

AD-A206 765

AD _____

State University of New York at Plattsburgh
Auditory Research Laboratories

Report No. ARL 86-2

The Effects of Blast Trauma (Impulse Noise)
on Hearing: A Parametric Study

Final Report
Part 1

Roger P. Hamerik
William A. Ahroon
George A. Turrentine

July 21, 1988

Supported by

U.S. Army Medical Research and Development Command
Fort Detrick, Frederick, Maryland 21701-5012

Grant No. DAMD17-83-G-9555

Callier Center for Communication Disorders
The University of Texas at Dallas
Dallas, Texas 75235

Approved for public release; distribution is unlimited

The findings in this report are not to be construed as an official
Department of the Army position unless so designated
by other authorized documents.

DTIC
ELECTE
S APR 07 1989 D
QH

89 4 06 058

unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188
Exp Date Jun 30, 1986

1a. REPORT SECURITY CLASSIFICATION unclassified			1b. RESTRICTIVE MARKINGS			
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; Distribution unlimited.			
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE						
4. PERFORMING ORGANIZATION REPORT NUMBER(S) ARL 86-2			5. MONITORING ORGANIZATION REPORT NUMBER(S)			
6a. NAME OF PERFORMING ORGANIZATION Callier Center for Communication Disorders		6b. OFFICE SYMBOL (if applicable)		7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) The University of Texas at Dallas Dallas, TX 75235			7b. ADDRESS (City, State, and ZIP Code)			
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Medical Research and Development Cmd.		8b. OFFICE SYMBOL (if applicable)		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER DAMD17-83-G-9555		
8c. ADDRESS (City, State, and ZIP Code) Fort Detrick Frederick, MD 21701-5012			10. SOURCE OF FUNDING NUMBERS			
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) The Effects of Blast Trauma (Impulse Noise) on Hearing: A Parametric Study (u)						
12. PERSONAL AUTHOR(S) Hamernik, Roger P. Ahroon, William A. Turrentine, George A.						
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM 9/15/83 TO 12/31/85		14. DATE OF REPORT (Year, Month, Day) 1988 July 21		15. PAGE COUNT 454
16. SUPPLEMENTARY NOTATION Part 1 of 2.						
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)			
FIELD	GROUP	SUB-GROUP				
			Blast Trauma Impulse Noise Hearing			
			RA 3			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) On reverse.						
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION unclassified			
22a. NAME OF RESPONSIBLE INDIVIDUAL MARY FRANCES BOSTIAN			22b. TELEPHONE (Include Area Code) 301-663-7325		22c. OFFICE SYMBOL SGRD-RMT-S	

DDFORM 1473, 84 MAR

83 APR edition may be used until exhausted.

All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

unclassified

A

ABSTRACT

There are three broad goals to this project. The first and primary goal is to begin the systematic development of a data base from which one could estimate the hazards to hearing resulting from exposure to blast waves or other high level impulse noise transients. To achieve this primary objective the following two objectives must first be achieved: (1) to develop a methodology to efficiently acquire data on a large number of experimental animals that have been exposed to a variety of blast wave configurations. This includes audiometric, histological and acoustic variables; (2) to develop a set of blast wave simulation devices which can reliably generate blast waves with a variable distribution of spectral energy in a laboratory environment. This report will describe progress that was achieved on each of these objectives. Before the project termination, data acquisition was completed on 70 chinchillas that were exposed to one of a series of very low frequency (125 Hz) energy-content blast wave exposure paradigms. This data represents part of the first of four phases of a parametric study that was designed to estimate the contributions of individual blast wave exposure variables on the production of hearing loss. Hearing function was measured using the auditory evoked potential (AEP) technique. The evaluation of hearing consisted of pre- and postexposure measurements of pure tone thresholds and tuning curves (masked thresholds). Quantitative and qualitative data on each experimental cochlea was obtained from the traditional surface preparation technique. The objective of this approach was to correlate the exposure variables with functional and morphological indices of trauma. The blast waves used in this first study were generated using a conventional compressed air-driven shock tube. The following blast wave parameters were studied:

1. Intensity of the blast wave. The intensity was characterized by the peak sound pressure level of the initial positive over pressure, and by the total energy (J/m^2) of the exposure. Three intensities were used; 150, 155, and 160 dB peak SPL.
2. Inter-stimulus interval (ISI) i.e., the effects of repetition rate. Rates of 1/m, 10/m, and 1/10m were used.
3. Total number of impulses (N), where $N = 1, 10$ and 100 .

The original goals of the project were not completed because the principal investigator moved from the University of Texas at Dallas to the State University of New York at Plattsburgh. Of the 21 groups specified in the original project, 13 were completed before moving. This report includes the raw data collected for those 13 groups. The remaining eight groups will be completed at the State University of New York at Plattsburgh (DAMD17-86-C-6172) and a final summary report will contain a detailed analysis of the data from all 21 groups.

Keywords: physiological effects; stress physiology;
hearing; blast waves; exposure physiology;
-table data; (KT)



Accession For	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

B

AD _____

State University of New York at Plattsburgh
Auditory Research Laboratories

Report No. ARL 86-2

The Effects of Blast Trauma (Impulse Noise)
on Hearing: A Parametric Study

Final Report

Roger P. Hamernik
William A. Ahroon
George A. Turrentine

July 21, 1988

Supported by

U.S. Army Medical Research and Development Command
Fort Detrick, Frederick, Maryland 21701-5012

Grant No. DAMD17-83-G-9555

Callier Center for Communication Disorders
The University of Texas at Dallas
Dallas, Texas 75235

Approved for public release; distribution is unlimited

The findings in this report are not to be construed as an official
Department of the Army position unless so designated
by other authorized documents.

FOREWORD

Disclaimer

Citations of commercial organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

Animal Use

In conducting the research described in this report, the investigators adhered to the "Guide for the Care and use of Laboratory Animals," prepared by the Committee on Care and Use of Laboratory Animals of the Institute of Laboratory Animal Resources, National Research Council (DHHS Publication No. (NIH) 86-23, revised 1985).

Statement of Progress: During the first year of this project, our primary goal was to obtain hearing threshold data, tuning curves and histological data on chinchillas that were exposed under a variety of conditions to low frequency energy-content blast waves. The source of these blast waves was a modified 6" x 6" cross section shock tube which terminated in an exponential horn. A minimum of five animals constituted an experimental group. The experimental groups that were to be run are detailed in the table. Twenty-one groups of animals constituted this phase of the project. Thirteen of the 21 groups have been completed. [The groups not completed are indicated by dashes under the symbol for sample size (N)]. The remaining eight groups have not been completed because of the premature termination of the project due to the move of the principal investigator from the University of Texas at Dallas to the State University of New York at Plattsburgh.

Table of Experimental Groups

Group	N	Intensity	Number	Rate
1	4	150 dB Peak SPL	1	
2	--	150 dB Peak SPL	10	10 per minute
3	5	150 dB Peak SPL	10	1 per minute
4	--	150 dB Peak SPL	10	1 per 10 minutes
5	--	150 dB Peak SPL	100	10 per minute
6	6	150 dB Peak SPL	100	1 per minute
7	--	150 dB Peak SPL	100	1 per 10 minutes
8	6	155 dB Peak SPL	1	
9	5	155 dB Peak SPL	10	10 per minute
10	5	155 dB Peak SPL	10	1 per minute
11	5	155 dB Peak SPL	10	1 per 10 minutes
12	6	155 dB Peak SPL	100	10 per minute
13	6	155 dB Peak SPL	100	1 per minute
14	5	155 dB Peak SPL	100	1 per 10 minutes
15	6	160 dB Peak SPL	1	
16	--	160 dB Peak SPL	10	10 per minute
17	6	160 dB Peak SPL	10	1 per minute
18	--	160 dB Peak SPL	10	1 per 10 minutes
19	--	160 dB Peak SPL	100	10 per minute
20	5	160 dB Peak SPL	100	1 per minute
21	--	160 dB Peak SPL	100	1 per 10 minutes
Total	70			

The Appendix contains the raw data and summary statistics for the 13 completed groups. The shock tube produced a blast wave that had the bulk of its energy in the octave band centered at 125 Hz. The data set for each exposed animal consisted of preexposure measures of hearing, recovery threshold measures, permanent threshold shift (PTS) measures and histology. Three preexposure audiometric thresholds were measured at 0.5, 1.0, 2.0, 4.0, 8.0, 11.2, and 16.0 kHz. Postexposure recovery functions were measured on each animal at postexposure times of $t = 0, 2, 8, 24$, and 240 hours at test frequencies of 0.5, 2.0 and 8.0 kHz. At 30 days postexposure three final audiograms were collected on each animal at each of the audiometric test frequencies to establish each animals PTS. In addition, tuning curves were collected for each animal at probe frequencies of 0.5, 1.0, 2.0, 4.0, 8.0 and

to OKAY

11.2 kHz prior to exposure and at 30 days postexposure. After the thirty-day testing was complete, each animal was sacrificed by decapitation and the cochlea was examined using the surface preparation histology procedure which yields a quantitative analysis of the sensory cell population in the cochlea.

A detailed analysis of the data will be presented in a summary report following the completion of the remaining eight groups.

~~insert~~ correct page

Appendix

**Individual and Group Statistics from:
The Effects of Blast Trauma (Impulse Noise)
on Hearing: A Parametric Study**

Part 1

Summary Data for the Group Exposed to:

150 dB, 1X

Animal

2071	-	Completed the Entire Protocol
2073	-	Completed the Entire Protocol
2084	-	Completed the Entire Protocol
2090	-	Completed the Entire Protocol
2074	-	No Audiometric Data: Bad Electrode

150 dB 1X

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
2071	12.5	9.2	15.8	4.2	27.5	29.2	*****
2073	36.3	30.0	33.5	17.5	25.0	23.3	*****
2084	30.0	20.0	15.0	11.3	31.2	26.5	*****
2090	19.2	20.8	25.8	15.8	30.8	32.5	55.8
Mean	24.5	20.0	22.5	12.2	28.6	27.9	55.8
S.D.	10.7	8.5	8.8	6.0	3.0	3.9	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
2071	12.5	7.5	12.5	0.8	24.2	19.2	*****
2073	37.5	27.5	32.5	15.8	29.2	12.5	*****
2084	15.8	12.5	10.8	9.2	37.5	25.8	*****
2090	17.5	15.8	15.8	14.2	32.5	34.2	60.8
Mean	20.8	15.8	17.9	10.0	30.8	22.9	60.8
S.D.	11.3	8.5	9.9	6.7	5.6	9.3	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
2071	0.0	-1.7	-3.3	-3.3	-3.3	-10.0	*****
2073	1.2	-2.5	-1.0	-1.7	4.2	-10.8	*****
2084	-14.2	-7.5	-4.2	-2.1	6.2	-0.7	*****
2090	-1.7	-5.0	-10.0	-1.7	1.7	1.7	5.0
Mean	-3.7	-4.2	-4.6	-2.2	2.2	-5.0	5.0
S.D.	7.1	2.6	3.8	0.8	4.1	6.4	*****

150 dB 1X

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
2071	10.0	10.0	5.0	0.0	5.0	10.0
2073	6.2	6.2	6.2	6.2	-3.7	6.2
2084	-2.5	-12.5	-7.5	-7.5	-12.5	-2.5
2090	-1.7	-1.7	3.3	-6.7	-6.7	3.3
Mean	3.0	0.5	1.8	-2.0	-4.5	4.3
S.D.	6.1	9.9	6.3	6.4	7.3	5.3

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
2071	6.7	6.7	6.7	1.7	1.7	6.7
2073	19.0	14.0	14.0	9.0	-6.0	19.0
2084	2.5	-7.5	-2.5	-2.5	-2.5	2.5
2090	1.7	6.7	1.7	-8.3	1.7	6.7
Mean	7.5	5.0	5.0	-0.0	-1.3	8.7
S.D.	8.0	9.0	7.1	7.3	3.7	7.1

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
2071	10.0	5.0	25.0	0.0	5.0	25.0
2073	27.5	27.5	32.5	27.5	12.5	32.5
2084	-3.7	-3.7	6.2	1.2	21.3	21.3
2090	1.7	-3.3	-8.3	-13.3	-8.3	1.7
Mean	8.9	6.4	13.9	3.9	7.6	20.1
S.D.	13.7	14.7	18.5	17.1	12.5	13.1

MASKED THRESHOLDS (dB SPL) Group: 150 dB 1X

Probe Frequency: 0.5 kHz

Masker (kHz): 0.150 0.200 0.300 0.400 0.520 0.600 0.650 0.750 1.300 2.200

Animal (Q-10 dB)

Pre-Exposure

2071 (1.66)	62.5	57.5	42.5	42.5	27.5	27.5	32.5	37.5	62.5	87.5
2073 (1.29)	77.5	72.5	62.5	52.5	47.5	52.5	52.5	57.5	82.5	92.5
2084 (2.72)	72.5	72.5	57.5	52.5	47.5	47.5	37.5	32.5	62.5	87.5
2090 (4.65)	57.5	57.5	52.5	32.5	32.5	22.5	32.5	32.5	47.5	87.5

Mean (2.58)	67.5	65.0	53.8	45.0	38.8	37.5	38.8	40.0	63.8	88.8
S.D. (1.51)	9.1	8.7	8.5	9.6	10.3	14.7	9.5	11.9	14.4	2.5

Animal (Q-10 dB)

Post-Exposure

2071 (1.66)	57.5	57.5	47.5	42.5	27.5	32.5	27.5	37.5	72.5	87.5
2073 (1.74)	77.5	72.5	62.5	57.5	47.5	52.5	52.5	62.5	82.5	87.5
2084 (1.13)	67.5	57.5	52.5	32.5	22.5	27.5	22.5	27.5	47.5	62.5
2090 (3.64)	62.5	62.5	47.5	42.5	22.5	32.5	37.5	37.5	62.5	95.0*

Mean (2.04)	66.3	62.5	52.5	43.7	30.0	36.3	35.0	41.3	66.3	83.1
S.D. (1.10)	8.5	7.1	7.1	10.3	11.9	11.1	13.2	14.9	14.9	14.2

MASKED THRESHOLDS (dB SPL) Group: 150 dB 1X

Probe Frequency: 1.0 kHz

Masker (kHz):	0.150	0.200	0.400	0.550	0.800	1.050	1.300	1.700	1.900	2.500
Animal (Q-10 dB)	Pre-Exposure									
2071 (1.77)	67.5	67.5	52.5	42.5	27.5	22.5	32.5	52.5	62.5	95.0*
2073 (1.32)	82.5	82.5	75.0*	65.0*	52.5	47.5	52.5	62.5	72.5	95.0*
2084 (2.10)	77.5	82.5	62.5	52.5	42.5	32.5	42.5	62.5	67.5	95.0*
2090 (1.84)	77.5	77.5	52.5	42.5	32.5	22.5	27.5	52.5	62.5	95.0*
Mean (1.75)	76.3	77.5	60.6	50.6	38.8	31.2	38.8	57.5	66.3	95.0
S.D. (0.32)	6.3	7.1	10.7	10.7	11.1	11.8	11.1	5.8	4.8	0.0

Animal (Q-10 dB)	Post-Exposure									
2071 (1.78)	67.5	67.5	52.5	42.5	32.5	22.5	27.5	47.5	52.5	95.0*
2073 (2.10)	82.5	82.5	67.5	57.5	52.5	42.5	52.5	62.5	62.5	87.5
2084 (2.10)	82.5	85.0*	62.5	47.5	32.5	22.5	32.5	52.5	57.5	87.5
2090 (1.91)	77.5	72.5	57.5	47.5	22.5	27.5	47.5	57.5	72.5	95.0*
Mean (1.97)	77.5	75.9	60.0	48.8	35.0	28.8	40.0	55.0	61.3	91.3
S.D. (0.16)	7.1	8.3	6.5	6.3	12.6	9.5	11.9	6.5	8.5	4.3

MASKED THRESHOLDS (dB SPL) Group: 150 dB 1X

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

2071 (1.58)	67.5	42.5	42.5	52.5	37.5	27.5	32.5	37.5	42.5	87.5
2073 (1.62)	72.5	62.5	52.5	57.5	52.5	47.5	47.5	67.5	95.0*	97.5
2084 (6.05)	67.5	52.5	42.5	32.5	37.5	22.5	37.5	47.5	77.5	95.0*
2090 (2.18)	72.5	52.5	47.5	37.5	22.5	27.5	32.5	47.5	95.0*	95.0*
Mean (2.86)	70.0	52.5	46.3	45.0	37.5	31.2	37.5	50.0	77.5	93.7
S.D. (2.15)	2.9	8.2	4.8	11.9	12.2	11.1	7.1	12.6	24.7	4.3

Animal (Q-10 dB)

Post-Exposure

2071 (4.09)	67.5	42.5	42.5	42.5	32.5	22.5	32.5	42.5	57.5	95.0*
2073 (3.25)	77.5	62.5	52.5	57.5	57.5	42.5	47.5	62.5	85.0*	95.0*
2084 (1.62)	72.5	47.5	47.5	37.5	32.5	27.5	27.5	47.5	72.5	95.0*
2090 (1.49)	47.5	47.5	32.5	42.5	22.5	22.5	17.5	22.5	57.5	90.0*
Mean (2.61)	66.3	50.0	43.7	45.0	36.3	28.8	31.2	43.7	68.1	93.7
S.D. (1.27)	13.1	8.7	8.5	8.7	14.9	9.5	12.5	16.5	13.3	2.5

MASKED THRESHOLDS (dB SPL) Group: 150 dB 1x

Probe Frequency: 4.0 kHz

Masker (kHz): 0.450 1.300 2.200 3.000 3.500 4.100 4.500 5.000 5.600 6.000

Animal (Q-10 dB)

Pre-Exposure

2071 (3.65)	67.5	52.5	47.5	32.5	22.5	17.5	32.5	52.5	67.5	82.5
2073 (1.95)	77.5	82.5	57.5	42.5	37.5	37.5	47.5	62.5	77.5	82.5
2084 (3.49)	77.5	57.5	57.5	47.5	32.5	27.5	37.5	67.5	82.5	82.5
2090 (3.26)	67.5	52.5	57.5	37.5	27.5	22.5	32.5	42.5	57.5	72.5

Mean (3.09)	72.5	61.3	55.0	40.0	30.0	26.3	37.5	56.2	71.3	80.0
S.D. (0.78)	5.8	14.4	5.0	6.5	6.5	8.5	7.1	11.1	11.1	5.0

Animal (Q-10 dB)

Post-Exposure

2071 (2.33)	72.5	47.5	52.5	32.5	22.5	22.5	32.5	52.5	57.5	72.5
2073 (2.57)	72.5	62.5	52.5	42.5	32.5	32.5	47.5	62.5	77.5	77.5
2084 (3.72)	72.5	57.5	52.5	37.5	22.5	32.5	47.5	67.5	77.5	82.5
2090 (3.53)	67.5	52.5	57.5	37.5	37.5	27.5	32.5	47.5	62.5	77.5

Mean (3.04)	71.3	55.0	53.8	37.5	28.8	28.8	40.0	57.5	68.7	77.5
S.D. (0.69)	2.5	6.5	2.5	4.1	7.5	4.8	8.7	9.1	10.3	4.1

MASKED THRESHOLDS (dB SPL) Group: 150 dB 1X

Probe Frequency: 8.0 kHz

Masker (kHz): 0.450 1.300 2.500 5.900 7.000 8.100 9.300 11.000 12.700 14.000

Animal (Q-10 dB)

Pre-Exposure

2071 (0.82)	77.5	57.5	62.5	42.5	47.5	47.5	42.5	52.5	72.5	82.5
2073 (1.28)	82.5	67.5	57.5	47.5	42.5	42.5	52.5	75.0*	87.5	92.5
2084 (3.52)	77.5	62.5	57.5	42.5	42.5	32.5	42.5	52.5	57.5	72.5
2090 (2.13)	72.5	62.5	67.5	47.5	42.5	37.5	42.5	62.5	72.5	95.0*

Mean (1.94)	77.5	62.5	61.3	45.0	43.7	40.0	45.0	60.6	72.5	85.6
S.D. (1.19)	4.1	4.1	4.8	2.9	2.5	6.5	5.0	10.7	12.2	10.3

Animal (Q-10 dB)

Post-Exposure

2071 (0.87)	72.5	62.5	57.5	42.5	42.5	47.5	42.5	62.5	97.5	97.5
2073 (3.00)	82.5	77.5	67.5	42.5	42.5	32.5	37.5	57.5	77.5	95.0*
2084 (5.29)	87.5	67.5	62.5	52.5	62.5	47.5	62.5	85.0*	95.0*	97.5
2090 (2.00)	72.5	57.5	57.5	47.5	42.5	37.5	37.5	62.5	62.5	82.5

Mean (2.79)	78.8	66.3	61.3	46.3	47.5	41.3	45.0	66.9	83.1	93.1
S.D. (1.88)	7.5	8.5	4.8	4.8	10.0	7.5	11.9	12.3	16.4	7.2

MASKED THRESHOLDS (dB SPL) Group: 150 dB LX

Probe Frequency: 11.2 kHz

Masker (kHz): 1.000 4.000 7.000 9.000 11.000 11.500 12.000 13.000 14.500 16.000

Animal (Q-10 dB)

Pre-Exposure

2071 (3.52)	72.5	57.5	62.5	57.5	47.5	47.5	42.5	47.5	67.5	95.0*
2073 (5.36)	77.5	77.5	82.5	62.5	42.5	47.5	52.5	72.5	77.5	87.5
2084 (3.61)	82.5	62.5	67.5	57.5	37.5	42.5	37.5	47.5	67.5	95.0*
2090 (4.80)	62.5	57.5	57.5	57.5	37.5	42.5	42.5	62.5	62.5	67.5
Mean (4.32)	73.8	63.8	67.5	58.8	41.3	45.0	43.7	57.5	68.7	86.3
S.D. (0.91)	8.5	9.5	10.8	2.5	4.8	2.9	6.3	12.2	6.3	13.0

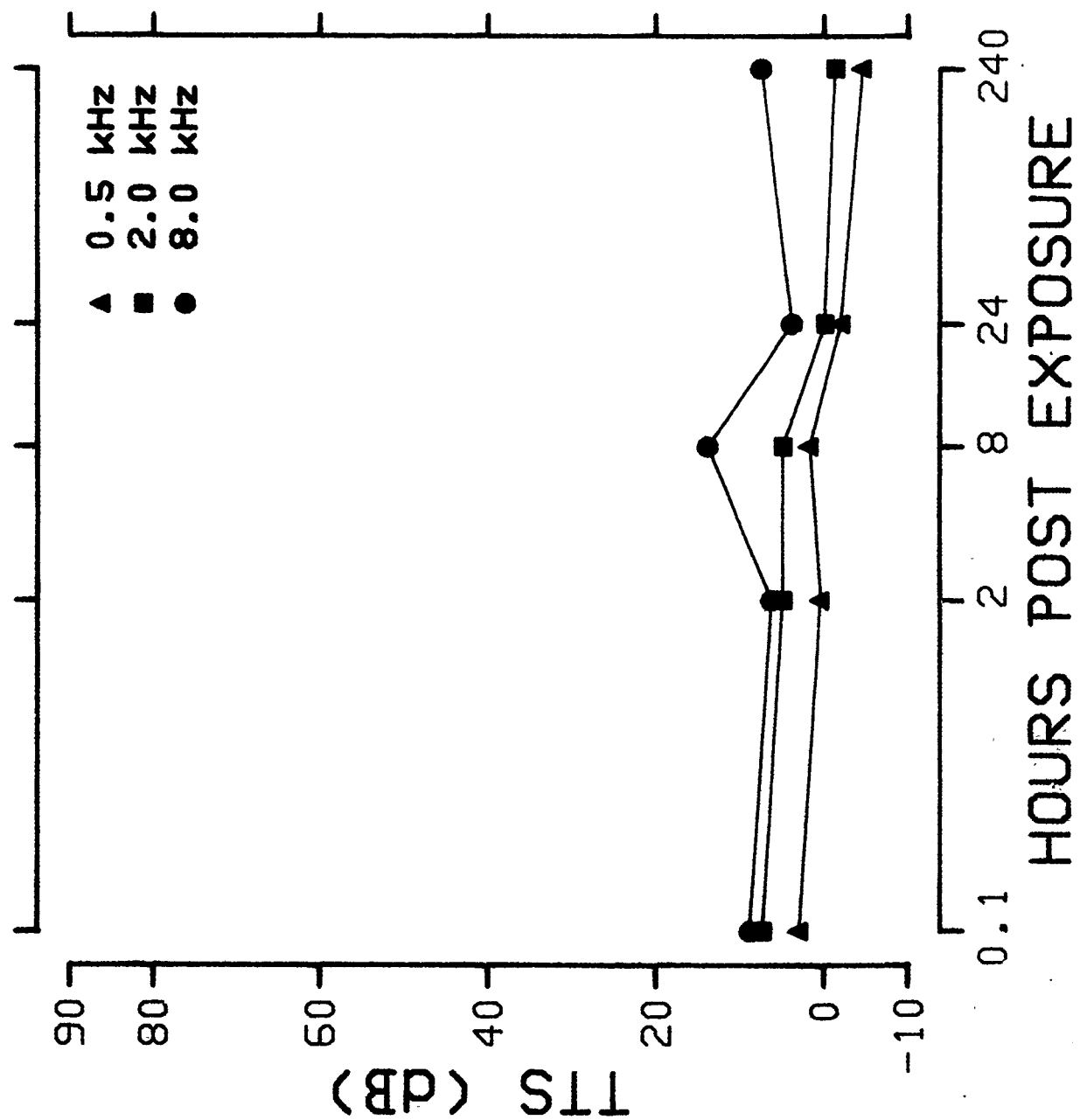
Animal (Q-10 dB)

Post-Exposure

2071 (3.29)	67.5	52.5	57.5	57.5	37.5	42.5	42.5	42.5	67.5	77.5
2073 (6.89)	67.5	52.5	62.5	47.5	22.5	27.5	37.5	47.5	82.5	87.5
2084 (4.14)	77.5	62.5	67.5	65.0*	32.5	37.5	32.5	42.5	72.5	82.5
2090 (4.53)	67.5	52.5	62.5	57.5	37.5	32.5	37.5	42.5	62.5	82.5
Mean (4.71)	70.0	55.0	62.5	56.9	32.5	35.0	37.5	43.7	71.3	82.5
S.D. (1.54)	5.0	5.0	4.1	7.2	7.1	6.5	4.1	2.5	8.5	4.1

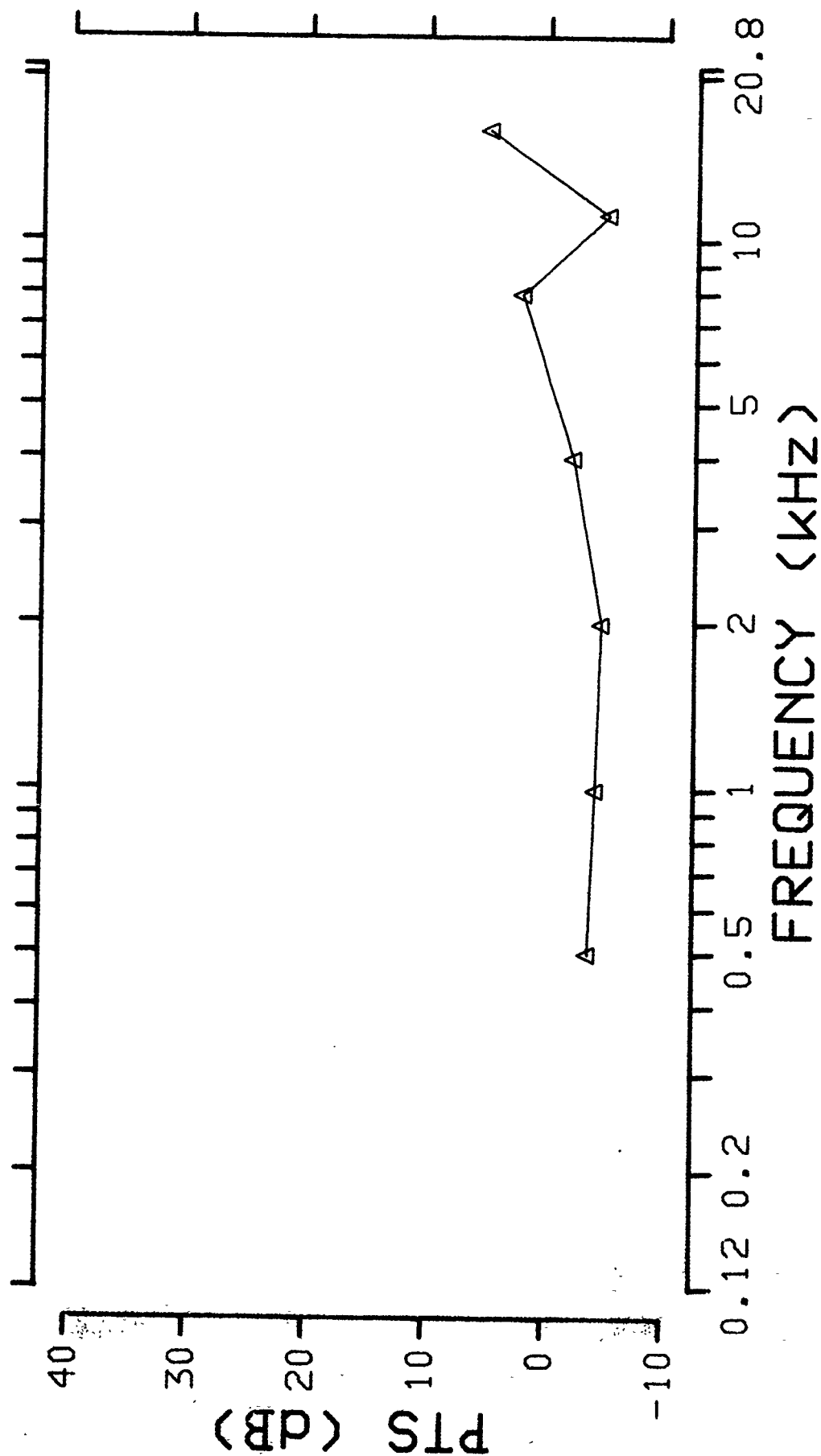
**The Group Mean Recovery Curves
Measured at Three Test Frequencies**

MEAN DATA (n=4) - 150 dB 1X



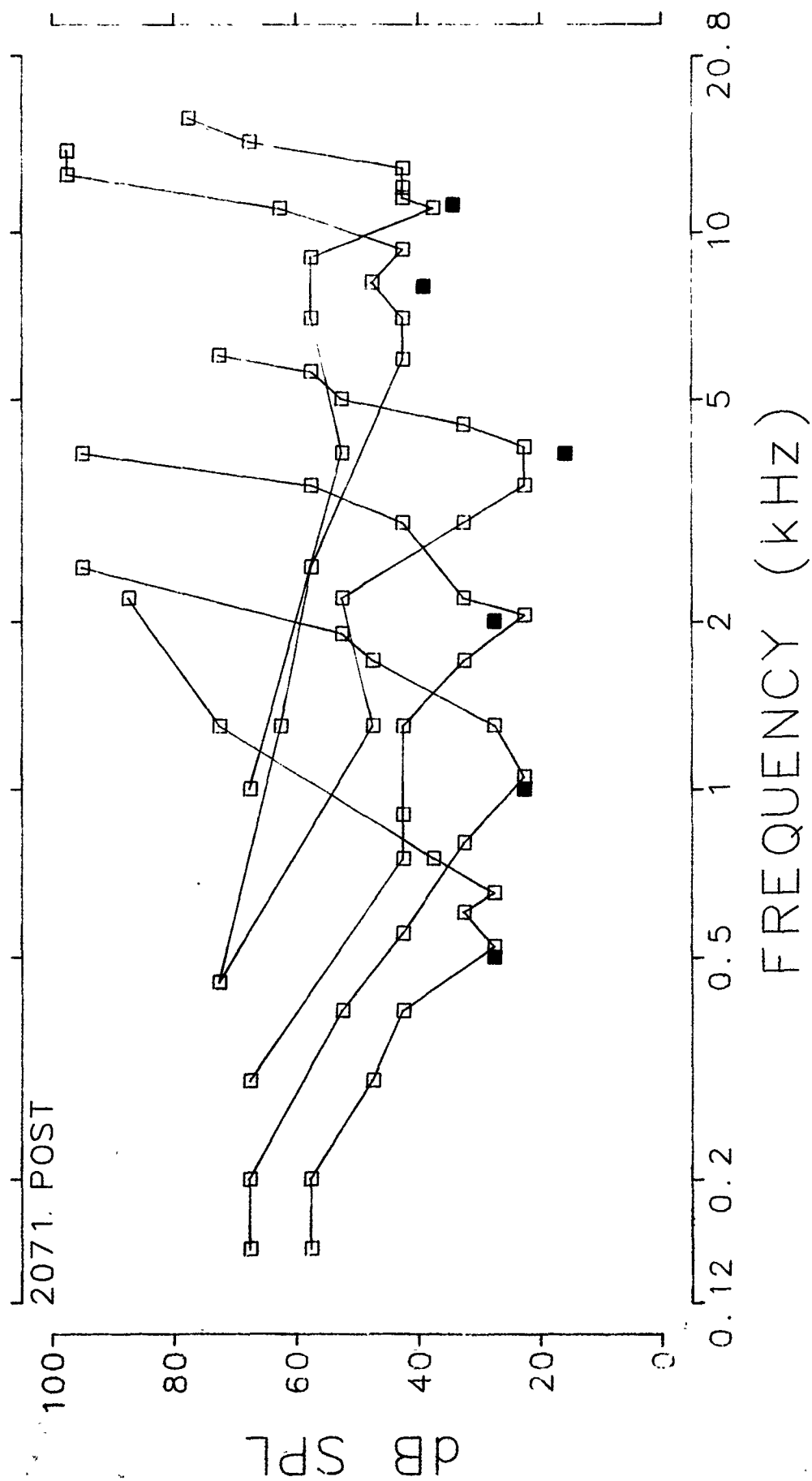
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

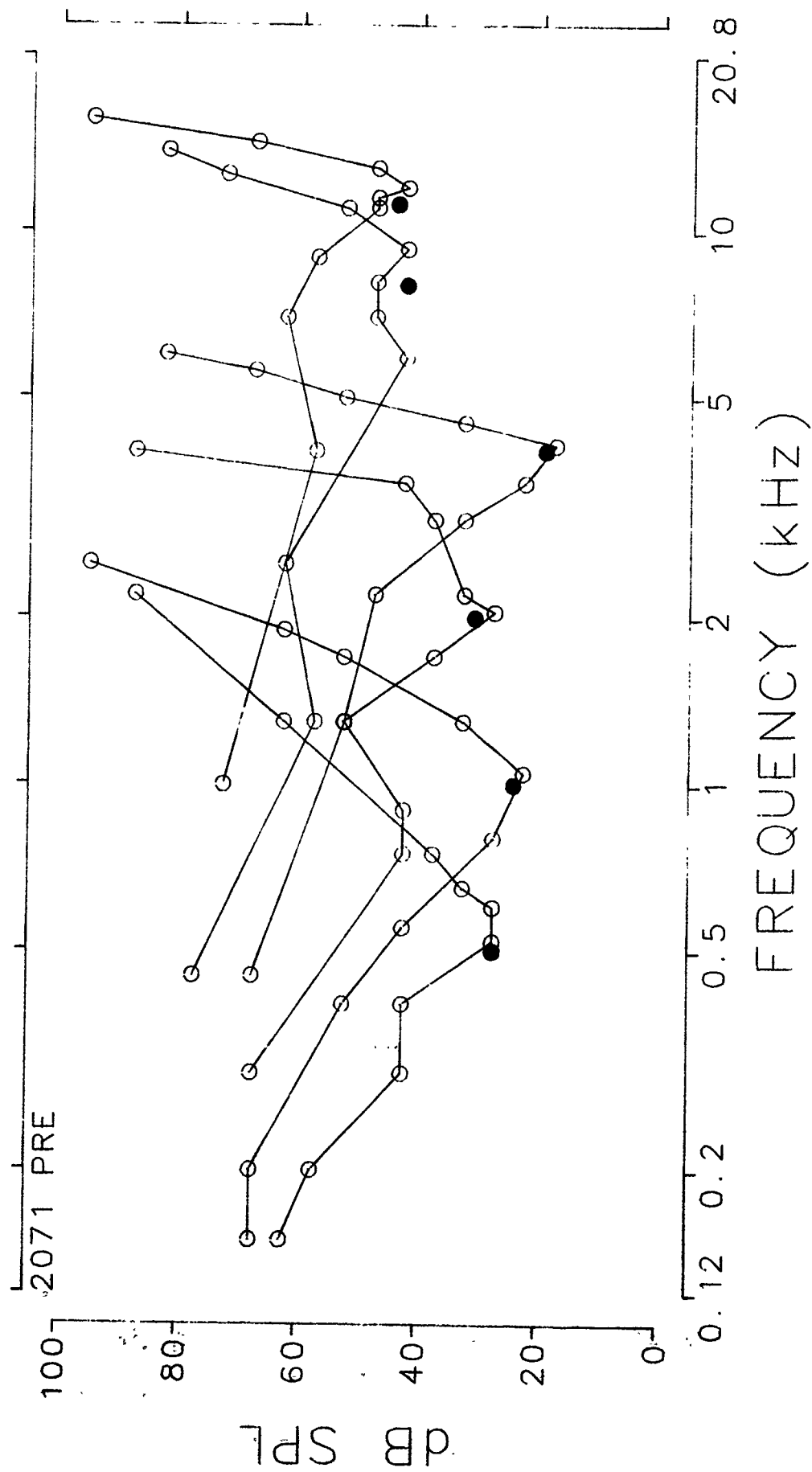
MEAN DATA (n=5) - 150 dB 1X

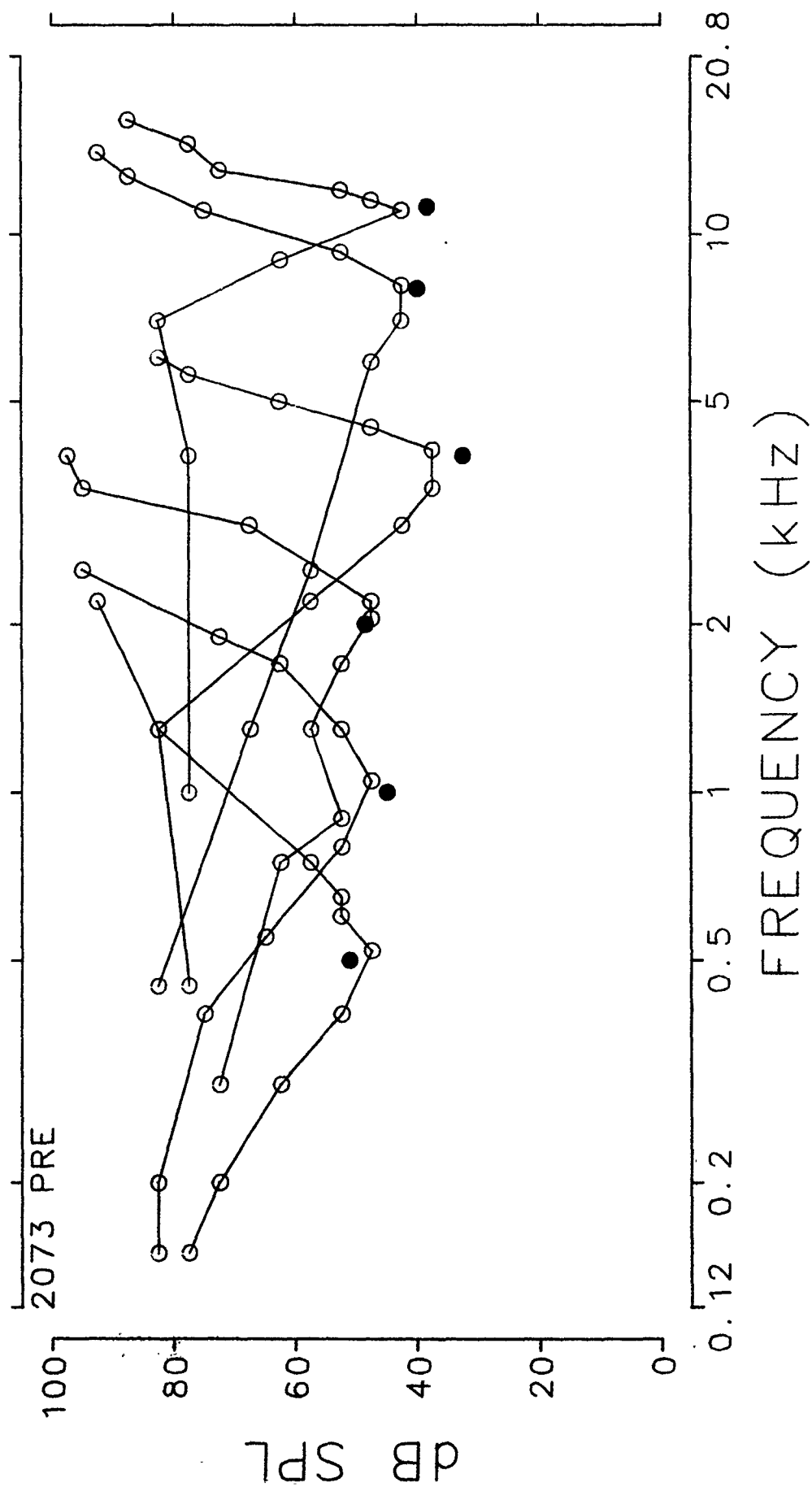


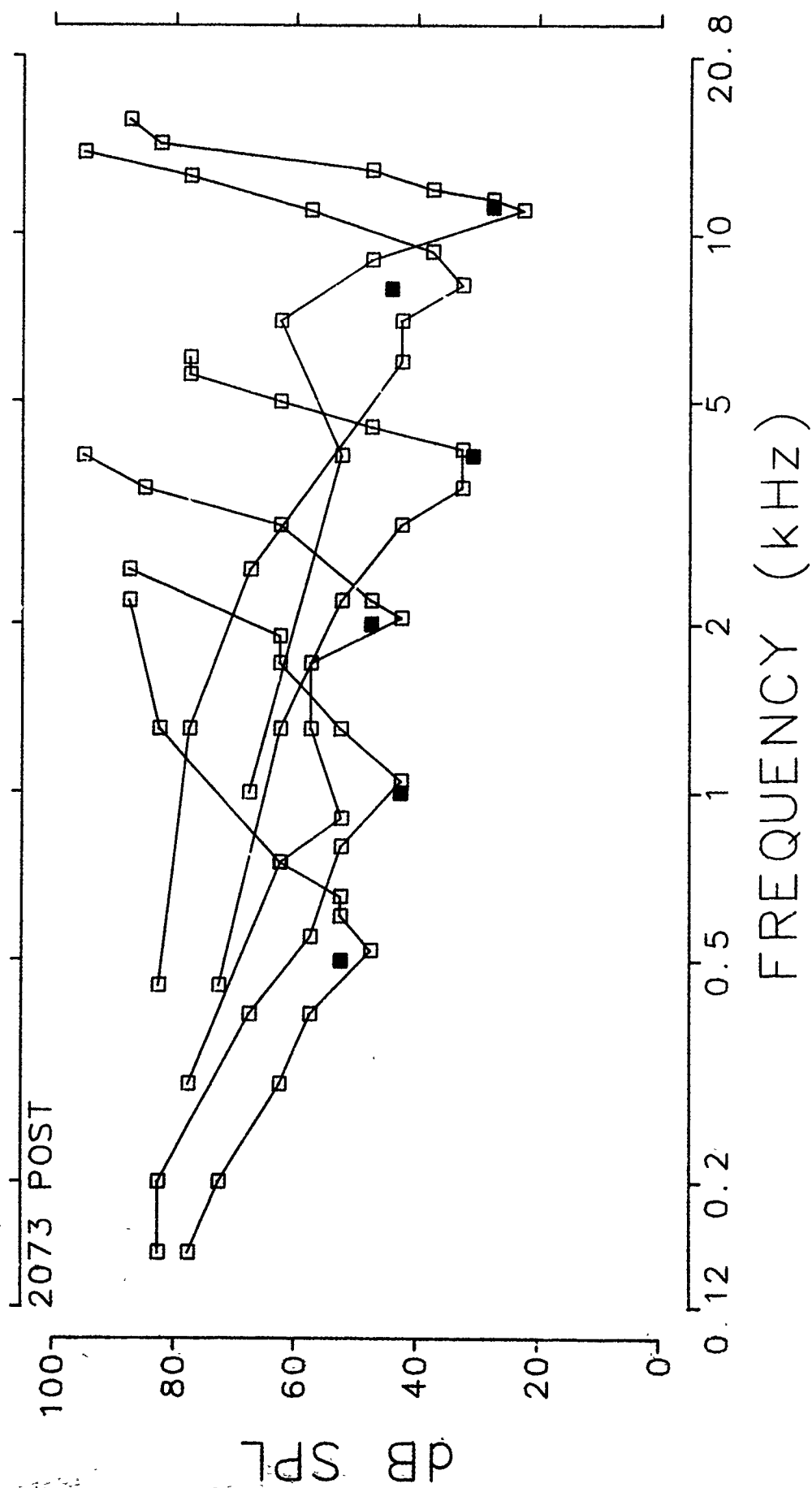
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

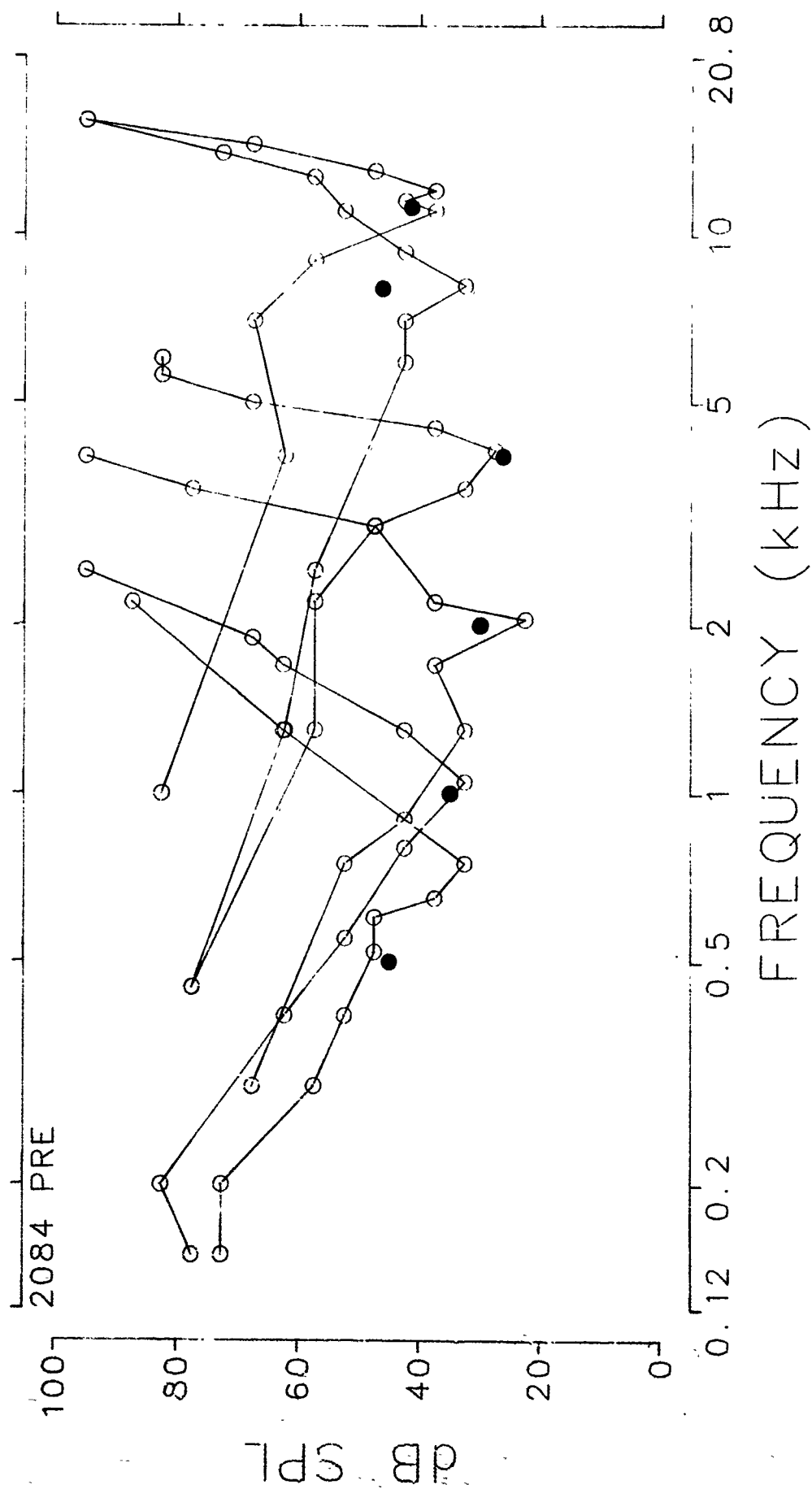
The solid symbol represents the threshold of the probe tone.

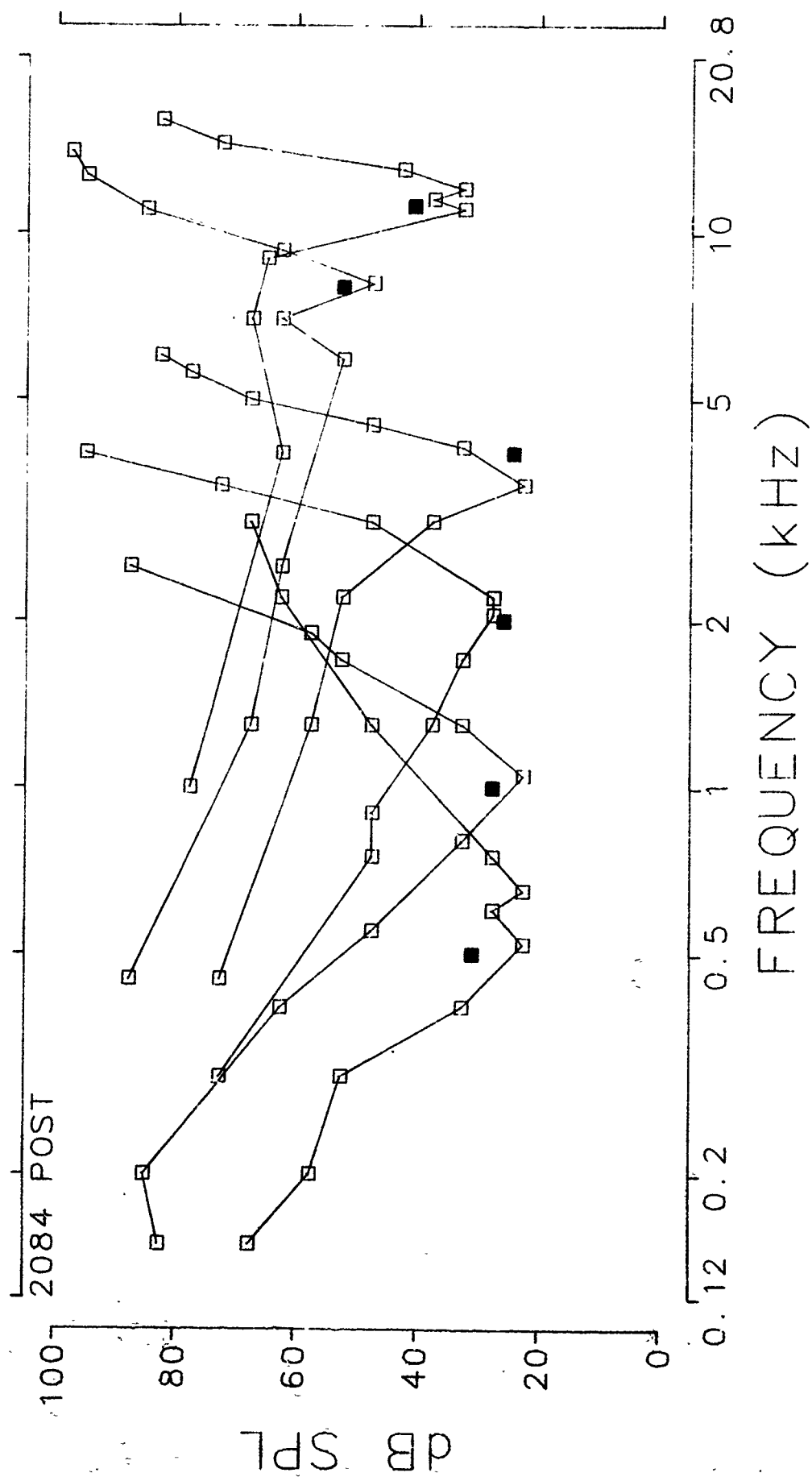












SHOCK TUBE EXPOSURE
150 dB, 1X

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R2071R	11	85	160	170	415
R2073R	41	220	371	265	856
R2074R	11	34	30	69	133
R2084R	37	73	84	71	228
R2090R	17	92	147	234	473
GROUP MEAN	23				421
S.D.	15				279

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
GROUP MEANS			
	0.125 kHz	2.0	137.0
	0.25 kHz	2.8	42.6
	0.5 kHz	4.6	64.4
	1 kHz	1.4	43.4
	2 kHz	2.4	44.2
	4 kHz	6.2	51.6
	8 kHz	3.2	23.8
	16 kHz	.4	13.8

STANDARD DEVIATIONS

	0.125 kHz	1.9	113.1
	0.25 kHz	1.5	24.5
	0.5 kHz	2.9	96.0
	1 kHz	1.9	48.9
	2 kHz	2.6	46.6
	4 kHz	7.1	42.9
	8 kHz	4.4	25.5
	16 kHz	.5	14.8

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R2071R							
0.125 kHz	3	35	85	111	231	0	0
0.25 kHz	2	3	5	33	41	0	0
0.5 kHz	5	17	14	5	36	8	5
1 kHz	0	6	6	4	16	0	0
2 kHz	1	4	11	7	22	0	0
4 kHz	0	12	31	2	45	0	1
8 kHz	0	5	6	3	14	0	2
16 kHz	0	2	2	5	9	0	0
TOTALS	11	85	160	170	415	8	8

CHINCHILLA R2073R

0.125 kHz	4	17	22	41	80	2	2
0.25 kHz	3	18	22	27	67	0	1
0.5 kHz	9	54	115	66	235	0	0
1 kHz	3	29	72	29	130	0	7
2 kHz	7	35	55	35	125	0	1
4 kHz	5	35	45	34	114	0	3
8 kHz	8	21	24	20	65	2	1
16 kHz	0	11	16	13	40	0	3
TOTALS	41	220	371	265	856	4	18

CHINCHILLA R2074R

0.125 kHz	3	3	12	13	28	0	1
0.25 kHz	5	5	1	14	20	0	2
0.5 kHz	2	1	5	16	22	0	0
1 kHz	0	7	2	13	22	0	0
2 kHz	1	7	2	5	14	0	0
4 kHz	0	5	5	3	13	0	1
8 kHz	0	2	1	2	5	0	0
16 kHz	0	4	2	3	9	0	0
TOTALS	11	34	30	69	133	0	4

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R2084R							
0.125 kHz	0	16	19	27	62	0	0
0.25 kHz	3	4	1	12	17	0	0
0.5 kHz	2	4	17	3	24	0	0
1 kHz	4	9	15	9	33	1	1
2 kHz	2	14	21	8	43	0	1
4 kHz	17	3	5	5	13	0	0
8 kHz	8	19	6	6	31	1	1
16 kHz	1	4	0	1	5	0	0
TOTALS	37	73	84	71	228	2	3

CHINCHILLA R2090R

0.125 kHz	0	46	108	130	284	0	3
0.25 kHz	1	2	6	60	68	0	0
0.5 kHz	5	0	2	3	5	0	0
1 kHz	0	7	4	5	16	0	0
2 kHz	1	9	3	5	17	0	0
4 kHz	9	26	17	30	73	21	13
8 kHz	0	0	3	1	4	0	0
16 kHz	1	2	4	0	6	1	0
TOTALS	17	92	147	234	473	22	16

Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (KHZ)

0.12 0.2 0.5 1.0 2.0 5.0 10.0 20.8

CHINCHILLA R2073R

— INNER HAIR
--- OUTER HAIR

% CELL LOSS

100
80
60
40
20
0

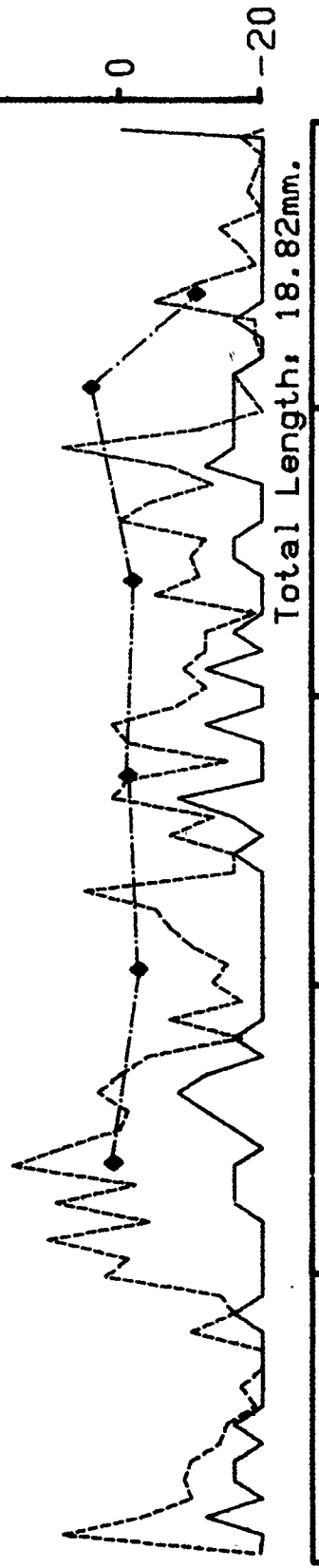
PTS (dB)

80
60
40
20
0
-20

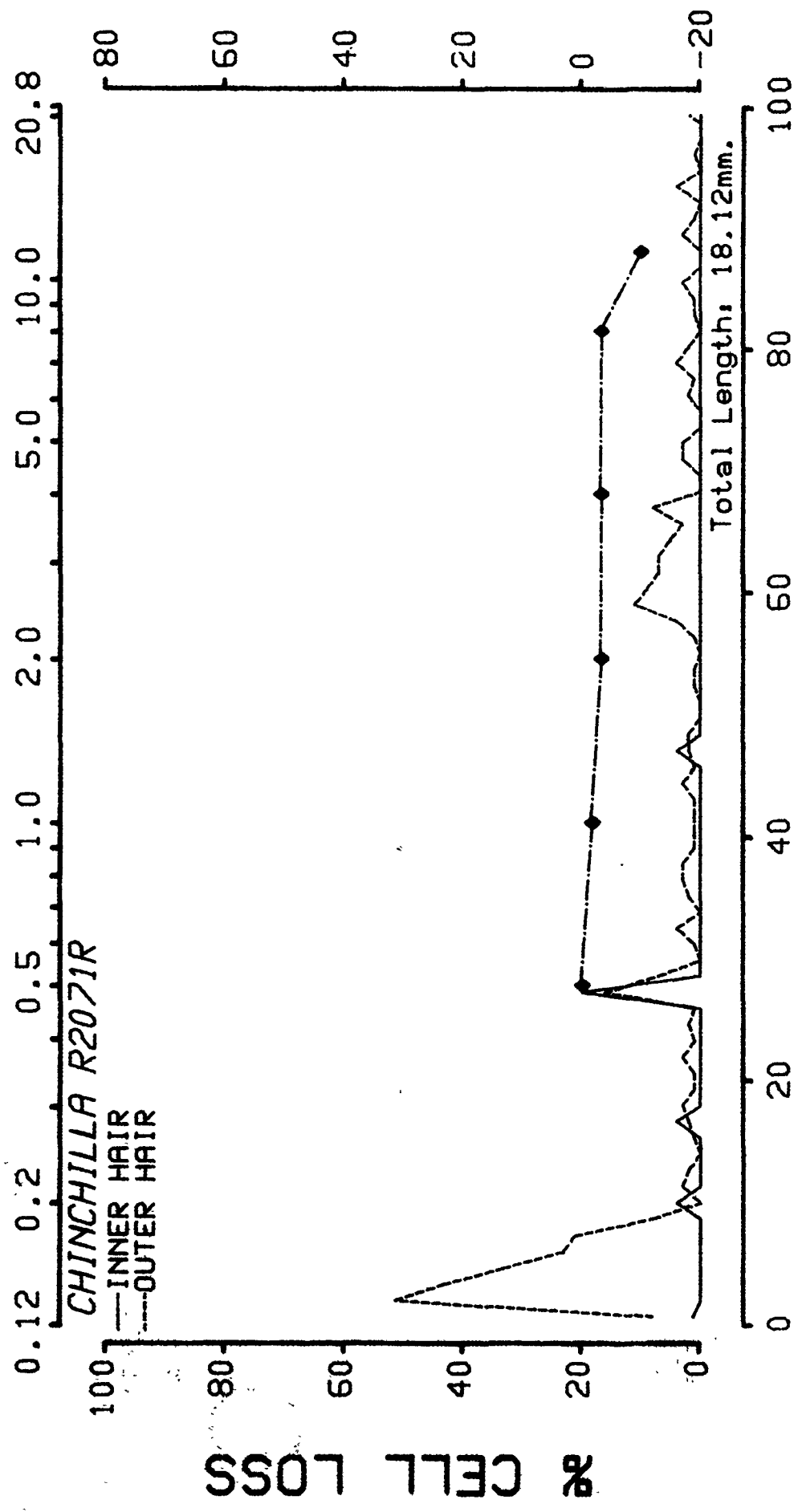
Total Length: 18.82mm.

0 20 40 60 80 100

% TOTAL DISTANCE FROM APEX

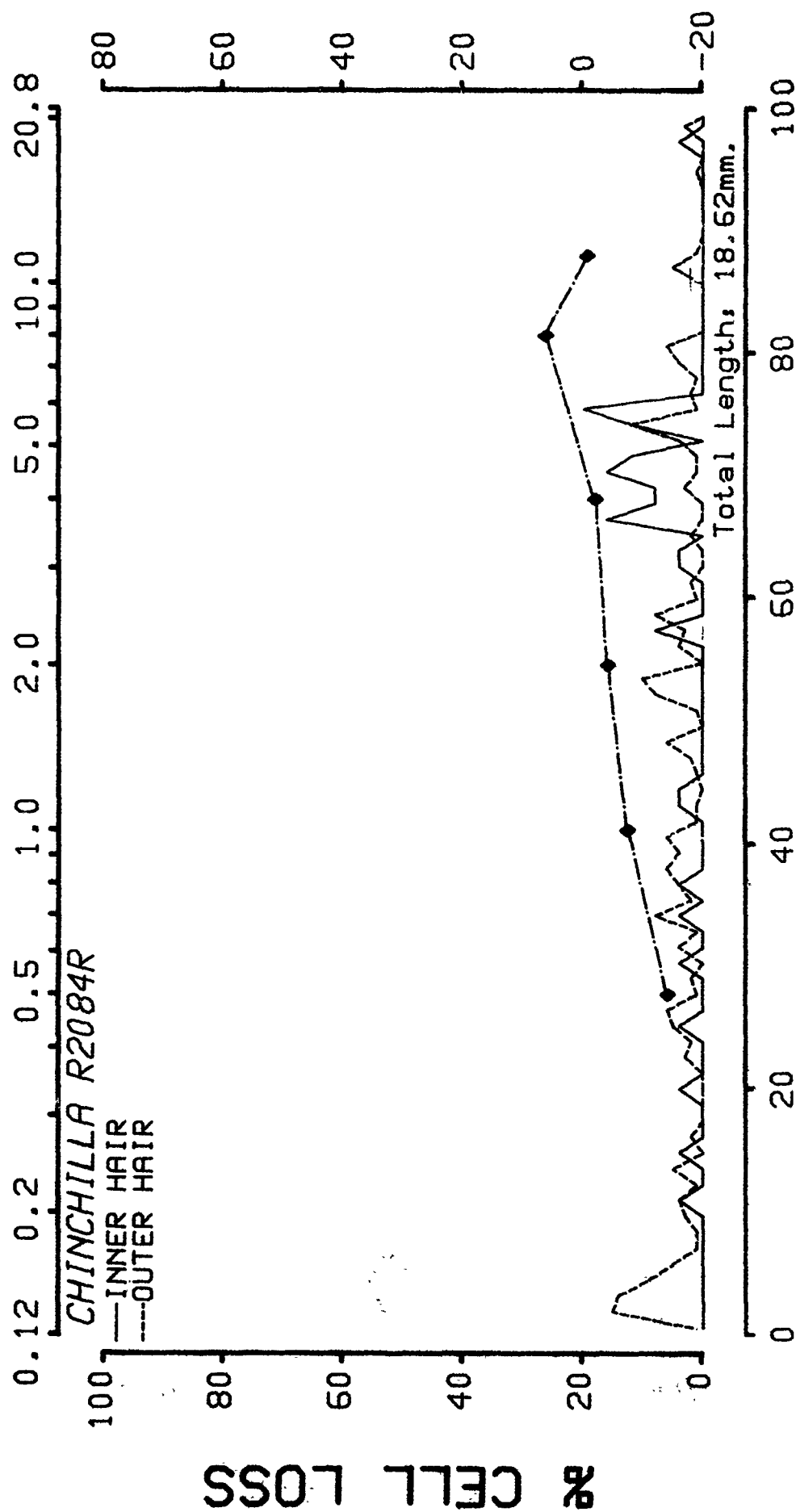


FREQUENCY (KHz)



% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)

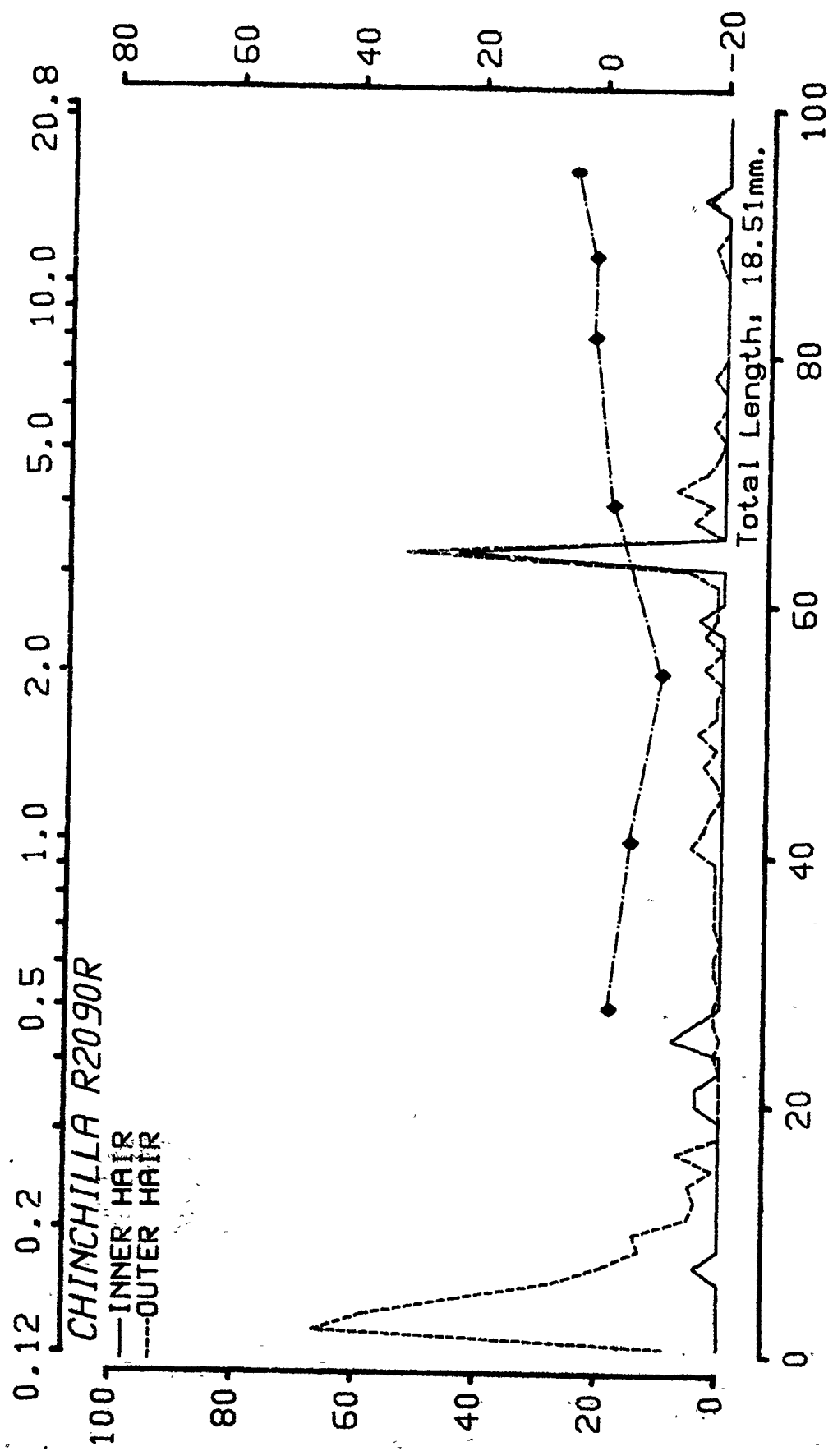


% CELL LOSS

PTS (dB)

% TOTAL DISTANCE FROM APEX

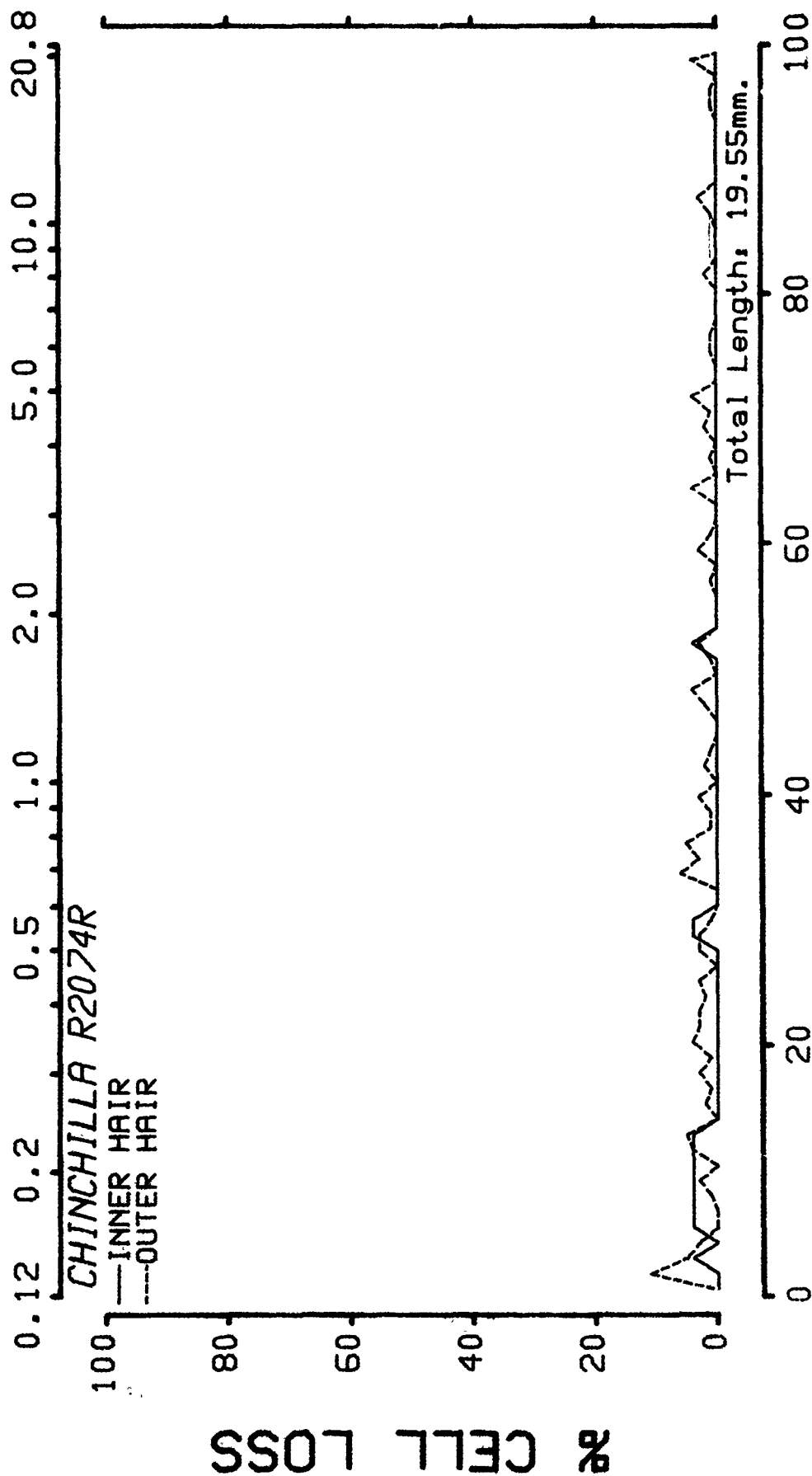
FREQUENCY (kHz)



% CELL LOSS

% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



Summary Data for the Group Exposed to:

150 dB, 10X, 1/M

Animal

1104	-	Completed the Entire Protocol
1010	-	Completed the Entire Protocol
1128	-	Completed the Entire Protocol
1094	-	Completed the Entire Protocol
1231	-	Completed the Entire Protocol

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1010	3.7	0.0	5.0	-8.3	8.0	13.7	*****
1094	15.3	11.7	11.7	3.3	13.0	3.7	*****
1104	18.7	11.7	16.7	6.7	18.0	25.3	*****
1128	20.3	8.3	11.7	6.7	9.7	15.3	*****
1231	26.3	11.7	15.7	5.7	25.3	21.7	*****
Mean	16.9	8.7	12.1	2.8	14.8	15.9	*****
S.D.	8.4	5.1	4.6	6.4	7.0	8.3	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1010	15.3	6.7	13.3	0.0	18.0	17.0	*****
1094	23.7	21.7	16.7	15.0	23.0	5.3	*****
1104	30.3	20.0	15.0	13.3	14.7	23.7	*****
1128	15.3	10.0	6.7	11.7	21.3	13.7	*****
1231	23.0	15.0	12.3	7.3	41.3	30.0	*****
Mean	21.5	14.7	12.8	9.5	23.7	17.9	*****
S.D.	6.3	6.4	3.8	6.0	10.4	9.4	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1010	11.7	6.7	8.3	8.3	10.0	3.3	*****
1094	8.3	10.0	5.0	11.7	10.0	1.7	*****
1104	11.7	8.3	-1.7	6.7	-3.3	-1.7	*****
1128	-5.0	1.7	-5.0	5.0	11.7	-1.7	*****
1231	-3.3	3.3	-3.3	1.7	16.0	8.3	*****
Mean	4.7	6.0	0.7	6.7	8.9	2.0	*****
S.D.	8.2	3.5	5.7	3.7	7.3	4.2	*****

150 dB 10X 1/M

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
1010	13.3	28.3	23.3	18.3	3.3	28.3
1094	1.7	6.7	6.7	6.7	11.7	11.7
1104	13.3	23.3	18.3	13.3	13.3	23.3
1128	1.7	1.7	6.7	1.7	-13.3	6.7
1231	26.7	31.7	6.7	1.7	1.7	31.7
Mean	11.3	18.3	12.3	8.3	3.3	20.3
S.D.	10.4	13.4	7.9	7.4	10.6	10.8

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1010	55.0	35.0	35.0	25.0	0.0	55.0
1094	8.3	8.3	8.3	3.3	3.3	8.3
1104	18.3	23.3	18.3	8.3	8.3	23.3
1128	13.3	18.3	13.3	13.3	-6.7	18.3
1231	38.3	43.3	23.3	8.3	8.3	43.3
Mean	26.7	25.7	19.7	11.7	2.7	29.7
S.D.	19.5	13.8	10.2	8.3	6.3	19.1

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1010	20.0	15.0	20.0	5.0	0.0	20.0
1094	5.0	5.0	10.0	5.0	10.0	10.0
1104	15.0	5.0	0.0	0.0	0.0	15.0
1128	8.3	13.3	13.3	13.3	3.3	13.3
1231	26.7	26.7	11.7	11.7	21.7	26.7
Mean	15.0	13.0	11.0	7.0	7.0	17.0
S.D.	8.7	8.9	7.2	5.4	9.2	6.5

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 0.5 kHz

Masker (kHz):	0.150	0.200	0.300	0.400	0.520	0.600	0.650	0.750	1.300	2.200
Animal (Q-10 dB)	Pre-Exposure									
1010 (1.53)	57.0	32.0	17.0	16.0	28.0	31.0	43.0	48.0	64.0	71.0
1094 (1.09)	62.0	52.0	37.0	31.0	33.0	36.0	43.0	43.0	54.0	71.0
1104 (1.02)	57.0	52.0	37.0	36.0	28.0	26.0	28.0	28.0	44.0	66.0
1128 (1.96)	77.0	67.0	47.0	41.0	33.0	36.0	48.0	58.0	69.0	94.0*
1231 (1.08)	64.0	58.0	47.0	42.0	34.0	36.0	39.0	39.0	64.0	96.0*
Mean	(1.34)	52.2	37.0	33.2	31.2	33.0	40.2	43.2	59.0	79.6
S.D.	(0.40)	12.9	12.2	10.6	2.9	4.5	7.5	11.1	10.0	14.2
Animal (Q-10 dB)	Post-Exposure									
1010 (2.12)	67.0	67.0	47.0	41.0	33.0	41.0	53.0	53.0	92.0*	94.0*
1094 (2.31)	62.0	52.0	32.0	31.0	18.0	21.0	28.0	33.0	49.0	86.0
1104 (2.31)	57.0	57.0	47.0	36.0	23.0	31.0	33.0	38.0	59.0	71.0
1128 (1.00)	52.0	42.0	27.0	21.0	23.0	21.0	28.0	43.0	49.0	56.0
1231 (1.51)	59.0	48.0	32.0	27.0	24.0	26.0	39.0	49.0	59.0	68.0
Mean	(1.85)	53.2	37.0	31.2	24.2	28.0	36.2	43.2	61.6	75.0
S.D.	(0.58)	9.5	9.4	7.8	5.4	8.4	10.4	8.1	17.7	15.1

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 1.0 kHz

Masker (kHz):	0.150	0.200	0.400	0.550	0.800	1.050	1.300	1.700	1.900	2.500
Animal (Q-10 dB)	Pre-Exposure									
1010 (4.13)	82.0	72.0	61.0	53.0	48.0	19.0	34.0	57.0	90.0*	94.0*
1094 (2.41)	52.0	47.0	46.0	33.0	28.0	14.0	24.0	32.0	47.0	51.0
1104 (2.33)	77.0	77.0	56.0	63.0	28.0	24.0	29.0	37.0	52.0	86.0
1128 (2.41)	82.0	77.0	51.0	43.0	28.0	14.0	24.0	42.0	52.0	81.0
1231 (1.54)	69.0	68.0	62.0	48.0	28.0	27.0	34.0	52.0	55.0	86.0
Mean (2.36)	72.4	68.2	55.2	48.0	32.0	19.6	29.0	44.0	59.2	79.6
S.D. (1.10)	12.6	12.4	6.8	11.2	8.9	5.9	5.0	10.4	17.5	16.7
Animal (Q-10 dB)	Post-Exposure									
1010 (1.84)	77.0	62.0	56.0	38.0	28.0	24.0	39.0	87.0	90.0*	94.0*
1094 (0.97)	77.0	67.0	51.0	43.0	23.0	24.0	29.0	37.0	42.0	56.0
1104 (1.79)	77.0	72.0	51.0	48.0	28.0	24.0	34.0	42.0	52.0	94.0*
1128 (2.71)	82.0	77.0	61.0	43.0	28.0	19.0	39.0	47.0	57.0	86.0
1231 (1.35)	74.0	63.0	52.0	48.0	38.0	32.0	34.0	52.0	60.0	76.0
Mean (1.73)	77.4	68.2	54.2	44.0	29.0	24.6	35.0	53.0	60.2	81.2
S.D. (0.65)	2.9	6.3	4.3	4.2	5.5	4.7	4.2	19.8	18.0	15.9

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

1010 (10.57)	72.0	58.0	44.0	49.0	42.0	11.0	31.0	36.0	59.0	81.0
1094 (0.83)	52.0	48.0	44.0	37.0	42.0	36.0	36.0	41.0	49.0	66.0
1104 (2.70)	72.0	53.0	44.0	39.0	27.0	26.0	41.0	46.0	54.0	89.0*
1128 (6.31)	80.0*	48.0	39.0	44.0	42.0	21.0	31.0	36.0	44.0	56.0
1231 (4.99)	62.0	49.0	53.0	39.0	37.0	25.0	38.0	45.0	51.0	52.0

Mean (5.08)	67.6	51.2	44.8	41.6	38.0	23.8	35.4	40.8	51.4	68.8
S.D. (3.72)	10.8	4.5	5.1	4.9	6.5	9.0	4.4	4.8	5.6	15.9

Animal (Q-10 dB)

Post-Exposure

1010 (6.31)	57.0	58.0	54.0	54.0	42.0	26.0	41.0	56.0	59.0	61.0
1094 (1.53)	67.0	43.0	34.0	29.0	32.0	26.0	36.0	41.0	59.0	71.0
1104 (2.53)	67.0	38.0	34.0	29.0	17.0	16.0	26.0	31.0	34.0	46.0
1128 (0.70)	32.0	33.0	24.0	24.0	17.0	16.0	16.0	16.0	19.0	31.0
1231 (7.40)	62.0	69.0	58.0	54.0	37.0	20.0	43.0	60.0	91.0	90.0*

Mean (3.70)	57.0	46.2	40.8	38.0	29.0	20.8	32.4	40.8	52.4	59.8
S.D. (2.98)	14.6	14.9	14.5	14.7	11.5	5.0	11.3	18.1	27.5	22.7

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 4.0 kHz

Masker (kHz): 0.450 1.300 2.200 3.000 3.500 4.100 4.500 5.000 5.600 6.000

Animal (Q-10 dB)

Pre-Exposure

1010 (7.26)	63.0	59.0	56.0	41.0	29.0	5.0	18.0	31.0	48.0	67.0
7394 (2.58)	73.0	54.0	51.0	26.0	24.0	15.0	23.0	26.0	38.0	57.0
1104 (4.83)	78.0	59.0	61.0	41.0	24.0	15.0	33.0	41.0	53.0	72.0
1128 (2.82)	78.0	64.0	61.0	36.0	24.0	29.0	38.0	41.0	53.0	72.0
1231 (5.55)	58.0	59.0	53.0	40.0	26.0	10.0	23.0	33.0	44.0	47.0

Mean	(4.69)	70.0	59.0	56.4	36.8	25.4	14.8	34.4	47.2	63.0
S.D.	(2.01)	9.1	3.5	4.6	6.4	2.2	9.0	6.5	6.4	10.8

Animal (Q-10 dB)

Post-Exposure

1010 (2.21)	73.0	69.0	56.0	36.0	24.0	25.0	33.0	36.0	43.0	72.0
1094 (3.63)	78.0	54.0	46.0	31.0	19.0	30.0	33.0	41.0	43.0	72.0
1104 (3.52)	83.0	59.0	56.0	41.0	29.0	20.0	28.0	36.0	43.0	62.0
1128 (3.53)	68.0	49.0	46.0	31.0	29.0	20.0	33.0	41.0	58.0	87.0
1231 (2.81)	58.0	49.0	43.0	35.0	26.0	35.0	48.0	53.0	59.0	72.0

Mean	(3.14)	72.0	56.0	49.4	34.8	25.4	26.0	41.4	49.2	73.0
S.D.	(0.61)	9.6	3.4	6.1	4.1	4.2	6.5	6.9	8.5	8.9

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 8.0 kHz

Masker (kHz):	9.450	1.300	2.500	5.900	7.000	8.100	9.300	11.000	12.700	14.000
Animal (Q-10 dB)	Pre-Exposure									
1010 (8.91)	63.0	74.0	71.0	38.0	****	30.0	43.0	67.0	88.0*	85.0*
1094 (4.38)	78.0	59.0	56.0	43.0	47.0	25.0	33.0	57.0	70.0	85.0*
1104 (2.87)	88.0	64.0	61.0	48.0	37.0	35.0	48.0	72.0	80.0	85.0*
1120 (5.15)	68.0	54.0	56.0	48.0	37.0	20.0	33.0	52.0	60.0	62.0
1231 (3.91)	68.0	59.0	56.0	48.0	43.0	25.0	31.0	57.0	66.0	72.0
Mean (5.04)	77.0	62.0	60.0	45.0	41.0	27.0	37.6	61.0	72.8	77.8
S.D. (2.32)	8.9	7.6	6.5	4.5	4.9	5.7	7.5	8.2	11.2	10.5

Animal (Q-10 dB)	Post-Exposure									
1010 (7.53)	58.0	49.0	46.0	28.0	32.0	15.0	43.0	57.0	75.0	85.0*
1094 (1.20)	78.0	59.0	26.0	43.0	37.0	40.0	43.0	47.0	65.0	85.0*
1104 (4.41)	73.0	54.0	46.0	38.0	32.0	20.0	33.0	47.0	50.0	57.0
1128 (5.68)	72.0	74.0	71.0	58.0	52.0	30.0	43.0	72.0	75.0	85.0*
1231 (2.85)	91.0*	92.0*	94.0*	91.0*	68.0	70.0	81.0	95.0*	89.0*	90.0*
Mean (4.33)	75.6	65.6	56.6	51.6	44.2	35.0	48.6	63.6	70.8	80.4
S.D. (2.45)	11.9	17.5	26.3	24.5	15.6	21.8	18.6	20.3	14.4	13.3

MASKED THRESHOLDS (dB SPL) Group: 150 dB 10X 1/M

Probe Frequency: 11.2 kHz

Masker (kHz): 1.000 4.000 7.000 9.000 11.000 11.500 12.000 13.000 14.500 16.000

Animal (Q-10 dB)

Pre-Exposure

1010 (2.83)	69.0	****	62.0	35.0	27.0	25.0	35.0	51.0	61.0	74.9
1094 (9.52)	64.0	*****	62.0	40.0	12.0	25.0	25.0	36.0	51.0	64.0
1104 (4.70)	64.0	*****	67.0	50.0	32.0	35.0	30.0	46.0	56.0	69.0
1128 (3.44)	69.0	*****	57.0	45.0	32.0	35.0	35.0	46.0	51.0	79.0
1231 (9.37)	51.0	*****	43.0	39.0	37.0	22.0	24.0	44.0	57.0	66.0

Mean (6.19)	63.4	*****	58.2	41.8	28.0	28.4	29.8	44.6	55.2	70.4
S.D. (3.05)	7.4	*****	9.2	5.8	9.6	6.1	5.3	5.5	4.3	6.1

Animal (Q-10 dB)

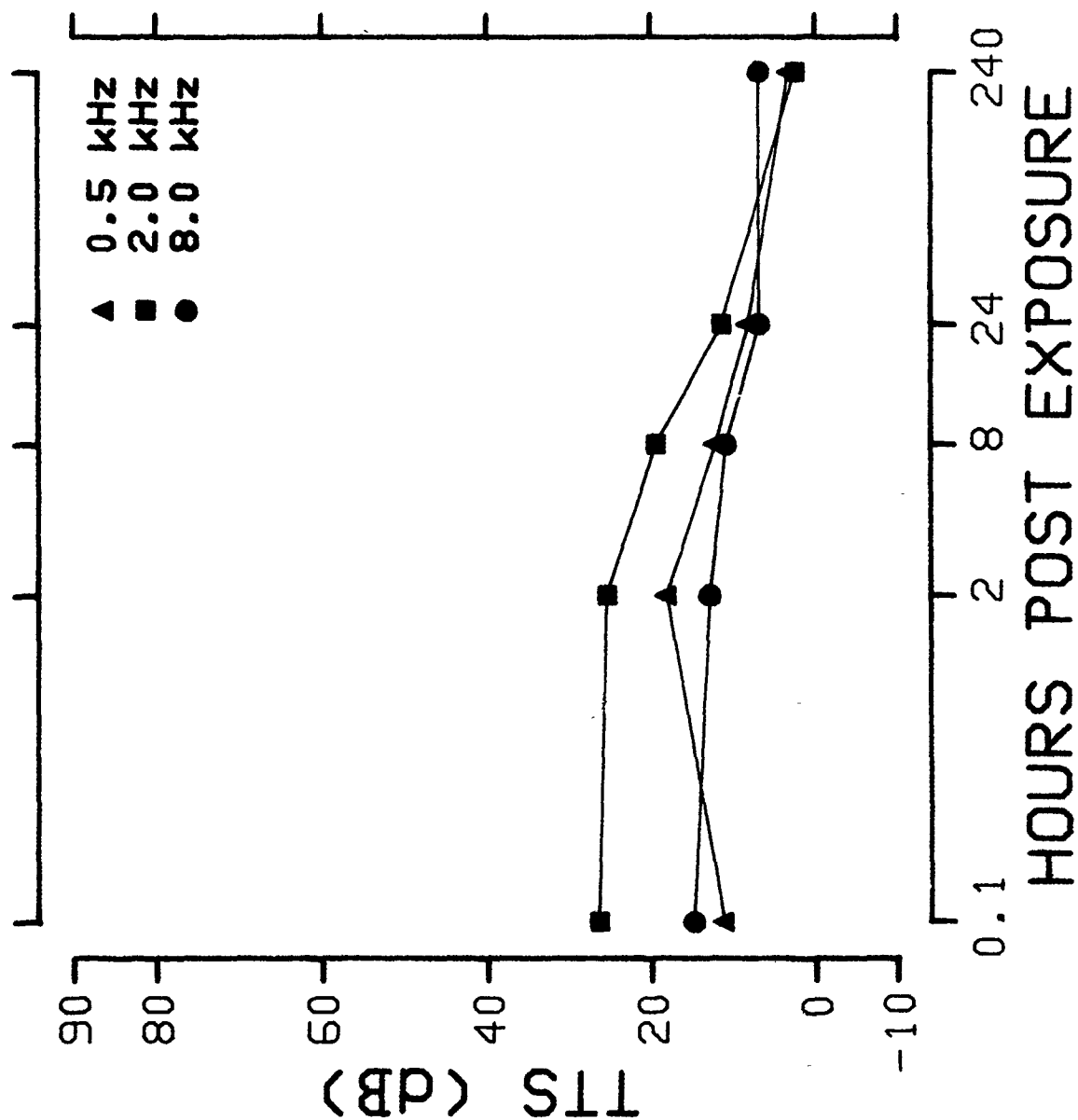
Post-Exposure

1010 (3.16)	69.0	*****	37.0	20.0	12.0	20.0	15.0	46.0	51.0	54.0
1094 (3.95)	74.0	*****	62.0	40.0	22.0	25.0	25.0	36.0	51.0	69.0
1104 (4.60)	64.0	*****	52.0	45.0	32.0	20.0	20.0	26.0	36.0	44.0
1128 (4.22)	59.0	*****	52.0	40.0	22.0	25.0	20.0	31.0	36.0	44.0
1231 (8.46)	71.0	*****	63.0	59.0	52.0	37.0	39.0	54.0	57.0	66.0

Mean (4.88)	67.4	*****	53.2	40.8	28.0	25.4	23.8	38.6	46.2	55.4
S.D. (2.07)	5.9	*****	10.5	14.0	15.2	6.9	9.2	11.3	9.6	11.8

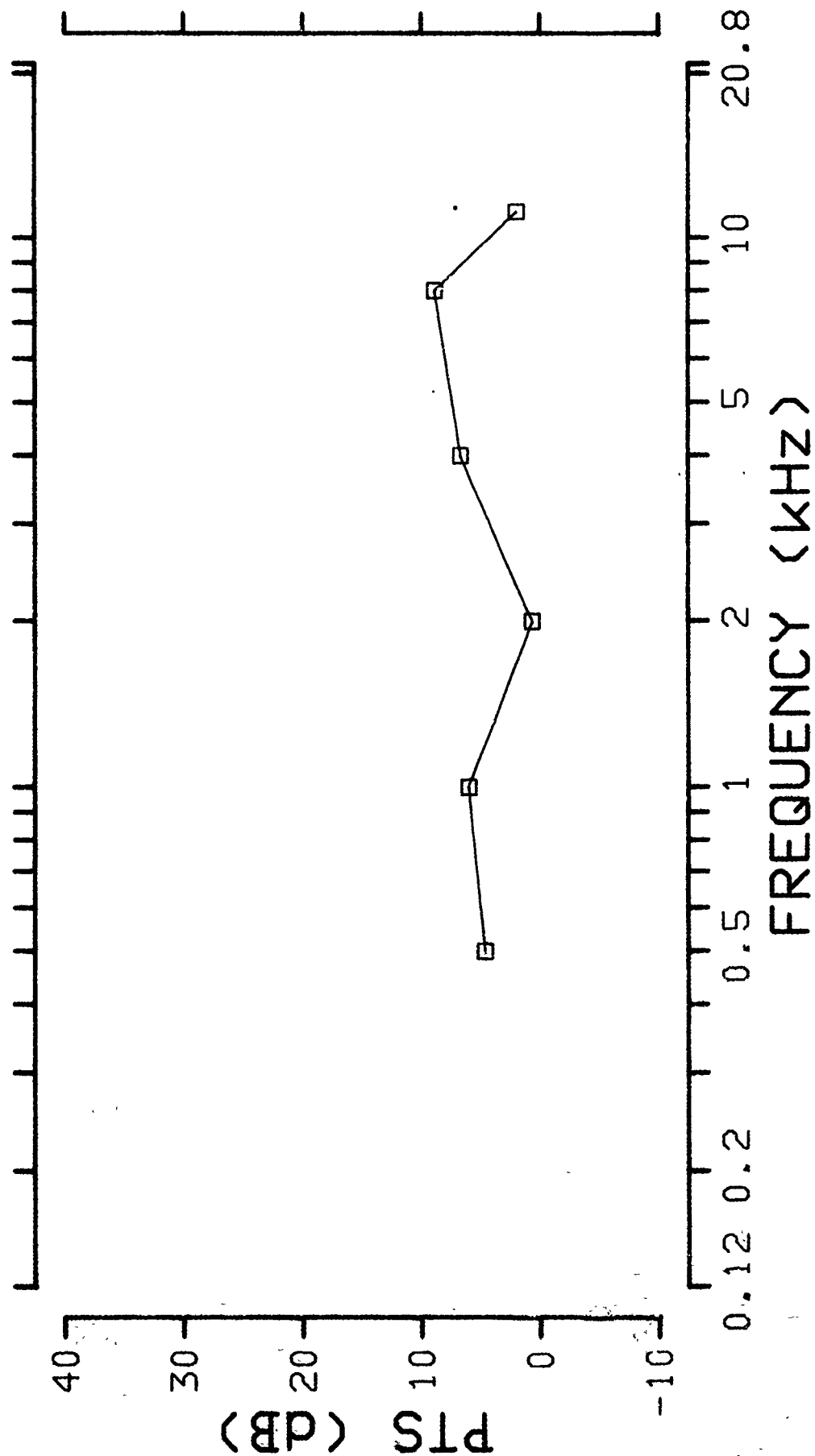
**The Group Mean Recovery Curves
Measured at Three Test Frequencies**

MEAN DATA (n=5) - 150 dB 10X 1/M



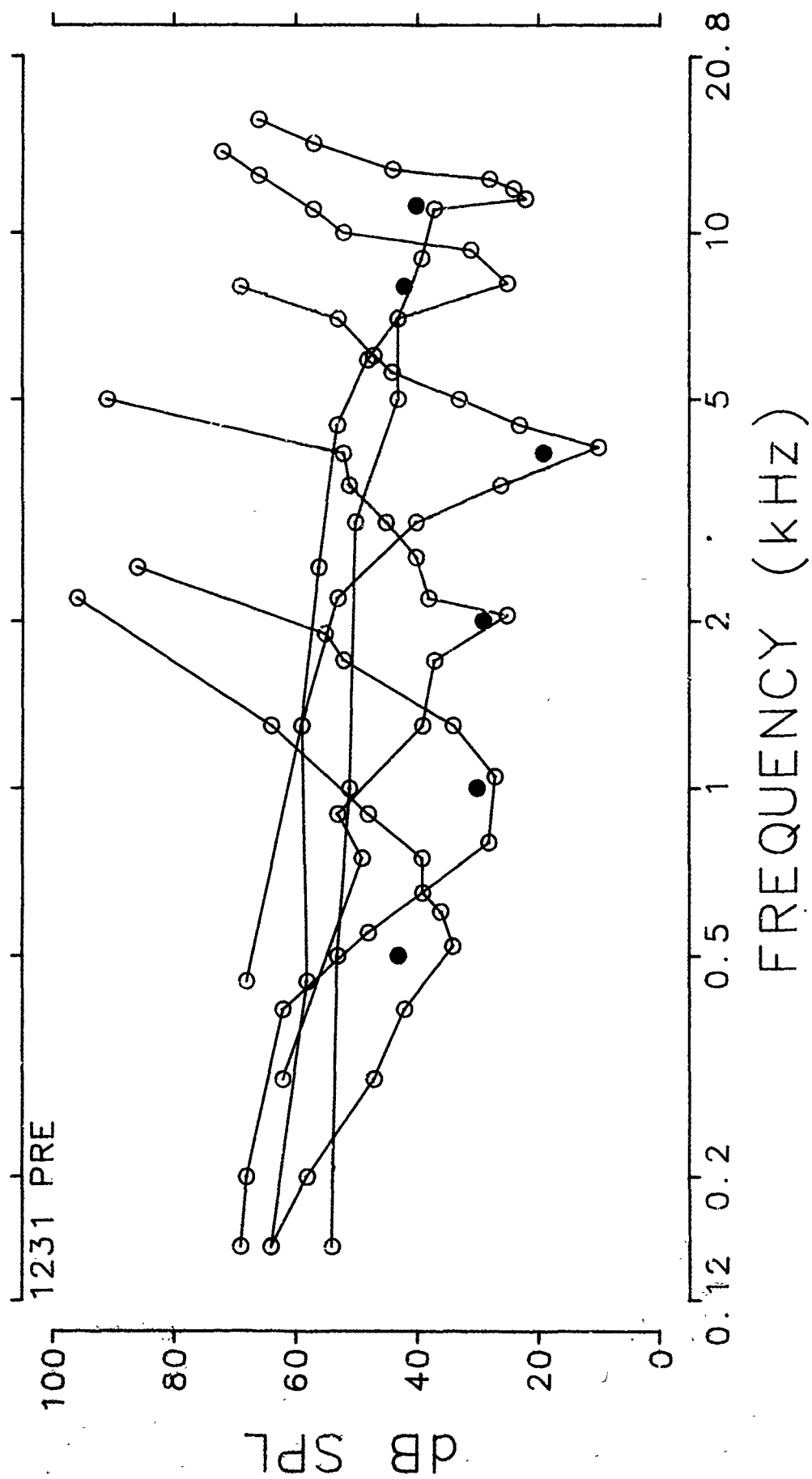
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

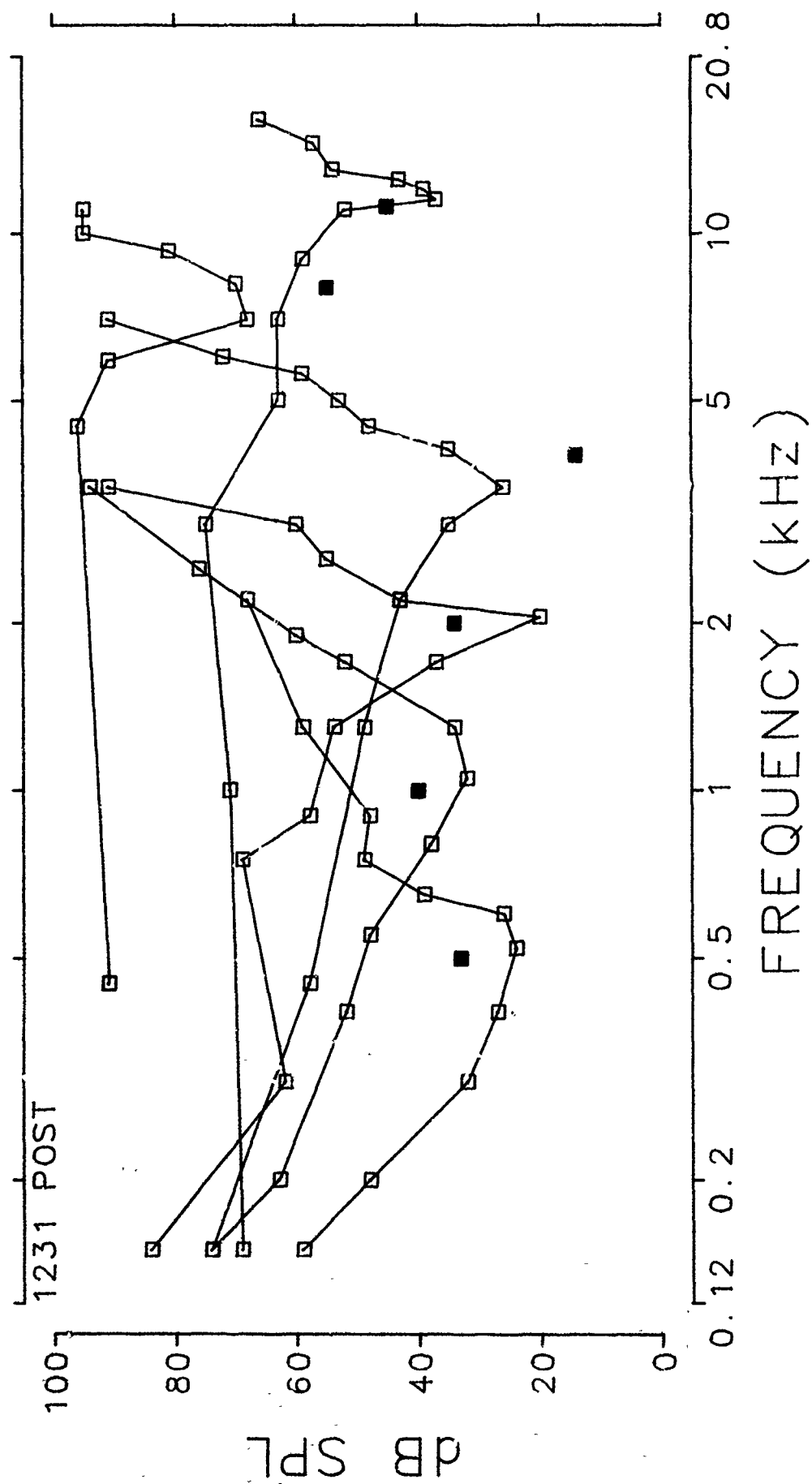
MEAN DATA (n=5) - 150 dB 10X 1/M

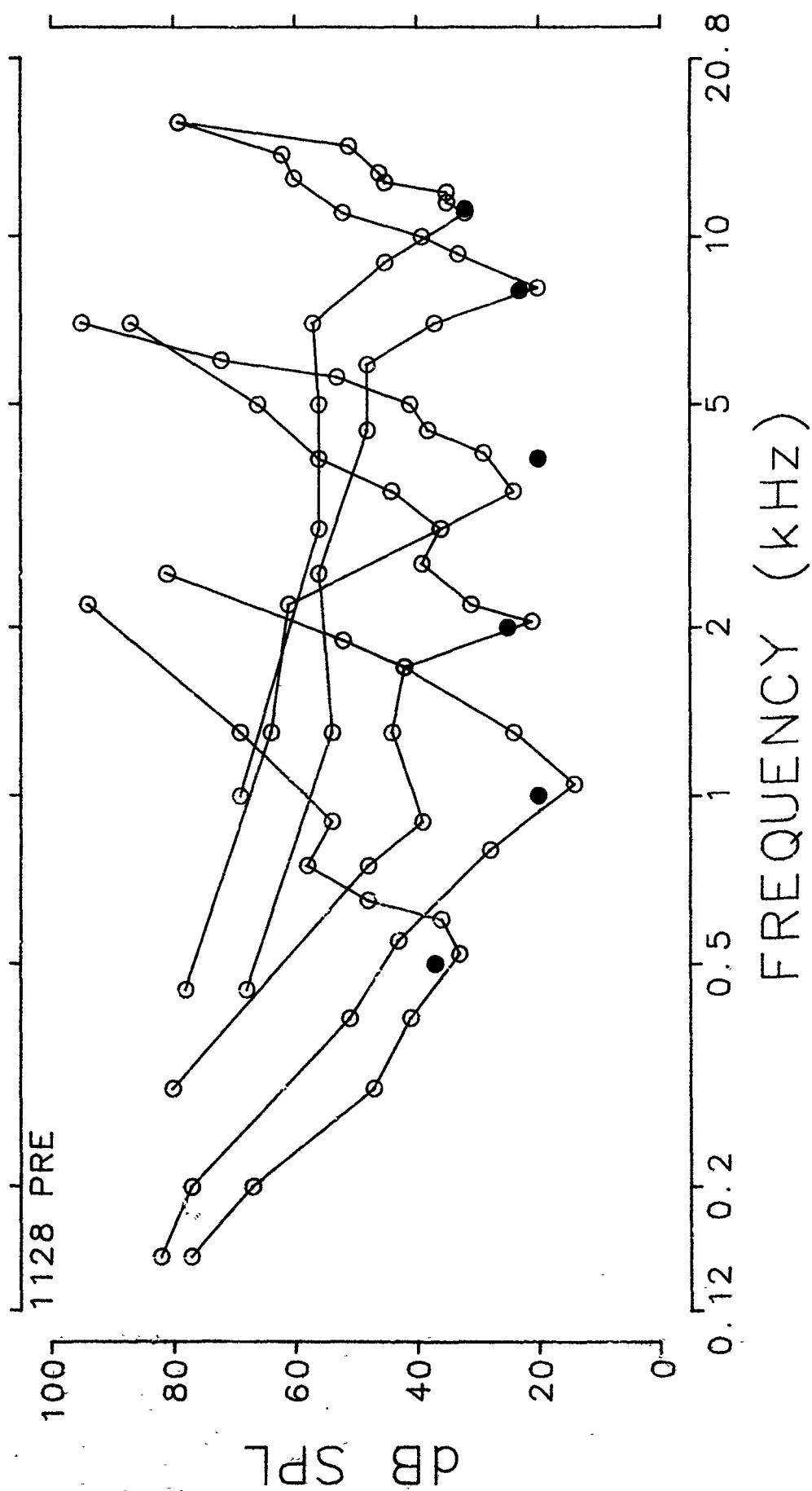


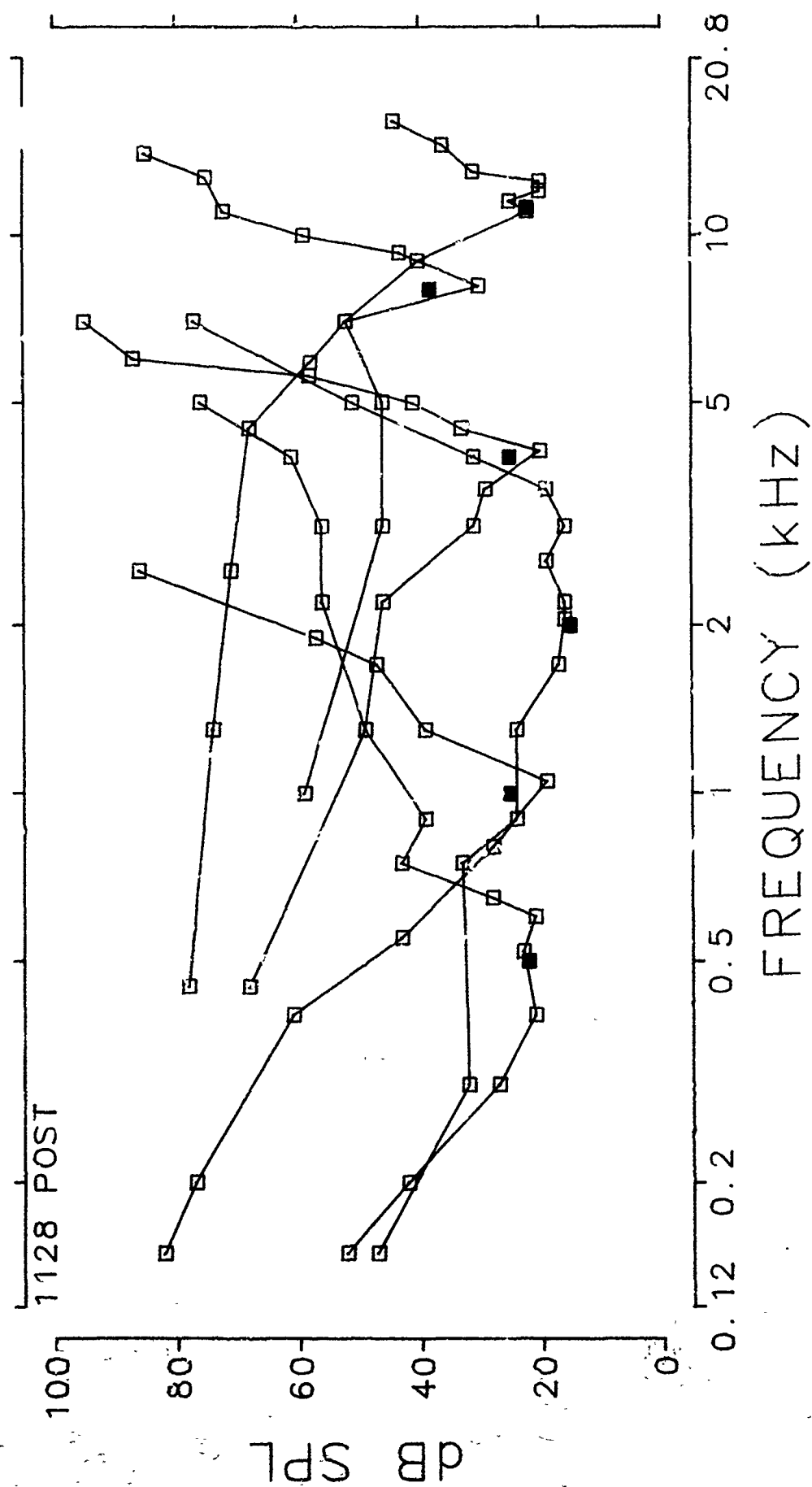
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

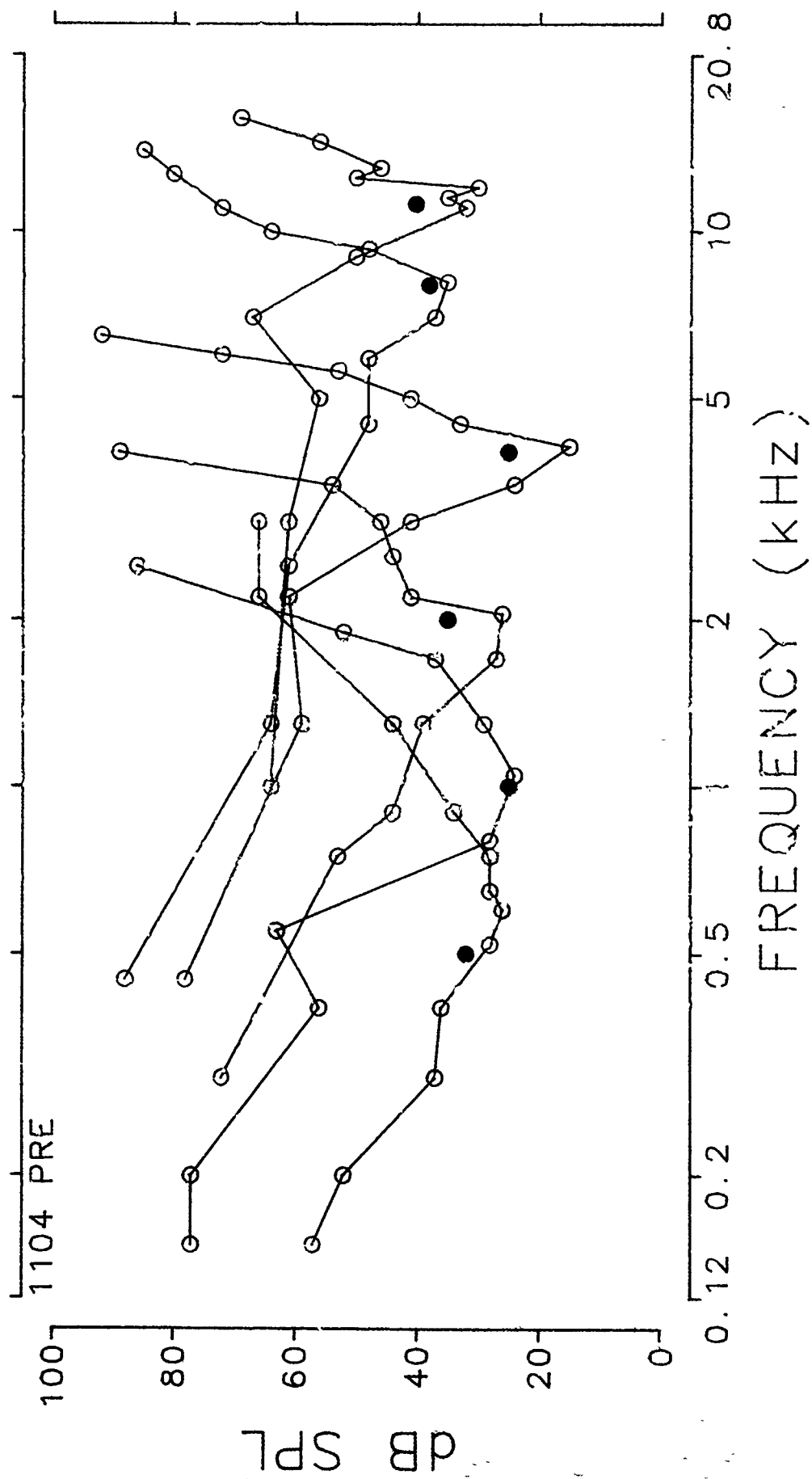
The solid symbol represents the threshold of the probe tone.

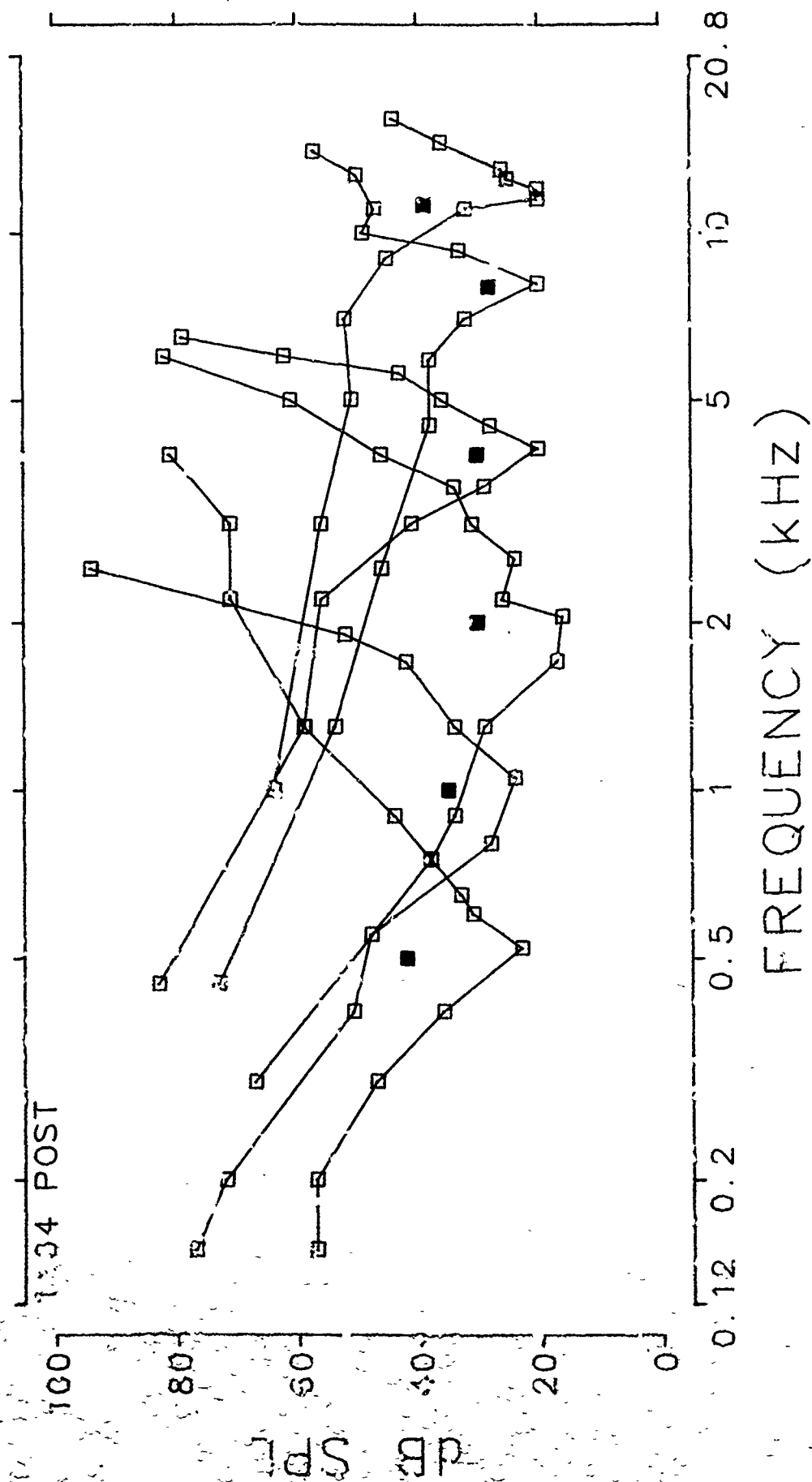


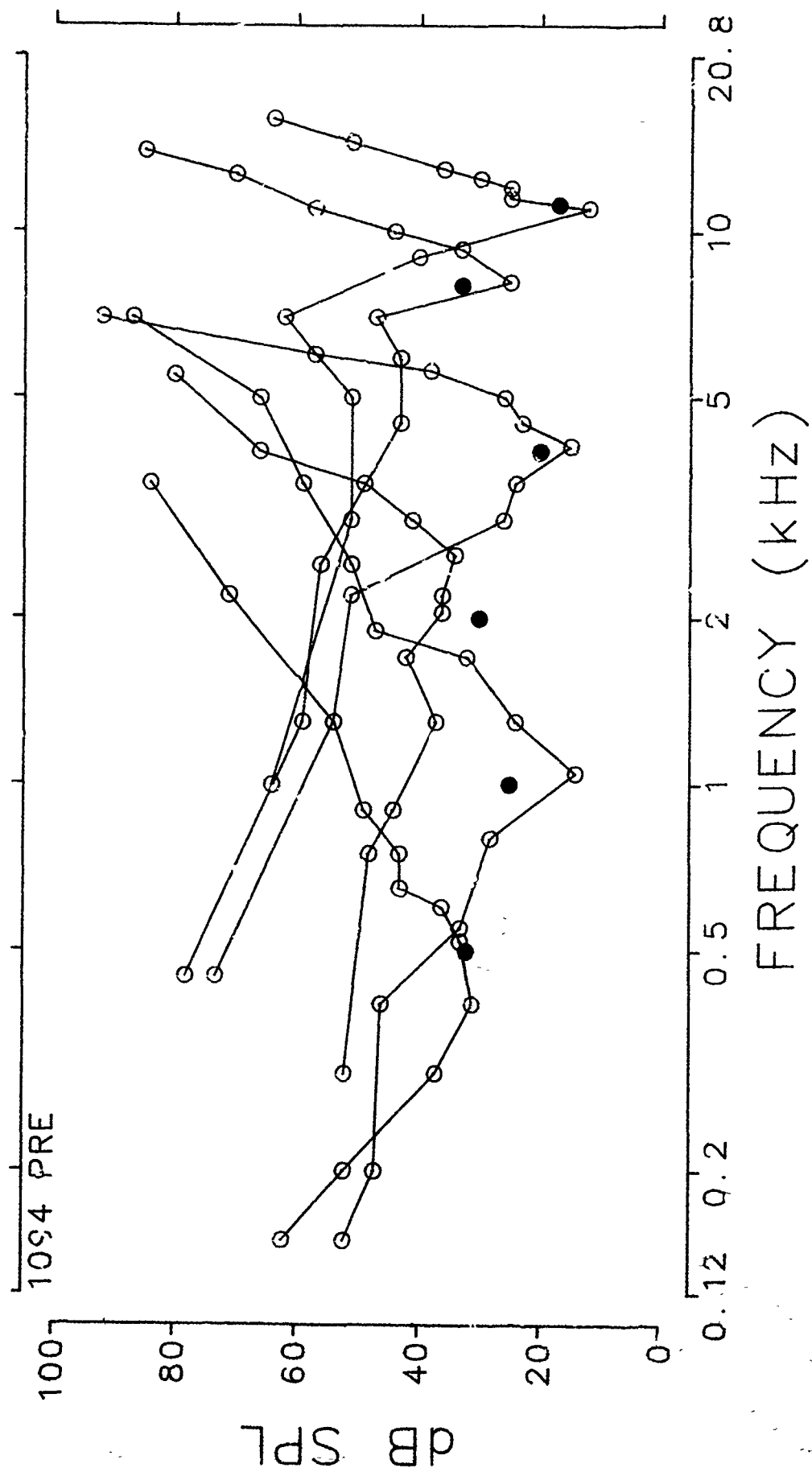


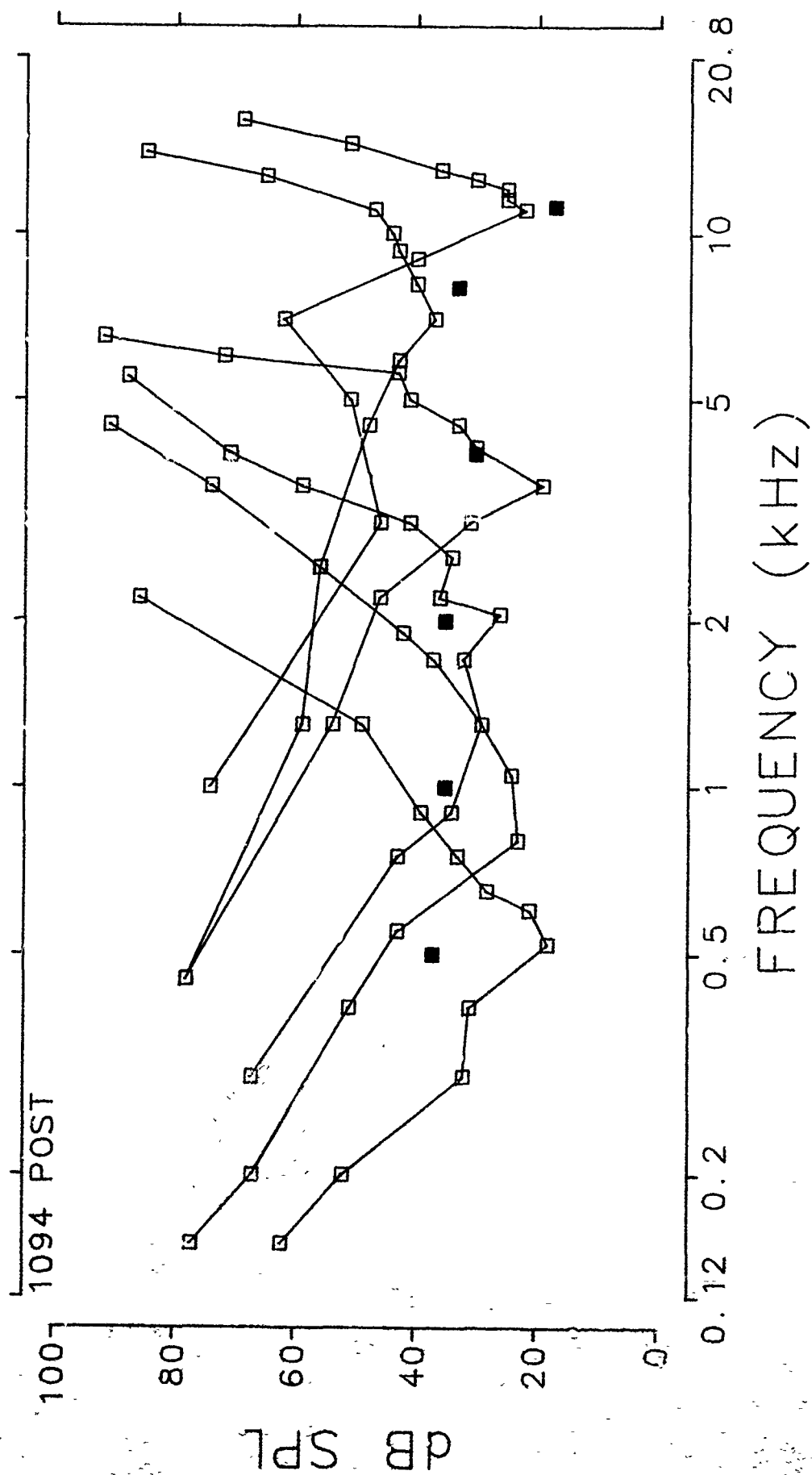


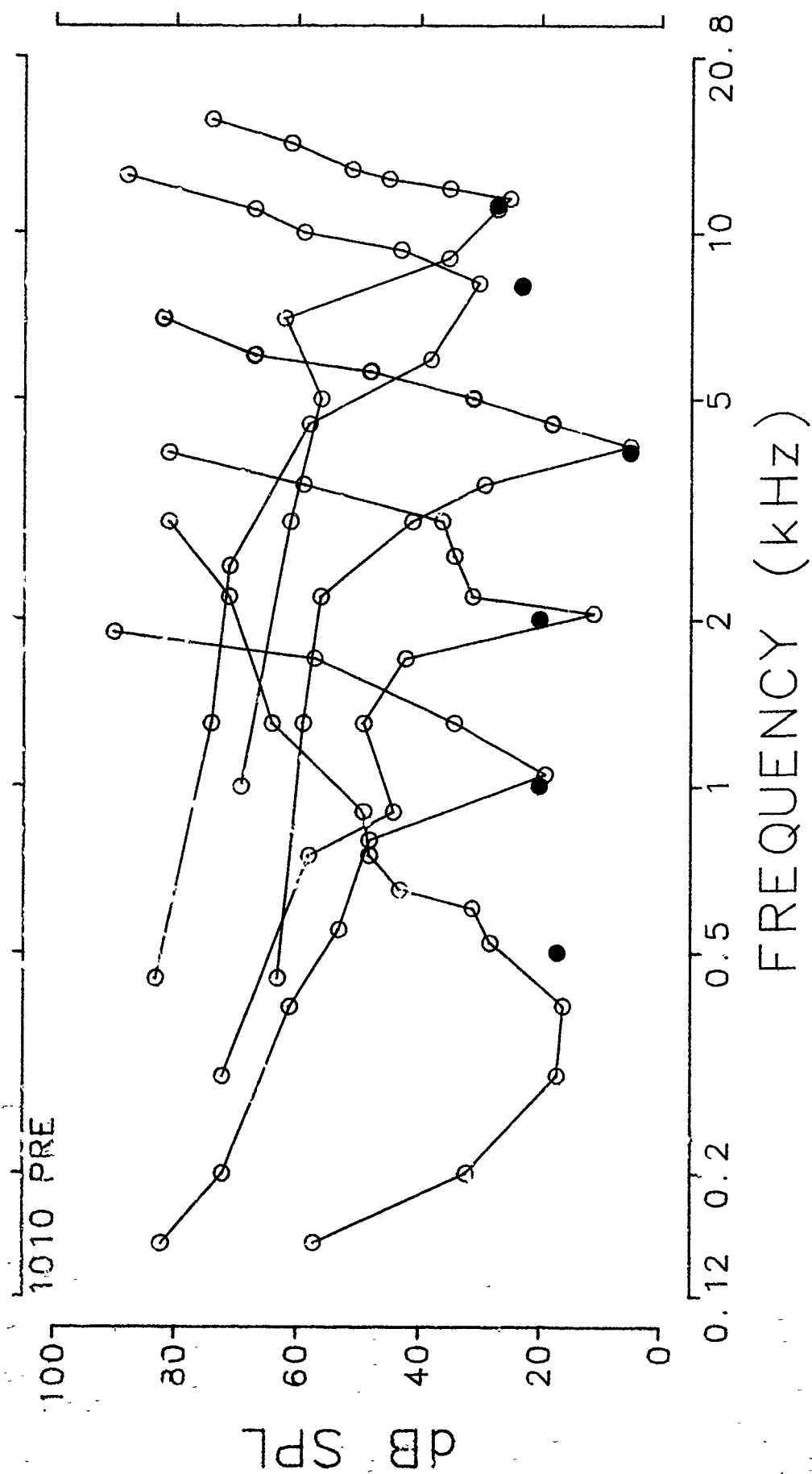


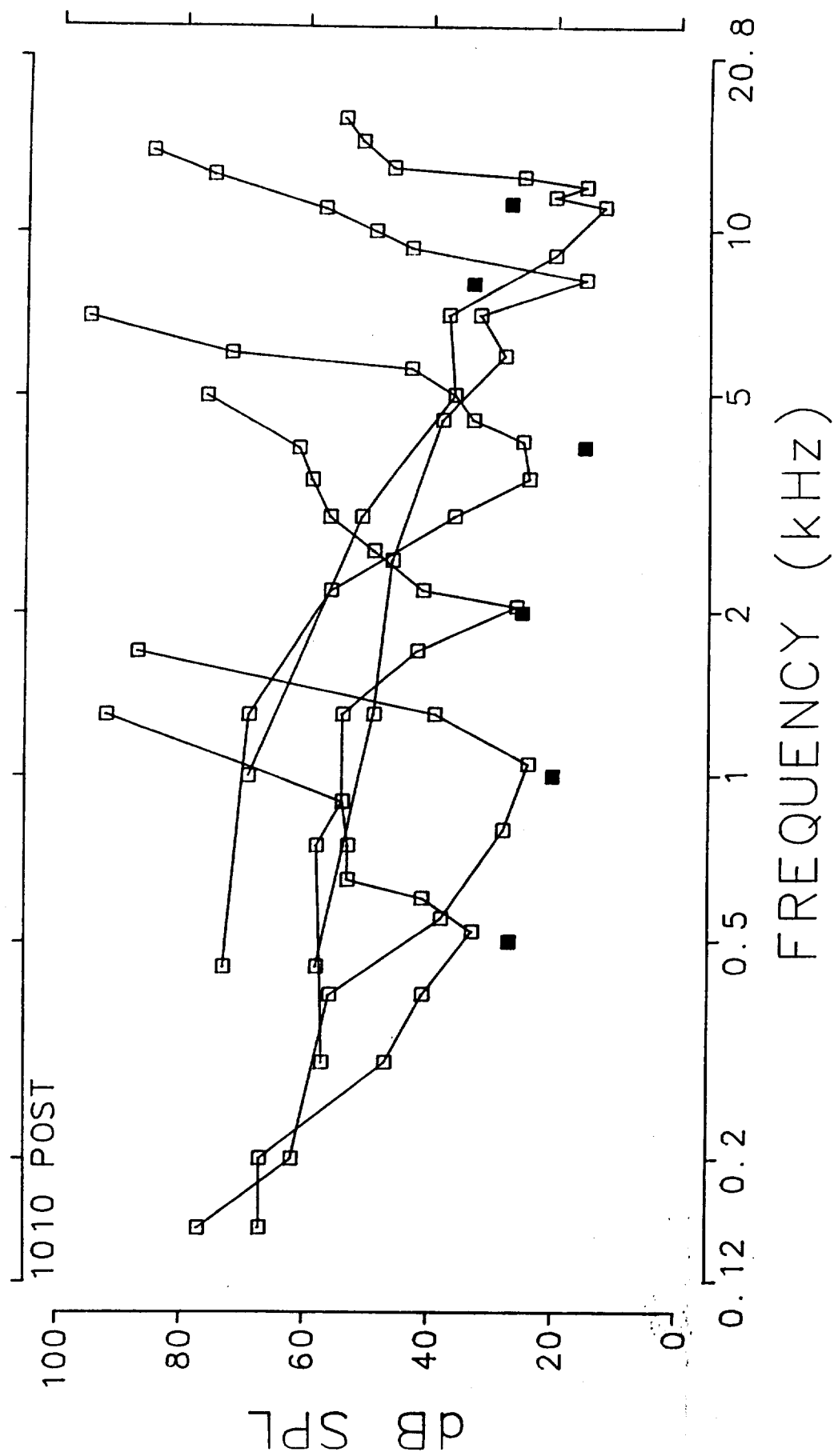












SHOCK TUBE EXPOSURE
150 dB, 10X, 1/MIN

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1010R	6	321	382	377	1080
R1094R	27	93	117	101	311
R1104R	16	36	56	120	212
R1128R	84	148	196	269	613
R1231R	46	259	334	146	739
GROUP MEAN	36				591
S.D.	31				348

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

GROUP MEANS	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
	0.125 kHz	6.4	88.6
	0.25 kHz	4.2	97.4
	0.5 kHz	6.4	86.4
	1 kHz	4.6	108.2
	2 kHz	1.8	116.4
	4 kHz	9.6	73.8
	8 kHz	2.4	11.4
	16 kHz	.2	7.8
STANDARD DEVIATIONS			
	0.125 kHz	6.5	59.8
	0.25 kHz	6.1	76.9
	0.5 kHz	10.5	100.8
	1 kHz	7.5	107.7
	2 kHz	1.9	145.7
	4 kHz	17.6	123.3
	8 kHz	1.5	12.6
	16 kHz	.4	5.9

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1010R							
0.125 kHz	2	20	89	76	185	0	0
0.25 kHz	1	7	46	180	233	0	1
0.5 kHz	0	4	4	43	51	0	0
1 kHz	0	119	86	43	248	0	6
2 kHz	0	169	156	30	355	0	2
4 kHz	1	2	0	2	4	0	0
8 kHz	2	0	1	3	4	0	0
16 kHz	0	0	0	0	0	0	0
TOTALS	6	321	382	377	1080	0	9

CHINCHILLA R1094R

0.125 kHz	8	15	5	10	30	0	0
0.25 kHz	3	10	22	22	54	0	0
0.5 kHz	3	9	26	9	44	0	0
1 kHz	2	5	12	9	26	0	0
2 kHz	5	19	14	12	45	2	2
4 kHz	2	19	21	22	62	1	2
8 kHz	2	10	9	11	30	0	0
16 kHz	1	3	6	6	15	0	0
TOTALS	27	93	117	101	311	3	4

CHINCHILLA R1104R

0.125 kHz	4	10	39	48	97	4	9
0.25 kHz	2	6	9	55	70	0	0
0.5 kHz	2	6	3	10	19	0	1
1 kHz	1	8	1	5	14	1	1
2 kHz	1	2	0	0	2	0	0
4 kHz	4	2	2	0	4	0	0
8 kHz	2	1	1	0	2	0	0
16 kHz	0	1	1	2	4	0	0
TOTALS	16	36	56	120	212	5	11

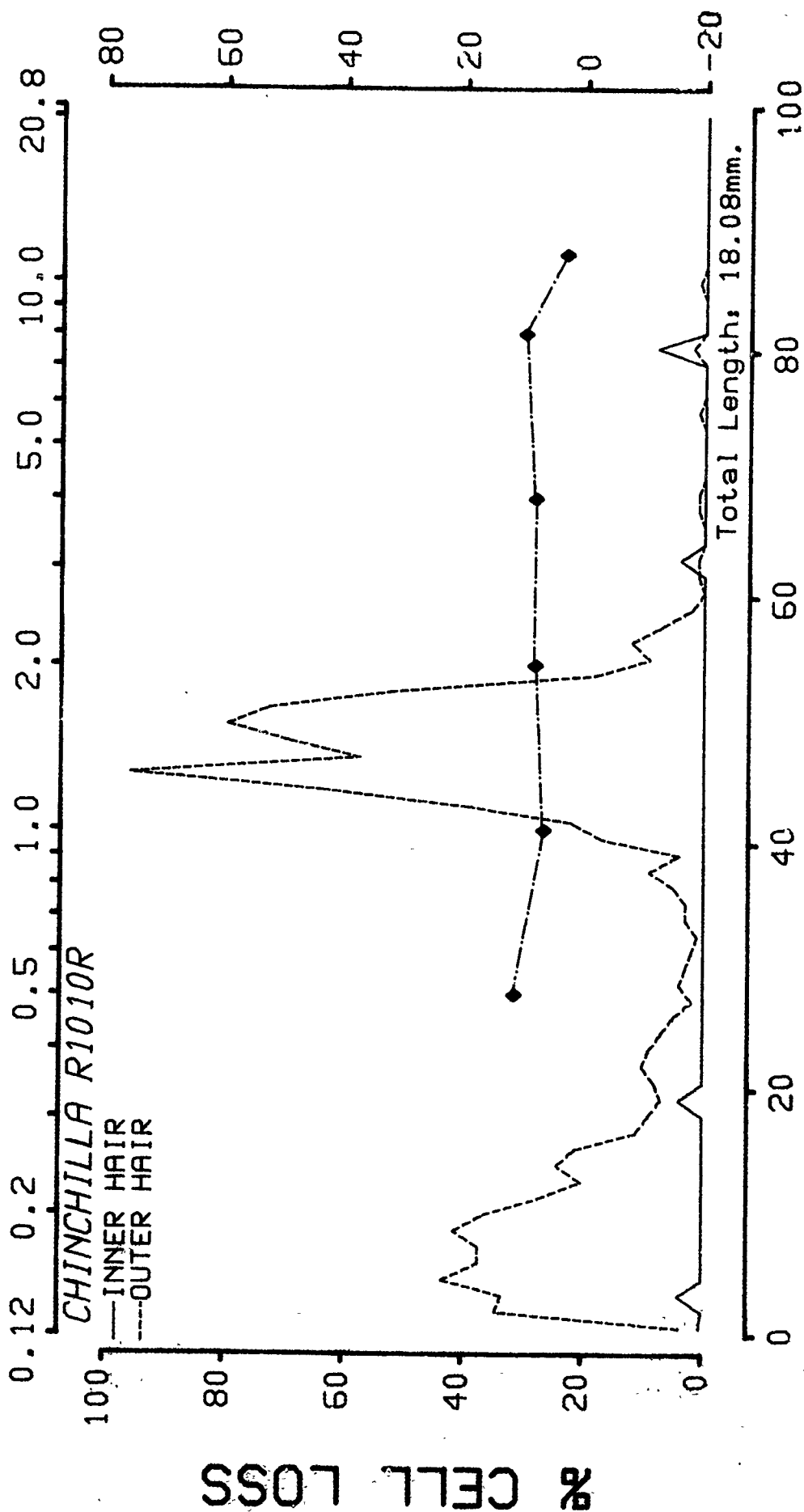
TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1128R							
0.125 kHz	17	6	25	49	80	0	6
0.25 kHz	15	5	7	69	81	0	0
0.5 kHz	2	9	23	21	53	0	0
1 kHz	2	17	21	16	54	0	1
2 kHz	2	4	12	9	25	0	1
4 kHz	41	98	99	93	290	63	43
8 kHz	5	4	5	10	19	0	0
16 kHz	0	5	4	2	11	0	0
TOTALS	84	148	196	269	613	63	51

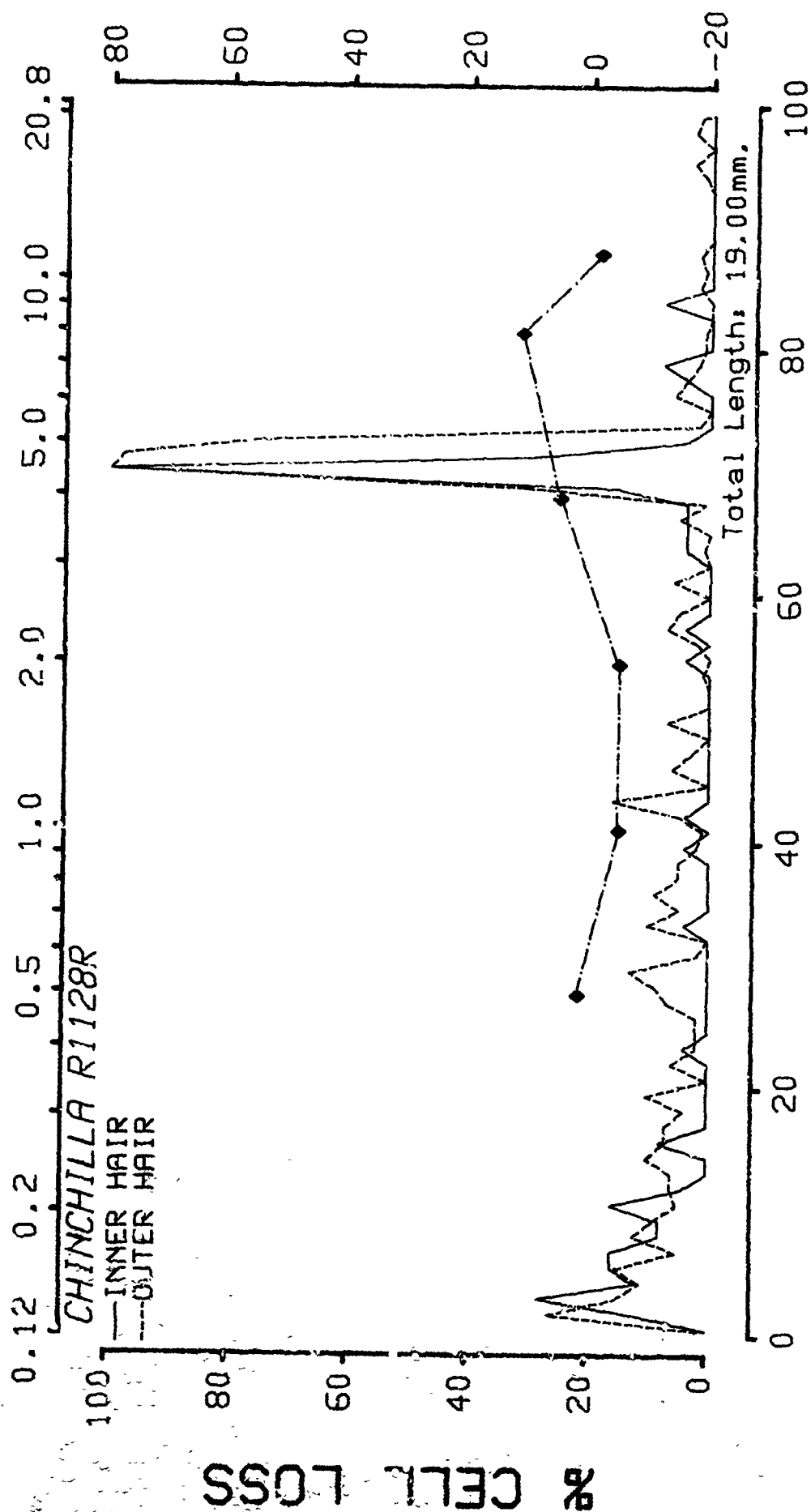
CHINCHILLA R1231R							
0.125 kHz	1	4	16	31	51	0	0
0.25 kHz	0	2	13	34	49	0	1
0.5 kHz	25	102	112	51	265	40	54
1 kHz	18	79	104	16	199	5	8
2 kHz	1	62	86	7	155	1	1
4 kHz	0	7	0	2	9	1	0
8 kHz	1	1	1	0	2	0	0
16 kHz	0	2	2	5	9	0	0
TOTALS	46	259	334	146	739	47	64

Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (kHz)

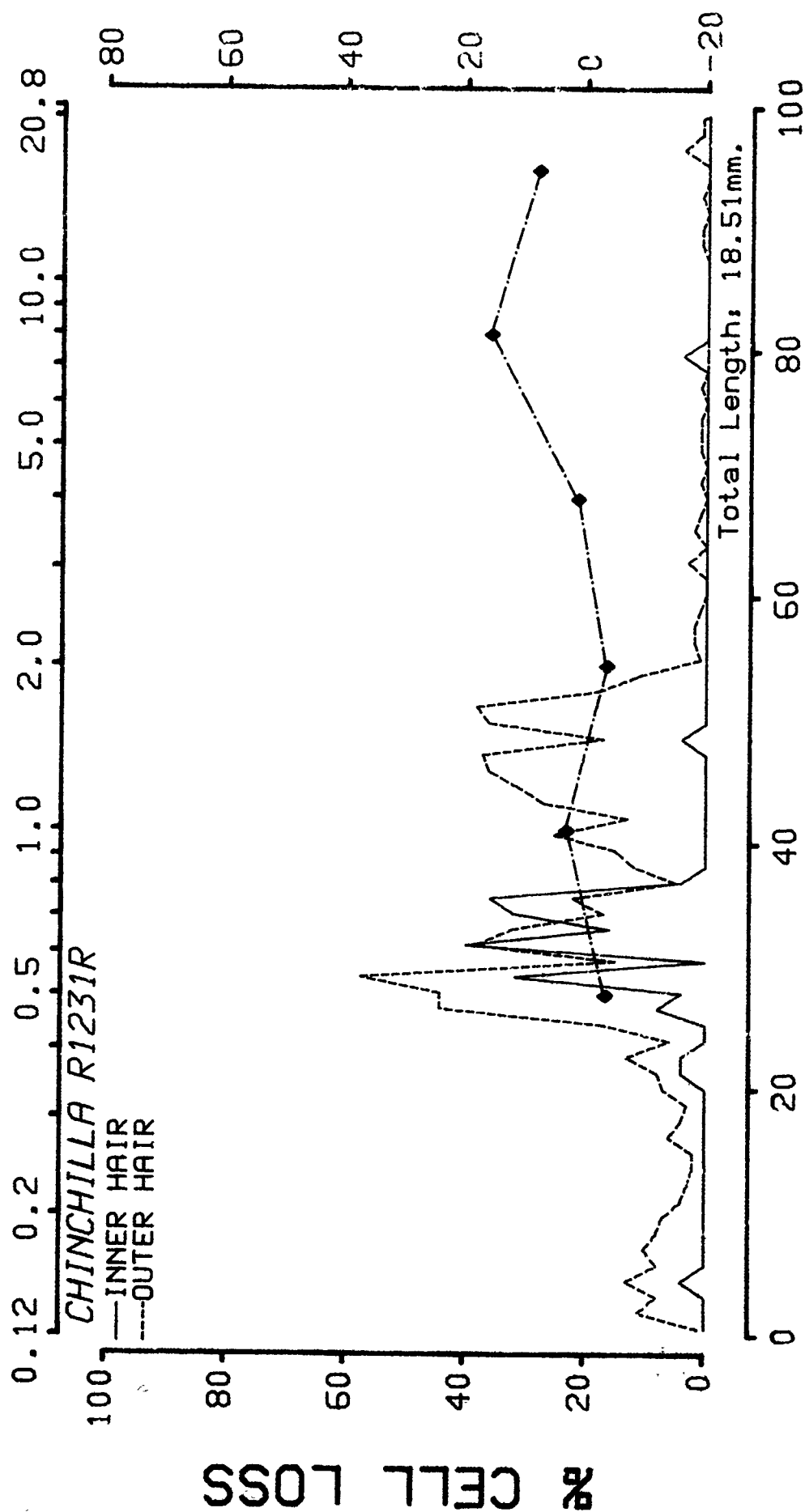


FREQUENCY (kHz)



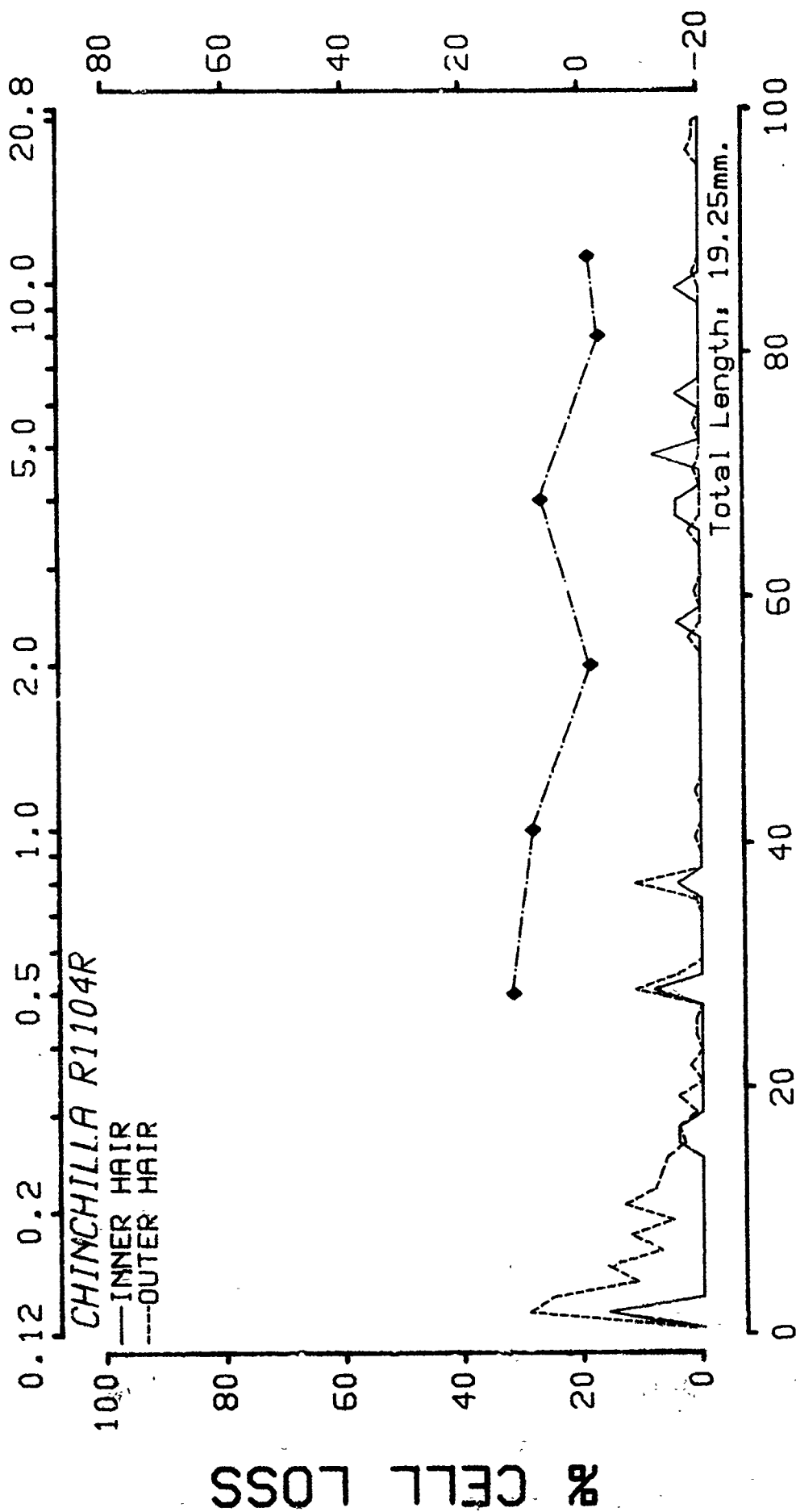
% TOTAL DISTANCE FROM APEX

FREQUENCY (KHZ)



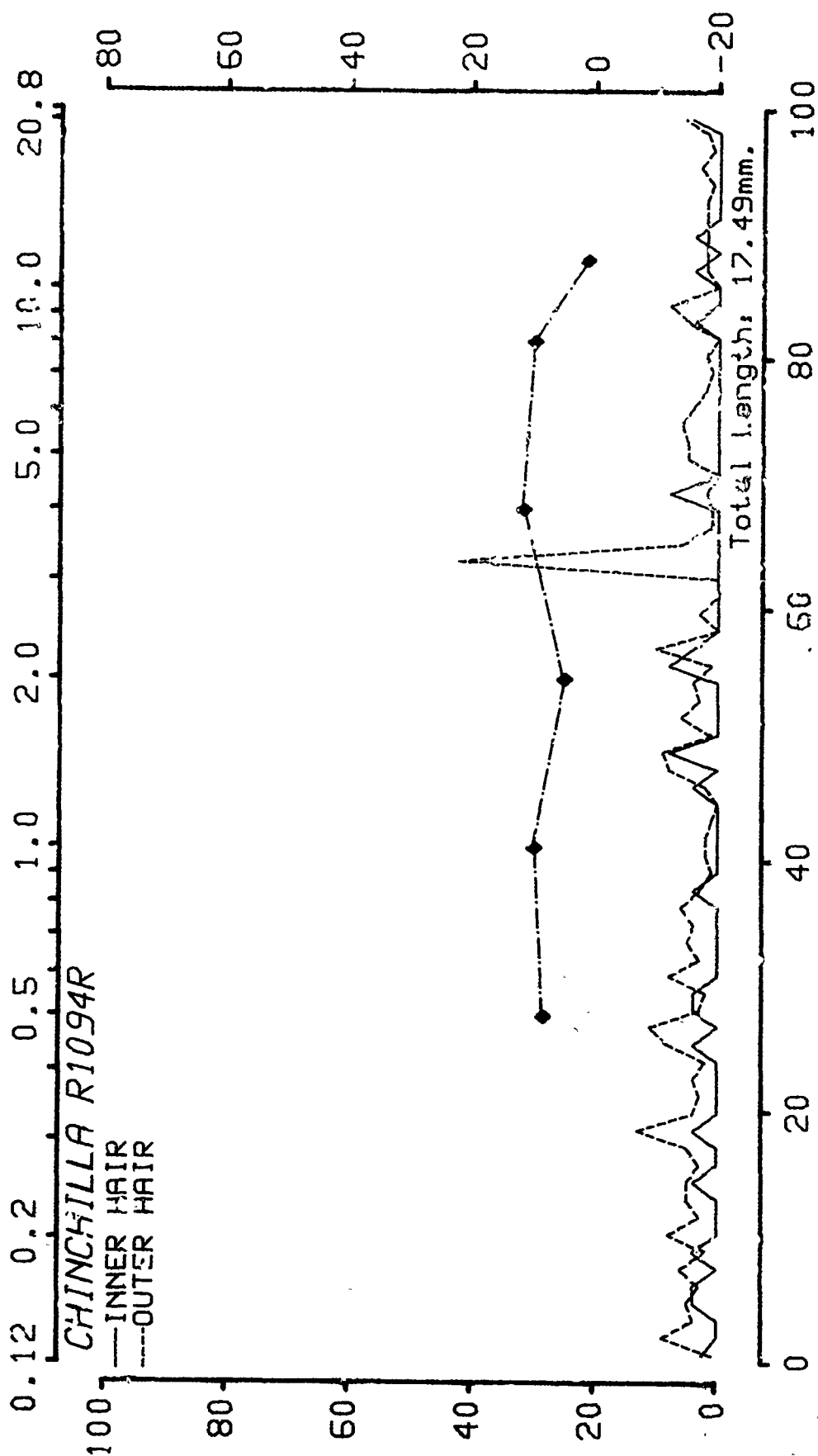
% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



% CELL LOSS

% TOTAL DISTANCE FROM APEX

Summary Data for the Group Exposed to:

150 dB, 100X, 1/M

Animal

1365	-	Completed the Entire Protocol
1448	-	Completed the Entire Protocol
1510	-	Completed the Entire Protocol
1564	-	Completed the Entire Protocol
1597	-	Completed the Entire Protocol
1539	-	No Tuning Curves Collected
1452	-	Audiometric data not used. The left cochlea was not destroyed.

150 dB 100X 1/M

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1365	17.5	10.8	10.8	2.5	15.8	20.8	*****
1448	25.8	12.5	9.2	4.2	10.8	7.5	*****
1510	29.2	14.2	20.8	12.5	27.5	27.5	*****
1539	20.8	15.8	22.5	20.8	32.5	29.2	*****
1564	35.8	22.5	15.8	10.8	20.8	20.8	*****
1597	25.0	17.5	10.8	5.8	27.5	29.2	*****
Mean	25.7	15.6	15.0	9.4	22.5	22.5	*****
S.D.	6.4	4.1	5.7	6.8	8.2	8.3	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1365	39.2	34.2	30.8	19.2	25.8	22.5	*****
1448	24.2	15.8	15.8	-0.8	5.8	12.5	*****
1510	27.5	15.8	24.2	19.2	29.2	29.2	*****
1539	49.2	37.5	30.8	32.5	40.8	40.8	*****
1564	39.2	40.8	39.2	12.5	25.8	25.8	*****
1597	55.8	39.2	37.5	9.2	19.2	39.2	*****
Mean	39.2	30.6	29.7	15.3	24.4	28.3	*****
S.D.	12.2	11.6	8.7	11.2	11.6	10.6	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1365	21.7	23.3	20.0	16.7	10.0	1.7	*****
1448	-1.7	3.3	6.7	-5.0	-5.0	5.0	*****
1510	-1.7	1.7	3.3	6.7	1.7	1.7	*****
1539	28.3	21.7	8.3	11.7	6.3	11.7	*****
1564	3.3	18.3	23.3	1.7	5.0	5.0	*****
1597	30.8	21.7	26.7	3.3	-8.3	10.0	*****
Mean	13.5	15.0	14.7	5.8	2.0	5.8	*****
S.D.	15.2	9.8	9.8	7.7	7.3	4.2	*****

150 dB 100X 1/M

TEMPORARY THRESHOLD SHIFT (dB)

Frequency 0.5 kHz

Animal\Hr	0	2	8	24	240	Max
1365	65.0	72.5*	45.0	30.0	15.0	72.5
1448	46.7	36.7	16.7	6.7	*****	46.7
1510	43.3	23.3	3.3	18.3	3.3	43.3
1539	41.7	41.7	26.7	26.7	21.7	41.7
1564	54.2*	54.2*	54.2*	26.7	1.7	54.2
1597	60.0*	60.0*	60.0*	42.5	17.5	60.0
Mean	51.8	48.1	34.3	25.1	11.8	53.1
S.D.	9.5	17.7	22.4	12.0	8.9	11.8

Frequency 2.0 kHz

Animal\Hr	0	2	8	24	240	Max
1365	66.7	66.7	46.7	36.7	21.7	66.7
1448	58.3	53.3	33.3	13.3	*****	58.3
1510	51.7	41.7	21.7	-3.3	6.7	51.7
1539	40.0	30.0	15.0	15.0	5.0	40.0
1564	74.2*	74.2*	66.7	41.7	26.7	74.2
1597	74.2*	74.2*	66.7	51.7	26.7	74.2
Mean	60.8	56.7	41.7	25.8	17.3	60.8
S.D.	13.5	18.2	22.2	20.8	10.7	13.5

Frequency 8.0 kHz

Animal\Hr	0	2	8	24	240	Max
1365	74.2*	74.2*	16.7	-3.3	1.7	74.2
1448	51.7	56.7	11.7	-8.3	*****	56.7
1510	62.5*	52.5*	20.0	25.0	10.0	62.5
1539	30.0	20.0	15.0	5.0	5.0	30.0
1564	61.7	69.2*	56.7	16.7	11.7	69.2
1597	57.5*	57.5*	57.5*	35.0	15.0	57.5
Mean	56.2	55.0	29.6	11.7	8.7	58.3
S.D.	14.8	19.0	21.5	16.8	5.3	15.4

MASKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

Probe Frequency: 0.5 kHz

Masker (kHz):	0.150	0.200	0.300	0.400	0.520	0.600	0.650	0.750	1.300	2.200
Animal (Q-10 dB)	Pre-Exposure									
1365 (3.57)	67.5	52.5	32.5	27.5	17.5	12.5	32.5	32.5	47.5	90.0*
1448 (3.11)	67.5	62.5	52.5	47.5	37.5	32.5	42.5	42.5	72.5	92.5
1510 (1.91)	72.5	72.5	57.5	52.5	47.5	42.5	37.5	37.5	77.5	95.0*
1564 (1.28)	67.5	67.5	62.5	62.5	57.5	52.5	57.5	52.5	90.0*	97.5
1597 (2.27)	87.5	87.5	57.5	62.5	52.5	47.5	42.5	40.0	72.5	87.5
Mean (2.43)	72.5	68.5	52.5	50.5	42.5	37.5	42.5	41.0	72.0	92.5
S.D. (9.92)	8.7	12.9	11.7	14.4	15.8	15.8	9.4	7.4	15.5	4.0
Animal (Q-10 dB)	Post-Exposure									
1365 (4.55)	67.5	57.5	57.5	52.5	37.5	27.5	37.5	57.5	87.5	82.5
1448 (1.30)	67.5	57.5	47.5	42.5	32.5	32.5	37.5	37.5	80.0*	90.0*
1510 (1.49)	57.5	57.5	47.5	42.5	32.5	27.5	27.5	27.5	67.5	90.0*
1564 (1.72)	72.5	67.5	67.5	67.5	62.5	57.5	57.5	67.5	95.0*	100.0*
1597 (2.18)	77.5	77.5	72.5	67.5	62.5	62.5	57.5	77.5	87.5	92.5
Mean (2.27)	68.5	63.5	58.5	54.5	45.5	41.5	43.5	53.5	83.5	91.0
S.D. (1.37)	7.4	8.9	11.4	12.5	15.7	17.1	13.4	20.7	10.4	6.3

MASKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

Probe Frequency: 1.0 kHz

Masker (kHz):	0.150	0.200	0.400	0.550	0.800	1.050	1.300	1.700	1.900	2.500
Animal (Q-10 dB)	Pre-Exposure									
1365 (2.10)	95.0*	90.0*	62.5	47.5	37.5	27.5	37.5	62.5	72.5	90.0*
1448 (1.05)	72.5	62.5	47.5	32.5	27.5	22.5	22.5	37.5	42.5	72.5
1510 (2.55)	72.5	72.5	52.5	42.5	32.5	22.5	37.5	52.5	50.0	67.5
1564 (1.45)	72.5	72.5	67.5	57.5	52.5	50.0*	47.5	72.5	80.0*	90.0*
1597 (1.58)	87.5	87.5	72.5	57.5	42.5	37.5	42.5	67.5	77.5	87.5
Mean (1.74)	80.0	77.0	60.5	47.5	38.5	32.0	37.5	58.5	64.5	81.5
S.D. (0.59)	10.6	11.5	10.4	10.6	9.6	11.8	9.4	13.9	17.1	10.7
Animal (Q-10 dB)	Post-Exposure									
1365 (1.70)	77.5	82.5	77.5	67.5	62.5	57.5	77.5	97.5	97.5	102.5
1448 (1.59)	72.5	67.5	52.5	42.5	37.5	32.5	47.5	70.0*	77.5	90.0*
1510 (1.65)	72.5	67.5	52.5	42.5	32.5	27.5	37.5	57.5	62.5	77.5
1564 (2.38)	87.5	87.5	87.5	82.5	67.5	82.5	90.0*	92.5	100.0*	100.0*
1597 (1.28)	67.5	67.5	62.5	57.5	47.5	42.5	47.5	57.5	57.5	50.0
Mean (1.72)	75.5	74.5	66.5	58.5	49.5	48.5	60.0	75.0	79.0	84.0
S.D. (0.41)	7.6	9.7	15.6	17.1	15.2	22.2	22.5	19.0	19.5	21.4

MASKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

1365 (1.26)	67.5	47.5	42.5	40.0	45.0	****	42.5	57.5	82.5	82.5
1448 (5.34)	67.5	35.0	30.0	32.5	25.0	12.5	27.5	37.5	57.5	90.0*
1510 (6.88)	77.5	57.5	62.5	57.5	47.5	22.5	32.5	47.5	80.0*	85.0*
1564 (2.70)	62.5	52.5	37.5	42.5	42.5	27.5	32.5	42.5	47.5	90.0*
1597 (4.01)	87.5	42.5	37.5	37.5	37.5	17.5	22.5	42.5	57.5	72.5

Mean (4.04)	72.5	47.0	42.0	42.0	39.5	20.0	31.5	45.5	65.0	84.0
S.D. (2.20)	10.0	8.7	12.3	9.4	8.9	6.5	7.4	7.6	15.4	7.2

Animal (Q-10 dB)

Post-Exposure

1365 (9.28)	72.5	47.5	47.5	57.5	62.5	37.5	57.5	80.0*	80.0*	90.0*
1448 (3.58)	50.0	30.0	30.0	35.0	27.5	7.5	7.5	37.5	57.5	90.0*
1510 (6.88)	67.5	42.5	42.5	42.5	47.5	22.5	32.5	37.5	57.5	72.5
1564 (****)	87.5	67.5	62.5	62.5	67.5	57.5	62.5	52.5	42.5	47.5
1597 (0.94)	67.5	47.5	42.5	37.5	37.5	37.5	32.5	37.5	47.5	87.5

Mean (5.17)	69.0	47.0	45.0	47.0	48.5	32.5	38.5	49.0	57.0	77.5
S.D. (3.66)	13.4	13.5	11.7	12.3	16.7	18.7	22.2	18.5	14.4	18.3

MASKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

Probe Frequency: 4.0 kHz

Masker (kHz):	0.450	1.300	2.200	3.000	3.500	4.100	4.500	5.000	5.600	6.000
Animal (Q-10 dB)	Pre-Exposure									
1365 (3.74)	72.5	57.5	52.5	47.5	32.5	22.5	27.5	52.5	67.5	77.5
1448 (2.81)	72.5	57.5	51.5	47.5	27.5	22.5	22.5	37.5	62.5	95.0*
1510 (4.61)	75.0*	57.5	42.5	42.5	32.5	17.5	22.5	52.5	52.5	62.5
1564 (3.26)	77.5	57.5	47.5	42.5	32.5	27.5	37.5	42.5	47.5	52.5
1597 (3.71)	77.5	57.5	52.5	42.5	17.5	12.5	22.5	37.5	47.5	62.5
Mean (3.62)	75.0	57.5	49.3	44.5	28.5	20.5	26.5	44.5	55.5	70.0
S.D. (0.67)	2.5	0.0	4.3	2.7	6.5	5.7	6.5	7.6	9.1	16.6
Animal (Q-10 dB)	Post-Exposure									
1365 (2.47)	73.5	62.5	67.5	57.5	42.5	47.5	47.5	80.0*	97.5	95.0*
1448 (4.10)	72.5	62.5	42.5	42.5	27.5	17.5	27.5	47.5	62.5	72.5
1510 (4.10)	80.0*	67.5	70.0*	52.5	42.5	32.5	42.5	67.5	62.5	72.5
1564 (3.26)	77.5	57.5	57.5	47.5	37.5	32.5	42.5	52.5	62.5	87.5
1597 (****)	****	****	****	****	****	****	****	****	****	****
Mean (3.48)	75.6	62.5	59.4	50.0	37.5	32.5	40.0	61.9	71.3	81.9
S.D. (0.78)	3.7	4.1	12.5	6.5	7.1	12.2	8.7	14.8	17.5	11.3

MARKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

Probe Frequency: 8.0 kHz

Masker (kHz):	0.450	1.300	2.500	5.900	7.000	8.100	9.300	11.000	12.700	14.000
Animal (Q-10 dB)	Pre-Exposure									
1365 (4.58)	72.5	62.5	72.5	47.5	47.5	27.5	37.5	90.0*	95.0*	85.0*
1448 (7.68)	87.5	67.5	67.5	52.5	60.0	17.5	32.5	67.5	75.0*	87.5
1510 (1.77)	75.0*	70.0*	62.5	37.5	27.5	22.5	27.5	32.5	57.5	57.5
1564 (3.57)	82.5	57.5	62.5	52.5	37.5	32.5	47.5	62.5	90.0*	95.0*
1597 (2.29)	72.5	62.5	57.5	47.5	32.5	32.5	42.5	67.5	72.5	77.5
Mean (3.98)	78.0	64.0	64.5	47.5	41.0	26.5	37.5	64.0	78.0	80.5
S.D. (2.34)	6.7	4.9	5.7	6.1	12.9	6.5	7.9	20.6	14.9	14.3
Animal (Q-10 dB)	Post-Exposure									
1365 (3.10)	92.5	72.5	72.5	42.5	37.5	32.5	60.0*	95.0*	95.0*	85.0*
1448 (4.25)	80.0*	70.0*	57.5	42.5	27.5	22.5	50.0*	52.5	67.5	72.5
1510 (3.26)	82.5	72.5	62.5	52.5	47.5	32.5	37.5	52.5	75.0*	85.0*
1564 (4.31)	87.5	62.5	62.5	42.5	47.5	37.5	52.5	62.5	77.5	92.5
1597 (*****)	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Mean (3.73)	85.6	69.4	63.8	45.0	40.0	31.2	50.0	65.6	78.8	83.8
S.D. (0.64)	5.5	4.7	6.3	5.0	9.6	6.3	9.4	20.1	11.6	8.3

MASKED THRESHOLDS (dB SPL) Group: 150 dB 100X 1/M

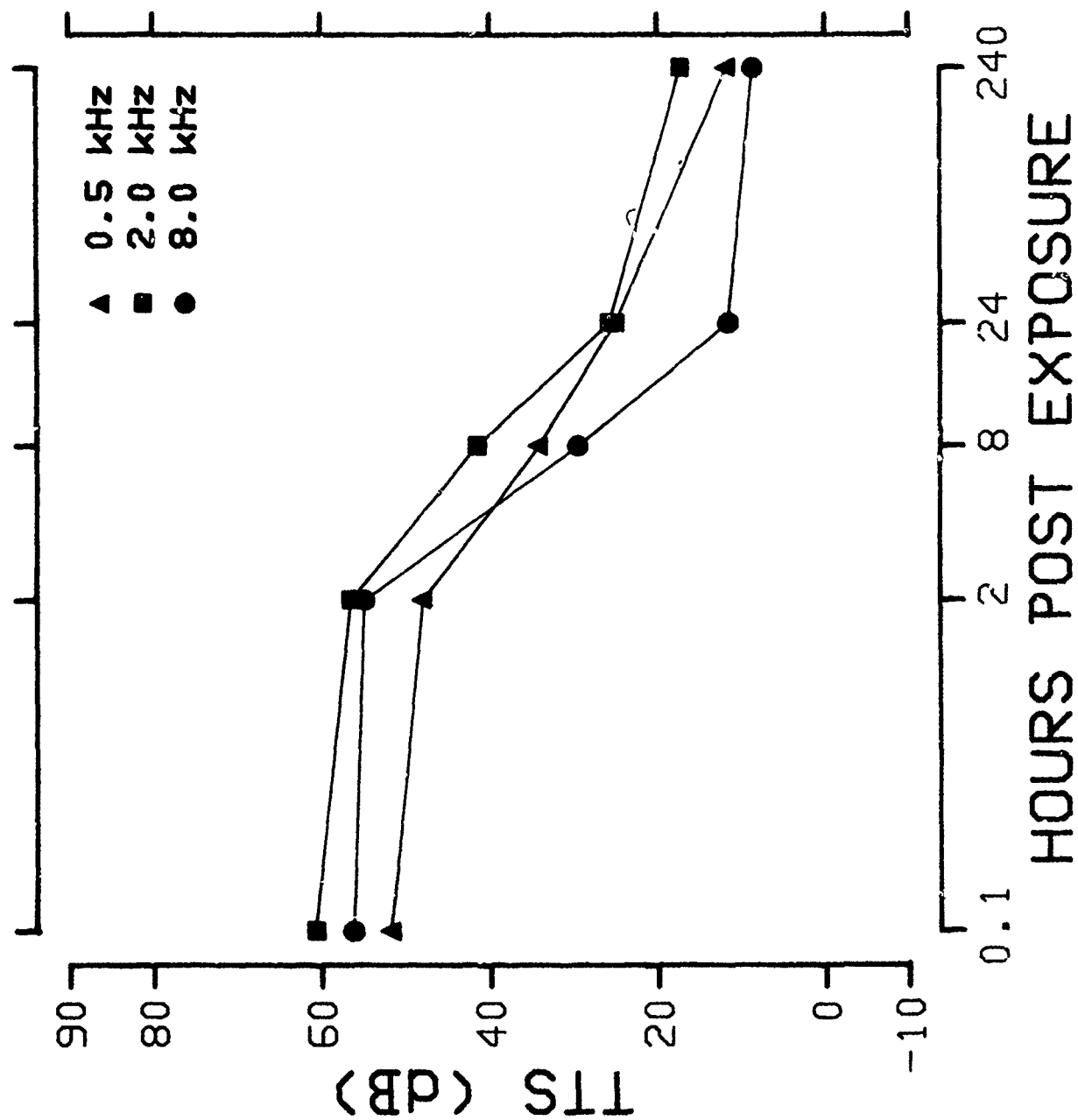
Probe Frequency: 11.2 kHz

Masker (kHz):	1.000	4.000	7.000	9.000	11.000	11.500	12.000	13.000	14.500	16.000
Animal (Q-10 dB)	Pre-Exposure									
1365 (8.81)	72.5	47.5	62.5	52.5	32.5	57.5	37.5	47.5	62.5	90.0*
1448 (7.24)	62.5	52.5	57.5	57.5	32.5	27.5	22.5	37.5	47.5	90.0*
1510 (2.99)	65.0*	52.5	65.0*	45.0*	27.5	27.5	32.5	32.5	47.5	52.5
1564 (5.36)	72.5	52.5	62.5	42.5	22.5	27.5	32.5	32.5	32.5	47.5
1597 (4.63)	67.5	52.5	52.5	57.5	27.5	17.5	22.5	22.5	37.5	57.5
Mean (5.81)	68.0	51.5	60.0	51.0	28.5	31.5	29.5	34.5	45.5	67.5
S.D. (2.27)	4.5	2.2	5.0	7.0	4.2	15.2	6.7	9.1	11.5	20.8

Animal (Q-10 dB)	Post-Exposure									
1365 (3.43)	67.5	47.5	62.5	62.5	37.5	42.5	37.5	42.5	62.5	90.0*
1448 (****)	****	****	****	****	****	****	****	****	****	****
1510 (7.47)	67.5	52.5	57.5	47.5	27.5	22.5	32.5	47.5	47.5	72.5
1564 (2.85)	67.5	52.5	57.5	52.5	37.5	37.5	42.5	42.5	57.5	77.5
1597 (****)	****	****	****	****	****	****	****	****	****	****
Mean (4.58)	67.5	50.8	59.2	54.2	34.2	34.2	37.5	44.2	55.8	80.0
S.D. (2.52)	0.0	2.9	2.9	7.6	5.8	10.4	5.0	2.9	7.6	9.0

The Group Mean Recovery Curves
Measured at Three Test Frequencies

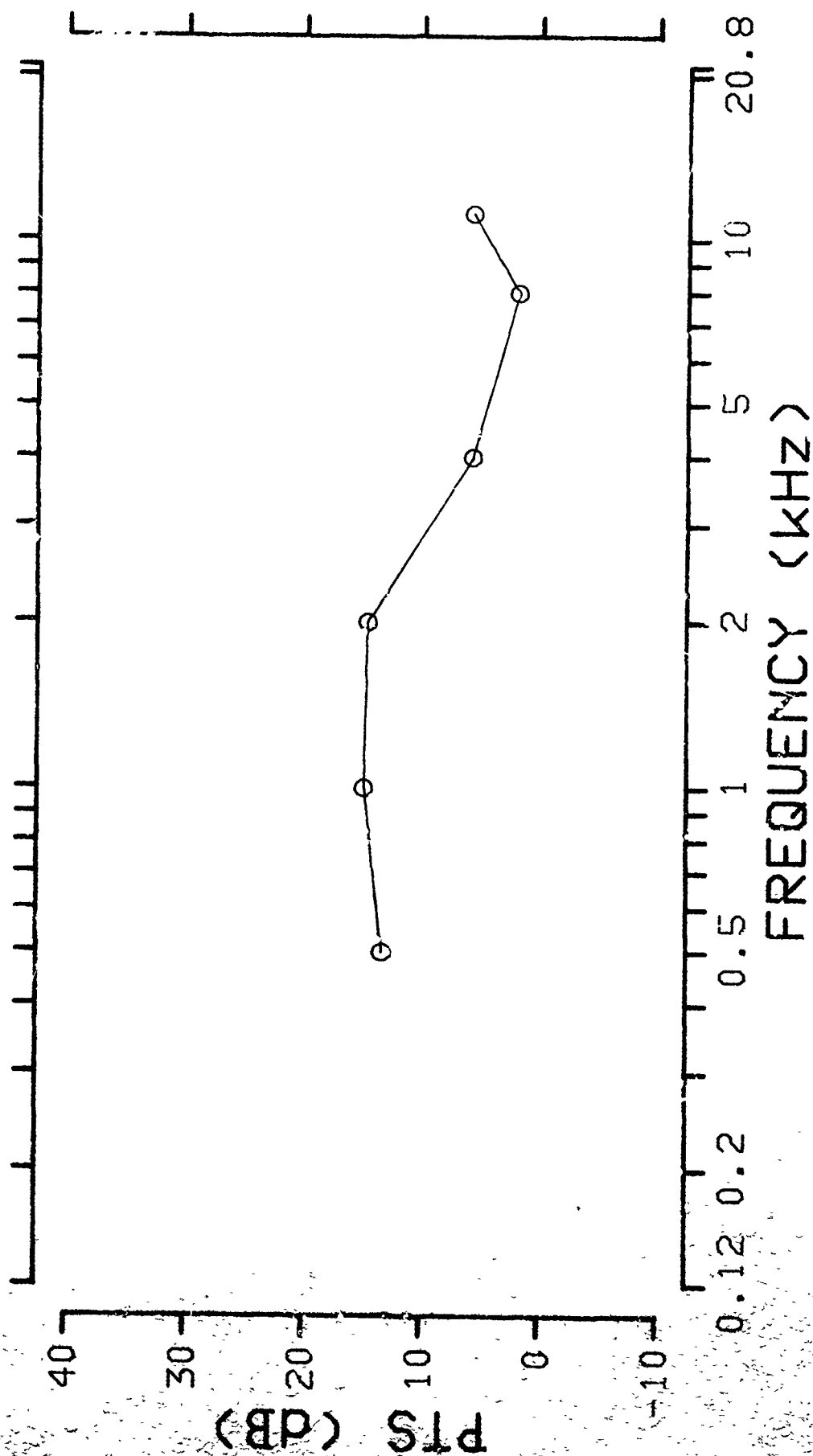
MEAN DATA (n=6) - 150 dB 100X 1/M



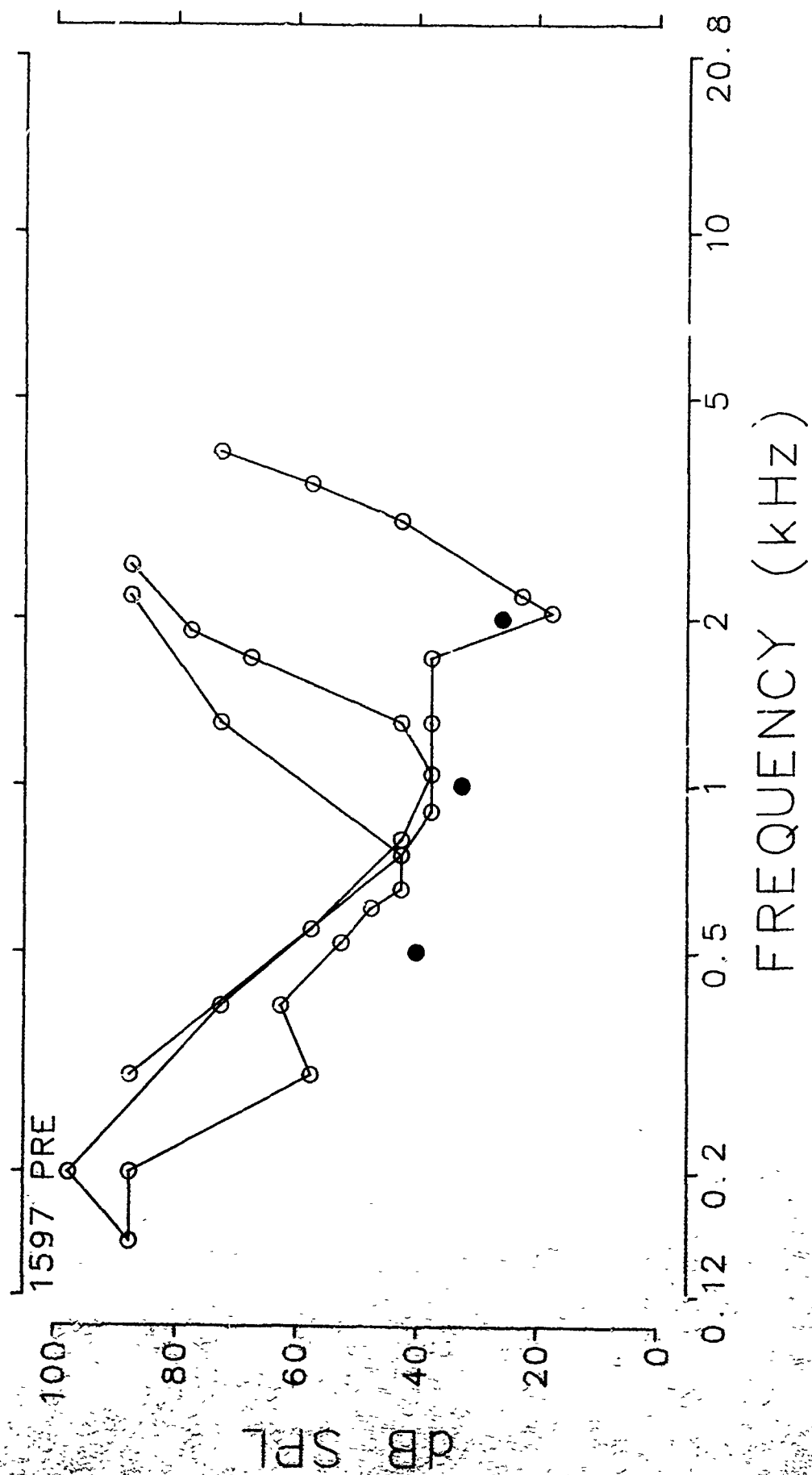
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

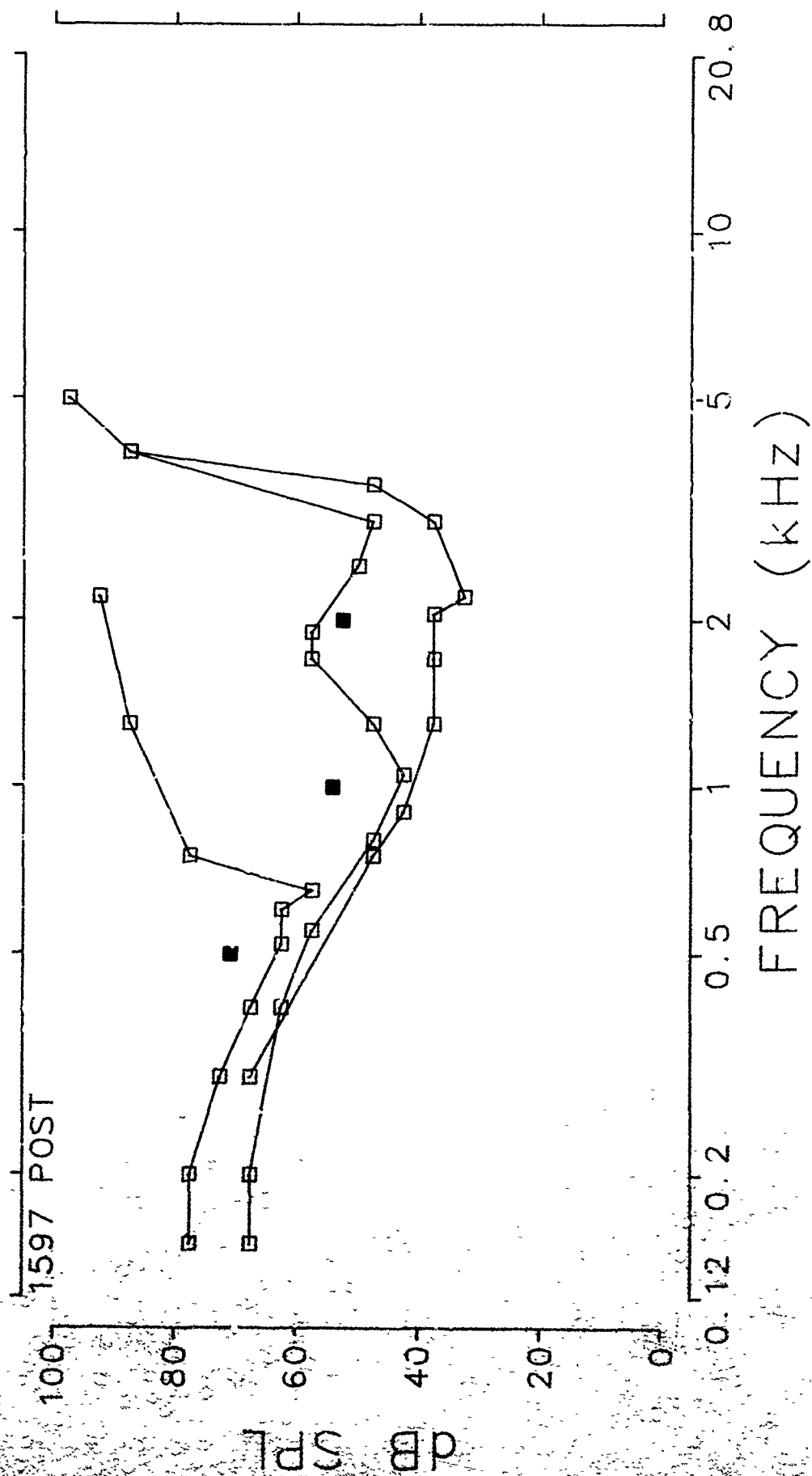
The solid symbol represents the threshold of the probe tone.

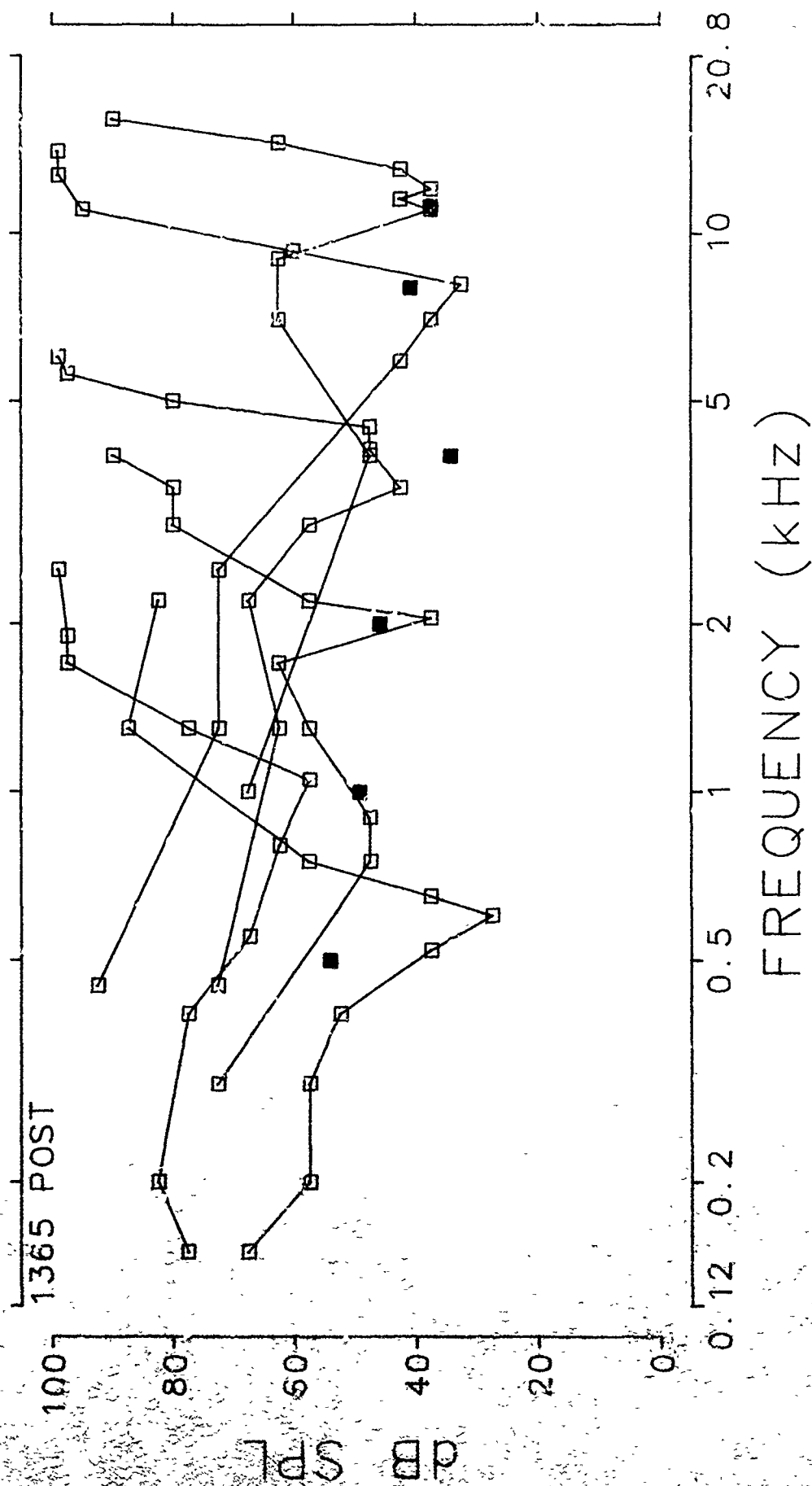
MEAN DATA (n=6) - 150 dB 100X 1/M

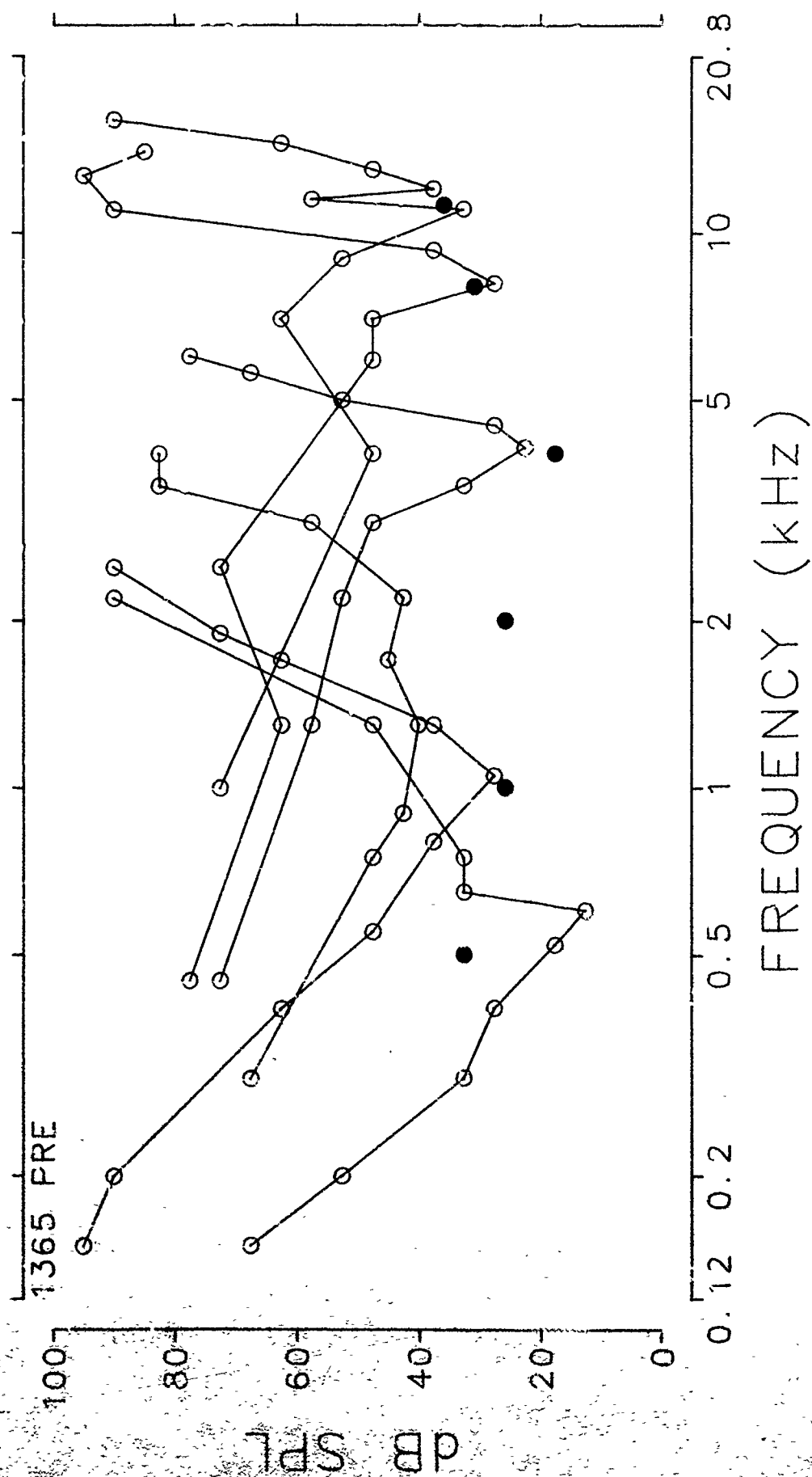


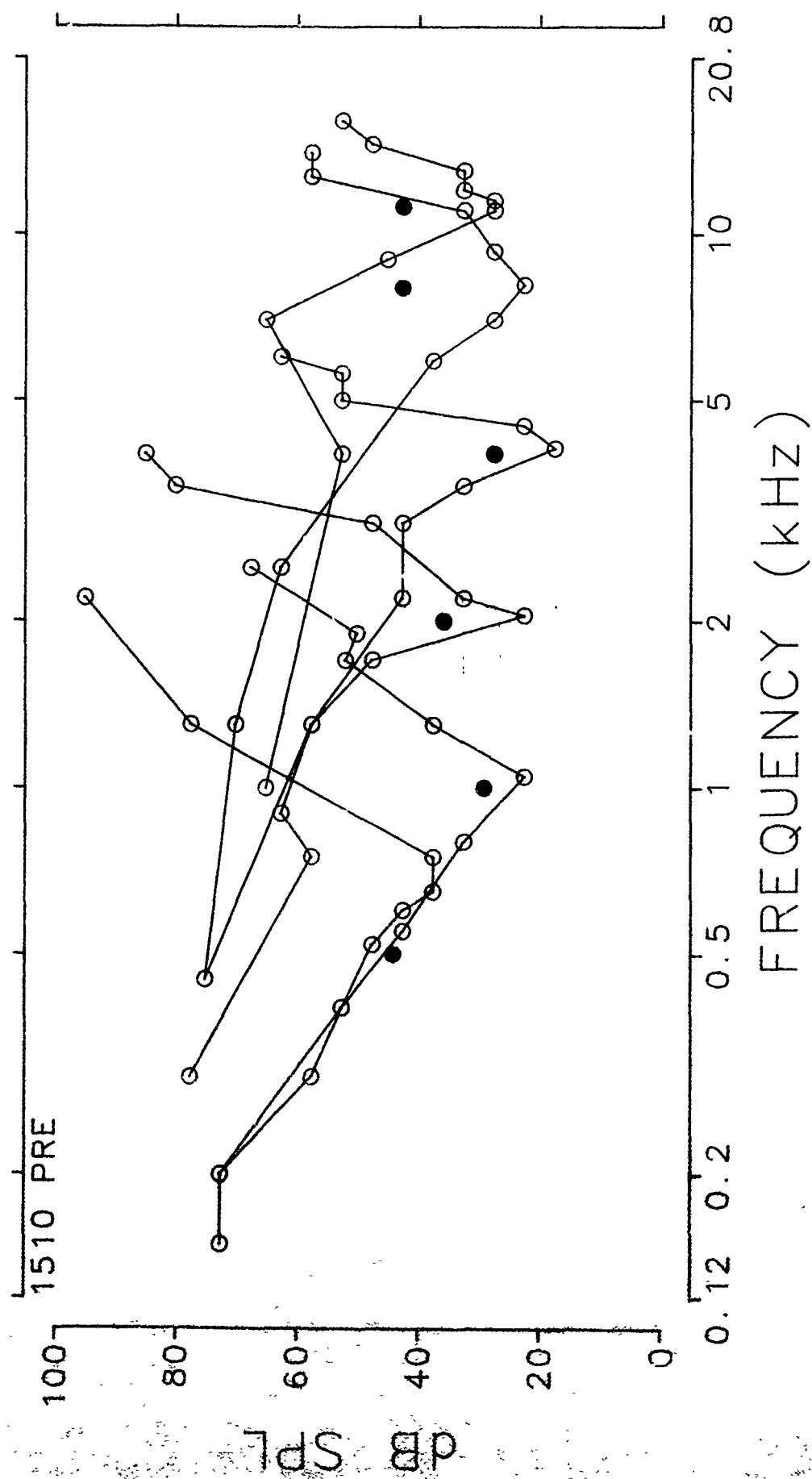
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

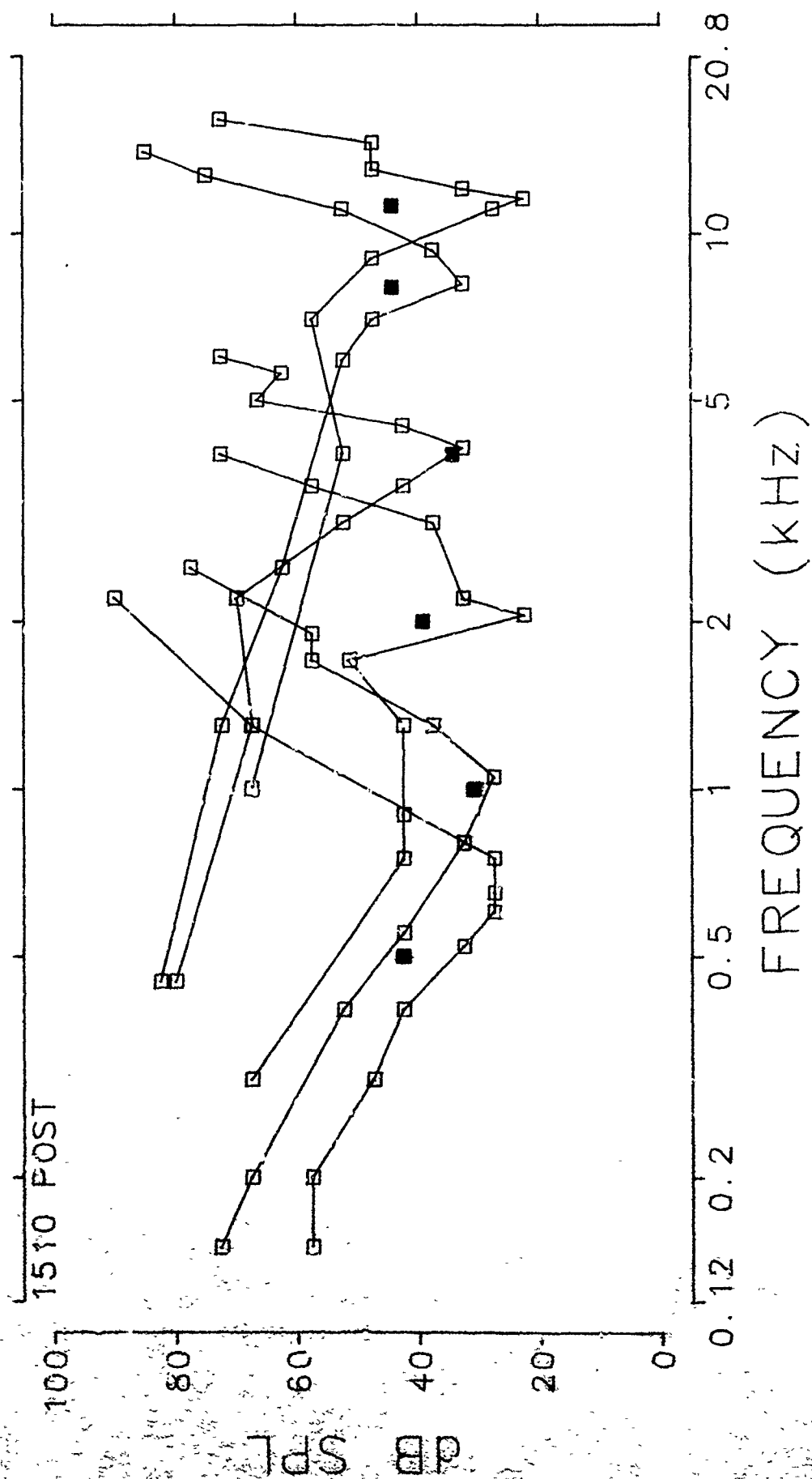


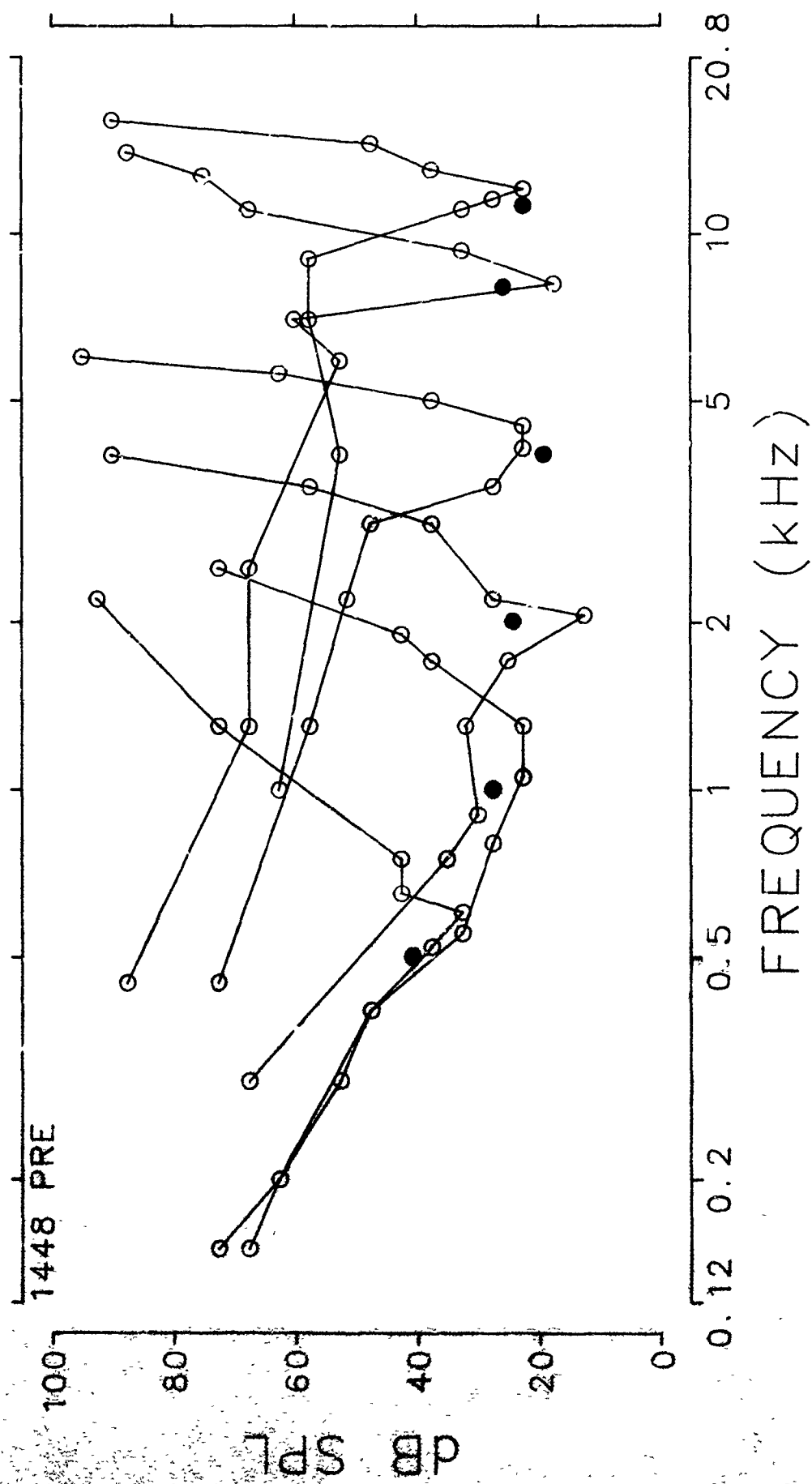


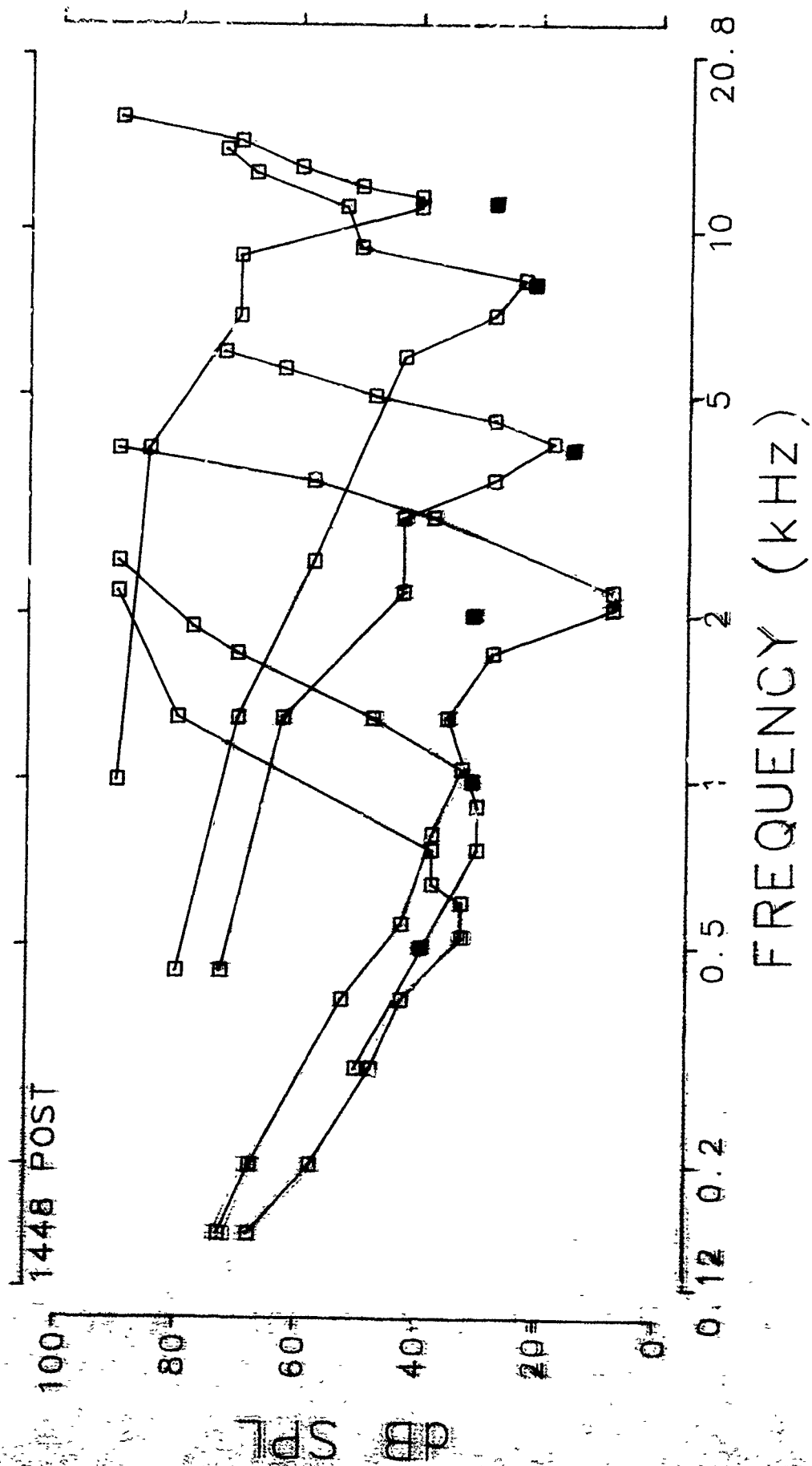


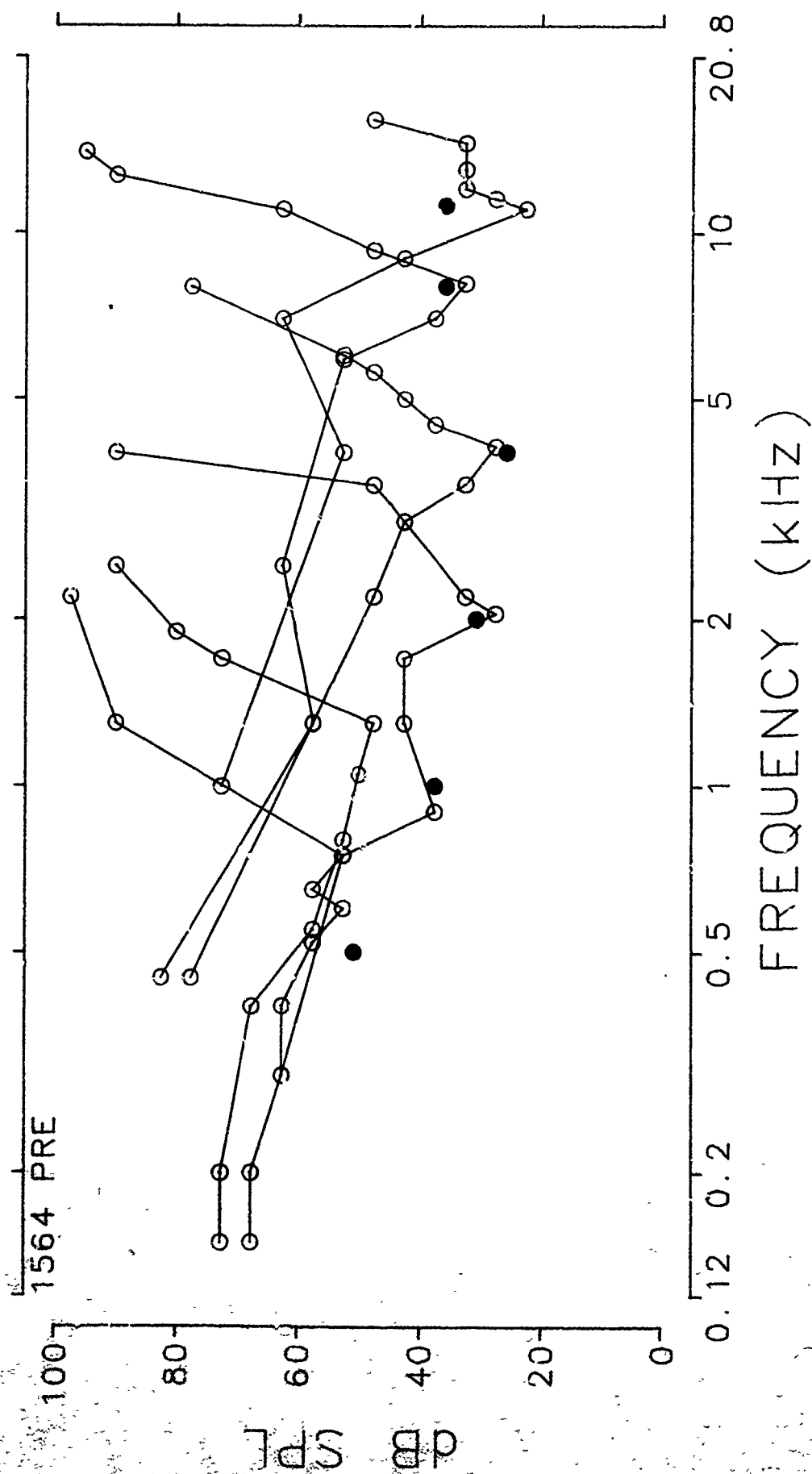


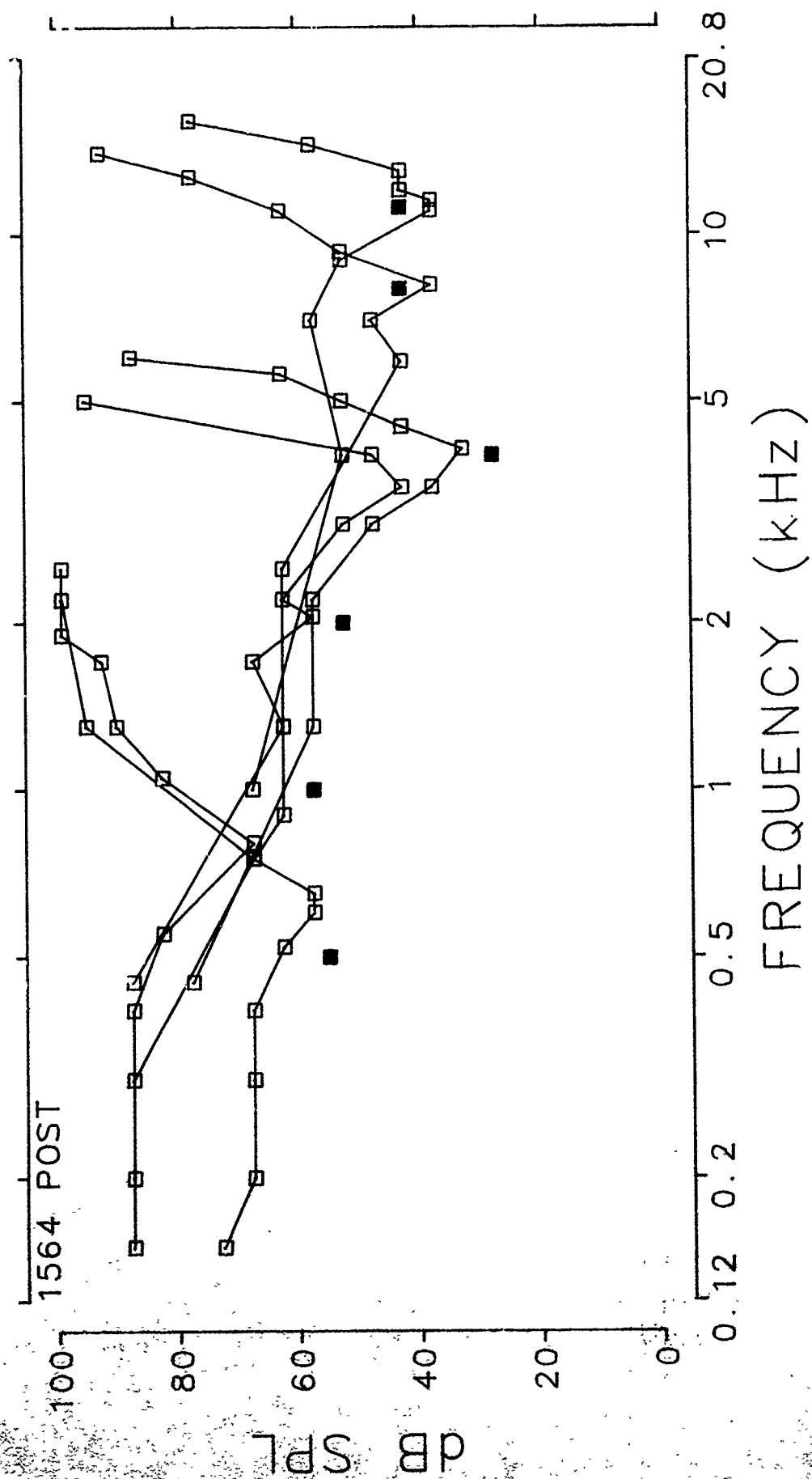












SHOCK TUBE EXPOSURE
150 dB, 100X, 1/MIN

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1365R	4	138	429	119	686
R1448R	28	196	338	152	686
R1452R	213	1461	1357	1151	3969
R1510R	17	76	104	81	261
R1539R	38	98	595	143	836
R1564R	82	903	942	597	2442
R1597R	110	563	786	476	1825
GROUP MEAN	70				1529
S.D.	73				1316

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

GROUP MEANS	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
	0.125 kHz	3.3	75.6
	0.25 kHz	1.9	59.3
	0.5 kHz	2.7	202.7
	1 kHz	15.3	432.9
	2 kHz	19.6	503.1
	4 kHz	16.7	217.6
	8 kHz	9.6	20.6
	16 kHz	1.0	17.1

STANDARD DEVIATIONS

0.125 kHz	2.6	55.2
0.25 kHz	2.0	90.6
0.5 kHz	1.9	277.6
1 kHz	29.4	346.5
2 kHz	29.1	371.5
4 kHz	16.9	287.9
8 kHz	23.5	18.3
16 kHz	1.0	14.1

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1365R							
0.125 kHz	1	8	26	15	49	0	1
0.25 kHz	0	3	1	3	7	0	0
0.5 kHz	0	1	3	6	10	0	0
1 kHz	1	39	135	13	187	1	2
2 kHz	1	81	217	65	363	1	2
4 kHz	1	4	41	6	51	0	0
8 kHz	0	0	1	2	3	0	0
16 kHz	0	2	5	9	16	0	0
TOTALS	4	138	429	119	686	2	5
CHINCHILLA R1448R							
0.125 kHz	8	22	64	57	143	0	0
0.25 kHz	4	0	2	30	32	0	0
0.5 kHz	3	8	9	11	28	2	0
1 kHz	3	95	145	17	257	2	3
2 kHz	3	60	109	18	187	5	2
4 kHz	3	6	2	7	15	0	0
8 kHz	4	2	3	8	13	0	0
16 kHz	0	3	4	4	11	0	0
TOTALS	28	196	338	152	686	9	5
CHINCHILLA R1452R							
0.125 kHz	3	14	20	26	60	0	0
0.25 kHz	0	124	50	89	263	0	0
0.5 kHz	5	338	316	124	778	1	11
1 kHz	81	340	341	338	1019	123	109
2 kHz	79	340	341	340	1021	164	136
4 kHz	42	259	263	231	753	94	78
8 kHz	1	37	16	2	55	0	0
16 kHz	2	9	10	1	20	1	0
TOTALS	213	1461	1357	1151	3969	383	334

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1510R							
0.125 kHz	5	11	6	14	31	2	1
0.25 kHz	1	11	7	15	33	0	0
0.5 kHz	2	9	14	11	34	0	0
1 kHz	3	18	36	8	62	0	3
2 kHz	1	7	6	6	19	0	2
4 kHz	3	1	7	12	20	0	0
8 kHz	0	8	19	5	32	0	0
16 kHz	2	9	9	10	28	1	0
TOTALS	17	76	104	81	261	3	6

CHINCHILLA R1539R

0.125 kHz	4	0	3	12	15	0	0
0.25 kHz	5	13	4	12	29	0	0
0.5 kHz	5	6	25	7	38	0	0
1 kHz	2	23	171	15	209	4	6
2 kHz	11	25	279	57	361	11	9
4 kHz	9	11	89	22	122	0	0
8 kHz	1	10	5	6	21	0	0
16 kHz	1	10	19	12	41	0	0
TOTALS	38	98	595	143	836	15	15

CHINCHILLA R1564R

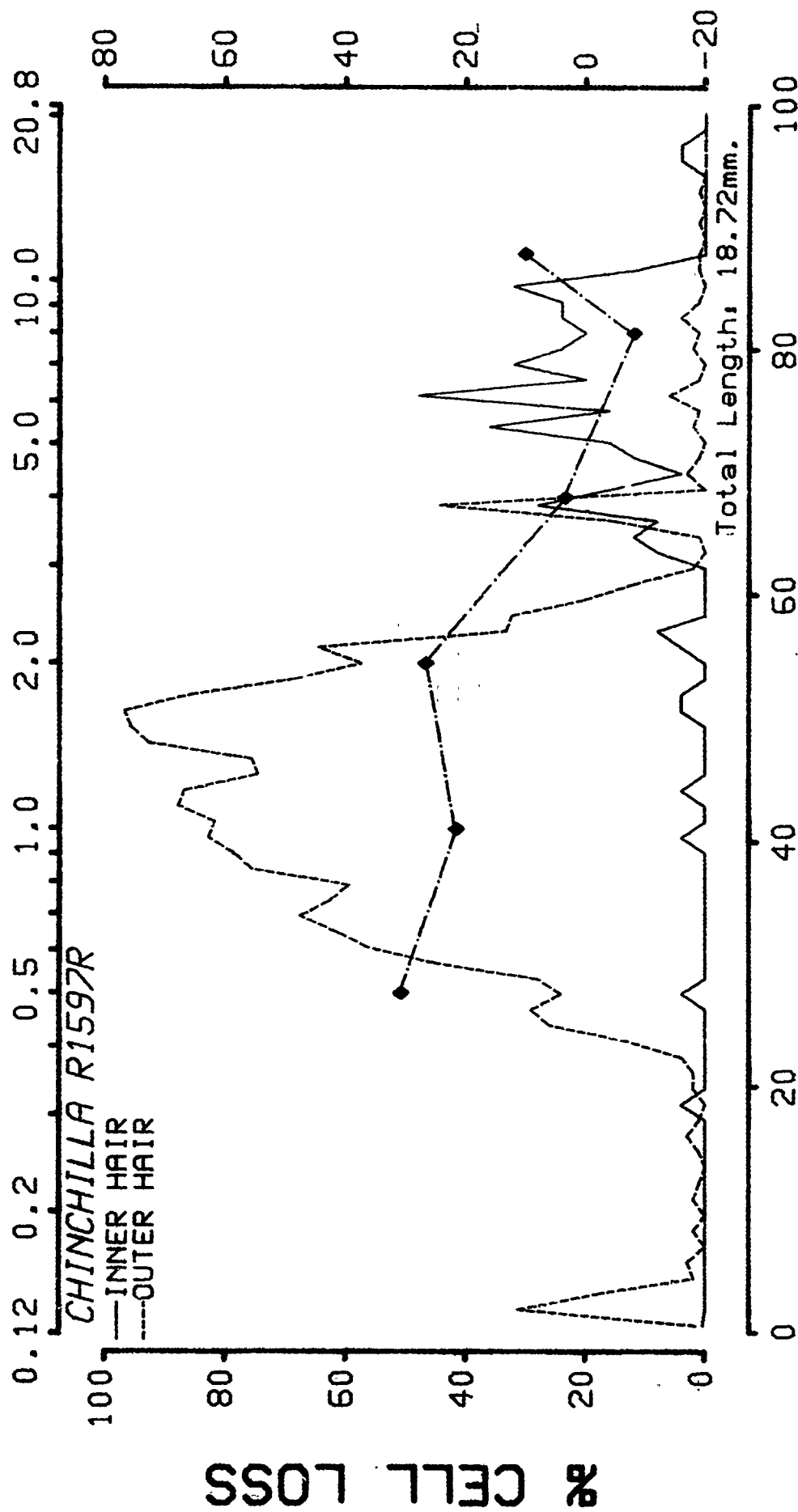
0.125 kHz	1	65	49	46	160	0	0
0.25 kHz	2	5	8	26	39	1	2
0.5 kHz	3	80	87	86	253	1	3
1 kHz	15	285	255	57	597	34	25
2 kHz	37	331	328	241	900	106	80
4 kHz	24	136	213	139	488	55	69
8 kHz	0	0	1	2	3	0	0
16 kHz	0	0	1	0	1	0	0
TOTALS	82	903	942	597	2442	197	179

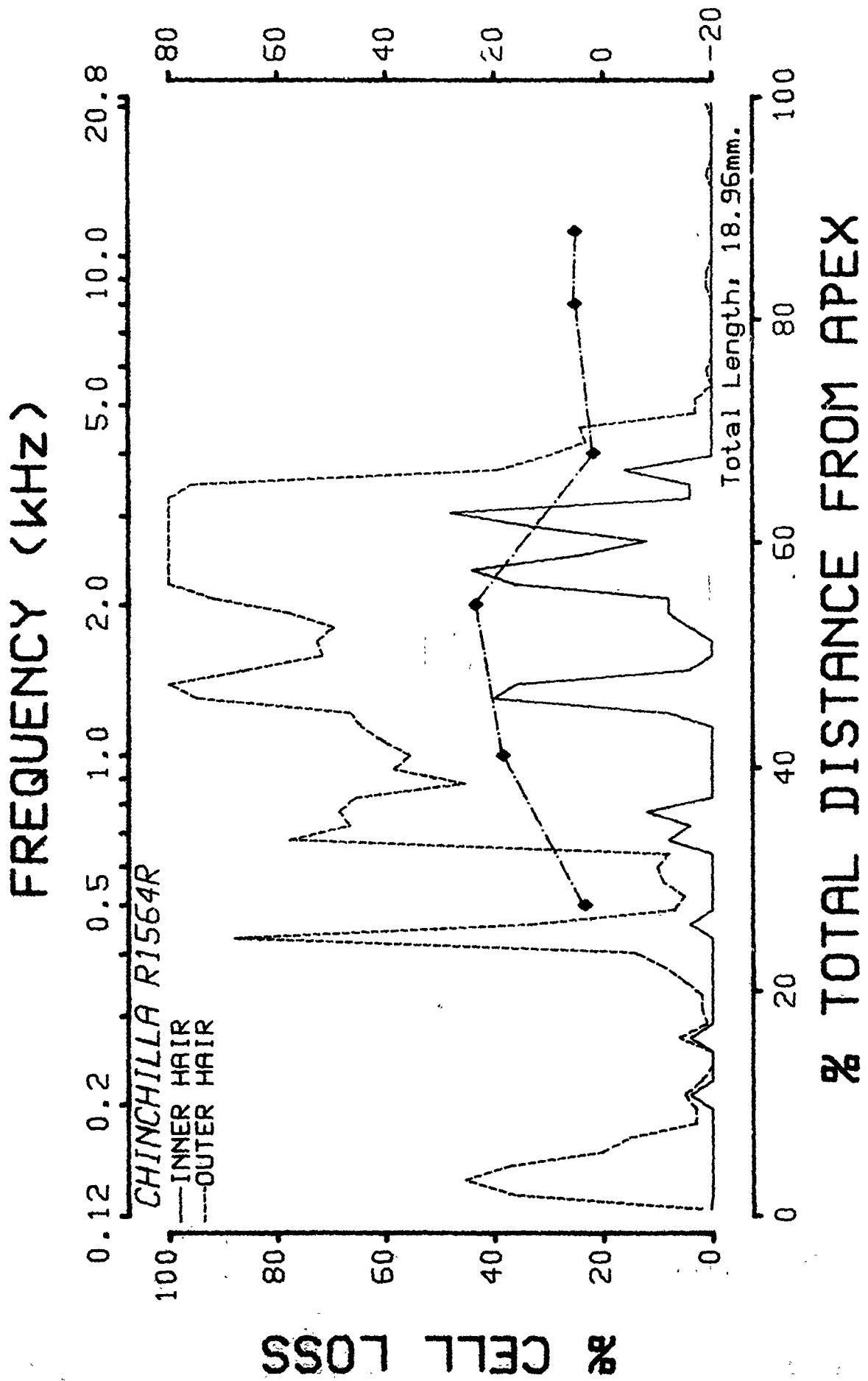
TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1597R							
0.125 kHz	1	13	21	37	71	0	0
0.25 kHz	1	3	4	5	12	0	0
0.5 kHz	1	92	169	17	278	0	1
1 kHz	2	256	252	191	699	0	2
2 kHz	5	166	302	203	671	0	0
4 kHz	35	23	31	20	74	6	6
8 kHz	63	10	6	1	17	3	0
16 kHz	2	0	1	2	3	0	0
TOTALS	110	563	786	476	1825	9	9

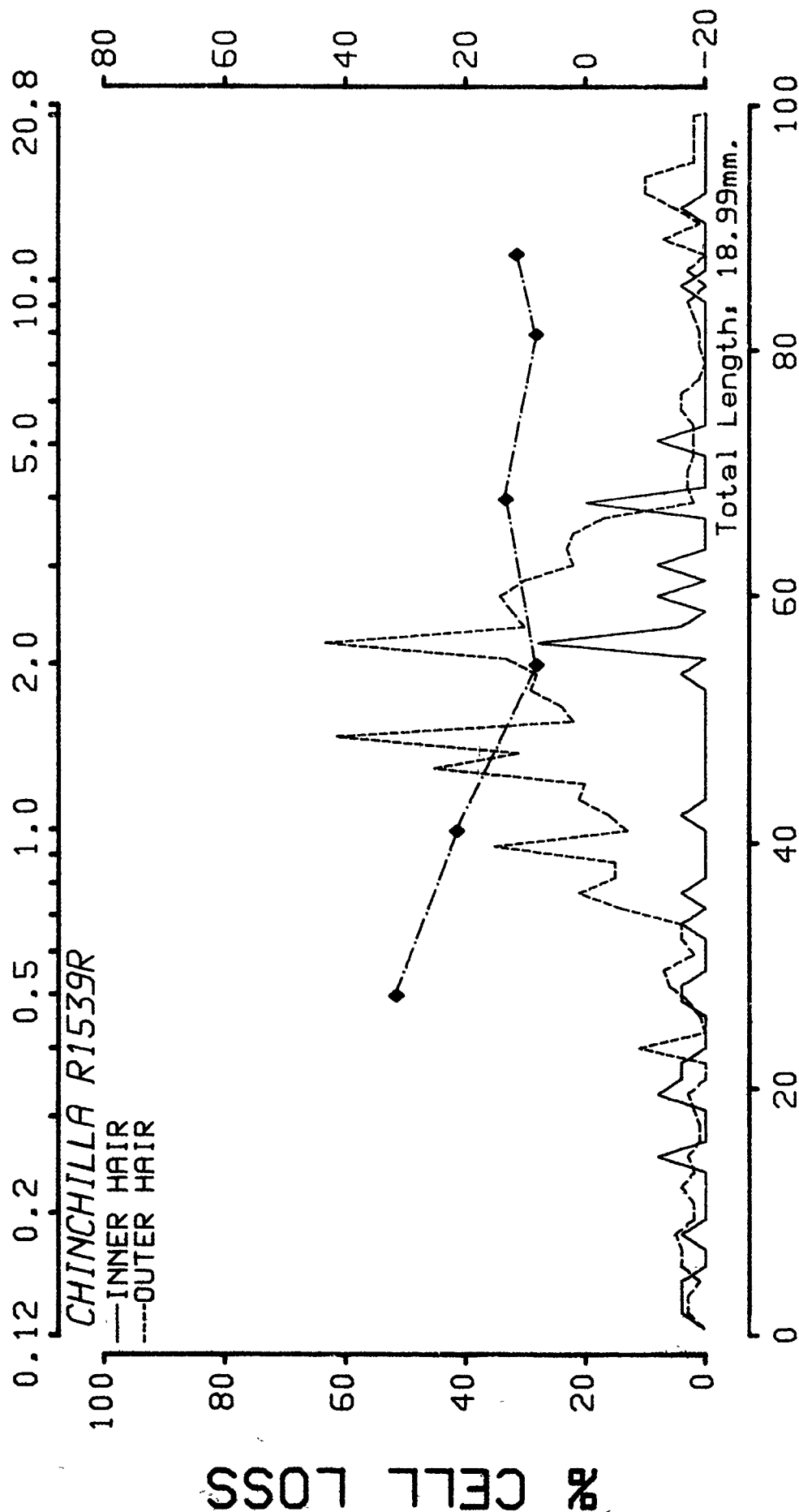
Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (kHz)





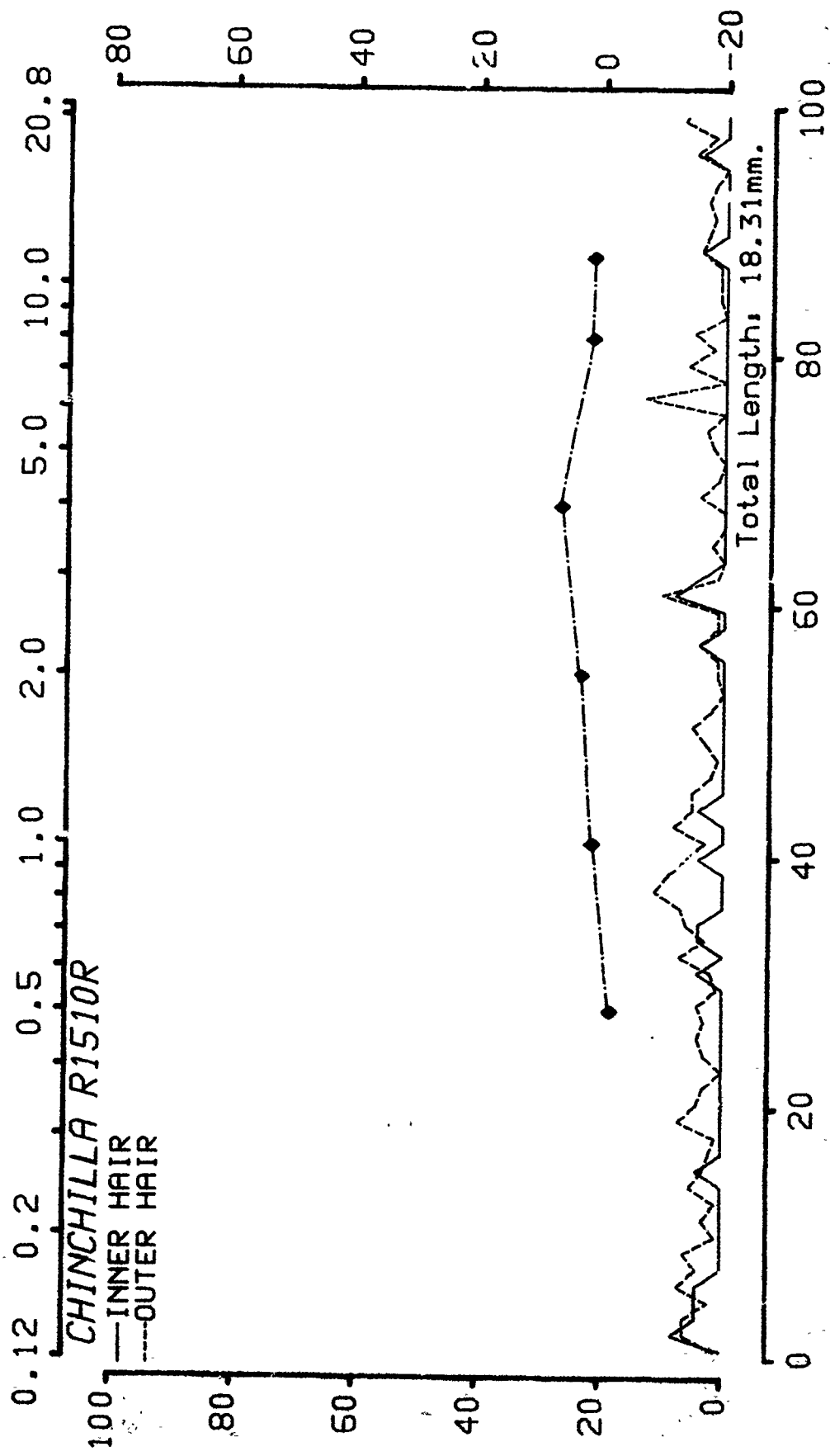
FREQUENCY (kHz)



% CELL LOSS

% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)

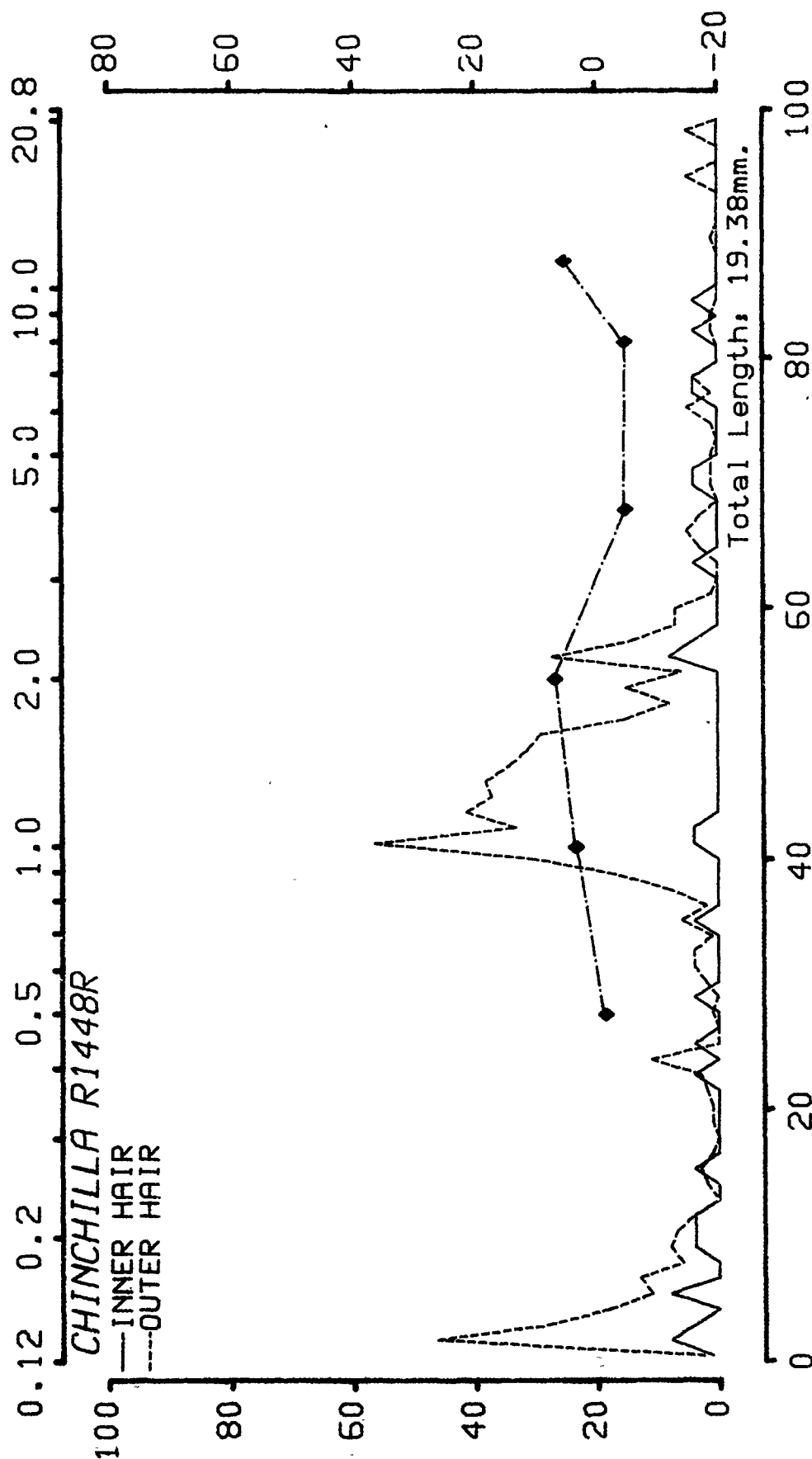


% CELL LOSS

PTS (dB)

% TOTAL DISTANCE FROM APEX

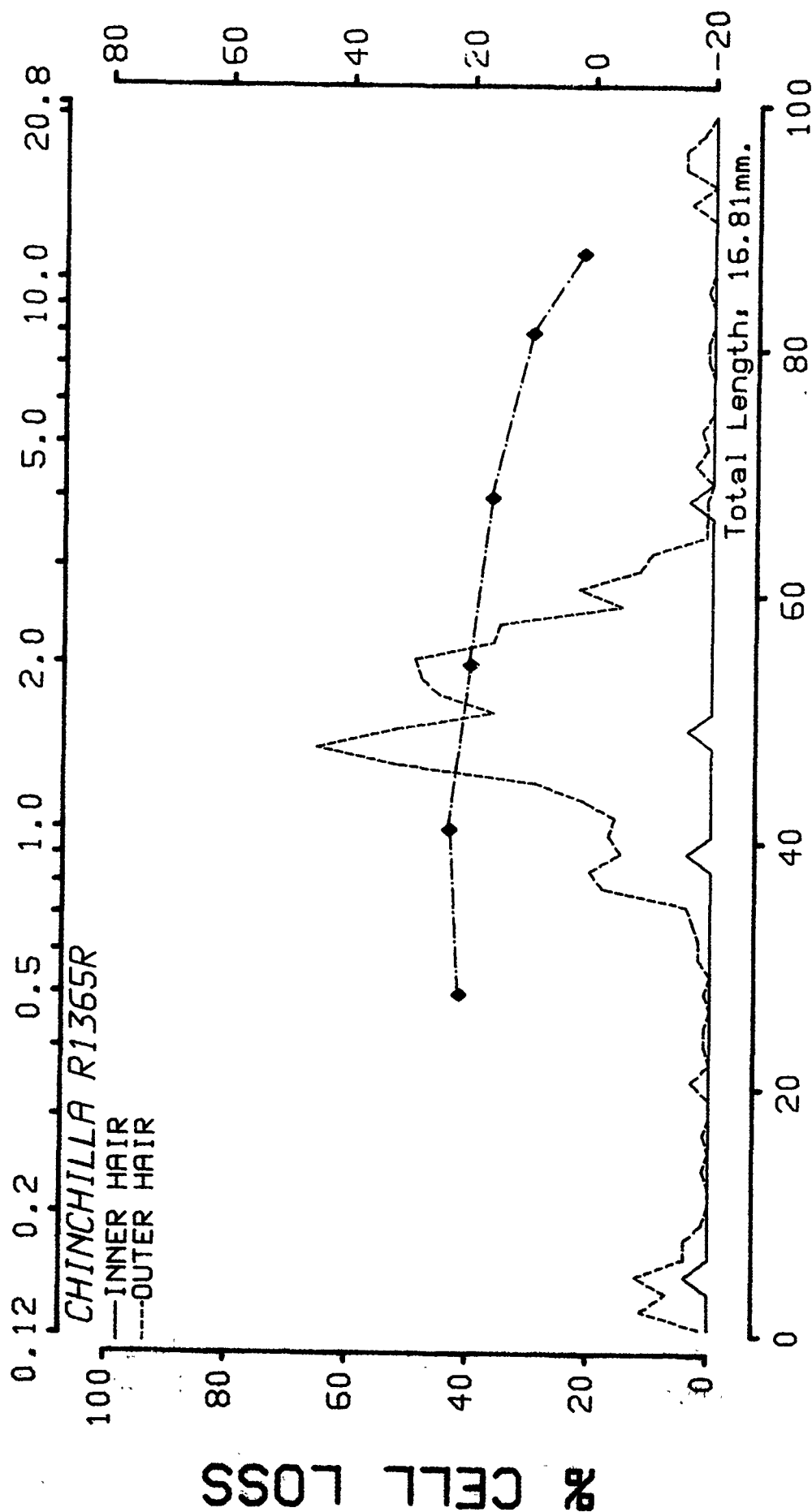
FREQUENCY (KHz)



% TOTAL DISTANCE FROM APEX

% CELL LOSS

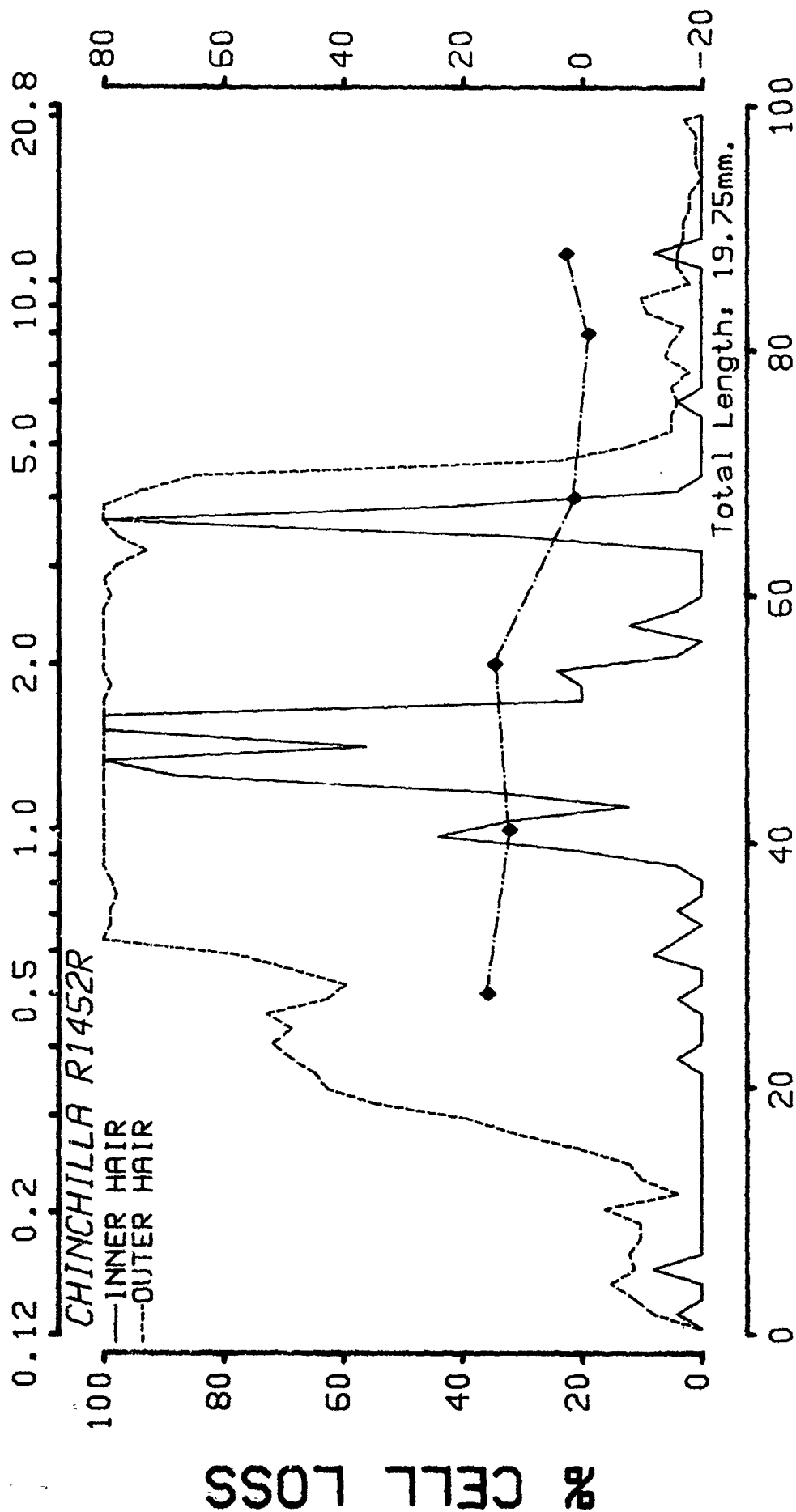
FREQUENCY (kHz)



PTS (dB)

% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



% TOTAL DISTANCE FROM APEX

Summary Data for the Group Exposed to:

155 dB, 1X

Animal

1933	-	Completed the Entire Protocol
1961	-	Completed the Entire Protocol
1975	-	Completed the Entire Protocol
2016	-	Completed the Entire Protocol
2076	-	Completed the Entire Protocol
1396	-	Only Histological Data Included in Means
1337	-	Only Histological Data Included in Means

155 dB 1X

A 100

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1933	12.5	7.5	15.8	4.2	20.8	19.2	*****
1961	14.2	9.2	17.5	10.8	20.8	22.5	*****
1975	7.5	0.8	5.8	-0.8	5.8	15.8	*****
2016	5.8	-2.5	7.5	-10.8	5.8	19.2	29.2
2076	12.5	9.2	12.5	20.8	10.8	15.8	*****
Mean	10.5	4.8	11.8	4.8	12.8	18.5	29.2
S.D.	3.6	5.3	5.1	11.9	7.6	2.8	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1933	5.8	7.5	19.2	0.8	25.8	17.5	*****
1961	20.8	12.5	15.8	10.8	12.5	20.8	*****
1975	7.5	4.2	4.2	0.8	9.2	22.5	*****
2016	2.5	-2.5	4.2	-0.8	0.8	15.8	*****
2076	10.8	-0.8	7.5	19.2	-2.5	4.2	*****
Mean	9.5	4.2	10.2	6.2	9.2	16.2	*****
S.D.	7.0	6.1	6.9	8.6	11.1	7.2	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1933	-6.7	0.0	3.3	-3.3	5.0	-1.7	*****
1961	6.7	3.3	-1.7	0.0	-8.3	-1.7	*****
1975	0.0	3.3	-1.7	1.7	3.3	6.7	*****
2016	-3.3	0.0	-3.3	10.0	-5.0	-3.3	*****
2076	-1.7	-10.0	-5.0	-1.7	-13.3	-11.7	*****
Mean	-1.0	-0.7	-1.7	1.3	-3.7	-2.3	*****
S.D.	4.9	5.5	3.1	5.2	7.8	6.5	*****

155 dB 1X

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
1933	0.0	0.0	-5.0	-5.0	0.0	0.0
1961	3.3	-1.7	8.3	-1.7	-1.7	8.3
1975	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
2016	-3.3	-3.3	1.7	*****	-3.3	1.7
2076	-5.0	0.0	-5.0	-5.0	0.0	0.0
Mean	-2.0	-2.0	-1.0	-4.2	-2.0	1.0
S.D.	3.6	2.2	6.0	1.7	2.2	4.8

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1933	1.7	6.7	1.7	-3.3	1.7	6.7
1961	5.0	0.0	0.0	-5.0	0.0	5.0
1975	-3.3	-3.3	1.7	-3.3	-3.3	1.7
2016	0.0	0.0	5.0	*****	0.0	5.0
2076	0.0	5.0	5.0	-5.0	0.0	5.0
Mean	0.7	1.7	2.7	-4.2	-0.3	4.7
S.D.	3.0	4.1	2.2	1.0	1.8	1.8

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1933	1.7	-3.3	-3.3	6.7	-8.3	6.7
1961	-3.3	-13.3	-8.3	-3.3	-8.3	-3.3
1975	26.7	11.7	21.7	-3.3	1.7	26.7
2016	-3.3	-3.3	6.7	*****	-3.3	6.7
2076	6.7	11.7	-3.3	-3.3	-13.3	11.7
Mean	5.7	0.7	2.7	-0.8	-6.3	9.7
S.D.	12.4	10.8	11.9	5.0	5.7	10.9

MASKED THRESHOLDS (dB SPL) Group: 155 dB LX

Probe Frequency: 0.5 kHz

Masker (kHz):	0.150	0.200	0.300	0.400	0.520	0.600	0.650	0.750	1.300	2.200
Animal (Q-10 dB)	Pre-Exposure									
1933 (2.62)	62.5	57.5	47.5	27.5	27.5	17.5	22.5	27.5	72.5	82.5
1961 (1.73)	57.5	57.5	52.5	47.5	32.5	27.5	27.5	32.5	62.5	82.5
1975 (1.49)	72.5	62.5	52.5	37.5	27.5	27.5	27.5	37.5	62.5	82.5
2016 (1.77)	77.5	67.5	52.5	52.5	32.5	37.5	32.5	42.5	67.5	82.5
2076 (4.55)	62.5	62.5	47.5	37.5	37.5	22.5	17.5	32.5	57.5	82.5
Mean (2.43)	66.5	61.5	50.5	40.5	31.5	26.5	25.5	34.5	64.5	82.5
S.D. (1.26)	8.2	4.2	2.7	9.7	4.2	7.4	5.7	5.7	5.7	0.0

Animal (Q-10 dB)	Post-Exposure									
1933 (4.36)	72.5	67.5	47.5	32.5	27.5	32.5	22.5	32.5	62.5	77.5
1961 (1.99)	62.5	62.5	47.5	42.5	37.5	27.5	27.5	32.5	62.5	82.5
1975 (2.62)	67.5	57.5	47.5	27.5	27.5	17.5	17.5	27.5	57.5	72.5
2016 (3.33)	62.5	62.5	42.5	37.5	22.5	17.5	12.5	27.5	57.5	82.5
2076 (2.44)	52.5	57.5	42.5	32.5	17.5	22.5	27.5	32.5	57.5	87.5
Mean (2.95)	63.5	61.5	45.5	34.5	26.5	23.5	21.5	30.5	59.5	80.5
S.D. (0.93)	7.4	4.2	2.7	5.7	7.4	6.5	6.5	2.7	2.7	5.7

MASKED THRESHOLDS (dB SPL) Group: 155 dB 1X

Probe Frequency: 1.0 kHz

Masker (kHz): 0.150 0.200 0.400 0.550 0.800 1.050 1.300 1.700 1.900 2.500

Animal (Q-10 dB)

Pre-Exposure

1933 (1.77)	67.5	72.5	52.5	47.5	32.5	27.5	37.5	57.5	72.5	82.5
1961 (0.93)	72.5	72.5	52.5	42.5	27.5	27.5	27.5	47.5	57.5	82.5
1975 (1.84)	77.5	72.5	52.5	47.5	27.5	22.5	32.5	47.5	62.5	82.5
2016 (2.47)	72.5	72.5	62.5	52.5	37.5	22.5	32.5	47.5	57.5	82.5
2076 (2.55)	72.5	72.5	52.5	42.5	32.5	22.5	37.5	52.5	57.5	82.5

Mean (1.91)	72.5	72.5	54.5	46.5	31.5	24.5	33.5	50.5	61.5	82.5
S.D. (0.66)	3.5	0.0	4.5	4.2	4.2	2.7	4.2	4.5	6.5	0.0

Animal (Q-10 dB)

Post-Exposure

1933 (2.85)	82.5	72.5	52.5	47.5	37.5	27.5	47.5	62.5	72.5	82.5
1961 (1.00)	72.5	77.5	57.5	42.5	27.5	27.5	32.5	47.5	62.5	77.5
1975 (1.00)	57.5	67.5	47.5	37.5	22.5	22.5	27.5	42.5	52.5	82.5
2016 (3.58)	72.5	62.5	47.5	37.5	27.5	12.5	32.5	42.5	57.5	82.5
2076 (1.18)	57.5	57.5	47.5	27.5	12.5	12.5	22.5	32.5	42.5	52.5

Mean (1.92)	70.5	67.5	50.5	38.5	25.5	20.5	32.5	45.5	57.5	75.5
S.D. (1.21)	9.1	7.9	4.5	7.4	9.1	7.6	9.4	11.0	11.2	13.0

MASKED THRESHOLDS (dB SPL) Group: 155 dB 1X

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

1933 (2.25)	72.5	47.5	37.5	52.5	37.5	37.5	42.5	42.5	72.5	82.5
1961 (4.57)	77.5	47.5	47.5	52.5	37.5	27.5	42.5	37.5	47.5	77.5
1975 (4.57)	72.5	52.5	37.5	52.5	32.5	22.5	37.5	47.5	72.5	82.5
2016 (2.77)	67.5	47.5	37.5	32.5	32.5	22.5	27.5	42.5	52.5	77.5
2076 (2.61)	72.5	47.5	42.5	57.5	42.5	37.5	42.5	67.5	82.5	82.5

Mean	(3.35)	72.5	48.5	40.5	49.5	36.5	29.5	38.5	47.5	65.5	80.5
S.D.	(1.12)	3.5	2.2	4.5	9.7	4.2	7.6	6.5	11.7	14.8	2.7

Animal (Q-10 dB)

Post-Exposure

1933 (3.55)	77.5	57.5	42.5	22.5	47.5	22.5	37.5	42.5	57.5	67.5
1961 (1.42)	77.5	52.5	42.5	52.5	37.5	32.5	37.5	42.5	57.5	82.5
1975 (*****)	****	****	****	****	****	****	****	****	****	****
2016 (4.57)	62.5	32.5	32.5	32.5	17.5	7.5	22.5	27.5	32.5	47.5
2076 (3.42)	57.5	32.5	27.5	27.5	27.5	17.5	22.5	57.5	72.5	82.5

Mean	(3.24)	68.7	43.7	36.3	33.8	32.5	20.0	30.0	42.5	55.0	70.0
S.D.	(1.32)	10.3	13.1	7.5	13.1	12.9	10.4	8.7	12.2	16.6	16.6

MASKED THRESHOLDS (dB SPL) Group: 155 dB 1X

Probe Frequency: 4.0 kHz

Masker (kHz):	0.450	1.300	2.200	3.000	3.500	4.100	4.500	5.000	5.600	6.000
Animal (Q-10 dB)	Pre-Exposure									
1933 (4.10)	72.5	47.5	57.5	37.5	32.5	22.5	32.5	42.5	47.5	67.5
1961 (2.11)	77.5	52.5	57.5	37.5	27.5	27.5	32.5	47.5	47.5	57.5
1975 (6.77)	72.5	52.5	52.5	42.5	27.5	12.5	32.5	42.5	62.5	77.5
2016 (4.42)	77.5	47.5	47.5	32.5	12.5	7.5	27.5	37.5	27.5	42.5
2076 (2.47)	67.5	52.5	57.5	47.5	42.5	37.5	42.5	57.5	52.5	62.5
Mean (3.97)	73.5	50.5	54.5	39.5	28.5	21.5	33.5	45.5	47.5	61.5
S.D. (1.85)	4.2	2.7	4.5	5.7	10.8	11.9	5.5	7.6	12.7	12.9

Animal (Q-10 dB)	Post-Exposure									
1933 (4.10)	82.5	67.5	62.5	57.5	47.5	37.5	47.5	62.5	77.5	87.5
1961 (4.10)	77.5	52.5	57.5	37.5	32.5	22.5	32.5	47.5	47.5	62.5
1975 (3.49)	82.5	47.5	47.5	32.5	17.5	12.5	22.5	32.5	47.5	82.5
2016 (3.13)	82.5	42.5	42.5	27.5	17.5	2.5	7.5	12.5	22.5	32.5
2076 (1.40)	62.5	42.5	42.5	42.5	27.5	27.5	32.5	32.5	32.5	62.5
Mean (3.24)	77.5	50.5	50.5	39.5	28.5	20.5	28.5	37.5	45.5	65.5
S.D. (1.11)	8.7	10.4	9.1	11.5	12.4	13.5	14.7	18.7	20.8	21.7

MASKED THRESHOLDS (dB SPL) Group: 155 dB LX

Probe Frequency: 8.0 kHz

Masker (kHz): 0.450 1.300 2.500 5.900 7.000 8.100 9.300 11.000 12.700 14.000

Animal (Q-10 dB)

Pre-Exposure

1933 (4.31)	82.5	57.5	57.5	42.5	32.5	22.5	37.5	72.5	82.5	82.5
1961 (3.94)	72.5	57.5	57.5	37.5	27.5	22.5	52.5	57.5	77.5	82.5
1975 (2.52)	67.5	57.5	37.5	22.5	12.5	17.5	27.5	37.5	42.5	82.5
2016 (5.29)	82.5	67.5	62.5	47.5	42.5	27.5	42.5	82.5	82.5	82.5
2076 (4.62)	72.5	57.5	52.5	47.5	42.5	37.5	27.5	47.5	62.5	82.5

Mean (4.13)	75.5	59.5	53.5	39.5	31.5	25.5	37.5	59.5	69.5	82.5
S.D. (1.03)	6.7	4.5	9.6	10.4	12.4	7.6	10.6	18.2	17.2	0.0

Animal (Q-10 dB)

Post-Exposure

1933 (2.82)	87.5	77.5	77.5	62.5	52.5	47.5	57.5	82.5	82.5	82.5
1961 (1.47)	82.5	62.5	57.5	42.5	27.5	27.5	27.5	37.5	62.5	62.5
1975 (2.35)	77.5	52.5	47.5	27.5	17.5	17.5	32.5	52.5	72.5	67.5
2016 (7.80)	67.5	77.5	57.5	32.5	22.5	-2.5	17.5	47.5	42.5	82.5
2076 (5.19)	77.5	52.5	52.5	42.5	27.5	17.5	42.5	67.5	77.5	87.5

Mean (3.93)	78.5	64.5	58.5	41.5	29.5	21.5	35.5	57.5	67.5	76.5
S.D. (2.56)	7.4	12.5	11.4	13.4	13.5	18.2	15.2	17.7	15.8	10.8

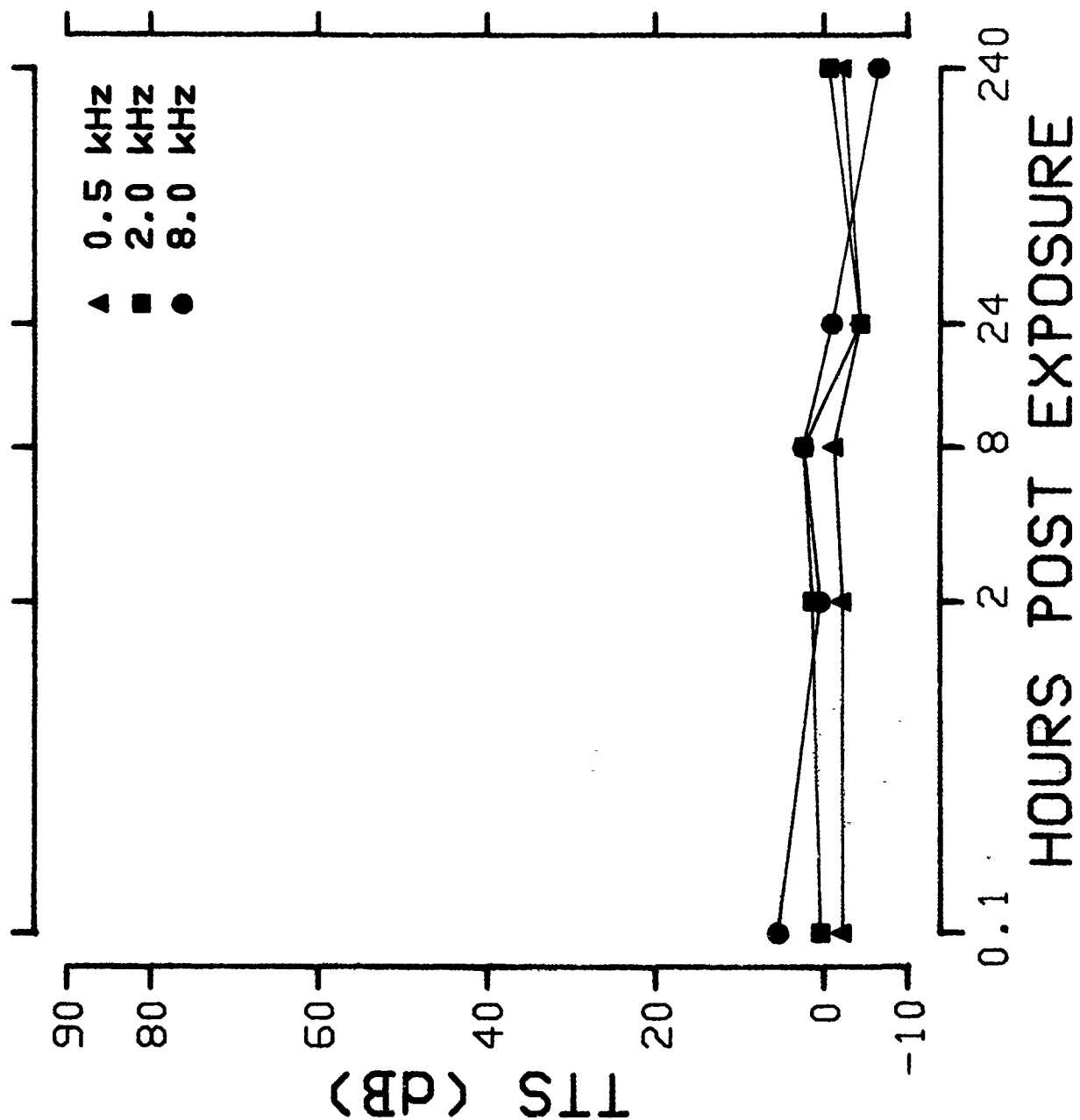
MASKED THRESHOLDS (dB SPL) Group: 155 dB 1X

Probe Frequency: 11.2 kHz

Masker (kHz):	1.000	4.000	7.000	9.000	11.000	11.500	12.000	13.000	14.500	16.000
Animal (Q-10 dB)	Pre-Exposure									
1933 (2.25)	62.5	47.5	32.5	22.5	32.5	42.5	27.5	27.5	52.5	77.5
1961 (6.71)	67.5	52.5	52.5	57.5	42.5	37.5	47.5	47.5	72.5	72.5
1975 (****)	****	****	****	****	****	****	****	****	****	****
2016 (10.35)	67.5	57.5	57.5	57.5	42.5	47.5	37.5	52.5	57.5	72.5
2076 (5.23)	67.5	52.5	52.5	52.5	62.5	47.5	47.5	52.5	72.5	72.5
Mean (6.14)	66.3	52.5	48.8	47.5	45.0	43.7	40.0	45.0	63.8	73.8
S.D. (3.37)	2.5	4.1	11.1	16.8	12.6	4.8	9.6	11.9	10.3	2.5
Animal (Q-10 dB)	Post-Exposure									
1933 (26.44)	87.5	87.5	82.5	92.5	27.5	87.5	92.5	92.5	87.5	92.5
1961 (5.39)	67.5	47.5	37.5	32.5	17.5	22.5	37.5	32.5	52.5	62.5
1975 (1.49)	52.5	37.5	27.5	22.5	22.5	37.5	22.5	32.5	42.5	67.5
2016 (****)	****	****	****	****	****	****	****	****	****	****
2076 (11.48)	62.5	42.5	42.5	57.5	32.5	22.5	32.5	42.5	62.5	72.5
Mean (11.20)	67.5	53.8	47.5	51.3	25.0	42.5	46.3	50.0	61.3	73.8
S.D. (10.96)	14.7	22.9	24.2	31.2	6.5	30.8	31.5	28.7	19.3	13.1

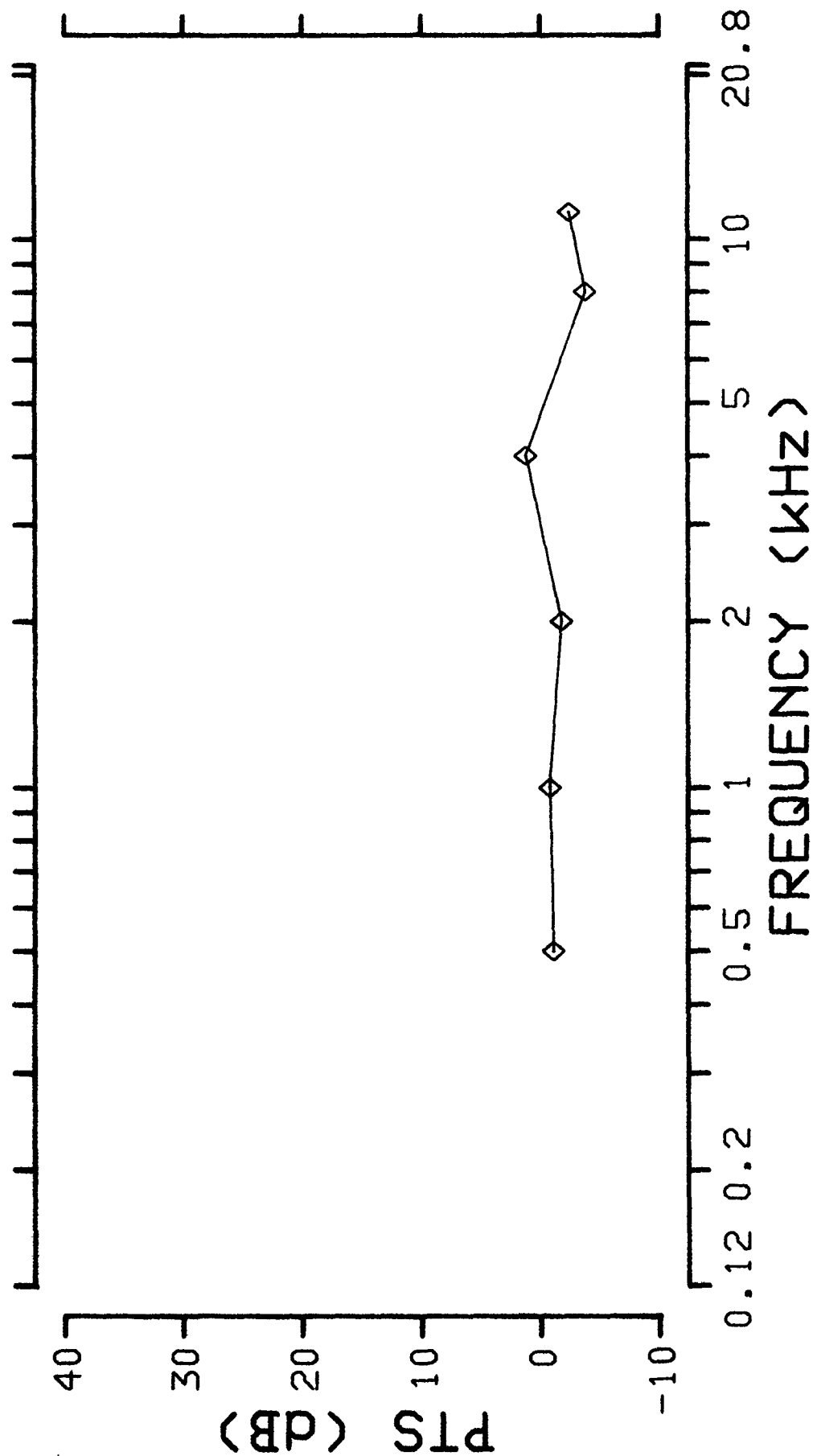
**The Group Mean Recovery Curves
Measured at Three Test Frequencies**

MEAN DATA (n=5) - 155 dB 1X



The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

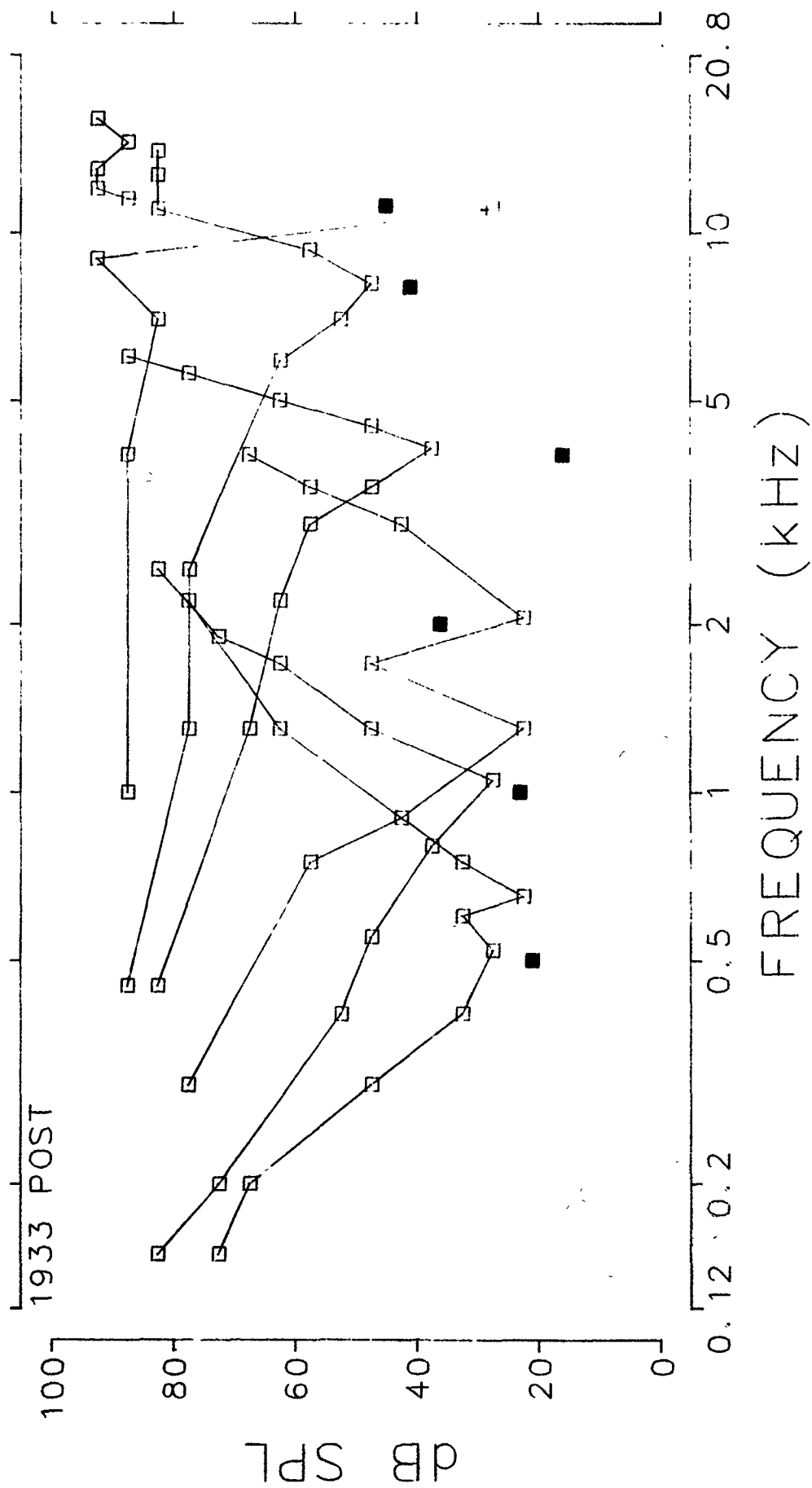
MEAN DATA (n=5) - 155 dB 1X

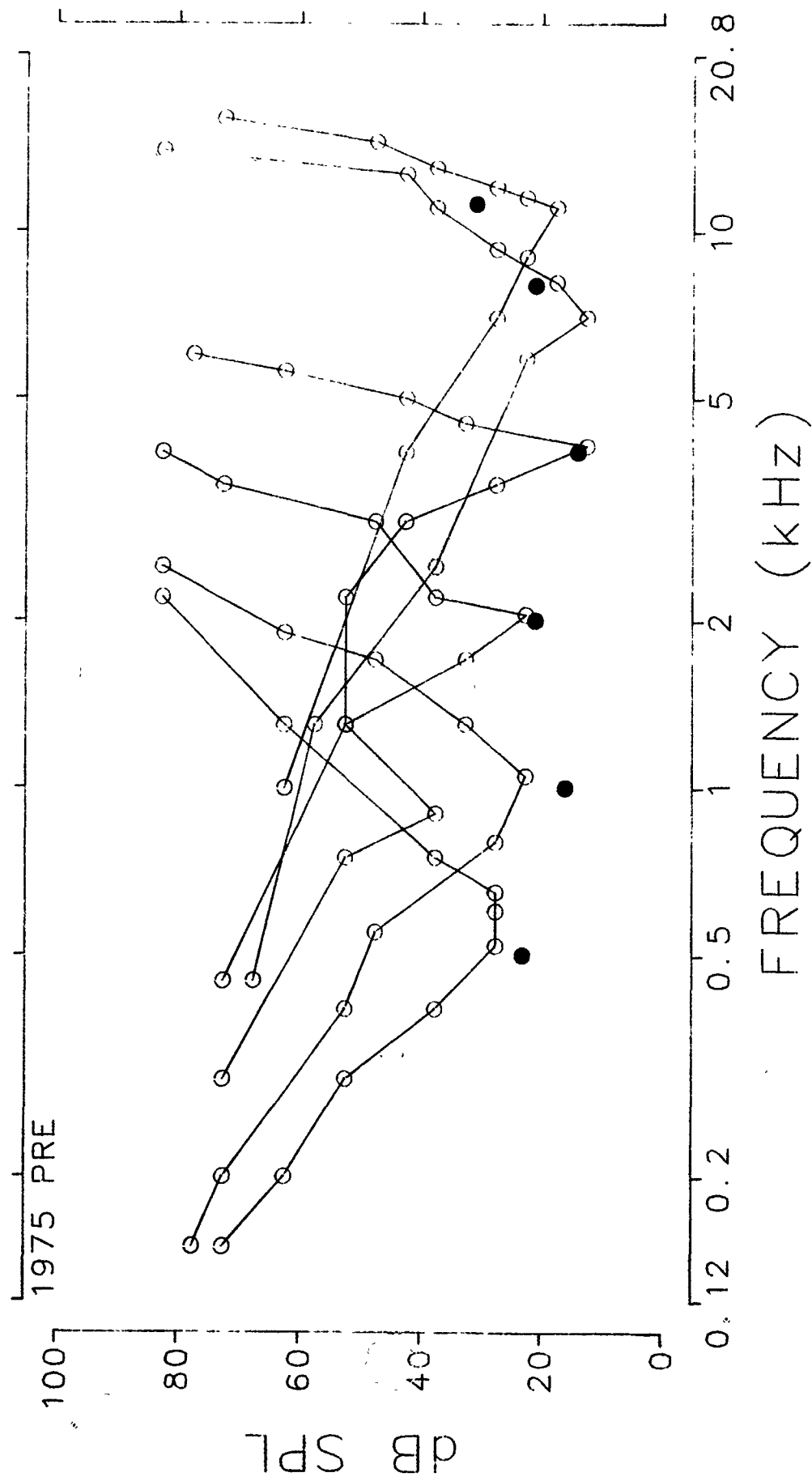


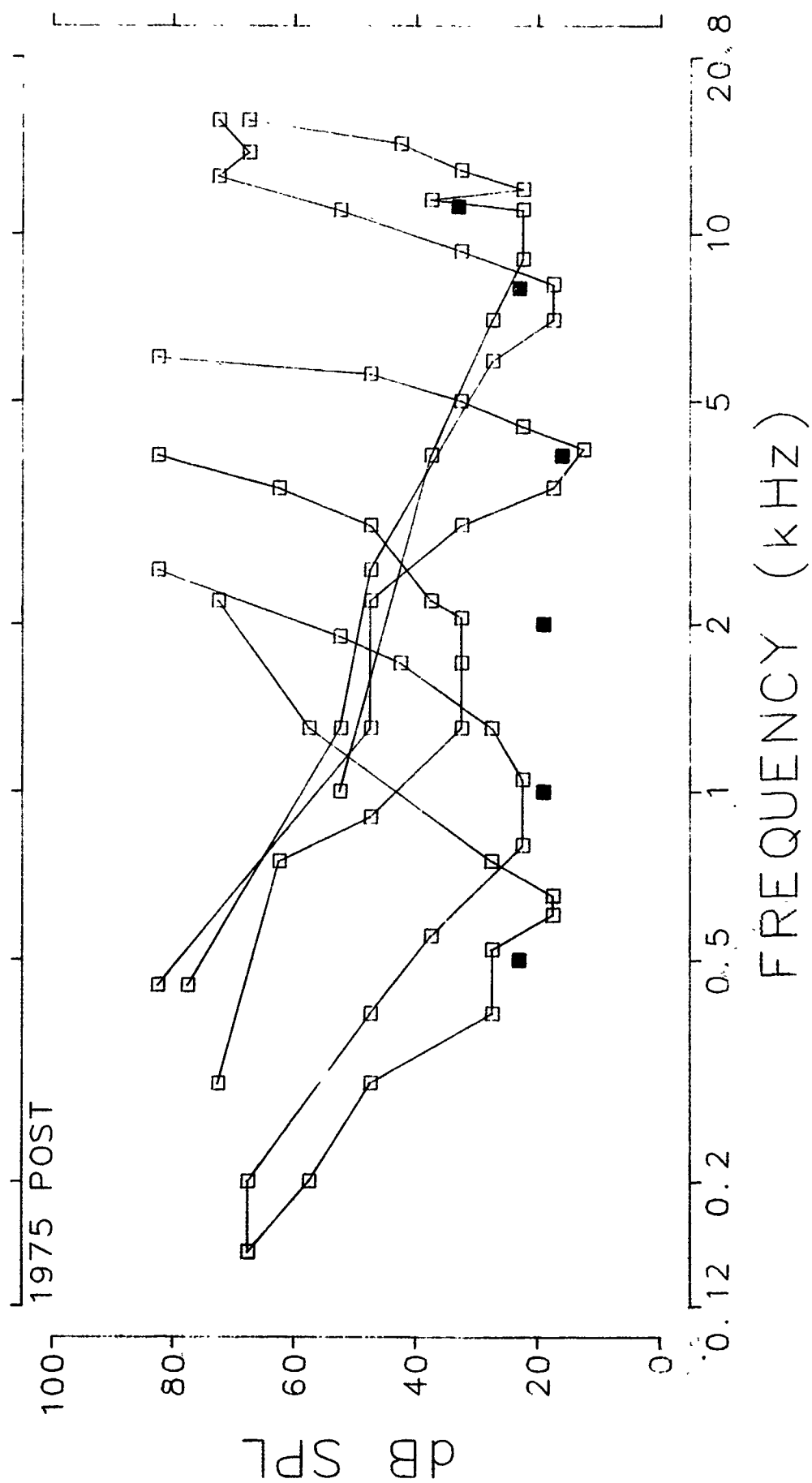
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

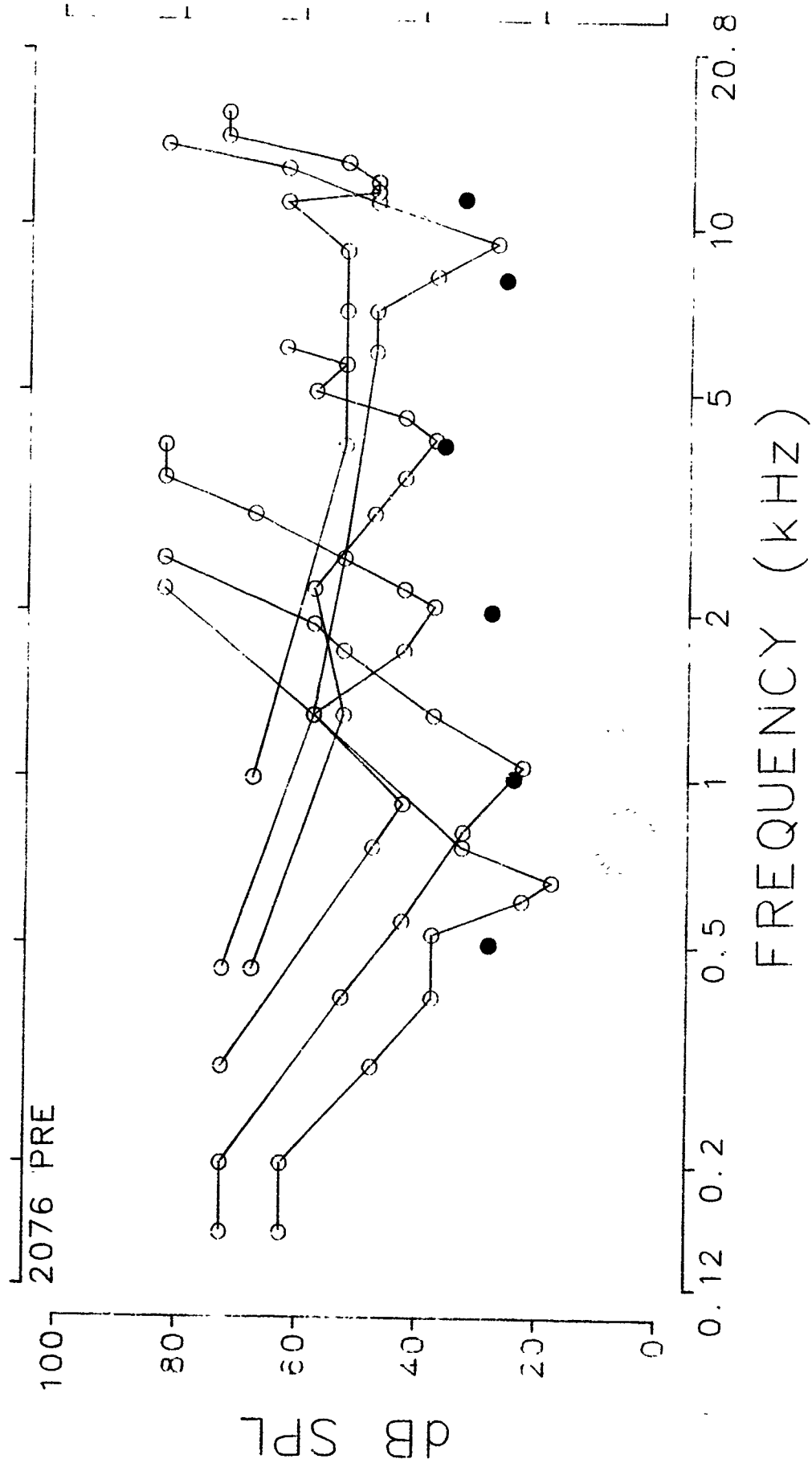
The solid symbol represents the threshold of the probe tone.

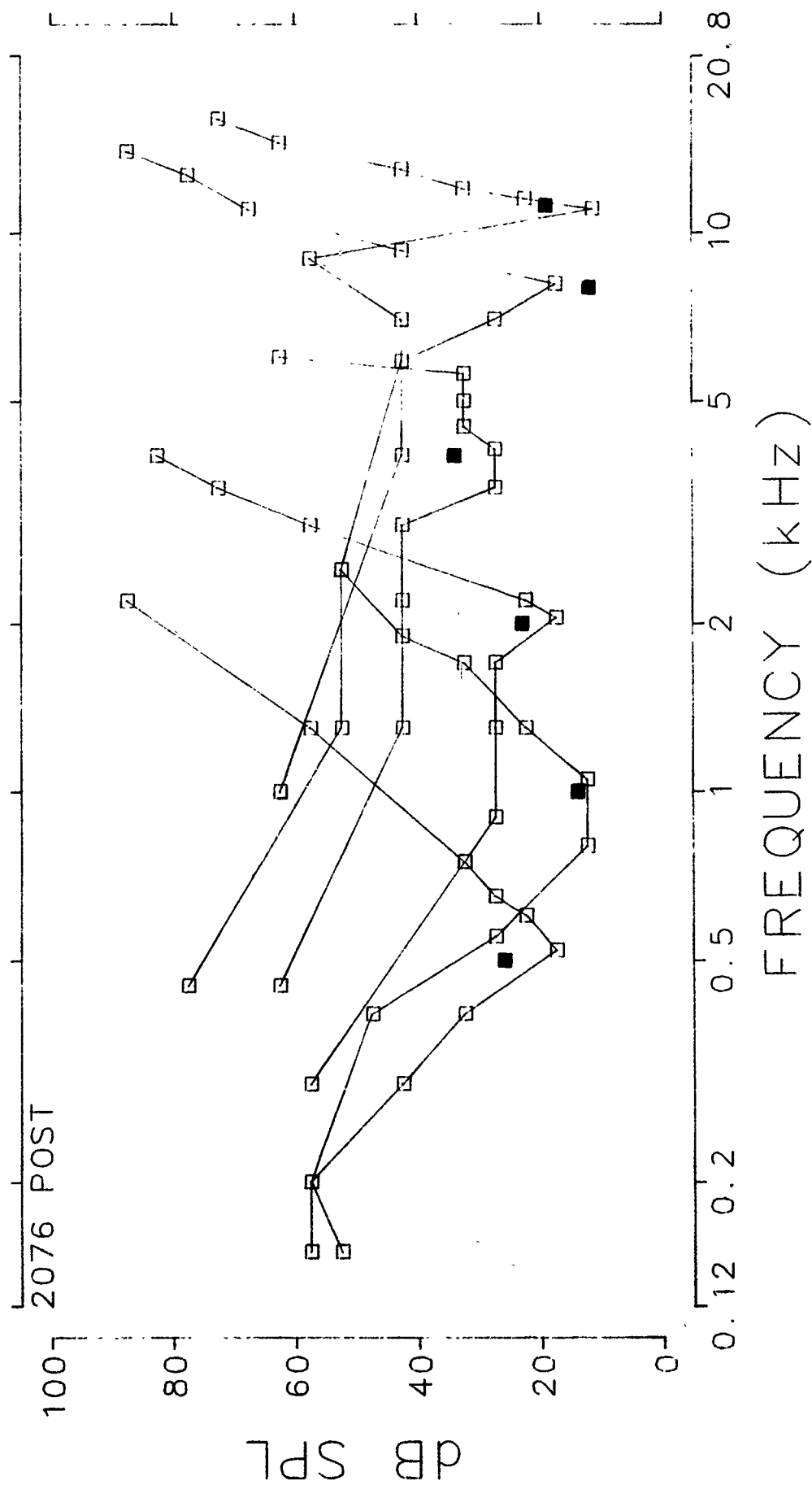
1933 PRE

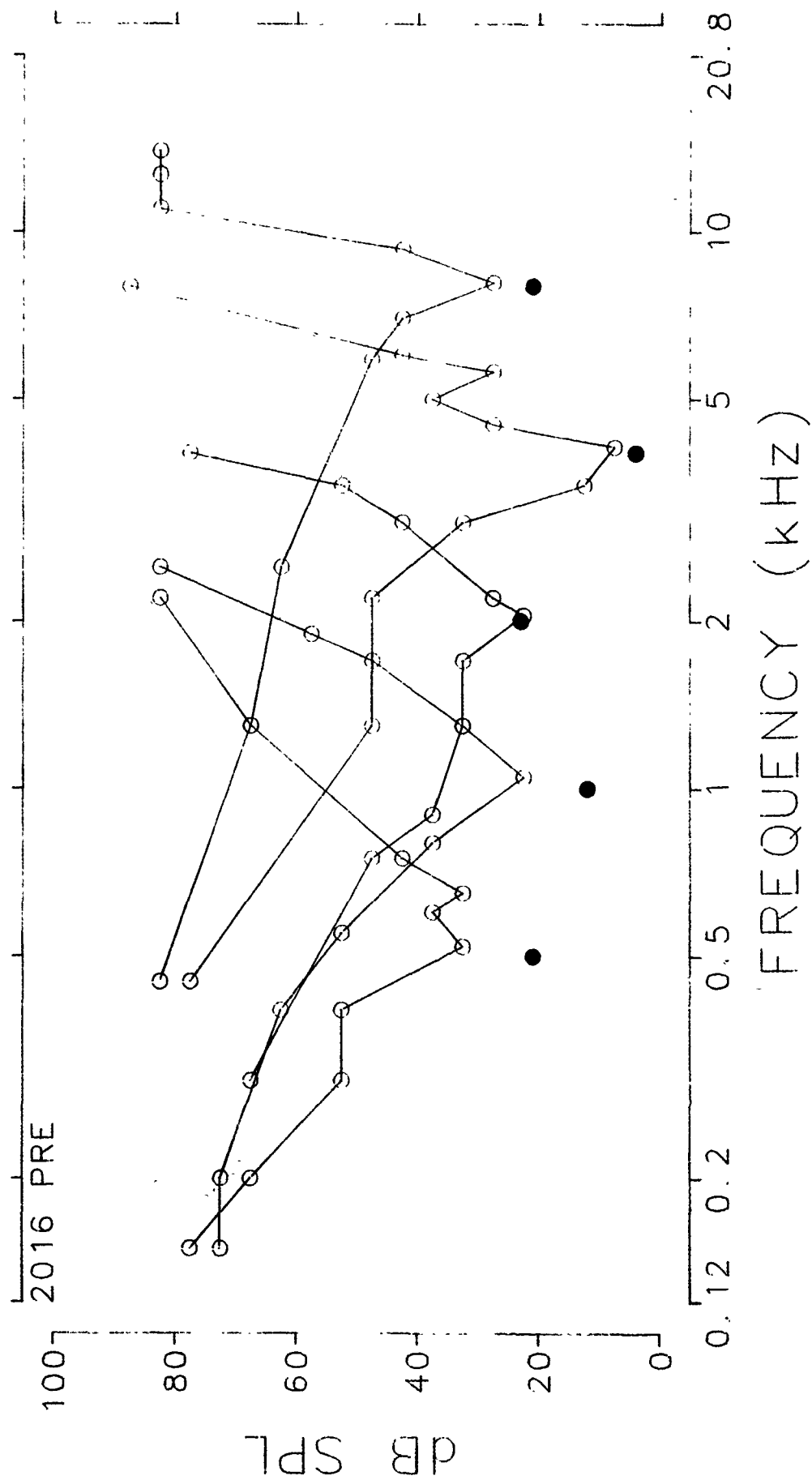


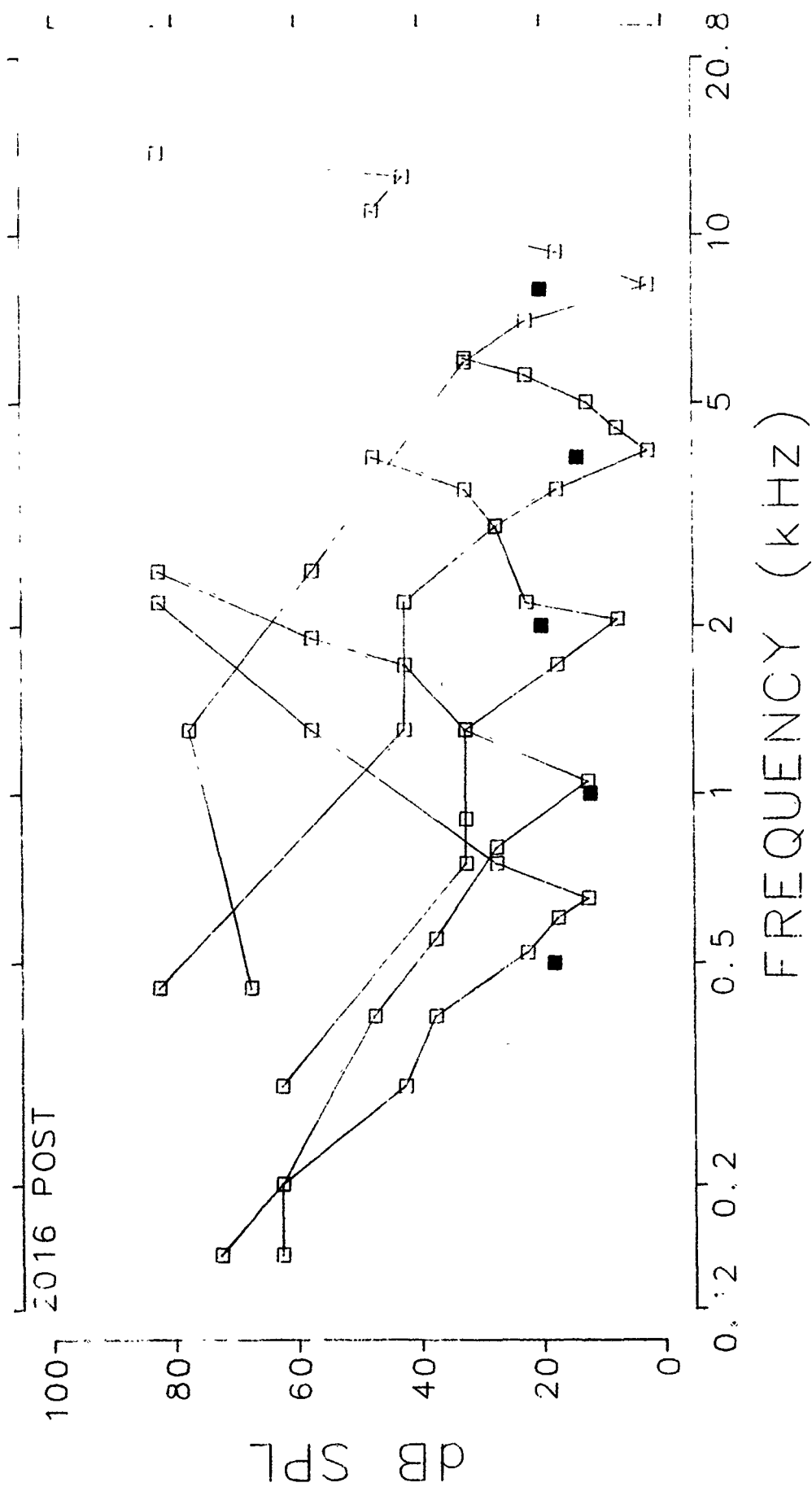


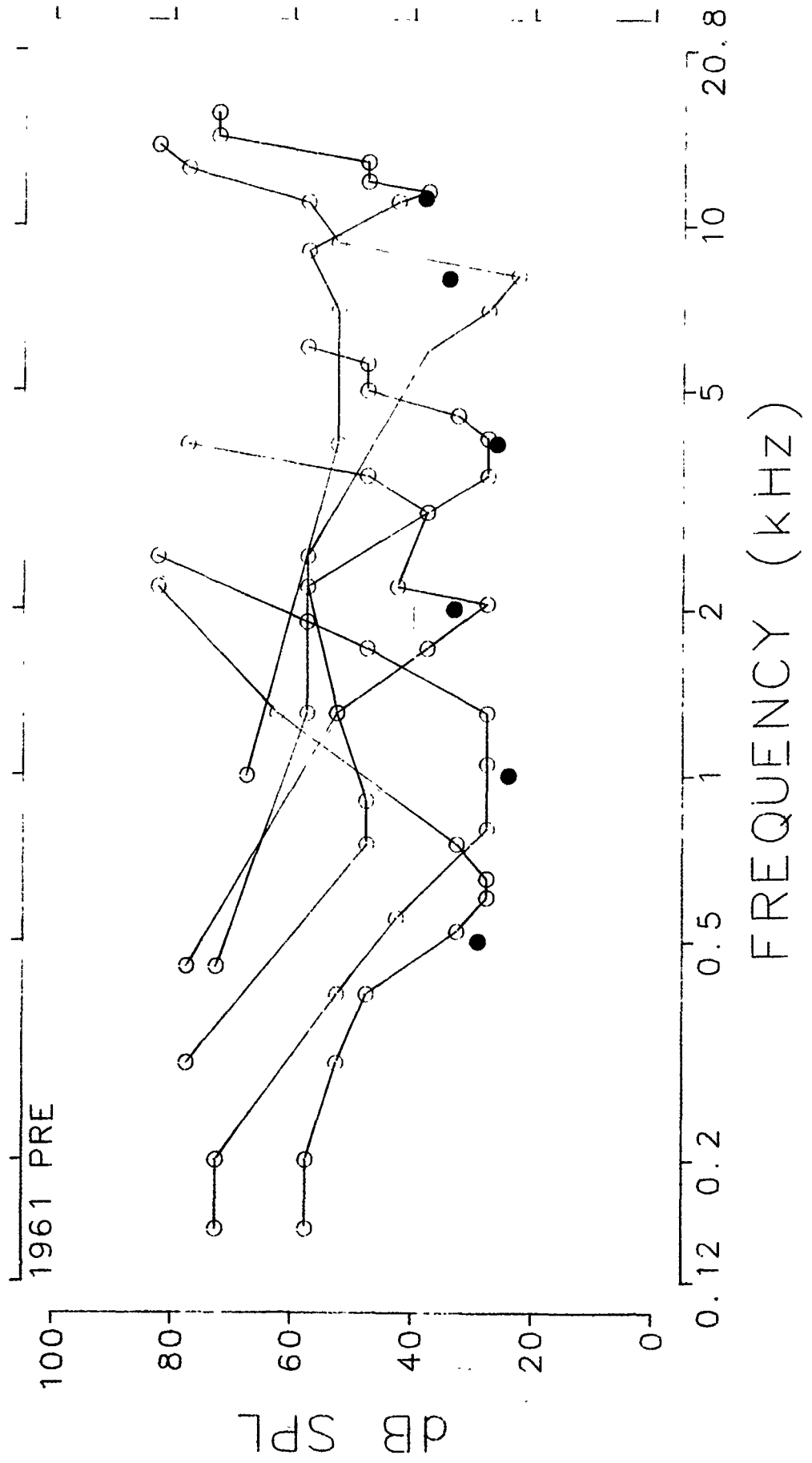


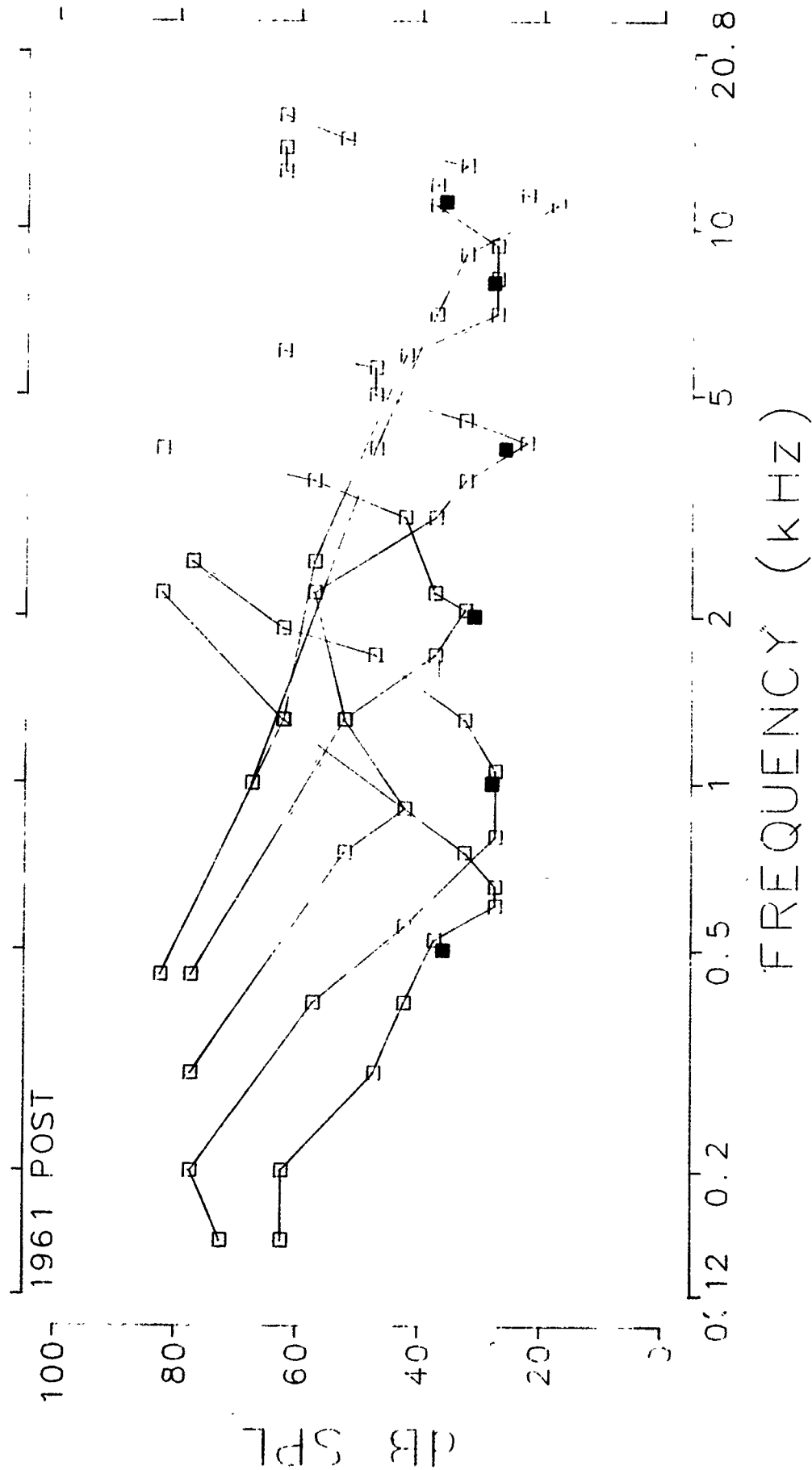


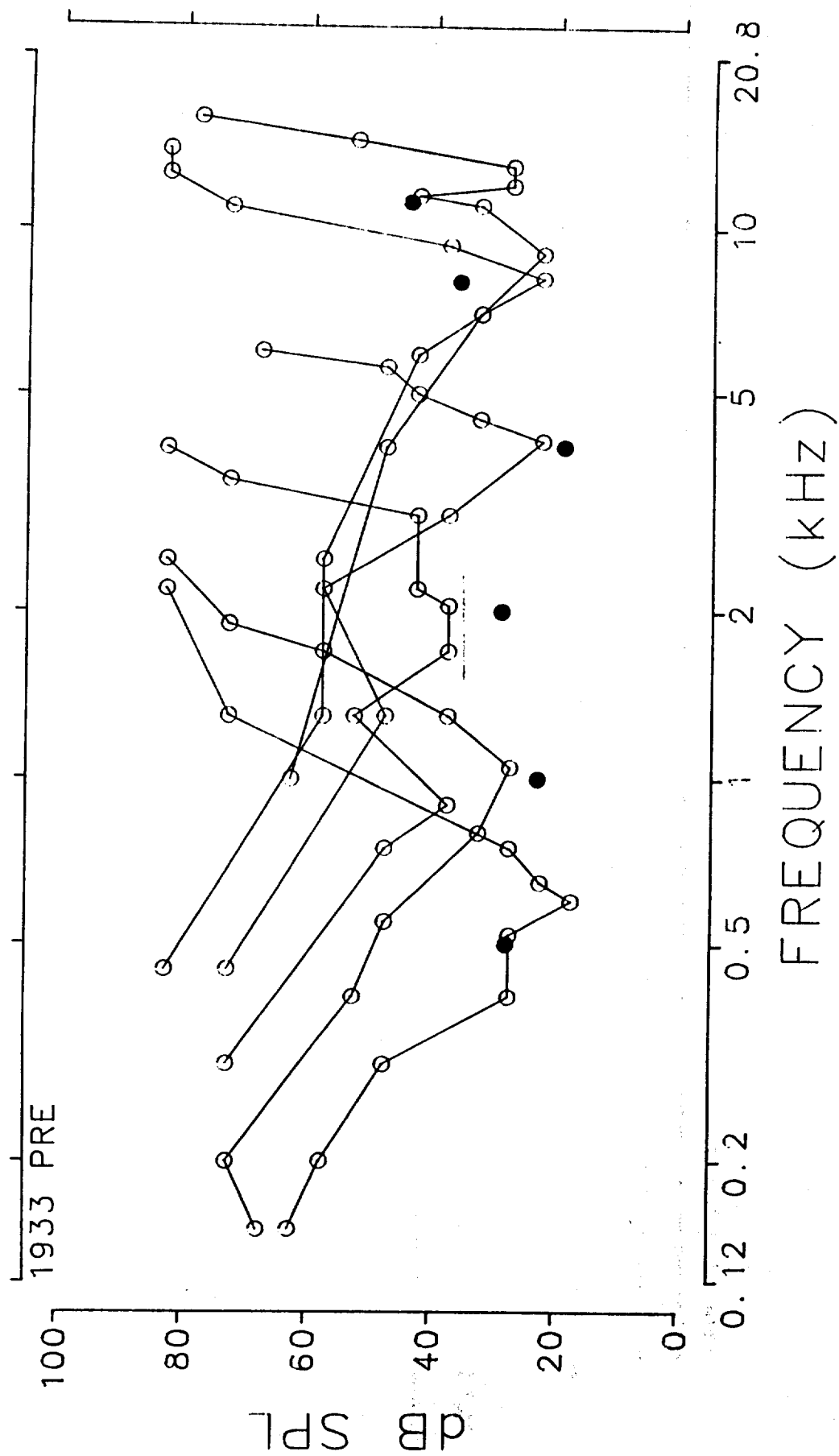


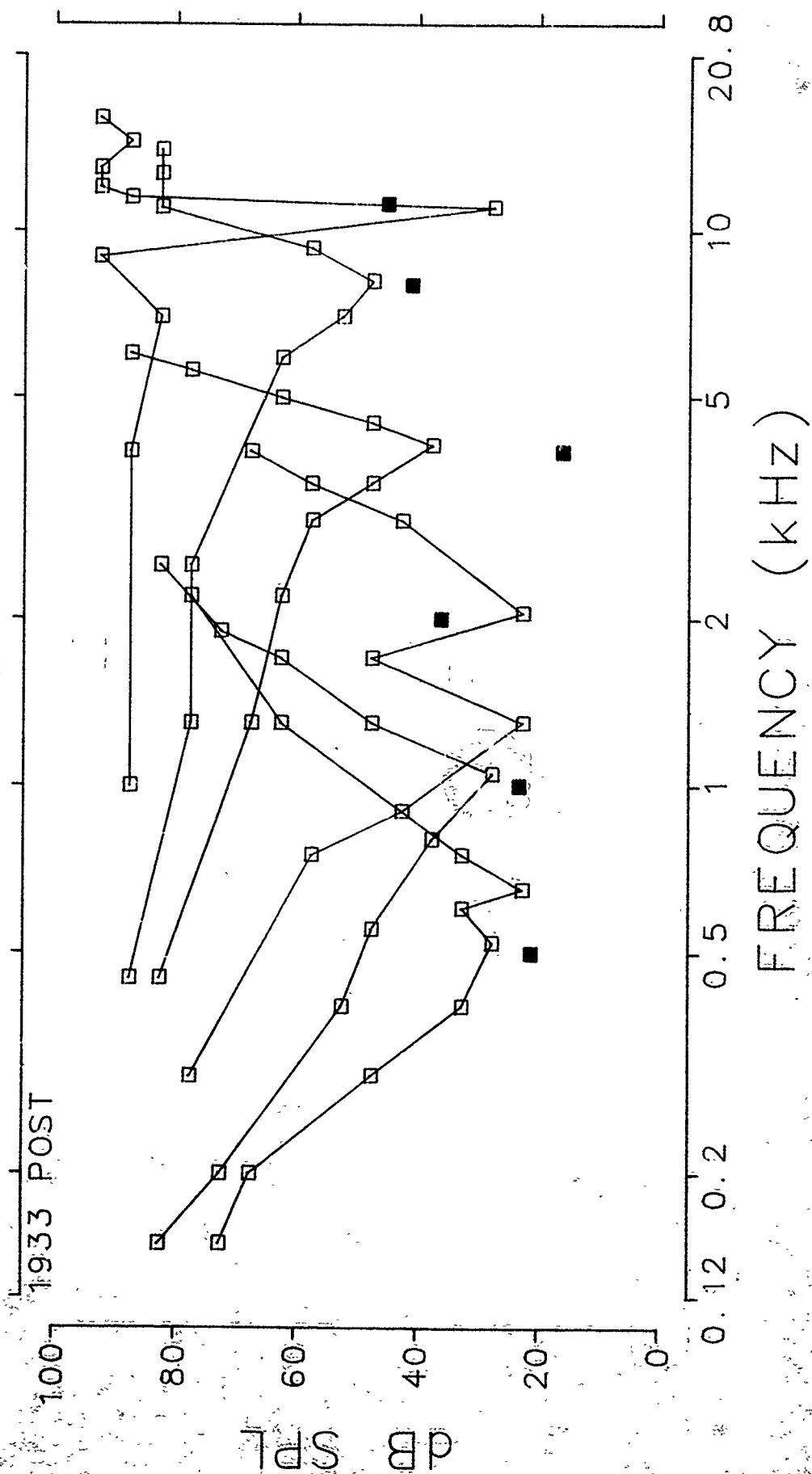












SHOCK TUBE EXPOSURE
155 dB, 1X

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1396R	3	35	42	97	174
R1337R	99	317	284	482	1083
R1933R	7	29	28	59	116
R1961R	12	67	159	123	349
R1975R	4	62	78	61	201
R2016R	21	20	39	56	115
R2076R	31	116	49	76	241
GROUP MEAN	25				326
S.D.	34				344

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

GROUP MEANS	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
	0.125 kHz	2.1	62.0
	0.25 kHz	4.7	58.7
	0.5 kHz	3.3	52.7
	1 kHz	3.1	53.3
	2 kHz	1.7	20.7
	4 kHz	5.3	33.6
	8 kHz	2.9	26.3
	16 kHz	2.0	16.1

STANDARD DEVIATIONS

0.125 kHz	1.1	51.9
0.25 kHz	4.3	77.3
0.5 kHz	5.3	57.7
1 kHz	5.0	65.7
2 kHz	2.8	17.1
4 kHz	9.4	39.5
8 kHz	5.0	48.2
16 kHz	4.4	19.3

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLA CELLS
CHINCHILLA R1396R							
0.125 kHz	1	1	11	21	33	0	7
0.25 kHz	1	14	10	45	69	0	1
0.5 kHz	0	10	15	21	46	0	1
1 kHz	0	3	5	7	15	0	0
2 kHz	1	1	0	0	1	0	0
4 kHz	0	4	1	2	7	0	0
8 kHz	0	2	0	1	3	0	0
16 kHz	0	0	0	0	0	0	0
TOTALS	3	35	42	97	174	0	9

CHINCHILLA R1337R

0.125 kHz	1	56	38	76	170	1	5
0.25 kHz	11	60	43	124	227	0	6
0.5 kHz	15	40	50	86	176	1	6
1 kHz	13	50	60	60	170	1	7
2 kHz	8	16	12	19	47	0	3
4 kHz	24	34	23	39	96	4	9
8 kHz	14	38	35	61	134	0	7
16 kHz	12	19	21	16	56	0	0
TOTALS	99	317	284	482	1083	7	43

CHINCHILLA R1933R

0.125 kHz	4	2	14	21	37	0	1
0.25 kHz	2	0	0	8	8	0	0
0.5 kHz	1	3	6	15	24	0	1
1 kHz	0	3	4	8	15	0	0
2 kHz	0	5	1	2	8	0	0
4 kHz	0	13	2	1	16	0	1
8 kHz	0	3	0	1	4	0	0
16 kHz	0	0	1	3	4	0	0
TOTALS	7	29	28	59	116	0	3

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1961R							
0.125 kHz	2	5	12	26	43	0	1
0.25 kHz	5	9	6	36	51	0	0
0.5 kHz	3	36	20	10	66	0	0
1 kHz	0	11	97	16	124	0	0
2 kHz	0	3	21	14	38	0	0
4 kHz	1	1	0	20	21	0	0
8 kHz	1	1	2	0	3	0	0
16 kHz	0	0	1	1	2	0	0
TOTALS	12	67	159	123	349	0	1

CHINCHILLA R1975R

0.125 kHz	2	23	32	29	84	0	0
0.25 kHz	0	4	3	10	17	0	0
0.5 kHz	0	6	15	0	21	0	1
1 kHz	1	8	15	3	26	0	0
2 kHz	1	9	2	8	19	1	0
4 kHz	0	1	3	0	4	0	0
8 kHz	0	7	3	3	13	0	0
16 kHz	0	4	3	8	15	0	0
TOTALS	4	62	78	61	201	1	1

CHINCHILLA R2016R

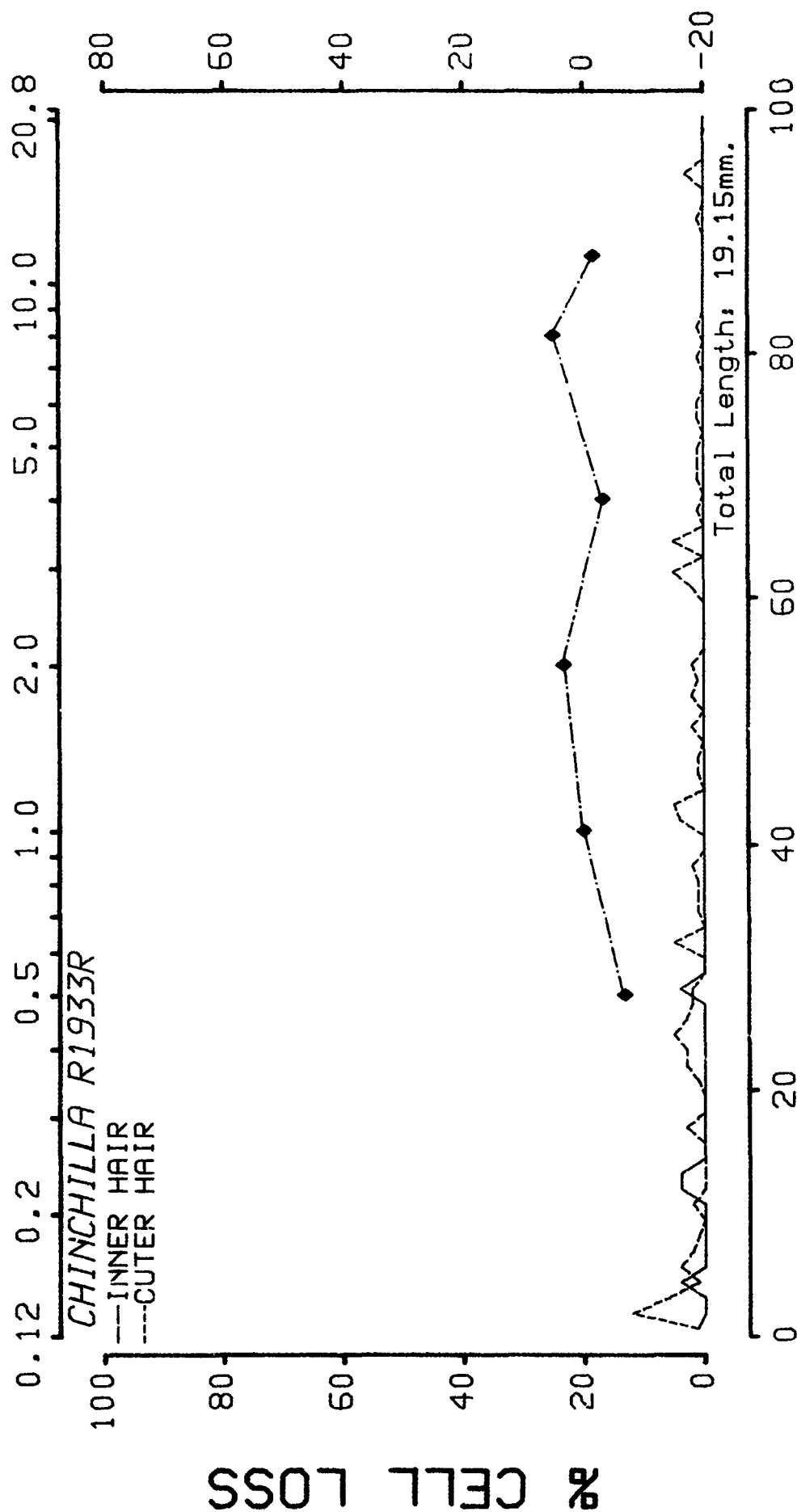
0.125 kHz	3	4	22	24	50	0	9
0.25 kHz	10	6	2	9	17	0	0
0.5 kHz	3	1	2	3	6	0	0
1 kHz	1	2	2	0	4	0	0
2 kHz	1	2	3	2	7	0	0
4 kHz	0	1	3	2	6	0	0
8 kHz	2	0	1	1	2	0	0
16 kHz	1	3	4	15	22	0	0
TOTALS	21	20	39	56	115	0	9

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R2076R							
0.125 kHz	2	2	5	10	17	0	1
0.25 kHz	4	5	4	13	22	0	1
0.5 kHz	1	15	8	7	30	1	0
1 kHz	7	10	4	5	19	4	0
2 kHz	1	15	3	7	25	4	1
4 kHz	12	47	20	18	85	28	9
8 kHz	3	12	1	12	25	8	3
16 kHz	1	7	3	4	14	1	1
TOTALS	31	116	49	76	241	46	16

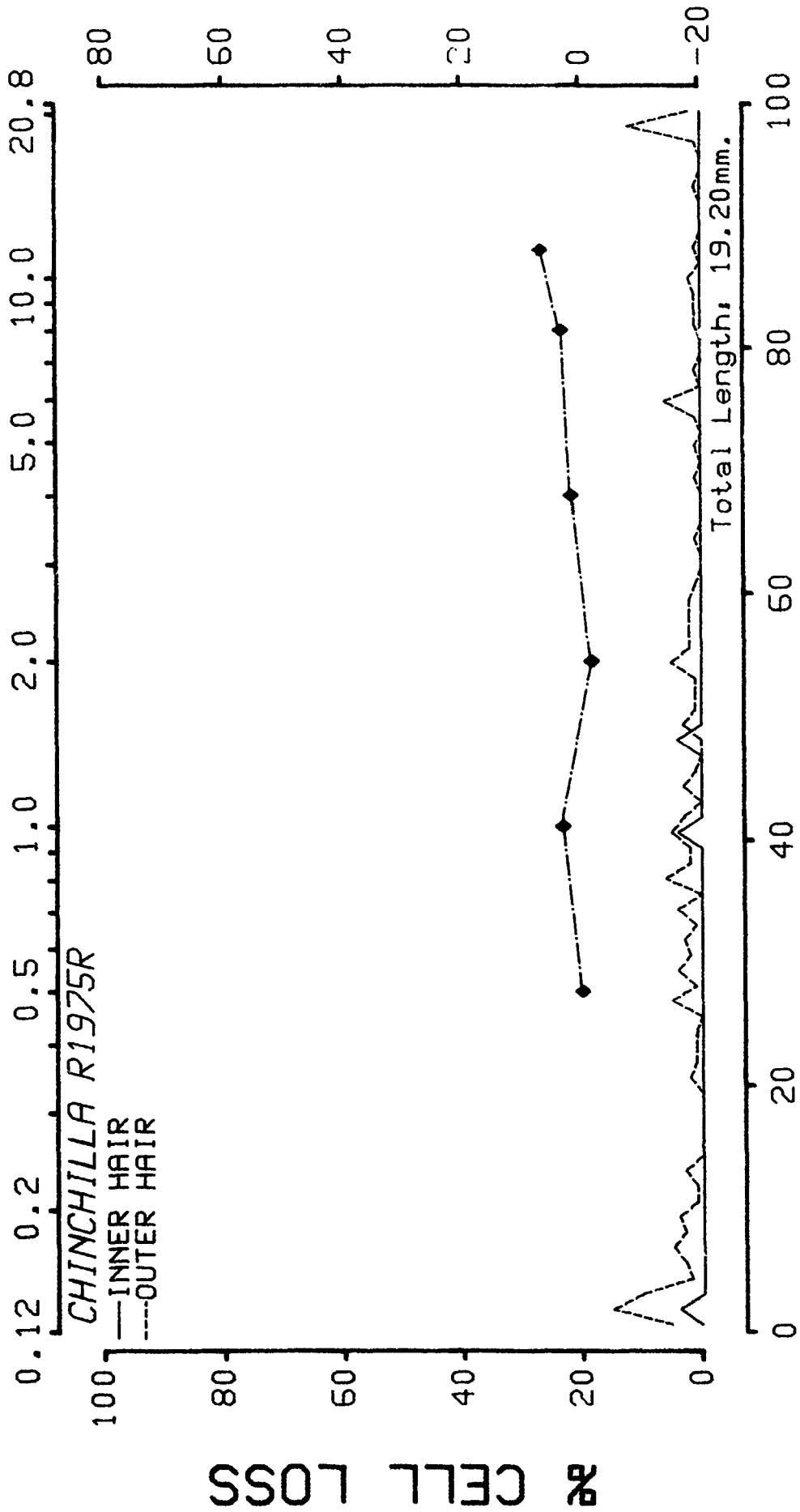
Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (KHz)



% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)

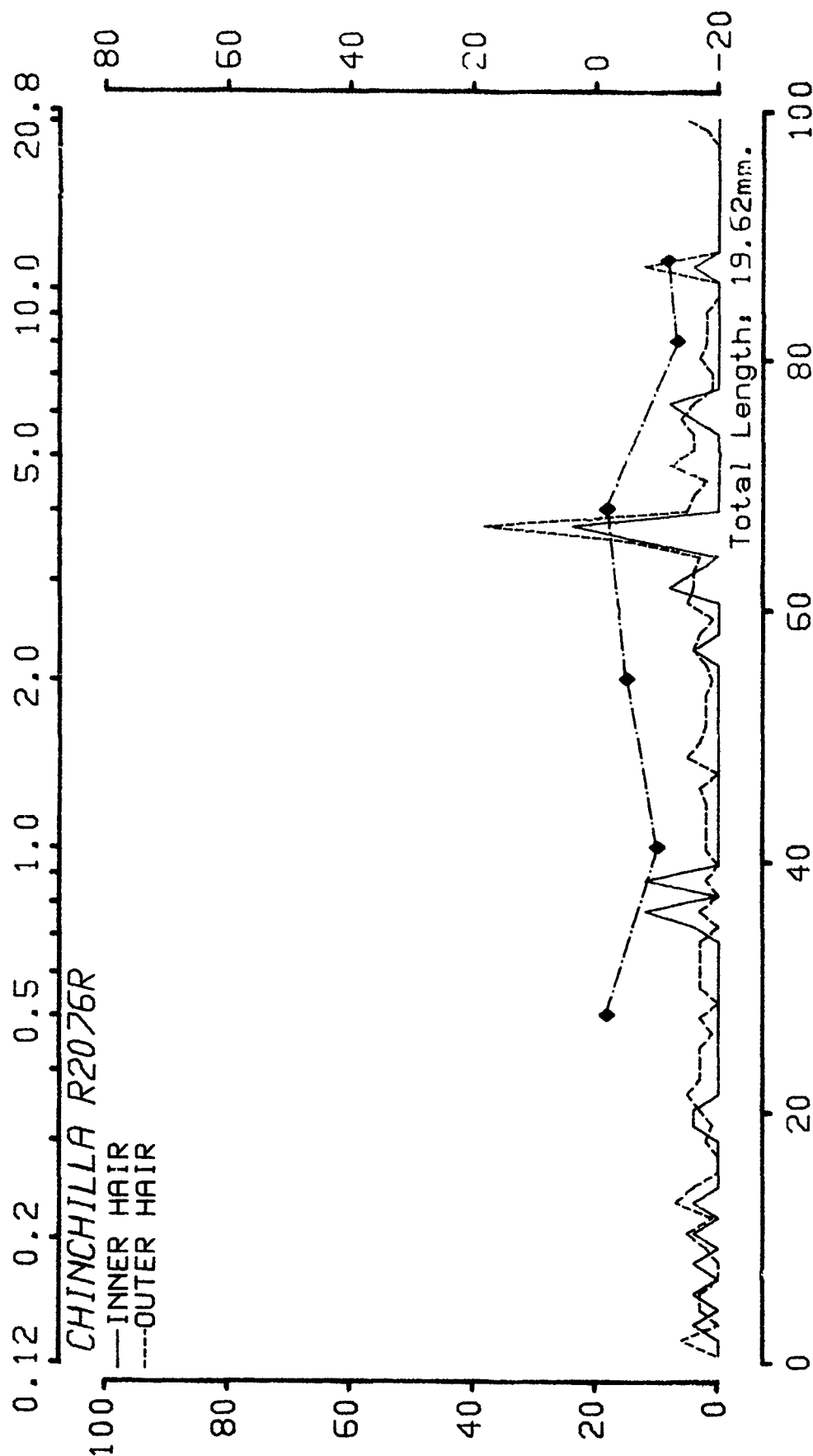


% TOTAL DISTANCE FROM APEX

PTS (dB)

% CELL LOSS

FREQUENCY (kHz)

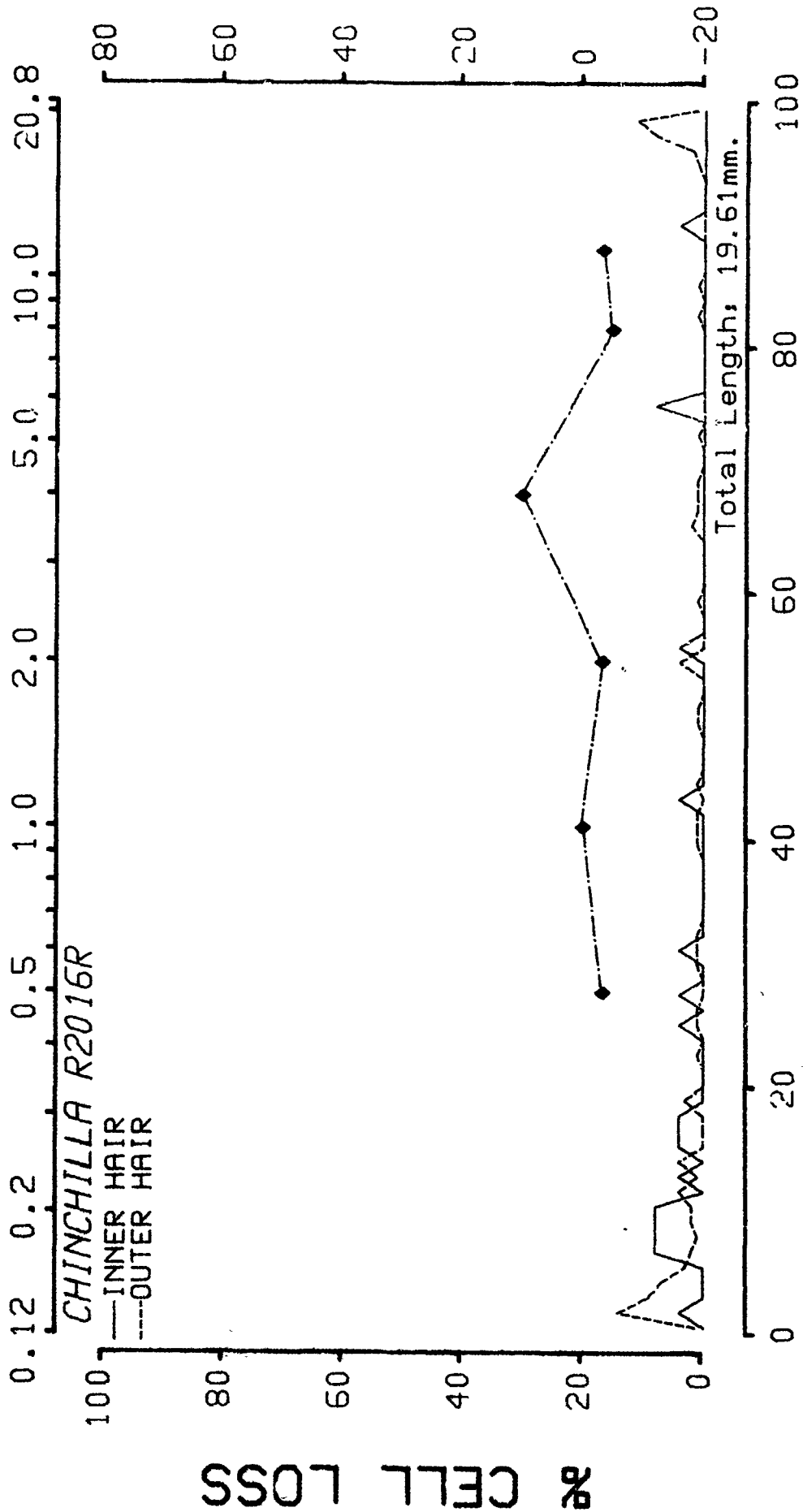


% CELL LOSS

% TOTAL DISTANCE FROM APEX

PTS (dB)

FREQUENCY (KHZ)

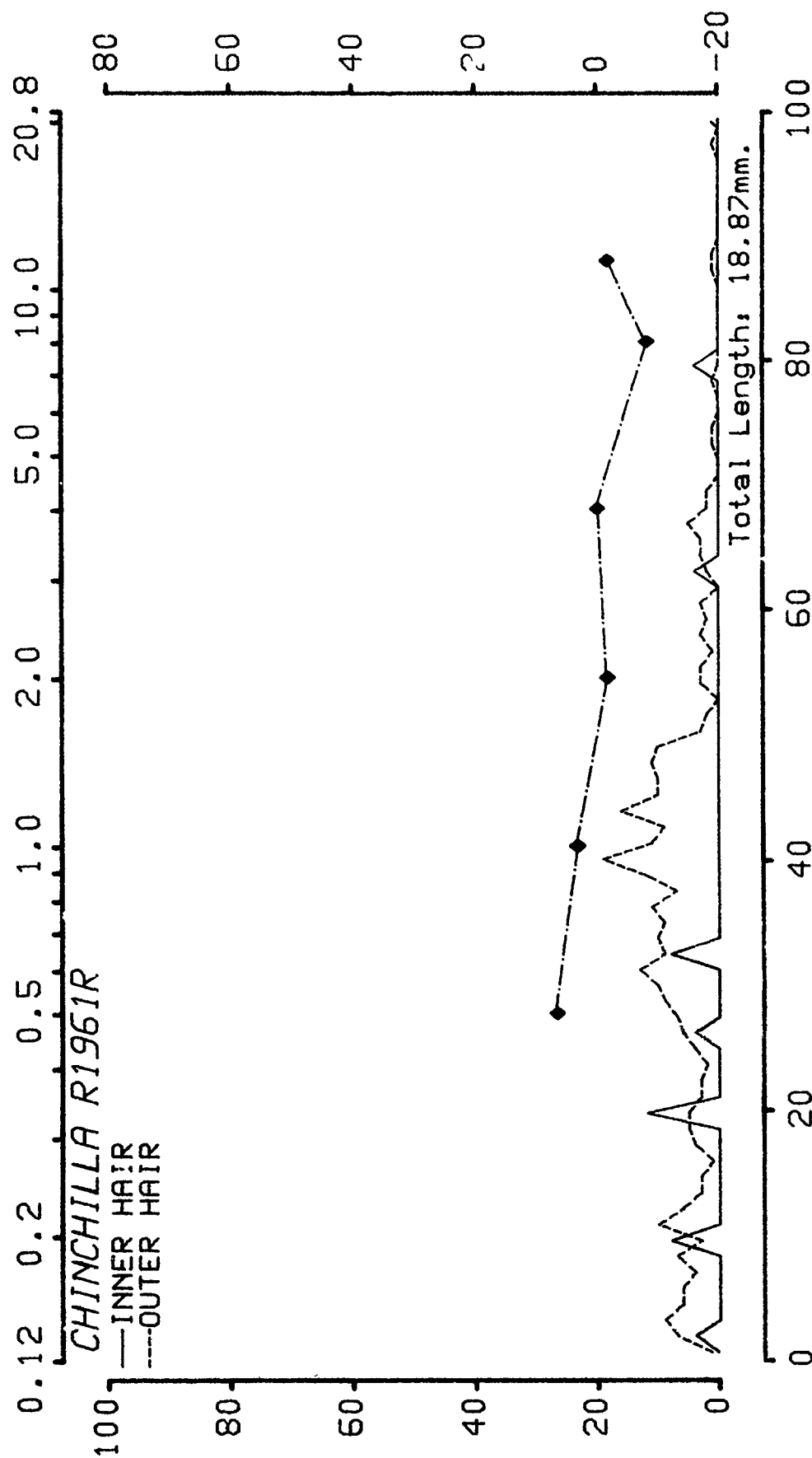


PTS (dB)

% TOTAL DISTANCE FROM APEX

% CELL LOSS

FREQUENCY (KHZ)

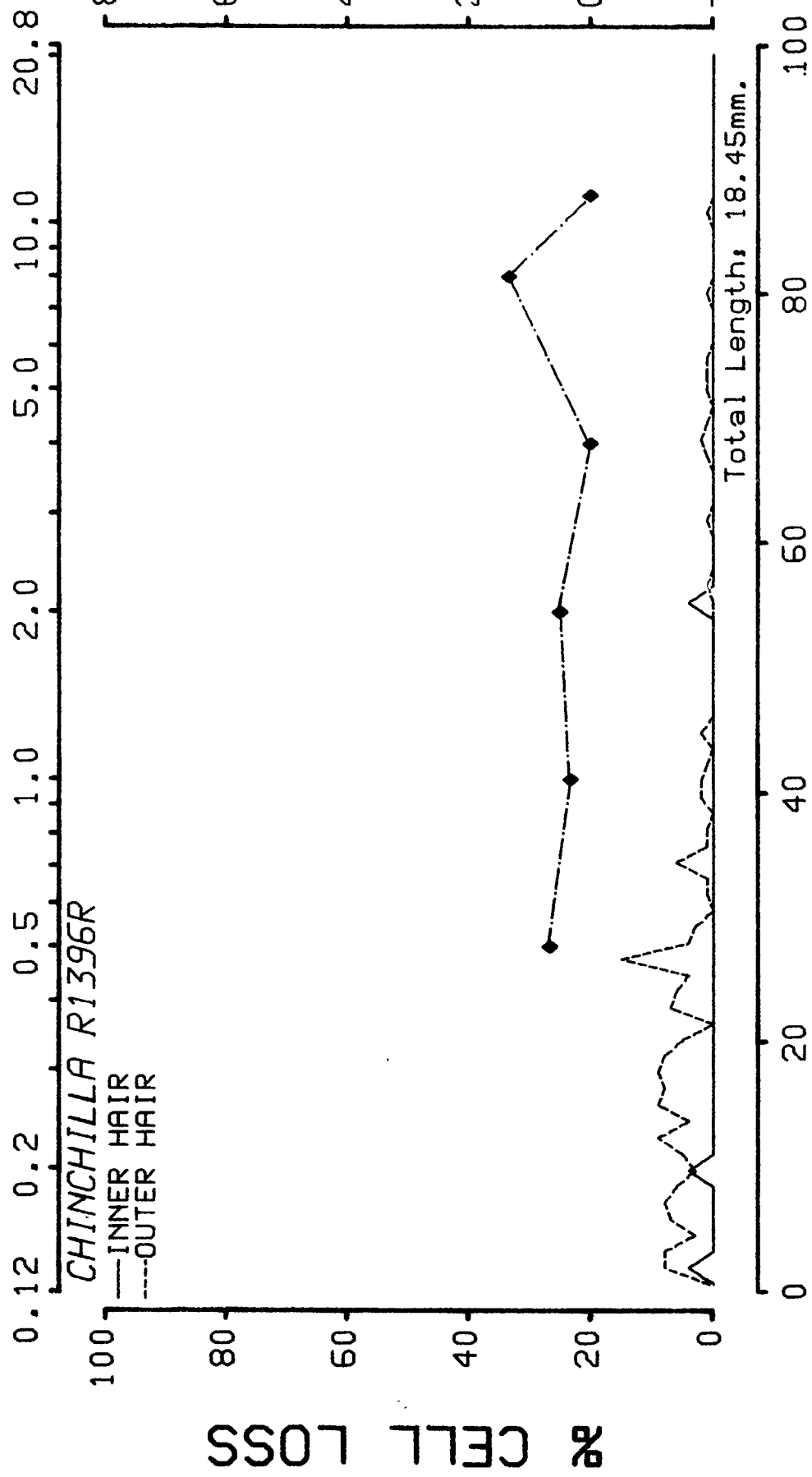


% TOTAL DISTANCE FROM APEX

PTS (dB)

% CELL LOSS

FREQUENCY (kHz)

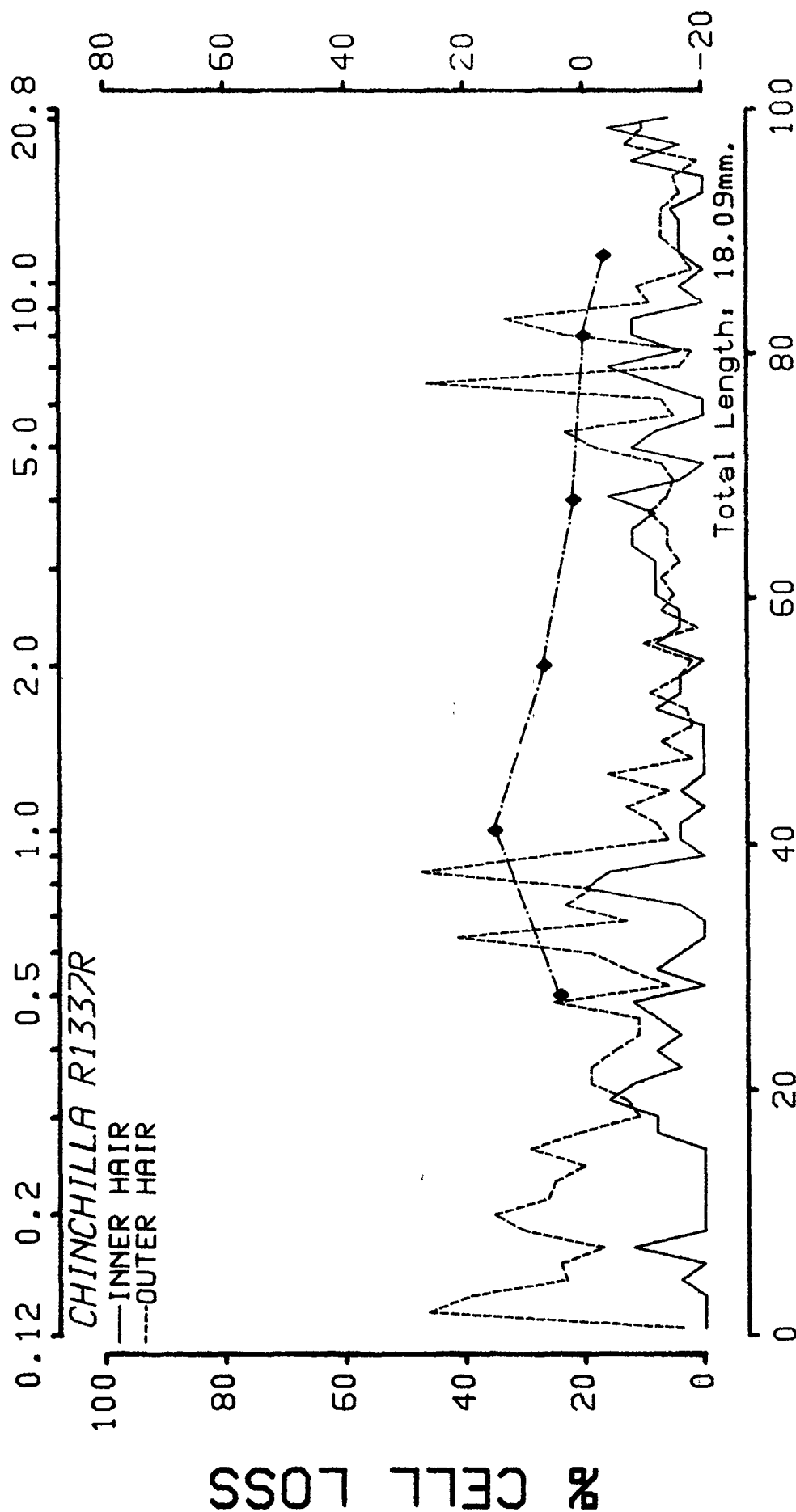


% TOTAL DISTANCE FROM APEX

% CELL LOSS

PTS (dB)

FREQUENCY (kHz)



% TOTAL DISTANCE FROM APEX

Summary Data for the Group Exposed to:

155 dB, 10X, 10/M

Animal

1534	-	Completed the Entire Protocol
1700	-	Completed the Entire Protocol
1716	-	Completed the Entire Protocol
1718	-	Completed the Entire Protocol
1759	-	Completed the Entire Protocol
1617	-	Bad Electrode: No Audiometric Data
1646	-	No Tuning Curves were Collected

155 dB 10X 10/M

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1534	29.2	17.5	14.2	10.8	20.8	22.5	*****
1700	20.8	17.5	15.8	-5.8	10.8	22.5	*****
1716	22.5	12.5	14.2	9.2	25.8	24.2	*****
1718	20.8	10.8	14.2	5.8	19.2	25.8	*****
1759	22.5	17.5	15.0	13.8	30.0	27.5	*****
Mean	23.2	15.2	14.7	6.8	21.3	24.5	*****
S.D.	3.5	3.3	0.7	7.6	7.3	2.2	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1534	29.2	15.8	17.5	10.8	20.8	25.8	*****
1700	17.5	12.5	12.5	2.5	15.8	22.5	*****
1716	32.5	27.5	19.2	20.8	39.2	30.8	*****
1718	29.2	27.5	17.5	9.2	25.8	32.5	*****
1759	34.2	39.2	25.8	20.8	30.8	35.8	*****
Mean	28.5	24.5	18.5	12.8	26.5	29.5	*****
S.D.	6.5	10.6	4.8	7.9	9.0	5.3	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1534	0.0	-1.7	3.3	0.0	0.0	3.3	*****
1700	-3.3	-5.0	-3.3	8.3	5.0	0.0	*****
1716	10.0	15.0	5.0	11.7	13.3	6.7	*****
1718	8.3	16.7	3.3	3.3	6.7	6.7	*****
1759	11.7	21.7	10.8	7.1	0.8	8.3	*****
Mean	5.3	9.3	3.8	6.1	5.2	5.0	*****
S.D.	6.6	11.9	5.1	4.5	5.3	3.3	*****

155 dB 10X 10/M

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
1534	3.3	8.3	8.3	8.3	-1.7	8.3
1700	1.7	1.7	1.7	-3.3	-3.3	1.7
1716	10.0	0.0	-5.0	0.0	10.0	10.0
1718	31.7	74.2*	21.7	26.7	16.7	74.2
1759	40.0	62.5*	55.0	30.0	15.0	62.5
Mean	17.3	29.3	16.3	12.3	7.3	31.3
S.D.	17.4	36.0	23.8	15.3	9.3	34.2

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1534	23.3	38.3	28.3	8.3	3.3	38.3
1700	6.7	1.7	1.7	1.7	-3.3	6.7
1716	13.3	-1.7	-1.7	-1.7	3.3	13.3
1718	33.3	75.8*	23.3	18.3	3.3	75.8
1759	47.5	52.5	37.5	22.5	12.5	52.5
Mean	24.8	33.3	17.8	9.8	3.8	37.3
S.D.	16.2	33.3	17.1	10.4	5.6	28.4

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1534	26.7	16.7	16.7	11.7	1.7	26.7
1700	16.7	11.7	6.7	1.7	-3.3	16.7
1716	6.7	6.7	11.7	11.7	1.7	11.7
1718	63.3	68.3	13.3	8.3	8.3	68.3
1759	37.5	47.5	17.5	12.5	17.5	47.5
Mean	30.2	30.2	13.2	9.2	5.2	34.2
S.D.	21.8	26.6	4.3	4.5	8.0	23.5

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 0.5 kHz

Masker (kHz):	0.150	0.200	0.300	0.400	0.520	0.600	0.650	0.750	1.300	2.200
Animal (Q-10 dB)	Pre-Exposure									
1534 (1.51)	72.5	67.5	57.5	52.5	42.5	42.5	37.5	42.5	62.5	87.5
1700 (3.19)	62.5	62.5	52.5	47.5	32.5	42.5	42.5	47.5	87.5	92.5
1716 (1.75)	67.5	62.5	52.5	50.0	42.5	40.0	35.0	40.0	62.5	87.5
1718 (2.05)	67.5	67.5	57.5	52.5	42.5	37.5	42.5	47.5	72.5	87.5
1759 (1.66)	62.5	62.5	52.5	42.5	27.5	32.5	32.5	37.5	62.5	85.0*
Mean (2.05)	66.5	64.5	54.5	49.0	37.5	39.0	38.0	43.0	69.5	88.0
S.D. (0.66)	4.2	2.7	2.7	4.2	7.1	4.2	4.5	4.5	11.0	2.7
Animal (Q-10 dB)	Post-Exposure									
1534 (1.78)	77.5	67.5	57.5	47.5	37.5	37.5	37.5	32.5	67.5	82.5
1700 (2.09)	57.5	52.5	42.5	32.5	22.5	27.5	32.5	42.5	72.5	87.5
1716 (1.77)	77.5	67.5	57.5	52.5	32.5	37.5	37.5	42.5	67.5	82.5
1718 (0.71)	67.5	62.5	47.5	47.5	47.5	52.5	57.5	67.5	90.0*	95.0*
1759 (0.59)	62.5	57.5	37.5	37.5	37.5	42.5	42.5	47.5	77.5	82.5
Mean (1.39)	68.5	61.5	48.5	43.5	35.5	39.5	41.5	46.5	75.0	86.0
S.D. (0.69)	8.9	6.5	8.9	8.2	9.1	9.1	9.6	12.9	9.4	5.5

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 1.0 kHz

Masker (kHz):	0.150	0.200	0.400	0.550	0.800	1.050	1.300	1.700	1.900	2.500
Animal (Q-10 dB)	Pre-Exposure									
1534 (1.61)	72.5	72.5	62.5	47.5	32.5	27.5	32.5	62.5	75.0*	95.0*
1700 (****)	****	****	****	****	****	****	****	****	****	****
1716 (1.69)	67.5	62.5	57.5	42.5	32.5	22.5	27.5	42.5	47.5	87.5
1718 (1.77)	72.5	77.5	62.5	47.5	32.5	27.5	37.5	57.5	57.5	95.0*
1759 (1.44)	77.5	77.5	57.5	42.5	32.5	27.5	32.5	52.5	62.5	85.0*
Mean (1.63)	72.5	72.5	60.0	45.0	32.5	26.3	32.5	53.8	60.6	90.6
S.D. (0.14)	4.1	7.1	2.9	2.9	0.0	2.5	4.1	8.5	11.4	5.2
Animal (Q-10 dB)	Post-Exposure									
1534 (1.93)	82.5	72.5	57.5	47.5	32.5	22.5	27.5	67.5	77.5	87.5
1700 (0.92)	62.5	62.5	47.5	37.5	27.5	27.5	32.5	47.5	52.5	87.5
1716 (0.85)	87.5	87.5	67.5	52.5	42.5	42.5	47.5	57.5	57.5	82.5
1718 (1.59)	82.5	72.5	62.5	52.5	47.5	42.5	57.5	67.5	62.5	95.0*
1759 (0.79)	77.5	77.5	72.5	62.5	57.5	57.5	57.5	77.5	77.5	77.5
Mean (1.22)	78.5	74.5	61.5	50.5	41.5	38.5	44.5	63.5	65.5	86.0
S.D. (0.51)	9.6	9.1	9.6	9.1	11.9	13.9	14.0	11.4	11.5	6.5

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

1534 (3.20)	67.5	47.5	37.5	32.5	27.5	17.5	22.5	47.5	77.5	95.0*
1700 (4.01)	67.5	47.5	47.5	42.5	47.5	27.5	32.5	52.5	85.0*	95.0*
1716 (2.04)	62.5	42.5	37.5	37.5	32.5	22.5	22.5	37.5	77.5	95.0*
1718 (6.05)	87.5	57.5	42.5	42.5	37.5	22.5	37.5	47.5	85.0*	95.0*
1759 (5.24)	82.5	72.5	57.5	52.5	47.5	17.5	22.5	52.5	57.5	87.5

Mean	(4.11)	73.5	53.5	44.5	38.5	21.5	27.5	47.5	76.5	93.5
S.D.	(1.59)	10.8	11.9	8.4	7.4	4.2	7.1	6.1	11.3	3.4

Animal (Q-10 dB)

Post-Exposure

1534 (4.09)	67.5	47.5	42.5	32.5	27.5	17.5	27.5	52.5	77.5	95.0*
1700 (4.09)	62.5	42.5	42.5	37.5	32.5	22.5	32.5	47.5	72.5	95.0*
1716 (3.42)	82.5	67.5	62.5	57.5	47.5	32.5	27.5	47.5	72.5	95.0*
1718 (9.19)	67.5	47.5	37.5	42.5	52.5	22.5	37.5	47.5	85.0*	95.0*
1759 (8.33)	67.5	42.5	37.5	42.5	52.5	27.5	42.5	32.5	37.5	95.0*

Mean	(5.83)	69.5	49.5	44.5	42.5	24.5	33.5	45.5	69.0	95.0
S.D.	(2.71)	7.6	10.4	10.4	9.4	5.7	6.5	7.6	18.3	0.0

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 4.0 kHz

Masker (kHz):	0.450	1.300	2.200	3.000	3.500	4.100	4.500	5.000	5.600	6.000
Animal (Q-10 dB)	Pre-Exposure									
1534 (3.95)	77.5	47.5	47.5	42.5	27.5	22.5	37.5	47.5	52.5	62.5
1700 (4.76)	77.5	57.5	47.5	47.5	37.5	27.5	42.5	62.5	67.5	67.5
1716 (2.73)	67.5	57.5	47.5	37.5	32.5	27.5	37.5	57.5	72.5	82.5
1718 (3.26)	72.5	52.5	52.5	42.5	32.5	27.5	37.5	47.5	57.5	67.5
1759 (2.73)	77.5	57.5	52.5	37.5	32.5	27.5	37.5	57.5	57.5	72.5
Mean (3.49)	74.5	54.5	49.5	41.5	32.5	26.5	38.5	54.5	61.5	70.5
S.D. (0.87)	4.5	4.5	2.7	4.2	3.5	2.2	2.2	6.7	8.2	7.6
Animal (Q-10 dB)	Post-Exposure									
1534 (3.23)	77.5	57.5	57.5	37.5	22.5	17.5	22.5	47.5	72.5	72.5
1700 (3.49)	67.5	57.5	52.5	42.5	27.5	22.5	32.5	57.5	72.5	85.0*
1716 (3.65)	77.5	67.5	62.5	52.5	42.5	37.5	52.5	67.5	77.5	95.0*
1718 (2.73)	82.5	52.5	52.5	37.5	32.5	27.5	37.5	52.5	62.5	87.5
1759 (3.65)	95.0*	62.5	57.5	47.5	37.5	32.5	47.5	52.5	67.5	95.0*
Mean (3.35)	80.0	59.5	56.5	43.5	32.5	27.5	38.5	55.5	70.5	87.0
S.D. (0.39)	10.0	5.7	4.2	6.5	7.9	7.9	11.9	7.6	5.7	9.3

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 8.0 kHz

Masker (kHz):	0.450	1.300	2.500	5.900	7.000	8.100	9.300	11.000	12.700	14.000
Animal (Q-10 dB)	Pre-Exposure									
1534 (6.87)	67.5	47.5	57.5	52.5	27.5	32.5	17.5	47.5	57.5	87.5
1700 (2.52)	72.5	62.5	62.5	47.5	37.5	37.5	57.5	62.5	67.5	77.5
1716 (1.30)	77.5	67.5	62.5	47.5	42.5	42.5	45.0	67.5	85.0*	95.0*
1718 (2.52)	82.5	62.5	57.5	32.5	22.5	27.5	37.5	47.5	62.5	67.5
1759 (5.99)	85.0*	62.5	62.5	47.5	52.5	32.5	47.5	57.5	77.5	95.0*
Mean (3.84)	77.0	60.5	60.5	45.5	36.5	34.5	41.0	56.5	70.0	84.5
S.D. (2.44)	7.2	7.6	2.7	7.6	11.9	5.7	15.0	8.9	11.2	11.9
Animal (Q-10 dB)	Post-Exposure									
1534 (3.01)	87.5	62.5	57.5	42.5	27.5	22.5	32.5	62.5	85.0*	95.0*
1700 (1.34)	72.5	67.5	62.5	37.5	37.5	32.5	32.5	42.5	57.5	47.5
1716 (0.99)	87.5	72.5	67.5	52.5	57.5	52.5	62.5	85.0*	95.0*	95.0*
1718 (3.18)	87.5	62.5	62.5	47.5	37.5	47.5	52.5	75.0*	85.0*	95.0*
1759 (2.29)	95.0*	67.5	62.5	57.5	42.5	42.5	52.5	67.5	85.0*	95.0*
Mean (2.16)	86.0	66.5	62.5	47.5	40.5	39.5	46.5	66.5	81.5	85.5
S.D. (0.98)	8.2	4.2	3.5	7.9	11.0	12.0	13.4	15.9	14.1	21.2

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 10/M

Probe Frequency: 11.2 kHz

Masker (kHz): 1.000 4.000 7.000 9.000 11.000 11.500 12.000 13.000 14.500 16.000

Animal (Q-10 dB)

Pre-Exposure

1534 (8.68)	72.5	52.5	47.5	37.5	27.5	17.5	22.5	37.5	37.5	72.5
1700 (5.75)	62.5	52.5	57.5	67.5	47.5	37.5	37.5	47.5	62.5	72.5
1716 (3.61)	72.5	52.5	52.5	52.5	32.5	37.5	37.5	42.5	52.5	72.5
1718 (3.26)	77.5	52.5	57.5	57.5	42.5	42.5	42.5	52.5	57.5	87.5
1759 (6.85)	77.5	52.5	67.5	52.5	47.5	37.5	32.5	42.5	57.5	72.5

Mean (5.63)	72.5	52.5	56.5	53.5	39.5	34.5	34.5	44.5	53.5	75.5
S.D. (2.27)	6.1	0.0	7.4	10.8	9.1	9.7	7.6	5.7	9.6	6.7

Animal (Q-10 dB)

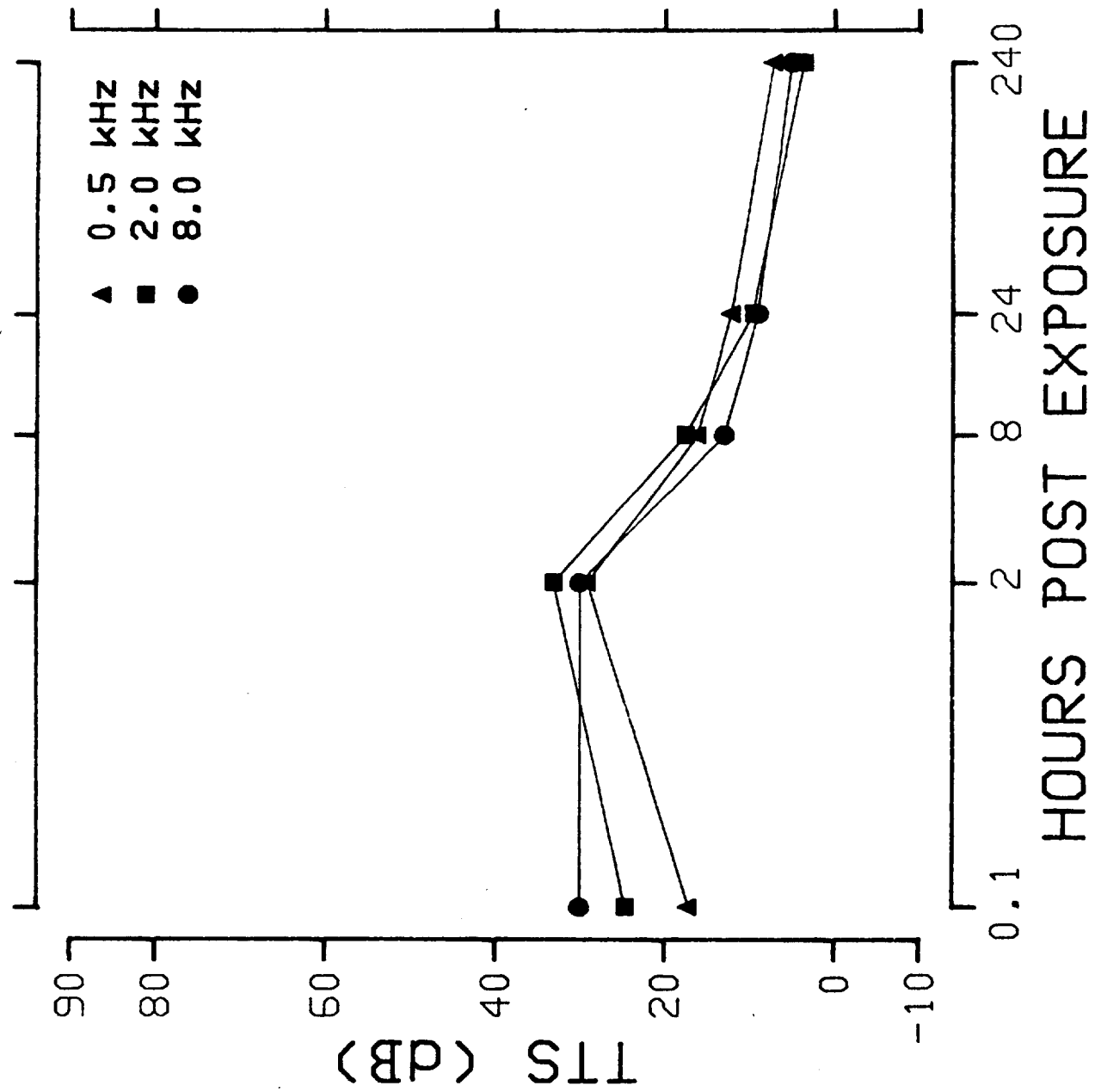
Post-Exposure

1534 (5.08)	72.5	57.5	62.5	37.5	32.5	27.5	22.5	27.5	47.5	87.5
1700 (8.15)	57.5	47.5	57.5	42.5	17.5	27.5	32.5	42.5	47.5	87.5
1716 (4.57)	77.5	52.5	57.5	77.5	47.5	42.5	47.5	47.5	95.0*	95.0*
1718 (7.09)	67.5	52.5	52.5	52.5	32.5	42.5	42.5	42.5	47.5	87.5
1759 (4.64)	72.5	57.5	67.5	65.0*	42.5	37.5	37.5	47.5	62.5	67.5

Mean (5.91)	69.5	53.5	59.5	55.0	34.5	35.5	36.5	41.5	60.0	85.0
S.D. (1.62)	7.6	4.2	5.7	16.4	11.5	7.6	9.6	8.2	20.6	10.3

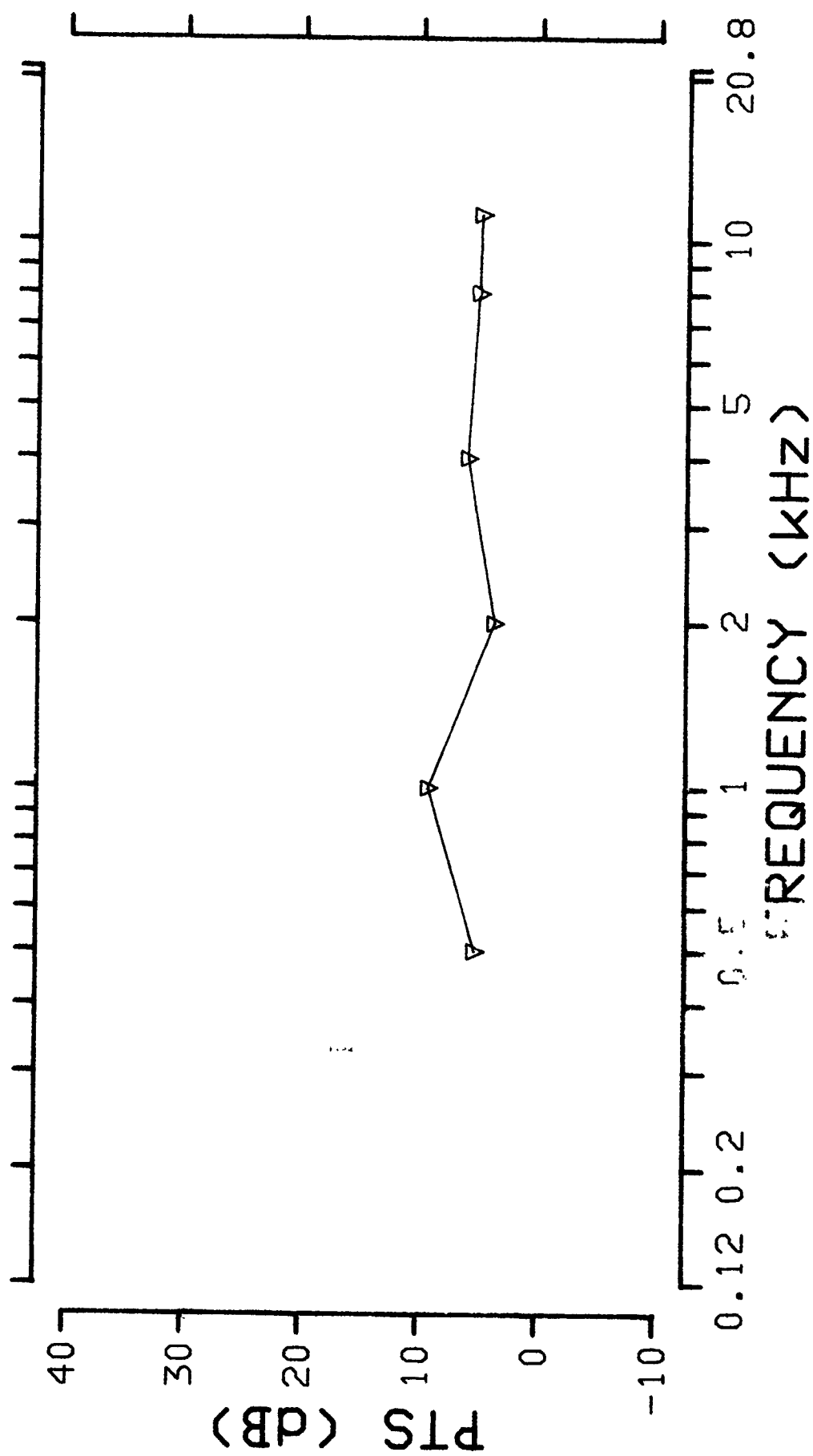
The Group Mean Recovery Curves
Measured at Three Test Frequencies

MEAN DATA (n=5) - 155 dB 10X 10/M



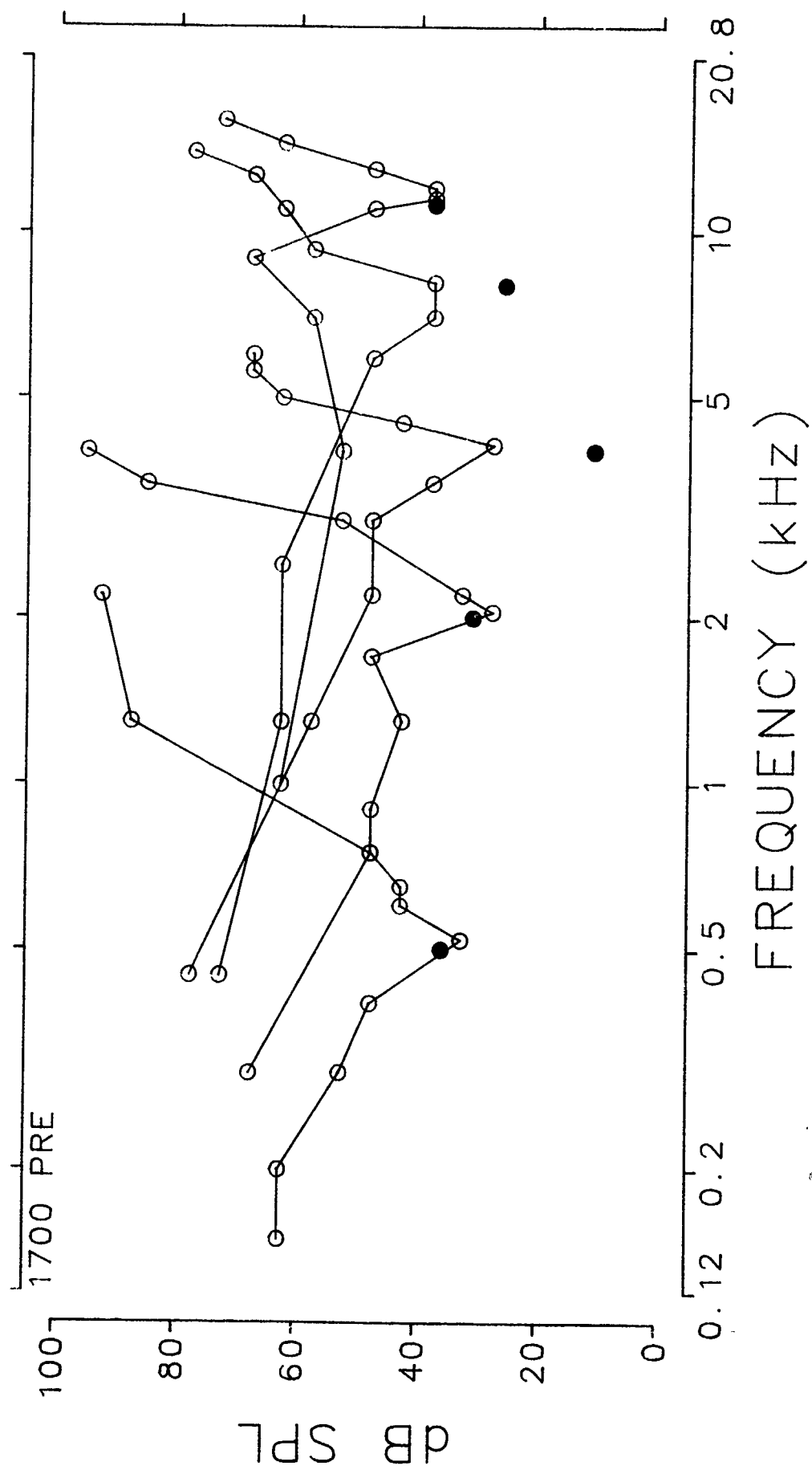
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

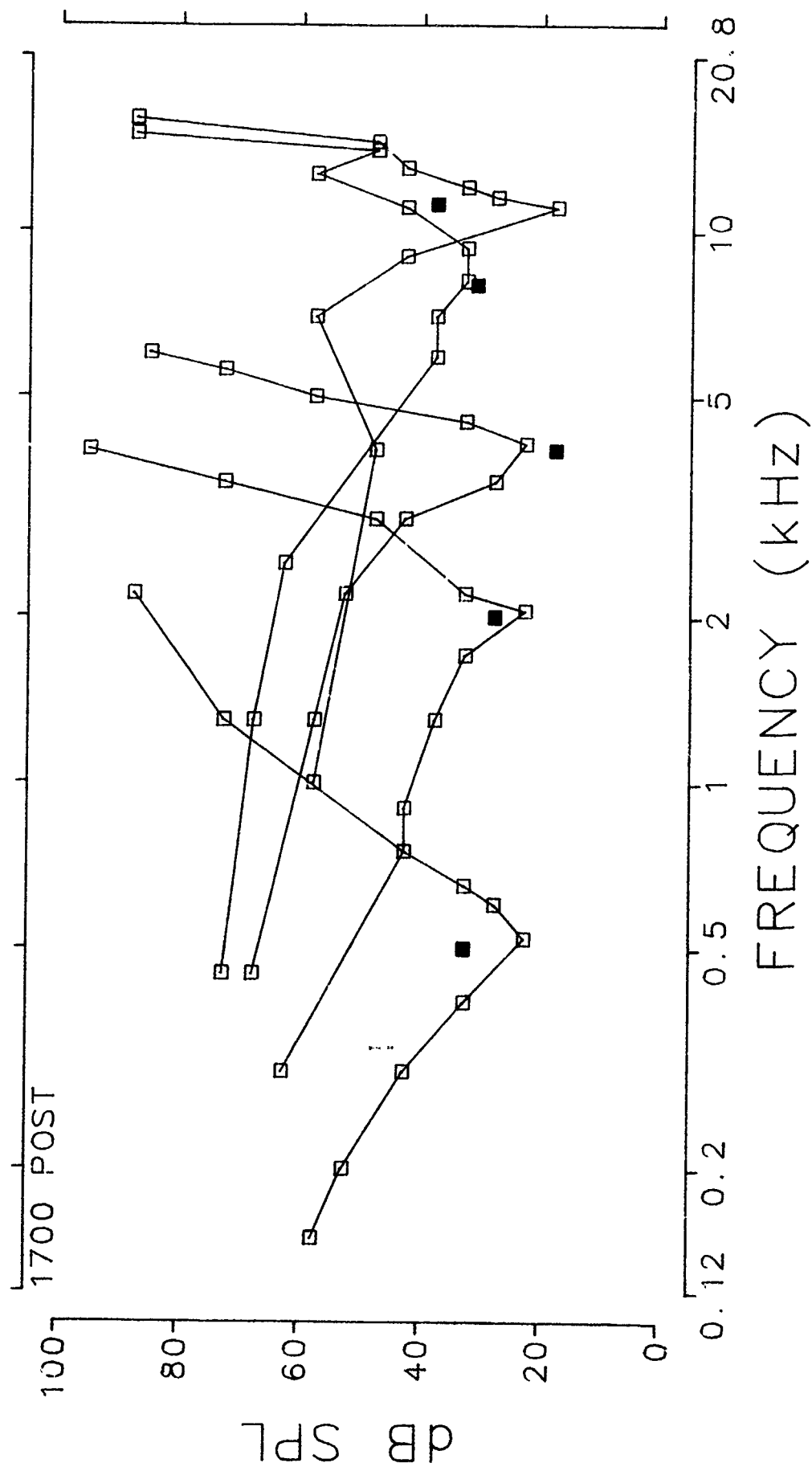
MEAN DATA (n=5) - 155 dB 10X 10/M

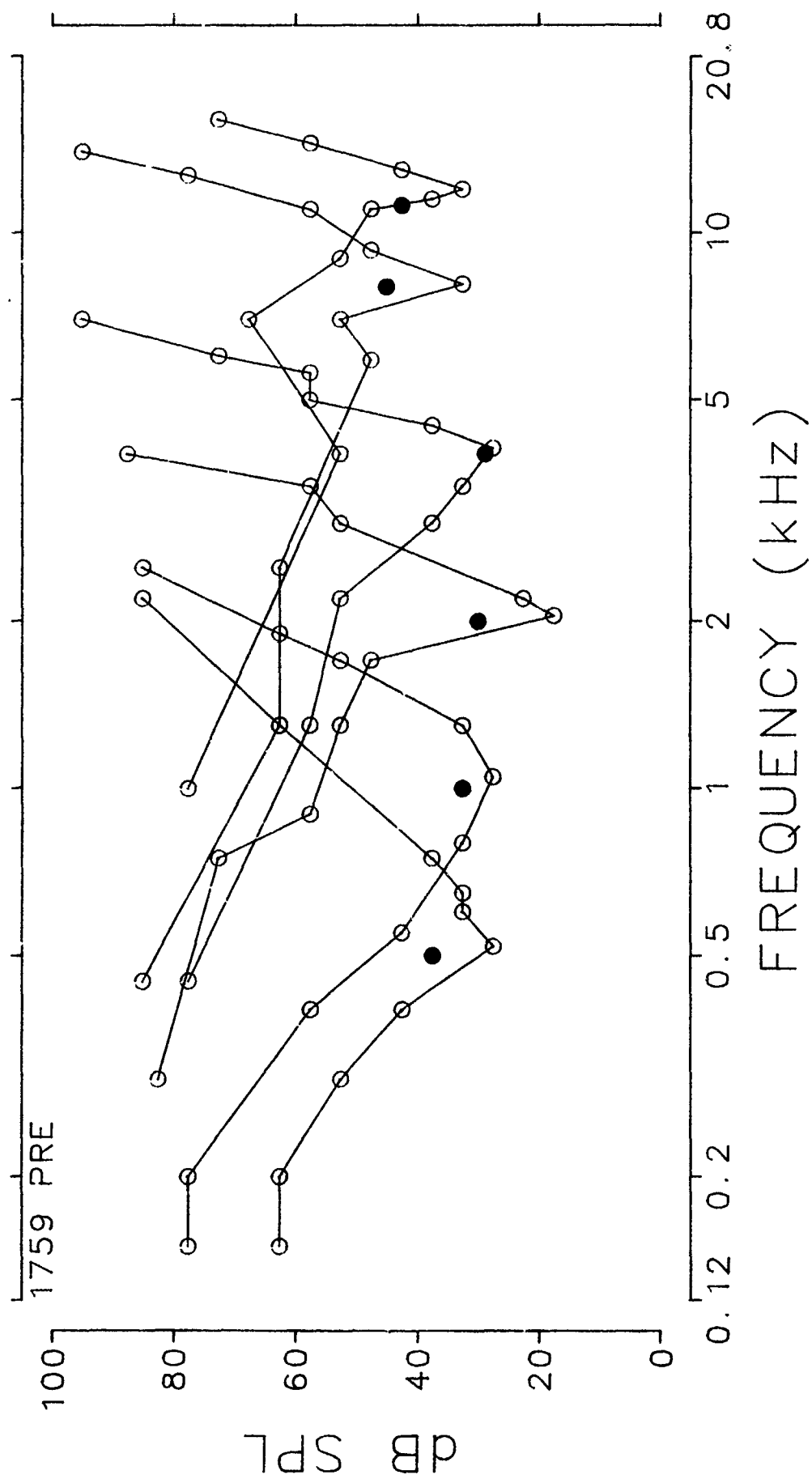


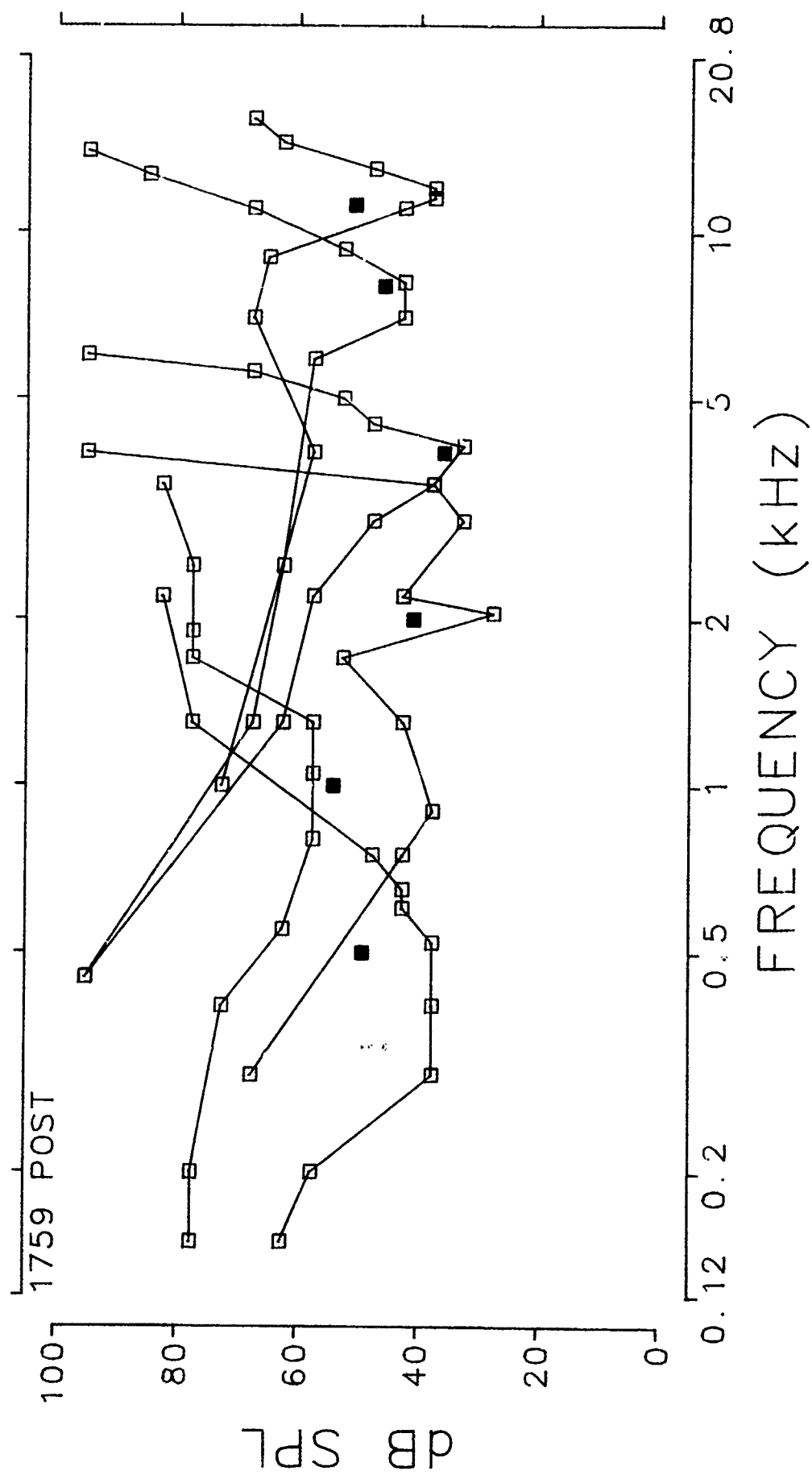
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

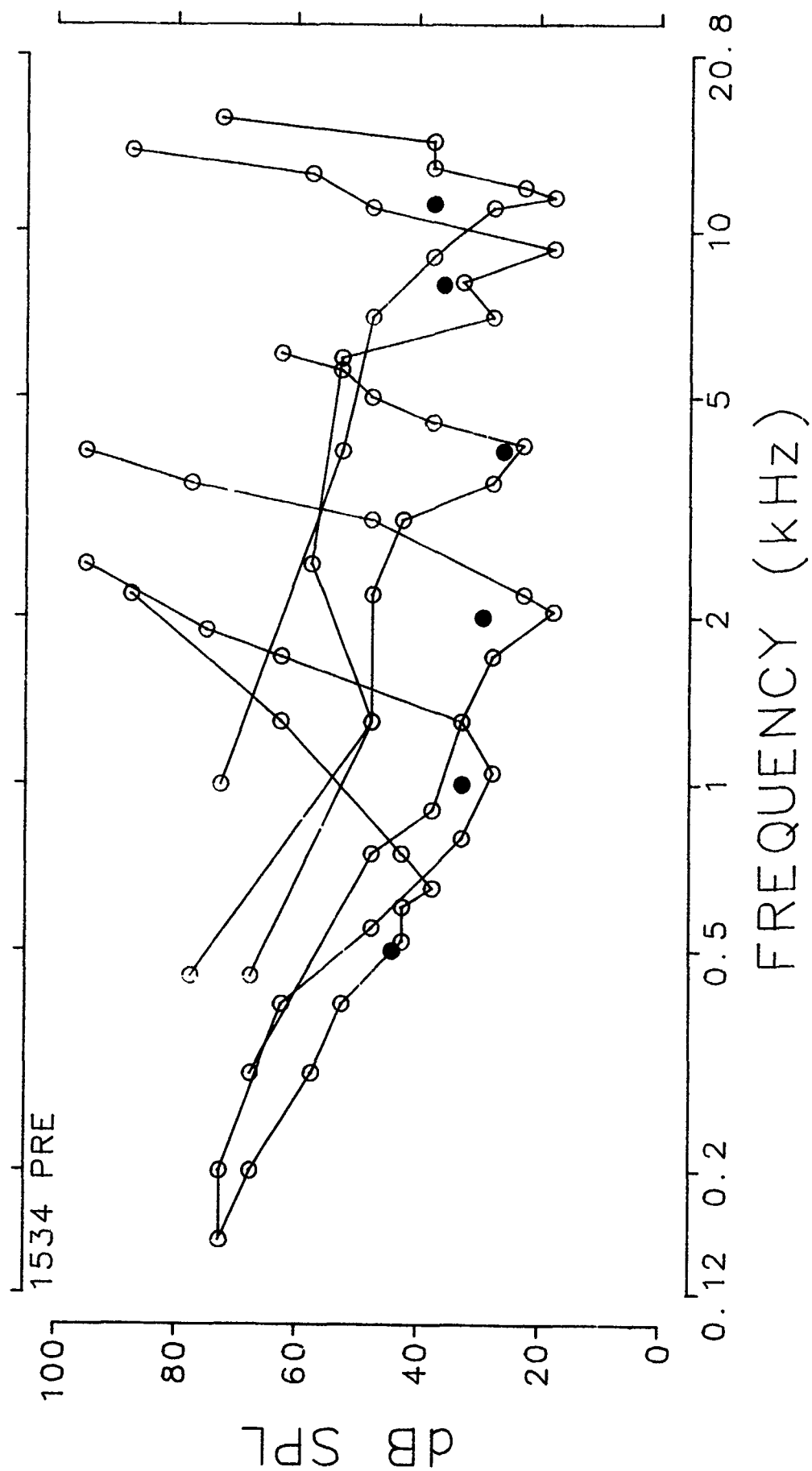
The solid symbol represents the threshold of the probe tone.

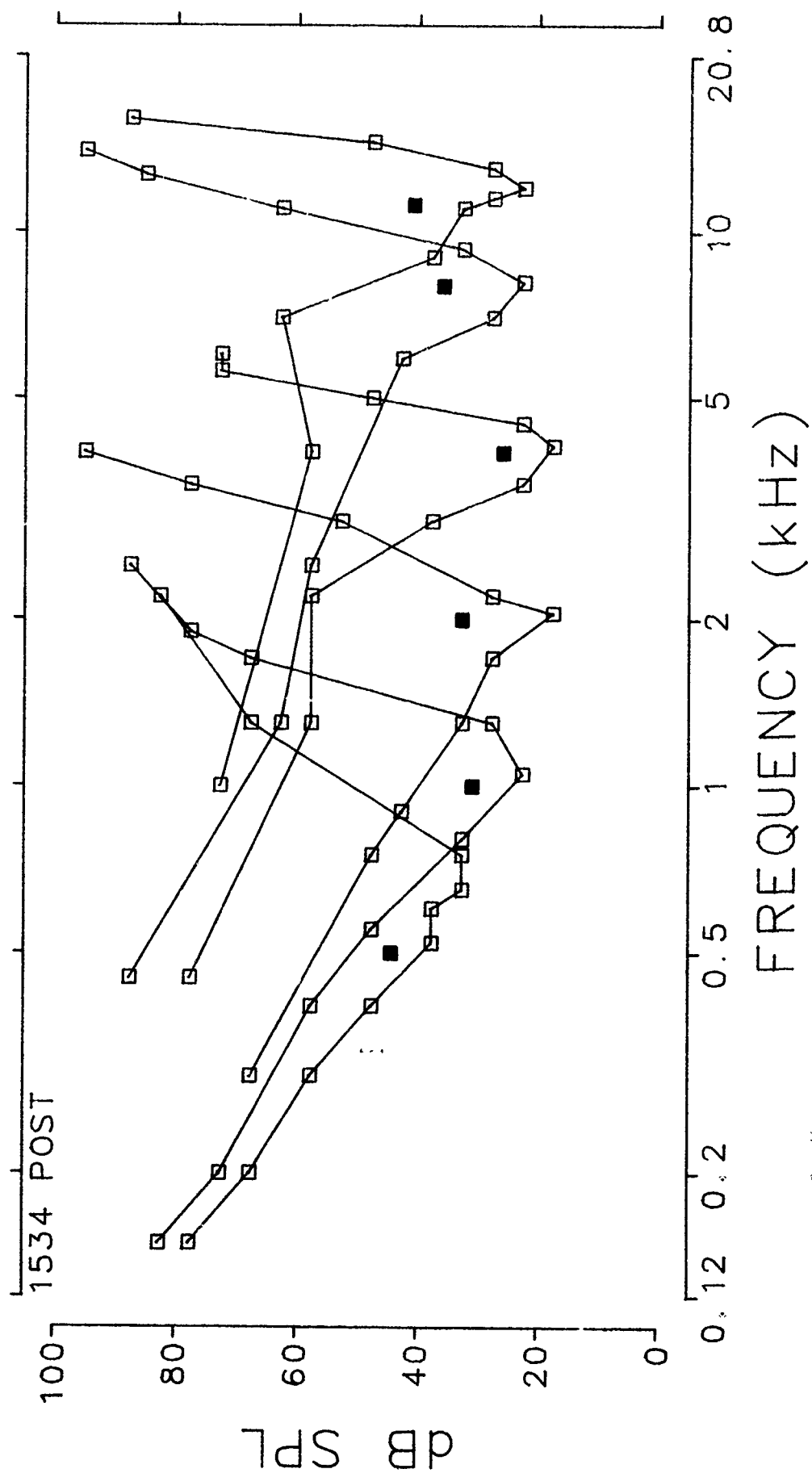


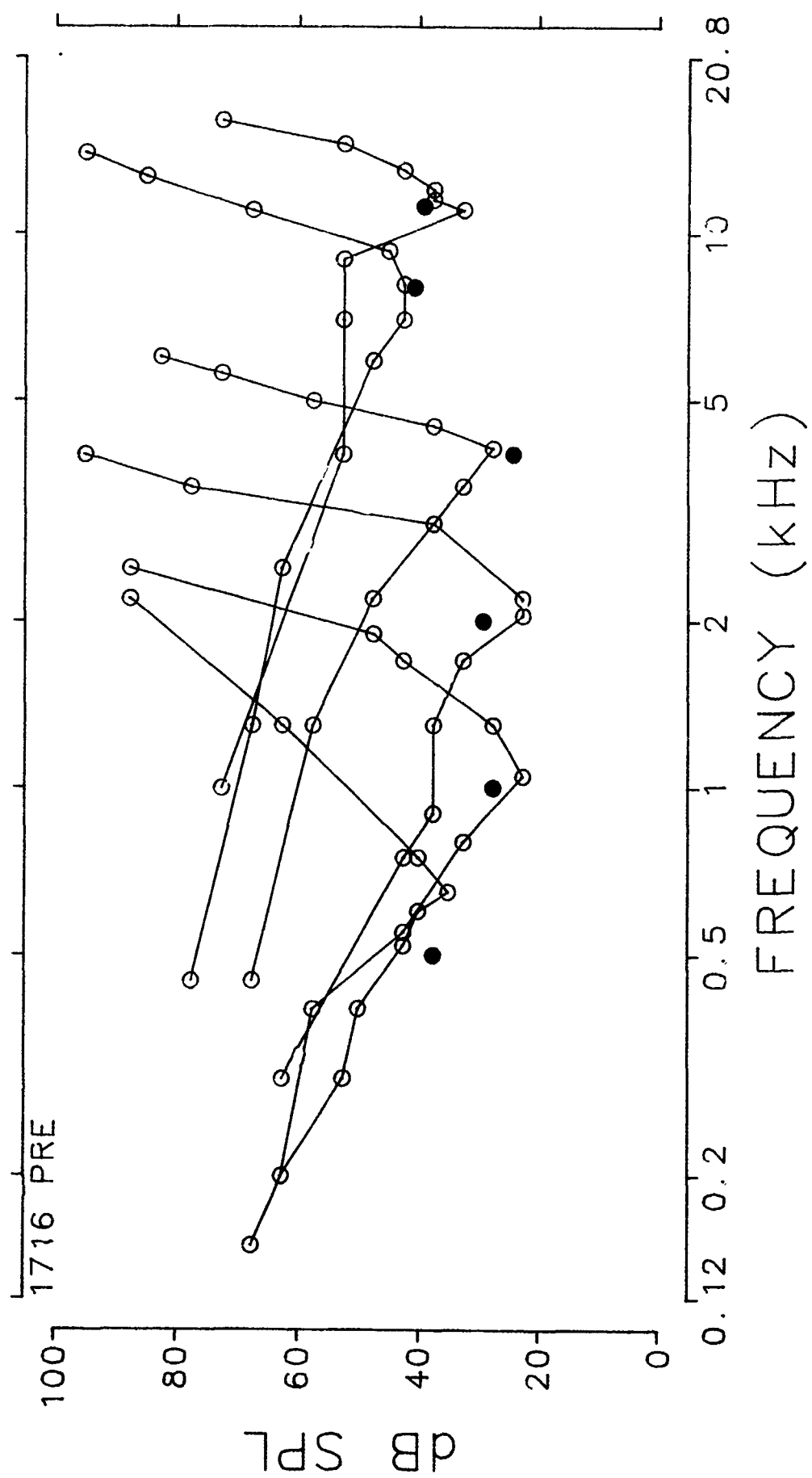


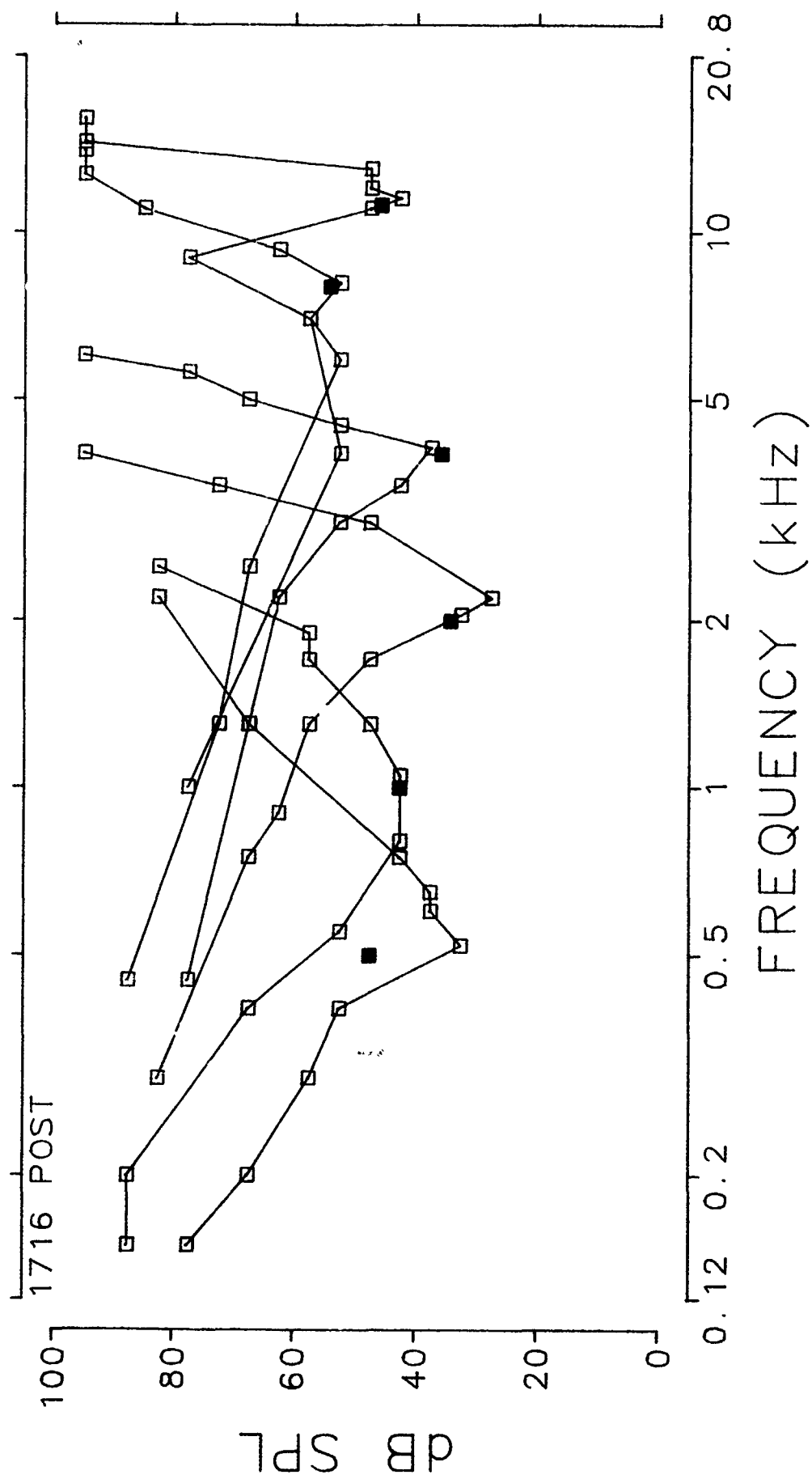


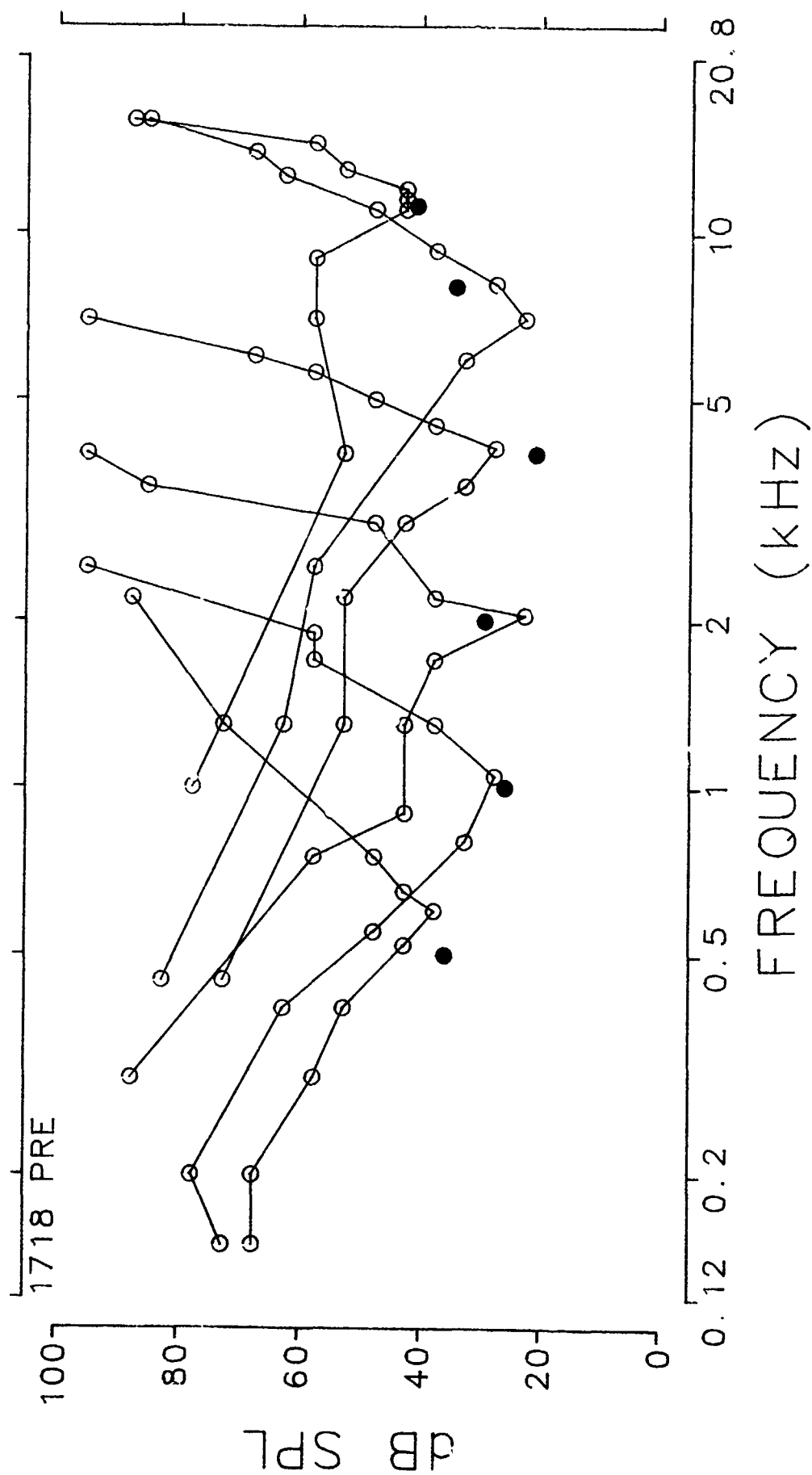


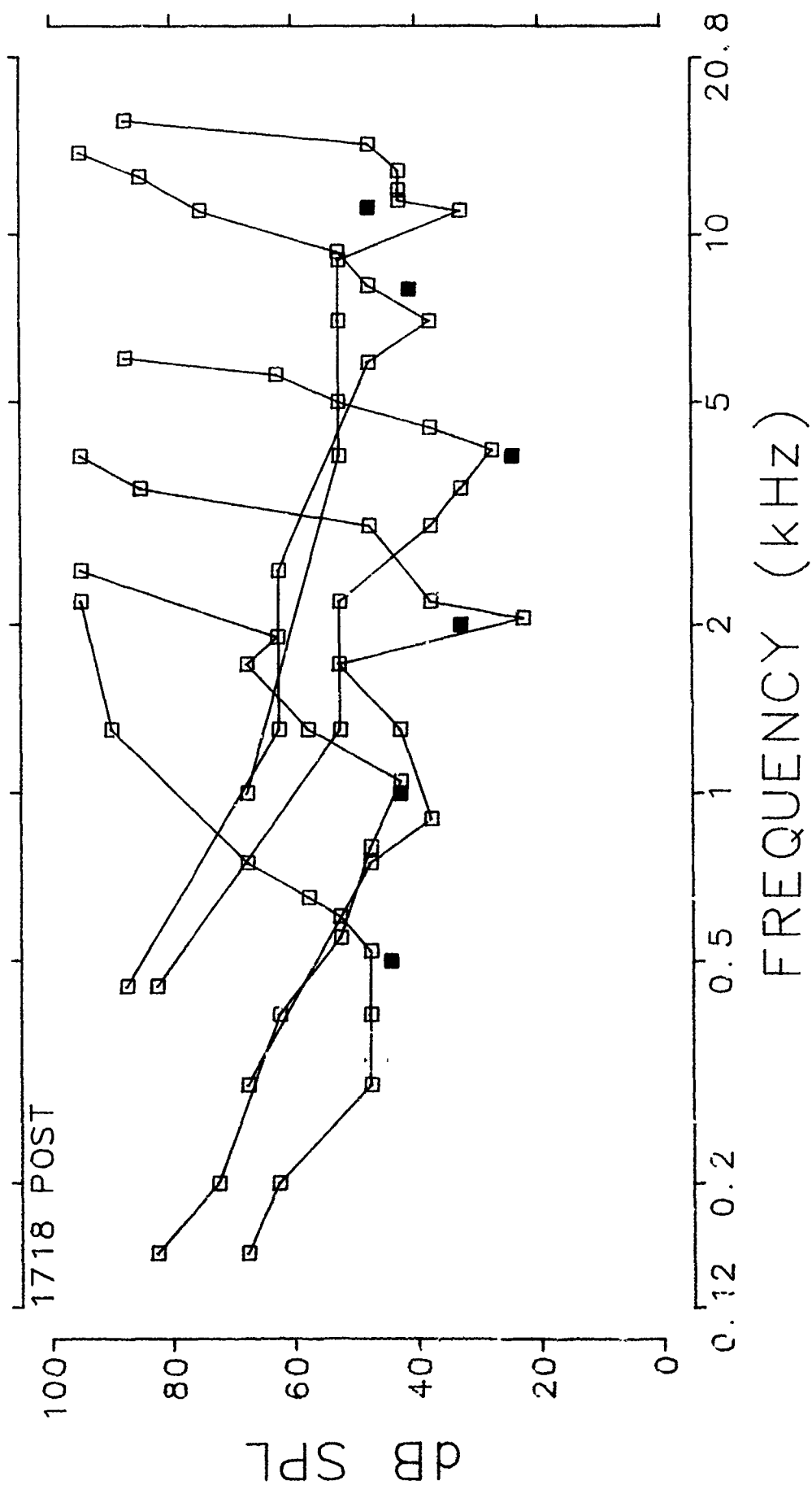












SHOCK TUBE EXPOSURE
155 dB, 10X, 10/MIN

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1534R	18	66	127	146	339
R1617R	130	865	950	805	2620
R1646R	15	86	102	230	418
R1700R	6	26	36	44	106
R1716R	14	106	151	301	558
R1718R	55	376	506	217	1099
R1759R	14	408	384	163	955
GROUP MEAN	36				871
S.D.	44				846

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

GROUP MEANS	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
	0.125 kHz	3.1	97.3
	0.25 kHz	2.9	63.0
	0.5 kHz	1.9	70.9
	1 kHz	6.1	251.4
	2 kHz	2.7	237.1
	4 kHz	15.7	123.7
	8 kHz	2.9	19.4
	16 kHz	.6	6.4

STANDARD DEVIATIONS

0.125 kHz	2.6	34.8
0.25 kHz	2.0	49.1
0.5 kHz	2.3	43.8
1 kHz	11.1	287.5
2 kHz	3.1	315.8
4 kHz	38.9	277.9
8 kHz	4.0	13.7
16 kHz	1.1	6.7

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1534R							
0.125 kHz	5	15	29	52	96	0	0
0.25 kHz	3	5	10	37	52	0	0
0.5 kHz	6	4	14	11	29	0	1
1 kHz	1	16	16	11	43	4	1
2 kHz	1	11	18	14	43	1	0
4 kHz	0	9	26	12	47	1	0
8 kHz	2	5	13	7	25	1	0
16 kHz	0	1	1	2	4	0	0
TOTALS	18	66	127	146	339	7	2

CHINCHILLA R1617R

0.125 kHz	2	4	34	30	68	0	0
0.25 kHz	0	6	3	26	35	0	0
0.5 kHz	0	9	73	17	99	0	0
1 kHz	4	258	259	213	730	3	13
2 kHz	9	309	310	274	893	8	36
4 kHz	104	265	258	230	753	191	151
8 kHz	11	13	13	15	41	4	6
16 kHz	0	1	0	0	1	0	0
TOTALS	130	865	950	805	2620	206	206

CHINCHILLA R1646R

0.125 kHz	2	18	38	85	141	2	2
0.25 kHz	2	8	22	61	91	0	0
0.5 kHz	3	6	10	27	43	1	0
1 kHz	3	7	6	21	34	3	1
2 kHz	3	29	4	13	46	13	0
4 kHz	1	12	6	7	25	3	0
8 kHz	0	4	11	9	24	0	0
16 kHz	1	2	5	7	14	0	0
TOTALS	15	86	102	230	418	22	3

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1700R							
0.125 kHz	0	6	22	14	42	0	0
0.25 kHz	2	1	0	14	15	0	0
0.5 kHz	0	5	7	3	15	0	0
1 kHz	0	4	3	0	7	0	0
2 kHz	1	7	1	6	14	0	0
4 kHz	2	1	2	2	5	0	0
8 kHz	1	1	0	4	5	0	0
16 kHz	0	0	1	1	2	0	0
TOTALS	6	26	36	44	106	0	0

CHINCHILLA R1716R

0.125 kHz	3	23	16	50	89	2	2
0.25 kHz	2	23	32	106	161	1	0
0.5 kHz	1	21	59	46	126	1	3
1 kHz	1	7	15	30	52	0	2
2 kHz	1	13	16	28	57	1	0
4 kHz	2	4	4	16	24	0	0
8 kHz	1	4	4	20	28	0	0
16 kHz	3	9	5	4	18	0	0
TOTALS	14	106	151	301	558	5	7

CHINCHILLA R1718R

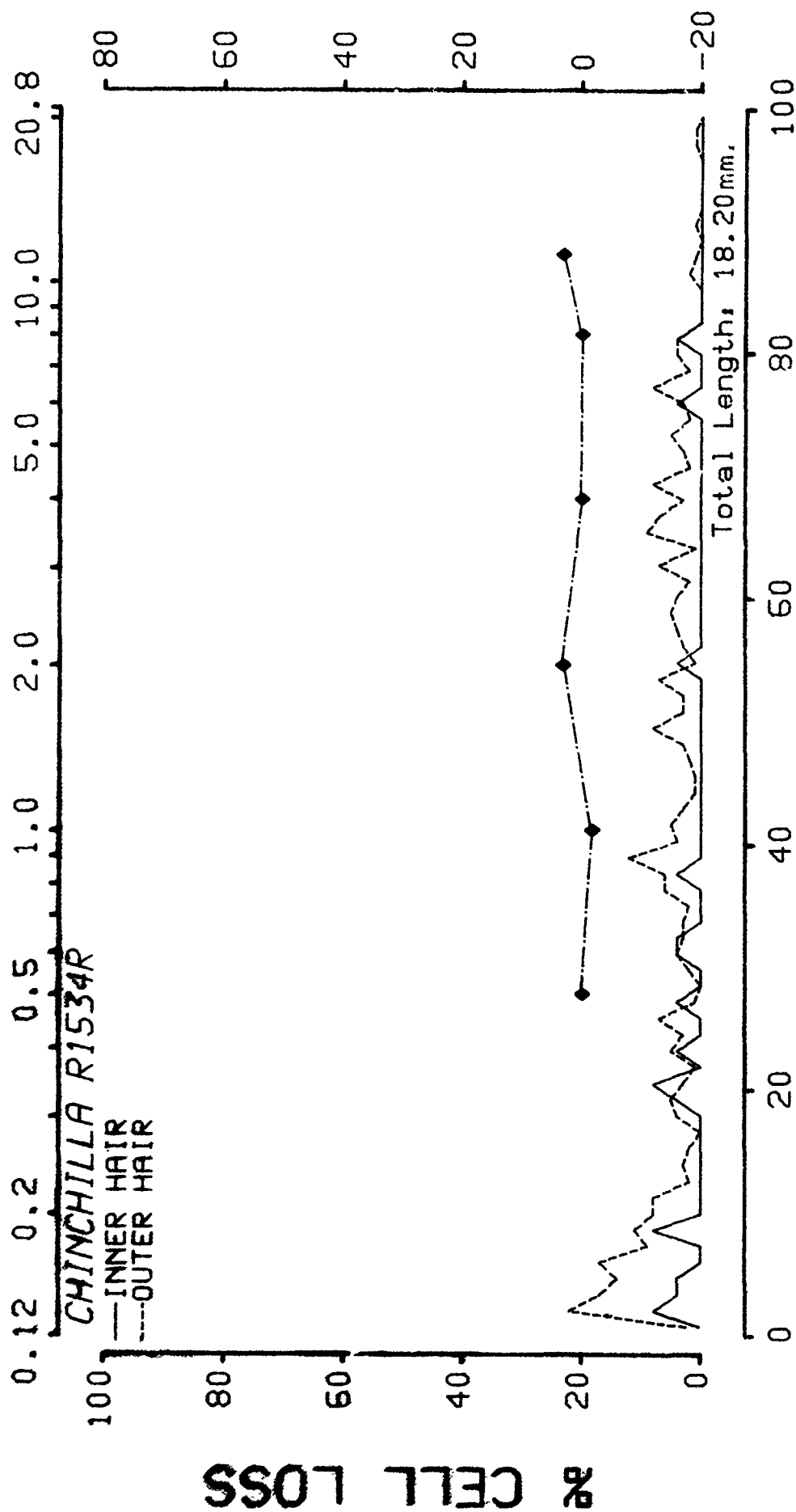
0.125 kHz	8	18	50	62	130	4	30
0.25 kHz	6	8	14	28	50	0	0
0.5 kHz	0	23	60	33	116	0	6
1 kHz	31	155	211	79	445	67	54
2 kHz	4	164	168	10	342	1	13
4 kHz	0	2	1	1	4	0	0
8 kHz	5	2	2	3	7	0	0
16 kHz	0	2	0	1	3	0	0
TOTALS	55	376	506	217	1099	72	103

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1759R							
0.125 kHz	2	12	43	60	115	0	0
0.25 kHz	5	5	11	21	37	0	0
0.5 kHz	3	33	24	11	68	0	0
1 kHz	3	226	190	33	449	0	0
2 kHz	0	124	112	29	265	0	3
4 kHz	1	1	3	4	8	0	0
8 kHz	0	2	0	4	6	0	0
16 kHz	0	2	0	1	3	0	0
TOTALS	14	408	384	163	955	0	3

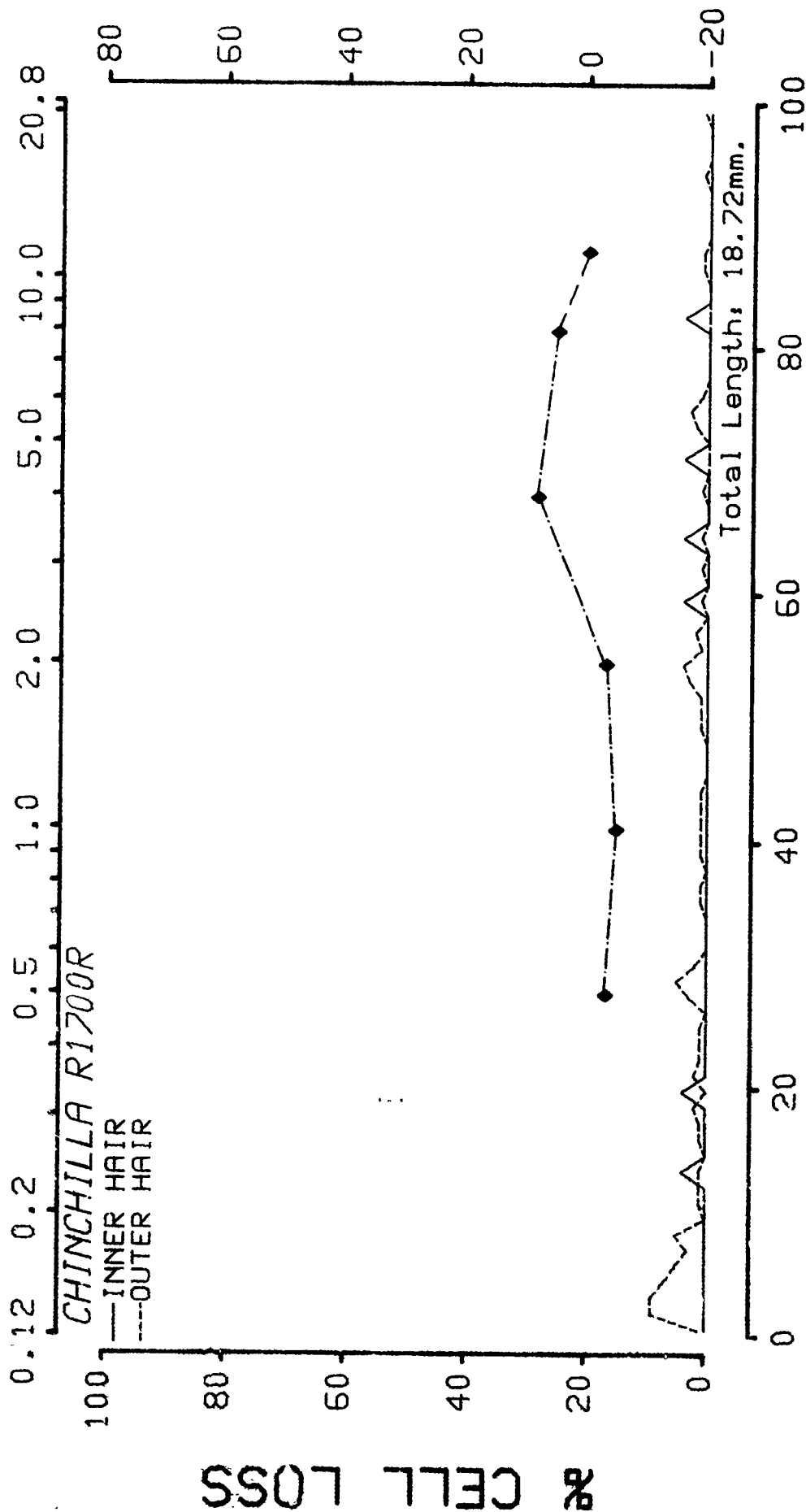
Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (kHz)

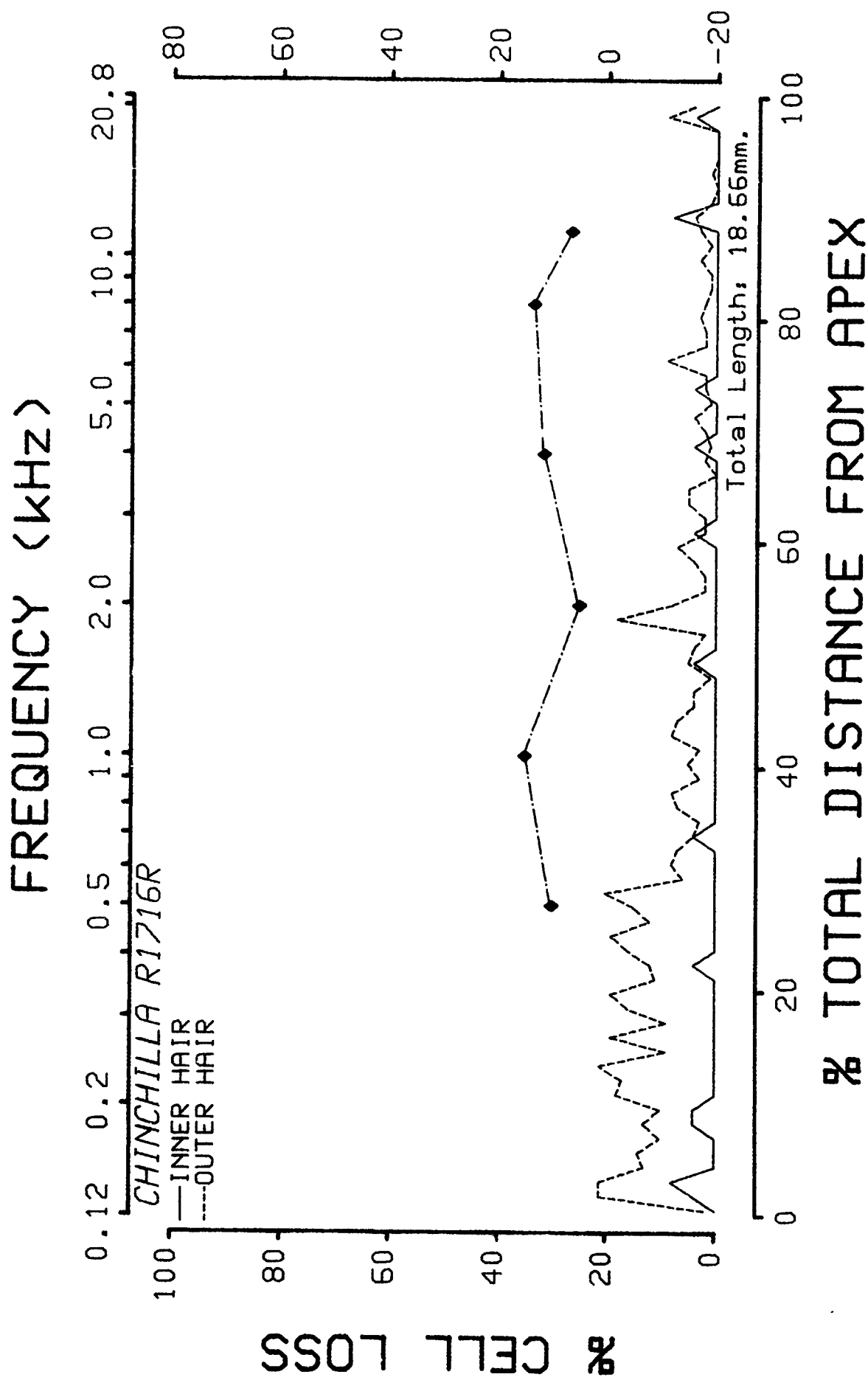


% TOTAL DISTANCE FROM APEX

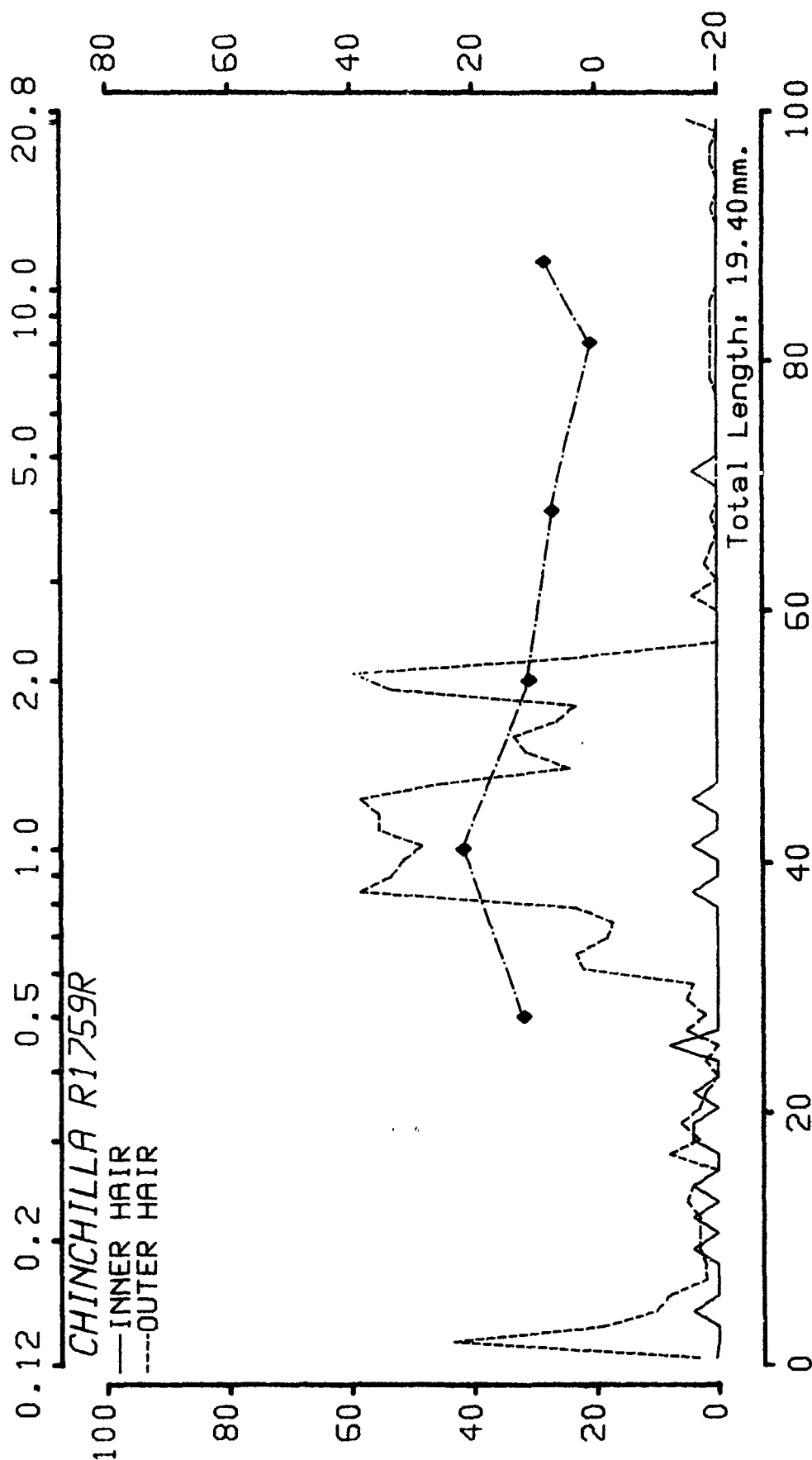
FREQUENCY (KHZ)



% TOTAL DISTANCE FROM APEX

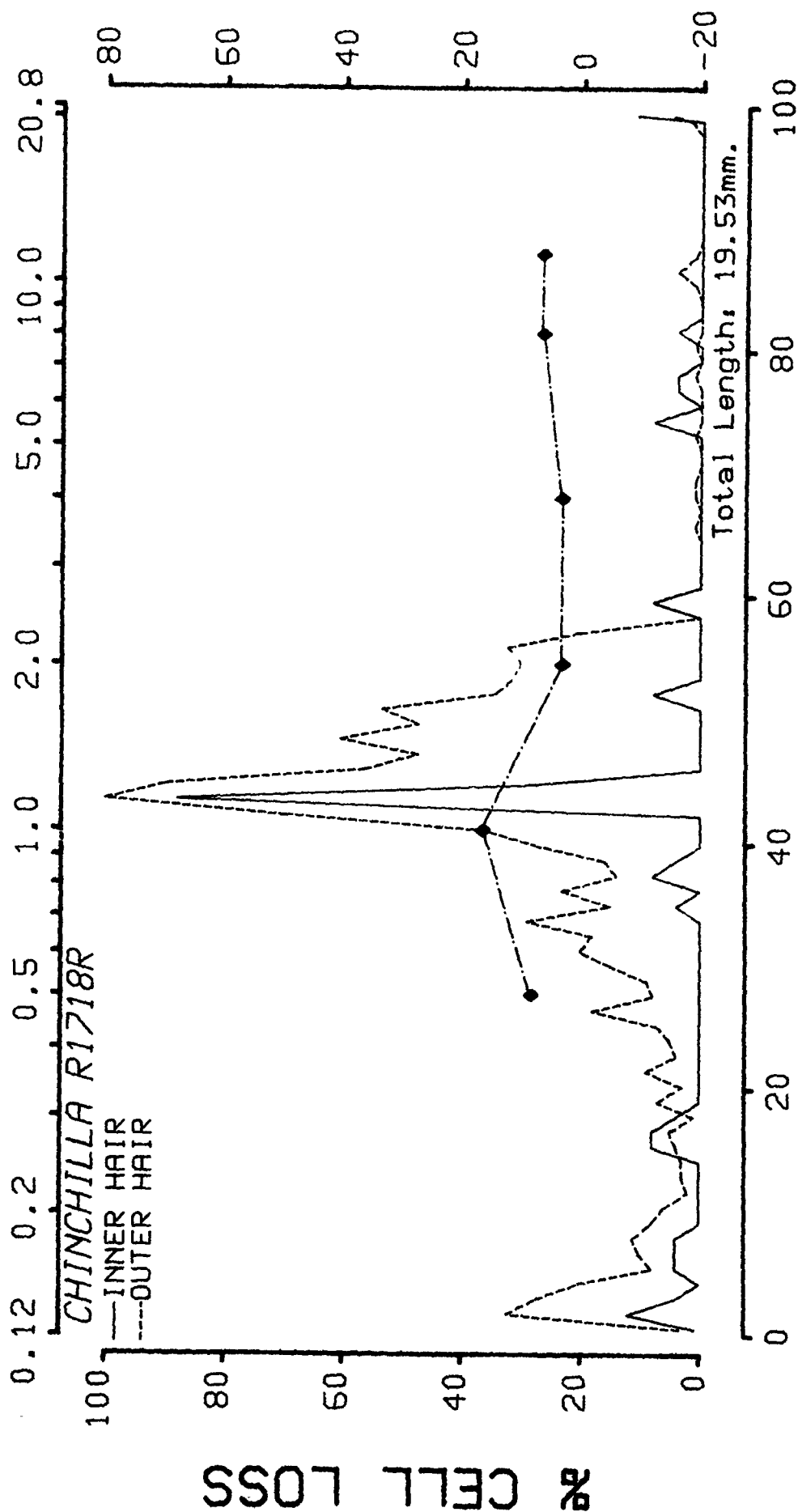


FREQUENCY (kHz)



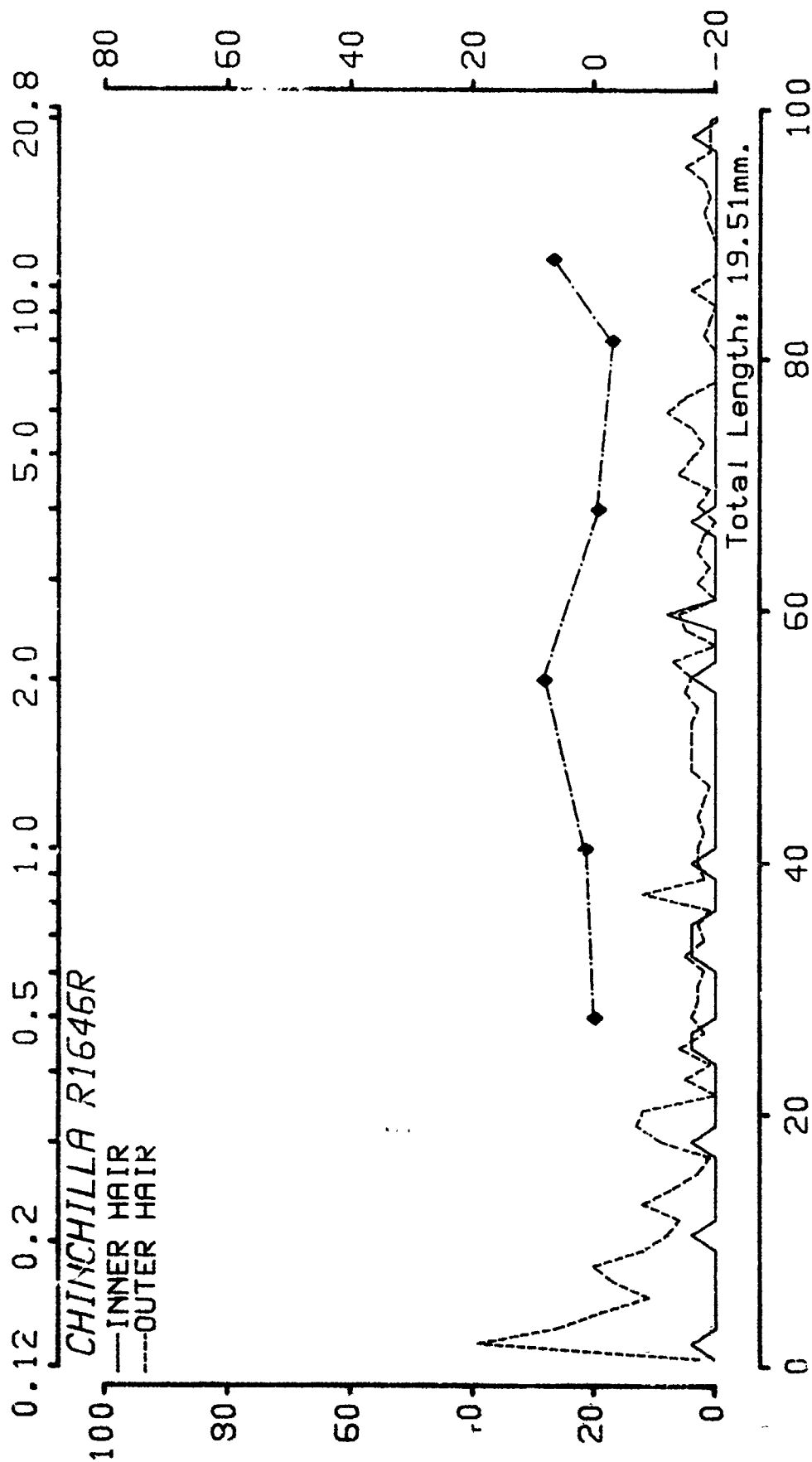
% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



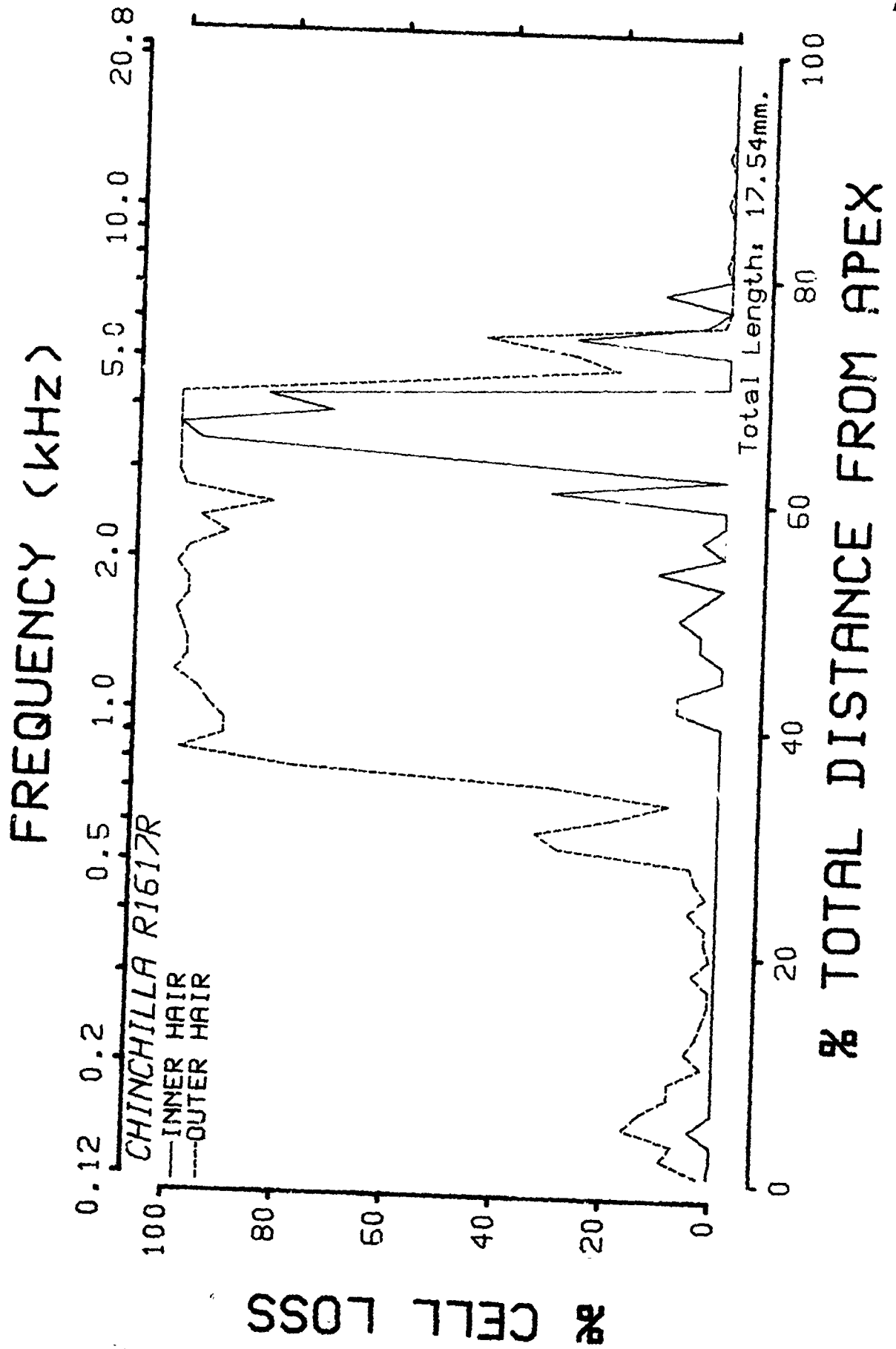
% TOTAL DISTANCE FROM APEX

FREQUENCY (KHz)



% TOTAL DISTANCE FROM APEX

% CELL LOSS



Summary Data for the Group Exposed to:

155 dB, 10X, 1/M

Animal

1102	-	Completed the Entire Protocol
1271	-	Completed the Entire Protocol
1272	-	Completed the Entire Protocol
1280	-	Completed the Entire Protocol
1293	-	Completed the Entire Protocol

155 cB 10X 1/M

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1102	15.3	11.7	6.7	6.7	19.7	22.0	*****
1271	21.3	20.0	20.7	7.3	20.3	26.7	*****
1272	21.3	10.0	15.7	5.7	17.0	20.0	*****
1280	21.3	10.0	17.3	5.7	18.7	41.7	*****
1293	19.5	17.5	16.8	6.8	25.5	20.8	*****
Mean	19.8	13.8	15.4	6.4	20.2	26.2	*****
S.D.	2.6	4.6	5.2	0.7	3.2	9.0	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1102	23.7	20.0	21.7	11.7	31.3	23.7	*****
1271	26.3	20.0	19.0	25.3	35.8	25.0	*****
1272	31.3	38.3	37.3	9.0	20.3	30.0	*****
1280	20.8	10.8	10.8	10.8	15.8	36.7	*****
1293	44.2	44.2	40.8	24.2	22.5	24.2	*****
Mean	29.3	26.7	25.9	16.2	25.1	27.9	*****
S.D.	9.2	14.0	12.7	7.8	8.2	5.5	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1102	8.3	6.3	15.0	5.0	11.7	1.7	*****
1271	5.0	0.0	-1.7	17.9	15.4	-1.7	*****
1272	10.0	28.3	21.7	3.3	3.3	10.0	*****
1280	-0.5	0.8	-6.5	5.2	-2.8	-5.0	*****
1293	24.7	26.7	24.0	17.3	-3.0	3.3	*****
Mean	9.5	12.8	10.5	9.8	4.9	1.7	*****
S.D.	9.4	13.8	13.8	7.2	8.4	5.7	*****

155 dB 10X 1/M

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
1102	21.7	51.7	51.7	36.7	21.7	51.7
1271	6.7	21.7	21.7	1.7	21.7	21.7
1272	11.7	11.7	11.7	11.7	-3.3	11.7
1280	21.7	11.7	1.7	1.7	-3.3	21.7
1293	48.0	71.5*	63.0	70.5*	23.0	71.5
Mean	21.9	33.6	29.9	24.4	11.9	35.6
S.D.	15.9	26.8	26.3	29.5	13.9	25.0

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1102	53.3	58.3	43.3	33.3	18.3	58.3
1271	3.3	18.3	23.3	18.3	13.3	23.3
1272	38.3	73.3	38.3	50.3	-1.7	73.3
1280	41.7	46.7	11.7	11.7	-3.3	46.7
1293	50.7	70.7	73.2*	60.7	25.7	73.2
Mean	37.5	53.5	38.0	36.5	10.5	55.0
S.D.	20.1	22.3	23.3	22.5	12.6	20.9

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1102	28.3	53.3	18.3	13.3	8.3	53.3
1271	11.7	21.7	26.7	31.7	16.7	31.7
1272	45.0	45.0	50.0	45.0	5.0	50.0
1280	48.3	38.3	28.3	3.3	-11.7	48.3
1293	37.0	67.0	42.0	17.0	-8.0	67.0
Mean	34.1	45.1	33.1	22.1	2.1	50.1
S.D.	14.7	16.9	12.7	16.4	11.7	12.6

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 0.5 kHz

Masker (kHz): 0.150 0.200 0.300 0.400 0.520 0.600 0.650 0.750 1.300 2.200

Animal (Q-10 dB)

Pre-Exposure

1102 (1.52)	47.0	42.0	27.0	21.0	18.0	16.0	23.0	23.0	44.0	56.0
1271 (1.16)	54.0	48.0	27.0	22.0	24.0	31.0	34.0	44.0	59.0	63.0
1272 (0.81)	54.0	48.0	27.0	27.0	34.0	31.0	49.0	64.0	79.0	96.0*
1280 (2.06)	64.0	58.0	47.0	37.0	29.0	31.0	44.0	49.0	92.0*	96.0*
1293 (2.06)	62.5	57.5	37.5	27.5	22.5	32.5	37.5	37.5	57.5	80.0*

Mean (1.52)	56.3	50.7	33.1	26.9	25.5	28.3	37.5	44.5	66.3	78.2
S.D. (0.55)	7.0	6.9	9.0	6.3	6.2	6.9	10.0	13.4	19.0	18.4

Animal (Q-10 dB)

Post-Exposure

1102 (2.75)	62.0	62.0	47.0	36.0	23.0	31.0	38.0	48.0	59.0	81.0
1271 (2.97)	64.0	58.0	42.0	32.0	29.0	21.0	34.0	39.0	69.0	88.0
1272 (1.75)	69.0	68.0	47.0	47.0	39.0	51.0	59.0	59.0	79.0	96.0*
1280 (1.12)	67.5	57.5	42.5	42.5	27.5	32.5	32.5	32.5	47.5	96.0*
1293 (1.28)	57.5	62.5	52.5	52.5	47.5	52.5	57.5	52.5	92.5	92.5

Mean (1.98)	64.0	61.6	46.2	42.0	33.2	37.6	44.2	46.2	69.4	90.7
S.D. (0.84)	4.6	4.2	4.3	8.2	9.9	13.7	13.0	10.6	17.4	6.3

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 1.0 kHz

Masker (kHz):	0.150	0.200	0.400	0.550	0.800	1.050	1.300	1.700	1.900	2.500
Animal (Q-10 dB)	Pre-Exposure									
1102 (1.96)	77.0	72.0	61.0	48.0	38.0	24.0	29.0	47.0	57.0	76.0
1271 (1.50)	49.0	38.0	37.0	33.0	23.0	32.0	39.0	62.0	60.0	61.0
1272 (0.66)	44.0	33.0	27.0	23.0	13.0	17.0	19.0	22.0	25.0	36.0
1280 (1.13)	92.0*	73.0	52.0	38.0	28.0	32.0	39.0	52.0	60.0	94.0*
1293 (1.65)	72.5	72.5	57.5	42.5	32.5	27.5	37.5	52.5	57.5	80.0*
Mean (1.38)	66.9	57.7	46.9	36.9	26.9	26.5	32.7	47.1	51.9	69.4
S.D. (0.50)	20.1	20.3	14.4	9.5	9.5	6.3	8.7	15.0	15.1	22.1

Animal (Q-10 dB)	Post-Exposure									
1102 (2.01)	67.0	62.0	56.0	48.0	33.0	29.0	44.0	67.0	67.0	76.0
1271 (1.58)	74.0	68.0	52.0	43.0	23.0	27.0	39.0	52.0	55.0	81.0
1272 (1.47)	74.0	73.0	67.0	58.0	43.0	47.0	59.0	72.0	70.0	81.0
1280 (2.55)	72.5	72.5	62.5	47.5	32.5	22.5	37.5	60.0*	57.5	95.0*
1293 (2.55)	87.5	92.5	82.5	72.5	67.5	57.5	72.5	67.5	57.5	62.5
Mean (2.03)	75.0	73.6	64.0	53.8	39.8	36.6	50.4	63.7	61.4	79.1
S.D. (0.52)	7.6	11.5	11.8	11.8	17.0	14.9	15.0	7.8	6.6	11.7

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 2.0 kHz

Masker (kHz):	0.300	0.750	0.900	1.300	1.700	2.050	2.200	3.000	3.500	4.000
Animal (Q-10 dB)	Pre-Exposure									
1102 (3.45)	62.0	48.0	34.0	29.0	17.0	11.0	26.0	26.0	39.0	46.0
1271 (3.23)	57.0	54.0	43.0	44.0	17.0	25.0	43.0	50.0	61.0	67.0
1272 (1.28)	42.0	39.0	28.0	34.0	27.0	30.0	48.0	75.0	94.0*	90.0*
1280 (5.41)	62.0	49.0	43.0	54.0	37.0	25.0	43.0	50.0	71.0	90.0*
1293 (7.98)	67.5	42.5	37.5	37.5	32.5	12.5	32.5	42.5	52.5	62.5
Mean (4.27)	58.1	46.5	37.1	39.7	26.1	20.7	38.5	48.7	63.5	71.1
S.D. (2.54)	9.7	5.9	6.4	9.7	9.0	8.4	9.0	17.7	20.7	18.9
Animal (Q-10 dB)	Post-Exposure									
1102 (4.89)	62.0	58.0	49.0	44.0	37.0	26.0	41.0	41.0	54.0	56.0
1271 (6.25)	52.0	49.0	43.0	39.0	37.0	20.0	33.0	40.0	51.0	90.0*
1272 (2.99)	62.0	64.0	63.0	74.0	52.0	60.0	73.0	93.0*	94.0*	90.0*
1280 (6.14)	67.5	42.5	37.5	32.5	32.5	12.5	22.5	42.5	42.5	62.5
1293 (3.72)	77.5	57.5	62.5	65.0	70.0	52.5	62.5	55.0	47.5	80.0*
Mean (4.80)	64.2	54.2	51.0	50.9	45.7	34.2	46.4	54.3	57.8	75.7
S.D. (1.44)	9.3	8.4	11.5	17.7	15.5	20.9	20.9	22.5	20.7	15.7

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 4.0 kHz

Masker (kHz):	0.450	1.300	2.200	3.000	3.500	4.100	4.500	5.000	5.600	6.000
Animal (Q-10 dB)	Pre-Exposure									
1102 (5.12)	78.0	64.0	56.0	46.0	34.0	15.0	23.0	36.0	43.0	67.0
1271 (2.00)	73.0	54.0	48.0	40.0	36.0	45.0	58.0	58.0	59.0	72.0
1272 (1.28)	43.0	39.0	23.0	20.0	21.0	30.0	38.0	38.0	49.0	47.0
1280 (2.99)	73.0	54.0	68.0	50.0	31.0	35.0	43.0	48.0	74.0	90.0*
1293 (4.76)	47.5	42.5	47.5	42.5	27.5	17.5	32.5	60.0*	75.0	77.5
Mean (3.23)	62.9	50.7	48.5	39.7	29.9	28.5	38.9	48.0	60.0	70.7
S.D. (1.68)	16.3	10.0	16.5	11.6	5.9	12.4	13.0	11.0	14.4	15.8
Animal (Q-10 dB)	Post-Exposure									
1102 (4.83)	78.0	59.0	61.0	46.0	29.0	20.0	38.0	46.0	53.0	67.0
1271 (2.14)	78.0	74.0	83.0	60.0	51.0	55.0	58.0	73.0	79.0	90.0*
1272 (2.46)	78.0	59.0	63.0	35.0	31.0	40.0	43.0	38.0	44.0	57.0
1280 (3.53)	72.5	57.5	47.5	47.5	32.5	22.5	27.5	42.5	52.5	67.5
1293 (2.73)	67.5	52.5	52.5	47.5	42.5	32.5	32.5	42.5	47.5	47.5
Mean (3.14)	74.8	60.4	61.4	47.2	37.2	34.0	39.8	48.4	55.2	65.8
S.D. (1.08)	4.7	8.1	13.6	8.9	9.3	14.2	11.7	14.0	13.8	15.8

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 8.0 kHz

Masker (kHz):	0.450	1.300	2.500	5.900	7.000	8.100	9.300	11.000	12.700	14.000
Animal (Q-10 dB)	Pre-Exposure									
1102 (4.85)	73.0	59.0	56.0	38.0	****	25.0	28.0	52.0	80.0	85.0*
1271 (3.49)	68.0	64.0	51.0	33.0	23.0	35.0	41.0	57.0	61.0	72.0
1272 (2.18)	58.0	54.0	51.0	28.0	23.0	20.0	31.0	42.0	51.0	62.0
1280 (1.76)	73.0	59.0	56.0	38.0	38.0	35.0	51.0	72.0	71.0	90.0*
1293 (4.49)	82.5	82.5	62.5	47.5	47.5	37.5	32.5	85.0*	90.0*	95.0*
Mean	(3.36)	70.9	63.7	55.3	36.9	32.9	30.5	61.6	70.6	80.8
S.D.	(1.37)	8.9	11.1	4.7	7.2	12.0	7.6	17.0	15.3	13.6

Animal (Q-10 dB)	Post-Exposure									
1102 (5.67)	63.0	59.0	56.0	38.0	37.0	25.0	48.0	67.0	70.0	85.0*
1271 (1.89)	68.0	64.0	66.0	43.0	48.0	40.0	56.0	77.0	76.0	90.0*
1272 (3.92)	53.0	29.0	36.0	33.0	23.0	15.0	31.0	57.0	51.0	57.0
1280 (1.35)	72.5	62.5	62.5	37.5	37.5	37.5	62.5	75.0*	95.0*	100.0*
1293 (3.52)	72.5	67.5	62.5	43.5	47.5	37.5	47.5	62.5	67.5	82.5
Mean	(3.27)	65.8	56.4	56.6	38.8	38.6	31.0	67.7	71.9	82.9
S.D.	(1.72)	8.2	15.6	12.1	4.1	10.2	10.7	8.4	15.9	16.0

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/M

Probe Frequency: 11.2 kHz

Masker (kHz): 1.000 4.000 7.000 9.000 11.000 11.500 12.000 13.000 14.500 16.000

Animal (Q-10 dB)

Pre-Exposure

1102 (14.94)	69.0	****	77.0	50.0	37.0	35.0	20.0	41.0	61.0	69.0
1271 (10.49)	56.0	****	48.0	44.0	42.0	27.0	29.0	59.0	62.0	71.0
1272 (16.84)	81.0	****	48.0	44.0	32.0	22.0	49.0	74.0	82.0	89.0*
1280 (9.01)	66.0	****	68.0	69.0	62.0	42.0	44.0	59.0	82.0	89.0*
1293 (4.93)	77.5	52.5	70.0*	67.5	42.5	42.5	37.5	47.5	67.5	90.0*

Mean (11.24)	69.9	52.5	62.2	54.9	43.1	33.7	35.9	56.1	70.9	81.6
S.D. (4.75)	9.9	****	13.4	12.4	11.4	9.1	11.6	12.6	10.4	10.6

Animal (Q-10 dB)

Post-Exposure

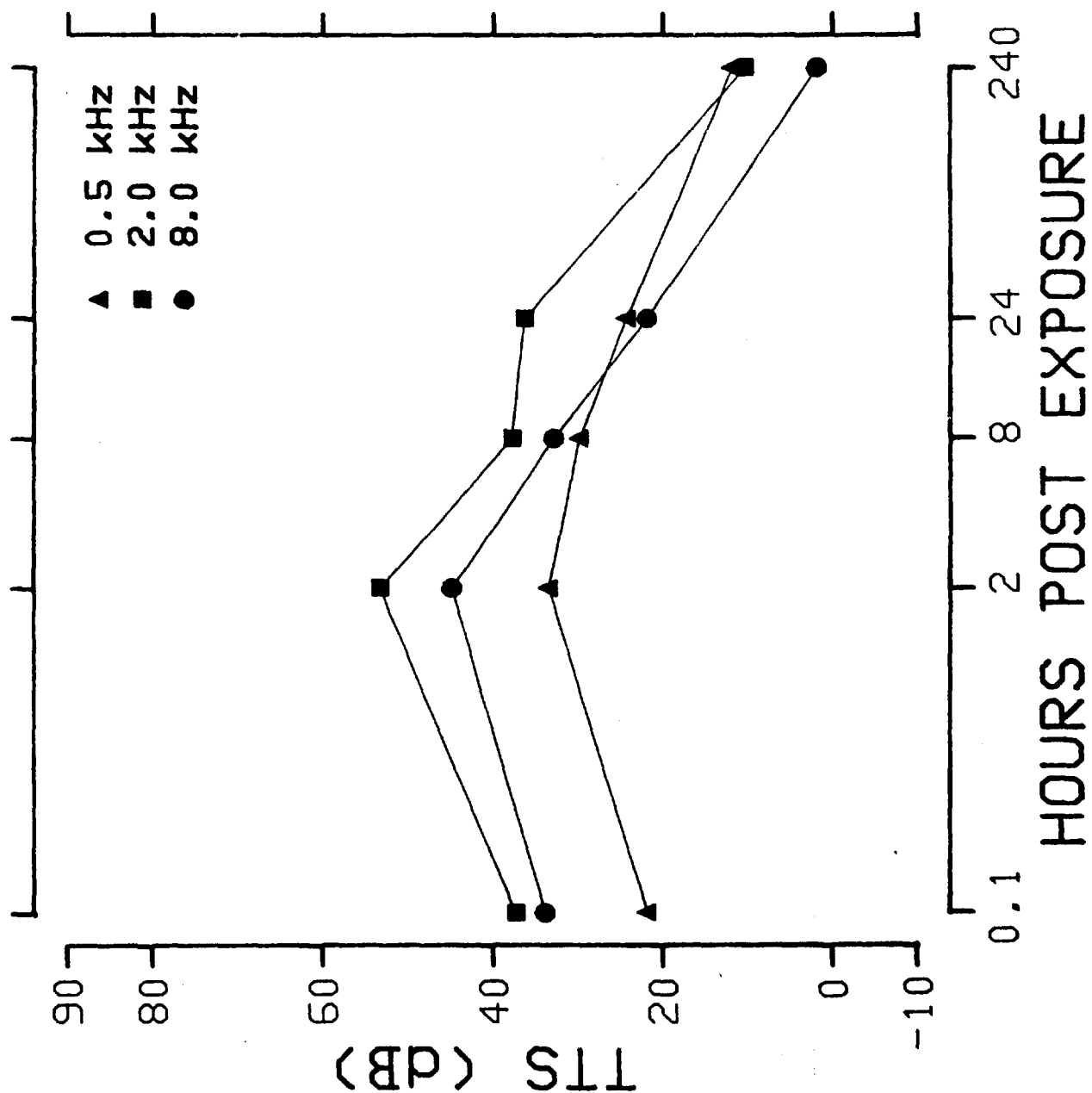
1102 (10.74)	84.0	****	62.0	35.0	32.0	35.0	25.0	41.0	56.0	64.0
1271 (2.54)	31.0	****	28.0	29.0	22.0	37.0	39.0	44.0	47.0	41.0
1272 (5.11)	76.0	****	73.0	59.0	37.0	42.0	44.0	59.0	62.0	66.0
1280 (0.80)	72.5	52.5	62.5	62.5	52.5	65.0	52.5	62.5	80.0*	90.0*
1293 (11.93)	72.5	52.5	62.5	70.0*	60.0*	52.5	67.5	47.5	72.5	100.0*

Mean (6.22)	67.2	52.5	57.6	51.1	40.7	46.3	45.6	50.8	63.5	72.2
S.D. (4.93)	20.8	0.0	17.2	18.0	15.4	12.5	15.8	9.5	13.1	23.3

The Group Mean Recovery Curves
Measured at Three Test Frequencies

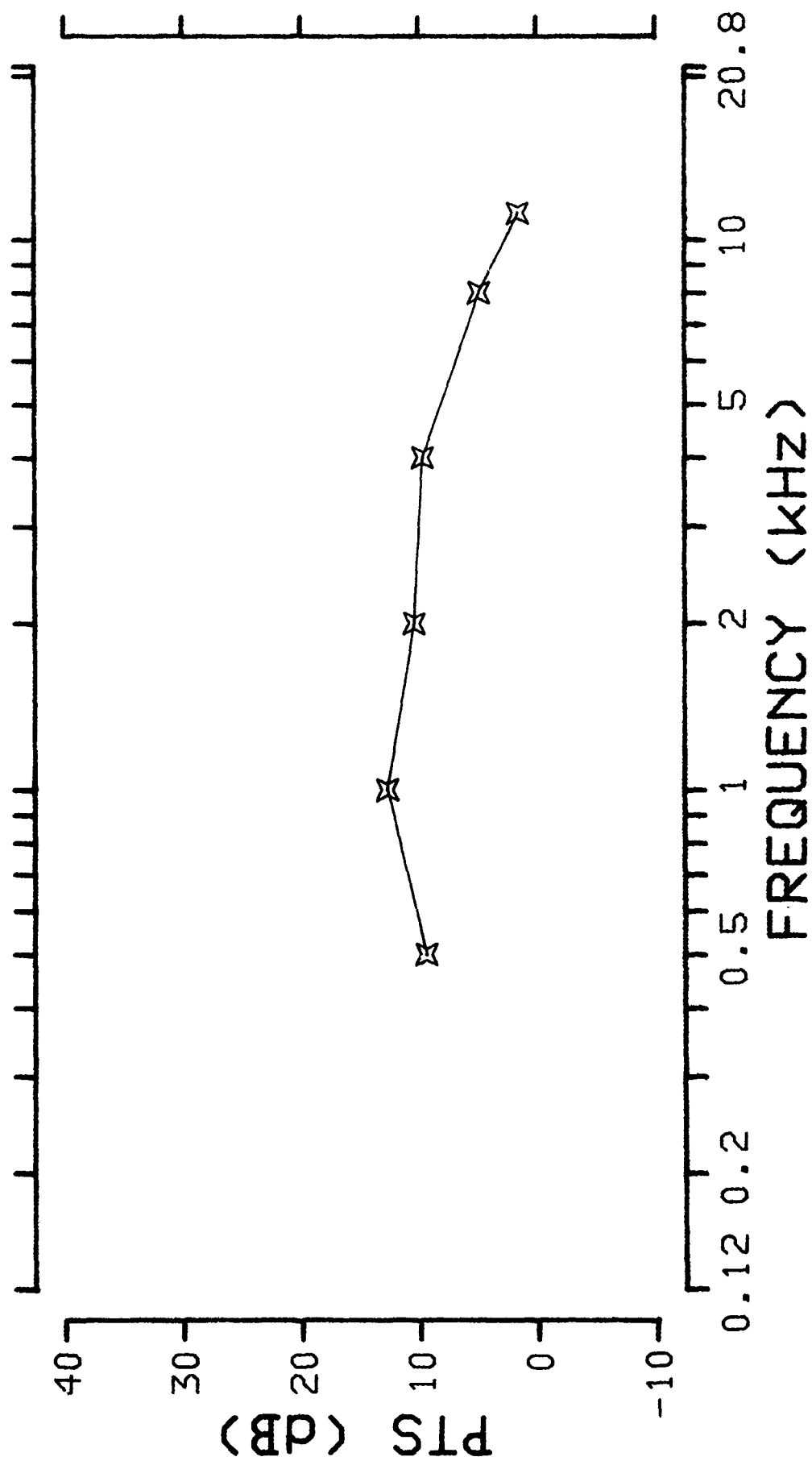
MEAN DATA (n=5) - 155 dB 10X 1/M

A183



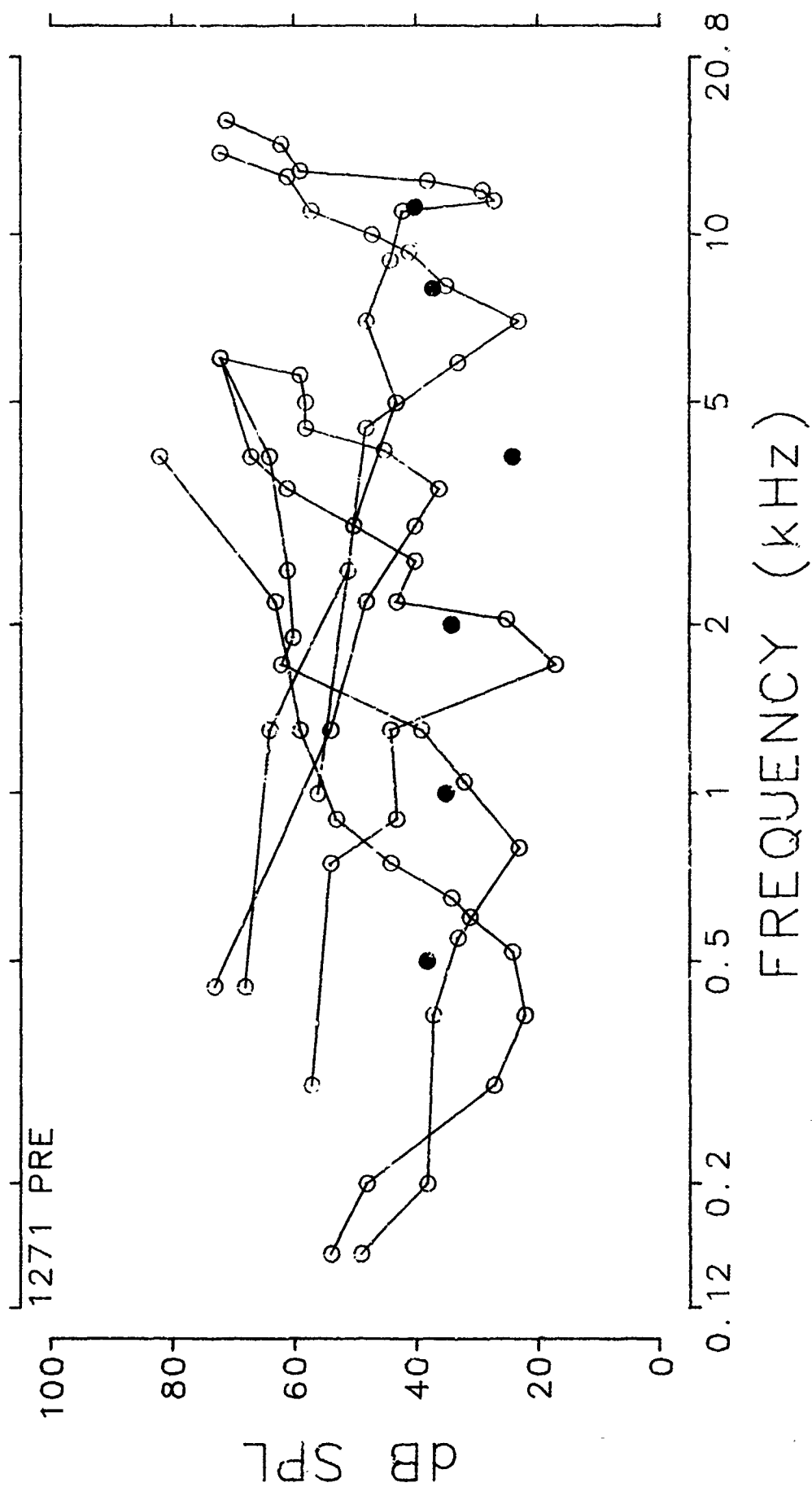
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

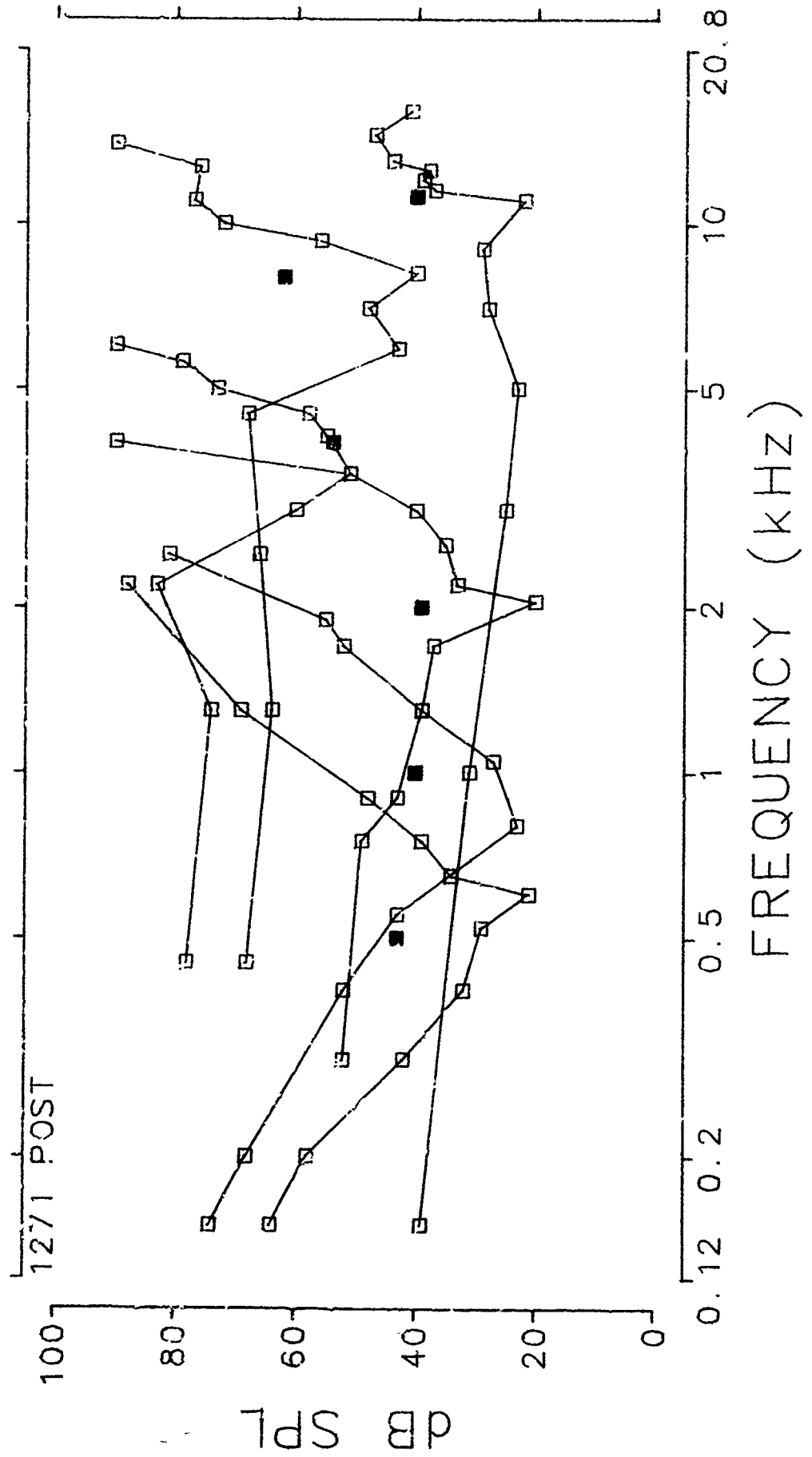
MEAN DATA (n=5) - 155 dB 10X 1/M

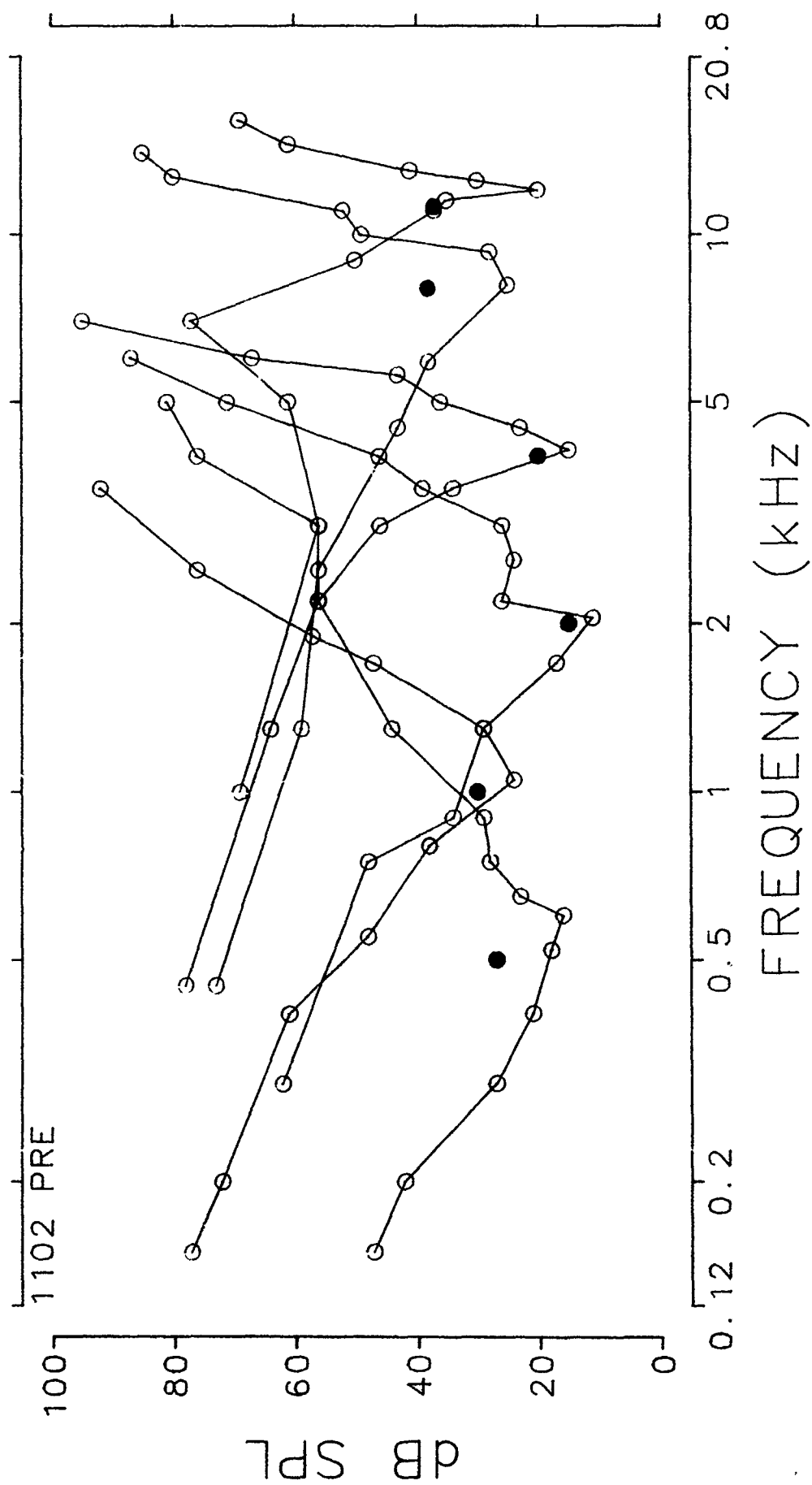


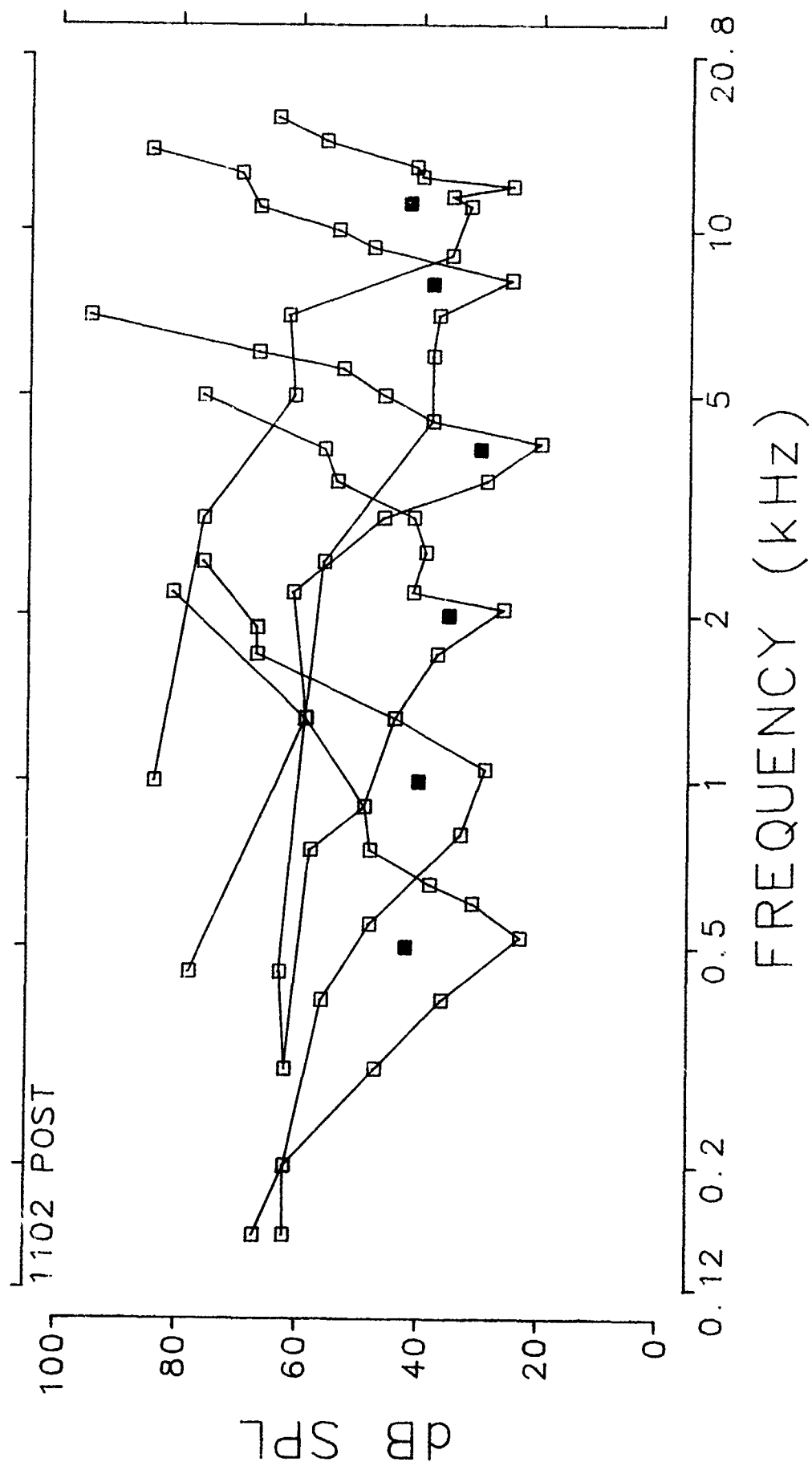
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

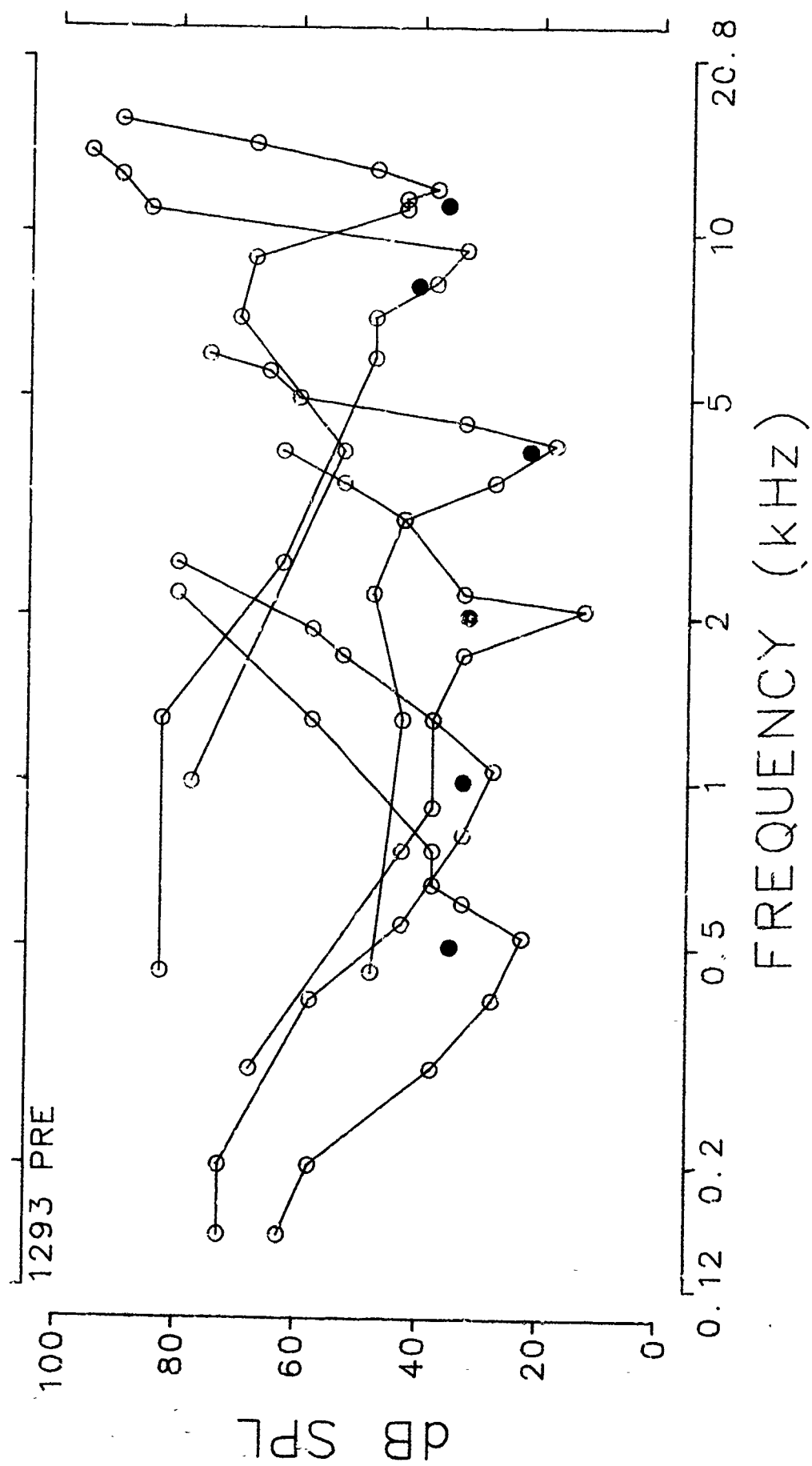
The solid symbol represents the threshold of the probe tone.

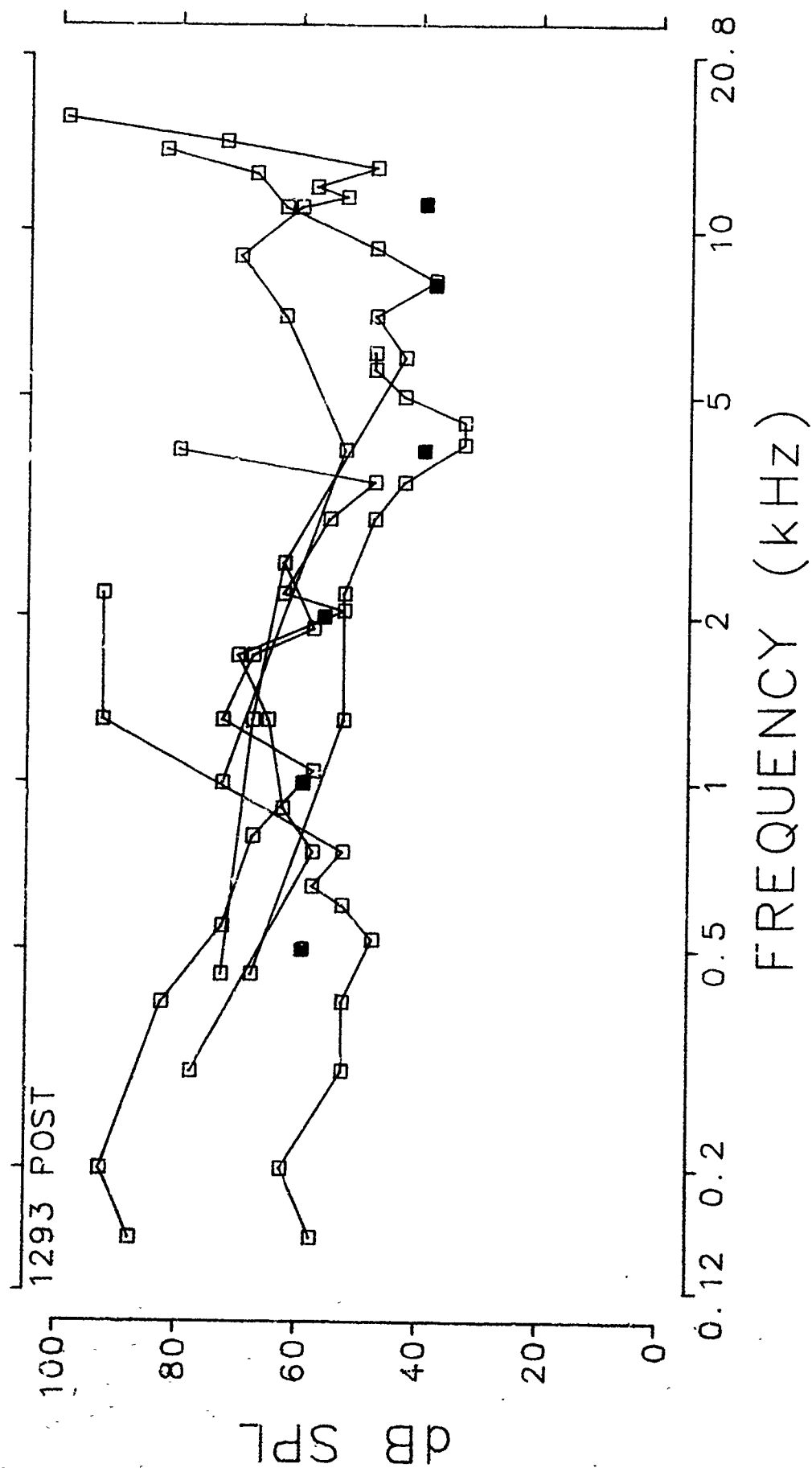


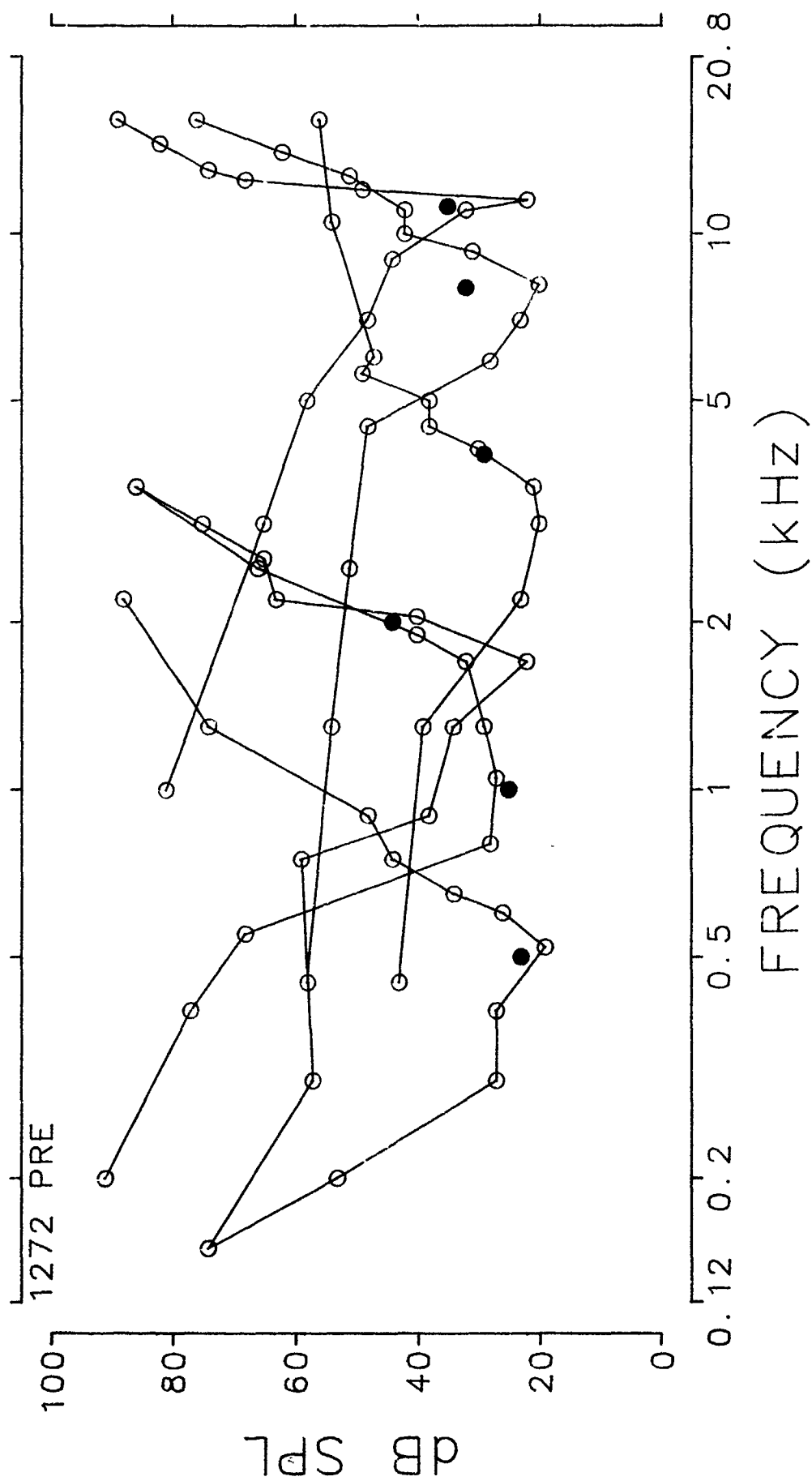


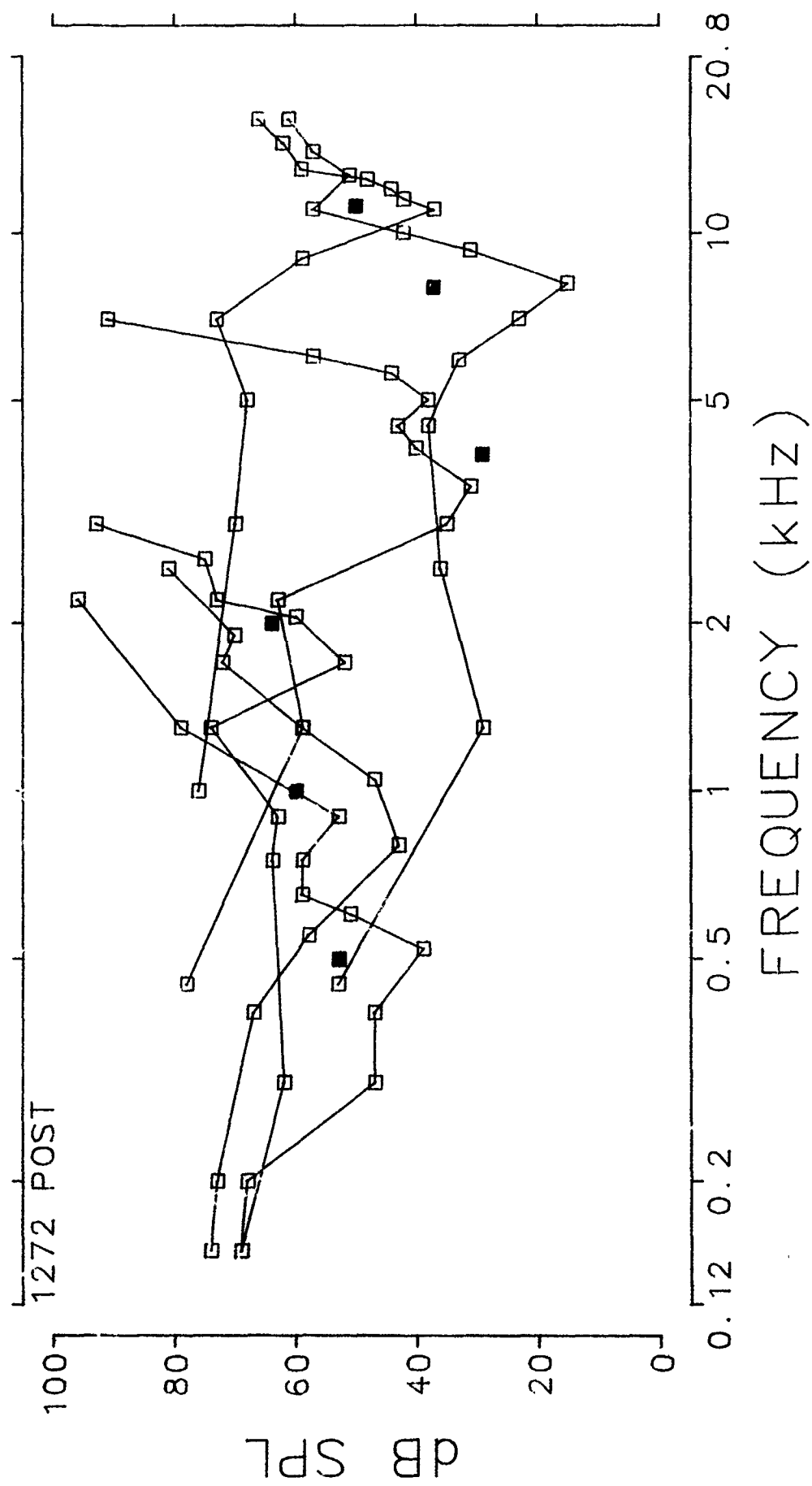


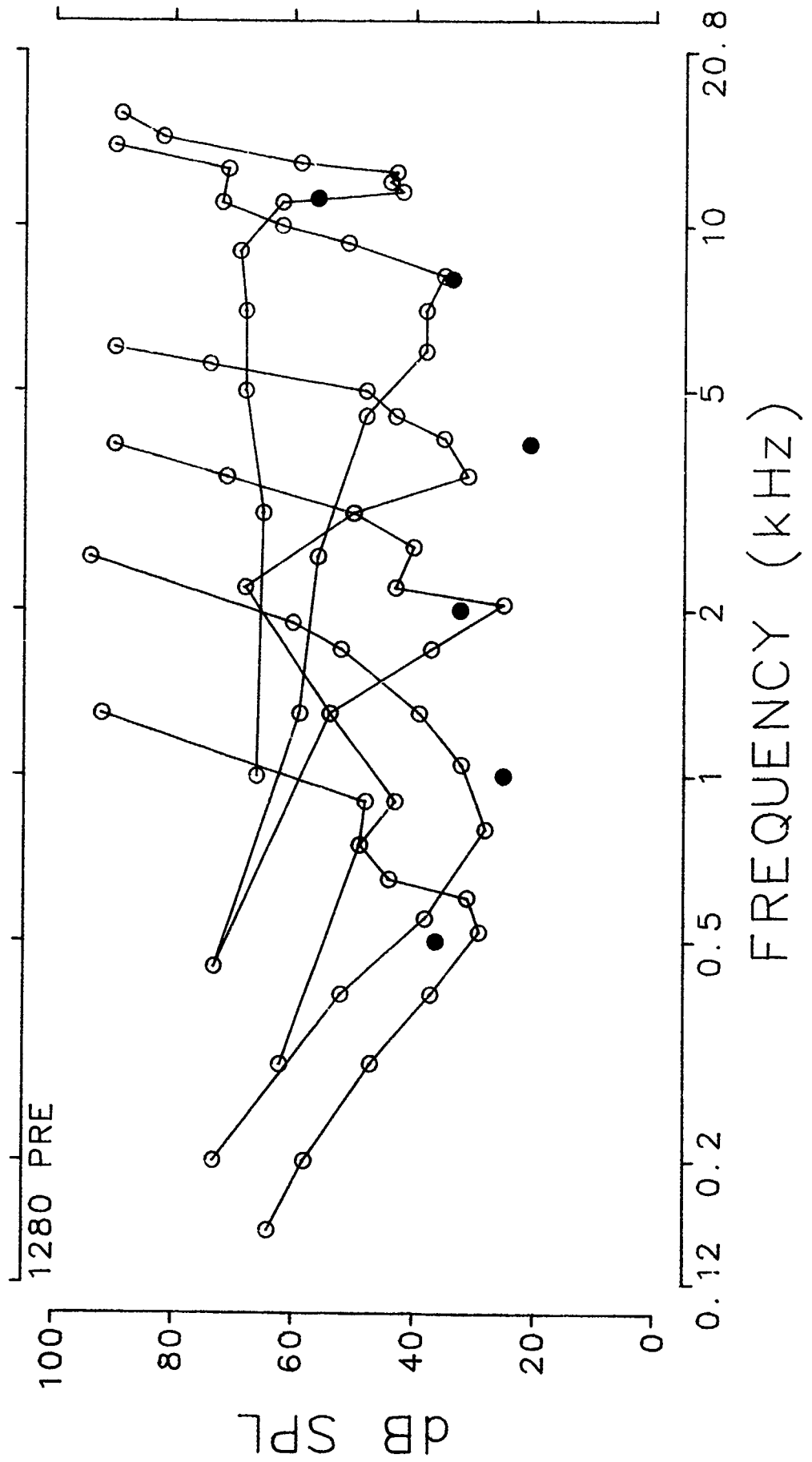


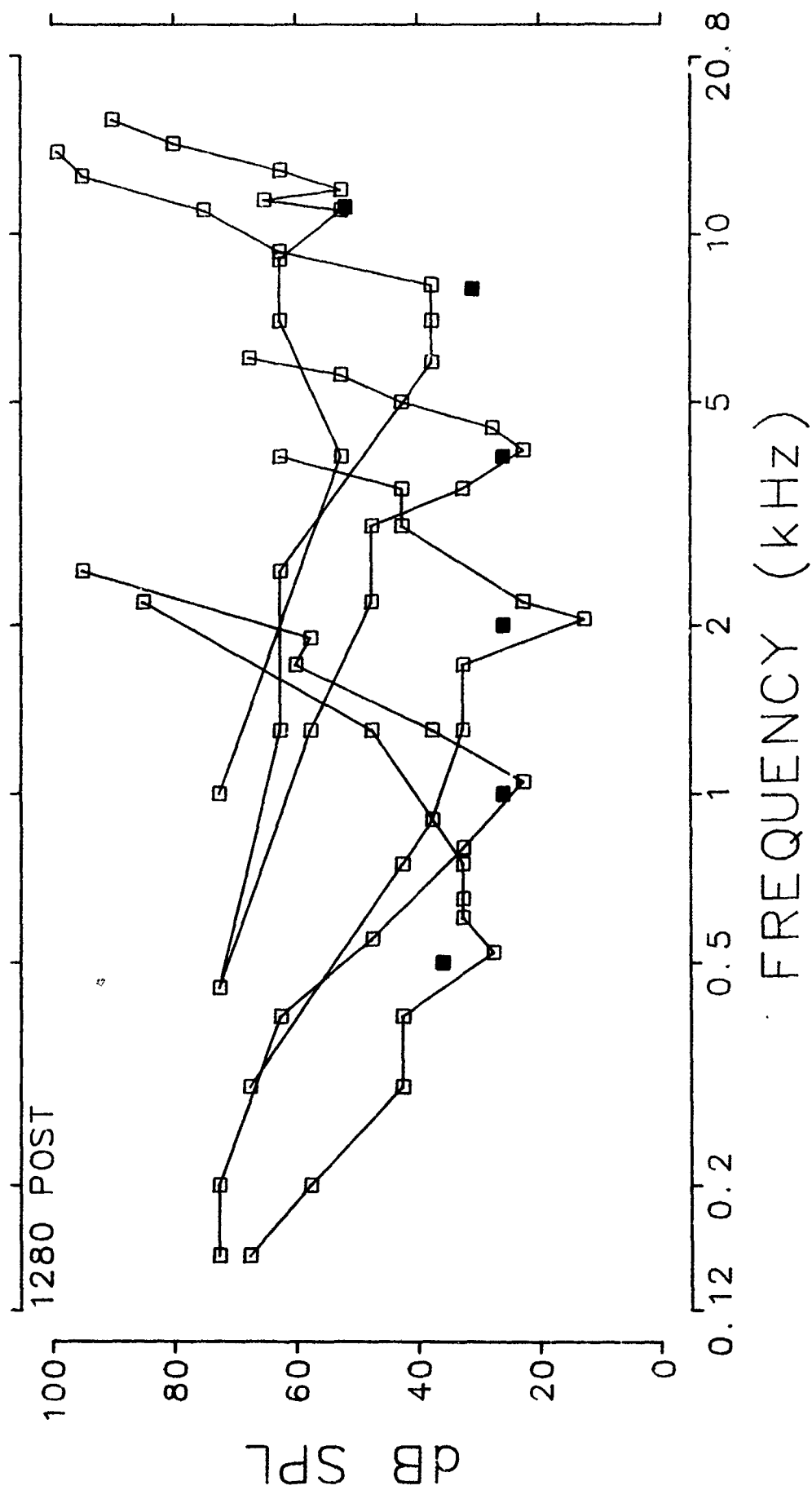












SHOCK TUBE EXPOSURE
155 dB, 10X, 1/MIN

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1102R	16	282	215	148	645
R1271R	14	170	127	220	517
R1272R	14	263	124	142	529
R1280R	5	63	81	112	256
R1293R	48	732	784	550	2066
GROUP MEAN	19				803
S.D.	17				720

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

	OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
GROUP MEANS			
	0.125 kHz	1.6	43.4
	0.25 kHz	2.0	53.6
	0.5 kHz	1.4	72.6
	1 kHz	3.0	277.8
	2 kHz	3.2	218.4
	4 kHz	4.6	67.6
	8 kHz	1.8	28.8
	16 kHz	1.8	27.0

STANDARD DEVIATIONS

0.125 kHz	1.5	26.2
0.25 kHz	1.6	23.6
0.5 kHz	1.5	45.7
1 kHz	4.1	332.8
2 kHz	4.5	281.7
4 kHz	7.8	67.2
8 kHz	1.3	26.9
16 kHz	2.2	34.7

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1102R							
0.125 kHz	3	7	10	25	42	0	0
0.25 kHz	2	8	25	54	87	0	0
0.5 kHz	4	26	32	26	84	0	0
1 kHz	3	168	94	16	278	1	6
2 kHz	3	68	46	18	132	1	3
4 kHz	0	1	5	5	11	0	0
8 kHz	1	2	2	3	7	0	0
16 kHz	0	2	1	1	4	0	0
TOTALS	16	282	215	148	645	2	9

CHINCHILLA R1271R

0.125 kHz	3	6	12	12	30	0	4
0.25 kHz	3	9	14	15	38	1	0
0.5 kHz	1	18	11	15	44	0	0
1 kHz	1	16	13	23	52	0	1
2 kHz	0	31	6	79	116	0	1
4 kHz	0	31	24	30	85	1	4
8 kHz	1	23	24	21	68	0	2
16 kHz	5	36	23	25	84	0	1
TOTALS	14	170	127	220	517	2	13

CHINCHILLA R1272R

0.125 kHz	0	2	6	19	27	0	0
0.25 kHz	1	8	17	41	66	0	1
0.5 kHz	1	28	19	31	78	0	0
1 kHz	1	148	38	22	208	2	0
2 kHz	2	31	16	6	53	0	1
4 kHz	5	9	3	3	15	0	0
8 kHz	1	5	1	1	7	0	0
16 kHz	3	19	11	6	36	2	3
TOTALS	14	263	124	142	529	4	6

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

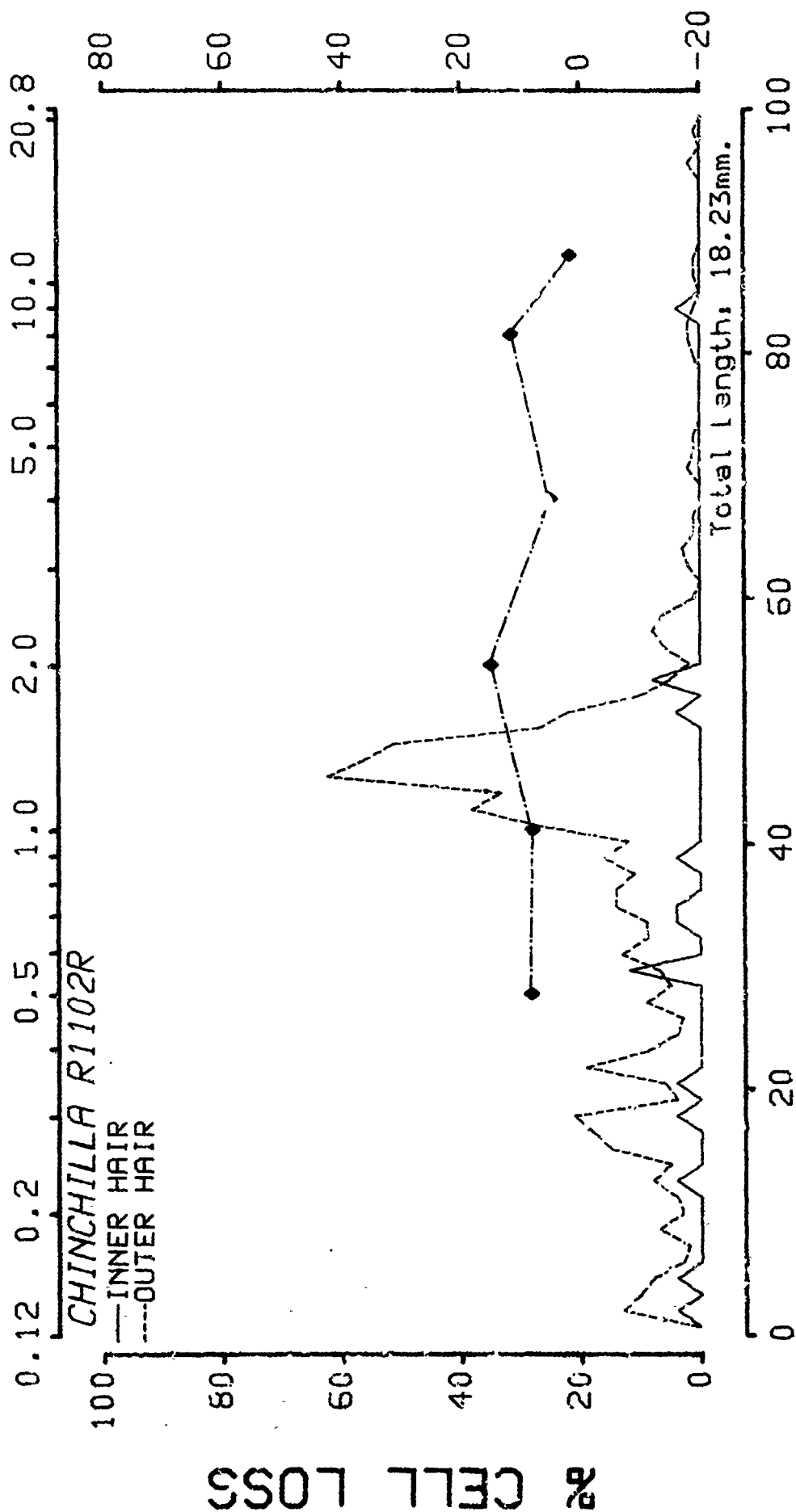
	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1280R							
0.125 kHz	0	2	5	22	29	0	0
0.25 kHz	0	3	5	19	27	0	0
0.5 kHz	1	5	6	7	18	0	0
1 kHz	0	8	1	2	11	1	0
2 kHz	0	21	26	25	72	0	0
4 kHz	0	9	21	22	52	0	0
8 kHz	4	14	16	15	45	2	3
16 kHz	0	1	1	0	2	0	0
TOTALS	5	63	81	112	256	3	3

CHINCHILLA R1293R

0.125 kHz	2	13	38	38	89	0	1
0.25 kHz	4	7	13	30	50	0	0
0.5 kHz	0	32	68	39	139	0	1
1 kHz	10	322	309	209	840	3	22
2 kHz	11	265	267	187	719	4	15
4 kHz	18	67	72	36	175	22	21
8 kHz	2	4	6	7	17	0	0
16 kHz	1	4	3	2	9	0	0
TOTALS	48	732	784	550	2066	29	60

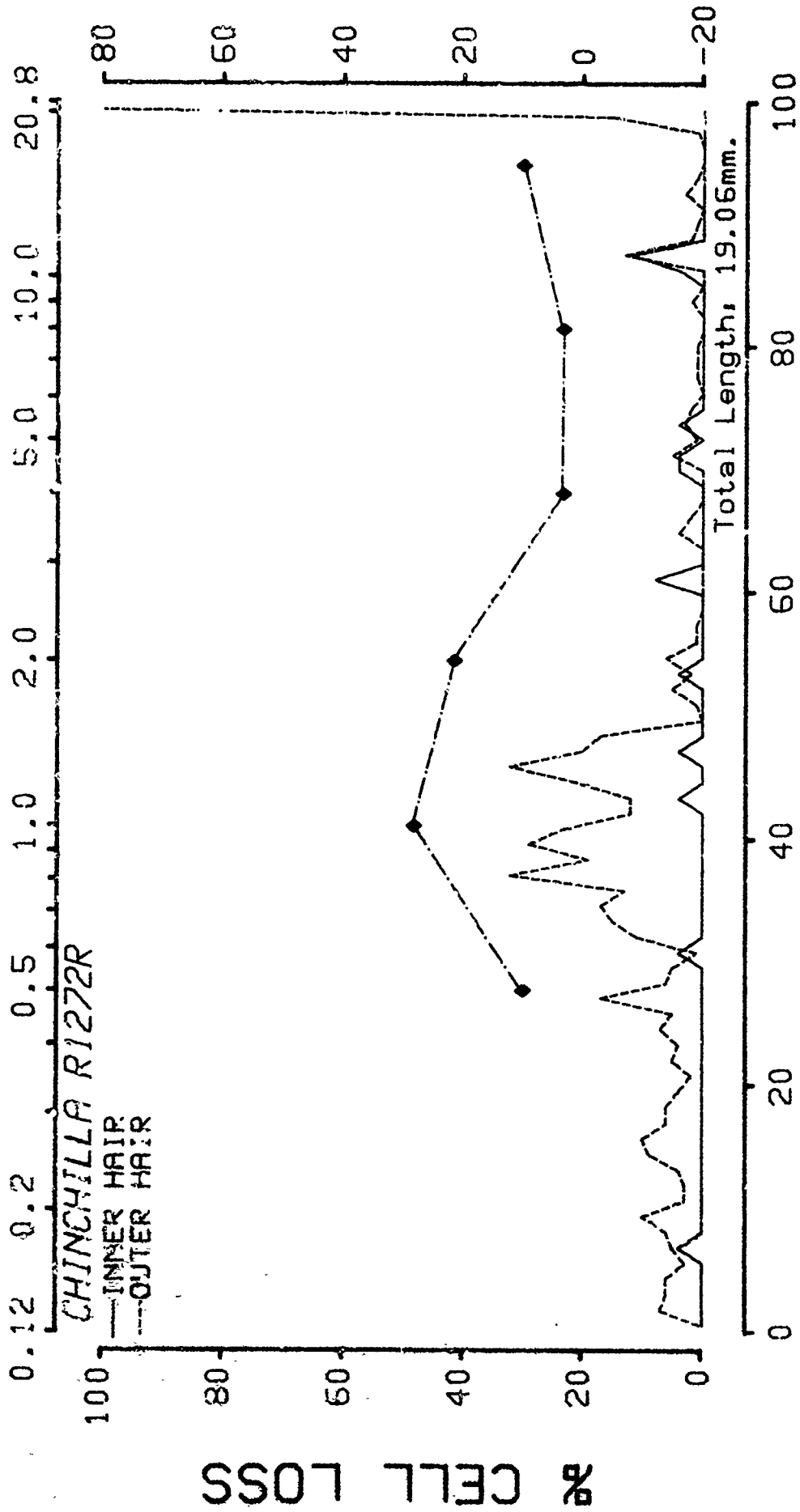
Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (kHz)



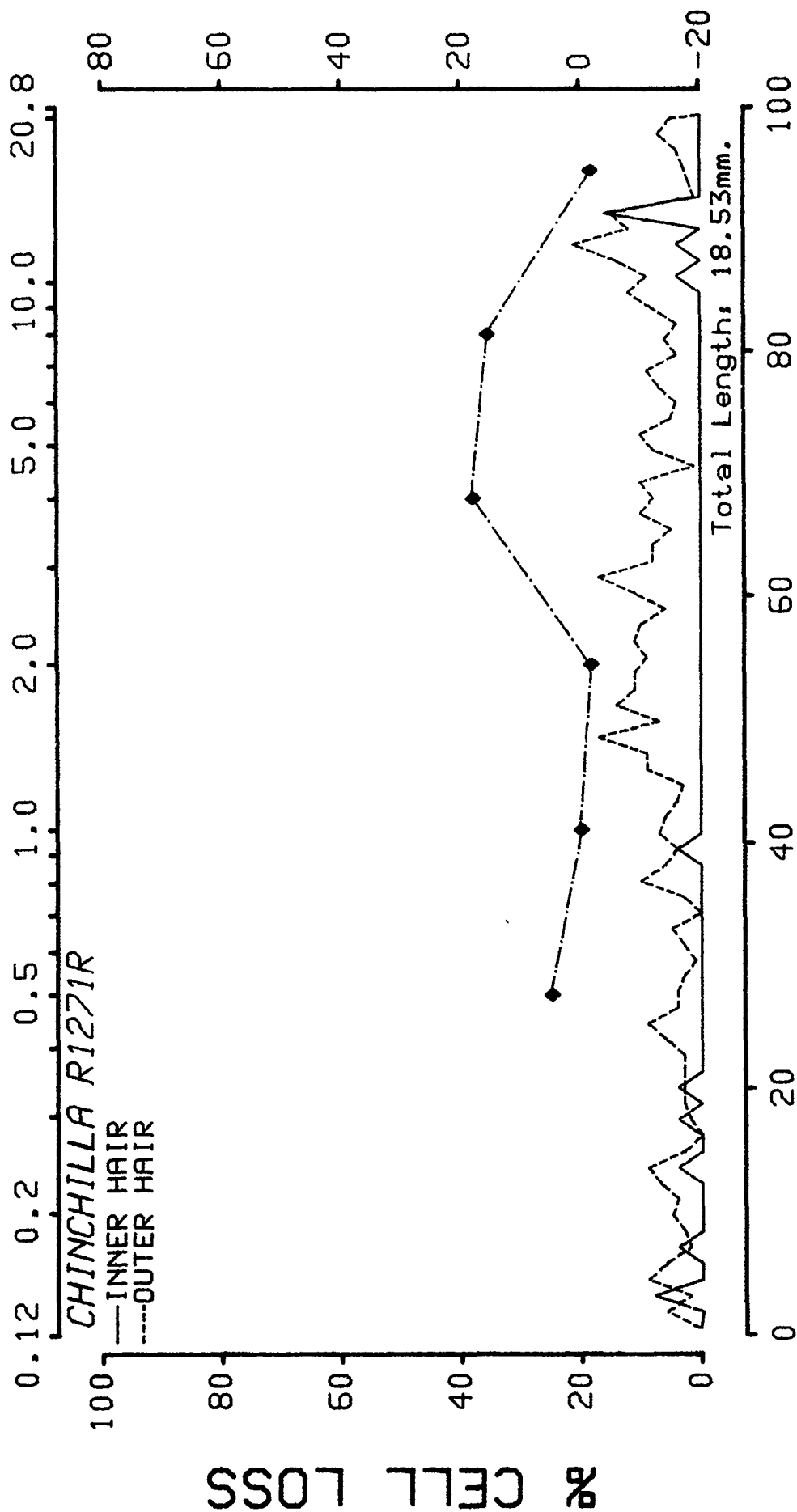
% TOTAL DISTANCE FROM APEX

FREQUENCY (KHZ)



% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)



% TOTAL DISTANCE FROM APEX

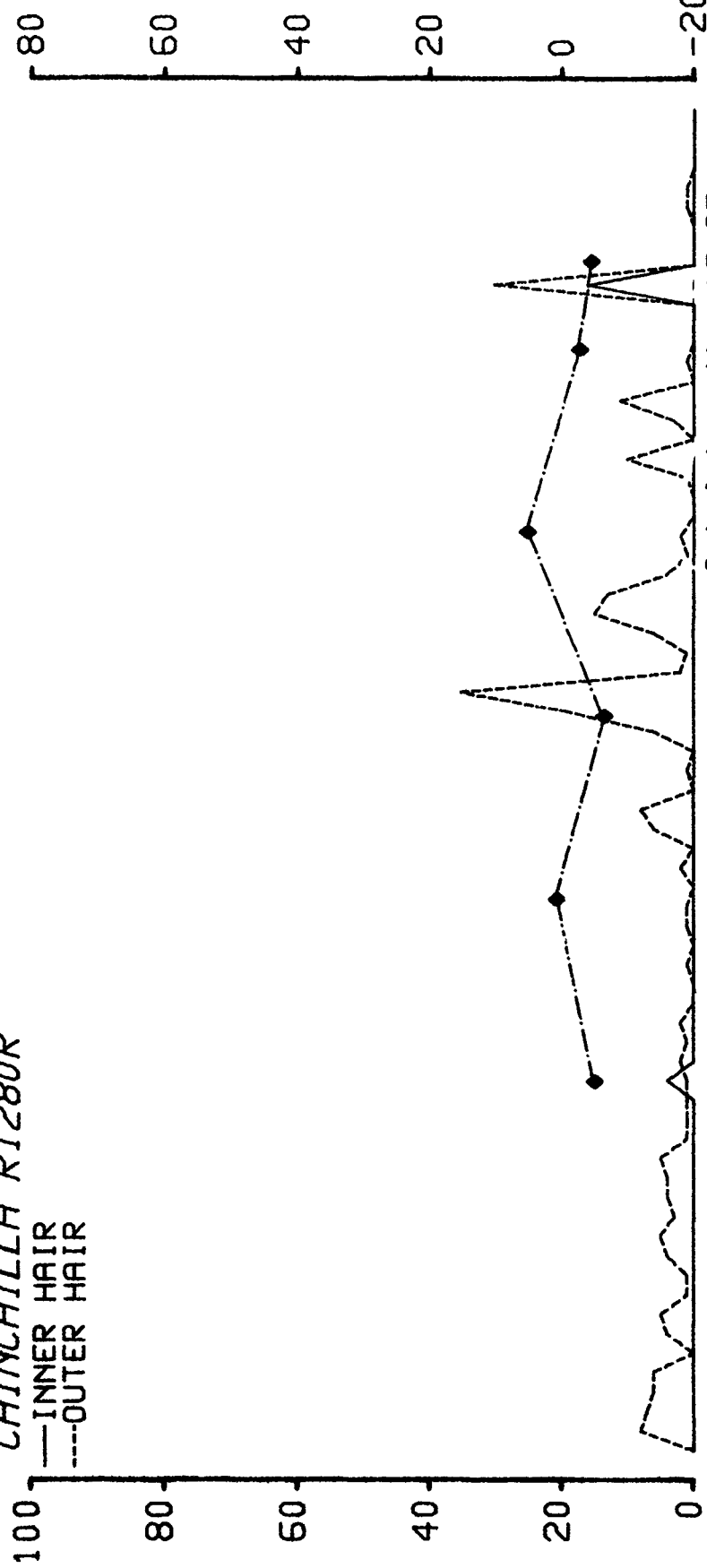
FREQUENCY (KHZ)

0.12 0.2 0.5 1.0 2.0 5.0 10.0 20.8

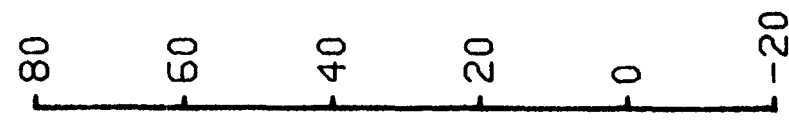
CHINCHILLA R1280R

— INNER HAIR
--- OUTER HAIR

% CELL LOSS



PTS (db)

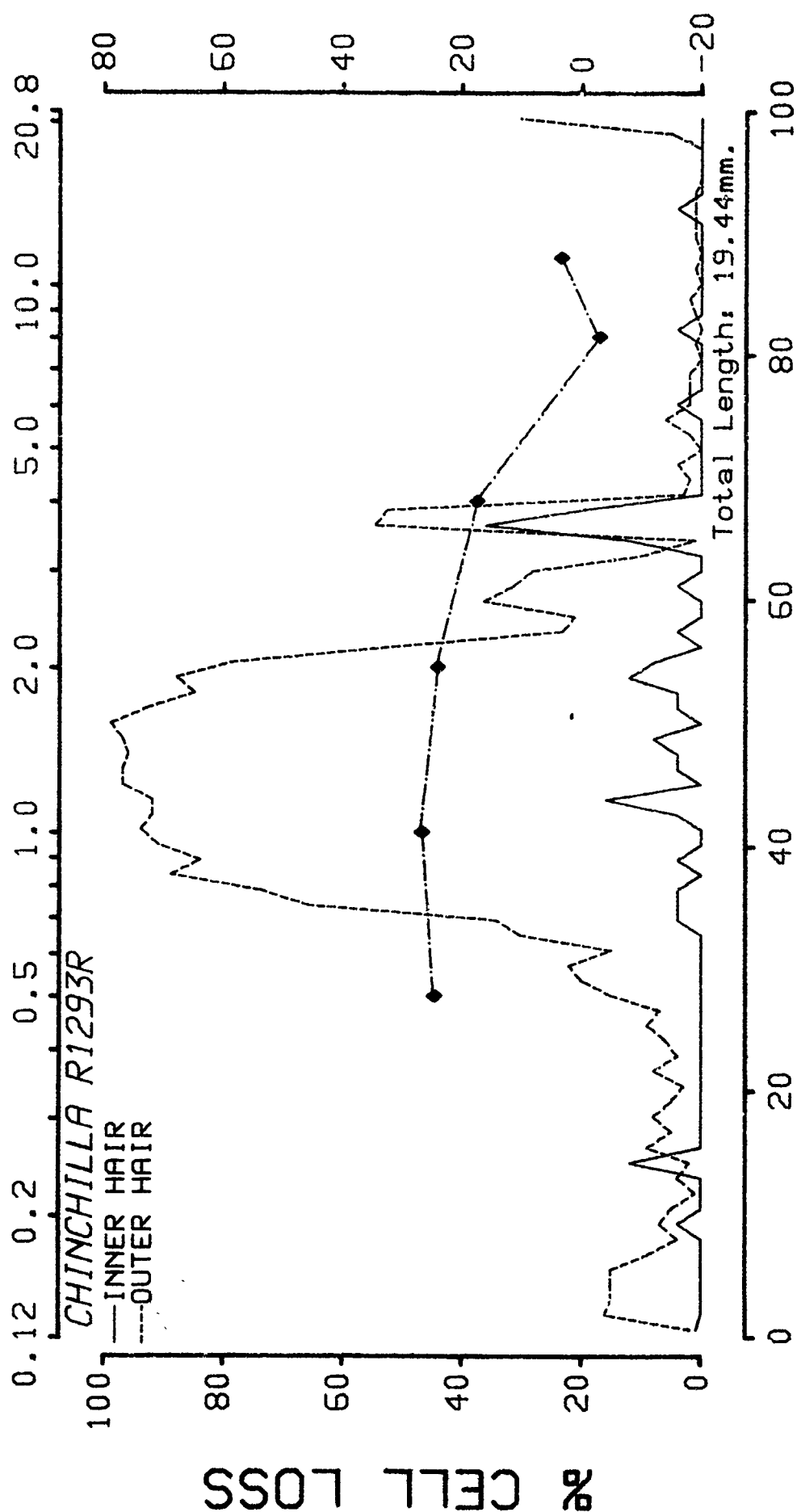


Total Length: 16.83mm.

% TOTAL DISTANCE FROM APEX

0 20 40 60 80 100

FREQUENCY (kHz)



% TOTAL DISTANCE FROM APEX

Summary Data for the Group Exposed to:

155 dB, 10X, 1/10M

Animal

1925	-	Completed the Entire Protocol
1931	-	Completed the Entire Protocol
1948	-	Completed the Entire Protocol
1967	-	Completed the Entire Protocol
1974	-	Completed the Entire Protocol

155 dB 10X 1/10M

PRE-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1925	24.2	10.8	15.8	10.8	25.8	37.5	*****
1931	27.5	15.8	24.2	10.8	33.5	46.3	*****
1948	17.5	7.5	19.2	15.8	22.5	27.5	*****
1967	26.2	16.2	11.2	12.8	26.2	22.8	*****
1974	19.2	9.2	12.5	15.8	28.8	27.5	*****
Mean	22.9	11.9	16.6	13.2	27.4	32.3	*****
S.D.	4.4	3.9	5.3	2.5	4.1	9.4	*****

POST-EXPOSURE THRESHOLDS (dB SPL)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1925	20.8	17.5	27.5	7.5	29.2	32.5	*****
1931	22.5	17.5	22.5	9.2	32.5	45.8	*****
1948	20.8	12.5	17.5	14.2	20.8	27.5	*****
1967	14.2	5.8	7.5	9.2	27.5	32.5	*****
1974	20.8	15.8	25.8	17.5	27.5	25.8	*****
Mean	19.8	13.8	20.2	11.5	27.5	32.8	*****
S.D.	3.3	4.9	8.0	4.2	4.3	7.8	*****

PERMANENT THRESHOLD SHIFT (dB)

Animal\kHz	0.5	1.0	2.0	4.0	8.0	11.2	16.0
1925	-3.3	6.7	11.7	-3.3	3.3	-5.0	*****
1931	-5.0	1.7	-1.7	-1.7	-1.0	-0.4	*****
1948	3.3	5.0	-1.7	-1.7	-1.7	0.0	*****
1967	-12.0	-10.3	-3.7	-3.7	1.3	9.7	*****
1974	1.7	6.7	13.3	1.7	-1.2	-1.7	*****
Mean	-3.1	1.9	3.6	-1.7	0.2	0.5	*****
S.D.	6.1	7.2	8.2	2.1	2.1	5.5	*****

155 dB 10X 1/10M

TEMPORARY THRESHOLD SHIFT (dB)

		Frequency 0.5 kHz				
Animal\Hr	0	2	8	24	240	Max
1925	28.3	63.3	63.3	3.3	-1.7	63.3
1931	10.0	5.0	-5.0	-5.0	-5.0	10.0
1948	25.0	25.0	0.0	10.0	0.0	25.0
1967	1.3	-3.7	-8.7	-8.7	-8.7	1.3
1974	33.3	18.3	13.3	8.3	-1.7	33.3
Mean	19.6	21.6	12.6	1.6	-3.4	26.6
S.D.	13.4	25.9	29.6	8.2	3.5	24.0

		Frequency 2.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1925	74.2*	79.2*	76.7	31.7	16.7	79.2
1931	8.3	3.3	-1.7	-1.7	-1.7	8.3
1948	33.3	23.3	3.3	8.3	-1.7	33.3
1967	1.3	6.3	1.3	-3.7	-3.7	6.3
1974	60.0	55.0	35.0	30.0	15.0	60.0
Mean	35.4	33.4	22.9	12.9	4.9	37.4
S.D.	31.6	32.8	33.5	17.0	10.0	32.0

		Frequency 8.0 kHz				
Animal\Hr	0	2	8	24	240	Max
1925	36.7	71.7	71.7	1.7	11.7	71.7
1931	14.0	4.0	-1.0	-1.0	-6.0	14.0
1948	50.0	40.0	10.0	5.0	0.0	50.0
1967	11.3	11.3	11.3	1.3	1.3	11.3
1974	48.8	58.8	13.8	3.7	-6.2	58.8
Mean	32.2	37.2	21.1	2.2	0.2	41.2
S.D.	18.6	29.3	28.8	2.3	7.3	27.1

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 0.5 kHz

Masker (kHz): 0.150 0.200 0.300 0.400 0.520 0.600 0.650 0.750 1.300 2.200

Animal (Q-10 dB)

Pre-Exposure

1925 (3.33)	72.5	67.5	62.5	57.5	32.5	37.5	47.5	42.5	87.5	92.5
1931 (1.19)	62.5	62.5	47.5	37.5	27.5	27.5	27.5	32.5	57.5	87.5
1948 (1.41)	62.5	57.5	27.5	27.5	22.5	22.5	32.5	27.5	82.5	87.5
1967 (1.66)	77.5	72.5	57.5	57.5	42.5	42.5	47.5	52.5	90.0*	97.5
1974 (3.11)	62.5	62.5	47.5	42.5	32.5	27.5	37.5	37.5	77.5	95.0*

Mean (2.14)	67.5	64.5	48.5	44.5	31.5	31.5	38.5	38.5	79.0	92.0
S.D. (1.00)	7.1	5.7	13.4	13.0	7.4	8.2	8.9	9.6	12.9	4.5

Animal (Q-10 dB)

Post-Exposure

1925 (1.66)	67.5	57.5	47.5	47.5	32.5	32.5	37.5	42.5	82.5	92.5
1931 (1.66)	67.5	62.5	52.5	42.5	27.5	27.5	27.5	37.5	57.5	85.0*
1948 (0.75)	62.5	62.5	32.5	27.5	27.5	32.5	32.5	32.5	67.5	87.5
1967 (3.19)	62.5	57.5	42.5	37.5	22.5	32.5	32.5	37.5	90.0*	92.5
1974 (1.72)	72.5	67.5	57.5	47.5	42.5	37.5	42.5	47.5	72.5	92.5

Mean (1.80)	66.5	61.5	46.5	40.5	30.5	32.5	34.5	39.5	74.0	90.0
S.D. (0.88)	4.2	4.2	9.6	8.4	7.6	3.5	5.7	5.7	12.7	3.5

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 1.0 kHz

Masker (kHz): 0.150 0.200 0.400 0.550 0.800 1.050 1.300 1.700 1.900 2.500

Animal (Q-10 dB)

Pre-Exposure

1925 (0.97)	77.5	72.5	62.5	32.5	27.5	27.5	32.5	67.5	85.0*	97.5
1931 (2.10)	72.5	77.5	42.5	47.5	37.5	27.5	37.5	52.5	52.5	77.5
1948 (2.55)	77.5	72.5	32.5	27.5	32.5	22.5	37.5	57.5	62.5	97.5
1967 (0.96)	77.5	77.5	67.5	47.5	42.5	42.5	47.5	87.5	92.5	97.5
1974 (1.09)	72.5	72.5	37.5	32.5	32.5	27.5	32.5	62.5	67.5	95.0*

Mean (1.53)	75.5	74.5	48.5	37.5	34.5	29.5	37.5	65.5	72.0	93.0
S.D. (0.74)	2.7	2.7	15.6	9.4	5.7	7.6	6.1	13.5	16.4	8.7

Animal (Q-10 dB)

Post-Exposure

1925 (1.12)	77.5	77.5	37.5	37.5	37.5	32.5	42.5	87.5	92.5	97.5
1931 (1.69)	72.5	72.5	62.5	37.5	32.5	22.5	27.5	42.5	52.5	82.5
1948 (2.55)	77.5	72.5	62.5	47.5	37.5	27.5	42.5	57.5	82.5	105.0*
1967 (1.55)	77.5	72.5	52.5	42.5	32.5	27.5	32.5	75.0*	82.5	97.5
1974 (0.94)	72.5	72.5	62.5	52.5	42.5	42.5	42.5	77.5	87.5	97.5

Mean (1.57)	75.5	73.5	55.5	43.5	36.5	30.5	37.5	68.0	79.5	96.0
S.D. (0.63)	2.7	2.2	11.0	6.5	4.2	7.6	7.1	17.9	15.7	8.2

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 2.0 kHz

Masker (kHz): 0.300 0.750 0.900 1.300 1.700 2.050 2.200 3.000 3.500 4.000

Animal (Q-10 dB)

Pre-Exposure

1925 (7.27)	47.5	42.5	42.5	52.5	42.5	22.5	37.5	52.5	57.5	92.5
1931 (3.61)	47.5	42.5	42.5	47.5	52.5	37.5	42.5	62.5	72.5	95.0*
1948 (6.05)	47.5	42.5	42.5	47.5	42.5	27.5	42.5	62.5	85.0*	97.5
1967 (8.33)	67.5	42.5	37.5	52.5	47.5	22.5	37.5	67.5	87.5	95.0*
1974 (8.33)	72.5	52.5	42.5	47.5	47.5	22.5	37.5	52.5	85.0*	97.5

Mean (6.72)	56.5	44.5	41.5	49.5	46.5	26.5	39.5	59.5	77.5	95.5
S.D. (1.98)	12.4	4.5	2.2	2.7	4.2	6.5	2.7	6.7	12.6	2.1

Animal (Q-10 dB)

Post-Exposure

1925 (2.06)	57.5	57.5	52.5	47.5	57.5	47.5	47.5	42.5	57.5	87.5
1931 (6.14)	67.5	47.5	37.5	27.5	42.5	22.5	32.5	57.5	42.5	87.5
1948 (1.97)	82.5	57.5	52.5	37.5	32.5	27.5	32.5	57.5	87.5	97.5
1967 (7.27)	62.5	47.5	37.5	32.5	37.5	17.5	32.5	57.5	85.0*	95.0*
1974 (11.02)	77.5	52.5	52.5	47.5	62.5	37.5	75.0*	90.0*	92.5	97.5

Mean (5.69)	69.5	52.5	46.5	38.5	46.5	30.5	44.0	57.0	73.0	93.0
S.D. (3.81)	10.4	5.0	8.2	8.9	12.9	12.0	18.5	20.5	21.8	5.1

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 4.0 kHz

Masker (k ^r):	0.450	1.300	2.200	3.000	3.500	4.100	4.500	5.000	5.600	6.000
Animal (Q-10 dB)	Pre-Exposure									
1925 (2.16)	57.5	57.5	52.5	47.5	37.5	37.5	42.5	62.5	87.5	92.5
1931 (4.40)	57.5	52.5	52.5	42.5	37.5	22.5	27.5	47.5	57.5	62.5
1948 (5.06)	67.5	57.5	57.5	57.5	52.5	37.5	47.5	67.5	87.5	87.5
1967 (2.85)	67.5	52.5	47.5	42.5	32.5	37.5	52.5	75.0*	77.5	82.5
1974 (2.01)	77.5	57.5	52.5	47.5	37.5	37.5	37.5	57.5	67.5	77.5
Mean (3.30)	65.5	55.5	52.5	47.5	39.5	34.5	41.5	62.0	75.5	80.5
S.D. (1.37)	8.4	2.7	3.5	6.1	7.6	6.7	9.6	10.4	13.0	11.5

Animal (Q-10 dB)	Post-Exposure									
1925 (3.12)	72.5	52.5	57.5	42.5	22.5	22.5	37.5	42.5	47.5	52.5
1931 (2.97)	72.5	47.5	52.5	32.5	22.5	17.5	22.5	42.5	47.5	62.5
1948 (3.49)	77.5	57.5	57.5	52.5	37.5	32.5	42.5	67.5	82.5	87.5
1967 (3.26)	77.5	52.5	52.5	42.5	32.5	27.5	37.5	57.5	67.5	82.5
1974 (3.26)	77.5	67.5	57.5	52.5	42.5	37.5	47.5	67.5	82.5	92.5
Mean (3.22)	75.5	55.5	55.5	44.5	31.5	27.5	37.5	55.5	65.5	75.5
S.D. (0.19)	2.7	7.6	2.7	8.4	8.9	7.9	9.4	12.5	17.5	17.2

MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 8.0 kHz

Masker (kHz): 0.450 1.300 2.500 5.900 7.000 8.100 9.300 11.000 12.700 14.000

Animal (Q-10 dB)

Pre-Exposure

1925 (4.31)	67.5	57.5	57.5	47.5	42.5	32.5	47.5	67.5	85.0*	95.0*
1931 (3.69)	87.5	75.5	67.5	65.0*	72.5	65.0*	57.5	75.0*	85.0*	95.0*
1948 (3.13)	82.5	67.5	67.5	57.5	42.5	47.5	62.5	77.5	85.0*	92.5
1967 (7.24)	82.5	62.5	62.5	52.5	20.0*	37.5	62.5	77.5	82.5	87.5
1974 (1.61)	77.5	62.5	62.5	47.5	57.5	52.5	57.5	82.5	87.5	92.5

Mean	(3.99)	79.5	65.1	63.5	54.0	47.0	57.5	76.0	85.0	92.5
S.D.	(2.07)	7.6	6.8	4.2	7.4	19.6	6.1	5.5	1.8	3.1

Animal (Q-10 dB)

Post-Exposure

1925 (1.17)	92.5	62.5	67.5	47.5	52.5	47.5	62.5	82.5	92.5	97.5
1931 (*****)	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1948 (0.99)	87.5	67.5	62.5	42.5	37.5	37.5	37.5	42.5	52.5	62.5
1967 (1.67)	72.5	57.5	57.5	47.5	47.5	42.5	62.5	77.5	95.0*	97.5
1974 (3.52)	77.5	57.5	62.5	52.5	57.5	47.5	57.5	85.0*	97.5	97.5

Mean	(1.84)	82.5	61.3	62.5	47.5	48.8	55.0	71.9	84.4	88.9
S.D.	(1.16)	9.1	4.8	4.1	4.1	8.5	11.9	19.8	21.3	17.5

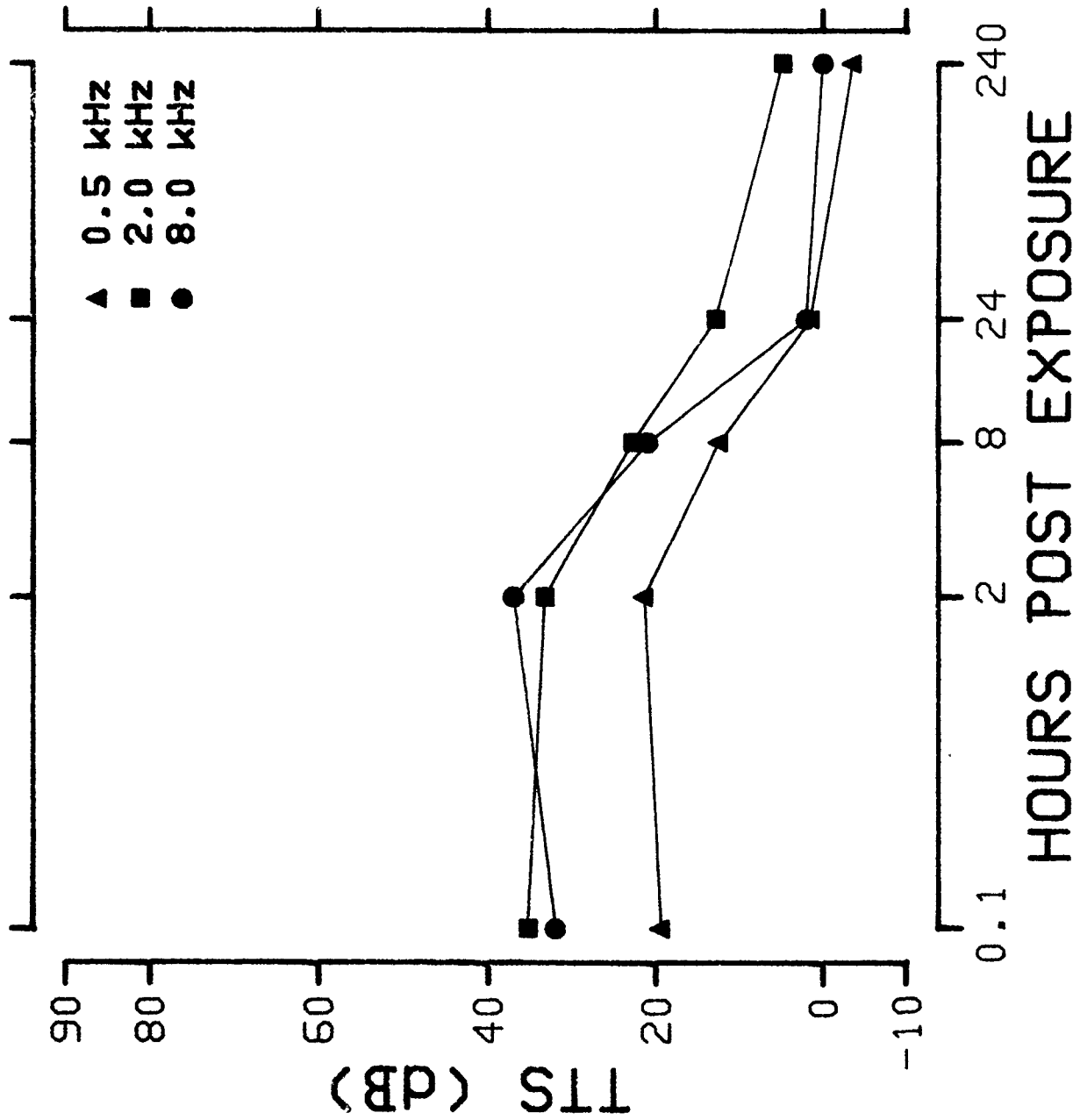
MASKED THRESHOLDS (dB SPL) Group: 155 dB 10X 1/10M

Probe Frequency: 11.2 kHz

Masker (kHz):	1.000	4.000	7.000	9.000	11.000	11.500	12.000	13.000	14.500	16.000
Animal (Q-10 dB)	Pre-Exposure									
1925 (3.57)	77.5	72.5	67.5	55.0*	52.5	47.5	65.0*	72.5	77.5	87.5
1931 (3.75)	85.0*	67.5	80.0*	65.0*	52.5	47.5	52.5	52.5	85.0*	95.0*
1948 (2.85)	77.5	67.5	67.5	67.5	57.5	52.5	52.5	52.5	67.5	95.0*
1967 (6.12)	72.5	52.5	72.5	52.5	32.5	37.5	47.5	47.5	67.5	72.5
1974 (3.01)	72.5	57.5	72.5	57.5	47.5	47.5	47.5	62.5	72.5	87.5
Mean (3.86)	77.0	63.5	72.0	59.5	48.5	46.5	53.0	57.5	74.0	87.5
S.D. (1.32)	5.1	8.2	5.1	6.5	9.6	5.5	7.2	10.0	7.4	9.2
Animal (Q-10 dB)	Post-Exposure									
1925 (5.82)	77.5	52.5	57.5	57.5	57.5	57.5	47.5	42.5	57.5	82.5
1931 (****)	****	****	****	****	****	****	****	****	****	****
1948 (3.43)	67.5	57.5	57.5	52.5	52.5	47.5	42.5	42.5	52.5	82.5
1967 (5.28)	82.5	57.5	62.5	65.0*	47.5	47.5	42.5	57.5	62.5	95.0*
1974 (2.73)	77.5	57.5	67.5	52.5	52.5	47.5	52.5	62.5	72.5	97.5
Mean (4.32)	76.3	56.2	61.3	56.9	52.5	50.0	46.3	51.3	61.3	89.4
S.D. (1.47)	6.3	2.5	4.8	5.9	4.1	5.0	4.8	10.3	8.5	8.0

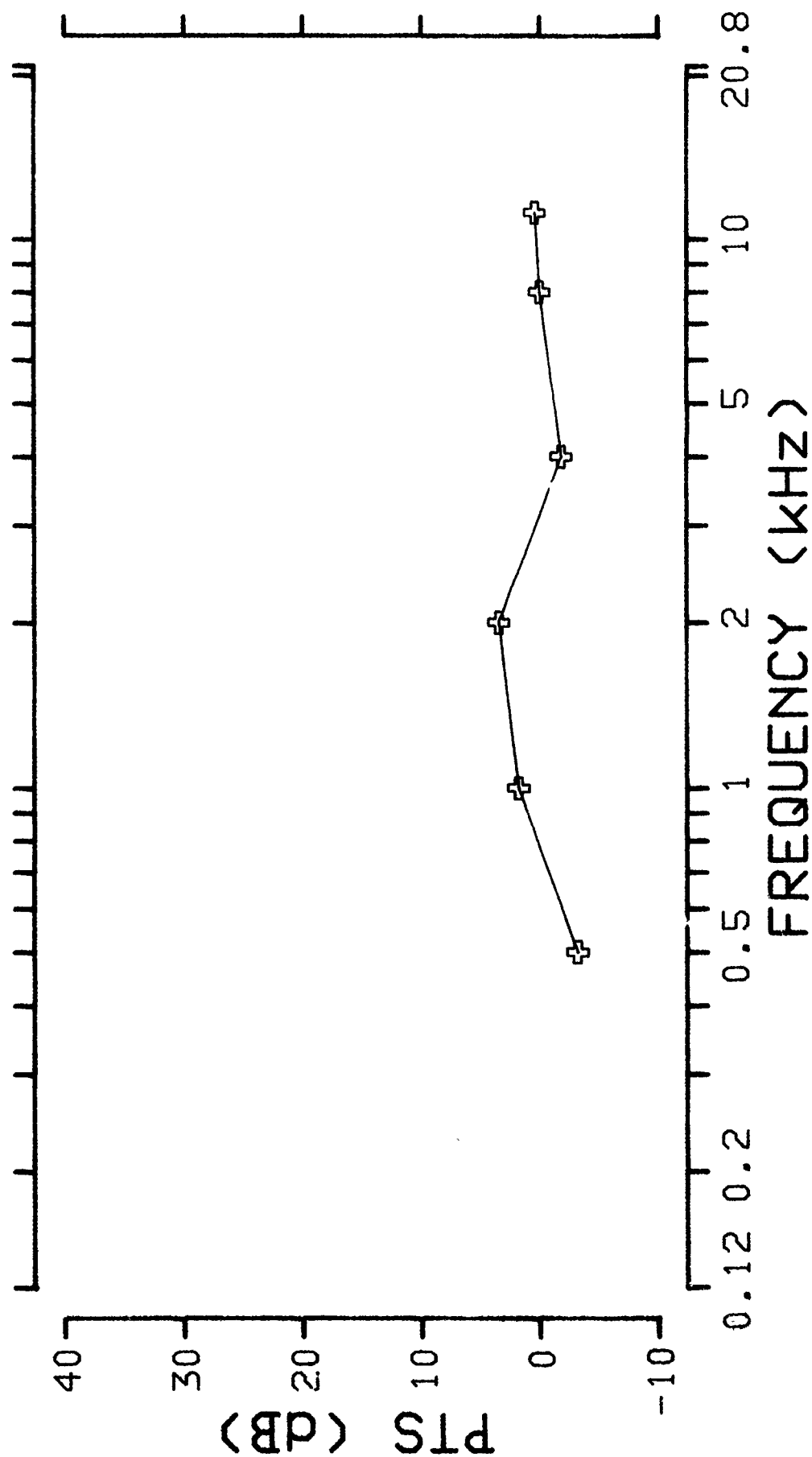
The Group Mean Recovery Curves
Measured at Three Test Frequencies

MEAN DATA (n=5) - 155 dB 10X 1/10M



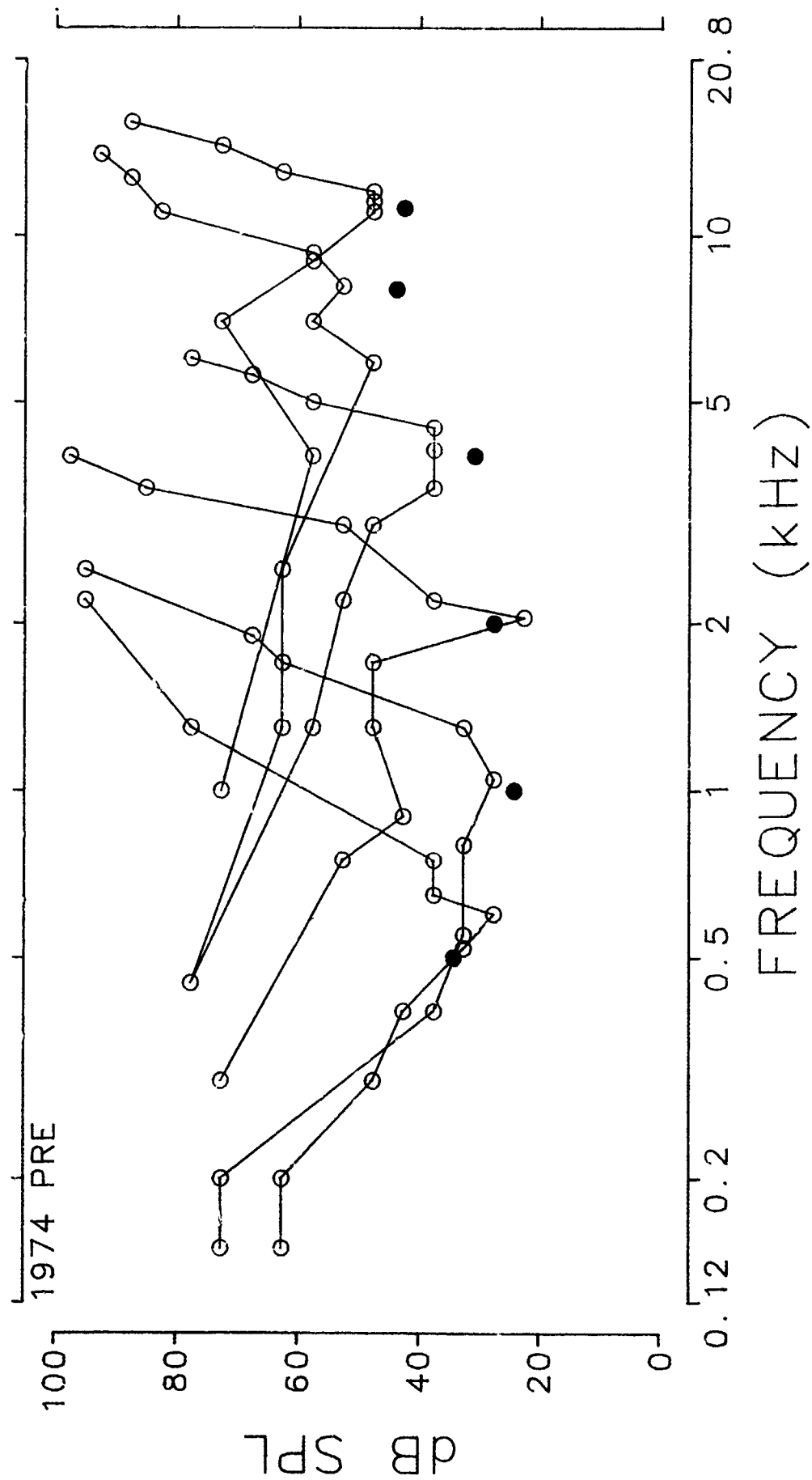
The Group Mean Permanent Threshold Shift (PTS)
for all Test Frequencies

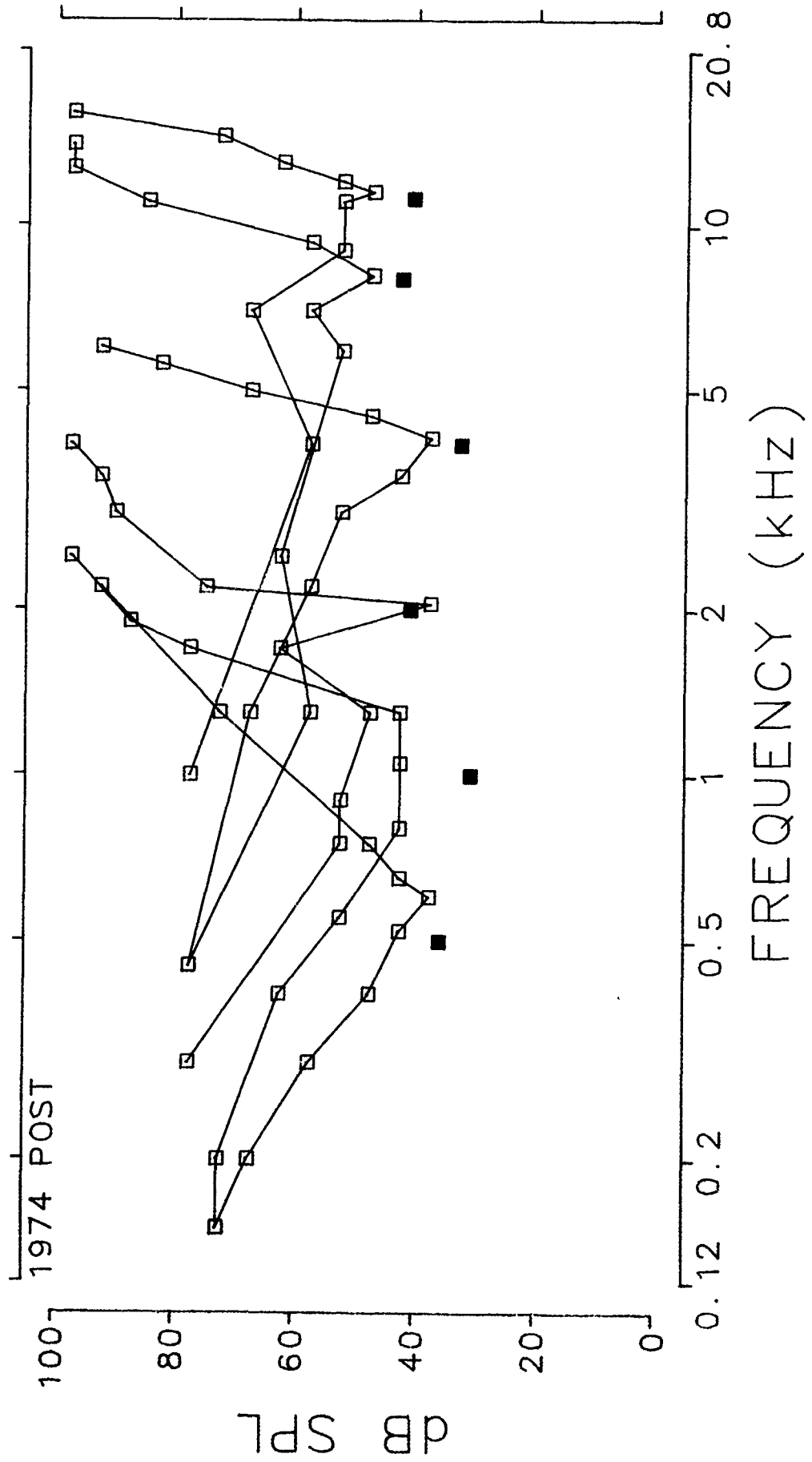
MEAN DATA (n=5) - 155 dB 10X 1/10M

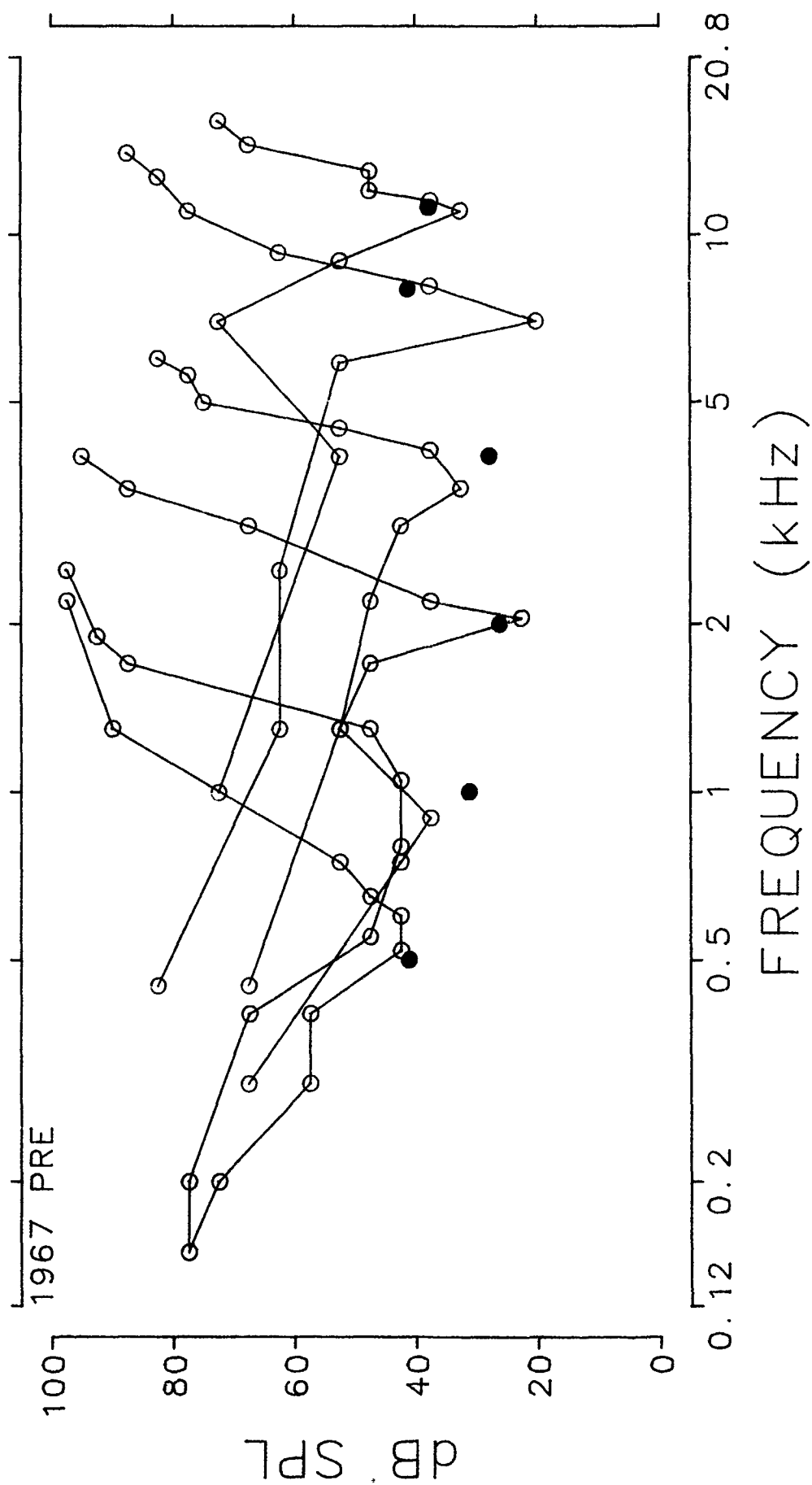


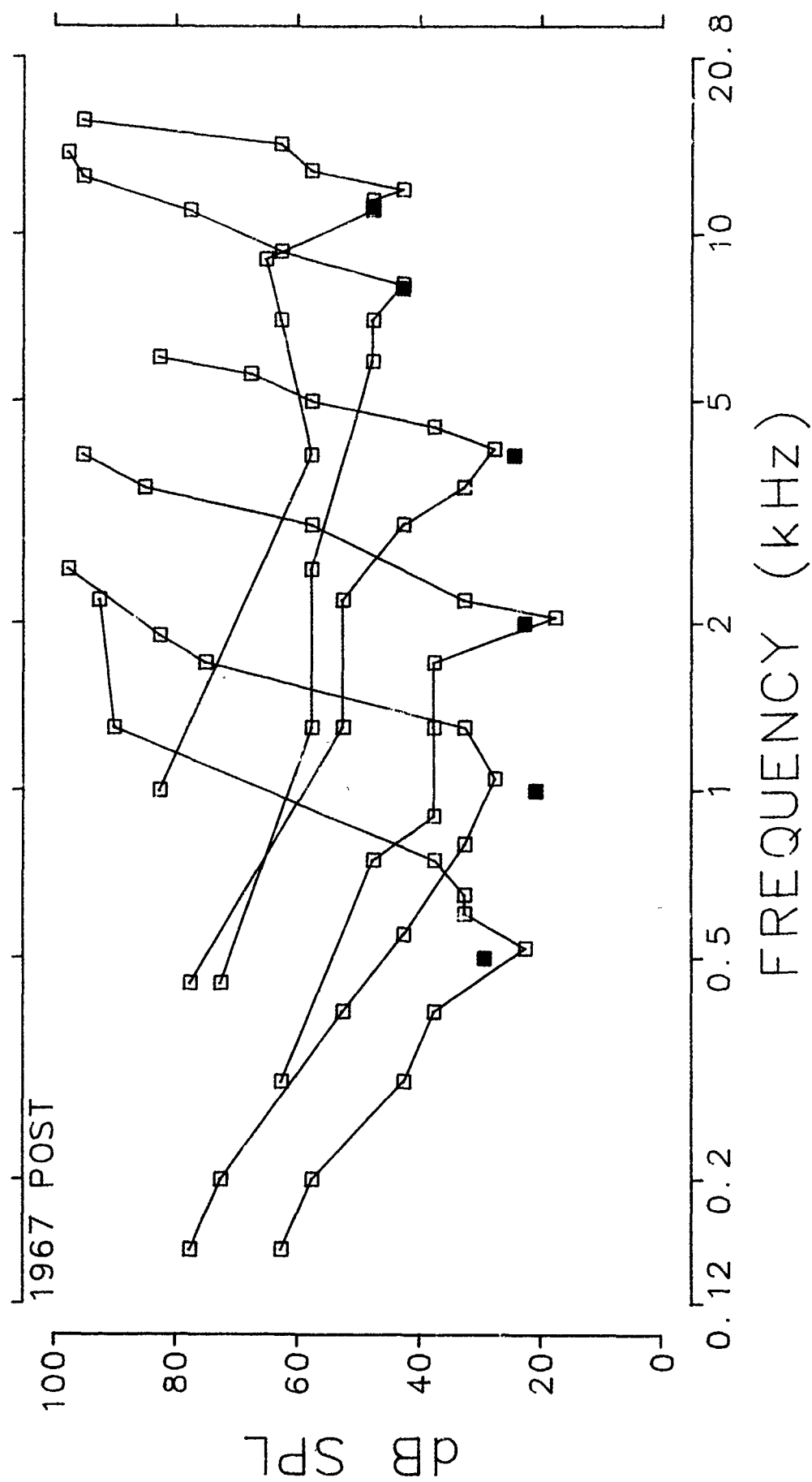
The Pre and Postexposure Tuning Curves for
Individual Animals in this Exposure Group.

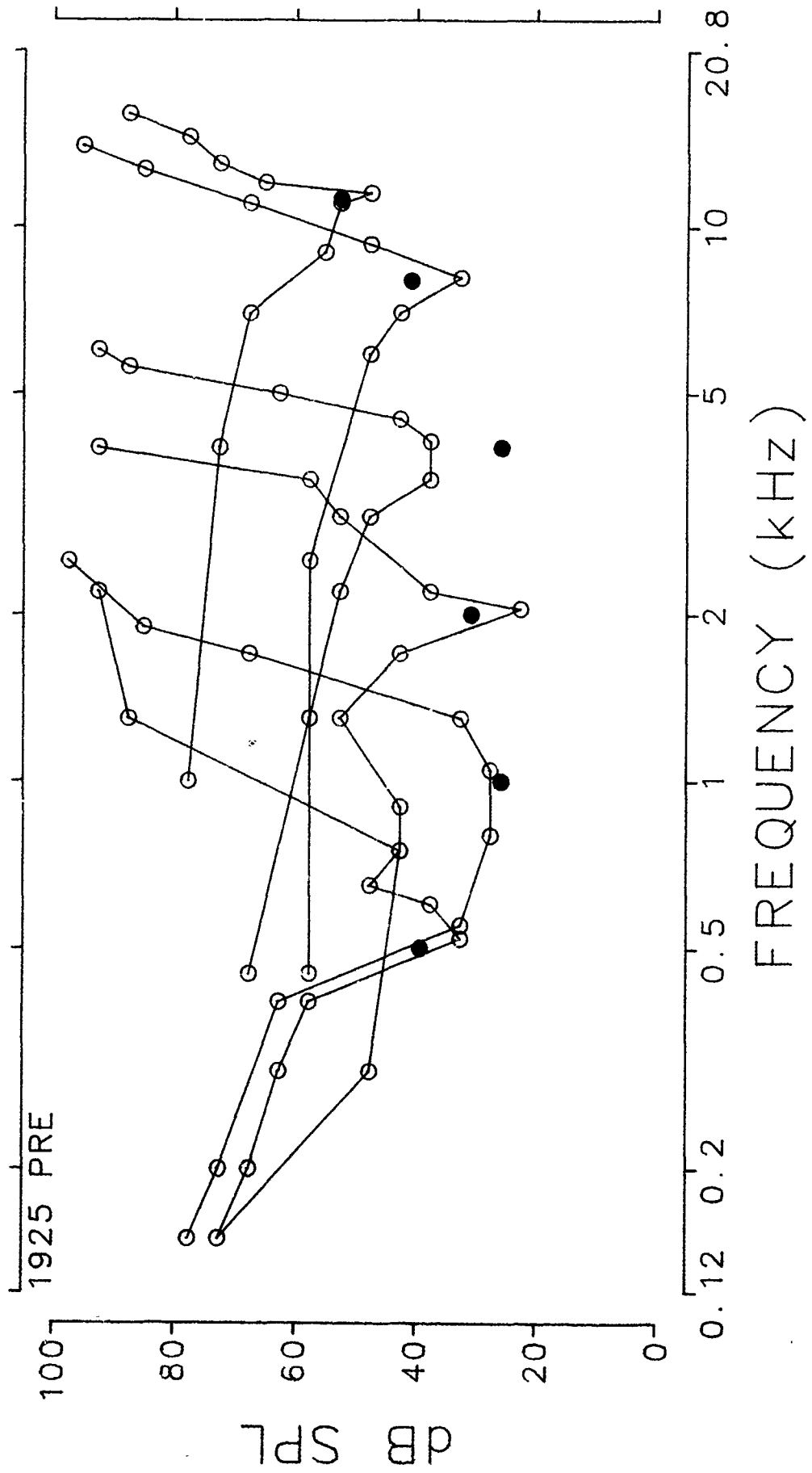
The solid symbol represents the threshold of the probe tone.

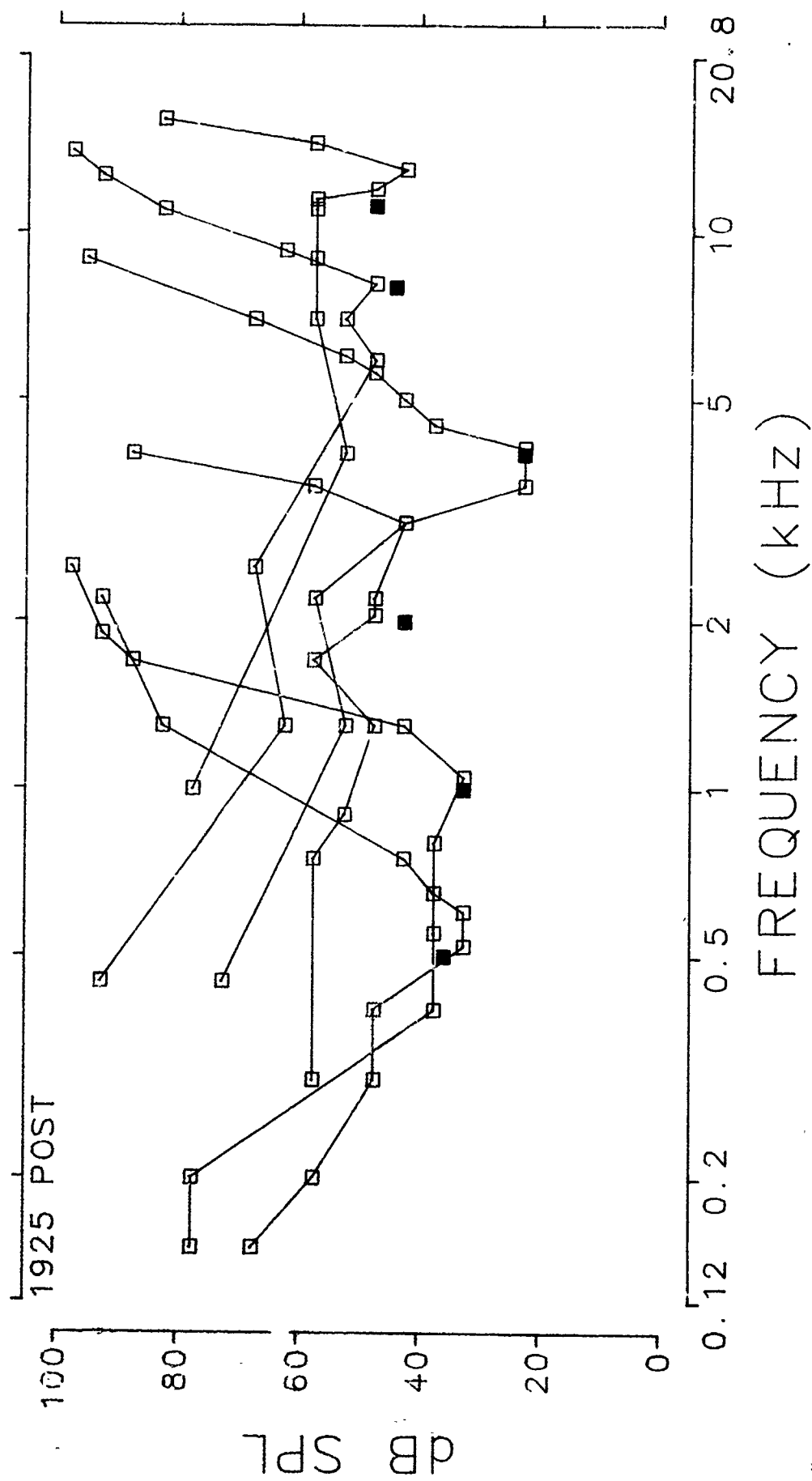


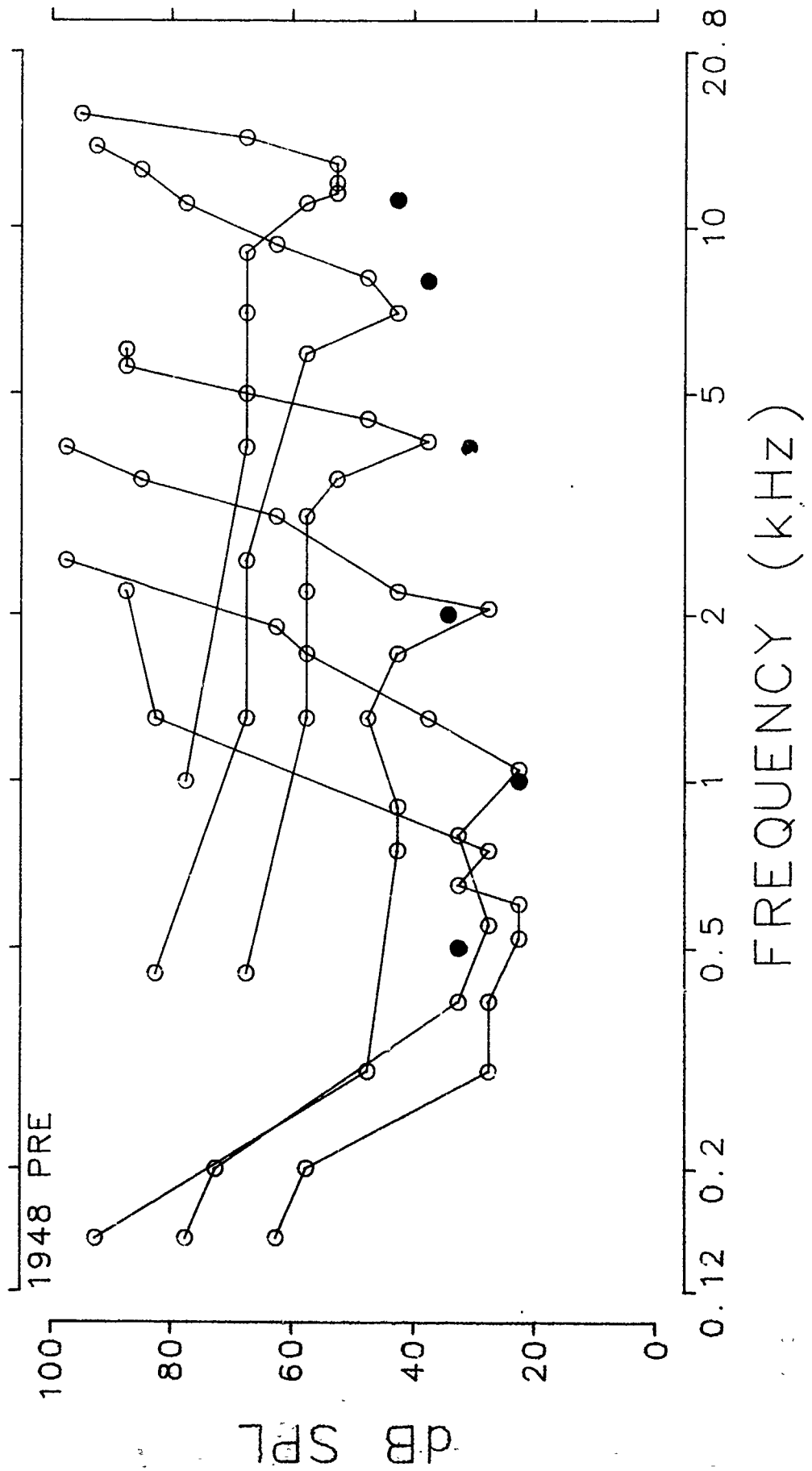


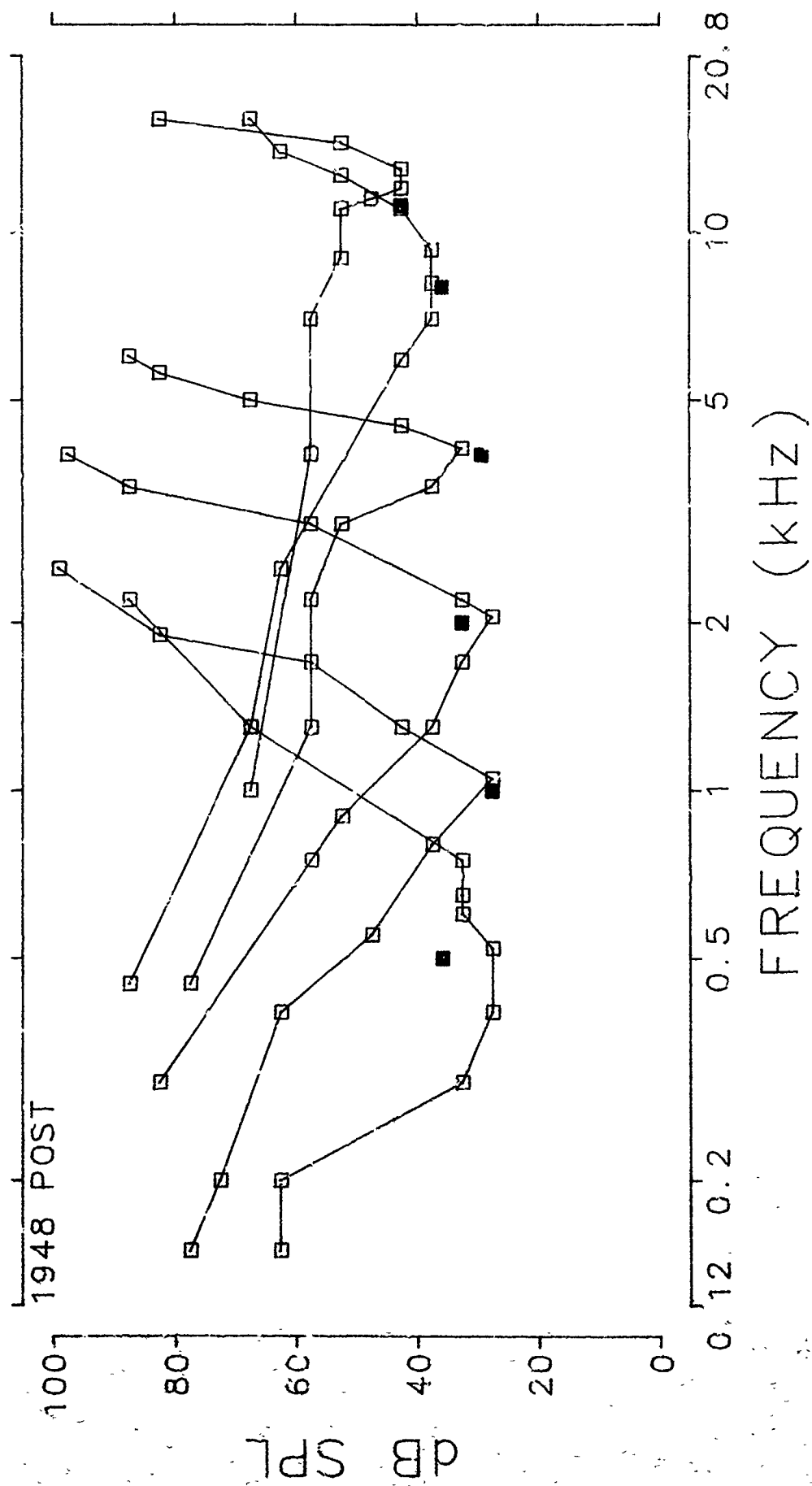


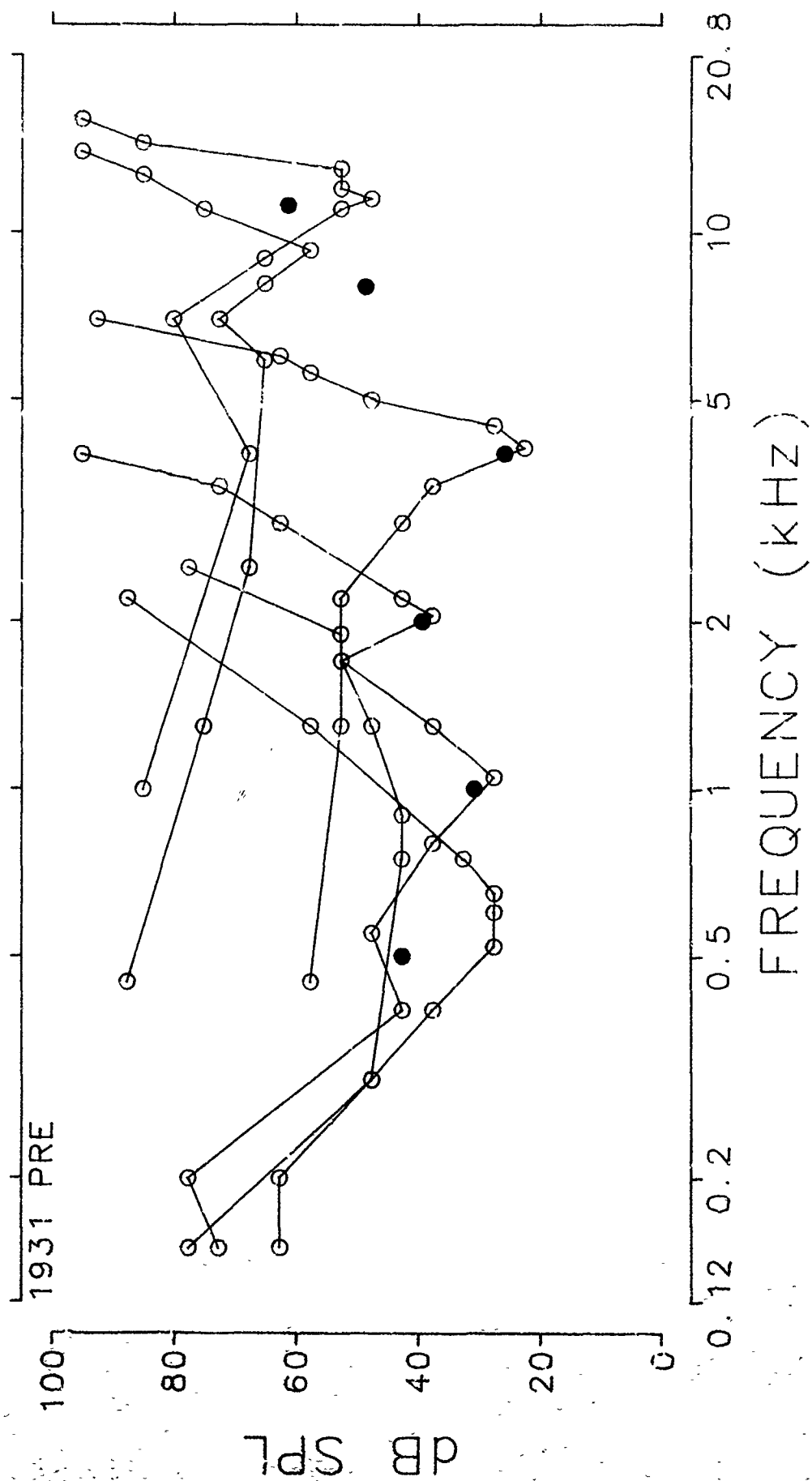


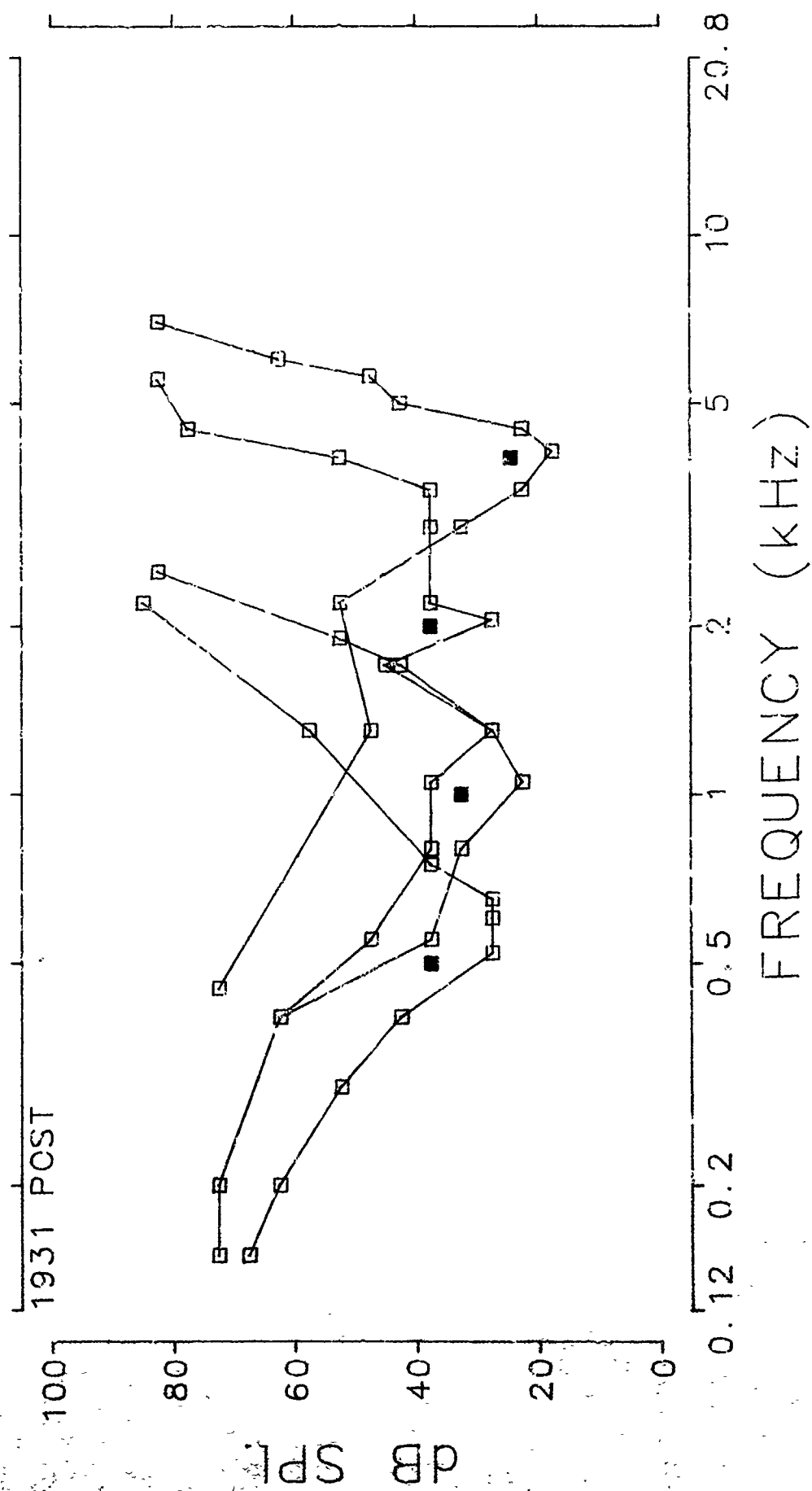












SHOCK TUBE EXPOSURE
155 dB, 10X, 1/10 MIN

TOTAL NUMBER OF COCHLEAR SENSORY CELLS MISSING

ANIMAL NUMBER	INNER HAIR CELLS	1ST ROW OUTER HAIR CELLS	2ND ROW OUTER HAIR CELLS	3RD ROW OUTER HAIR CELLS	TOTAL OUTER HAIR CELLS
R1925R	11	156	289	135	580
R1931R	17	25	50	46	121
R1948R	1	34	41	106	181
R1967R	28	101	130	141	372
R1974R	6	64	100	168	332
GROUP MEAN	13				317
S.D.	10				180

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND LENGTHS OF THE
COCHLEA CENTERED AT THE FREQUENCIES INDICATED

OCTAVE BAND CENTER FREQUENCY	INNER HAIR CELLS	OUTER HAIR CELLS
GROUP MEANS		
0.125 kHz	2.8	51.0
0.25 kHz	2.2	34.2
0.5 kHz	1.0	45.0
1 kHz	1.2	48.6
2 kHz	2.0	80.8
4 kHz	1.4	25.4
8 kHz	1.2	21.4
16 kHz	.8	10.8

STANDARD DEVIATIONS

0.125 kHz	2.2	16.4
0.25 kHz	2.0	18.5
0.5 kHz	1.2	42.0
1 kHz	1.3	42.2
2 kHz	1.9	106.8
4 kHz	2.2	19.2
8 kHz	2.2	11.4
16 kHz	.8	7.1

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1925R							
0.125 kHz	2	5	14	30	49	0	1
0.25 kHz	4	1	2	46	49	0	0
0.5 kHz	1	10	8	13	31	0	1
1 kHz	1	24	65	16	105	1	4
2 kHz	2	99	155	13	267	1	13
4 kHz	0	7	35	7	49	0	0
8 kHz	0	8	7	3	18	0	0
16 kHz	1	2	3	7	12	0	0
TOTALS	11	156	289	135	580	2	19

CHINCHILLA R1931R

0.125 kHz	4	5	15	20	40	0	0
0.25 kHz	4	1	4	2	7	0	0
0.5 kHz	3	5	2	8	15	0	0
1 kHz	0	5	8	7	20	0	0
2 kHz	1	4	3	1	8	0	1
4 kHz	2	3	11	3	17	0	0
8 kHz	1	0	2	2	4	0	0
16 kHz	2	2	5	3	10	0	0
TOTALS	17	25	50	46	121	0	1

CHINCHILLA R1948R

0.125 kHz	1	7	18	33	58	0	1
0.25 kHz	0	5	5	28	38	0	1
0.5 kHz	0	4	2	14	20	0	1
1 kHz	0	1	2	7	10	0	0
2 kHz	0	5	2	7	14	0	1
4 kHz	0	5	1	2	8	0	0
8 kHz	0	7	11	12	30	0	0
16 kHz	0	0	0	3	3	0	0
TOTALS	1	34	41	106	181	0	4

TOTAL SENSORY CELL LOSSES OVER OCTAVE BAND FREQUENCIES

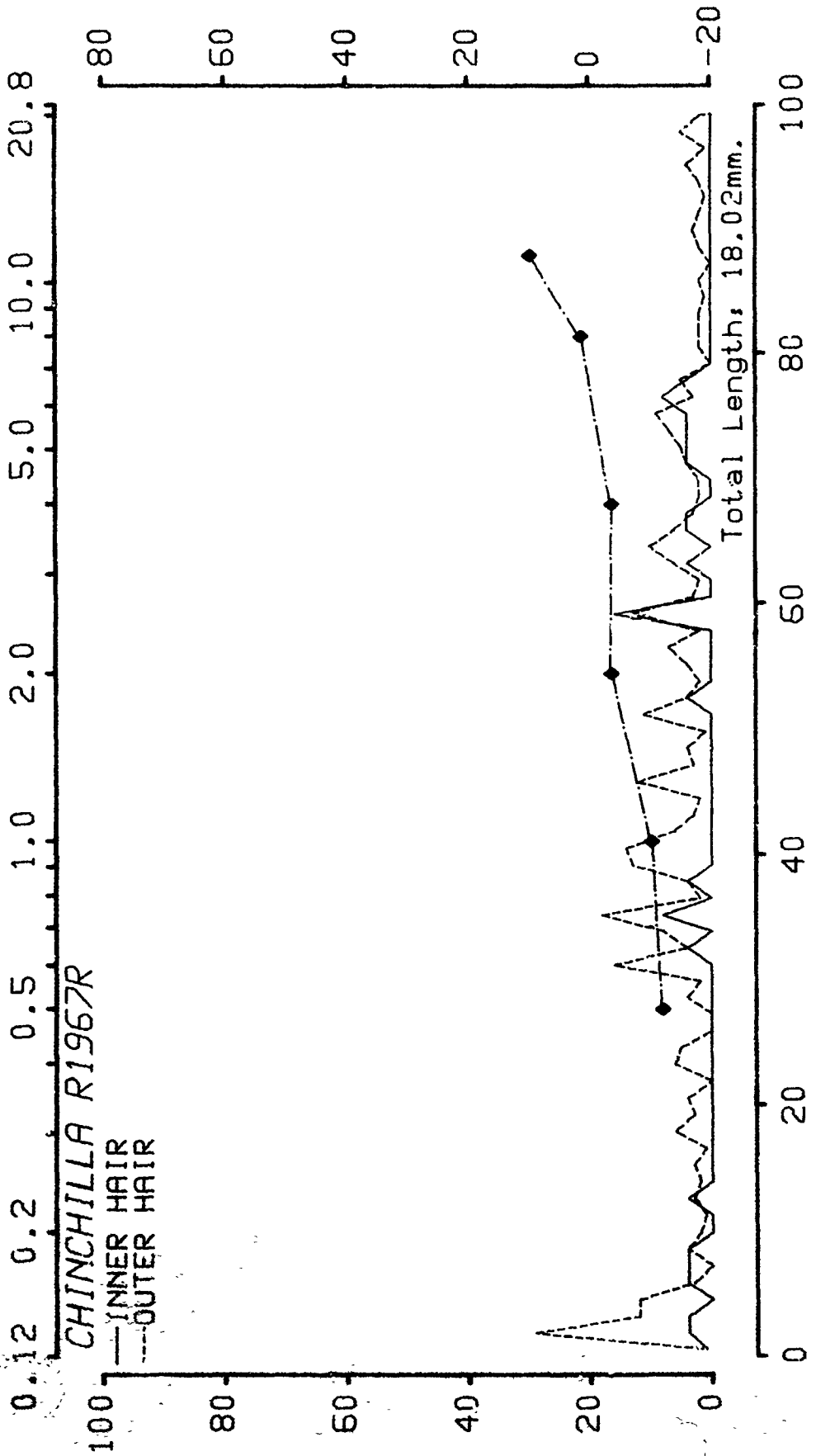
	INNER HAIR CELLS	1st ROW OUTER HAIR CELLS	2nd ROW OUTER HAIR CELLS	3rd ROW OUTER HAIR CELLS	NET OUTER HAIR CELLS	INNER PILLAR CELLS	OUTER PILLAR CELLS
CHINCHILLA R1967R							
0.125 kHz	6	13	24	38	75	0	0
0.25 kHz	3	8	9	8	25	1	0
0.5 kHz	1	10	19	12	41	0	0
1 kHz	3	28	28	26	82	2	1
2 kHz	5	19	16	16	51	0	1
4 kHz	5	9	15	19	43	0	0
8 kHz	5	8	11	14	33	0	0
16 kHz	0	6	8	8	22	0	0
TOTALS	28	101	130	141	372	3	2

CHINCHILLA R1974R

0.125 kHz	1	1	3	29	33	0	1
0.25 kHz	0	0	8	44	52	0	0
0.5 kHz	0	19	51	48	118	0	0
1 kHz	2	9	8	9	26	0	0
2 kHz	2	20	22	22	64	2	4
4 kHz	0	4	2	4	10	0	0
8 kHz	0	9	5	8	22	0	1
16 kHz	1	2	1	4	7	0	0
TOTALS	6	64	100	168	332	2	6

Cochleograms and PTS Audiograms
for Individual Animals

FREQUENCY (KHz)



% CELL LOSS

% TOTAL DISTANCE FROM APEX

FREQUENCY (kHz)

0.12 0.2 0.5 1.0 2.0 5.0 10.0 20.8

CHINCHILLA R1974R

— INNER HAIR
--- OUTER HAIR

% CELL LOSS

100

80

60

40

20

0

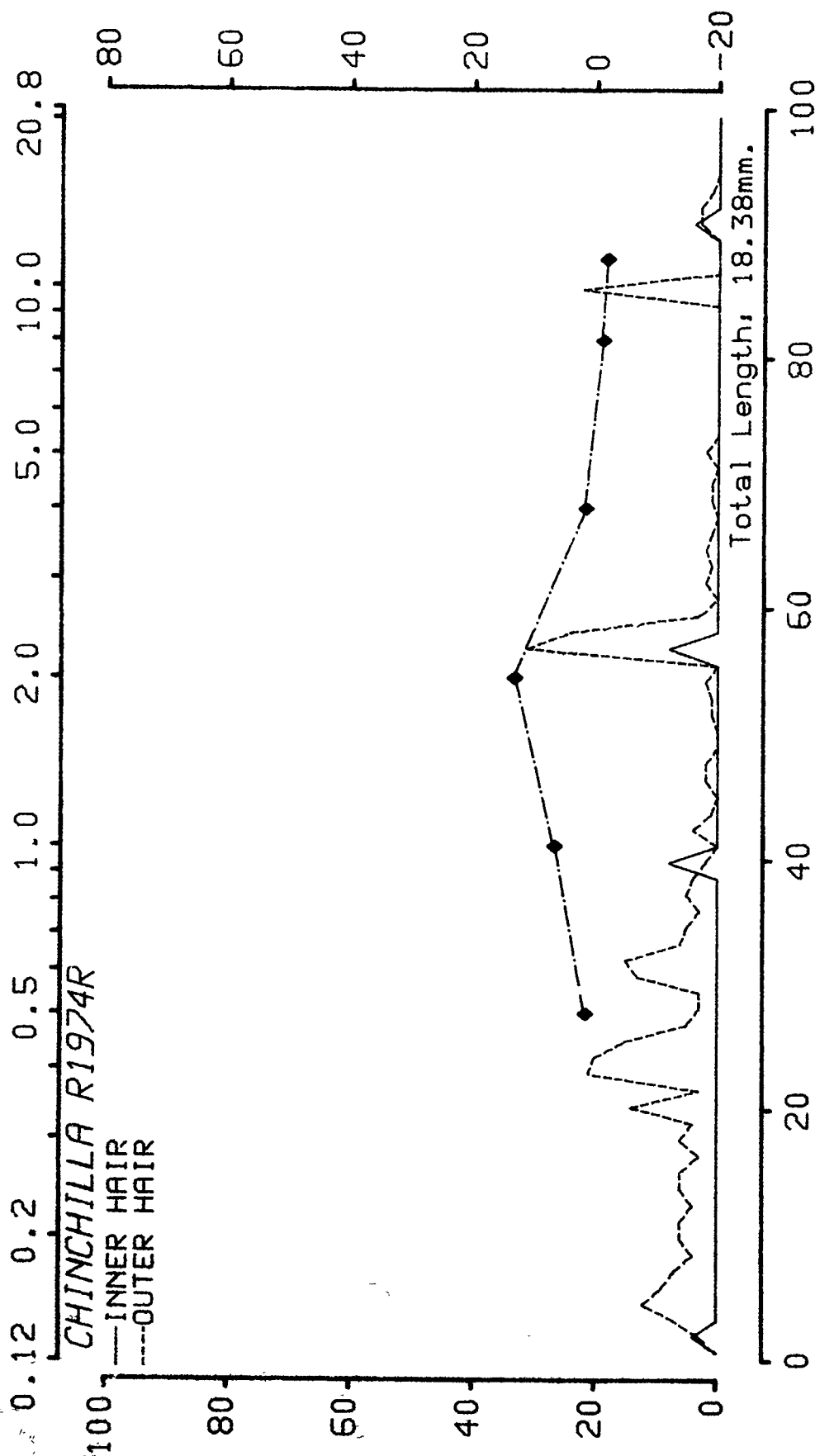
PTS (dB)

80 60 40 20 0 -20

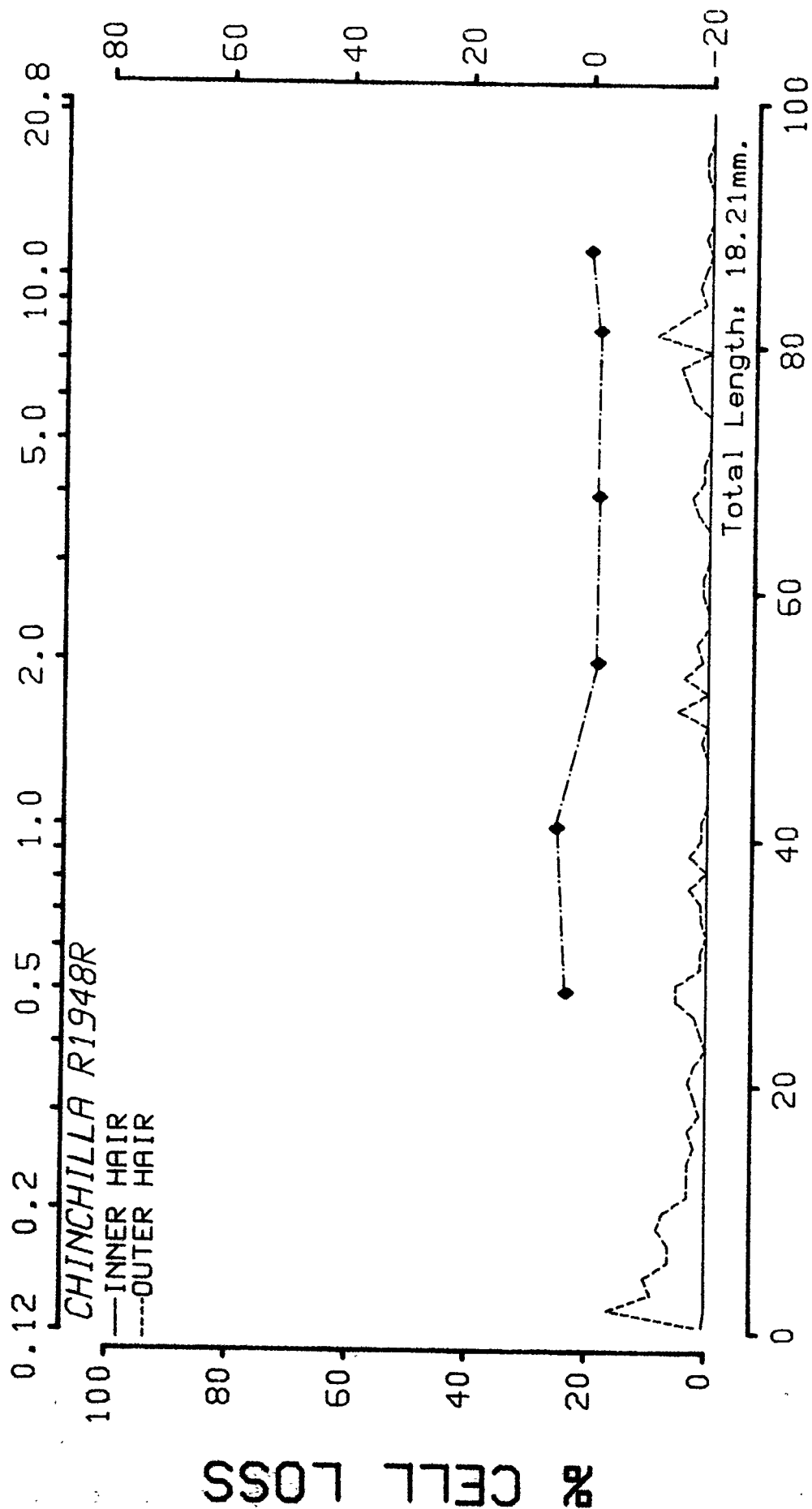
Total Length: 18.38mm.

% TOTAL DISTANCE FROM APEX

0 20 40 60 80 100



FREQUENCY (kHz)

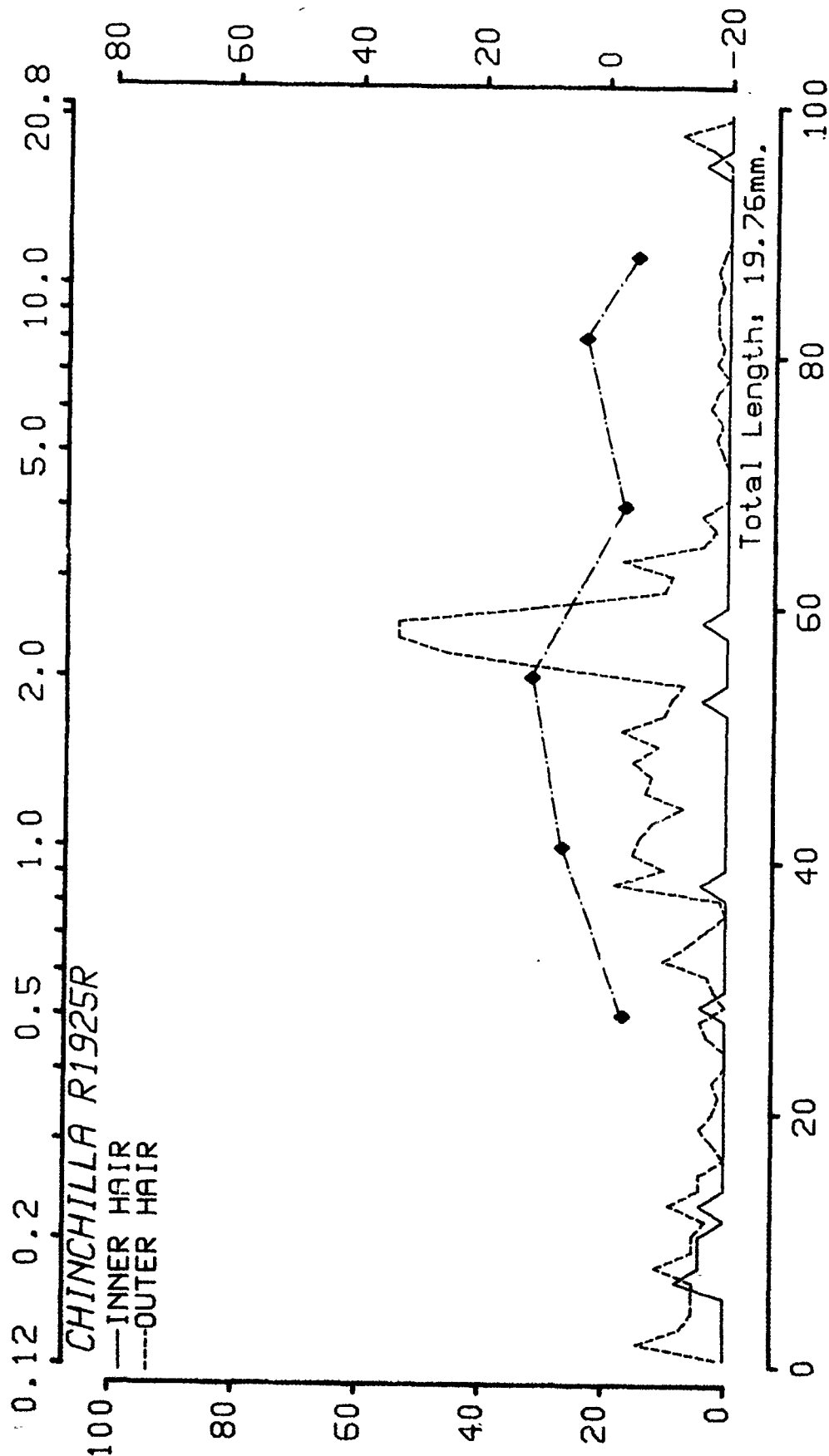


PTS (dB)

% TOTAL DISTANCE FROM APEX

% CELL LOSS

FREQUENCY (kHz)



% CELL LOSS

% TOTAL DISTANCE FROM APEX

FREQUENCY (KHZ)

0.12 0.2 0.5 1.0 2.0 5.0 10.0 20.8

CHINCHILLA R1931R

— INNER HAIR
--- OUTER HAIR

% CELL LOSS

100

80

60

40

20

0

FTS (dB)

80 60 40 20 0 -20

Total Length: 18.00mm.

0 20 40 60 80 100

% TOTAL DISTANCE FROM APEX