

# Contents

<i>Editorial Foreword to the Series</i>	xv
<i>The Environment and Productivity: An Introduction</i>	1
<i>D. J. Osborne and M. M. Gruneberg</i>	
The concept of productivity	1
The environment and efficiency	3
The environment and safety	4
The environment and performance	5
The environment and comfort	7
Summary	9
References	9
<i>The Physical Context of Work</i>	11
<i>David Canter</i>	
Considering the physical context	12
Approaching environmental design	14
Metaphors for complexity	15
Beyond productivity	16
Satisfaction	16
Turnover	16
Communication	17
Symbolic identification	17
Adaptability and growth	17
Competence and safety	17
Experiencing places	18
Immediate consequences	20
1. Spatial	20
Beyond ergonomics	20
2. Social	24
3. Services	26
Distant consequences	27

1. Layout	27
2. Interaction	28
3. Facilities	31
Differing perspectives	32
Designing for place use	34
Conclusions	35
Further reading	36
References	37
<b><i>Engineering Anthropometry: Work Space and Equipment to Fit the User</i></b>	<b>39</b>
<i>K. H. E. Kroemer</i>	
Secular changes in body size	43
Anthropometric measurement techniques	45
Survey sampling	47
Measurements needed	48
Muscle strength assessment	51
Excursion into anthropometric statistics	54
Models as data 'massage' systems	57
Interfacing the operator with the equipment	62
Sources of anthropometric data	64
International standardization	65
References	67
<b><i>Climate and Human Performance</i></b>	<b>69</b>
<i>John L. Kozbrick and Bernard J. Fine</i>	
Indices of climatic effects	69
(a) Physical indices	69
(b) Subjective indices	70
Thermal reception	71
Thermoregulation	72
Climate and performance	74
Thermal stress	75
Performance and comfort	75
Other research approaches	76
Diurnal rhythms	76
Time perception	77
Studies of the effect of climate on performance	77
Research considerations	92
Acclimatization	92
Choice of climatic conditions	92
Duration of exposure	93
Performance tasks and training	94
Motivation	94

Effective temperature	94
Differences among individuals	95
Experimental design and controls	96
References	97
Supplementary references	103
<b><i>Illumination at Work</i></b>	<b>109</b>
<i>E. D. Megaw and L. J. Bellamy</i>	
Light units	110
Illuminance	110
Luminance	110
Retinal illuminance	112
The visual response to light	112
Spectral sensitivity	112
Adaptation	113
Visual acuity	114
Temporal resolution	117
Methods of establishing lighting for performance	117
A. The analytic approach	118
Weston's experiments	119
The Blackwell and CIE approach	121
B. Empirical studies	124
Reading	124
Inspection	127
Inspection of fabric	129
Inspection of sheet steel	129
Inspection of glass	130
Colour judgement	131
Colour anomalies	133
Adverse effects of lighting	133
Glare	133
Disability glare	134
Discomfort glare	135
Preferred luminance ratios	136
Visual fatigue	136
Summary	138
References	138
<b><i>Vibration at Work</i></b>	<b>143</b>
<i>D. J. Osborne</i>	
The bases of vibration effects	145
Seat-shoulder transmissibility	147
Hand-arm transmissibility	148

Head-eye transmissibility	149
Health problems due to vibration	151
Performance effects of vibration	153
A. Visual performance effects of vibration	154
Vibrating the object alone	154
Vibrating the observer alone	158
Vibrating the object and the observer together	162
B. Motor performance effects of vibration	164
C. The effects of vibration on the speed of reaction and information processing	168
A vibration standard	171
Summary	173
References	173
<b><i>Industrial Noise and Man</i></b>	<b>179</b>
<i>Paul L. Michael and Gordon R. Bienvenue</i>	
Noise-induced hearing impairment	179
Background	179
A test battery approach to detecting hearing changes	180
A loudness discrimination test	181
A level of initial masking test	181
The evaluation and practical usefulness of the test battery	182
Noise interference with speech and warning signals	183
A. Speech interference	183
Variables related to speech interference	183
Measures of speech interference	184
Implications of speech interference	184
B. Warning signal interference	184
Noise effects on cognitive task performance	185
Characteristics of the noise	185
Characteristics of the task	185
Characteristics of the individual	185
Cumulative and post-noise exposure effects	186
Field studies of task performance	186
Implications of task performance effects	186
Noise effects on annoyance, relaxation and sleep	187
A. Annoyance	187
Individual reactions	187
Community reactions	187
Noise attitude surveys	188
The design of social noise surveys	188
Survey content	189
Description of the noise environment	189

Activity interference from noise	190
Psychosocial and situational variables	190
Personal–demographic backgrounds	190
B. Relaxation and sleep disturbance	191
Sleep disturbance variables	191
Implications of sleep disturbance effects	191
Stress and its relation to noise exposure	192
General physiological responses to noise	192
The stress response to noise	193
Hormonal secretions due to noise	193
A hormonal mediation model for auditory and non-auditory noise effects	194
Evidence for hormonal mediation of noise effects	194
A summary of stress and its relation to noise exposure	196
Noise measurement	197
General	197
Surveys of work areas	198
Determining speech or warning signal interference	199
Determining annoyance levels	199
Statistical distribution of noise levels ( $L_N$ )	200
Energy equivalent continuous level ( $L_{eq}$ )	202
Determining day–night level ( $L_{dn}$ )	203
Tape recorders	203
Summary	203
References	204
<b><i>Industrial Music</i></b>	211
<i>John G. Fox</i>	
Some early observations	211
Background music and industrial music	213
Background music at work	214
Industrial music	215
An emotional impetus to productivity	215
A neuropsychological stimulus to productivity	217
The temporal programme	221
The music content	222
Rhythm	222
Loudness	223
The new industrial scene	224
References	224
<b>Author Index</b>	227
<b>Subject Index</b>	233