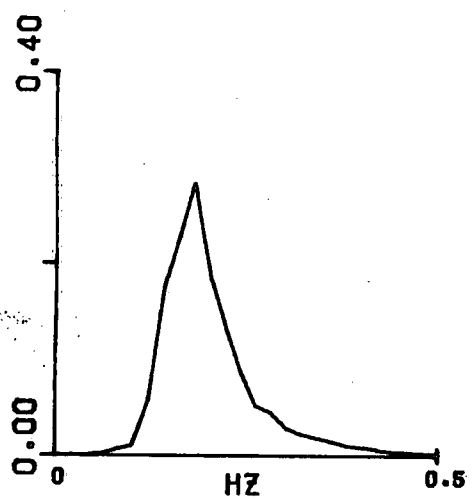


BEARING

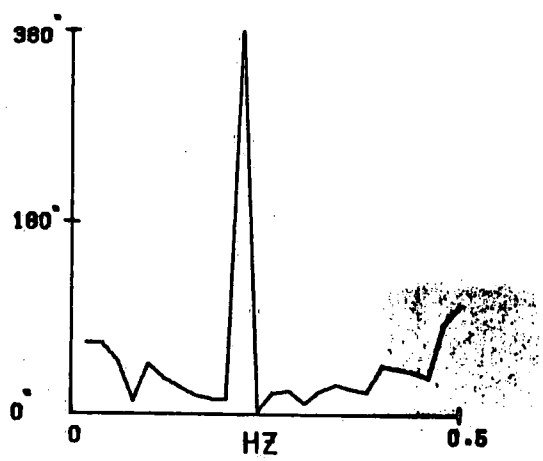


1984 11 1 18 3 10

Z-D

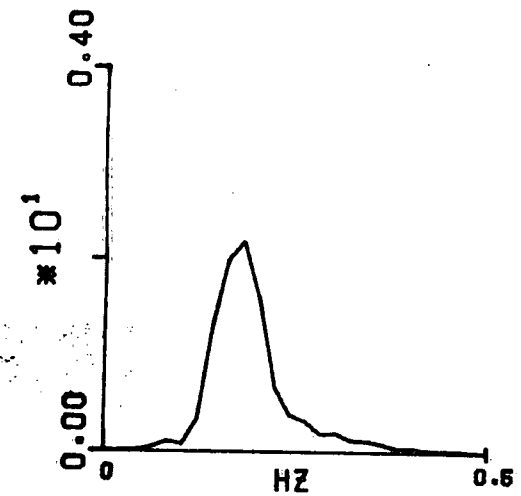


BEARING

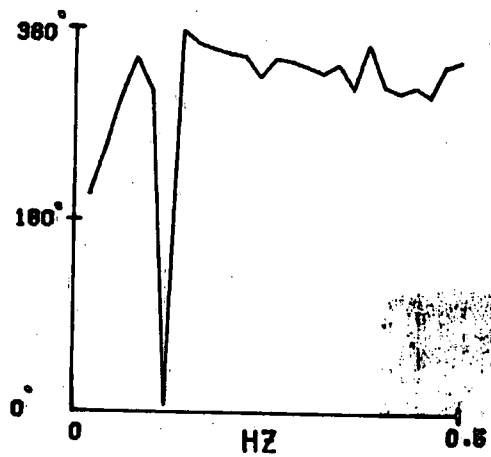


1984 11 3 0 1 17

Z-D

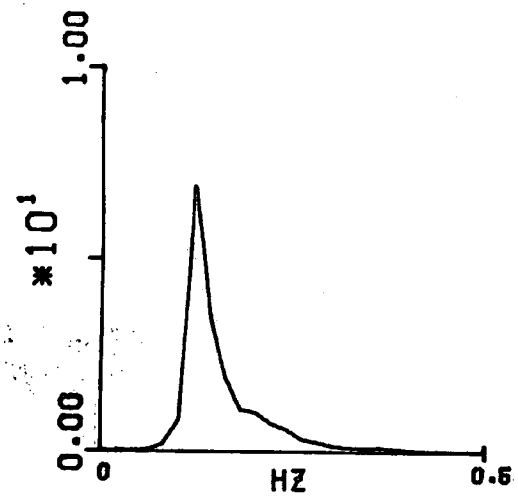


BEARING

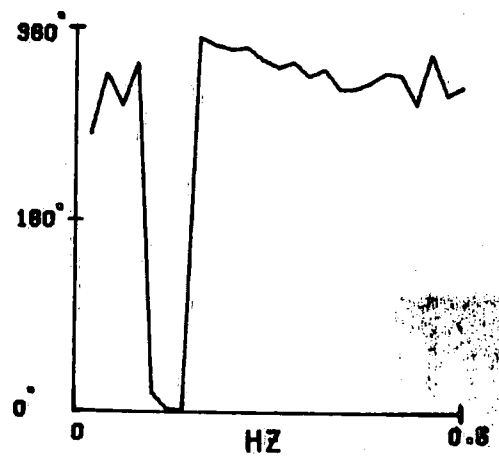


1984 11 3 6 7 58

Z-D

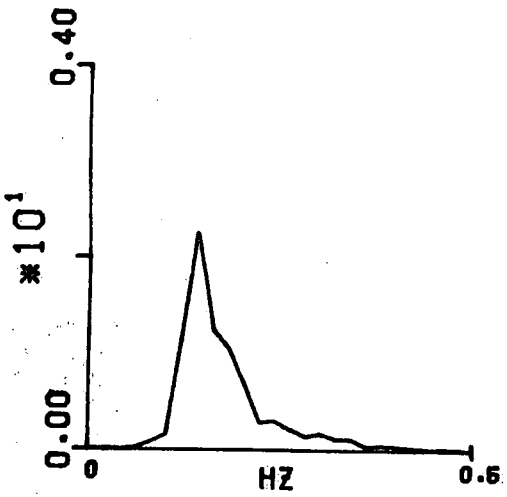


BEARING

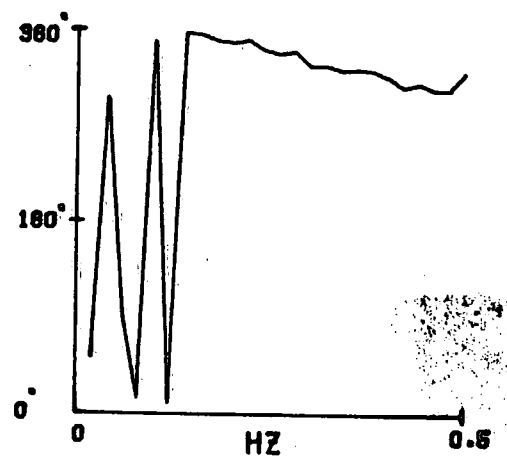


1984 11 3 12 1 26

Z-D

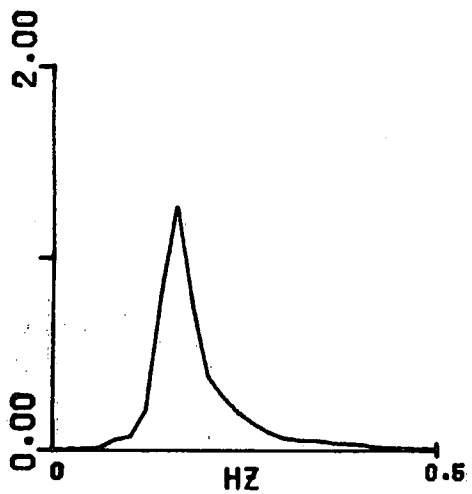


BEARING

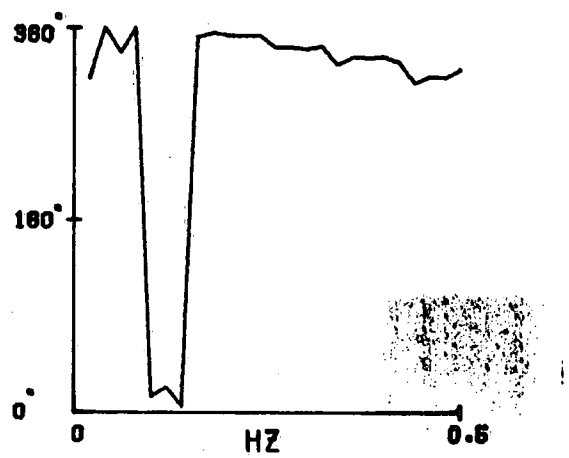


1984 11 3 18 1 20

Z-D

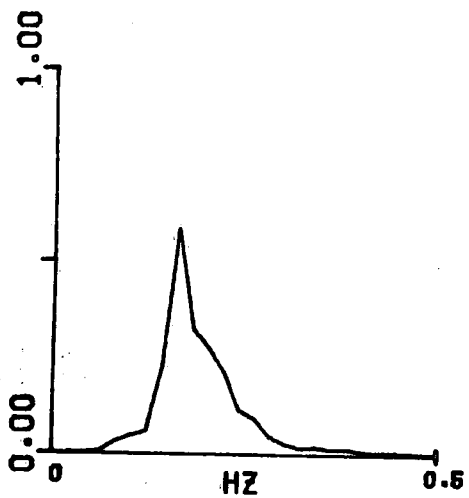


BEARING

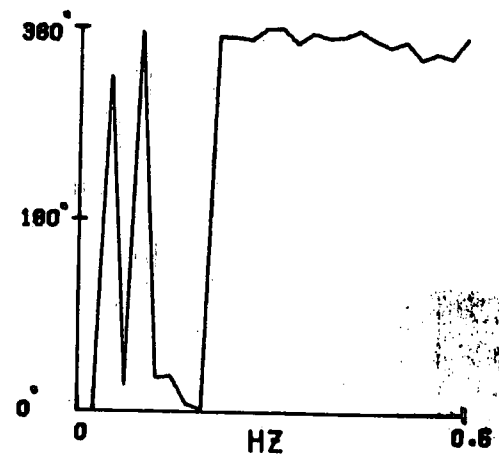


1984 11 4 0 1 31

Z-D

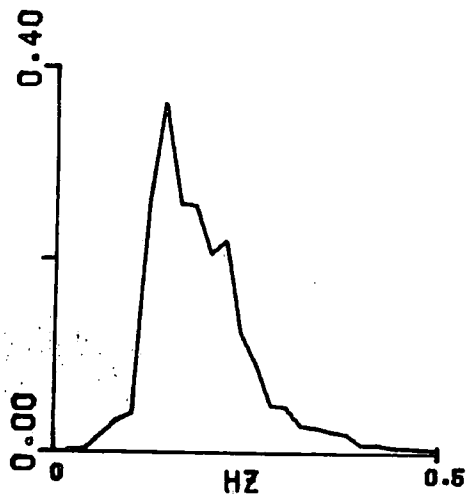


BEARING

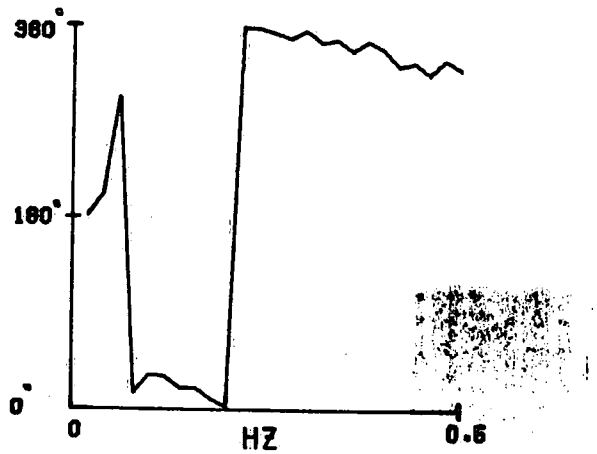


1984 11 4 6 6 57

Z-D

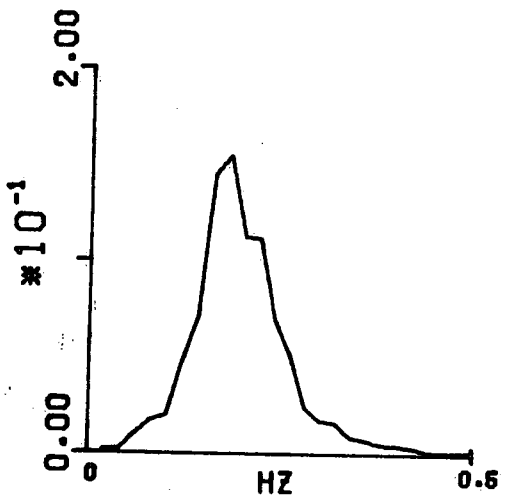


BEARING

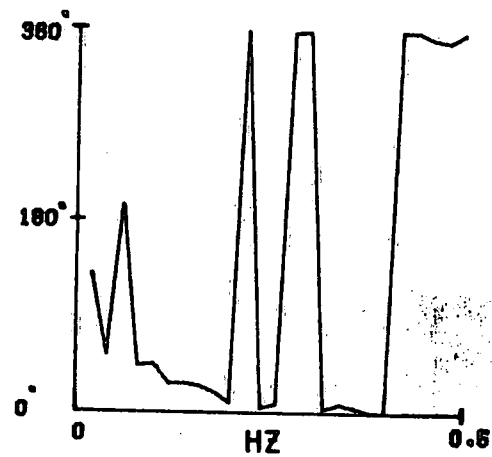


1984 11 4 12 1 23

Z-D

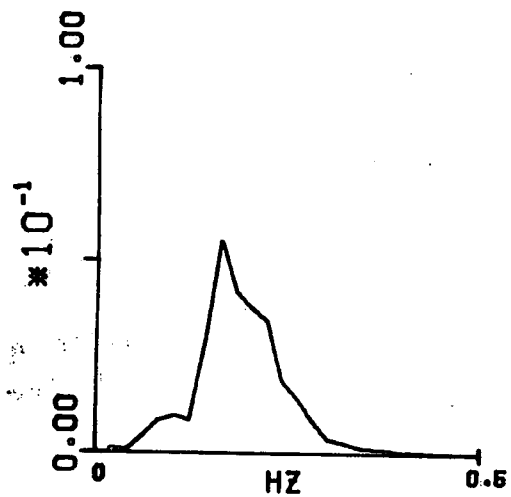


BEARING

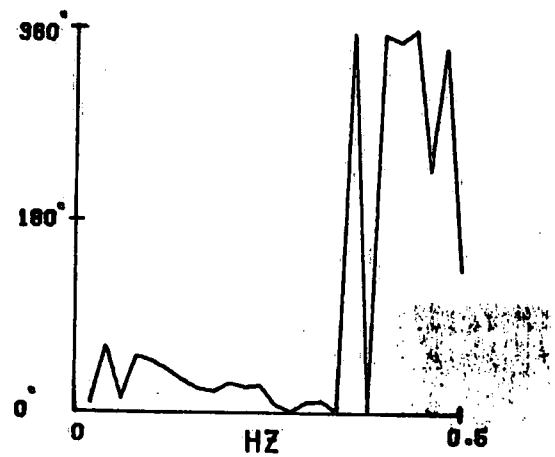


1984 11 4 18 1 22

Z-D

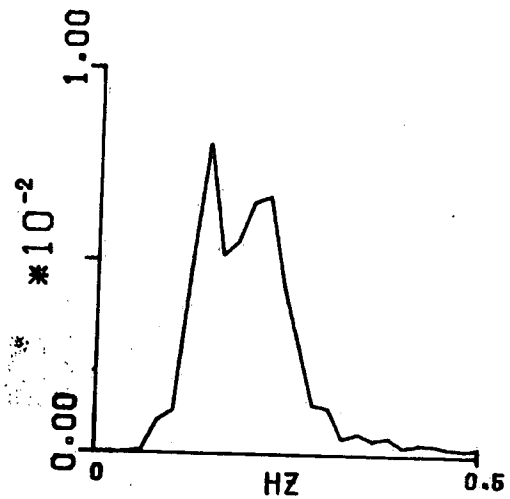


BEARING

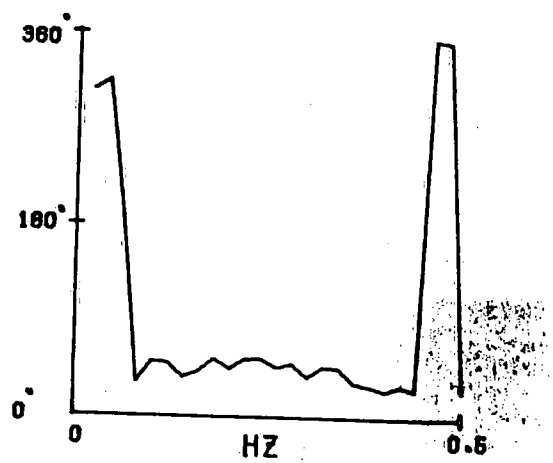


1984 11 7 0 8 34

Z-D

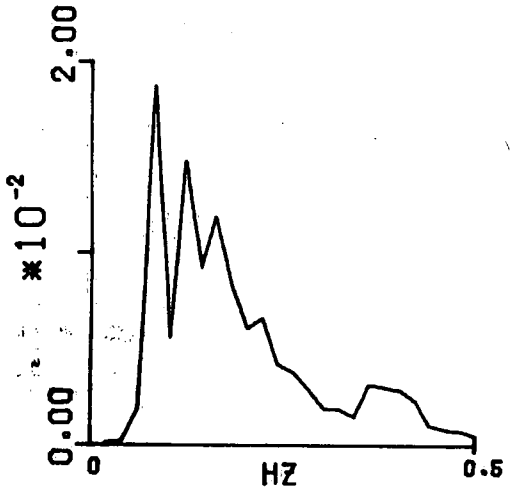


BEARING

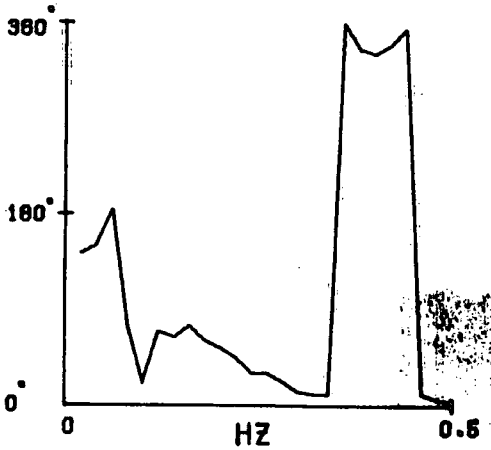


1984 11 7 6 9 13

Z-D

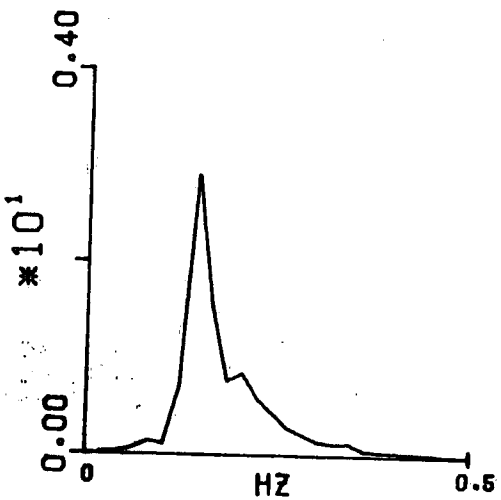


BEARING

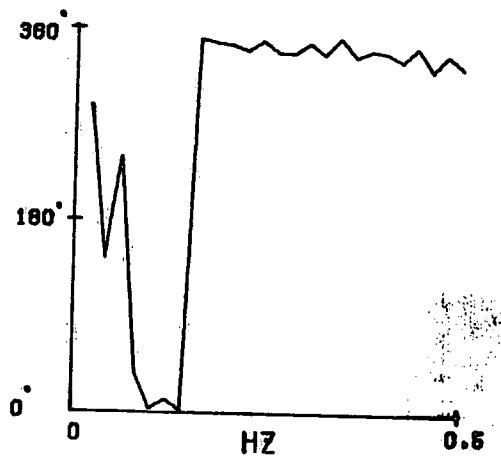


1984 11 7 18 1 32

Z-D

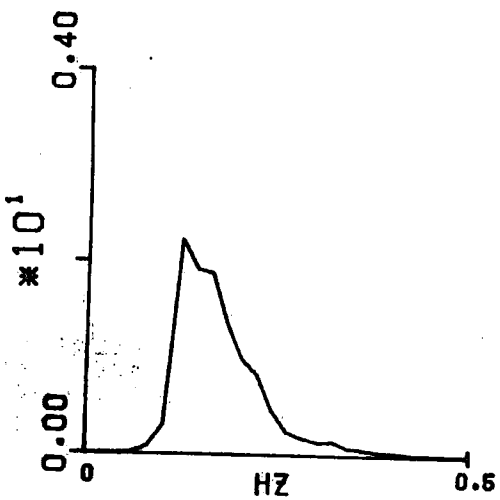


BEARING

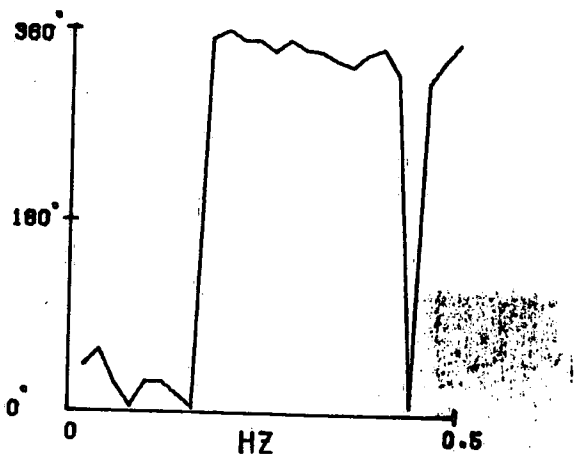


1984 11 8 0 1 41

Z-D



BEARING



APPENDIX 3

Data on Magnetic Tape in the Format for C^2S^2

The format of the data is easily understood by using the example run and these notes:

Line 1	contains the Julian day and year followed by the run number.
Line 2	contains the degrees of freedom.
Line 3	contains the characteristic wave height in metres; peak frequency in Hz; direction from which the waves are coming in degrees true.
Line 4	contains the rms directional spread at the peak frequency in degrees, s parameter in cosine to the power 2s model.
Line 5	contains the total energy in m^2.
Line 6	contains the wind speed in m/s for two anemometers and direction in degrees tru.
Line 7	contains the depth in m.
Line 8	contains the day and month.
Line 9	contains the hour and minute.
Line 10	contains the latitude in degrees and minutes.
Line 11	contains the longitude in degrees and minutes.
Line 12	contains the number of frequencies for which information follows (always 26: 0, 0.02, 0.04,....,0.50 Hz).

The remainder of the data is in three line sets. The first number is the frequency in Hertz, followed by the values for that frequency of A1, B1, A2, B2, C11, C22, C33, C13, Q12, C13, Q13, C23 and Q23. (See Long 1980, where his d(x) corresponds to A1, B1, A2, B2.)

```
STANHOPE. THEAD   =  272 1984     1
IDGFRE =      55
HS     =      .519   PEAK FREQ =  .26   DIR+N = 342.6
RMS DIR+N SPREAD =        34.9    S    =        4.4
ETOT   =      .0168
TWO WINDSP+S=     9.21     9.11   WINDIR= 244.2
 DEPTH =    14.60
NDAY   =    28    MONTH =     9
HOUR   =    18    MINUTE=     1
LATDEG =    46    XLTMIN =      26.80    LATDIR = N
LNGDEG =    63    XLNMIN =       6.00    LNGDIR = W
NUMPT  =    26
0.          0.          0.          0.          0.
 .22739E-03  .46447E-05  .57727E-05 -.49278E-05 -.46623E-05
 .21319E-04 -.49142E-05  .12228E-05 -.11175E-05
 .20000E-01 -.50260E-01  .23795E-01 -.38435E-01  .33628E+00
 .52474E-03  .10453E-04  .11289E-04 -.17329E-04 -.53684E-05
 .30535E-04  .25417E-05  .36557E-05 -.14306E-05
 .40000E-01 -.14027E+00  .16320E-01  .83433E-01  .18541E+00
 .49439E-03  .12431E-04  .10516E-04 -.11726E-04 -.14941E-04
 .33036E-04  .17383E-05  .21273E-05  .17305E-05
 .60000E-01  .78042E-02  .28674E-01  .20589E-01  .71554E-01
 .78499E-03  .66307E-04  .63631E-04 -.38611E-04  .24925E-05
-.56141E-04  .91577E-05  .46488E-05 -.15222E-04
 .80000E-01 -.22749E-01 -.15823E+00  .65972E-01 -.17763E+00
 .14161E-02  .40029E-03  .35075E-03 -.29197E-04 -.23460E-04
-.35034E-03 -.16318E-03 -.66704E-04  .31189E-04
 .10000E+00 -.78373E-01 -.16414E+00 -.37647E+00 -.44008E+00
 .17672E-02  .16320E-03  .36026E-03  .92034E-04 -.75379E-04
-.44338E-03 -.15787E-03 -.11518E-03 -.46393E-04
 .12000E+00  .17140E-01 -.10534E+00 -.43857E+00 -.15519E+00
 .27450E-02  .10835E-03  .27764E-03 -.15234E-04  .17643E-04
-.38169E-03 -.10843E-03 -.29950E-04  .12119E-04
 .14000E+00  .15515E+00  .40027E-01 -.44210E+00 -.37764E+00
 .49780E-02  .12944E-03  .33459E-03 -.12974E-03  .23580E-03
 .18077E-03  .60835E-04 -.87519E-04 -.20753E-04
 .16000E+00  .34300E+00  .18391E+00 -.22185E+00 -.15879E+00
 .15725E-01  .15842E-03  .24875E-03 -.35555E-03  .86790E-03
-.12866E-03  .46536E-03 -.32326E-04 -.62257E-05
 .18000E+00  .67324E+00  .11439E+00  .33183E+00  .74549E-01
 .55571E-01  .48101E-03  .24132E-03 -.15259E-02  .42654E-02
-.10431E-02  .72472E-03  .26924E-04  .78633E-04
 .20000E+00  .75861E+00  .13585E+00  .65322E+00  .46560E-01
 .19177E+00  .15964E-02  .33487E-03 -.82102E-02  .14599E-01
 .20350E-02  .26145E-02  .44961E-04 -.25229E-03
 .22000E+00  .77307E+00 -.78670E-01  .64152E+00 -.19126E+00
 .25666E+00  .15995E-02  .34931E-03 -.98547E-02  .17290E-01
 .24649E-02 -.17594E-02 -.18637E-03 -.92074E-04
 .24000E+00  .82660E+00 -.86720E-01  .79862E+00 -.26902E+00
 .68246E+00  .46412E-02  .51964E-03 -.26310E-01  .49056E-01
 .88125E-02 -.51465E-02 -.69417E-03 -.41669E-03
 .26000E+00  .77696E+00 -.24403E+00  .64774E+00 -.57928E+00
 .11292E+01  .61610E-02  .13171E-02 -.41352E-01  .71397E-01
 .22092E-01 -.22424E-01 -.21659E-02 -.56839E-03
 .28000E+00  .71172E+00 -.33578E+00  .45679E+00 -.69073E+00
 .14231E+01  .68309E-02  .25471E-02 -.51219E-01  .82220E-01
 .34487E-01 -.38790E-01 -.32388E-02 -.57430E-03
 .30000E+00  .67474E+00 -.37131E+00  .38267E+00 -.63407E+00
 .11505E+01  .62287E-02  .27810E-02 -.44238E-01  .68698E-01
 .26497E-01 -.37804E-01 -.28564E-02 -.21686E-03
 .32000E+00  .64015E+00 -.42965E+00  .37672E+00 -.72831E+00
 .11518E+01  .61534E-02  .27858E-02 -.48501E-01  .66076E-01
 .25247E-01 -.44348E-01 -.32553E-02  .43233E-03
 .34000E+00  .53302E+00 -.51788E+00 -.53075E-02 -.78641E+00
 .13279E+01  .52557E-02  .53118E-02 -.46473E-01  .63140E-01
 .47845E-01 -.61347E-01 -.41552E-02 -.21730E-03
 .36000E+00  .46825E+00 -.54711E+00 -.57181E-01 -.70382E+00
 .11291E+01  .41947E-02  .47035E-02 -.41550E-01  .46935E-01
 .37475E-01 -.54840E-01 -.31313E-02  .44991E-03
 .38000E+00  .41296E+00 -.56731E+00 -.25391E+00 -.74248E+00
 .16054E+01  .52440E-02  .88133E-02 -.55625E-01  .62036E-01
 .73135E-01 -.85224E-01 -.52186E-02  .10988E-04
 .40000E+00  .32144E+00 -.55612E+00 -.26905E+00 -.61996E+00
 .13017E+01  .47102E-02  .61776E-02 -.50248E-01  .41633E-01
 .63787E-01 -.72030E-01 -.39949E-02  .68176E-03
 .42000E+00  .20164E+00 -.55421E+00 -.45400E+00 -.56861E+00
 .14866E+01  .38738E-02  .10316E-01 -.51323E-01  .29287E-01
 .87250E-01 -.80495E-01 -.40342E-02  .11614E-02
 .44000E+00  .30203E+00 -.37279E+00 -.30329E+00 -.27440E+00
 .99305E+00  .47261E-02  .88409E-02 -.22087E-01  .35057E-01
 .73706E-01 -.43270E-01 -.18614E-02 -.19688E-02
 .46000E+00  .17162E+00 -.35502E+00 -.40615E+00 -.39430E+00
 .14446E+01  .47568E-02  .11263E-01 -.44162E-01  .26107E-01
 .10777E+00 -.54007E-01 -.31584E-02 -.23175E-03
 .48000E+00  .15021E+00 -.33103E+00 -.39949E+00 -.27197E+00


 .11436E+01  .37307E-02  .86944E-02 -.24115E-01  .17905E-01
 .84536E-01 -.39459E-01 -.16897E-02 -.44961E-03
 .50000E+00 -.40301E-01 -.29655E+00 -.50916E+00 -.85357E-01
 .12520E+01  .31146E-02  .95764E-02 -.16297E-01 -.50799E-02
 .95244E-01 -.37381E-01 -.54163E-03  .74655E-03
```

```
      PROGRAM DISKTP(INPUT,TAPE5=INPUT,OUTPUT,TAPE6=OUTPUT,TAPE1,TAPE2)
      DIMENSION IREC(8)
      N=0
      NF=1
      READ(5,30) NFILES
30    FORMAT(I3)
99    CONTINUE
      N=0
100   CONTINUE
      READ(1,10,END=1000)IREC
10    FORMAT(8A10)
      N=N+1
      WRITE(2,10)IREC
      GO TO 100
1000  CONTINUE
      EEOF=EOF(1)
      NF=NF+1
      ENDFILE 2
      IF(NF.LE.NFILES) GO TO 99
      STOP
      END
```