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U. S. ARMY

HUMAN FACTORS ENGINEERING

BIBLIOGRAPHIC SERIES

VOLUME 2

1960-1964 LITERATURE

Prepared by

THE PROJECT STAFF
DEPARTMENT OF DEFENSE
HUMAN FACTORS ENGINEERING INFORMATION ANALYSIS CENTER

Institute for Psychological Research
Tufts University

October 1966

HUMAN ENGINEERING LABORATORIES



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U. S. ARMY HUMAN ENGINEERING LABORATORIES
Aberdeen Proving Ground, Md.

FOREWORD

The Department of the Army was assigned responsibility, effective 1 October 1965, for the development and maintenance of a Human Factors Engineering Information Analysis Center in accordance with the provisions of the Department of Defense Scientific and Technical Information program (DoD Instruction 5100.45). At present the Information Analysis Center is located at Tufts University under the technical guidance of the U. S. Army Human Engineering Laboratories.

The Office of Naval Research initiated the Tufts University effort over ten years ago. This volume, the one preceding it, and a subsequent volume, covering the human factors engineering literature from 1940 through 1965, although published by the U. S. Army Human Engineering Laboratories, is a result of the Office of Naval Research support and direction of this program during its formative years.

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Introduction

This document is the second in a series of bibliographies covering the human factors engineering literature. The first volume, HEL BIB VOL I, covered the 1940 through 1959 literature. The present bibliography contains material, for the most, from the time period 1960 through 1964. A third bibliography dealing with the 1965 literature will be published soon.

As in the past the project staff was influenced by several considerations in the selection of references for inclusion in the bibliography. First, there was an attempt to select those references which reflected the broad spectrum of revealed interests of human factors personnel. Second, the documents had to be available to the project staff for examination prior to coding and abstracting. If the document was not among the acquisitions of the project, it was not included in the bibliography.

Because of the tremendous volume of literature published during this period, the project staff was not able to acquire every document of relevance. The present volume should, however, provide a useful compilation of references to the human factors engineering literature which reflect the cumulative (through 1964) acquisitions of HEIAS.

This and future volumes will be published in punched loose leaf page format. This will permit additions of new material and modifications of old. Additions will be in the form of new acquisitions. Modifications will be primarily in the form of changes to the index and the resulting changes in the coding of the accessions involved. At some later date it is planned to publish a complete set of those pages that have been or will have been modified. Also at some later date an author index will be published. It is suggested that the user place the present volume in a notebook (or notebooks) or whatever form he finds convenient for use and future modifications.

Instruction in the Use of the Present Bibliography

General

The user should examine the index (Part I) thoroughly before attempting to locate references on a specific topic. Familiarization with the terms is essential if effective retrieval is to be realized. After examining its content, the user should be able to enter the index with the terms which are descriptive of, or synonymous with his query. Documents have been coded only to those terms or descriptors which are underlined. Having noted the terms of interest he should then go to Part II (Facsimile of Subject Matter File) and under the appropriate terms find the accession numbers of those documents which have been coded to that term. Noting these numbers he can then go to Part III (Citations and Abstracts) to find the actual references.

Index Changes

There have been some slight modifications in the index published in the first volume of this series. These changes are reflected in the present index. Some of the modifications are described below:

	(added)	<u>Airport facilities</u>
<u>Ambient Noise level of background, general</u>	(changed to)	<u>Ambient Noise level office, home, and general background</u>
<u>rockets, missiles</u>	(changed to)	<u>rockets, missiles, and launch facilities</u>

<u>Anthropometric Measures</u> <u>body density</u> <u>centers of gravity</u>	(changed to)	<u>Anthropometric Measures</u> <u>body density and centers</u> <u>of gravity</u>
<u>Auditory</u> <u>reaction time</u>	(changed to)	<u>Auditory</u> reaction time--see Reaction Time and Refractory Period
<u>Auditory</u> <u>skills</u> <u>sonar listening</u>	(changed to)	<u>Auditory</u> <u>skills</u> sonar listening--see Monitoring, above
<u>Automatic</u> <u>checkout systems</u>	(changed to)	<u>Automatic</u> checkout systems--see Maintenance (systems)
<u>Clothing</u> <u>belting</u>	(changed to)	<u>Clothing</u> <u>belts and fasteners</u>
<u>Controls</u> <u>ship and submarine controls</u>	(changed to)	<u>Controls</u> ship and submarine controls-- see Ship and Submarine
<u>vehicle controls</u>	(changed to)	vehicle controls--see Vehicle
<u>Displays</u> <u>size</u>	(changed to)	<u>Displays</u> <u>size and shape</u>
<u>Escape from</u> <u>aircraft</u>	(changed to)	<u>Escape from</u> <u>aircraft and spacecraft</u>
<u>submarines</u>	(changed to)	submarines--see Ship and Submarine
<u>Groups</u> <u>effectiveness</u> <u>problem solving</u> <u>productivity</u>	(changed to)	<u>Groups</u> <u>performance</u>
<u>size</u> <u>structure</u>	(changed to)	<u>size and structure</u>

<u>Individual Factors Affecting Performance</u> <u>attention</u> <u>set</u>	(changed to)	<u>Individual Factors Affecting Performance</u> <u>set and attention</u>
<u>Life Jackets</u>	(changed to)	Life Jackets--see Sea (rescue)
<u>Lighting Systems</u> <u>outdoors</u> <u>airfields</u>	(changed to)	<u>Lighting Systems</u> <u>outdoors</u> <u>airport</u>
	(added)	<u>Machine Recognition</u>
<u>Motion, Effects of</u> <u>amplitude and frequency</u> <u>oscillatory</u> <u>rotation</u>	(changed to)	<u>Motion, Effects of</u> <u>rotation and oscillation</u> (includes amplitude and frequency)
	(added)	sub-category of <u>general</u> to <u>Optical Aids</u>
<u>Overlays</u>	(changed to)	Overlays--see Radar and other CRT Displays
<u>Panel and Console Design</u> <u>ships and submarines</u>	(changed to)	<u>Panel and Console Design</u> ships and submarines--see Ship and Submarine (controls, displays, and instrument panel design)
<u>vehicles</u>	(changed to)	vehicles--see Vehicle (controls, displays, and instrument panel design)
<u>Physiological Capacities</u>	(changed to)	<u>Physiological Capacities and Indices</u>
	(added)	<u>electroencephalogram</u>
<u>Physiological Equipment and Methods</u> <u>first five sub-categories</u>	(changed to)	<u>Physiological Equipment and Methods</u> <u>electrophysiological techniques</u>
<u>Printed Material, Legibility, and Readability</u> <u>general references</u> <u>readability</u>	(removed)	

Sea
craft, design of

(changed to)

Sea
craft, design of--see
Ship and Submarine

Sensory
facilitation and inhibition
of reception

(changed to)

Sensory
interaction (i.e., effects of
stimulation in one modality on
perception in another; includes
facilitation and inhibition)

Ship
lighting systems
exterior

(changed to)

Ship and Submarine
controls, displays, and
instrument panel design
escape systems
general
habitability
lighting systems

Space Flight Systems
control systems

(changed to)

Space Flight Systems
control and display systems

Space Travel
maneuvers

(changed to)

Space Travel
maneuvers and performance

Speech
communication systems
ship

(changed to)

Speech
communication systems
ship and submarine

Submarine
controls
crews--see Groups
displays
escape systems
general references
habitability

(changed to)

Submarine--see Ship and
Submarine

(omitted from 1940-59 product) Underlining of
television under Training Aids
and Devices

Underwater
environmental effects
oxygen requirements
pressure requirements

(changed to)

Underwater
oxygen and pressure
requirements

	(added)	<u>Vehicle</u> <u>controls, displays, and</u> <u>instrument panel design</u>
<u>Visual</u> <u>acuity</u> <u>colored illumination</u> <u>general references</u> <u>types of</u> <u>dynamic</u> <u>static</u>	(changed to)	<u>Visual</u> <u>acuity</u> <u>dynamic</u> <u>general</u> <u>illumination</u>
<u>Visual</u> <u>reaction time</u>	(changed to)	<u>Visual</u> reaction time--see Reaction Time and Refractory Period
<u>Windshields</u> <u>evaluation of</u>	(changed to)	<u>Windshields</u> --see also Aircraft (design); Vehicle (design)
<u>Work Place Design</u> <u>illumination</u> <u>command centers</u>	(changed to)	<u>Work Place Design</u> <u>illumination</u> command centers--see other facilities, below
<u>factory and office</u> <u>home</u>	(changed to)	<u>factory, office, and home</u>
<u>ship and submarine</u>	(changed to)	ship and submarine--see Ship and Submarine
<u>vehicle</u>	(changed to)	vehicle--see Vehicle

The Index and Its Use

The accessions are only coded to those terms which are underlined and in the cases of subheading, are coded to the lowest subcategory (i.e., to the secondary or tertiary heading, if there is one). For example, if the reader will note the category Aging, Effects of, he will find a number of secondary categories, such as vision; motor performance; etc. No references have been coded to Aging, Effects of, as such, but only to the secondary headings. In the case of Radar and other CRT Displays the reader will note the secondary heading screen and under this, various tertiary headings, such as size and shape. Relevant documents, for example those dealing with the shape of radar screens or scope faces, have been coded to the lowest subcategory, in this case size and shape. No references will have been coded to screen alone.

The index can, of course, be used as a hierarchical system or a coordinate index. For example, if a user were interested in articles dealing with drugs and their effects, he would examine the references listed in the category Drugs. Similarly, if he were interested in articles dealing with man's tolerance to acceleration, he would go to the category Motion, Effects of/acceleration and deceleration/tolerance. However, if he were interested in the effects of drugs on man's tolerance to acceleration forces, rather than go through all the references in the above mentioned categories, the reader should note only those accession numbers common to both categories. The loose leaf notebook form should facilitate this type of matching.

The reader is advised to look through the various general categories in making a search. These categories contain not only

references of a general nature, books, bibliographies, etc., but in some cases miscellaneous articles which could not be readily coded elsewhere. Occasionally, the reader will note a secondary heading 'other'. These categories contain references to equipment, methods, topics, etc., not specifically listed under the main heading.

An index of this nature develops through use. All relevant terms and descriptors cannot be anticipated in its initial development and are often incorporated only after the index has been in use for some time. Therefore, if the user cannot find terms specifically descriptive of his problem he should attempt to find synonymous terms. As mentioned previously, the user should examine the whole index thoroughly before attempting to locate specific topics.

Facsimile of Subject Matter File

Part II contains those categories to which documents have been coded along with the accession numbers of the documents. In essence, it represents the index stripped to the bare essentials, i.e., minus all cross headings and notes. The user will note that there are several categories with only a few or no references coded to them. These categories were left in the index because it is known that in the 1960-1965 bibliographies, there will be a number of references coded to them.

Citations and Abstracts

Part III contains the actual citations and abstracts listed in numerical order by accession number. This section was compiled by filming the actual 3x5 citation and abstract cards from the files of HEIAS. In some cases the reference material was on a 5x8 card. This

presented layout problems and in an attempt to conserve as much space as possible some cards had to be placed sideways for filming. While we realize this presents somewhat of an inconvenience for the reader, we feel the conservation of space was worth it.

The format of the citations is generally in keeping with the recommendations of the Publication Manual of the American Psychological Association. In some instances, however, variation in the amount and type of information in the original document has introduced some variation in the final citation. The content of the citation tries to maximize the amount of information to assist the user in acquiring a copy of the document.

The abstracts for the most part are descriptive only and do not contain results. However, in the future results will be included. It was simply too great a task to go back and re-abstract documents for this bibliography. The letter codes found at the end of the abstract, the T, I, G, and R designations indicate that the document contains: T-tables, I-illustrations, G-graphs, and R-references (e.g., R-7 means that 7 references were cited). A list of abbreviations used in the abstracts is given on the next page.

The documents cited are not available from Tufts University, but are held in repository at HEIAS and may be examined on the project's premises.

KEY TO ABBREVIATIONS

a.c.	alternating current	g	acceleration of normal pull of gravity
AD	average deviation	G	gravitational force acting upon an object
AFGCT	Armed Forces General Classification Test	GCA	Ground Control Approach
AGCT	Army General Classification Test	GSR	galvanic skin response
AL	adaptation level		
amp.	ampere	Hg	mercury
ANIP	Army-Navy Instrument Program	hr.	hour
ANOVA	analysis of variance	i	intensity
AP	action potentials	IBM	international Business Machine
AR	acoustic reflex	i.e.	that is
AVID	Advanced Visual Information Display	ILS	Instrument Landing System
		in.	inch
bit	unit of information	IQ	Intelligence Quotient
BMR	basal metabolic rate		
		j.n.d.	just noticeable difference
C	centigrade		
ca	about or approximately	kc	kilocycle
cc	cubic centimeter	kg	kilogram
CCC	Combat Control Center	KR	knowledge of results
cff	critical flicker frequency		
CIC	Combat Information Center	L	lambert
clo	measure of protective value of fabrics	LL	loudness level
cm	centimeter	lb	pound
CNS	central nervous system		
CO	carbon monoxide	m	meter
CO ₂	carbon dioxide	M	mean
cpm	cycles per minute	Ma	milliampere
cps	cycles per second	Mc	megacycle
CR	critical ratio	Mdn	median
CRT	cathode ray tube	mg	milligram
cu ft	cubic foot	mi	mile
		min.	minute
db	decibel	mL	millilambert
d.c.	direct current	mm	millimeter
df	degrees of freedom	MOS	Military Occupational Specialty
DL	difference limen	mph	miles per hour
		msec	millisecond
E, Es.	experimenter, experimenters	m	millimicron
EEG	electroencephalogram	μsec.	microsecond
e.g.	for example		
EKG or ECG	electrocardiogram	N	number of
EMG	electromyogram		
ERG	electroretinogram	°	degree
et al	and others	O, Os.	observer, observers
etc.	and so forth	O ₂	oxygen
Exp.	experiment	OCS	Officers' Candidates School
		OR	Operations Research
f	frequency		
F	fahrenheit, F-ratio	p	probability level
ft	foot	PB	phonetically balanced
ft-c	foot-candle	PERT	Program Evaluation and Review Technique
ft-L	foot-Lambert	PGR	psychogalvanic skin response
ft-lbs	foot-pounds	PI	photo interpretation
ft/sec	feet per second	PPI	Planned Position Indicator

KEY TO ABBREVIATIONS (cont'd)

pps	pulses per second
psi	pounds square inch
PSS	Personnel Subsystem concept (USAF)
PED	Personnel and Equipment Data file
HE	verifying Human Engineering design Standards
QQPRI	Qualitative and Quantitative Personnel Requirements Information
PSTE	Personnel Subsystem Test and Evaluation
TC	Training concepts
TED	Training Equipment Development program
TEPI	Training Equipment Planning Information
TOTM	Technical Orders and Manuals
TP	Training plans

r	roentgen, correlation coefficient
rad	absorbed dose of radiation
REM	Roentgen equivalent in man
RBE	relative biological effectiveness
ROTC	Reserve Officers Training Corps
rpm	revolutions per minute
RT	reaction time

S, Ss	subject, subjects
SAGE	Semi Automatic Ground Environment
SD	standard deviation
SDT	signal detection theory
sec.	second
S/N	signal-to-noise ratio
SPL	sound pressure level
S-R	stimulus-response
SUBIC	Submarine Integrated Control

t	t-test
TTS	temporary threshold shift
vs	versus
VTOL	Vertical Takeoff and Landing Aircraft

SYMBOLS:

χ^2	chi square
%	per cent
>	more than
<	less than
=	equal
ΔI	change in intensity
μ	micron
σ^2	variance

A

- Ability Testing--see Tests and Testing (proficiency)
- Absolute Judgments--see Psychophysics; specific sensory categories
- Absolute Pitch--see Audition (stimulus characteristics)
- Acceleration and Deceleration--see Motion, Effects of
- Acceptability of Equipment and Tasks--see Individual Factors Affecting Performance
- Accessibility--see Maintenance (design for); Work Place Design (area requirements)
- Accidents--see Safety
- Acclimatization--see Environmental Conditions and Effects (tolerance, adaptation, acclimatization); Physiological Capacities and Indices
- Accommodation and Convergence--see Visual
- Accuracy of Movement--see Motor Performance and Skills (speed and precision)
- Acoustic
 - design--see also Ambient Noise (reduction and control); Work Place Design (acoustics) engineering--see design, above
 - measurement--see Ambient Noise (measurement)
 - reflex--see Audition (aftereffects of stimulation)
 - shielding--see Ambient Noise (reduction and control)
- Action Potential--for data, see Physiological Capacities and Indices; for methods, see Physiological Equipment and Methods
- Activity Analysis--see Methods and Techniques for Study and Analysis of Tasks, Operations, and Systems
- Acuity
 - auditory--see Audition (thresholds)
 - sensory, other--see specific sensory categories
 - visual--see Visual
- Adaptation
 - auditory--see Audition (aftereffects of stimulation)
 - perceptual--see Perception (general)
 - theory--see Perception (theory)
 - visual--see Visual (adaptation, pre-adaptation, and pre-exposure)
- Adjustment, Method of--see Psychophysics (methods)
- Aerial Observations--see Visual (search and detection)
- Aerospace Medicine, general--see Environmental Conditions and Effects (general); Space Travel
- A-Frames--see Packs and Carriers
- Afterimages--see Audition (aftereffects of stimulation); Visual (aftereffects, afterimages)
- Agging, Effects of
 - audition
 - general
 - motor performance
 - vision
 - work capacity
- Aiding--see Tracking
- Aiming--see Motor Performance and Skills
- Airblast--see Environmental Conditions and Effects (windblast, airblast, windchill)
- Airborne Equipment--see Aircraft (related equipment)
- Air Conditioning--see Work Place Design (atmospheric control)
- Aircraft
 - accidents--see Safety
 - collision--see Safety
 - communication systems--see Speech (communication systems)
 - controls--see Controls
 - design--see also Helicopters; VTOL, STOL Aircraft
 - escape from--see Escape from

Aircraft--(cont'd)

general

instrument panel arrangement--see Panel and Console Design

landing and landing systems

lighting, exterior

lighting, interior--see Work Place Design (illumination)

noise--see Ambient Noise (level)

related equipment

visibility and recognition--see Visual (search and detection)

Air Crews--see Groups

Airport (airfields)

facilities--see also Air Traffic Control Systems

lighting--see Lighting Systems (outdoors)

noise--see Ambient Noise (level)

runway design--see Aircraft (landing and landing systems)

Air Reconnaissance--see Visual (search and detection)

Air Sickness--see Motion, Effects of

Airspeed Indicators--see Displays (type)

Air Traffic Control Systems

communication and information flow--see also Language Design; Speech (communication systems)

control problems

equipment (displays, etc.)

general

layout and workplace design

operator variables

traffic flow

training and simulation

Alarms and Auditory Warning Devices--see Auditory (displays, nonverbal)

Alcohol--see Drugs

Alertness--see Individual Factors Affecting Performance

Allocation of Functions--see Assignment of Functions to Men and Machines in Systems

Alphanumeric Displays--see Displays (type); Radar and other CRT Displays (types)

Altimeters--see Displays (type)

Altitude Chamber--see Environmental Conditions and Effects (equipment and methods)

Altitude, Effects of--see Environmental Conditions and Effects

Ambient Noise

accidents--see effects on performance, below

composition--see measurement, below

control--see reduction and control, below

criteria for buildings--see Acoustic (design); reduction and control, below;
Work Place Design (acoustics)

deafness--see hearing loss, below

effects on performance (includes industrial efficiency)

general

hearing loss--see also Audition (aftereffects of stimulation)

injury--see hearing loss, above

level

aircraft

airport

equipment, general

industrial environments

office, home, and general background

rockets, missiles, and launch facilities

ships and submarines

Ambient Noise

level (cont'd)

vehicle (motor)

weapons

measurement (e.g., spectral analysis, critical band analysis)

reduction and control--see also Acoustic (design); Work Place Design (acoustics)

acoustic shielding

general

hearing conservation program

noise reducing devices and systems

personal equipment (e.g., earplugs)--see Auditory (devices)

standards of tolerance and annoyance

speech interference level--see Speech (masking)

tolerable level--see reduction and control, above

Amplifiers--see Auditory (equipment)

Anchoring Effects--see Perception (general); Psychophysics

Anechoic Chambers--see Audition (equipment and methods)

Angle, Perception of--see Visual (perception)

Ankle Dimensions--see Anthropometric Measures

Anomalies

auditory--see Audition

sensory, other--see specific sensory categories

visual--see Visual

Anoxia--see Environmental Conditions and Effects (oxygen requirements)

Anthropometric Measures

arm and leg dimensions

biomechanical analysis

body density and centers of gravity

body size and dimensions

equipment and methods

extent and flexibility of limb movement

general

hand and foot dimensions

head dimensions

locomotion

muscular strength and endurance

posture

somatotyping

space requirements--see also Work Place Design (area requirements)

Anti-g-Suits--see Clothing (high altitude and anti-g)

Anxiety--see Individual Factors Affecting Performance (emotion)

Anxiety, Tests of--see Tests and Testing (personality and sociometric)

Apparent Movement--see Visual (perception)

Aptitude--see Individual Factors Affecting Performance

Aptitude Testing--see Tests and Testing

Aqua Lung--see Underwater (breathing apparatus)

Arctic Climate Clothing--see Clothing (Arctic ensembles and cold weather)

Arm

dimensions--see Anthropometric Measures

movement--see Anthropometric Measures; Motor Performance and Skills

strength--see Anthropometric Measures (muscular strength and endurance)

Armored Vehicle--see Vehicle

Armored Vests--see Clothing (body armor)

Articulation Testing--see Communications Systems (techniques for evaluation); Speech

Artificial Intelligence (biosimulation)

Artificial Limbs--see Prosthetics

Asbestos Suits--see Clothing (thermal protection)

Aspiration, Level of--see Individual Factors Affecting Performance (motivation and morale)

Assignment of Functions to Men and Machines in Systems

Assignment of Personnel--see Personnel

Atmosphere--see Environmental Conditions and Effects

Attention--see Individual Factors Affecting Performance (set and attention); Perception;
Training (basic learning data); Vigilance and Monitoring

Attenuators--see Auditory (equipment)

Attitude Indicators--see Displays (type)

Attitude Toward Task--see Individual Factors Affecting Performance (acceptability of and
attitude toward equipment and tasks)

Audiogyric Effects--see Orientation in Space, Factors Determining; Perception (illusions)

Audiometry--see Audition (equipment and methods); Speech

Audio-Visual Aids--see Training Aids and Devices

Audio-Visual Interaction--see Sensory (interaction)

Audio-Visual Monitoring--see Vigilance and Monitoring (performance)

Audio-Warning Devices--see Auditory (displays, nonverbal); Warning Devices

Audition

aftereffects of stimulation (e.g., acoustic reflex, fatigue, pitch shifts, time errors, etc.)

aging--see Aging, Effects of; norms, below

anomalies and individual differences

auditory patterns and meaning (e.g., flutter discrimination, melodic and temporal)

binaural vs. monaural

equipment and methods (e.g., anechoic chambers, audiometric devices, communication
simulators, techniques of audiometry)

general

norms

physiological mechanisms

psychophysical scales (e.g., mel scale, sone scale)

recruitment

repetitive stimulation

sound localization

standards and specifications

stimulus characteristics

frequency and pitch

intensity and loudness

other (e.g., brightness, duration, timbre, vocality)

stimulus mixtures (e.g., harmonics, beats, combination tones, modulations)

thresholds

training, nonverbal--see Training (specific types)

Auditory

acuity--see Audition (thresholds)

adaptation--see Audition (aftereffects of stimulation)

detection--see skills, below

devices

ear defenders (e.g., plugs, pads, etc.)

enhancement devices (e.g., hearing aids, guidance for blind, etc.)

displays, nonverbal--for systems utilizing verbal communication, see Speech
(communication systems)

flight guidance systems (flybar)

intermittent warning and signaling devices (e.g., sirens, bells, radio range)

multi-channel

sonar and other underwater sound systems

telegraphic systems

Auditory (cont'd)

equipment

input devices (e.g., microphones, vibration pickups)

output devices (e.g., earphones, loudspeakers)

transmission devices (e.g., amplifiers, attenuators, frequency modulators, scramblers)

fatigue--see Audition (aftereffects of stimulation)

feedback--see signals, below

flight guidance systems--see displays, above

localization--see Audition (sound localization)

masking--for speech masking, see Speech

noise--see Ambient Noise

numerousness--see signals, below

patterns--see Audition

reaction time--see Reaction Time and Refractory Period

search--see skills, below

signals

channel capacity

coding

detection--see skills, below

feedback

general characteristics

to-noise ratio

skills

discrimination

monitoring

search and detection

sonar listening--see monitoring, above

tracking--see Tracking

training--see Training (specific types)

vs. visual presentation--see Sensory (comparison)

Aural Harmonics--see Audition (stimulus mixtures)

Aural Reading Devices--see Auditory (devices)

Auto-Correlation Function--see Mathematical and Statistical Methods

Autoinstruction--see Programmed Instruction; Training Aids and Devices (teaching machines)

Autokinetic Effects--see Visual (perception)

Automatic

checkout systems--see Maintenance (systems)

control systems--see Controls

learning devices--see Training Aids and Devices (teaching machines)

maintenance--see Maintenance (systems)

Automation

Automobile Accidents--see Safety

Automobile Design--see Vehicle

Automobiles--see Vehicle

Aviation Medicine--see Environmental Conditions and Effects (general)

B

Backlighting--see Instrument Lighting (rear)

Back Rests--see Seats and Seating (body supports)

Ballistic Vests--see Clothing (body armor)

Band Compression Speech--see Speech (distortion)

Barometric Pressure--see Environmental Conditions and Effects

Basic Training--see Training (specific types)

Beacon Lights--see Warning and Signal Lights
 Bearing Information Aids--see Radar and other CRT Displays (range and bearing scales and aids)
 Beats--see Audition (stimulus mixtures)
 Bells--see Auditory (displays, nonverbal)
Belts, Harnesses, and other Restraining Devices--see also Clothing (belts and fasteners)
 Bends--see Environmental Conditions and Effects (decompression)
 Betting Behavior--see Subjective Probability
 Bibliographies--see General and Comprehensive References in Human Factors Engineering;
 bibliographies also are included under general in major topics
 Binaural Discrimination--see Audition (binaural vs. monaural)
 Binocular Disparity--see Visual (perception)
 Binocular Field--see Visual (field)
 Binoculars--see Optical Aids
Biodynamics--see also Anthropometric Measures; Motor Performance and Skills
 Bioelectric Methods and Equipment--see Physiological Equipment and Methods
 Bio-instrumentation--see Physiological Equipment and Methods
 Bio-kinetic Analysis--see Anthropometric Measures; Motor Performance and Skills
 Biomechanical Analysis--see Anthropometric Measures; Motor Performance and Skills
Bionics
 Biosimulation--see Artificial Intelligence
 Bisectioning Movements--see Motor Performance and Skills
 Black Light--see Light (special types)
 Blackout--see Motion, Effects of (acceleration and deceleration)
 Blindness--see Visual (anomalies and individual differences)
 Blindness, Flash--see Flash
 Blinking--see Motor Performance and Skills (involuntary reflexes)
 Blinking Signal Lights--see Flash (rate); Traffic (signs and signals); Warning and Signal
 Lights
 Blink Rate--see Flash; Motor Performance and Skills (involuntary reflexes)
 Body
 armor--see Clothing
 build--see Anthropometric Measures
 density--see Anthropometric Measures
 movement, perception of--see Perception
 size and dimensions--see Anthropometric Measures
 supports--see Belts, Harnesses, and other Restraining Devices
 temperature--see Physiological Capacities and Indices
 Bone Conduction--see Audition (physiological mechanisms)
 Books in Human Factors Engineering--see General and Comprehensive References in Human
 Factors Engineering
 Boredom--see Individual Factors Affecting Performance (motivation and morale)
 Braille Systems--see Tactile Coding
 Breathing Capacity--see Physiological Capacities and Indices
Breathing Devices and Equipment--see also Masks; Underwater
 Brightness
 comfort relation--see Visual (comfort and fatigue)
 discrimination--see Visual
 sky--see Light (natural)
 Broad Band Blue Illumination--see Light (special types)
 Buffeting--see Vibration (whole body)

C

Cabs, Truck--see Vehicle
 Caffeine, Effects of--see Drugs
 Caloric Intake--see Diet, Food, and Nutrition

Calorimetry--see Physiological Equipment and Methods (metabolic measurement)

Camouflage and Concealment

Canal Sickness--see Motion, Effects of (sickness)

Cardio-vascular Indices--see Physiological Capacities and Indices

Cards, Design of (e.g., data processing cards, E-Z Sort, etc.)

Cargo Handling Systems--see Supply Systems

Carrier Approach Light Systems--see Aircraft (landing and landing systems); Lighting Systems (outdoors)

Carriers--see Packs and Carriers

Cathode-Ray-Tube Displays--see Radar and other CRT Displays

Centers of Gravity--see Anthropometric Measures

Centrifuge--see Motion, Effects of (equipment and methods)

Channel Capacity--see Auditory (signals); Sensory (comparison); Visual (information processing)

Characters and Symbols, Design of--see Numerals, Letters, and Characters, Design of

Charts, Design of--see Maps and Charts, Design of

Check Lists--see Job Performance Aids

Chest Measurement--see Anthropometric Measures (body size and dimensions)

Choice Behavior--see Individual Factors Affecting Performance (thought processes)

Chopping--see Speech (distortion)

Chronophotography--see Motor Performance and Skills (equipment and methods)

Cinematography--see Films; Training Aids and Devices

Click-Pitch Threshold--see Audition (stimulus characteristics); Auditory (signals)

Climatic Chamber--see Environmental Conditions and Effects (equipment and methods)

Clipping--see Speech (distortion)

Closed Ecological Systems--see Space Flight Systems (sealed cabins)

Clothing

Arctic ensembles and cold weather

belts and fasteners

body armor

equipment and methods

fabrics

flight

footgear

general

handgear

headgear

high altitude and anti-g

noxious agents, protection (e.g., rocket fuel, liquid oxygen, etc.)

radiation protection

restrictive effects

sizing, techniques of measurement

space suits

 tests of--see equipment and methods, above

thermal protection

tropical ensembles

 underwater ensembles--see Underwater

Cochlear Response--see Audition (physiological mechanisms)

Cockpit Lighting--see Work Place Design (illumination)

Cockpits--see Aircraft (design)

Coding

 auditory signals--see Auditory (signals)

 color--see Color

 controls--see Controls

 kinesthetic--see Kinesthesia

 lights--see Light

 tactile--see Tactile Coding

 visual--see Visual

Cognitive Processes--see Individual Factors Affecting Performance (thought processes)

Cold Environments--see Environmental Conditions and Effects

Cold Weather Protective Clothing--see Clothing (Arctic ensembles and cold weather)

Collision, Mid-Air--see Safety

Color--see also Vision (color vision)

- coding--see also Light
- filters--see Optical Aids; Vision (equipment and methods)
- lights--see Light
- paints and finishes--see Paints, Finishes, and Surfaces
- phenomena--see Vision (color vision)
- preference--see Vision (color vision)
- smokes--see Signaling Systems, Visual
- systems (e.g., abridged systems, international XYZ system, etc.)--see Visual (standards and specifications)

Colorimetry--see Vision (equipment and methods)

Combat Information Centers, CIC--see Command and Control Systems

Combination Tones--see Audition (stimulus mixtures)

Comfort--see also Seats and Seating; Visual (comfort and fatigue)

Command and Control Systems

Communication and information Theory

- general
- information assessment and processing
- redundancy, uncertainty

Communication Systems

- general
- group--see Groups
- nonverbal--see Auditory (displays, nonverbal); Tactile Coding
- speech--see Speech
- techniques for evaluation

Comparison of Sensory Channels--see Sensory (comparisons)

Compatibility, Stimulus-Response--see Control-Display Dynamics; Sensory (general)

Compensatory Tracking--see Tracking

Complexity of Work or Task--see Work and Task Performance

Complex Tones--see Audition (stimulus mixtures)

Compression and Expansion, Speech--see Speech (distortion)

Computers

- data processing systems
- design
- general
- man interaction
- models and programs
- simulation--see also Simulation and Simulators
- systems component

Concept Formation--see Individual Factors Affecting Performance (thought processes); Training (basic learning data)

Confinement--see Prolonged Confinement

Console Design--see Panel and Console Design

Contact Analog Displays--see Displays (type)

Containers and Packaging

Contaminated Environments--see Environmental Conditions and Effects

Control-Display Dynamics

- compatibility and motion stereotypes
- feedback--see Tracking
- general
- integration
- movement ratios
- quickening--see also Tracking

Controller, Human--see Human

Controls

adjustments--see setting, precision, below

aided--see Tracking

aircraft

automatic

backlash, deadspace, and response lag

coding

combined (e.g., pushbutton on stick, ganged controls)

comparison of types

eye (as control mechanism)

force and time to activate

general

handgrips and handles

industrial (e.g., on machinery or equipment)

labeling--see Labels, Design of

linear movement

levers and sticks

pedals and rudder bars

push buttons and toggle switches

loading--see resistance, below

location and positioning

multiple-axis

remote handling

resistance (damping, inertia, friction, torque, etc.)

rotary movement

cranks and wheels

knobs

sensitivity and amplification--see Control-Display Dynamics (movement ratios)

setting, precision

ship and submarine controls--see Ship and Submarine

spacecraft--see Space Flight Systems

three-axis--see multiple-axis, above

vehicle controls (e.g., automobiles, tanks, etc.)--see Vehicle

Control Tower

design of workspace--see Air Traffic Control Systems

language--see Language Design

speech--see Speech (communication systems)

systems--see Air Traffic Control Systems

Convergence (of eyes)--see Visual (accommodation and convergence)

Correlation Techniques--see Mathematical and Statistical Methods

Cost Effectiveness Analysis--see Systems Design (techniques of analysis)

Counters--see Displays (type)

Crane Cabs--see Controls (industrial); Industrial (equipment, design of)

Cranking Movement--see Motor Performance & Skills (repetitive movements)

Cranks--see Controls (rotary movement)

Crash Impact and Survival--see Safety

Creativity--see Individual Factors Affecting Performance (thought processes)

Crews--see Groups

Critical

band analysis--see Ambient Noise (measurement); Speech (basic characteristics)

flicker frequency--see Flicker

incident technique--see Methods and Techniques for Study and Analysis of Tasks, Operations, and Systems

Cross Modality Matching--see Psychophysics (methods); Sensory (interaction)

CRT Displays--see Radar and other CRT Displays

Cursors--see Radar and other CRT Displays (range and bearing scales and aids)
Cushions--see Seats and Seating
Cutaneous Communication Systems--see Tactile Coding
Cutaneous Sense--see Touch
Cybernetics

D

Damping--see Ambient Noise (reduction and control); Controls (resistance)
Dark Adaptation--see Visual (adaptation, pre-adaptation, and pre-exposure)
Data
 analysis--see Mathematical and Statistical Methods
 processing systems--see Computers
Daylight--see Light (natural)
Dazzle--see Flash (blindness); Visual (comfort and fatigue)
Deafness--see Ambient Noise (hearing loss)
Deceleration--see Motion, Effects of (acceleration and deceleration)
Decision Analysis--see Game and Decision Theory; Methods and Techniques for Study and Analysis of Tasks, Operations, and Systems
Decision Making--see Command and Control Systems; Individual Factors Affecting Performance (thought processes)
Decision Theory--see Game and Decision Theory
Decompression Sickness--see Environmental Conditions and Effects (decompression)
Depth Perception--see Visual (perception)
Desert--see Clothing; Environmental Conditions and Effects (hot)
Detection, Auditory--see Auditory (skills)
Detection Theory--see also Psychophysics
Detection, Visual--see Visual (search and detection)
Dial and Scale Design--see Displays
Dial Setting--see Motor Performance and Skills (positioning movements)
Diet, Food, and Nutrition
Difference and Summation Tones--see Audition (stimulus mixtures)
Digital Displays--see Displays (type)
Dimensions
 body--see Anthropometric Measures
 furniture--see Furniture Design
 work place--see Work Place Design
Discriminability Scaling--see Psychophysics
Disorientation--see Orientation in Space, Factors Determining
Display-Control Dynamics--see Control-Display Dynamics
Displays
 auditory--see Auditory (displays, nonverbal)
 dial and scale design
 general
 location--see Panel and Console Design
 pointer design
 quickened--see Control-Display Dynamics; Tracking
 reading and interpretation problems
 size and shape
 type
 airspeed indicators
 altimeters
 attitude indicators
 combined displays (integrated)
 comparison of types (e.g., outside-in vs. inside-out)
 heading indicators
 indicator and warning--see also Warning Devices
 integrated displays--see combined displays, above

Displays

type (cont'd)

large displays (for viewing by more than one person, e.g., plot boards)

other (e.g., digital, kinalog, matrix, etc.)

polar coordinate

radar--see Radar and other CRT Displays

television--see Television

Distance Perception--see Visual (perception)

Distorted Vision--see Visual (field)

Diurnal Cycles

Door Handles--see Controls

Doors and Doorways--see Work Place Design (passageways)

Doppler Displays--see Auditory (displays, nonverbal)

Driving

analysis of

performance and skills

safety--see Safety

Drugs

Dummy and Mannikin Design

Dye Markers--see Signaling Systems, Visual

Dynamic Acuity--see Visual (acuity)

E

Ear

damage--see Ambient Noise (hearing loss)

defenders--see Auditory (devices)

muffs--see Auditory (devices)

plugs--see Auditory (devices)

protectors--see Auditory (devices)

EEG--see Physiological Capacities and Indices; Physiological Equipment and Methods (electrophysiological techniques)

Ego-involvement--see Individual Factors Affecting Performance (motivation and morale)

Ejection Capsule--see also Escape from; Seats and Seating

Ejection Seats--see Escape from; Seats and Seating (ejection)

Elastic Resistance--see Controls (resistance)

Electrocardiogram--see Physiological Capacities and Indices; Physiological Equipment and Methods (electrophysiological techniques)

Electroencephalogram--see Physiological Capacities and Indices; Physiological Equipment and Methods (electrophysiological techniques)

Electroluminescence--see Instrument Lighting

Electromyograph--see Physiological Equipment and Methods (electrophysiological techniques)

Electronic Equipment--see Equipment (design and evaluation)

Electroretinogram--see Physiological Equipment and Methods (electrophysiological techniques); Vision (physiological mechanisms)

Emergency Lights--see Warning and Signal Lights

Emotion--see Individual Factors Affecting Performance

Empty Field Myopia--see Vision (effects of unusual environments)

Energy Expenditure--see Physiological Capacities and Indices

Engine Mufflers--see Ambient Noise (reduction and control)

Engine Noise--see Ambient Noise

Entrances--see Work Place Design (passageways)

Environmental Conditions and Effects--see also Stress

acclimatization--see tolerance, below

air conditioning--see Work Place Design (atmospheric control)

air velocity

atmospheric pressure (high altitude)

Environmental Conditions and Effects (cont'd)

climatic chamber--see equipment and methods, below

cold

decompression

equipment and methods

evaporative cooling

general

heating

hot (includes both desert and tropical environments)

humidity

ionized air

oxygen requirements

radiation

space--see Space Travel

temperature (room)

thermal radiation

tolerance, adaptation, acclimatization

altitude and pressure

cold

heat

weightlessness--see Space Travel; Weightlessness

toxic environments

ventilation

water--see also Underwater

windblast, airblast, windchill

Equipment

arrangement--see Work Place Design

design and evaluation (includes equipment not covered elsewhere, e.g., electronic equipment)

noise--see Ambient Noise

Equipment Used in Human Factors Research

Ergonomics--see General and Comprehensive References in Human Factors Engineering

Error

analysis--see Mathematical and Statistical Methods

equipment--see also Maintenance

human

Escape from

aircraft and spacecraft--see also Ejection Capsules; Seats and Seating (ejection)

other places

submarines--see Ship and Submarine

Exercise and Performance--see also Physical Fitness and Performance

Exits and Entrances--see Work Place Design (passageways)

Experimental Method--see Research Techniques in Human Factors Engineering

Explosive Decompression--see Environmental Conditions and Effects (decompression)

Eye

as Control Mechanism--see Controls

blink--see Motor Performance and Skills (involuntary reflexes)

dominance

fixation--see Panel and Console Design (spatial dynamics, frequency of use of components, and order of use); Printed Material, Legibility, and Readability

movement

F

Face Masks--see Masks

Face-to-Face Communication--see Speech (communication systems)

Facial Measurements--see Anthropometric Measures

Facilitation of Reception--see Sensory (interaction)

Facilities (Human Engineering)

Factor Analysis--see Mathematical and Statistical Methods

Factory Lighting--see Work Place Design (illumination)

Fallout, Radioactive--see Environmental Conditions and Effects (radiation)

Fatigue--see Auditory (aftereffects of stimulation); Exercise and Performance; Sleep and Performance; Visual (comfort and fatigue); Work and Task Performance

Fear--see Individual Factors Affecting Performance (emotion)

Feedback

delayed auditory--see Auditory (signals)

delayed speech--see Speech (distortion)

sensory feedback--see Sensory (feedback)

theory--see Cybernetics

tracking--see Tracking (feedback)

Field of View, Work Place--see Work Place Design (visibility, field of view)

Figural Aftereffects--see Visual (aftereffects, afterimages); Kinesthesia

Films

display use

general, human factors--see General and Comprehensive References in Human Factors Engineering

research, use in--see Research Techniques in Human Factors Engineering

training--see Training Aids and Devices

Filters

auditory--see Auditory (equipment)

optical--see Optical Aids; Vision (equipment and methods)

Fire Fighting

clothing--see Clothing (thermal protection)

equipment--see also Vehicle

Fitness, Physical--see Physical Fitness and Performance

Fixtures, Lighting--see Work Place Design (illumination)

Flares--see Lighting Systems (outdoors); Signaling Systems, Visual; Warning and Signal Lights

Flash

blindness

rate

visibility

Flesch Reading Ease Formulas--see Printed Material, Legibility, and Readability

Flexibility of Movement--see Anthropometric Measures

Flicker

Flight

control systems--see Controls

guidance systems

performance and skills--see also Low Level, High Speed Flight

simulation (includes spaceflight)

testing

training--see Training (specific types)

Floodlights--see Lighting Systems (outdoors)

Flow Analysis--see Methods and Techniques for Study and Analysis of Tasks, Operations, and Systems; Work Place Design

Fluorescent and Luminous Materials

Flybar--see Auditory (displays, nonverbal)

Fog, Haze, Smog, and Smoke

Food--see Diet, Food, and Nutrition

Foot

dimensions--see Anthropometric Measures

gear--see Clothing

Form Perception--see Visual (perception)

Free Fall--see Motion, Effects of (acceleration and deceleration)

Frequency

distortion--see Speech (distortion)

modulators--see Auditory (equipment)

Frictional Resistance--see Controls (resistance)
Frostbite--see Environmental Conditions and Effects (cold)
Function Analysis--see Methods and Techniques for Study and Analysis of Tasks, Operations,
and Systems
Furniture Design--see also Seats and Seating

G

G Forces--see Motion, Effects of (acceleration and deceleration)
Gain--see Control-Display Dynamics (movement ratios)
Galvanic Skin Response--see Physiological Capacities and Indices
Galvanometer--see Physiological Equipment and Methods (other methods and equipment)
Game and Decision Theory
Gases--see Environmental Conditions and Effects
Gas Masks--see Masks
General and Comprehensive References in Human Factors Engineering
 articles and reports
 bibliographies
 books
 films
 handbooks
 symposia and conferences
Glare--see Flash (blindness); Visual (comfort and fatigue)
Glasses--see Optical Aids
Gloves--see Clothing (handgear)
Goggles--see Optical Aids
Graphs and Tables, Design of
Gravitational Forces--see Motion, Effects of (acceleration and deceleration)
Gravity, Centers of--see Anthropometric Measures
Grenades--see Weapons Systems, Design of (handheld)
Grips--see Controls
Grip Strength--see Anthropometric Measures (muscular strength)
Ground Support Equipment--see also Space Flight Systems; Weapons Systems, Design of
Grouping of Components--see Panel and Console Design (layout)
Groups
 air crews
 communication
 evaluation
 general
 infantry squads
 interaction
 leadership
 missile crews
 morale
 performance
 research techniques
 selection
 ship and submarine crews
 size and structure
 space crews
 tank crews
 theory
 training--see Training
Gunnery Training--see Training (specific types)
Gustation--see Smell and Taste
Gust scale--see Smell and Taste

Hand

dimensions--see Anthropometric Measures
 grips--see Controls
 signals--see Signaling Systems, Visual
 strength--see Anthropometric Measures
 tools, design of--see Tools, Design of
 wheels--see Controls (rotary movement)

Handbooks--see General and Comprehensive References in Human Factors Engineering

Handbooks, Manuals, Texts, Design of

Handedness--see Motor Performance and Skills

Hand Grenades--see Weapons Systems, Design of (handheld)

Handgear--see Clothing

Handles--see Controls

Harnesses--see Belts, Harnesses, and other Restraining Devices

Hats--see Clothing (headgear)

Headphones--see Auditory (equipment)

Head Size--see Anthropometric Measures

Hearing

aids--see Auditory (devices)

conservation program--see Ambient Noise (reduction and control)

loss--see Ambient Noise; Audition (anomalies and individual differences); Speech (audiometric testing)

Heart Rate--see Physiological Capacities and Indices

Heat--see Environmental Conditions and Effects

Heated Suits--see Clothing (thermal protection)

Heating--see Environmental Conditions and Effects

Heat Loss--see Physiological Capacities and Indices (temperature, body)

Helicopters

Helmets--see Clothing (headgear)

High Altitude--see Environmental Conditions and Effects (atmospheric pressure)

Highway Lighting--see Lighting Systems (outdoors)

Highway Research--see also Safety (motor vehicle and highway); Traffic

Hot Weather Clothing--see Clothing (tropical ensembles)

Hot Weather Environments--see Environmental Conditions and Effects

Houses, Dwellings, and Shelters, Design of

Hue--see Vision (color vision)

Human

controller (general discussion of man as a control mechanism)

error--see Error

information processing capabilities (includes reception and transmission)

transfer functions

Human Factors Engineering--see General and Comprehensive References in Human Factors Engineering

Humidity--see Environmental Conditions and Effects

Hyperopia--see Visual (anomalies and individual differences)

Hypodynamics--see Sensory (deprivation); Weightlessness

Hypoxia--see Environmental Conditions and Effects (oxygen requirements)

ICAO Phonetic Alphabet--see Language Design

Ideal Observer--see Detection Theory; Psychophysics (theory)

Illumination--see Instrument Lighting; Light; Lighting Systems; Vision; Visual; Work Place Design

Illusions, Perceptual--see Perception (illusions)

Image Interpretation, Photographic--see Photographs, Photography, and Photointerpretation

Immersion Suits--see Underwater (clothing and equipment)
 Impaired Hearing--see Ambient Noise (hearing loss); Audition (anomalies and individual differences)
 Incentives--see Individual Factors Affecting Performance (motivation and morale)
 Indicator and Warning Lights--see Displays (type); Warning and Signal Lights
 Indicators and Scales--see Displays (dial and scale design)
Individual Factors Affecting Performance
 acceptability of and attitude toward equipment and tasks
 alertness
 aptitude and intelligence
 emotion
 fatigue and behavior decrement--see Work and Task Performance
 general
 motivation and morale
 personality
 set and attention
 thought processes
Industrial
 deafness--see Ambient Noise (hearing loss)
 equipment, design of
 noise--see Ambient Noise (level)
 safety--see Safety (industrial)
Industry and Business, Human Factors Oriented Studies
 Inertial Resistance--see Controls (resistance)
 Infantry
 squads--see Groups
 training--see Training (specific types)
Information--see also Communication Systems
 analysis--see Communication and Information Theory
 processing, human--see Human
 reception, human--see Human
 storage and retrieval systems
 theory--see Communication and Information Theory
 transmission, human--see Human
 Infrared Devices--see Light (special types)
 Inhibition of Reception--see Sensory (interaction)
 Injuries, Analysis of--see Safety
 Input Channel, Comparison--see Sensory (comparison)
 Input Channel, Interaction--see Sensory (interaction)
 Instructions, Effects on Task Performance--see Individual Factors Affecting Performance (set and attention); Training (basic learning data)
Instrument Lighting--see also Light; Work Place Design (illumination)
 color and intensity of illumination
 direct lighting and floodlighting
 edge and ring
 electroluminescent
 general
 rear (transillumination)
 Intelligence--see Individual Factors Affecting Performance
 Intelligence Testing--see Tests and Testing
 Intelligibility--see Speech
 Interaural Phase Cues--see Audition (sound localization)
 Intercom Systems--see Speech (communication systems)
 International Language--see Language Design
 Intersensory Effects--see Sensory (interaction)
 Interval Scaling--see Psychophysics (scaling)