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Research Product 80-5b

Physical Performance Standards
for Army Jobs:
Procedures Manual

Personnel Utilization Technical Area

May 1980

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**A Field Operating Agency under the Jurisdiction of the
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PHYSICAL PERFORMANCE STANDARDS FOR ARMY JOBS:
PROCEDURES MANUAL

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FOREWORD

The Army Research Institute conducts basic research in topical areas of relevance to its exploratory and advanced development programs. Under investigation in the basic research program is a rating or scaling methodology for determining physical requirements of jobs, as an alternative to empirical methodologies. An initial product of this program is the set of procedures for accomplishing the scaling of the physical task demands, procedures for which early research has indicated acceptable reliability. The investigation is completely responsive to the objectives of Army RDT&E Project 2Q161102B74F.


JOSEPH ZEIDNER
Technical Director

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The manual describes a procedure for determining the physical ability requirements of Army jobs. The approach incorporates the steps used in a study to identify the strength and stamina demands of four MOSs (see Technical Report by Myers, Gebhardt & Fleishman, 1979). The method serves as a useful technology for developing reliable, job-related physical ability standards, without requiring a great deal of time and effort on the part of technical personnel and incumbent soldiers. For instance, the rating scales used to obtain expert judgments about physical ability requirements of jobs are self explanatory and can, therefore, be administered with minimal guidance. Similarly, the data analysis does not require technical sophistication beyond understanding of elementary statistics. The procedure manual is divided into three sections: (1) task analysis, (2) physical abilities analysis, and (3) data analysis and presentation of results. Each section describes in detail the steps necessary to establish physical ability standards for Army jobs.

Task Analysis

It is possible to obtain judgments of physical ability requirements without providing the raters with descriptions of the work; however in most situations you will probably want to obtain some type of job/task analysis data to serve as a basis for the expert ratings. In that, even though more global job descriptions of MOSs might be sufficient when the raters are tenured incumbents with knowledge and expertise, it is recommended that because the raters are also providing estimates of criticality more detailed and specific task statements be made available. This is especially true if the purpose of your investigation is not only to identify physical ability demands of jobs, but also to determine which tasks are responsible for certain demands to emerge. Similarly, if your goal is to develop criteria to measure physical competencies of soldiers, then it will be desirable to base the physical ability ratings on the tasks representing each MOS.

The Army's personnel system provides various levels of job information. At the more general level, AR 611-201 contains global descriptions of the duties and qualifications of each Career Management Field (CMF) such as infantry, as well as the identification of specific MOSs within each CMF (e.g., 11B, 11C, and 11H). The remainder of the section is devoted to more specific information about each MOS. It contains summaries of the duties at each skill level providing a global impression of the work involved. Qualifications are referred to in terms of a physical profile consisting of general factors related to physical capacity/stamina, upper extremities, lower extremities, hearing, eyesight, psychiatric, color vision, and color discrimination, as well as the more general aptitude requirements for the MOS (e.g., combat, clerical and skilled technical). The CMF section concludes with a description of the related civilian occupations from the DOT classification and the Federal Civil Service classification.

There is also available more detailed task analysis information. The Military Occupational Development Division of Personnel Management System Directorate, USAMILPERCEN, can provide inventories of tasks describing most major MOSs. These Military Occupational Data Banks (MODB) were developed to serve as job analysis survey instruments. Each instrument contains an exhaustive list of tasks which can serve as a basis for rating the physical demands of a MOS. The list, however, often includes hundreds of tasks which would require an almost impossible burden on the rating process. Rating large numbers of tasks can not only be costly in terms of man hours off duty, but may also reduce the quality of the findings because of the tedious rating process for the raters. To reduce the size of the task list to a more manageable size it is desirable that one or more persons familiar with the MOS review the list and eliminate those tasks that are obviously not physically demanding.¹

¹ The DOL has developed a relatively gross scale consisting of five physical categories of work which can be used by someone familiar with the MOS to classify the tasks in a more systematic manner. (See U.S. Department of Labor's Handbook for Analyzing Jobs. Manpower Administration, U.S. Government Printing Office, Washington, D.C., SN 2900-0131).

Even after decreasing the size of the task bank it may be necessary to further investigate the task content of the MOS. The task statements within a specific MODB may be limited in that they are too general, ambiguous, or may involve variable demands. If this is the situation it may be advantageous to explore the nature and content of the tasks with two to three job experts. If possible a meeting with the three experts assembled as a group should be scheduled to discuss each task's clarity and understandability, as well as delineating the broad tasks into more specific elements. To promote an efficient and effective meeting, it might be helpful to send a list of the tasks to the group of experts prior to the meeting. For example, a worksheet with instructions similar to the following might be sent to the group members allowing them to review each task before the meeting.

We have completed the preliminary screening of Military Occupational Data Banks for physically demanding tasks for MOS. This screening was based on our own internal review of the lists by personnel knowledgeable of particular MOSs.

The next step will be to have additional experts like yourself, review the tentative list of physically demanding tasks for each MOS. They will investigate the comprehensiveness of the task list. That is, do the tasks cover the physical domain of the MOS? They will also focus on clarity and understandability of each task. Tasks that have varying demands will be defined more precisely (e.g., changing tires). Tasks that are too broad will be broken down into more specific tasks/elements (e.g., prepare bivouac area).

Please review the attached list of tasks that have been identified as physically demanding. Some of the tasks are specific enough to allow for reliable ratings of physical ability requirements. However, other tasks are too general and ambiguous, which may lead to unreliable ratings. Consequently, before we go into the field to collect the data, we need your assistance to examine each task and consider the following:

- Is the task clear and precise to allow for accurate (reliable) ratings by independent judges?
- If the task is too general and broad, then use the space provided to make notes regarding the specific nature of the task (e.g., subtasks).

- If the task has variable demands, then use the space provided to note the different demands (e.g., change tires on different sized vehicles).
- Are there any additional physically demanding tasks you consider important?

When they have completed their review of that task list, you should meet to discuss their findings.

As previously mentioned, the extent of the job analysis efforts may depend on who is performing the physical ability ratings or the purpose of the analysis. However, it is important to emphasize that your extra efforts in obtaining quality job analysis data will probably yield benefits in terms of information regarding the tasks responsible for the different physical demands of a MOS. The findings based on ratings of specific tasks will be useful for developing performance standards, training content, and assessment instruments, as well as for documenting and defending your procedures.

When sufficient task information has been obtained, the next step will be to convene a group of experts to rate the physical ability requirements of each task (i.e., physical abilities analysis).

Physical Abilities Analysis

In an attempt to translate the characteristics of jobs into the physical requirements of personnel, Physical Abilities Analysis was developed to identify the physical requirements of jobs. This approach is based on the extensive research indicating that neither a general physical proficiency factor, nor a general strength factor exists in performing physical work. This result was obtained from research where actual performances were observed on several hundred physical proficiency tasks. People who performed well on certain groups of tasks did not necessarily perform well on others. Correlations were computed among tasks and nine factors emerged accounting for a significant portion of the variance in physical task performance.

Nine basic physical abilities found useful in describing hundreds of separate physical performances can be used to evaluate the physical abilities required in jobs, as well as providing a basis for selecting measures most diagnostic of the separate abilities. Of these nine physical ability factors five are important to the present manual--four indices of strength and one index of stamina.² Results of past research indicate that a single strength factor is a meaningless concept. Instead, there are at least four separate strength factors that require assessment.

The first of these is dynamic strength. This is defined as the ability to exert muscular force repeatedly or continuously over time. It represents muscular endurance and emphasizes the resistance of the muscles to fatigue. The common emphasis of tasks involving this ability is on the ability of the muscles to propel, support, or move the body and/or objects repeatedly or to provide support for prolonged periods.

The second factor, trunk strength, is a more limited dynamic strength factor--specific to the trunk muscles, particularly the abdominal and lower back muscles.

A third strength factor is static strength. In contrast to dynamic strength that involves continuous or repeated support of the body's own weight as well as objects for prolonged times, static strength is the force an individual can exert against external objects (such as lifting heavy weights or pulling heavy equipment). It seems to represent the maximum force an individual can exert, even for a brief period, where the force is exerted up to some maximum effort. However, resistance to fatigue is not involved as is the case with dynamic strength.

The fourth strength factor is explosive strength. This is the

² Although there are other abilities besides the strength area (e.g., flexibility) an important antecedent to sex differences in physical competency appears to be strength and stamina factors; therefore, the physical abilities analysis developed for the Army incorporates the strength/stamina abilities.

ability to expend a maximum of energy in one or a series of explosive acts. This ability is distinguished from the other strength factors in requiring effective mobilization of energy for bursts of effort, rather than continuous strain or exertion of muscles. For example, jumping tasks involve this ability, as do short runs, such as the 50-yard dash. Apparently, "speed" or being able to run fast in these short sprints involves effective mobilization force by the legs against the ground. This ability is not as important in long endurance activities, but is important where short bursts of effort are required.

The final ability, stamina is the ability of the respiratory and circulatory systems to perform efficiently over prolonged time periods in relation to the workload. This ability is technically termed cardio-respiratory endurance and is limited by cardiac output. It is the ability of the heart to pump large quantities of blood in one stroke, and the oxygen carrying capacity of the blood.

Physical Abilities Analysis Manual. When the physical abilities technique was developed for the Army two adaptations to the original procedure were made to more adequately reflect the needs of the Army's personnel system and its work environment, as well as to advance the state of the art. These included separating the strength factors (i.e., dynamic, explosive and static) into upper and lower body extremities and clarifying the issue of task criticality.

Because some tasks performed by soldiers may require physical involvement of certain parts of the body more than other parts, and because research shows that differences between male and female physical competencies vary with the muscle groups involved (i.e., upper and lower body strength) the three original strength abilities (i.e., dynamic, static, and explosive) were expanded into more specific factors focusing either on the upper part of the body (i.e., muscle groups above the waist located in the hands, arms, upper back, and shoulders), or factors focusing on the lower part of the body (i.e., muscle groups below the waist located in the feet and legs). It is important to note that the definitions of the revised upper/lower body strength factors incorporate the same basic,

underlying meaning as the original abilities. For example, the only difference between upper and lower body strength factors is location of the muscle groups involved. The definition, comparison, and the seven-point scale for the seven strength factors as well as stamina and effort abilities are presented in the physical abilities analysis manual (see Appendix). The effort scale was included because of its "link" with other measures of physical demands of jobs. Research has shown that perceived effort in doing a task is related to actual caloric costs of performing the task. Effort rating can provide an overall estimate of the physical exertion associated with Army jobs or tasks.

The Physical Abilities Analysis Manual (PAAM) was adapted for the Army to assess the extent to which a job or tasks require these eight different abilities. For each ability there is a set of definitions that explains the ability and a chart that differentiates the ability from other abilities. Accompanying each definition is a rating scale that includes concrete examples of tasks representing different amounts of that ability. These examples represent a wide variety of tasks which would be familiar to raters using the scale, so that special training is unnecessary to use the technique. For example, looking at the scale "upper body static strength," the seven-point scale goes from "requires little muscle force to move a light object" to "requires use of maximum muscle force possible to lift, push, or pull a very heavy object." The specific task anchors given on this seven-point scale range from "lift one package of bond paper" (approximately level 1 on the scale) to "reach over and behind a table to lift a 70 lb. box onto the table" (which is about a level 6 on a seven-point scale). There are other examples to assist the rater. It is important to note that all scale values for task examples were determined empirically from previous research. In observing a new job, the rater looks at the tasks involved and places the job and/or tasks on the scale with respect to these definitions and examples given. He/she does this for each of the scales covering the physical abilities and effort in the manual.

To ensure that the physical ability requirements of Army jobs are based on important tasks, three scales measuring criticality are included in the manual--consequences of inadequate performance, task delay tolerance, and learning difficulty. Each scale represents a different aspect of criticality, and together they provide an overall estimate of task criticality. Past research has shown the scales yield reliable ratings. The scales are again constructed on a seven-point scale with anchors providing a description of the level of criticality including examples. The scales are presented in the physical abilities analysis manual (Appendix).

Administration of Physical Abilities Analysis Manual. A group of 20 to 30 incumbent soldiers, E-5 and above, who are experienced and knowledgeable of the Army MOS under investigation, should be assembled to complete the PAAM. Since they are providing estimates of both the physical requirements and task criticality it is recommended that the manual be completed by experienced soldiers trained and currently working in the MOS regardless of the task data availability.

When the group has been convened and the PAAMs have been passed to each member, the administrator reads aloud most parts of the manual starting with the Introduction which describes the purpose of the analysis and the contents of the manual (see Appendix). Next, the participants should be instructed to complete the biographical information (e.g., tenure, rank, MOS, and skill level). If there are no questions read the instructions for Part 1 which focuses on rating physical abilities in terms of overall job performance. No task information is provided. It describes the format for presenting each ability, criticality and effort scale using upper body static strength as an example.

The administrator reads the definitions, comparisons, and the seven-point scale. To help clarify the process, it is useful to provide the group with a task/job (not the one under study) and let them rate it on how much ability it takes to do the task. When everyone has completed rating the example task, ask the members their ratings. This may get

them involved in the work as well as give the administrator an idea of their understanding of the definitions and scales. Conclude each scale by having the participants rate how much ability it takes to do the job and place the appropriate number on the line provided at the bottom of each page. The group should continue to go through the manual in the same manner until all 12 scales have been completed.

After the group completes Part I the administrator reads aloud the instructions to Part II of the manual (see Appendix).³ This section of the PAAM contains the same 12 scales; however, in contrast to the first part the ratings are obtained for each task making up the MOS. The participants are to decide how much physical ability, criticality, and effort is associated with each task. A set of task statements representing the MOS follows each page describing the scales. The participants are to place the appropriate number on the line next to each task.

Part II may be completed as a group, waiting for everyone to finish each scale before proceeding onto the next scale, or by allowing the individuals to complete the manual on their own. The administrator will need to assess the participants degree of understanding the scales and the rating process. Allowing the participants to rate at their own pace, to provide flexibility, there is a potential danger that some may hurriedly record the ratings reducing the quality of the results. Consequently, it may be desirable to stress the importance of the study and how crucial it is that they are careful in providing the ratings. This is especially critical when there is a large number of tasks to be rated which can lead to monotony.

Data Analysis and Presentation of Results

Descriptive statistics can be calculated for each rating providing means, standard deviations, and frequency distributions. The statistics can provide a number of different insights. First, the tasks for an MOS

³ If task analysis data is not available then the group will not complete Part II.

may be ranked according to their average rating for each strength factor and stamina. A matrix of ability by MOS with mean ratings and standard deviations in the cells are useful when comparing overall physical demands of several MOSs. A profile can be developed for each MOS by using a seven-point scale on the left and right vertical axis and the different physical abilities across the horizontal axis. The title of the MOS can then be placed at the appropriate level on the scale for each ability (i.e., a profile for each MOS). For comparison reasons it might be useful to test the significance of a difference between average ratings based on the different MOS.

Second, based on the task rankings within an ability category for a MOS one can use the most demanding (i.e., top of ranked tasks) as the criterion task assuming that if one can perform this task he/she should be physically capable of performing less demanding tasks. A profile across all abilities of the criterion tasks for each MOS can be used to illustrate the findings. Such a figure will provide the physical ability requirements in terms of criterion tasks for measuring physical competencies of soldiers (i.e., is soldier physically competent to meet requirements of the job).

Since the standards may be used to screen out incompetent soldiers or identify failures in the training system, it is important that the physical ability standards (i.e., criterion tasks) are critical to the MOS. Therefore, each criterion task and associated physical ability should meet certain standards--reliable and judged as critical to the MOS. The overall criticality of a task can be determined based on the combined ratings of consequences of inadequate performance, delay tolerance, and learning difficulty. Reliability can be estimated in several ways. The standard deviation of the physical ability ratings for each task gives an indication of rater agreement. Intraclass correlation coefficients can be calculated for each scale in order to illustrate the amount of agreement among the raters regarding relative importance of the tasks requiring the ability.

PHYSICAL ABILITIES ANALYSIS MANUAL
FOR
ARMY JOBS

(Appendix)

INTRODUCTION

Physical Abilities Analysis is a method to evaluate the physical demands of jobs. Every job is made up of a group of tasks that must be completed effectively for the worker to exhibit successful job performance. Different jobs are made up of different tasks and require different abilities for effective performance. The abilities that we will consider are the physical traits of the worker that produce successful performance of the different tasks that make up the job.

Physical Ability Analysis describes the physical abilities needed to do the physical part of a job. This manual contains eight rating scales that pertain to one's physical abilities. These eight physical abilities include Upper and Lower Body Static, Dynamic, Explosive, and Trunk Strength and Stamina. The effort scale is included to provide an overall estimate of the physical exertion experienced in performing either a task or a job. The manual also contains three measures of criticality (i.e., consequences of inadequate performance, delay tolerance, and learning difficulty).

Each scale consists of seven points. The number "7" at the top of the scale is the greatest amount of physical ability and effort as well as the highest criticality any job could have. The number "1" at the bottom is the lowest amount of physical ability, effort, and criticality any job could have. Number "4" on the scale is an average or moderate amount.

The manual is separated into two parts. In Part I you will use the 12 scales to indicate two things about your job: the amount of physical abilities and effort required by the job, and the criticality of the job. In Part II, you will use the same 12 scales to indicate the amount of physical abilities and criticality for a series of tasks that make up your job. In other words, you will rate each task on each of the 12 scales.

More detailed and explicit instructions are provided at the beginning of each part of the manual.

Before continuing, please complete the following background information.

Background Information

1. Name _____
2. Social Security Number _____ 1: 2-10
3. What Year were You Born? _____ 1: 11-14
4. What is your sex? ___ 1. Female 1: 15
 ___ 2. Male
5. What is your race? ___ 1. White 1:16
 ___ 2. Black
 ___ 3. Malayan
 ___ 4. Oriental
 ___ 5. Hispanic
 ___ 6. Other
6. Your Grade? (e.g., E-5) _____ 1:17
7. What is your MOS? (e.g., 12B) _____ 1:18-19
8. What is your skill Level? (e.g., 3) _____ 1:20
9. How long have you been assigned
to your present MOS? _____ years 1:21-22
10. How long have you been in
the Army? _____ years 1:23-24

PART I

Ratings of Overall Job Requirements

Instructions

To use the Physical Abilities Analysis Manual you must be familiar with the definition of each ability. These abilities are defined and examples are given to tell you what the ability is and how it differs from other similar abilities. For example, to familiarize yourself with the manual turn the page and read the definition and comparison information for the first ability, Upper Body Static Strength. After you have finished reading the definition and comparisons, and feel you really understand it, you are ready to begin analyzing the job.

Next, think about the job you are describing. Do you think Upper Body Static Strength is needed or not needed to do this job? If it is not needed, place a zero in the appropriate space and proceed on to the next physical ability.

If, however, you think that the ability, Upper Body Static Strength is required to do the job, then you need to decide how much strength is needed and rate this according to the scale located below the definition and comparisons on the next page. The numbers 1 to 7 represent the amount of Upper Body Static Strength is required to perform the job. The number "7" at the top of the scale indicates the greatest amount of Upper Body Static Strength that any job could require. The number "1" at the bottom represents the lowest amount of Upper Body Static Strength any job could require. Number "4" is an average amount of Upper Body Static Strength. Examples of tasks that need different amounts of the ability are on the right-hand side of the scale. These examples are there to help you decide how much of the ability is needed to do the job you are describing. For example, "Reach over and behind a table to lift a 70 lb. box onto a table," is a task that requires a great deal of Upper Body Static Strength. If the job you are describing usually requires even more Upper Body Static Strength than this, it would be somewhere nearer to the "7" at the top of the scale. "Lift one package of bonded paper," requires very little Upper Body Static Strength. If the

job you are describing requires even less Upper Body Static Strength than this, it would be somewhere nearer to the "1" at the bottom of the scale. "Carry a 5 gallon bucket of water," requires more Upper Body Static Strength than "Lifting a package of bond paper," and much less than "Reach over and behind a table to lift a 70 lb. box onto a table."

Next, how do you decide how much Upper Body Static Strength is needed to do the job? Consider these steps:

First, think about what the worker does on the job you are describing that needs this ability.

Second, use the examples to the right of the scale by asking the questions, "Does the worker need more, just about the same, or less of the ability than this example?"

Some words of caution:

- (1) Assume the worker is trained and experienced.
- (2) Do not overrate the amount of Upper Body Static Strength required to do the job. It is often the case that people involved with a job assume it is more demanding than it really is.
- (3) If the worker performs a task requiring a great deal of Upper Body Static Strength frequently, it should be rated high.
- (4) If a worker performs a task requiring a great deal of Upper Body Static Strength infrequently but the task is important to the job, it should be rated high.

Choose a number on the scale from 7 to 1 that you think is the amount of the ability needed to do the job and place it in the box provided. We will then proceed through the remaining 7 physical abilities. The three criticality and the effort scales will be

completed in the same way, using the 7 point scale. Definitions for these scales are provided. Once you have read them, perform the ratings.

If you have any questions up to this point, please ask the administrator. If not, you may begin rating Upper Body Static Strength. Please stop when you have completed rating the job for each ability and wait for further instructions from the administrator about the next ability to be rated. We will go through the manual step by step as a group.

1. UPPER BODY STATIC STRENGTH

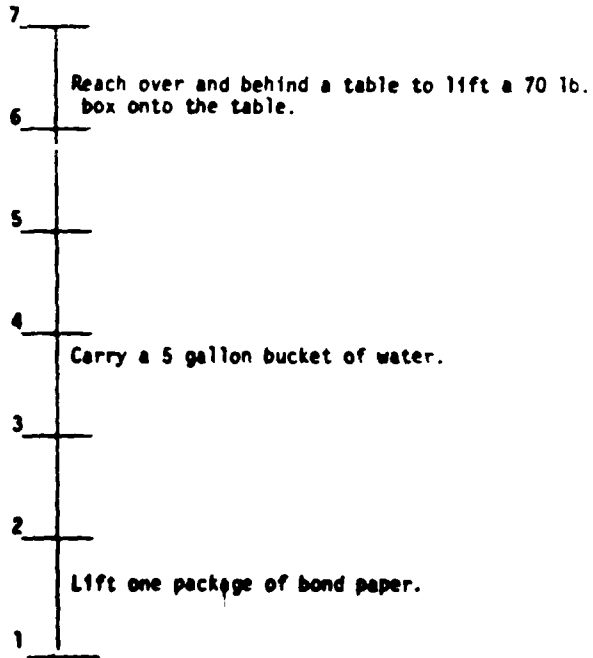
This is the ability to use muscle force in the upper part of the body (i.e., above the waist) in order to lift, push or pull objects. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW UPPER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs. vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time

1. UPPER BODY STATIC STRENGTH

Requires use of maximum muscle force above the waist necessary to lift, push or pull very heavy objects.



Requires use of little muscle force above the waist necessary to lift, push or pull light objects.

Using the 7-point scale please rate how much Upper Body Static Strength it takes to do the job. Place appropriate number on the line. ()

2. LOWER BODY STATIC STRENGTH

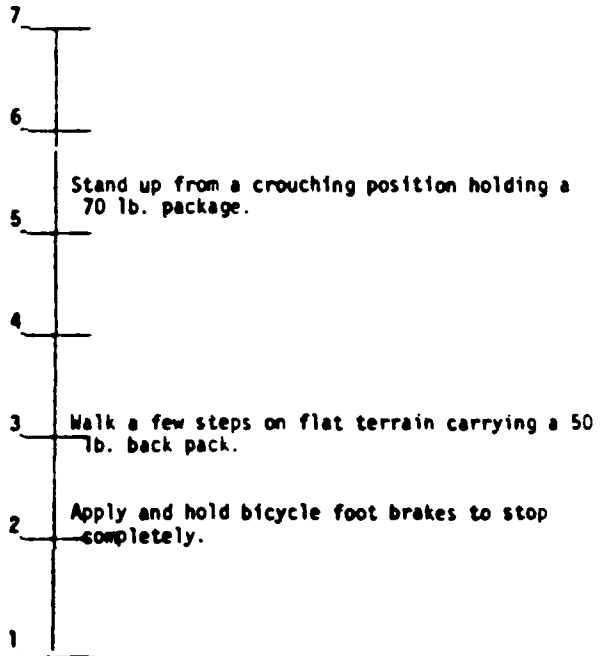
This is the ability to use muscle force in the lower part of the body (i.e., below the waist) in order to lift, carry, push or pull objects. This ability can involve a combination of muscles located in the feet, legs, and lower back.

HOW LOWER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without <u>stopping</u> , up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time.

2. LOWER BODY STATIC STRENGTH

Requires use of maximum muscle force below the waist necessary to lift, carry, push or pull a very heavy object.



Requires use of a little muscle force below the waist necessary to lift, carry, push or pull a light object.

Using the 7-point scale please rate how much Lower Body Static Strength it takes to do the job. Place appropriate number on the line. (_____)

4. LOWER BODY DYNAMIC STRENGTH

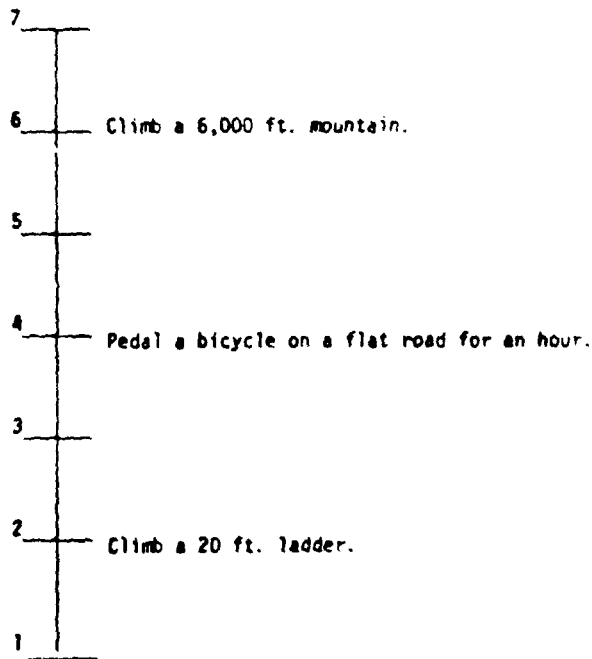
This ability involves the degree to which the muscles in the lower part of the body (i.e., below the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the feet and legs.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects repeatedly.	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up or move one's <u>entire body</u> weight with feet and legs.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the <u>specific muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not get winded during physical exertion.

4. LOWER BODY DYNAMIC STRENGTH

Requires use of all maximum muscle force below the waist to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force below the waist to hold up or move the body weight or objects for a short time

Using the 7-point scale please rate how much Lower Body Dynamic Strength it takes to do the job. Place appropriate number on the line. (_____)

5. UPPER BODY EXPLOSIVE STRENGTH

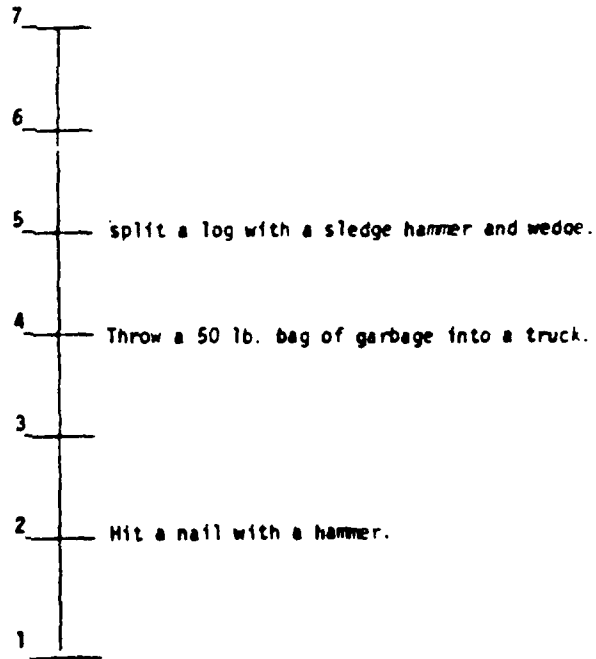
This is the ability to use short bursts of muscle force in the upper part of the body (i.e., above the waist) to propel one's self, as in throwing objects. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Does <u>not</u> involve use of muscle force over a long time.	vs.	Stamina (S): <u>Does</u> involve physical exertion over a long period of time.

5. UPPER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force above the waist to propel one's own body weight or objects.



Requires bursts of a little muscle force above the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Upper Body Explosive Strength it takes to do the job. Place appropriate number on the line. ()

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6. LOWER BODY EXPLOSIVE STRENGTH

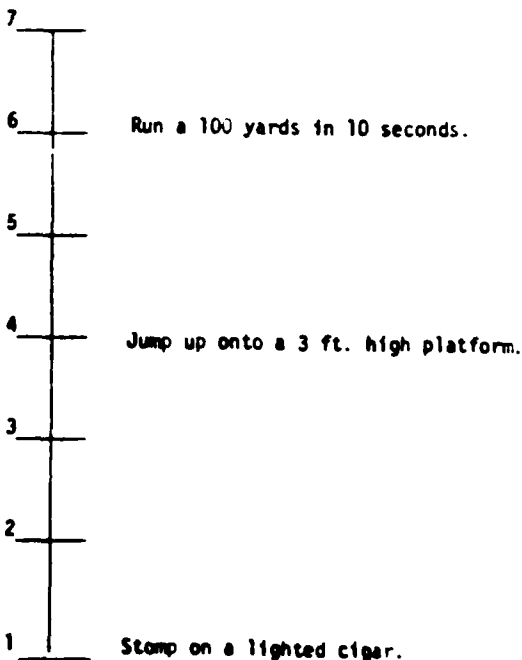
This is the ability to use short bursts of muscle force in the lower part of the body (i.e., below the waist) to propel one's self, as in jumping or sprinting. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the feet and legs.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (S): <u>Does</u> involve physical exertion over a long time.

6. LOWER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force below the waist necessary to propel one's own body weight or objects.



Requires bursts of a little muscle force below the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Lower Body Explosive Strength it takes to do the job. Place appropriate number on the line. (_____)

1:30

7. TRUNK STRENGTH

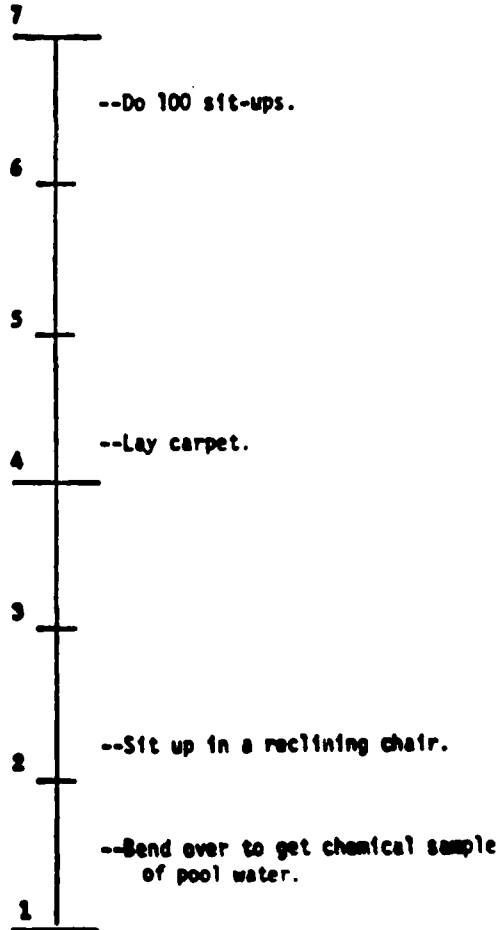
This ability involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not "give out," or fatigue, when they are put under such repeated or continuous strain.

HOW TRUNK STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles.	vs.	Dynamic Strength (3): Hold up or move one's <u>entire</u> body weight with the arms and shoulder muscles.
Hold up or move part of one's <u>body weight</u> .	vs.	Static Strength (1): Move <u>objects</u> .
Use your stomach and back muscles to <u>continue to hold up</u> or <u>move</u> part of one's body.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel one's body or an object.
Involves the degree to which the <u>stomach and back muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

7. TRUNK STRENGTH

Requires use of all the stomach and lower back muscle force possible to hold up or move part of your body for as long as possible.



Requires use of a little stomach and lower back muscle force to hold up or move part of your body for a short time.

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Using the 7-point scale please rate how much Trunk Strength it takes to do the job. Place appropriate number on the line. (_____)

8. STAMINA

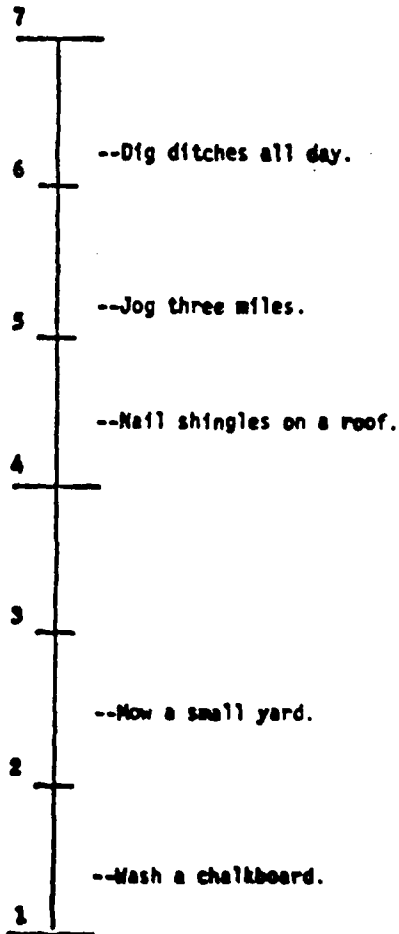
This is the ability to exert oneself physically over a period of time without getting winded or out of breath.

HOW STAMINA IS DIFFERENT FROM OTHER ABILITIES:

Does involve physical exertion over a long time.	vs.	Static Strength (1) and Explosive Strength (2): Do <u>not</u> involve using muscle force over a long time.
Involves not getting <u>winded</u> .	vs.	Dynamic Strength (3) and Trunk Strength (4): Involves one's <u>muscles</u> not getting tired.

8. STAMINA

Requires physical activity of the whole body over a long time, with great strain on the heart and blood vessels.



Requires physical activity of the whole body over a short time with little strain on the heart and blood vessels.

Using the 7-point scale please rate how much Stamina it takes to do the job. Place appropriate number on the line. ()

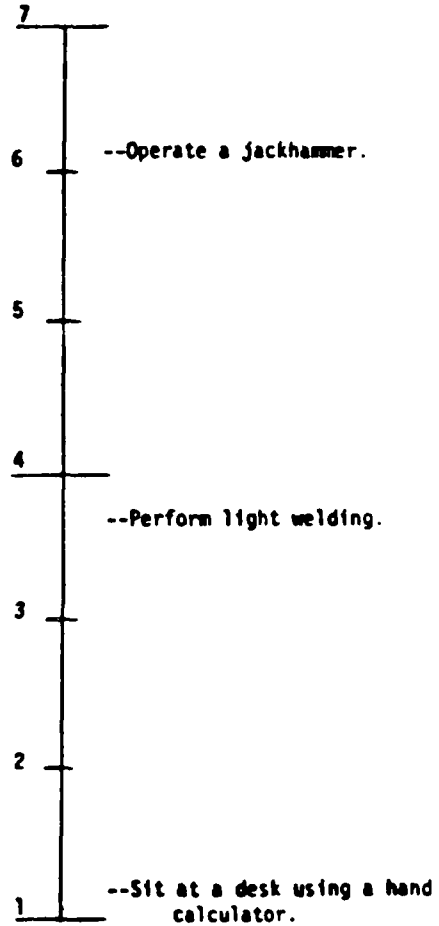
9. EFFORT

This is the degree of physical exertion experienced in performing either a single task or a series of tasks.

9. EFFORT

Requires extensive physical exertion.

Requires little physical exertion.



Using the 7-point scale please rate how much Effort it takes to do the job. Place appropriate number on the line.

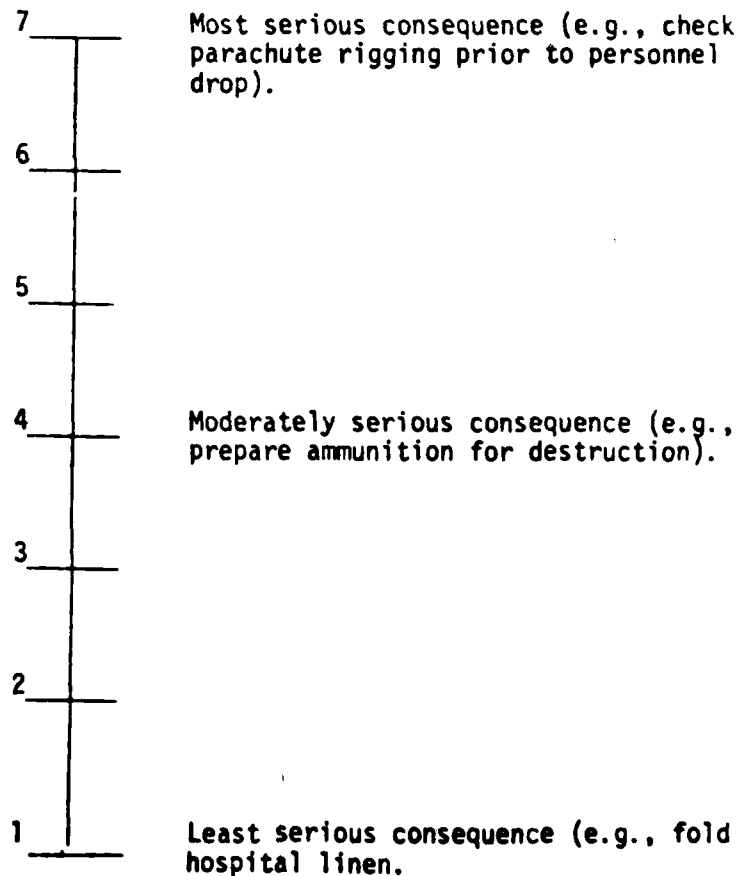
(_____)

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10. CONSEQUENCES OF INADEQUATE PERFORMANCE

This scale is a measure of the seriousness of probable consequences of inadequate performance of a job. It is defined in terms of possible injury or death, wasted supplies, damaged equipment, and wasted man-hours of work. The work is to be rated on a scale from 1 (Least Serious Consequences of Inadequate Performance) to 7 (Most Serious Consequences of Inadequate Performance) with intermediate levels defined as follows:

What will happen if the job is inadequately performed?



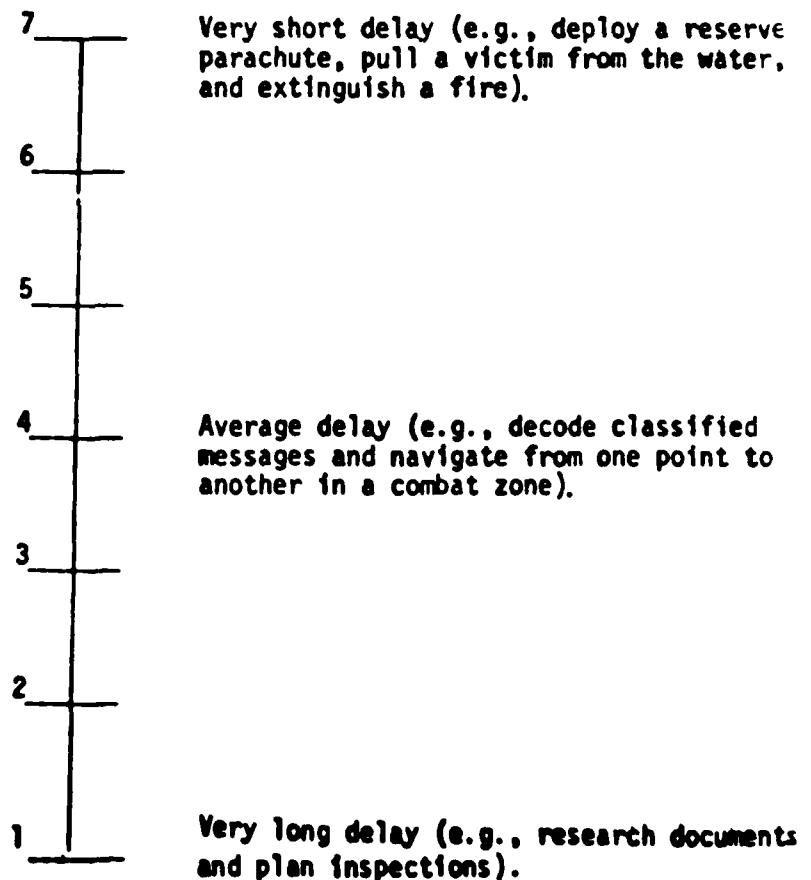
Using the 7-point scale please rate what will happen if the job is inadequately performed. Place appropriate number on the line.

(_____)

11. DELAY TOLERANCE

This scale is a measure of how much delay work performance can be tolerated between the time the soldier becomes aware that the work must be performed and the time he must begin doing it. Must the soldier begin immediately, or does he have time to consult a manual, seek guidance, or even be taught to do it? The work is to be rated on a scale from 1 (Very Long Delay Tolerance) to 7 (Very Short Delay Tolerance) with intermediate levels defined as follows:

How much delay before performing
the job is acceptable?



Using the 7-point scale please rate how much delay before performing the job is acceptable. Place appropriate number on the line.

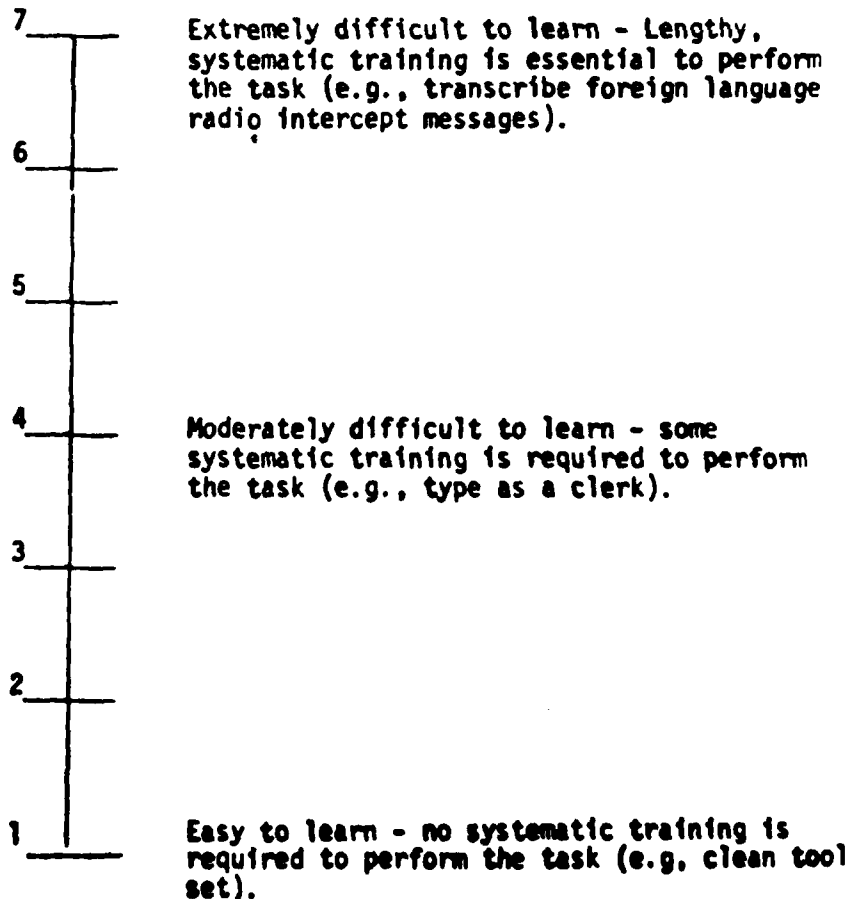
(_____)

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12. LEARNING DIFFICULTY

This scale is a measure of the need for lengthy, systematic training before a new member of the appropriate Army specialty could perform the job adequately. It may be thought of as the difficulty involved in "picking up" the job. The work is to be rated on a scale from 1 (Easy to Learn) to 7 (Extremely Difficult to Learn) with intermediate levels defined as follows:

How difficult is the job to learn?



Using the 7-point scale please rate how difficult it is to learn the job. Place appropriate number on the line. ()

PART II

Rating of Task Requirements

Instructions

Now that you have completed Part I you will be using the same 12 scales to rate physical abilities, criticality, and team performance for a series of tasks in your MOS.

For example, the first scale is again Upper Body Static Strength. Read the first task on the list, and then think about the definition of Upper Body Static Strength. Do you think Upper Body Static Strength is needed or not needed to do this task? If it is not needed place a zero and proceed on to the next task in the list. If, however, you think the ability is required to do the task, then you need to decide how much Upper Body Static Strength is needed. Use the 7 point scale and choose the number you think is the amount of the ability needed to do the task. Place the number on the line next to the task. Please continue through all of the tasks and place the appropriate number on the line next to each task.

When you have rated all of the tasks for Upper Body Static Strength stop and wait for further instructions. We will then proceed as a group in the same fashion through the remaining 11 scales.

If you have any questions, please ask the administrator. If not, you may begin.

1. UPPER BODY STATIC STRENGTH

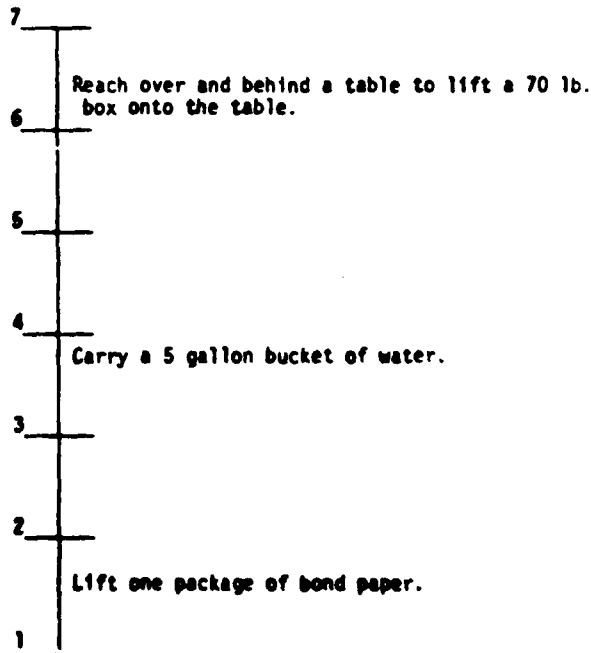
This is the ability to use muscle force in the upper part of the body (i.e., above the waist) in order to lift, push or pull objects. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW UPPER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs. vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time

1. UPPER BODY STATIC STRENGTH

Requires use of maximum muscle force above the waist necessary to lift, push or pull very heavy objects.



Requires use of little muscle force above the waist necessary to lift, push or pull light objects.

Using the 7-point scale please rate how much Upper Body Static Strength it takes to perform each of the following tasks on the next page.

TASK LIST

Insert List of Tasks representing the MOS under investigation. Leave space next to each task to allow participants to record their ratings.

The same List of Tasks should be placed after each ability and/or criticality page.

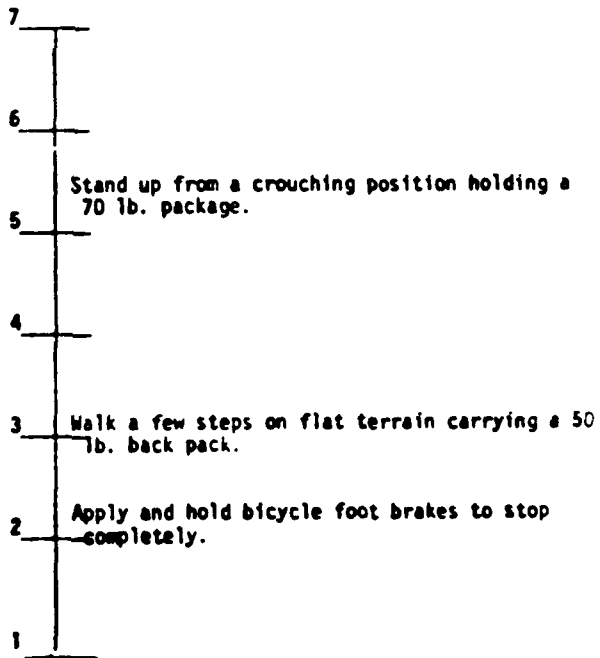
This is the ability to use muscle force in the lower part of the body (i.e., below the waist) in order to lift, carry, push or pull objects. This ability can involve a combination of muscles located in the feet, legs, and lower back.

HOW LOWER BODY STATIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use muscle to exert force against <u>objects</u> .	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Use <u>continuous</u> muscle force, without stopping, up to the amount needed to lift, push, pull or carry an object.	vs.	Explosive Strength (2): Gather energy to move one's own body to propel some object with <u>short bursts</u> of muscle force.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time.

2. LOWER BODY STATIC STRENGTH

Requires use of maximum muscle force below the waist necessary to lift, carry, push or pull a very heavy object.



Requires use of a little muscle force below the waist necessary to lift, carry, push or pull a light object.

Using the 7-point scale please rate how much Lower Body Static Strength it takes to perform each of the following tasks on the next page.

3. UPPER BODY DYNAMIC STRENGTH

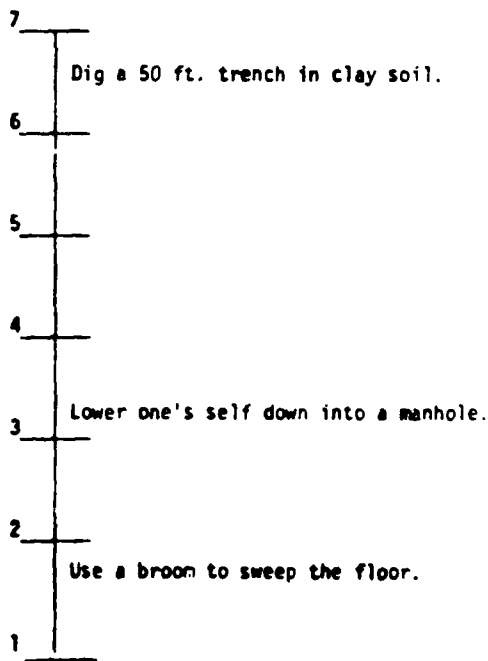
This ability involves the degree to which the muscles in the upper part of the body (i.e., above the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the hands, arms, upper back and shoulders.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's body weight or objects <u>repeatedly</u> .	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up or move one's <u>entire</u> body weight with hands and arms.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using mainly stomach and lower back muscles.
Involves the degree to which the <u>specific muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not get winded during physical exertion.

3. UPPER BODY DYNAMIC STRENGTH

Requires use of maximum muscle force above the waist necessary to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force above the waist to hold up or move the body weight or objects for a short time.

Using the 7-point scale please rate how much Upper Body Dynamic Strength it takes to perform each of the following tasks on the next page.

4. LOWER BODY DYNAMIC STRENGTH

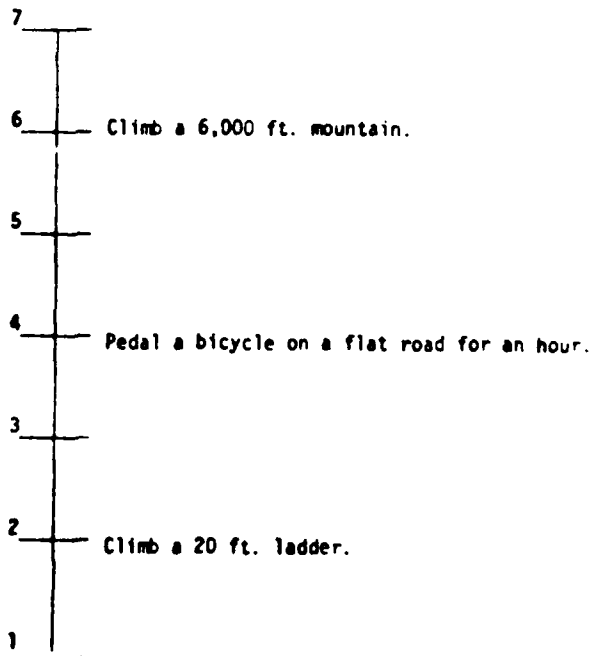
This ability involves the degree to which the muscles in the lower part of the body (i.e., below the waist) do not fatigue when exerted in repeated or continuous movements. This is the ability to support, hold up, or move the body's own weight and/or objects repeatedly or continuously over time using muscles located in the feet and legs.

HOW DYNAMIC STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move one's <u>body weight</u> or objects <u>repeatedly</u> .	vs.	Static Strength (1): Exert force against objects.
Use one's muscles to <u>continue to hold up or move</u> one's body weight or an object.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel the body or an object.
Hold up or move one's <u>entire</u> body weight with feet and legs.	vs.	Trunk Strength (4): Hold up or move <u>part</u> , not all, of your body, using <u>mainly</u> stomach and lower back muscles.
Involves the degree to which the <u>specific muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one does not get winded during physical exertion.

4. LOWER BODY DYNAMIC STRENGTH

Requires use of all maximum muscle force below the waist to hold up or move the body weight or objects for long periods.



Requires use of a little muscle force below the waist to hold up or move the body weight or objects for a short time

Using the 7-point scale please rate how much Lower Body Dynamic Strength it takes to perform each of the following tasks on the next page.

5. UPPER BODY EXPLOSIVE STRENGTH

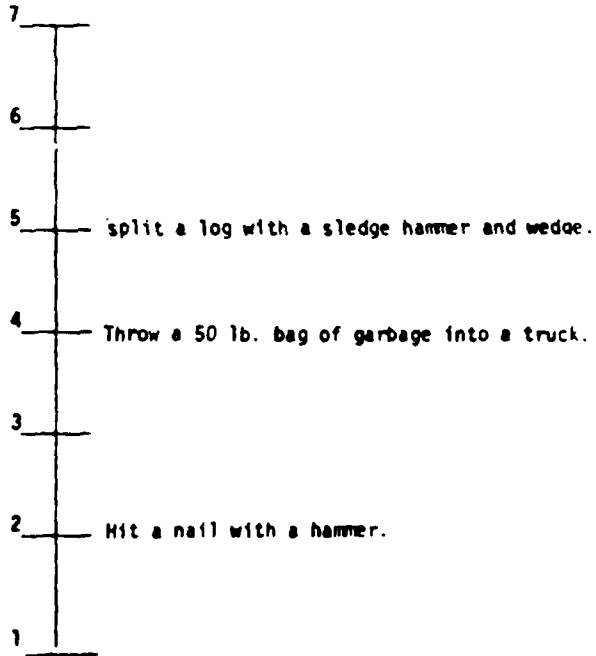
This is the ability to use short bursts of muscle force in the upper part of the body (i.e., above the waist) to propel one's self, as in throwing objects. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the hands, arms, upper back, and shoulders.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Does <u>not</u> involve use of muscle force over a long time.	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long period of time.

5. UPPER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force above the waist to propel one's own body weight or objects.



Requires bursts of a little muscle force above the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Upper Body Explosive Strength it takes to perform each of the following tasks on the next page.

6. LOWER BODY EXPLOSIVE STRENGTH

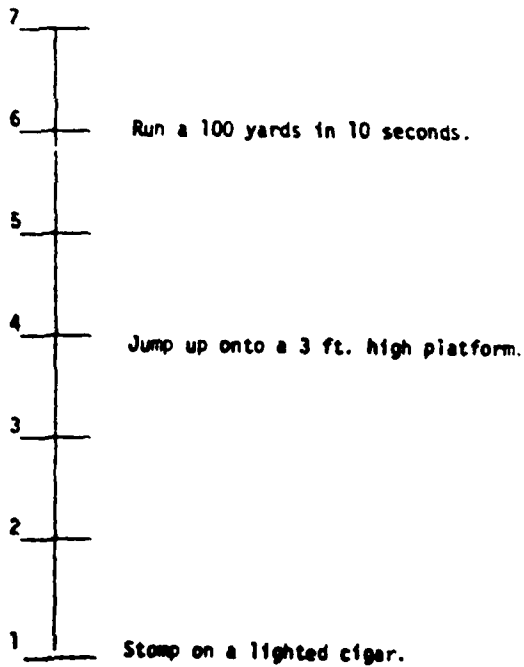
This is the ability to use short bursts of muscle force in the lower part of the body (i.e., below the waist) to propel one's self, as in jumping or sprinting. It requires gathering energy for bursts of muscular effort. This ability can involve a combination of muscles located in the feet and legs.

HOW EXPLOSIVE STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Use <u>short bursts</u> of muscle force to move the body or an object.	vs.	Trunk Strength: Use muscle power <u>repeatedly</u> to hold up or move part, not all, of one's body, using stomach and lower back muscles. Dynamic Strength: Use muscle power <u>repeatedly</u> to hold up or move one's <u>entire</u> body weight or objects using hands, arms, shoulders, legs and feet.
Does <u>not</u> involve the use of muscle force over a long time.	vs.	Stamina (5): <u>Does</u> involve physical exertion over a long time.

6. LOWER BODY EXPLOSIVE STRENGTH

Requires bursts of maximum muscle force below the waist necessary to propel one's own body weight or objects.



Requires bursts of a little muscle force below the waist to move one's own body weight or objects.

Using the 7-point scale please rate how much Lower Body Explosive Strength it takes to perform each of the following tasks on the next page.

7. TRUNK STRENGTH

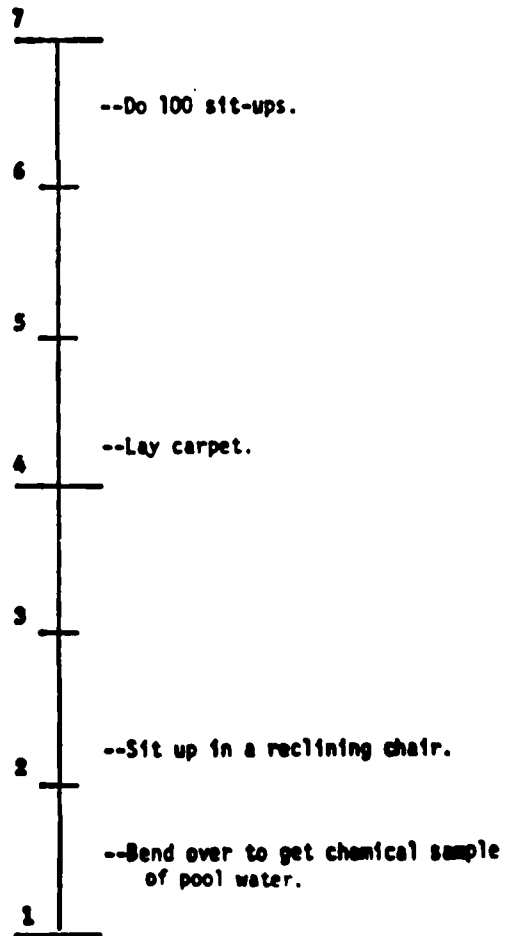
This ability involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not "give out," or fatigue, when they are put under such repeated or continuous strain.

HOW TRUNK STRENGTH IS DIFFERENT FROM OTHER ABILITIES:

Hold up or move <u>part</u> , not all, of one's body, using stomach and lower back muscles.	vs.	Dynamic Strength (3): Hold up or move one's <u>entire</u> body weight with the arms and shoulder muscles.
Hold up or move part of one's <u>body weight</u> .	vs.	Static Strength (1): Move <u>objects</u> .
Use your stomach and back muscles to <u>continue to hold up</u> or <u>move</u> part of one's body.	vs.	Explosive Strength (2): Use <u>short bursts</u> of muscle force to propel one's body or an object.
Involves the degree to which the <u>stomach and back muscles</u> do not give out.	vs.	Stamina (5): Involves the degree to which one <u>does not get winded</u> during physical exertion.

7. TRUNK STRENGTH

Requires use of all the stomach and lower back muscle force possible to hold up or move part of your body for as long as possible.



Requires use of a little stomach and lower back muscle force to hold up or move part of your body for a short time.

Using the 7-point scale please rate how much Trunk Strength it takes to perform each of the following tasks on the next page.

8. STAMINA

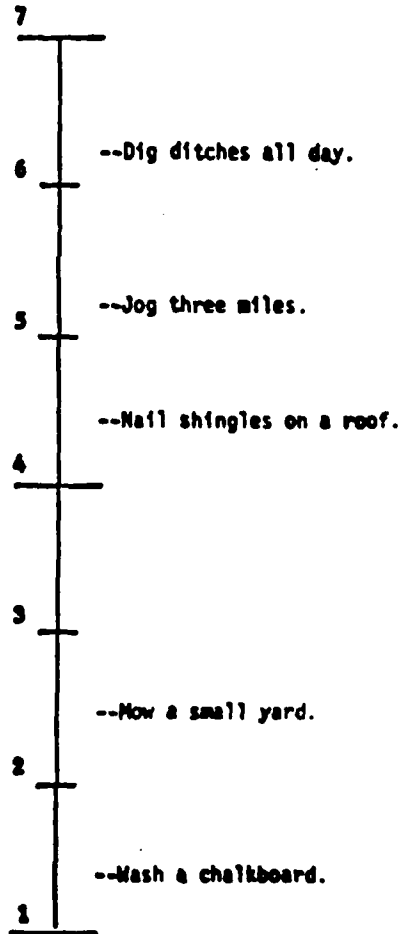
This is the ability to exert oneself physically over a period of time without getting winded or out of breath.

HOW STAMINA IS DIFFERENT FROM OTHER ABILITIES:

Does involve physical exertion over a long time.	vs.	Static Strength (1) and Explosive Strength (2): Do <u>not</u> involve using muscle force over a long time.
Involves not getting <u>winded</u> .	vs.	Dynamic Strength (3) and Trunk Strength (4): Involves one's <u>muscles</u> not getting tired.

8. STAMINA

Requires physical activity of the whole body over a long time, with great strain on the heart and blood vessels.



Requires physical activity of the whole body over a short time with little strain on the heart and blood vessels.

Using the 7-point scale please rate how much Stamina it takes to perform each of the following tasks on the next page.

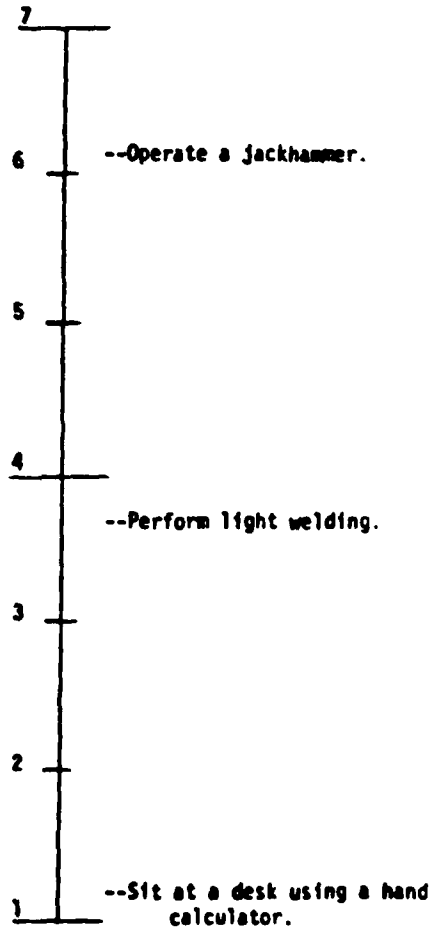
9. EFFORT

This is the degree of physical exertion experienced in performing either a single task or a series of tasks.

9. EFFORT

Requires extensive physical exertion.

Requires little physical exertion.

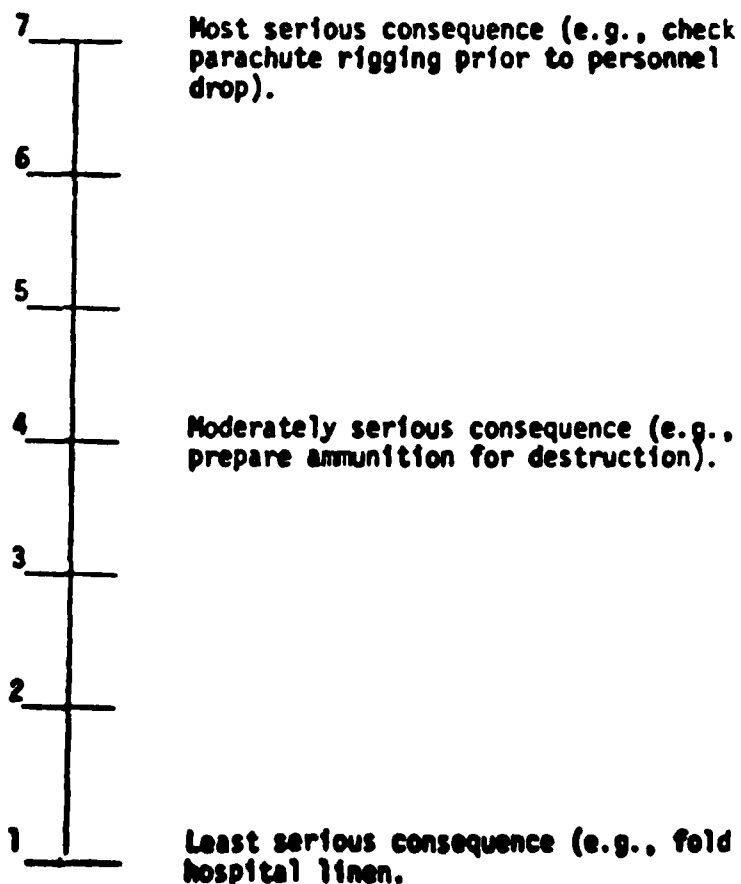


Using the 7-point scale please rate how much Effort it takes to perform each of the following tasks on the next page.

10. CONSEQUENCES OF INADEQUATE PERFORMANCE

This scale is a measure of the seriousness of probable consequences of inadequate performance of a task. It is defined in terms of possible injury or death, wasted supplies, damaged equipment, and wasted man-hours of work. The work is to be rated on a scale from 1 (Least Serious Consequences of Inadequate Performance) to 7 (Most Serious Consequences of Inadequate Performance) with intermediate levels defined as follows:

What will happen if the task is inadequately performed?

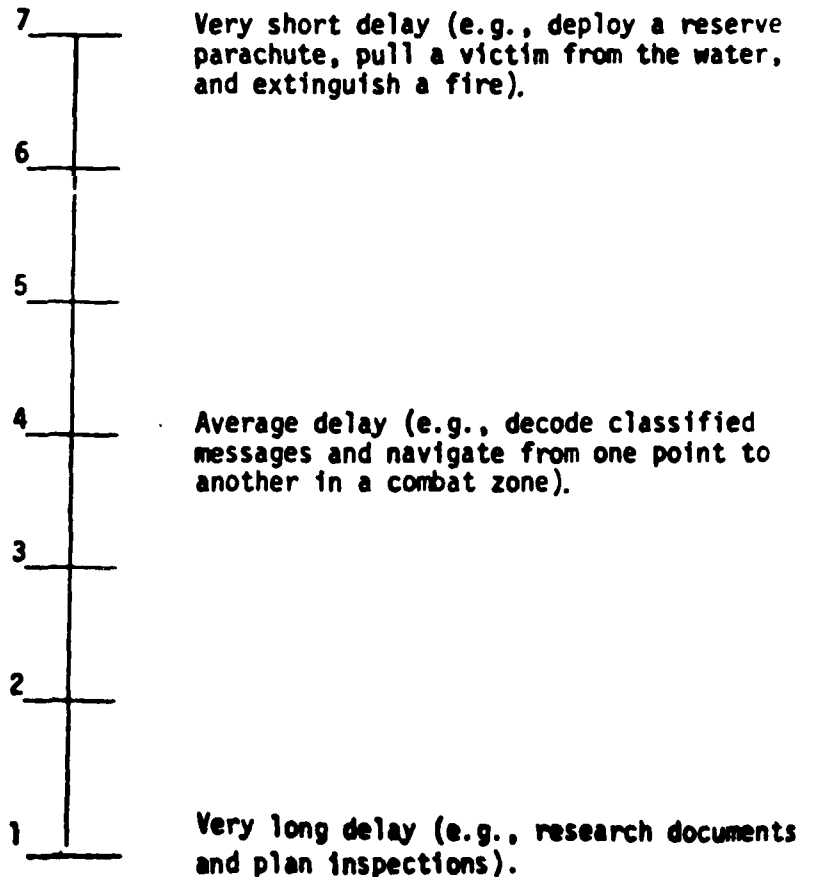


Using the 7-point scale please rate what will happen if the task is inadequately performed.

11. DELAY TOLERANCE

This scale is a measure of how much delay work performance can be tolerated between the time the soldier becomes aware that the work must be performed and the time he must begin doing it. Must the soldier begin immediately, or does he have time to consult a manual, seek guidance, or even be taught to do it? The work is to be rated on a scale from 1 (Very Long Delay Tolerance) to 7 (Very Short Delay Tolerance) with intermediate levels defined as follows:

How much delay before performing the task is acceptable?

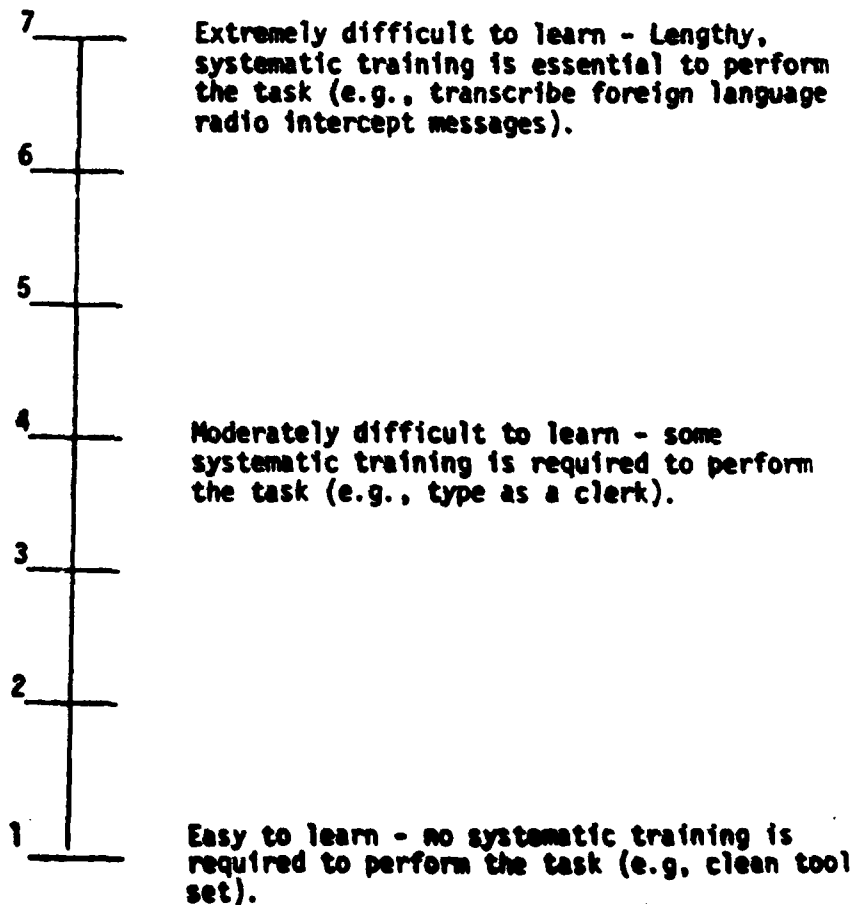


Using the 7-point scale please rate how much delay before performing the task is acceptable.

12. LEARNING DIFFICULTY

This scale is a measure of the need for lengthy, systematic training before a new member of the appropriate Army specialty could perform the task adequately. It may be thought of as the difficulty involved in "picking up" the task. The work is to be rated on a scale from 1 (Easy to Learn) to 7 (Extremely Difficult to Learn) with intermediate levels defined as follows:

How difficult is the task to learn?



Using the 7-point scale please rate how difficult it is to learn the task.