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PROGRESS REPORT.

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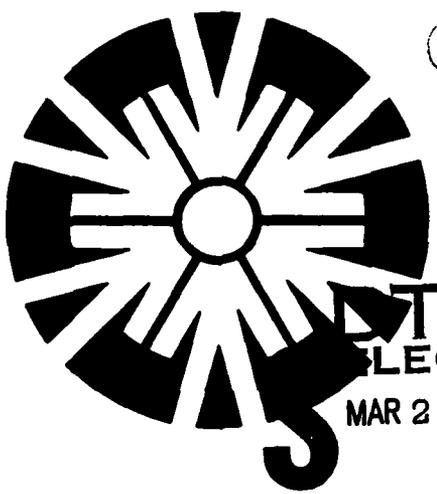
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LEVEL

6 ESTABLISHING CRITERIA FOR ASSIGNING PERSONNEL TO AIR FORCE JOBS.

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SUMMARY

~~1~~ This initial report presents a comprehensive summary of the activities and accomplishments during the first year by the contractor, the Institute for Biotechnology, Texas Tech University. Performing under the sponsorship of the Air Force Office of Scientific Research and the technical monitorships of the Air Force Medical Research Lab and Human Resources Lab, the contractor's program is directed toward improving the Air Force's present capability to select and assign personnel to Air Force Specialty Codes (AFSCs). This is being accomplished through the development of a validated objective criterion with which the Air Force can reliably evaluate the compatibility of an individual's ability, or inability, to successfully perform a selected set of well defined demanding tasks within a wide variety of Air Force career fields and jobs.

Primary efforts during the first year were focused on the initial job analysis phase of the project. In this phase each Air Force Specialty Code (AFSC) is surveyed to identify the tasks which require significant physical demands. These tasks are quantified, using an appropriate physical unit through the use of task analysis, such that an accurate assessment of demands can be made. From this list of tasks for each AFSC, a set of tasks known as Performance Criteria Tasks (PCTs) will be selected. An individual's performance on these PCTs, then, will determine whether or not the individual is successful or not in performing the physically demanding tasks within the AFSC.

This report discusses the questionnaires developed for the field surveys to be conducted, the rationale and sampling scheme used for the selection of tasks, the preliminary questionnaire used in the field survey of the initial 45 AFSCs, and the basic questionnaire to be used on the accompanying follow-up survey. An analysis of the preliminary survey data and discussion of other project interface activities completes the presentation of significant accomplishments during the first year. The report closes with an outline of the future activities planned in the near term portion of the project.

Examples of the survey questionnaires developed can be found in the appendices along with samples of data collected to date. A Master Program Schedule is also included in Section II of the report to assist the reader in obtaining the big picture view of the project in terms of major milestones planned and the status to date against the overall plan.

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SECTION I

INTRODUCTION

The primary objective of this project is to develop and validate objective criterion with which the Air Force can reliably evaluate the compatibility of an individual's physical capacities with the physical demands of the various Air Force Specialty Codes (AFSCs). The validity of the criterion will be measured by the individual's ability, or inability, to successfully perform a selected set of well defined, significantly demanding tasks within an AFSC.

The methodology for accomplishing the objective is divided into several phases. Each of these phases and their interrelationships and interdependencies, as related to the development of the objective assignment criteria, is an inherent part of the technical effort to be performed.

Validation of the Initial Assignment Criterion is intended to demonstrate that an individual's strength and stamina assessments, (measured by primary aptitude tests) are within five percent of the individual's strength and stamina assessments (measured by secondary aptitude tests) and successfully predict an individual's capability to perform work requiring a specified level of demand.

Furthermore, validation of the Final Assignment Criterion should demonstrate that assignment tests can be used to classify individuals according to their ability to perform work with a certain level of demand. This method is designed to demonstrate that 95 percent of the individuals successfully performing the tasks classified as requiring a certain level of demand can pass the test with a certain or larger strength assessment, and that 95 percent of the individuals who have not performed successfully on tasks classified as requiring a certain level of demand cannot pass the tests with an equivalent or larger strength and stamina assessment.

The following is a summary description of the categories of activities and the key factors to be considered:

Job Analysis

Perform a comprehensive job analysis encompassing the following activities:

An operational definition of the levels of physical demands of tasks.

A procedure for task analysis and quantification of those tasks which have significant physical demands.

Quantification of the demands of tasks which require significant physical demands.

Identification of well defined tasks which will be referred to as Performance Criteria Tasks (PCTs).

Translate Job Demands to Physical Capacities

Job demands will be translated to physical capacities by:

Identification of a battery of objective Strength/Stamina Aptitude Tests which can be used to accurately determine an individual's maximum safe physical capability to perform significantly demanding tasks, as defined in the job analysis activities above.

A manual to describe the tests used in the battery, the procedures and equipment required in the administration of the tests, and use of resultant scores. These manuals can be used for training personnel prior to having them administer for test batteries.

The Strength/Stamina Aptitude tests will take into consideration the following factors:

Consistency with the strength and endurance values resulting from the initial task analyses and quantification.

Upper body strength, lower body strength, and whole body strength.

Present versus potential future physical condition, Armed Forces Entrance and Examining Station (AFEES) and Basic Military Training (BMT) schedule impacts.

Test administration in terms of equipment, time, and personnel.

Validation

The finalization and validation of assignment criteria will take into consideration the following factors:

An "assignment criterion" (both initial and final) that is to be used to evaluate the physical capacities of personnel to be enlisted and/or reassigned in order to predict success or non-success in heavy jobs.

Validation of the analysis of the Initial Assignment Criterion and subsequently the Final Assignment Criterion.

Documentation of the completed project which will include the Primary and Secondary Test Batteries and a test manual for each battery.

Figure 1 presents the Master Program Schedule for this program. This schedule depicts the major milestones to be accomplished within each category of program activities. For convenience, the activities are time-phased with reference to the three scales (calendar year, fiscal year, and months from go-ahead). The Master Program Schedule, combined with the contractor's proposal Integrated Flow Diagram that identifies the interactions and interdependencies of activities, serves as the overall schedule planning document from which more detailed schedules and flow networks are developed to insure proper program planning, control, tracking, and reporting of actual performance against planned performance. This initial annual report focuses primary attention on the significant accomplishments during the first year. This is followed by a summary look into the expected future accomplishments for next year and identification of the major milestones to be accomplished in the out-years.

Note, the Master Program Schedule portrays an integrated "wave concept" for administering survey Questionnaires #1 and #2 in the field. This insures an orderly screening process for the collection of essential data, adequate analysis of the data, and comprehensive coverage of the many Air Force jobs to be surveyed.

Although not shown on the summary schedule (for the sake of clarity), numerous other interfacing activities are taking place with representatives from the Army and Navy currently involved in similar research projects. It is equally important to establish an early interface with such other related types of studies and projects being conducted within the Air Force. Specifically, this contractor's project for establishing criteria for assigning personnel to Air Force jobs must also be viewed in terms of the recognized interface that exists.

At the present time, the Air Force is operating the Advanced Personnel Data System, Procurement Management Information System (APDS-PROMIS) as an aid in assigning new personnel to Air Force jobs. This system utilizes job property information, personal characteristics, and Air Force personnel requirements in order to obtain maximum overall effectiveness in matching personnel to various Air Force jobs (Ward, 1978). The information resulting from this research on Air Force jobs requiring heavy work may provide useful inputs to the PROMIS program.

Discussions with personnel at the Air Force Human Resources Laboratory (HRL), indicated that the information generated by this research pertaining to strength and stamina could be incorporated into the PROMIS system. One area of application would be in the "job properties array." This array contains relevant job-attribute information, including relative difficulty, that is used in the personnel assignment system. It appears feasible that information from this research concerning strength and stamina requirements of various AFSCs could become part of the job properties array.

The second area of application relates to the "person-characteristics array" which, in the PROMIS System, represents the relevant person-attribute information used in the personnel assignment procedure. Information from the Strength/Stamina Aptitude tests could act as an input to the person-characteristics array in the system. The strength and stamina aptitudes of personnel could then be compared with the data contained in the job properties array of a particular AFSC to ensure compatibility.

Since the incorporation of the strength and stamina information obtained from this research into the PROMIS system data base appears highly feasible, additional work during the next year will be directed at determining the necessary format required to input the information into the system in a timely and effective manner.

FIGURE 1

MASTER PROGRAM SCHEDULE

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
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By _____	
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**FIGURE 1
MASTER PROGRAM SCHEDULE**

Calendar Year	1978	1979											
Fiscal Year	FY '79												
Month	O	N	D	J	F	M	A	M	J	J	A	S	O
PROGRAM MANAGEMENT Physical Demands Survey. (Wave Concept)	Project Planning Report Questionnaire #1 Wave I Questionnaire #2												
JOB ANALYSIS .Assemble Tasks Lists for 240 AFSCs .Develop Survey Questionnaire to Identify AFSC Tasks Requiring Significant Demands .Modify Survey Plan (Two Questionnaires) .Administer Survey Questionnaires #1 .Develop Survey Questionnaires #2 .Administer Survey Questionnaires #2 .Identify Requirements for Questionnaire #2 .Conduct Sample Survey of Questionnaire #2 .Refine/Finalize Questionnaire #2 .Analyze Preliminary Questionnaire #1 Data .Develop Sampling Scheme for Selecting Data .Select Tasks/AFSC to be used in Survey (Q#2) .Validate Tasks Selected .Finalize Tasks Selected for Survey (Q#2) .Visit/Analyze AFEES Schedules .Visit/Analyze BMT Schedule .Identify Interface with PROMIS Program .Perform Hazard Analysis & Procure Test Equipment for Task Qualification .Quantify AFSC Tasks into Physical Units .Select Performance Criteria Tasks (PCTs)													
TRANSLATE JOB DEMANDS TO PHYSICAL CAPACITIES .Translate PCTs to Physical Capacities .Test Documentation and Inventory .Perform Hazard Analysis & Procure Equipment for Physical Capacities .Identify Candidates for Test Battery .Administer Candidate Tests													
VALIDATION .Perform Hazard Analysis & Procure Equipment for Longitudinal Validation .Validate Assignment Criteria .Validate BMT Testing .Complete Validation													
FINAL REPORT													
Months From Go-Ahead	1	2	3	4	5	6	7	8	9	10	11	12	13

Note: This schedule reflects latest revisions as of September 31, 1979

1979		1980						1981				1982				1983							
FY '80												FY '81				FY '82				FY '83			
O	N	O	J	F	M	A	M	J	J	A	S	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<p style="text-align: center;">Report ▲</p> <p>▲Wave II ▲ ▲Wave III ▲ ▲ Wave I ▲ ▲ Wave II ▲ ▲Wave III▲</p>												<p style="text-align: center;">Report ▲</p>				<p style="text-align: center;">Report ▲</p>							
13	14	15	16	17	18	19	20	21	22	23	24	27	30	33	36	39	42	45	48	51	54	57	60

SECTION II

SIGNIFICANT ACCOMPLISHMENTS DURING THE FIRST YEAR

1. Overview

Initial efforts during the first year were concentrated on organizational and management planning activities to insure a well designed and disciplined structure to accomplish the program objectives. The contractor's team, consisting of experienced personnel in the fields of ergonomics, biomechanics, statistics, mathematics, psychology, and a recently retired Air Force colonel, were actively involved in accomplishing first year objectives and activities. Concurrently, a preliminary survey questionnaire, commonly referred to as Questionnaire #1, was designed by the Occupational and Manpower Research Division of the Air Force Human Resources Laboratory (HRL) and others while the contractor's team was designing their part of the accompanying Questionnaire #2.

These complimentary survey questionnaires serve as the primary vehicle for generating the input data to perform the analysis of AFSCs to quantify tasks requiring not only significant physical demands, but all physical tasks down to the least demanding. As shown in the Master Program Schedule, a "wave concept" is being employed in administering the survey in the field. Working with lots (waves) of about 45 AFSCs, starting with the most demanding jobs as determined by the present Armed Services X-Factor Classification system, the preliminary questionnaire was administered to approximately 40-50 supervisors in each AFSC career field.

Once the preliminary screening of approximately 800-1050 tasks for each AFSC is accomplished, the supervisor's rating data is analyzed and, utilizing the sampling scheme presented later in this section, an average of 25 tasks are then selected and used in administering the more comprehensive Questionnaire #2 follow-up portion of the survey on the same group of AFSCs. Using the wave concept, the pattern of surveying additional groups of 45 AFSCs is repeated until all, or most, of the AFSCs are surveyed.

In the process of designing Questionnaire #2, more than a dozen different formats were evaluated and the best two formats were tested in a sample survey conducted at a selected Air Force Base near the contractor's facility. This proved to be an invaluable "dry-run" for making refinements to the format finally selected and incorporating more effective, time saving recommendations. Additionally, throughout the survey process, close coordination with HRL will be maintained to insure that the tasks selected for Questionnaire #2 are truly representative of the larger number of

tasks evaluated in the screening process covered by the preliminary questionnaire.

Ancillary efforts during this initial phase of the program have focused attention on establishing early interfaces with the Armed Services Entrance and Examining Stations (AFEES) and the Air Force Basic Military Training (BMT) center to avoid potential schedule impacts, and the Air Force's Procurement Management Information System (PROMIS program). This section of the report will address these accomplishments during the first year in considerable detail.

2. Questionnaire #1

The primary objectives of Questionnaire #1 are:

To reduce the number of tasks in all AFSCs to a manageable number and select a representative sample of those physically demanding tasks for further analysis using Questionnaire #2.

To rate the level of physical demands of each task according to a 9-point scale and determine each AFSC task demand distributions.

To amend the task list for each AFSC by adding any physically demanding tasks not included in the supplied task list.

Each task was rated using a 9-point scale (see Appendix 1 for an example of Questionnaire #1). The development of this scale was a joint effort between Texas Tech University and concerned Air Force agencies. The rationale for this scale was based on data collected on an earlier study which used a mini-questionnaire (Ayoub, et al., 1978). The results of the study indicated that manual materials handling activities accounted for 90% of the physically demanding tasks. These manual materials handling activities include lifting, lowering, pushing, pulling and carrying. Lifting is considered to be one of the most demanding of these activities. Since people are familiar with lifting objects of a known weight, they can more accurately estimate lifting forces than forces required by other manual handling activities. Therefore, lifting activities were used to define the 9-point scale used in Questionnaire #1 for task ratings.

The first wave of Questionnaire #1 was administered for 45 AFSCs and the results of 43 AFSCs were analyzed. Typical examples of the three types of task demand distributions found is given in Appendix 3. A representative sample of tasks will be selected from each AFSC for use in Questionnaire #2 based on the analysis procedure presented in paragraph 4 of this section.

3. Questionnaire #2

In order to obtain more information on tasks identified as demanding in Questionnaire #1, a second questionnaire was developed. One part of this Questionnaire #2, designed by Texas Tech, is contained in Appendix 2. The other part of the questionnaire is being developed by HRL. The HRL section will have the airman rate each task on two 9-point scales, one each for strength and stamina.

The primary objective of the Texas Tech part of Questionnaire #2 is to collect essential quantitative data on the tasks identified from Questionnaire #1 as being physically demanding in terms of specific activities. A study by Arbeit and Scheafer (1977) has shown that experienced people usually accurately estimate quantitative values for specific job demands. However, this study involved the use of personal interviews rather than a questionnaire format. Therefore, a field validation of Questionnaire #2 is essential and will be conducted. The responses from Questionnaire #2 and the field study will then be analyzed to find the most common type of activity performed during each task. This information will then be used in the next phase of the project to select Performance Criteria Tasks (PCTs). The PCTs are test tasks which will be representative of the activities performed within each of the AFSCs.

As mentioned, the development of Questionnaire #2 has centered around activities involving manual materials handling. The representative activities chosen were lift and lower, push and pull, and carry. Torque (or turning) activities were also included as the earlier study (Ayoub, et al., 1978) identified them as a problem for some individuals. Each supervisor responding to the questionnaire will provide the basic information regarding each activity performed as a part of the task being surveyed. Provisions are included for additional information to be obtained if that activity entails demanding effort of a specified level or above.

Several iterations of the questionnaire were required before arriving at a concise format which would meet established objectives and to solve problems associated with using the same questionnaire and to provide adequate information on many different tasks and using machine scoring methods to minimize production and analysis cost. A sample of the proposed Texas Tech version is shown in Appendix 2.

Questionnaire #2 will be administered to approximately 50 supervisors for each AFSC. Since this questionnaire will provide detailed quantitative and subjective estimates of strength and stamina requirements, each supervisor will respond to approximately 60 tasks for Part 1 of Questionnaire #2 developed by HRL and 10 tasks for Part 2 developed

by Texas Tech University. In order to provide an adequate demand representation for each AFSC, it will be necessary to obtain detailed quantitative data for a total of 25 tasks for each AFSC. Therefore, each supervisor will not be required to answer Questionnaire #2 for the same 10 tasks. Instead, each supervisor will be given a select set of 10 tasks which will differ from those provided to other supervisors. However, for purposes of reliability the tasks given to each supervisor are so arranged that quantitative data can be obtained for a total of 25 tasks with approximately 20 supervisors responding to each task.

At the middle of this first year, a significant accomplishment was a sample survey, field test of Questionnaire #2 which resulted in modifications and improvements to meet established requirements. The sample survey conducted in July 1979 was administered to selected military personnel assigned to Reese AFB, Hurlwood, Texas. The purpose of the survey was to validate the portion of the questionnaire developed by the contractor. Special emphasis was given to the questionnaire's format, time required to complete it, and recommendations for improvement.

Under the supervision of a retired Air Force career officer, the survey team received complete support from the Base Commander's office in conducting the sample survey. Working with the Central Base Personnel Office as the designated point of contact, interviews were established with key supervisory personnel from the functional organizations of Maintenance, Civil Engineering, Supply, and the Base Fire Department. Within each functional area, an AFSC with significantly demanding physical requirements was selected for detailed evaluation. Using the appropriate AFSC Job Description Task Listing published by the Occupational and Manpower Research Division, Air Force Human Resources Laboratory, the Noncommissioned Officer In-Charge (NCOIC) of each functional area meticulously screened his detailed listing of approximately 1,000 tasks and selected the 25 tasks which he considered to be the most physically demanding, based on his extensive experience in the career field.

Each NCOIC then selected a cross-section of enlisted supervisors and airmen, including at least one female airman, to take the proposed survey questionnaire. The survey questionnaire was administered separately to each group in appropriately designated testing facilities. Each examinee was given a booklet containing the Instructions, Background Information Sheet, and 25 pre-printed task questionnaires for his AFSC. A member of the survey team recorded the starting times for the Instructions, Background Information Sheet, each task questionnaire, and the completion time for each examinee. Immediately afterwards, a discussion was held with each group to solicit comments, suggestions, and recommendations for improvement. An exit discussion with

each NCOIC completed the on-site activities. An analysis of the data and comments was subsequently performed by the survey team and additional specialists from the contractor's organization. When necessary, follow-up inquiries were made with the individuals examined or the respective NCOIC. In those few cases where the results of an examinee were considered invalid due to misinterpretations or insufficient experience in his career field, a follow-up survey was administered to another individual. Additionally, an alternate questionnaire format was given to one examinee in each AFSC group. Both the primary and alternate formats were discussed with the examinee and NCOIC for the purpose of obtaining the pros and cons of each. In summary, this sample survey was very useful in justifying assumptions made, identifying necessary modification, establishing requirements for Questionnaire #2, and incorporating recommendations for improvement.

The following is a summary of AFSCs and personnel covered in the sample survey:

TABLE 1
SAMPLE SURVEY PERSONNEL

AFSC	431X1C Aircraft Mechanic	551X0 Pavement	645X1 Material Facilities	571X0 Fire Protection
Number Surveyed	5	2	2	3
Average Months in DAFSC	90	48	27	50
Average Months in Career Field	90	103	27	50
Number Taking Primary Questionnaire	4	1	1	2
Number Taking Alternate Questionnaire	1	1	1	1

The following are some of the more significant findings from the sample survey with comments or subsequent actions taken noted in parenthesis:

Average time to read instructions and complete the Background Information Sheet was 9 minutes, 6 seconds. (Time reduced to an estimated 8 minutes, or less, with rewritten instructions incorporating suggested improvements.)

Average time per question was 14 seconds. Hence, the expected total time to complete the survey, assuming an expected 50% response to all questions as determined in the sample survey, is estimated to be 2 hours, 7 minutes. (This time is equivalent to others recorded by previous tests. Again, total improvements and refinements to the questionnaire and survey procedures should lower this figure to slightly under 2 hours.)

Expect 28-34% of the answers to fall within the physically demanding range for each of the four categories of the questionnaire; and, a corresponding lesser amount for other AFSCs considered less physically demanding. (Both the ultimate sampling scheme and actual selection of tasks to be used for Questionnaire #2 considered this factor. Furthermore, there was a high correlation between the 25 demanding tasks selected by the NCOICs in this sample survey and those selected for same AFSCs using the sampling scheme specified in Section II of this report.)

Inexperienced airmen with less than 48 months in their career field and/or below the grade of E-6 (TSgt.) will probably respond to less than 50% of all questions. More experienced personnel consistently responded at the 50% or higher level. (Note, the sample survey was designed to have both supervisory and nonsupervisory personnel take the survey in order to gage the impact of the latter group. The desired individual for the survey should be a supervisor, grade E-7, with about 60 months in his DAFSC, and over 100 months in his career field. In reality, a supervisory E-6/TSgt would be acceptable and provide meaningful responses.)

The Alternate questionnaire format selectively used and discussed with the examinees and NCOICs could not be justified for replacement of the primary format. (A comparison of times, percent questions answered, etc. confirmed the decision to use the primary format.)

In all cases, there was a pronounced learning curve improvement recorded by the examinee after responding to only three tasks. (Other improvements made should result in some further reduction in time required to answer each question.)

In summary, the sample survey was beneficial in creating a more effective survey questionnaire, and improving the sampling scheme rationale being employed and the selection of actual tasks to be used in the field survey.

4. Analysis of Questionnaire #1 Survey

For each AFSC there are numerous defined tasks, in most cases hundreds of detailed tasks. Each task may require various levels of physical strength and/or stamina. Using Questionnaire #1, these tasks are rated on a physical demand scale which goes from 0 to 9. A task rated at 9 is clearly a significantly demanding task whereas a task rated at 0 is not considered to require any physical stamina or strength. Since it is desired to choose a representative sample of many tasks available, the possible candidates for selection are those that fall at 2.5 or above on the demand scale. The more demanding tasks are considered to be those that fall within the higher portion of the scale, at 5.0 or above.

Data obtained and analyzed from the Questionnaire #1 survey (first wave of 45 AFSCs) showed that 12 AFSCs had fewer than 10 tasks rated at 5.0 or above. Furthermore, 6 AFSCs had at least 10 tasks but fewer than 20 rated at 5.0 or above; 3 AFSCs had at least 20 but fewer than 25; 8 had at least 25 but fewer than 50; 11 had at least 50 but fewer than 80; 1 had at least 100 but fewer than 150; and 2 had more than 150. There were 29 AFSCs that had fewer than 50 tasks rated at or above 5 and 40 AFSCs had fewer than 80 tasks at or above 5. Therefore, if 2.5 is taken to be the lower limit for task selection, there is still a substantial number of tasks available for sampling purposes. A sampling scheme was developed accordingly. A key objective is to have representative tasks for the entire range selected and thereby obtain a confirmation of the actual distribution of all the varying levels of demand.

Sampling Scheme. The range 2.5 to 9.0 is divided into subintervals, namely 2.5-3.0, 3.0-3.5, ..., 8.5-9.0. In developing this sampling procedure, each subinterval has a width of .5 rather than .1 (the interval size of data received from HRL). There are two reasons for this change in interval size from .1 to .5. First, with subintervals of size .1, the frequencies in the subintervals are relatively small which leads to situations where more tasks are selected than are present in a subinterval. Secondly, even with an interval size of .5 one is left with 15 to 20 subintervals which is reasonable to justify the adequacy of a frequency distribution in describing the data. Therefore, the job of selecting tasks is simplified with a minimal loss of information.

TABLE 2
EXAMPLES OF ALLOCATION OF TASKS

Weights w_i	Frequency f_i	$w_i f_i$	$w_i f_i / \sum w_i f_i$	Number of Tasks Selected n_i	
<u>Example 1</u> AFSC 552X0, Carpentry Specialist				**	
7.0*	7	49	.040	1	6
6.5	6	39	.032	1	3
6.0	9	54	.044	2	3
5.5	19	105	.084	3	3
5.0	28	140	.113	3	3
4.5	47	211	.171	4	2
4.0	44	176	.142	3	2
3.5	54	189	.153	3	1
3.0	55	165	.133	3	1
2.5	<u>44</u>	<u>110</u>	.089	<u>2</u>	<u>1</u>
	313	1238		25 = n	
<u>Example 2</u> AFSC 111X0, Defense Aerial Gunner					
3.5*	3	10.5	.191	5	
3.0	9	27.0	.491	12	
2.5	<u>7</u>	<u>17.5</u>	.318	<u>8</u>	
	19	55.0		25 = n	

* No frequencies for the remaining subintervals.

** Alternate Sampling Scheme.

Let f_1, f_2, \dots, f_{13} be the frequencies of the tasks falling in these subintervals for a particular AFSC. These frequencies are then weighted in such a way that proportionately more tasks are selected from the high demand subintervals.

Let w_1, w_2, \dots, w_{13} , denote the weights corresponding to the subintervals. Let n be the number of tasks to be selected from a given AFSC, and let n_i (where $i=1, 2, \dots, 13$) be the number of tasks to be selected from the i th subinterval. Then, n_i is given by:

$$(1) \quad n_i = \frac{w_i f_i}{\sum_{j=1}^{13} w_j f_j} \quad n \quad i=1, 2, \dots, 13$$

An obvious choice for the weights is the lower limit of the subinterval, namely $w_1 = 2.5, w_2 = 3.0, \dots, w_{13} = 8.5$.

Table 2 illustrates two examples of the allocation of tasks. It is quite possible that the sampling procedure calls for a larger number of tasks from a subinterval than are actually present in the subinterval; this is especially apparent in Example 2. Note also in the second example that each n_i is greater than the corresponding frequency f_i . In this case one has to allocate the remaining six (25-19) tasks to other subintervals. This situation occurs in only three AFSCs out of a total of 43 AFSC analyzed in wave one. The three are AFSC 111X0 (Defense Aerial Gunner), AFSC 112X0 (Inflight Refueling Operator), AFSC 270X0 A/B/C/D (Air Traffic Control Operator).

Alternate Sampling Schemes. In the sampling scheme described above and applied to the AFSC's in Table 2, the weights used were the lower limits of the demand subintervals. That is, the weights were obtained as a linear function of the lower limits. If larger sample sizes are desired for the upper demand levels than those obtained by using a linear function of the interval limits, then a different function may be used. For example, one may use w_i^2 or $e^{w_i} = \exp(w_i)$, where $w_i = 2.5, 3, 3.5, \dots, 8.5$. Use of these functions would lead to a larger selection of tasks at the upper end of the demand scale. The same formula, Eq. (1) may be used with w_i replaced by w_i^2 or $\exp(w_i)$, or any other function that is desired.

As an example, suppose we use the exponential function $\exp(w_i)$ for the allocation of the sample size of 25 tasks

for AFSC 552X0 used in example 1, Table 2. This yields the number of tasks n_i : 6,3,3,3,3,3,2,1,1,0 as compared with n_i : 1,1,2,3,3,4,3,3,3,2, obtained in example 1 using linear weights.

Task Selection. The basic sampling scheme chosen will provide the number of tasks to be selected from the sub-intervals. The specific tasks to be selected from each interval poses another problem. The task to be selected should be representative of those in the interval. The selection of the tasks in each interval should reflect the number of airmen involved in each task. This type of information is currently being compiled by HRL. Individual task descriptions also play a role in selection of tasks. For example, if a group of tasks appear to be identical, or nearly so, from their description, then it may not be necessary to choose more than one or two tasks from this group. On the other hand, if a group contains tasks which are very different in their description, then tasks with different descriptions are to be selected. Another factor influencing the selection of tasks is the number of supervisors responding to a given task. If a choice is to be made from many tasks, then the one with the highest number of respondents is normally selected since this task is familiar to more supervisors; it further indicates greater participation of airmen than the other tasks.

Using the methodology developed in the sampling scheme and the criterion established for task selection, the actual tasks for three example AFSCs are presented in Table 3-5 (the basic data and their distribution is portrayed in Appendix 3). Tasks under each AFSC are also identified by their designated number with an accompanying descriptive title for the task.

The selection procedure described above has yielded 25 tasks from each AFSC. In those AFSC's that have a large number of tasks at 2.5 or above it will be necessary to select more than 25 tasks, especially if the tasks are different in their physical demand features. On the other hand if an AFSC has few (say less than 40) tasks or if the tasks can be grouped into sets of similar tasks then it may not be essential to sample as many as 25 tasks. Data for each AFSC also sheds some light on the number of tasks to be selected. Tasks on heavy as well as light side of the demand scale are to be investigated and a decision made whether to select more or less than 25 tasks. In short, the sample size from an AFSC is dependent on the number of demanding tasks as well as how dissimilar the tasks in an AFSC are.

After the number of tasks from each subinterval has been determined, the problem is to decide which tasks to select. It is apparent that the number of persons in an AFSC who are involved in the particular task(s) may affect the choice of tasks. The information on the number of per-

TABLE 3
AFSC 328X4, AVIONIC INERTIAL & RADAR NAVIGATION SYSTEMS

Wts. w_i	Freq. f_i	# of Tasks n_i	Task No.	Task Description
6.0	2	2	128	Remove or install new or repaired inertial or radar system units.
			197	Pack or unpack equipment.
5.5	1	1	134	Test inertial or radar navigation systems using Category II support equipment.
5.0	1	1	229	Prepare supplies or equipment for storage or use.
4.5	6	3	104	Erect or position flight line maintenance stands.
			120	Operate flight line generator equipment.
			166	Process test equipment to precision measuring equipment laboratories (PMEL).
			4.0	7
3.5	9	4	112	Isolate malfunctions on inertial navigation system (INS) units.
			113	Isolate malfunctions on inertial reference system (IRS) units.
			109	Isolate malfunctions on doppler navigation system (DNS) units.
			121	Operate flight line light carts.
			168	Service peculiar Category II test equipment.
3.0	11	4	198	Paint equipment.
			200	Perform preventive maintenance inspections on inertial or radar navigation systems (INS/RNS).
			73	Conduct on the job training (OJT).
			83	Instruct personnel on equipment maintenance or repair techniques.
			183	Test operation of new or repaired units.
2.5	16	6	191	Inspect desiccants.
			96	Inspect completed jobs.
			103	Visually inspect electronic equipment, inter-connecting cables, or connections.
			123	Perform operational tests on inertial or radar navigation systems.
			176	Test minimum performance of INS units.
			187	Verify reported malfunctions in system units.
			188	Clean or dust equipment or components.

TABLE 4
AFSC 431X0, HELICOPTER MAINTENANCE

Wts. w_i	Freq. f_i	# of Tasks n_i	Task No.	Task Description
5.5	5	1	359	Remove/install H-53 cyclic control components.
5.0	15	2	190	Clean helicopter aircraft or components.
			345	Prepare/pack H-3/53 tail rotor assemblies.
4.5	22	3	186	Assemble H-53 helicopter aircraft after delivery.
			238	Position or spot vehicles.
			536	Remove/install main transmissions/components.
4.0	36	4	221	Remove corrosion from H-3/53 system components.
			236	Perform ground operations of hoisting equipment
			429	Perform H-53 post engine installation inspections.
			639	Remove/install batteries on H-3/53.
3.5	37	3	216	Prepare H-53 for temporary storage.
			232	Operate helicopter radio or interphone systems.
			275	Remove/install H-53 door or windows.
3.0	69	5	189	Assemble H-53 components after delivery.
			225	Research/record data for issue/turn-in slips.
			272	Remove/install H-53 airframe tubing/hoses.
			811	Maintain facility/work area environmental control systems.
			816	Perform inspections of facilities/work area.
2.5	110	7	204	Perform special maintenance on H-53.
			222	Remove/install mission-essential equipment.
			223	Research general TOs and standard publications for required maintenance.
			235	Perform H-1 ground operation of hoist equipment.
			239	Remove or recover damaged H-1 helicopter aircraft.
			274	Remove/install H-53 door/windows.
			284	Troubleshoot H-1N helicopter airframe system.

TABLE 5
AFSC 472X3, VEHICLE MAINTENANCE

Wts. w_i	Freq. f_i	# of Tasks n_i	Task No.	Task Description
7.0	2	1	458	Dismount/mount heavy duty tires (tractors, blows or firetrucks.
6.5	8	1	380	Remove/install conventional transmissions.
6.0	9	1	385	Remove/service/install accessory drives, gear boxes, or auxiliary transfers.
5.5	10	1	397	Remove/install/straighten front axles.
5.0	29	3	229	Remove/install flywheels or ring gears.
			337	Remove/install fuel tanks.
			368	Clean, test, adjust, assemble or disassemble conventional transmissions.
4.5	40	3	414	Remove/install coil springs.
			421	Remove/service/adjust/install drive shafts, jack shafts or center bearings.
			682	Remove/install/adjust body component parts.
4.0	55	5	371	Remove/adjust/install PTO transmission units.
			404	Inspect/remove/install constant velocity universal joints/components.
			446	Remove or install brake drums.
			462	Perform static tire/bubble balancing.
			465	Remove/replace wheels on standard vehicles for tire repairs.
3.5	49	3	217	Inspect/remove/install motor mountings.
			268	Remove or install batteries.
			324	Remove/inspect/install exhaust pipes, tail pipes, mufflers, spark arrestors or resonators.
3.0	70	4	230	Remove/install oil pans/gaskets.
			234	Remove/install diesel fuel injector pumps.
			392	Remove/adjust/install power steering pumps.
			451	Remove or install wheel studs.
2.5	69	3	244	Bench test starter motors.
			350	Remove, install/repair heater cores.
			434	Inspect/remove/service/install disc brakes components.

sons involved is not currently available, however HRL at Brooks Air Force Base is compiling such information for final selection of tasks. This information is not expected to change drastically the tasks to be selected from an AFSC. However, minor changes will be made if warranted by the additional information.

5. Visit to Armed Forces Entrance and Examining Station
(AFEES)

Preliminary planning for implementation of the strength and stamina aptitude test batteries at the AFEES was begun during the first project year. In order to implement the tests with a minimum increase in costs and interruptions, an analysis of the schedule of activities at the AFEES is considered necessary.

A visit by project personnel to the AFEES located in San Antonio, Texas, was conducted in order to obtain an overview of the schedule of activities. The San Antonio AFEES can be considered a medium-sized operation compared to the larger stations such as those located in Los Angeles, Chicago, or New York.

An examination of the current schedule of activities and facilities, combined with discussions with AFEES personnel, indicated that incorporation of a strength and stamina test battery would not create any severe problems with respect to the current schedule of operations. The general impression was that sufficient time is available for the incorporation of such tests. However, it was pointed out that considerable variation among the AFEES facilities and method of operations does exist. Consequently, additional AFEES will be visited to gain an idea of the extent of this variation before final planning for implementing the tests is done. A site visit to one or more of the larger AFEES facilities is planned in order to obtain additional planning information.

SECTION III

FUTURE ACTIVITIES

The Master Program Schedule shows the activities to be performed to achieve the project objectives. Because of the additional time needed to administer and score Questionnaires #1 and #2, the schedule during the job analysis phase has been changed from what was originally planned. However, since data from the heaviest AFSCs will be obtained in the first waves of the questionnaires, other activities such as hazard analysis, AFEES and BMT analyses will be started before all questionnaires have been administered. During the subsequent period the following major categories of effort and their steps will be performed to complete the project:

Job Analysis

The objective here is the analysis of Air Force tasks requiring significant physical demands.

Steps to be Completed:

- Development and Administration of Survey Questionnaires to Identify AFSC Tasks Requiring Significant Physical Demands.
- Selection of Tasks Which Have Significant Physical Demands.
- Task Analysis to Develop Detailed Descriptions of AFSC Tasks.
- Initial Definition and Procurement of Test Equipment.
- AFSC Task Quantification in Physical Units.
- Selection of Performance Criteria Tasks (PCTs).

Translate Job Demands to Physical Capacities

This phase is concerned with the development of appropriate candidate tests.

Steps to be Completed:

- Translate PCTs' Requirements into Physical Capacities Relevant to Successful Task Performance.
- Test Documentation and Inventory.
- Identify Candidate Tests for Inclusion Within Test Battery.
- Administering Likely Candidate Tests to Sample of Individuals.
- AFEES and BMT Schedule Analysis.

Validation of the Assignment Criteria

This phase will be concerned with the selection, finalization and testing of the assignment criteria.

Steps to be Completed:

- Select Secondary Test Battery--Develop Final Assignment Criterion.
- Select Primary Test Battery--Develop Initial Assignment Criterion.
- Location of Test Stations During Validation Period.
- Conduct Field Studies to Investigate Effect of BMT on Measures of Physical Capacities.
- Longitudinal Validation of Assignment Criteria.
- Document Primary and Secondary Batteries and their Procedures for Administration.

APPENDIX I

QUESTIONNAIRE #1

Note: The following is only an example of the format for Questionnaire #1. It contains part of the questionnaire booklet for one AFSC. Each AFSC has a booklet containing a list of all tasks within that AFSC. Therefore, each booklet contains a variable number of pages depending on the length of the task list.

UNITED STATES AIR FORCE

PHYSICAL DEMANDS SURVEY



AVIONIC INERTIAL AND RADAR NAVIGATION SYSTEMS
CAREER LADDER

AFSCs 32834, 32854, 32874, and 32894

Return completed to CBPO within
10 working days per AFR 35-2

26

OCCUPATION AND MANPOWER RESEARCH DIVISION
AIR FORCE HUMAN RESOURCES LABORATORY
BROOKS AFB, TEXAS 78235
AUTOVON 240-3640
AFPT 80-328-167

INSTRUCTIONS

We are asking you to complete the following survey so that we can identify tasks in your career ladder that are physically demanding (that is, tasks requiring a large amount of physical strength or endurance). As a subject matter expert in the 328X4 career ladder, you are best qualified to make the evaluation. In order to get the most from the survey, we ask that you carefully consider your response to each question.

This survey contains two sections - a brief background information section and a more extensive listing of tasks typically performed in your career ladder. After completing the background section, you will be asked to rate each task on a 10-point physical strength and endurance scale. Tasks requiring physical strength and endurance are defined as those involving significant use of the "large" muscle groups in the arms, back or legs. These would include requirements for lifting, lowering or carrying heavy or cumbersome objects, pushing or pulling, torquing or any other demand for frequent or continuous exertion of muscular effort. To establish a common frame of reference for rating each task, the following scale definitions are provided:

Rating Scale for Physical Strength and Endurance

Scale Point	Description of Effort
0	No Significant Physical Demand - Corresponding requirement would include periodic lifting of 9 lbs or less - Includes most administrative and clerical tasks.
1	Extremely Light - Corresponding requirement would include periodic lifting of 10-19 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
2	Very Light - Corresponding requirement would include periodic lifting of 20-29 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
3	Light - Corresponding requirement would include periodic lifting of 30-39 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
4	Light to Moderate - Corresponding requirement would include periodic lifting of 40-49 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
5	Moderate - Corresponding requirement would include periodic lifting of 50-59 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
6	Moderate to Heavy - Corresponding requirement would include periodic lifting of 60-69 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
7	Heavy - Corresponding requirement would include periodic lifting of 70-79 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
8	Very Heavy - Corresponding requirement would include periodic lifting of 80-89 lbs to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
9	Extremely Heavy - Corresponding requirement would include periodic lifting of 90 lbs or more to a height of 5 ft OR an equivalent demand for frequent or continuous muscular effort.
X	No Knowledge of Task Requirement

THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO EDC

When you consider the overall level of physical strength and endurance required by each task, it is requested that you provide ratings on the basis of:

- a. The most demanding aspect of each task. For example, if performing a task requires some light lifting and some heavy lifting, provide ratings based on the higher requirement. In considering the most demanding aspect of each task, also take into account any factors, such as unusual posture, frequency and duration of sustained work which might contribute to the overall demand level.
- b. The level of demand placed on a single individual performing the task. Occasionally a given task will be performed by more than one person. In this case, assume that the workload is shared equally by all members performing. (i.e., if a 300 lb object is generally lifted by 3 people, the task demand for a single individual would be 100 lbs.)

AND

- c. The level of demand required by the complete task from start to finish. For example, any preliminary activities that are an integral part of the task should be considered in rating the task.

To obtain the maximum response possible, it is requested that you rate each task of which you have any knowledge. These would include tasks you presently perform, which you have performed at a prior time and those which you have observed others performing. Please provide your best estimates even though you may not be absolutely certain of the rating. Note: If there are any physically demanding tasks in your career ladder that are not listed in the booklet, please list them on the blank pages provided at the end of the booklet and rate them as you would the other tasks.

Now, begin the background section on the next page. When this is completed, proceed to the task ratings. Thank you for your cooperation in this survey.

BACKGROUND INFORMATION

Date

Case Control Number

(1)

PLEASE PRINT INFORMATION REQUESTED AND CHECK APPLICABLE BOXES

NAME (FIRST LAST MD)			DATE OF BIRTH			SEX	
			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (15-22) Year Month Day (23-28)			<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE (12)	

GRADF	F1	E2	E3	E4	E5	E6	E7	E8	E9
	<input type="text"/>								
	AB	AMN	A1C	SRA SGT	SSGT	TSGT	MSGT	SMSGT	CMSGT

(13)

SOCIAL SECURITY ACCOUNT NUMBER (SS-1A)	TELEPHONE
<input type="text"/>	<input type="text"/>
(31-39)	AREA CODE DUTY EXTENSION

HEIGHT	WEIGHT	PRIMARY AFSC	DUTY AFSC
<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/>	<input type="text"/>
F1 IN (40-42)	LBS (43-45)	PREFIX NUMBER SUFFIX (46-52)	PREFIX NUMBER SUFFIX (53-59)

MAJOR COMMAND (CHECK ONE)

<input type="checkbox"/> A AAC	<input type="checkbox"/> G DMAAC	<input type="checkbox"/> C ADCOM	<input type="checkbox"/> E AFACF	<input type="checkbox"/> Y AFCS	<input type="checkbox"/> O AFSDSC	<input type="checkbox"/> F AFLC
<input type="checkbox"/> M AFRES	<input type="checkbox"/> H AFSC	<input type="checkbox"/> I ARPC	<input type="checkbox"/> J ATC	<input type="checkbox"/> K AU	<input type="checkbox"/> N HQ USAF or FLD EXT	<input type="checkbox"/> O MAC
<input type="checkbox"/> R PACAF	<input type="checkbox"/> S SAC	<input type="checkbox"/> T TAC	<input type="checkbox"/> B USAFA	<input type="checkbox"/> D USAFE	<input type="checkbox"/> U USAFSS	<input type="checkbox"/> X OTHER UNIT or ORGANIZATION

(6)

TOTAL MONTHS IN PRESENT JOB	TOTAL MONTHS AT PRESENT BASE
<input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/>
(Card 02 5-7)	(Card 02:8-10)

TOTAL MONTHS IN DUTY AFSC	TOTAL MONTHS IN CAREER FIELD
<input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/>
(Card 02:11-13)	(Card 02:14-16)

TOTAL MONTHS ACTIVE FEDERAL MILITARY SERVICE	NUMBER OF SUBORDINATES WHO REPORT TO YOU DIRECTLY FOR SUPERVISION
<input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
(Card 02 17-19)	(Card 02 20-21)

DURING THE PAST YEAR, HAVE ANY OF YOUR SUBORDINATES EXPERIENCED DIFFICULTY PERFORMING IN THIS CAREER LADDER BECAUSE THE PHYSICAL DEMANDS OF THE JOB EXCEEDED THEIR PHYSICAL STRENGTH OR STAMINA CAPABILITIES?

YES NO

(Card 02:23)

ORGANIZATION	BASE OR INSTALLATION
<input type="text"/>	<input type="text"/>
(Card 02 24-27)	(Card 03:5-8)

PRESENT WORK ASSIGNMENT (POSITION OR JOB TITLE)

(Card 03. 9-73)

PRIVACY ACT STATEMENT

AUTHORITY: 5 USC Sec 301, AFR 35-2 & EO 9397. DISCLOSURE: COMPLETION OF THE INVENTORY, INCLUDING SSAN IS MANDATORY. FAILURE TO PROVIDE COMPLETE INFORMATION WILL DETRACT FROM THE AIR FORCE'S CAPABILITY TO FULFILL THE FOLLOWING PURPOSES. PRINCIPAL PURPOSE: DEVELOPMENT OF SCREENING PROCEDURES AND CORRESPONDING JOB REQUIREMENTS FOR PHYSICAL STRENGTH AND STAMINA. ROUTINE USES: PERSONNEL AND OCCUPATIONAL RESEARCH, JOB REDESIGN AND DEVELOPMENT OF TRAINING PROGRAMS.

TASK RATING INSTRUCTIONS

The tasks listed on the following pages are grouped under duty headings. Please rate each task on the equivalent level of physical strength and endurance required to perform it. Use a pencil or pen to record your ratings in the column to the right of the task statements.

Examples:

Rate Here

Schedule maintenance workload and duty assignments	0	
Overhaul rotor blades	7	
Runup engines for operational checks	2	
Etc.		

Remember -

- Rate all tasks of which you have knowledge
- Rate the demands for a single member performing
- Consider task from start to completion

JOB INVENTORY
(DUTY - TASK LIST)

AFSC
328X4

PAGE 1 OF 16 PAGES

INSTRUCTIONS: RATE EACH TASK BELOW ON ITS REQUIREMENT FOR PHYSICAL STRENGTH AND/OR ENDURANCE.

SCALE REFERENCE POINTS FOR SIMPLE LIFTING REQUIREMENTS WOULD BE:

0 = 0 - 9 lbs; 1 = 10 - 19 lbs; 2 = 20 - 29 lbs; 3 = 30 - 39 lbs; 4 = 40 - 49 lbs;
5 = 50 - 59 lbs; 6 = 60 - 69 lbs; 7 = 70 - 79 lbs; 8 = 80 - 89 lbs; 9 = 90 lbs or more.

A. ORGANIZING AND PLANNING

RATING SCALE

- 0 = No Significant Demand
- 1 = Extremely Light
- 2 = Very Light
- 3 = Light
- 4 = Light to Moderate
- 5 = Moderate
- 6 = Moderate to Heavy
- 7 = Heavy
- 8 = Very Heavy
- 9 = Extremely Heavy
- X = Don't Know

RATE HERE →

1. Assign personnel to duty positions		5
2. Develop organizational charts		6
3. Establish equipment requirements		7
4. Establish organizational policies, office instructions (OI), or standing operating procedures (SOP)		8
5. Establish performance standards		9
6. Establish personnel requirements		10
7. Establish requirements for maintenance of equipment or facilities		11
8. Establish work priorities		12
9. Estimate requirements for tools, parts, or equipment		13
10. Plan layouts of facilities		14
* * * * *		
11. Plan or prepare briefings		15
12. Plan or schedule work assignments		16
13. Plan safety programs		17
14. Plan security programs		18
15. Prepare emergency or disaster plans		19
16. Schedule leaves or passes		20

If you know of a physically demanding task under this duty which does not appear in the list, please add it to the blank pages at the end of the booklet and rate it as you would the other tasks.

/		
/		
/		
/		
/		

INSTRUCTIONS: RATE EACH TASK BELOW ON ITS REQUIREMENT FOR PHYSICAL STRENGTH AND/OR ENDURANCE.

SCALE REFERENCE POINTS FOR SIMPLE LIFTING REQUIREMENTS WOULD BE:

0 = 0 - 9 lbs; 1 = 10 - 19 lbs; 2 = 20 - 29 lbs; 3 = 30 - 39 lbs; 4 = 40 - 49 lbs;
5 = 50 - 59 lbs; 6 = 60 - 69 lbs; 7 = 70 - 79 lbs; 8 = 80 - 89 lbs; 9 = 90 lbs or more.

RATING SCALE

- 0 = No Significant Demand
- 1 = Extremely Light
- 2 = Very Light
- 3 = Light
- 4 = Light to Moderate
- 5 = Moderate
- 6 = Moderate to Heavy
- 7 = Heavy
- 8 = Very Heavy
- 9 = Extremely Heavy
- X = Don't Know

B. DIRECTING AND IMPLEMENTING

RATE HERE

1. Brief personnel on maintenance management directives or procedures		21
2. Conduct or participate in staff meetings		22
3. Counsel subordinates on personal or military-related problems		23
4. Develop or improve work methods or procedures		24
5. Develop status boards, graphs, or charts		25
6. Direct flight line maintenance activities		26
7. Direct maintenance debriefing teams		27
8. Direct maintenance or utilization of equipment		28
9. Direct or implement quality control programs		29
10. Direct shop maintenance activities		30
* * * * *		
11. Direct support for off-shore aircraft maintenance stations		31
12. Draft or edit correspondence		32
13. Draft or revise job descriptions		33
14. Establish publications libraries		34
15. Implement controls for repair cycle assets		35
16. Implement cost reduction programs		36
17. Implement emergency or disaster plans		37
18. Implement or review disaster control exercise procedures		38
19. Implement precision measuring equipment (PME) monitoring programs		39
20. Implement safety programs or procedures		40
* * * * *		
(Continued next page)		

* * * * *

Considering your specialty as a whole, about what percentage of all of the work done by first termers would you estimate falls into each category?

Card 99

- 1. Very Light Work (Includes most administrative and clerical work) % (5-6)
- 2. Light Work % (7-8)
- 3. Medium Work % (9-10)
- 4. Heavy Work % (11-12)
- 5. Very Heavy Work % (13-14)

Your answers should total 100 %

* * * * *

STOP -

After you have completed the Background Section, and the Task Ratings (including write-ins if applicable) please check to be sure that all tasks have been rated.

Return completed booklet to CBPO for transmittal to:

AFHRL/OR
Attn: Kentron International Inc.
Brooks AFB, TX 78235

APPENDIX 2

QUESTIONNAIRE #2

Note: The following is the format of the Texas Tech University part of Questionnaire #2. It will be used to obtain quantitative information for a group of tasks selected for each AFSC. There will be one page in the questionnaire for each task with the task totaled printed in the appropriate box at the top of the page.

UNITED STATES AIR FORCE

PHYSICAL DEMANDS SURVEY



INFLIGHT REFUELING OPERATOR
CAREER LADDER

AFSCs 11230, 11250, 11270, and 11290

Return completed to CEPC within
10 working days per AFR 35-2

OCCUPATION AND MANPOWER RESEARCH DIVISION
AIR FORCE HUMAN RESOURCES LABORATORY
BROOKS AFB, TEXAS 78235
AUTOVON 280-3640
AFPT 80-112-167

Physical Demand Questionnaire

INTRODUCTION

The Air Force has a great variety of jobs, a greater variety than any civilian industry. The Air Force has pilots and mechanics, band leaders and truck drivers, dentists and telephone linemen. In the enlisted class alone there are about 230 specialities (AFSCs). Each of the AFSCs is a complex assortment of tasks. Some of the tasks performed within an AFSC involve moderate or heavy physical work. We must have a better understanding of the quantities and frequencies of effort in tasks involving heavy work, so that we can ensure that individuals assigned to a particular AFSC have the necessary physical capabilities to perform these tasks.

On a previous occasion we sent out a questionnaire with a list of all known tasks in each AFSC, asking individuals to rank them and identify those involving heavy work. Now, we have a shorter list of tasks which have been repeatedly identified as involving heavy work, and we need more detailed information about these tasks.

This second questionnaire which we are now asking you to complete will serve this purpose. Not all questions apply to all tasks, so we have designed the questionnaire to make it easy for you to skip over sections which do not apply.

You realize the importance of assigning the right person to a job. This questionnaire is one step in a complex program to define a relevant and objective assignment criteria, but it is a critical step, and therefore, deserves your best attention. We will observe and measure a few of the tasks later. If your answers are reasonably accurate, we will be able to make good use of this information.

This questionnaire asks in broad terms about the characteristics of your AFSC, and not how any particular individual performs in the job. You may be called upon to clarify questions we have regarding your answers. None of the information you provide will be used to evaluate you or effect your personnel records. Your information will be averaged with other evaluations, and only the statistical composites will ever be reported.

This survey contains three sections: a brief Background Information Section, a Quantitative Evaluation Section, and a General Evaluation Section. Each section begins with the instructions for that section.

Now fill out the Background Information section which follows this page. When this is completed, proceed to the next section. Thank you for your cooperation in this survey.

BACKGROUND INFORMATION

Date

Case Control Number

(1-4)

PLEASE PRINT INFORMATION REQUESTED AND CHECK APPLICABLE BOXES

NAME (FIRST, LAST, MI)

DATE OF BIRTH

SEX

(15-22)

Year

Month

Day (23-28)

MALE

FEMALE (29)

GRADE

E1

AB

E2

AMN

E3

A1C

E4

SRA SGT

E5

SSGT

E6

TSGT

E7

MSGT

E8

SMSGT

E9

CMSGT

(30)

SOCIAL SECURITY ACCOUNT NUMBER (SSAN)

(31-39)

TELEPHONE

AREA CODE

DUTY EXTENSION

HEIGHT

FT

IN

(40-42)

WEIGHT

LBS

(43-45)

PRIMARY AFSC

PREFIX

NUMBER

SUFFIX

(46-52)

DUTY AFSC

PREFIX

NUMBER

SUFFIX

(53-59)

MAJOR COMMAND (CHECK ONE)

A

AAC

G

DMAAC

C

ADCOM

E

AFAFC

Y

AFCS

O

AFDSDC

F

AFLC

M

AFRES

H

AFSC

I

ARPC

J

ATC

K

AU

N

HQ USAF
or
FLO EXT

Q

MAC

R

PACAF

S

SAC

T

TAC

B

USAFA

D

USAFE

U

USAFSS

X

OTHER UNIT
or
ORGANIZATION

(60)

TOTAL MONTHS IN PRESENT JOB

(Card 02:5-7)

TOTAL MONTHS AT PRESENT BASE

(Card 02:8-10)

TOTAL MONTHS IN DUTY AFSC

(Card 02:11-13)

TOTAL MONTHS IN CAREER FIELD

(Card 02:14-16)

TOTAL MONTHS ACTIVE FEDERAL MILITARY SERVICE

(Card 02:17-19)

NUMBER OF SUBORDINATES WHO REPORT TO YOU DIRECTLY FOR SUPERVISION

(Card 02:20-21)

DURING THE PAST YEAR, HAVE ANY OF YOUR SUBORDINATES EXPERIENCED DIFFICULTY PERFORMING IN THIS CAREER LADDER BECAUSE THE PHYSICAL DEMANDS OF THE JOB EXCEEDED THEIR PHYSICAL STRENGTH OR STAMINA CAPABILITIES?

YES

NO

(Card 02:23)

ORGANIZATION

(Card 02:24-73)

BASE OR INSTALLATION

(Card 03:5-8)

PRESENT WORK ASSIGNMENT (POSITION OR JOB TITLE)

(Card 03:9-73)

PRIVACY ACT STATEMENT

AUTHORITY: 5 USC Sec 301, AFR 35-2 & EO 9397. DISCLOSURE: COMPLETION OF THE INVENTORY, INCLUDING SSAN IS MANDATORY. FAILURE TO PROVIDE COMPLETE INFORMATION WILL DETRACT FROM THE AIR FORCE'S CAPABILITY TO FULFILL THE FOLLOWING PURPOSES. PRINCIPAL PURPOSE: DEVELOPMENT OF SCREENING PROCEDURES AND CORRESPONDING JOB REQUIREMENTS FOR PHYSICAL STRENGTH AND STAMINA. ROUTINE USES: PERSONNEL AND OCCUPATIONAL RESEARCH, JOB REDESIGN AND DEVELOPMENT OF TRAINING PROGRAMS.

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Instructions for Quantitative Evaluation Section

This section of the task survey consists of a standard set of questions to be answered for each task identified at the top of the page. The last page has two questions on the AFSC as a whole together with a space for comments. Table A shows the four categories of physically demanding activities with examples.

Table A

<u>Demanding Activity</u>	<u>Examples</u>
1. Lift or lower	Lift box on a truck or shelf Lift box/part from cart to workbench Lower installed parts from aircraft to floor Lower box from truck to floor Shovelling snow, cement, or gravel
2. Push or Pull	Push handsaw Push aircraft or ground equipment unit Close or open hanger doors Drag hose into position Remove armature from motor
3. Carry	Carry stores of ammunition Carry motor to shop for overhaul Carry can of foam to scene of fire Empty tires from storage bins
4. Torquing or Turning	Loosen corroded mounting bolts with wrench Pump auto jack handle Connect hose sections Close water main Remove weapons from bombays with helper on ramp

I

A task may involve either one, two, three, or four of the categories of (i.e. lift/lower, push/pull, carry, torque). If the task requires lifting or lowering, then select the most demanding lift or lower for this task in answering the questions; if the task requires pushing or pulling, then select the most demanding push or pull for this task. Proceed similarly for carry and torque activities. For each question circle only one answer. For the General Task Information section, write in your best estimate for the answer in the appropriate boxes.

Complete the questionnaire for each identified task using your total experience in this AFSC (i.e. not just your current job assignment).

Do not report work done by tools or handling equipment. If tools/equipment are involved, report the effort expended by the airman while using the tools/equipment.

If more than one airman must work together to perform the activity, report the share of effort performed by one person.

If the task is also performed by others in your AFSC in a "speciality shop" (i.e. tire shop, engine depot, etc.), answer the questions in terms of whichever job is the more physically demanding.

If the task is seasonal work, report the activity as it is performed during the most demanding season. Do not attempt to spread it over the year in any manner.

As a general rule, answer the questionnaire in terms of a normal working day or shift and not the exceptional situation of wartime conditions or similar maximum performance exercises.

You are not rating all the tasks in your AFSC. Other raters have a different set of tasks.

Work straight through the section and follow all specific instructions. These questions must apply to all AFSC's and may not address yours perfectly. For this reason, we have provided a place for REMARKS at the end of this section so that you may insert specific information, if you wish.

PHYSICAL DEMANDS SURVEY

Check here if you cannot evaluate this task. AFSC TASK

INSTRUCTIONS: COMPLETE CATEGORIES 1 THROUGH 4 BY CIRCLING THE ANSWERS WHICH BEST DESCRIBES THE ACTIVITIES AND COMPLETE THE GENERAL TASK INFORMATION BELOW BY WRITING THE ANSWERS IN THE TWO DIGIT BOX PROVIDED. FOR EACH TASK PERFORMED SELECT THE MOST DEMANDING ACTIVITY UNDER EACH OF THE CATEGORIES LISTED BELOW (LIFT/LOWER, PUSH/PULL, CARRY, AND TURN). ANSWER THE QUESTIONS FOR THE MOST DEMANDING ACTIVITY IN EACH CATEGORY. REMEMBER, ANSWER THE QUESTIONS FOR A NORMAL WORK DAY OR SHIFT AND NOT THE EXCEPTIONAL SITUATION (SUCH AS WARTIME, ETC.)

CATEGORY 1: LIFT OR LOWER ACTIVITIES

DOES THIS TASK REQUIRE LIFTING OR LOWERING?
 YES
 NO
 COMPLETE THIS SECTION →
 GO TO CATEGORY #2

- 1a. Type**
WHICH CHOICE BEST DESCRIBES THE MOST DEMANDING LIFT OR LOWER ACTIVITY IN THIS TASK:
- 1 lift: 1 hand
 - 2 lift: 2 hands
 - 3 lower: 1 hand
 - 4 lower: 2 hands

- 1b. Repetition**
HOW MANY TIMES IS THE ACTIVITY REPEATED TO COMPLETE THE TASK? IF THE TASK TAKES MORE THAN ONE DAY GIVE THE REPETITIONS FOR ONE DAY:
- 1 1-2 times
 - 2 3-4 times
 - 3 5-8 times
 - 4 9-15 times
 - 5 16-30 times
 - 6 31-60 times
 - 7 61-100 times
 - 8 101-200 times
 - 9 more than 200 times

- 1c. Weight**
WHAT WEIGHT 'OR SHARE' OF THE WEIGHT MUST ONE AIRMAN USUALLY LIFT OR LOWER EACH TIME:
- 1 0-14 lbs
 - 2 15-29 lbs
 - 3 30-44 lbs
 - 4 45-59 lbs
 - 5 60-74 lbs
 - 6 75-89 lbs
 - 7 90-104 lbs
 - 8 105-119 lbs
 - 9 more than 120 lbs

- 1d. Rate**
IF THE LIFT OR LOWER IS REPEATED, WHAT RATE BEST DESCRIBES THIS REPETITION:
- 1 0-1/min
 - 2 2-4/min
 - 3 5-8/min
 - 4 9-15/min
 - 5 16-30/min
 - 6 31-45/min
 - 7 46-60/min
 - 8 61-75/min
 - 9 more than 75/min

IF ANSWER TO QUESTIONS 1c OR 1d WAS IN A BOXED AREA, CONTINUE →

IF NEITHER ANSWER WAS IN THE BOXED AREA, SKIP TO CATEGORY #2

- 1e. Body Posture**
WHAT IS THE USUAL POSTURE USED WHILE PERFORMING THE LIFT OR LOWER:
- 1 stand
 - 2 sit
 - 3 crawl
 - 4 lying
 - 5 kneeling
 - 6 stoop: (bend knees)
 - 7 bend: (at waist)

- 1f. Position**
HOW FAR IS THE AIRMAN'S GRIP FROM THE SUPPORT SURFACE (SURFACE ON WHICH THE AIRMAN IS WORKING):
- 1 2 ft below
 - 2 1 ft below
 - 3 surface
 - 4 surface-1 ft
 - 5 1-2 ft above
 - 6 3-4 ft above
 - 7 5-6 ft above
 - 8 7-8 ft above
 - 9 more than 8 ft above

- 1g. Distance**
WHAT IS THE DISTANCE THE OBJECT IS LIFTED OR LOWERED?
- 1 1 ft
 - 2 2 ft
 - 3 3 ft
 - 4 4 ft
 - 5 5 ft
 - 6 6 ft
 - 7 7 ft
 - 8 8 ft
 - 9 9 ft or more

CATEGORY 2: PUSH OR PULL ACTIVITIES

DOES THIS TASK REQUIRE PUSHING OR PULLING?
 YES
 NO
 COMPLETE THIS SECTION →
 GO TO CATEGORY #3

- 2a. Type**
WHICH CHOICE BEST DESCRIBES THE MOST DEMANDING LIFT OF LOWER ACTIVITY IN THIS TASK:
- 1 push: 1 hand
 - 2 push: 2 hands
 - 3 pull: 1 hand
 - 4 pull: 2 hands
 - 5 push with shoulder
 - 6 push with back
 - 7 push with legs

- 2b. Repetition**
HOW MANY TIMES IS THE ACTIVITY REPEATED TO COMPLETE THE TASK? IF THE TASK TAKES MORE THAN ONE DAY GIVE THE REPETITIONS FOR ONE DAY:
- 1 1-2 times
 - 2 3-4 times
 - 3 5-8 times
 - 4 9-15 times
 - 5 16-30 times
 - 6 31-60 times
 - 7 61-100 times
 - 8 101-200 times
 - 9 more than 200 times

- 2c. Force**
WHAT FORCE MUST THE AIRMAN USUALLY APPLY TO PUSH OR PULL THE OBJECT:
(Not the weight of the object)
- 1 0-14 lbs
 - 2 15-29 lbs
 - 3 30-44 lbs
 - 4 45-59 lbs
 - 5 60-74 lbs
 - 6 75-89 lbs
 - 7 90-104 lbs
 - 8 105-119 lbs
 - 9 more than 120 lbs

- 2d. Rate**
IF THE PUSH OR PULL IS REPEATED, WHICH SINGLE RATE BEST DESCRIBES THIS REPETITION:
- 1 less than 1/hr
 - 2 about 1/hr
 - 3 about 5/hr
 - 4 about 10/hr
 - 5 about 30/hr
 - 6 about 60/hr
 - 7 about 5/min
 - 8 about 10/min
 - 9 about 30/min

IF AN ANSWER TO QUESTIONS 2c OR 2d WAS IN A BOXED AREA, CONTINUE →

IF NEITHER ANSWER WAS IN THE BOXED AREA, SKIP TO CATEGORY #3

- 2e. Body Posture**
WHAT IS THE USUAL POSTURE USED WHILE PERFORMING THE PUSH OR PULL:
- 1 sitting
 - 2 standing
 - 3 lying
 - 4 crawling
 - 5 walking
 - 6 running
 - 7 swimming
 - 8 stoop (bent knees)
 - 9 bend (at waist)

- 2f. Distance Moved**
WHICH CHOICE BEST DESCRIBES THE TOTAL DISTANCE THE OBJECT IS MOVED:
- 1 0-1 ft
 - 2 2-3 ft
 - 3 4-5 ft
 - 4 6-10 ft
 - 5 11-50 ft
 - 6 51-100 ft
 - 7 101-500 ft
 - 8 501-1000 ft
 - 9 more than 1000 ft

- 2g. Time**
HOW LONG DOES IT TAKE TO PUSH OR PULL THE OBJECT THE DISTANCE IN QUESTION 2f:
- 1 0-2 sec
 - 2 2-5 sec
 - 3 5-10 sec
 - 4 11-60 sec
 - 5 1-2 min
 - 6 3-5 min
 - 7 6-10 min
 - 8 11-20 min
 - 9 more than 20 min

CATEGORY 3: CARRY ACTIVITIES

DOES THIS TASK REQUIRE CARRYING?
 YES → COMPLETE THIS SECTION
 NO GO TO CATEGORY #4

<p>3a. Type WHICH CHOICE BEST DESCRIBES THE MOST DEMANDING CARRY ACTIVITY IN THIS TASK:</p> <p><input type="checkbox"/> 1 hand (at side) <input type="checkbox"/> 2 hand (at front from body) <input type="checkbox"/> over the shoulder <input type="checkbox"/> walking sideways <input type="checkbox"/> walking backwards <input type="checkbox"/> load in the back</p> <p align="right">(XX)</p>	<p>3b. Repetition HOW MANY TIMES IS THE ACTIVITY REPEATED TO COMPLETE THE TASK? IF THE TASK TAKES MORE THAN ONE DAY GIVE THE REPETITIONS FOR ONE DAY:</p> <p><input type="checkbox"/> 1-2 times <input type="checkbox"/> more <input type="checkbox"/> 3-5 times than <input type="checkbox"/> 6-8 times 200 <input type="checkbox"/> 9-15 times times <input type="checkbox"/> 16-30 times <input type="checkbox"/> 31-60 times <input type="checkbox"/> 61-100 times <input type="checkbox"/> 101-200 times (XX)</p>	<p>3c. Weight WHAT WEIGHT 'OR SHARE' OF THE WEIGHT MUST ONE AIRMAN USUALLY CARRY:</p> <p><input type="checkbox"/> 0-14 lbs <input type="checkbox"/> 15-29 lbs <input type="checkbox"/> 30-39 lbs <input type="checkbox"/> 40-49 lbs <input type="checkbox"/> 50-59 lbs <input type="checkbox"/> 60-69 lbs <input type="checkbox"/> 70-79 lbs <input type="checkbox"/> 80-89 lbs <input type="checkbox"/> 90-104 lbs <input type="checkbox"/> 105-119 lbs <input type="checkbox"/> more than 120 lbs (XX)</p>	<p>3d. Rate IF THE CARRY IS REPEATED, WHAT RATE BEST DESCRIBES THIS REPETITION:</p> <p><input type="checkbox"/> less than 1/hr <input type="checkbox"/> about 1/hr <input type="checkbox"/> about 1/2 hr <input type="checkbox"/> about 10/hr <input type="checkbox"/> about 30/hr <input type="checkbox"/> about 1/min <input type="checkbox"/> about 5/min <input type="checkbox"/> about 10/min <input type="checkbox"/> about 30/min (XX)</p>
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<p>IF THE ANSWER FOR QUESTIONS 3c OR 3d WAS IN A BOXED AREA, CONTINUE →</p> <p>IF NEITHER ANSWER WAS IN A BOXED AREA, SKIP TO CATEGORY #4</p> <p align="right">(XX)</p>	<p>3e. Body Posture WHICH BEST DESCRIBES THE POSTURE USUALLY USED WHILE CARRYING:</p> <p><input type="checkbox"/> walk <input type="checkbox"/> crawl <input type="checkbox"/> stoop (bent knees) <input type="checkbox"/> run <input type="checkbox"/> ascend or descend stairs <input type="checkbox"/> ascend or descend ladder <input type="checkbox"/> ascend or descend ramp <input type="checkbox"/> ascend or descend pole (XX)</p>	<p>3f. Distance Moved WHAT IS THE TOTAL DISTANCE THE OBJECT IS USUALLY CARRIED:</p> <p><input type="checkbox"/> 0-1 ft <input type="checkbox"/> 2-3 ft <input type="checkbox"/> 4-5 ft <input type="checkbox"/> 6-10 ft <input type="checkbox"/> 11-50 ft <input type="checkbox"/> 51-100 ft <input type="checkbox"/> 101-500 ft <input type="checkbox"/> 501-1000 ft <input type="checkbox"/> more than 1000 ft (XX)</p>	<p>3g. Time HOW LONG DOES IT USUALLY TAKE TO CARRY THE OBJECT THE DISTANCE INDICATED IN 3f:</p> <p><input type="checkbox"/> 1-2 sec <input type="checkbox"/> 3-5 sec <input type="checkbox"/> 6-10 sec <input type="checkbox"/> 11-60 sec <input type="checkbox"/> 1-2 min <input type="checkbox"/> 3-5 min <input type="checkbox"/> 6-10 min <input type="checkbox"/> 11-20 min <input type="checkbox"/> more than 20 min (XX)</p>
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CATEGORY 4: TORQUING OR TURNING ACTIVITIES

DOES THIS TASK REQUIRE TORQUING?
 YES → COMPLETE THIS SECTION
 NO GO TO GENERAL TASK INFORMATION

<p>4a. Type WHICH CHOICE BEST DESCRIBES THE MOST DEMANDING TORQUE OR TURN ACTIVITY IN THIS TASK:</p> <p><input type="checkbox"/> 1 hand on lever <input type="checkbox"/> 2 hands on lever <input type="checkbox"/> 1 hand on wheel or knob <input type="checkbox"/> 2 hands on wheel or knob <input type="checkbox"/> 1 hand on crank <input type="checkbox"/> 2 hands on crank <input type="checkbox"/> 1 hand on handle <input type="checkbox"/> 2 hands on handle (XX)</p>	<p>4b. Repetition HOW MANY TIMES IS THE ACTIVITY REPEATED TO COMPLETE THE TASK? IF THE TASK TAKES MORE THAN ONE DAY GIVE THE REPETITIONS FOR ONE DAY:</p> <p><input type="checkbox"/> 1-2 times <input type="checkbox"/> more <input type="checkbox"/> 3-4 times than <input type="checkbox"/> 5-8 times 200 <input type="checkbox"/> 9-15 times times <input type="checkbox"/> 16-30 times <input type="checkbox"/> 31-60 times <input type="checkbox"/> 61-100 times <input type="checkbox"/> 101-200 times (XX)</p>	<p>4c. Force WHAT FORCE MUST ONE AIRMAN USUALLY EXERT TO DO THIS ACTIVITY:</p> <p><input type="checkbox"/> 0-9 lbs <input type="checkbox"/> 10-19 lbs <input type="checkbox"/> 20-29 lbs <input type="checkbox"/> 30-39 lbs <input type="checkbox"/> 40-49 lbs <input type="checkbox"/> 50-59 lbs <input type="checkbox"/> 60-69 lbs <input type="checkbox"/> 70-79 lbs <input type="checkbox"/> more than 80 lbs (XX)</p>	<p>4d. Rate IF THE TORQUE OR TURN IS REPEATED, WHAT RATE BEST DESCRIBES THIS REPETITION:</p> <p><input type="checkbox"/> 0-1 times/min <input type="checkbox"/> 2-4 times/min <input type="checkbox"/> 5-9 times/min <input type="checkbox"/> 9-15 times/min <input type="checkbox"/> 16-30 times/min <input type="checkbox"/> 31-45 times/min <input type="checkbox"/> 46-60 times/min <input type="checkbox"/> 61-75 times/min <input type="checkbox"/> more than 75 times/min (XX)</p>
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<p>IF THE ANSWER FOR QUESTIONS 4c OR 4d WAS IN A BOXED AREA, CONTINUE →</p> <p>IF NEITHER ANSWER WAS IN A BOXED AREA, SKIP TO GENERAL TASK INFORMATION</p> <p align="right">(XX)</p>	<p>4e. Body Posture WHICH BEST DESCRIBES THE POSTURE USUALLY USED WHILE TORQUING:</p> <p><input type="checkbox"/> standing <input type="checkbox"/> stoop (bent knees) <input type="checkbox"/> sitting <input type="checkbox"/> kneeling <input type="checkbox"/> bend (at waist) <input type="checkbox"/> lying (XX)</p>	<p>4f. Revolutions HOW MANY REVOLUTIONS DOES IT TAKE TO COMPLETE THE ACTIVITY:</p> <p><input type="checkbox"/> 0-4 rev. <input type="checkbox"/> 5-1 rev. <input type="checkbox"/> 2-4 rev. <input type="checkbox"/> 5-9 rev. <input type="checkbox"/> 10-24 rev. <input type="checkbox"/> 25-49 rev. <input type="checkbox"/> 50-99 rev. <input type="checkbox"/> 100-200 rev. <input type="checkbox"/> more than 200 rev. (XX)</p>	<p>4g. Time HOW LONG DOES IT TAKE TO MAKE THE REVOLUTIONS SELECTED IN QUESTION 4f:</p> <p><input type="checkbox"/> 0-1 sec <input type="checkbox"/> 2-4 sec <input type="checkbox"/> 5-9 sec <input type="checkbox"/> 10-19 sec <input type="checkbox"/> 20-39 sec <input type="checkbox"/> 40-60 sec <input type="checkbox"/> 1-2 min <input type="checkbox"/> 3-5 min <input type="checkbox"/> more than 5 min (XX)</p>	<p>4h. Posture HOW FAR IS THE GRIP FROM THE SUPPORT SURFACE:</p> <p><input type="checkbox"/> 2 ft below <input type="checkbox"/> 1 ft below <input type="checkbox"/> surface level <input type="checkbox"/> 0-1 ft above <input type="checkbox"/> 2-3 ft above <input type="checkbox"/> 4-5 ft above <input type="checkbox"/> 6-7 ft above <input type="checkbox"/> more than 7 ft (XX)</p>	<p>4i. Distance Moved WHAT IS THE LENGTH OF THE RADIUS OF THE OBJECT BEING TURNED:</p> <p><input type="checkbox"/> 1-4 in. <input type="checkbox"/> 5-1 in. <input type="checkbox"/> 2-3 in. <input type="checkbox"/> 4-5 in. <input type="checkbox"/> 6-8 in. <input type="checkbox"/> 9-15 in. <input type="checkbox"/> 16-30 in. <input type="checkbox"/> 31-60 in. <input type="checkbox"/> more than 60 in. (XX)</p>
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GENERAL TASK INFORMATION

ANSWER THESE QUESTIONS FOR THIS TASK

<p>7a. Time WHAT IS THE AVERAGE TIME REQUIRED TO COMPLETE THIS ENTIRE TASK FROM START TO FINISH:</p> <p><input type="checkbox"/> 10 or less <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25 <input type="checkbox"/> 26 <input type="checkbox"/> 27 <input type="checkbox"/> 28 <input type="checkbox"/> 29 <input type="checkbox"/> 30 <input type="checkbox"/> 31 <input type="checkbox"/> 32 <input type="checkbox"/> 33 <input type="checkbox"/> 34 <input type="checkbox"/> 35 <input type="checkbox"/> 36 <input type="checkbox"/> 37 <input type="checkbox"/> 38 <input type="checkbox"/> 39 <input type="checkbox"/> 40 <input type="checkbox"/> 41 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Percent WHAT PERCENT OF THE AIRMAN IN YOUR AFSC PERFORM THIS TASK:</p> <p align="center">[] []</p>	<p>7c. Percent Time WHAT PERCENT OF THE AIRMAN'S MAN-YEAR IS SPENT PERFORMING THIS TASK:</p> <p align="center">[] []</p>	<p>7d. Environment THE PERCENT OF TIME THE TASK IS PERFORMED 'FILL IN ALL BOXES):</p> <p><input type="checkbox"/> indoors <input type="checkbox"/> outdoors <input type="checkbox"/> inflight</p>	<p>7e. Manpower HOW MANY AIRMEN USUALLY WORK TOGETHER AS A TEAM TO ACCOMPLISH THIS TASK:</p> <p align="center">[] [] man</p>	<p>7f. Frequency HOW OFTEN IS THE TASK USUALLY PERFORMED:</p> <p><input type="checkbox"/> daily <input type="checkbox"/> weekly <input type="checkbox"/> monthly</p>
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THIS TASK IS BEST QUALITY PRACTICE FROM COPY FURNISHED TO DDC

AFSC SURVEY QUESTIONS

6. To what extent do the questions in the four categories describe the heavy work in the tasks you have evaluated?

- | | | |
|----------------|--------|----------------|
| 1. 10% or less | 4. 40% | 7. 70% |
| 2. 20% | 5. 50% | 8. 80% |
| 3. 30% | 6. 60% | 9. 90% or more |

7. If there are other categories of demanding activities (other than lift/lower, push/pull, carry, or turn/torque) in your AFSC, name these other significant categories.

- | | |
|----------|----------|
| 1. _____ | 3. _____ |
| 2. _____ | 4. _____ |

8. **REMARKS.** If you have comments or additional information about the tasks you have just evaluated, use the space below.

STOP -

After you have completed the Background Section, and the Task Ratings (including write-ins if applicable) please check to be sure that all tasks have been rated.

Return completed booklet to CBPO for transmittal to:

**AFHRL/OR
ATTN: Kentron International Inc.
Brooks AFB TX 78235**

APPENDIX 3

SURVEY QUESTIONNAIRE #1 DATA

Data from Questionnaire #1 consist of the ratings of tasks by supervisors for 43 different AFSCs. The number of supervisors (raters) is variable for different AFSCs, having a minimum of 24 and a maximum of 49. Also, the number of tasks for the AFSCs is variable. The minimum number of tasks in an AFSC is 210; the maximum number is 1375. Each task is rated by supervisors on a scale of 0 to 9. Physically demanding tasks are rated high, whereas those which do not require strength are rated low. The demand scale 0 to 9 is divided into subintervals with a size of .10 each. A frequency count is carried out for the mean ratings in each subinterval; tasks whose mean ratings are within a given subinterval are grouped into that subinterval. A mean rating is the average of the ratings given to a task by the supervisors. This information provides a frequency distribution for each AFSC. Observe that the sum of the frequencies in a frequency distribution is the total number of tasks under that AFSC.

Now for each example AFSC, a distribution of tasks is given. The shapes of these 43 AFSC task distributions are seen to resemble the following distributions:

- a. Exponential distribution
- b. Bell-shaped or normal distribution
- c. A distribution with a heavy tail to the right.

Three AFSC's whose frequency distributions resemble those in a, b, and c are selected. A discussion of these 3 AFSCs follows later in this appendix. Inspection of the data shows that these three distributions cover all the distributions of tasks for all AFSCs.

In the following Examples A, B, and C, frequency distributions of task demands for three AFSCs are provided. A frequency distribution table has two columns. The first column contains intervals of mean ratings and the second column the corresponding frequencies of tasks. A mean rating for a given task is the average rating of the task by supervisors. For example, if 35 supervisors rated a particular task, then the mean rating of that task is the total of the 35 scores divided by 35.

Since each task is rated on a demand scale of 0 to 9, the mean rating is also a number between 0 and 9. The range of mean ratings which goes from 0 to 9 is divided into subintervals of width .1, yielding 90 intervals of mean ratings, which are 0-.1, .1-.2, ..., 8.9-9.0. The number of tasks whose mean ratings are between 0. and .1 are counted in the

first interval of mean ratings, the number of tasks whose mean ratings are between .1 and .2 are included in the second interval of mean ratings, and so on. For example, in Example A there is one task whose mean rating is between .0 and .1, yielding a frequency of 1, and 28 tasks with mean ratings between .1 and .2, yielding a frequency of 28.

The three examples, each displaying the frequency distribution and an accompanying histogram of tasks for a typical AFSC are:

1. Example A:
AFSC 328X4, Avionic Inertial and Radar Navigation Systems. The histogram depicts an exponential distribution.
2. Example B:
AFSC 431X0, Helicopter Maintenance. This AFSC has 817 tasks. The histogram depicts a bell-shaped distribution.
3. Example C:
AFSC 472X3, Vehicle Maintenance. This AFSC has 690 tasks. The histogram resembles a distribution having a heavy right tail.

TABLE 3-1

Frequency distribution of task demands for the AFSC 328X4, Avionic Inertial and Radar Navigation System.

<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>
0.0-0.1	1	2.1-2.2	5	4.2-4.3	0
0.1-0.2	28	2.2-2.3	8	4.3-4.4	1
0.2-0.3	25	2.3-2.4	2	4.4-4.5	1
0.3-0.4	18	2.4-2.5	3	4.5-4.6	2
0.4-0.5	15	2.5-2.6	3	4.6-4.7	0
0.5-0.6	11	2.6-2.7	5	4.7-4.8	2
0.6-0.7	7	2.7-2.8	3	4.8-4.9	0
0.7-0.8	10	2.8-2.9	2	4.9-5.0	2
0.8-0.9	9	2.9-3.0	3	5.0-5.1	1
0.9-1.0	0	3.0-3.1	1	5.1-5.2	0
1.0-1.1	6	3.1-3.2	3	5.2-5.3	0
1.1-1.2	3	3.2-3.3	3	5.3-5.4	0
1.2-1.3	3	3.3-3.4	2	5.4-5.5	0
1.3-1.4	7	3.4-3.5	2	5.5-5.6	0
1.4-1.5	2	3.5-3.6	2	5.6-5.7	1
1.5-1.6	2	3.6-3.7	3	5.7-5.8	0
1.6-1.7	5	3.7-3.8	1	5.8-5.9	0
1.7-1.8	5	3.8-3.9	2	5.9-6.0	0
1.8-1.9	3	3.9-4.0	1	6.0-6.1	0
1.9-2.0	1	4.0-4.1	3	6.1-6.2	1
2.0-2.1	7	4.1-4.2	2	6.2-6.3	0
				6.3-6.4*	1

*Frequencies in other subintervals are zero.

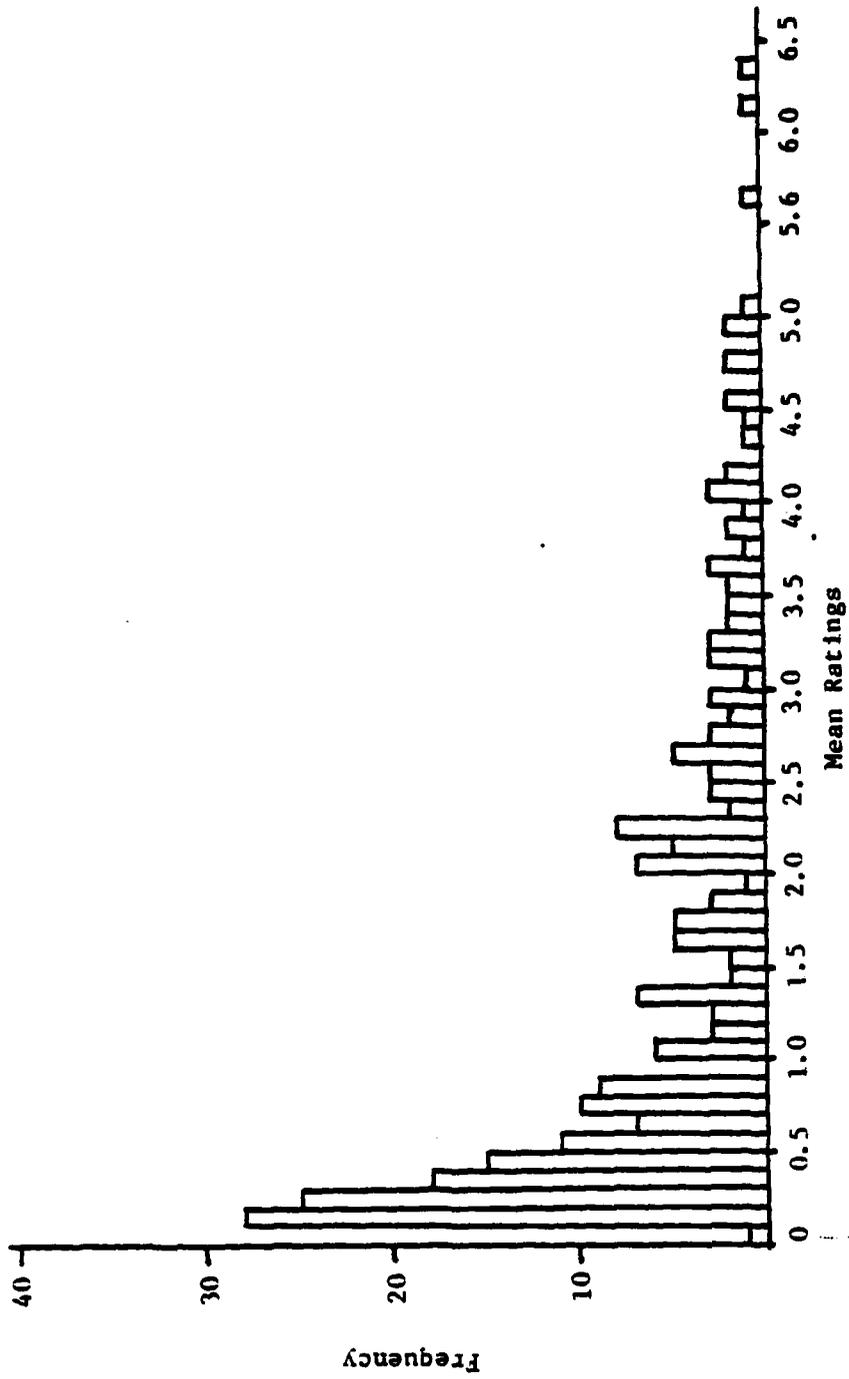


FIGURE 3-1 Histogram of task mean ratings for AFSC 326X4, Avionic Inertial and Radar Navigation Systems.

TABLE 3-2

Frequency distribution of task demands for AFSC 431X0, Helicopter Maintenance.

<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>
0.0-0.1	1	1.9-2.0	21	3.8-3.9	5
0.1-0.2	0	2.0-2.1	36	3.9-4.0	3
0.2-0.3	0	2.1-2.2	18	4.0-4.1	9
0.3-0.4	3	2.2-2.3	39	4.1-4.2	11
0.4-0.5	10	2.3-2.4	32	4.2-4.3	5
0.5-0.6	8	2.4-2.5	21	4.3-4.4	5
0.6-0.7	14	2.5-2.6	27	4.4-4.5	6
0.7-0.8	18	2.6-2.7	26	4.5-4.6	3
0.8-0.9	15	2.7-2.8	19	4.6-4.7	4
0.9-1.0	24	2.8-2.9	25	4.7-4.8	6
1.0-1.1	26	2.9-3.0	13	4.8-4.9	2
1.1-1.2	30	3.0-3.1	16	4.9-5.0	7
1.2-1.3	26	3.1-3.2	15	5.0-5.1	5
1.3-1.4	43	3.2-3.3	16	5.1-5.2	6
1.4-1.5	23	3.3-3.4	13	5.2-5.3	0
1.5-1.6	27	3.4-3.5	9	5.3-5.4	2
1.6-1.7	23	3.5-3.6	12	5.4-5.5	2
1.7-1.8	26	3.6-3.7	9	5.5-5.6	2
1.8-1.9	39	3.7-3.8	8	5.6-5.7	2
				5.7-5.8*	1

*Frequencies in other subintervals are zero.

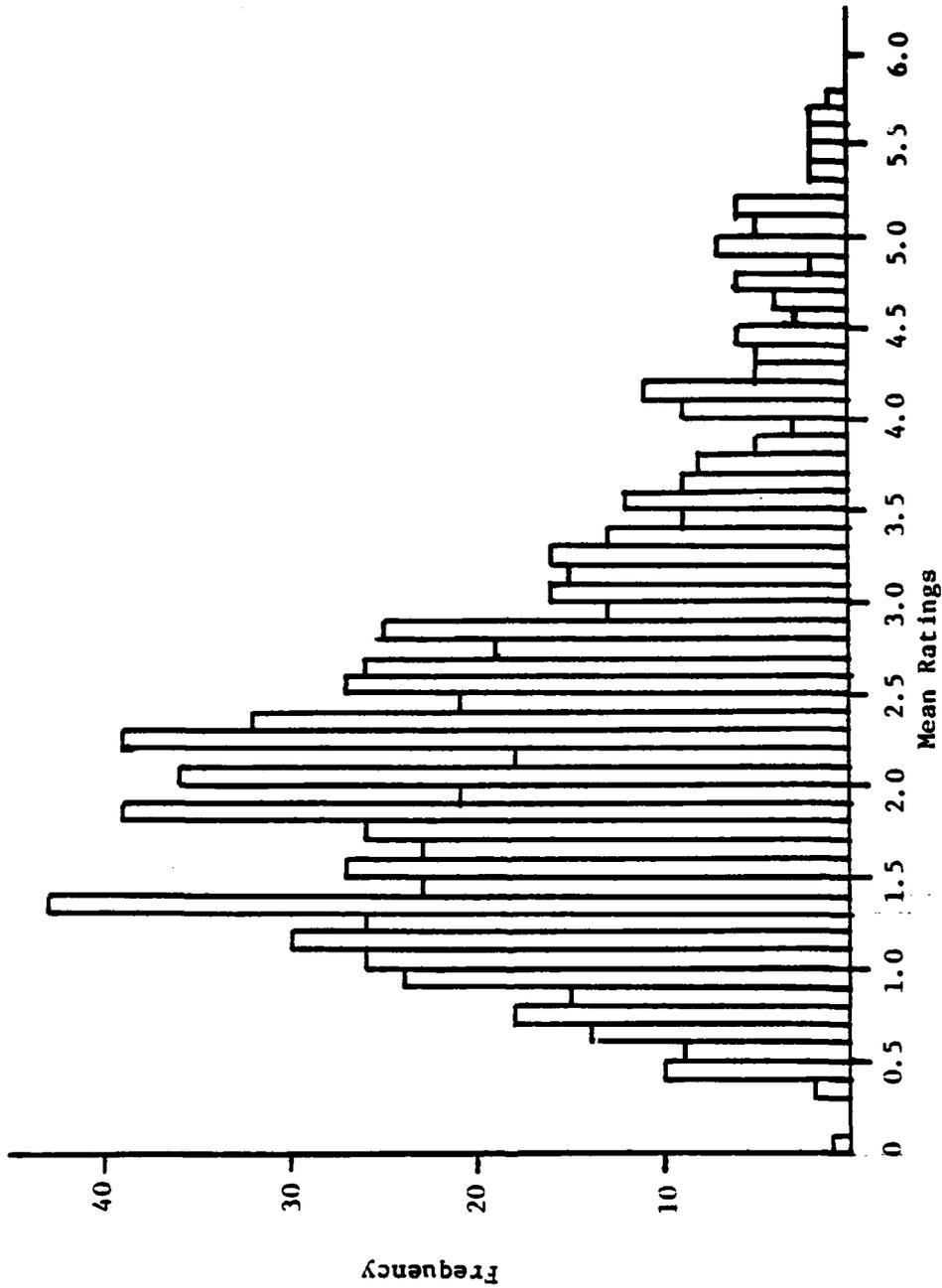


FIGURE 3-2 Histogram of tasks mean ratings for AFSC 431X0, Helicopter Maintenance.

TABLE 3-3

Frequency distribution of task demands for AFSC 472X3, Vehicle Maintenance.

<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>	<u>Mean Rating</u>	<u>Frequency</u>
0.0-0.1	0	2.5-2.6	13	5.0-5.1	9
0.1-0.2	1	2.6-2.7	11	5.1-5.2	2
0.2-0.3	10	2.7-2.8	15	5.2-5.3	6
0.3-0.4	12	2.8-2.9	17	5.3-5.4	6
0.4-0.5	18	2.9-3.0	13	5.4-5.5	6
0.5-0.6	24	3.0-3.1	14	5.5-5.6	3
0.6-0.7	30	3.1-3.2	14	5.6-5.7	3
0.7-0.8	27	3.2-3.3	18	5.7-5.8	1
0.8-0.9	17	3.3-3.4	13	5.8-5.9	1
0.9-1.0	8	3.4-3.5	11	5.9-6.0	2
1.0-1.1	18	3.5-3.6	8	6.0-6.1	2
1.1-1.2	15	3.6-3.7	15	6.1-6.2	1
1.2-1.3	14	3.7-3.8	5	6.2-6.3	2
1.3-1.4	13	3.8-3.9	12	6.3-6.4	3
1.4-1.5	7	3.9-4.0	9	6.4-6.5	3
1.5-1.6	12	4.0-4.1	12	6.5-6.6	2
1.6-1.7	17	4.1-4.2	12	6.6-6.7	2
1.7-1.8	17	4.2-4.3	13	6.7-6.8	2
1.8-1.9	10	4.3-4.4	10	6.8-6.9	0
1.9-2.0	8	4.4-4.5	8	6.9-7.0	2
2.0-2.1	18	4.5-4.6	11	7.0-7.1	0
2.1-2.2	15	4.6-4.7	5	7.1-7.2	0
2.2-2.3	12	4.7-4.8	7	7.2-7.3	0
2.3-2.4	11	4.8-4.9	12	7.3-7.4	1
2.4-2.5	15	4.9-5.0	5	7.4-7.5*	3

*No frequencies for other subintervals.

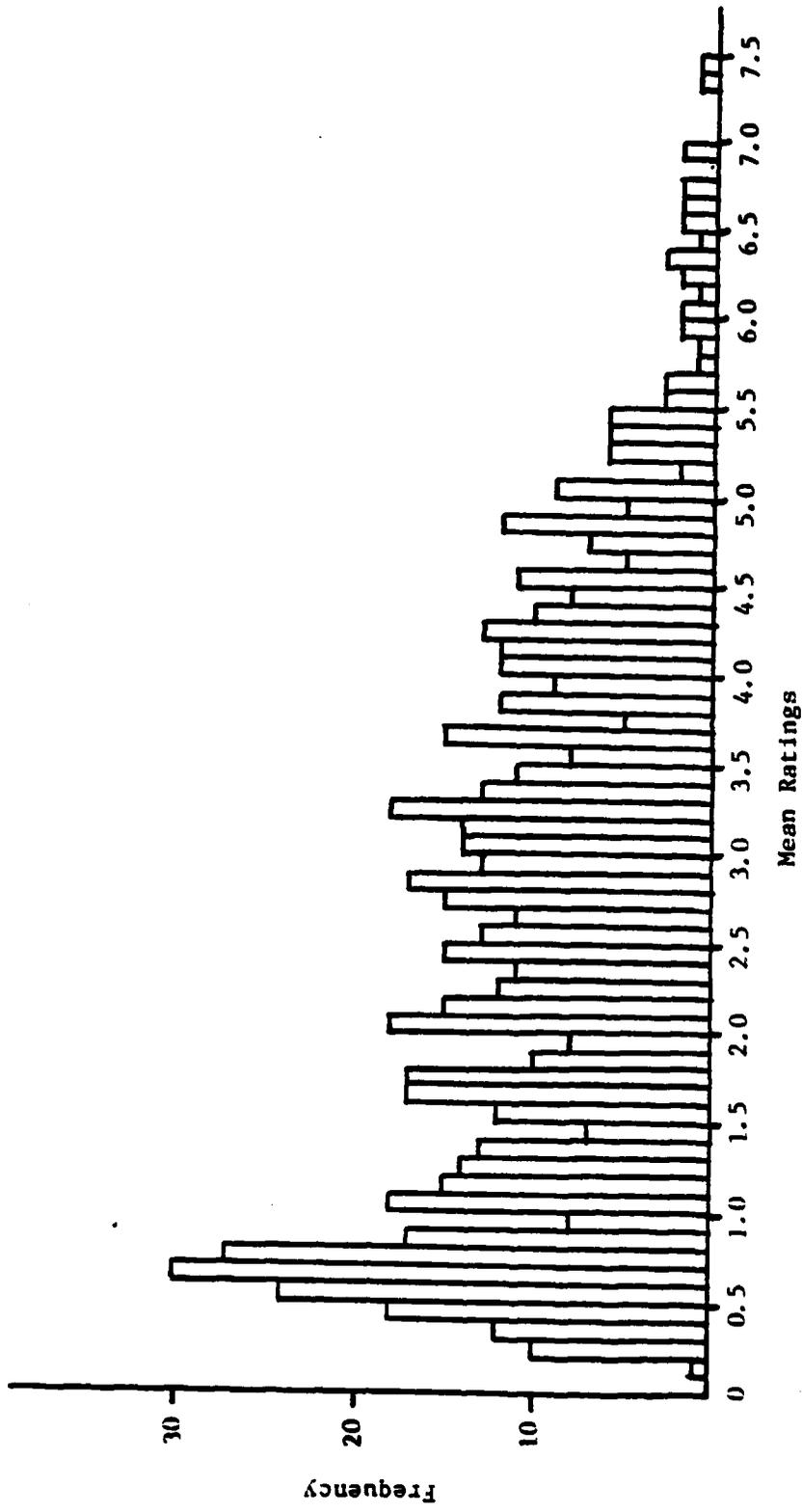


FIGURE 3-3 Histogram of task for mean ratings for AFSC 472X3, Vehicle Maintenance.

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