The structure of information display systems should be based on a selection of preferable ways of solving the problems, i.e. strategies of operators. Experiments have shown that correlation coefficients between the structure of visually perceived stimuli and the reactions of operators (r_{SR}) changes within the limits $-1 < r_{SR} < 1$. The comparison of this interval with Stevens' Law indicates the significantly more complicated character of the psychological action of the multi-component system of operative information display as compared to psycho-physical determination of perception. Special cases have been studied experimentally including the case $r_{SR} \to -1$, when operators have to overcome the inadequacy between the displayed information structure and their subjective mental model of the situation. The investigation of the case $r_{SR} \to 1$ led to a theoretical prediction and on the basis of it to the practical realization of a special class of abstract information display systems playing the role of conventional controlled object and under definite circumstances suggesting the choice of a single strategy in problem-solving. The application of the given abstract systems in the course of operators' training in the form of visual informational mnemonic schemes allowed a simplification of the interpretation of perceived data, a decrease in memory load and in general psychophysiological work overstrain, an increase in work safety and a reduction in the training period of 25–30%. Some principles of optimizing the psychological factors of operative problem solving complexity were practically used in training and the organization of operators' work at a series of large-scale automated systems and yielded positive results.

Determination of Critical Loads of Stoop Lifting

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Various studies of the stresses involved in stoop lifting have been made. In the literature available there is no mention of natural critical loads where the rate of physiological response changes. Human physical capability is limited and, within this range, there may be zones of light, moderate, and heavy physiological response. In order to identify these zones 40 human volunteers (32 males—aged 18 to 33 yrs, mean weight 70 kg, mean height 176 cm; and 8 females—aged 19 to 33 yrs, mean weight 54 kg, and mean height 161 cm) were asked to perform the two-phase lift task. In the first, the lift-up phase, the weights were stoop lifted from the ground and placed on a table in front. In the second, the lift-down phase, the same lift was performed in reverse order. These operations were performed with successively increasing weights within the range of 10 to 55 kg rising in steps of 5 kg. During this activity electrocardiogram and electromyograms from erector spinae and external oblique were recorded from skin electrodes. Intra-abdominal pressure was monitored using a pressure sensitive radio pill. Omnidirectional loop antennae were designed to pick up the transmitted signals. The result shows that the critical weights where the physiological responses changed significantly were 30 and 45 kg for males and 20 and 30 kg for females. On the basis of observation made it has been concluded that manual handling may be restricted to maxima of 45 kg for men and 30 kg for women for the age group studied. A sex difference in the combined response of external oblique and rises in the intra-abdominal pressure with rising weight has been reported.

Anthropometry as a Variable in Human Factors Engineering

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One of the fundamental concepts in the field of human factors engineering or ergonomics is represented by the systems approach. According to this concept, the man together with his equipment, whether it be personal equipment he is wearing or using, or a machine he is operating, is considered to be a man/equipment system. A basic requirement for the efficient use and operation of such a system is that the man and the equipment be compatible. Effective human engineering plays an important role in achieving such compatibility. Since anthropometric data constitute a basic requisite for defining the elements of body size in the human engineering of man/equipment systems, anthropometry provides an essential input in the development of such systems. Anthropometry is the measurement of the human body. Since effective human engineering requires the use of body size data on the specific population for which the equipment is intended, military anthropometry, for example, is one important source of the information necessary for the design and sizing of equipment and material to be used by military forces.

Similarly, anthropometric data on civilian populations are required for application in the human engineering of industrial man/equipment systems or in the design and development of products for civilian consumer use. Fortunately, more and more anthropometric data have become available in recent years, not only in the United States, but particularly in many other countries. Even a cursory or superficial examination of these data immediately indicate very clearly that marked differences exist in human body size and proportions. Anthropometric data thus serve to emphasize the ranges of variation in human body size. Although human variability has not received sufficient attention in the field of human engineering or ergonomics in the past, it cannot be ignored. More emphasis on the accommodation of human variability is necessary if we are to improve the human engineering of man/equipment systems. The purpose of this paper is to first review available sources of anthropometric data. Secondly, through the examination and discussion of several of the basic dimensions of the human body, some of the parameters of human variability will be indicated as they relate to human engineering.

Indoor Air Pollution as an Environmental Factor

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An average person spends most of his time indoors and the quality of indoor air does affect his performance and well-being. This justifies the study of air quality not only in work surroundings but in homes as well. A small pilot study is in progress where the air quality in two homes and a shop is being investigated. Parameters include carbon monoxide, oxides of nitrogen, sulphur dioxide and formaldehyde. Results of this study will be reported. The aim of this investigation is to emphasize the importance of indoor air and to demonstrate the interplay of indoor and outdoor air pollution.

Product Safety and Product Performance Research at the National Bureau of Standards

By J. V. Fechter

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The National Bureau of Standards has earned a worldwide reputation for developing and refining basic standards. In recent years the Bureau's role has been expanded to include not only basic standards development, but also the application and development of technology to solve more immediate problems. When the Centre for Consumer Product Technology was established in 1974, problems related to consumer products were formally added to the NBS mission. Activities of the Center have primarily involved: developing standards for law enforcement equipment, providing technical support to the Consumer Product Safety Commission, and working on many facets of energy conservation. Included in the Center is a human factors section, which is responsible for providing 'trouble-shooting expertise' and research data to other engineers and scientists working on consumer products. Until the Center was established, most human factors research at NBS was done in 'sterile' laboratory modules, originally designed for physical science experiments. Now, we have a well-instrumented home in which to perform our studies. It includes a functional kitchen, workshop, living room, playroom, and family room. Since the atmosphere is realistic and natural, performance will more closely approximate real-world behaviour, and therefore we can be more confident in generalizing from our test results. Video and audio records can be made unobtrustively from all rooms in the house, and performance measures can be recorded directly using the laboratory computer. While much of the equipment is common in many human factors laboratories, its configuration and application at NBS is unique. Our research programme is just beginning. We are tasked to study the safe and satisfactory performance of all consumer products, and will be involved in providing technical information to: (1) government agencies involved with consumer products, (2) manufacturers, and (3) consumers themselves.

Integration of Human Factors into Electronic Digital Watch Design

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This paper will describe how human factors features were incorporated into many aspects of the Texas Instruments Digital watch. Human factors testing and surveys were conducted to maximize consumer satisfaction. These tests and surveys related to the consumer's environment,