## CONTENTS

			Page	
1	BASIC CONCEPTS			
	1.1	Mechanics Review	1	
	1.2	Mathematics Review	4	
	1.3	Simple Harmonic Oscillation	7	
	1.4	Summary	10	
	1.5	Assignments	10	
2	BEHAVIOR OF SOUND WAVES			
_		bund Wave Propagation	<b>12</b> 12	
	2.2	Speed of Propagation	15	
	2.3	Sound Intensity and Sound Power	16	
	2.4	Reflection of Sound Waves	18	
	2.5	Diffraction of Sound Waves	20	
	2.6	Refraction of Sound Waves	20	
	2.7	Absorption and Transmission of Sound Waves	22	
	2.8	Summation of Pure Tones	22	
	2.9	Sound Spectra	25 25	
	2.10	Summary	23	
	2.10	Assignments	28	
3	ANALYSIS OF SOUND WAVES			
5	3.1	Definition of the Decibel	<b>31</b> 31	
	3.2	Relationships between Sound Power, Sound Intensity, and Sound	51	
	5.2	Pressure Levels	33	
	3.3	Multiple Sound Sources	35	
	3.3 3.4	Octave Band Analysis	33 39	
		•		
	3.5	Other Frequency Spectrum Analyses	41 42	
	3.6 3.7	Summary Assignments	42 43	
			45	
4		SURING SOUNDS	45	
	4.1	Sound Level Meter	45	
	4.2	Microphones	46	
	4.3	Weighting Networks	51	
	4.4	Auxiliary Equipment of the Sound Lever Meter	53	
	4.5	Tape Recording Sounds	55	
	4.6	Types of Sound Fields	56	
	4.7	Recommended Measurement Procedures	57	
	4.8	Initial Checklist	58	
	4.9	Summary	59	
	4.10	Assignments	59	
5	CONTROLING SOUNDS			
	5.1	Source-Path-Receiver	62	
	5.2	Hearing Indoor Sounds	63	
	5.3	Sound Absorption	64	
	5.4	Sound Transmission Loss	68	
	5.5	Sound Attenuation by Barriers	72	
	5.6	Vibration Isolation	75	
	5.7	Examples of Noise Control	77	
	5.8	Summary	81	
	5.9	Assignments	82	

6	SPEECH AND HEARING		
	6.1	Speech	85
	6.2	The Ear Anatomy	86
	6.3	How We Hear	88
	6.4	Loudness and Loudness Level	89
	6.5	Calculating Loudness	92
	6.6	Audiometry	94
	6.7	Hearing Conservation Criteria	95
	6.8	Summary	97
	6.9	Assignments	98
	• • •		
7	EFFE(	CTS OF NOISE ON PEOPLE	101
	7.1	Auditory Effects	101
	7.2	Speech Interference	107
	7.3	Sleep Interference	110
	7.4	Annoyance	111
	7.5	Task Interference	113
	7.6	Other Effects	113
	7.7	Summary	115
	7.8	Assignments	115
8	SPECIAL NOISE ENVIRONMENTS		117
U	8.1	Infrasound	117
	8.2	Ultrasound	119
	8.3	Impulse Noise	119
	8.3 8.4	Sonic Boom	119
	8. <del>4</del> 8.5	Effects of Noise on Animals	122
	8.6	Summary	125
	8.7	Assignments	125
	017		
9	OUTDOOR COMMUNITY NOISE		128
	9.1	Examples of Community Noise	128
	9.2	Some Statistical Indicators	129
	9.3	Energy Equivalent Sound Level	134
	9.4	Maximum Levels for a Fraction of the Time	136
	9.5	Energy Equivalent Sound Levels from histograms	138
	9.6	Day-Night Average Sound Level	139
	9.7	Noise Pollution Level	143
	9.8	Measuring for Community Noise	145
	9.9	Summary	146
	9.10	Assignments	147
4.0	mm +		
10		SPORTATION NOISE	151
	10.1	Growth of Transportation Noise	151
	10.2	Perceived Noise Level	154
	10.3	Composite Noise Rating for Aircraft Noise	156
	10.4	Noise Exposure Forecast	157
	10.5	Approximate Construction of NEF Contours	160
	10.6	Highway Noise	162
	10.7	Procedure for Predicting Highway Noise	164
	10.8	Railroad Line Noise	168
	10.9	Summary	171
	10.10	Assignments	171
11	INDUSTRIAL NOISE		176
	11.1	Outdoor Industrial Noise	176
	11.2	A Criterion for Steady-State Noise Exposure	177
	11.3	Noise Exposure Rating	179
	11.4	Federal Occupational Noise Levels	180
	11.5	Ear Protection Equipment	182

	11.6	Measuring for Industrial Noise	186
	11.7	Summary	188
	11.8	Assignments	188
12	NOISE	190	
	12.1	Review of Federal Laws	191
	12.2	Controlling Aircraft/Airport Noise	192
	12.3	Controlling Stationary Noise Sources	193
	12.4	Controlling Surface Transportation Noise Sources	195
	12.5	Controlling Construction Noise	197
	12.6	Measurement Procedures in Ordinances	198
	12.7	Nuisance Laws	198
	12.8	Enforcement and Penalty Features	199
	12.9	Summary	199
	12.10	Assignments	200
Ind	ex		207