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AIR FORCE HUMAN RESOURCES LABORATORY

VOCATIONAL INTEREST-CAREER EXAMINATION: USE AND APPLICATION IN COUNSELING AND JOB PLACEMENT

By
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Final Report for Period June 1976 – February 1978

AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235

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This final report was submitted by Personnel Research Division, under project 7719, with HQ Air Force Human Resources Laboratory (AFSC), Brooks Air Force Base, Texas 78235. Dr. William E. Alley, Demographic and Attitudinal Research Branch, was the principal investigator.

This report has been reviewed and cleared for open publication and/or public release by the appropriate Office of Information (OI) in accordance with AFR 190-17 and DoDD 5230.9. There is no objection to unlimited distribution of this report to the public at large, or by DDC to the National Technical Information Service (NTIS).

This technical report has been reviewed and is approved for publication.

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This report describes scales and supporting empirical documentation associated with the Vocational Interest-Career Examination (VOICE). The instrument provides a reliable quantitative basis for describing the vocational interests of people who may have little or no experience on the job and for relating this information to the appropriate choice of an occupational area. Basic interest and occupational scales are defined in terms of their relevant psychometric properties and potential applications in vocational counseling and job placement. Studies bearing on the reliability and validity of the scales for purposes of estimating future job satisfaction are summarized to provide users of the instrument with appropriate source material.

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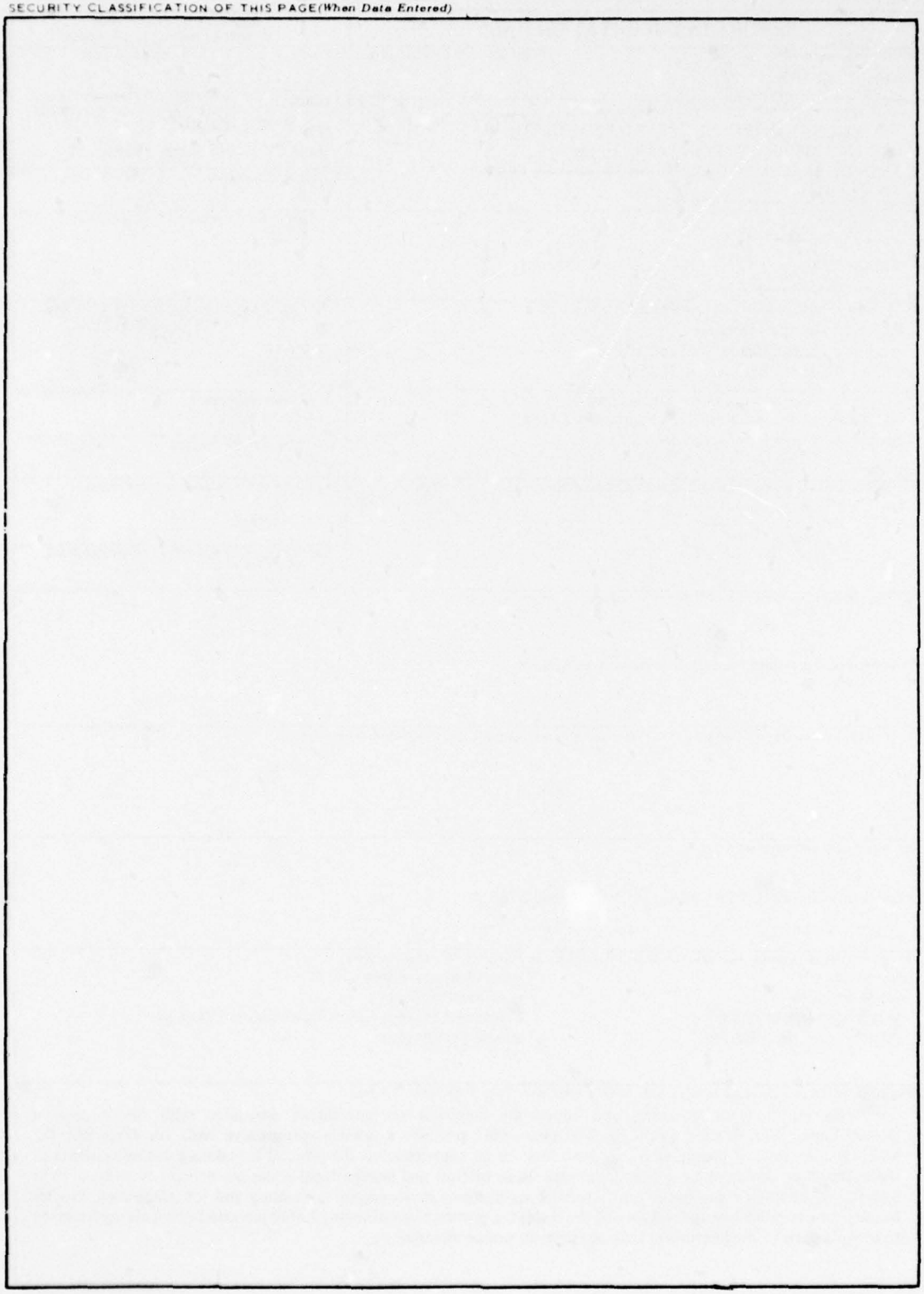

PREFACE

This research was conducted under project 7719, Selection and Classification Technology; task 771909, Specialized Procedures to Improve Personnel Classification and Assignment. The investigation was made in response to RPR 74-24, Development of Improved Techniques for Estimating Person-Job Compatability. Appreciation is expressed to the following individuals for significant contributions to the project:

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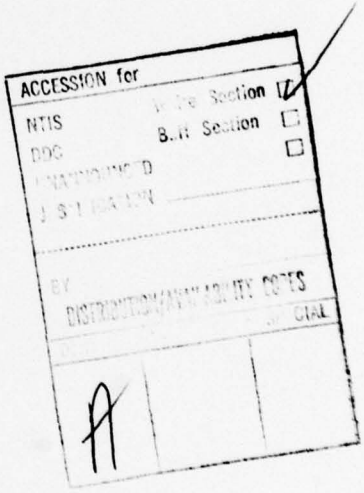

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I. INTRODUCTION

The Air Force, like most other large employers, is concerned with obtaining the fullest possible utilization of its personnel resources. A key element of that objective requires that incoming recruits be assigned to appropriate jobs at the entry level. The present job-placement procedures rely primarily on the results of individual aptitude testing, job entry requirements, and needs of the service in evaluating suitability for competing assignments. An applicant's vocational preferences with respect to available jobs are typically assessed on a more informal basis during conversations with Air Force recruiting or counseling personnel. Although some choice may be exercised on the part of the applicant during the process, decisions are sometimes made under less than optimal conditions. Since the people entering the service typically have little prior experience in the civilian job market, and even less understanding of the Air Force occupational system, they understandably have a difficult time relating personal likes and dislikes to the choices available. Considerable research has shown that the later consequences of misclassification at the entry level can be costly for both the individual and the employer.

Almost by definition, any occupational pursuit that will involve a 4- to 6-year service commitment is or should be a source of personal satisfaction for the incumbent. Without overlooking the fundamental economic arrangements between employer and employee, it is nonetheless true that workers tend to seek out and remain on jobs that offer the highest degree of personal involvement (NAEP Survey, 1977). Aside from the intrinsic aspects of job satisfaction, there are parallel concerns recently identified in the literature that seem to be no less important for the individual. These factors are believed to be related to the psychological stress induced by chronic dissatisfaction and may include subjective feelings of fatigue, depression, and low self-esteem (Quinn & Mangione, 1973); dissatisfaction with life in general (Andrews & Withey, 1974; Kavanagh & Halpern, 1977); psychosomatic illness and general deterioration in mental health (Gechman & Wiener, 1975; McDonald & Gunderson, 1974); drug and alcohol abuse (Mangione & Quinn, 1975); and increased risk for coronary heart disease (French & Caplan, 1972; House, 1972; Kornhauser, 1965).

An employer's concern with the prevailing level of job satisfaction has to do with the influence of worker attitudes on general organizational effectiveness. As noted previously, the onset of job dissatisfaction may have negative effects on both the emotional and physical well-being of the employee. When these debilitating effects manifest themselves in medical problems on the job, the employer shares in the cost associated with lost time and increased utilization of medical benefits. There is evidence, for example, indicating that the frequency of visits to on-site medical facilities is significantly related to job satisfaction levels in the work force (Kasl & French, 1962; McDonald & Gunderson, 1974). The proposition that employee satisfaction also affects overall job performance and quality of work has received a great deal of attention, although findings in this area have been somewhat inconsistent. Seashore and Taber (1975), in summarizing results of studies involving both individual and organizational subgroups, note that positive correlations between satisfaction and performance occur frequently, negative correlations can and do occur, and typical associations are positive but weak. The recent work of Kesselman, Wood, and Hagen (1974) and Orpen (1974) suggests that the relationship is moderated to an extent by the degree of contingent versus noncontingent rewards associated with performance on the job. In settings where performance and rewards are directly proportional, there is a higher statistical association between satisfaction and performance than in situations where rewards are not contingent upon performance.

Incidental behaviors on the job (i.e., those not necessarily related to task performance) may also be negatively affected by job dissatisfaction as noted in a recent study by Mangione and Quinn (1975). Their analysis found that higher rates of counterproductive behavior (theft, sabotage, etc.) and drug abuse on the job were typically associated with groups of dissatisfied workers, particularly for those employees over 30 years of age.

Perhaps the most serious implication of personnel dissatisfaction, at least from the employer's perspective, has to do with its influence on various forms of occupational withdrawal. Research over the past several years has demonstrated quite consistently, and in some cases dramatically, that personnel dissatisfied with their jobs are much more likely to be absent from work (Waters & Roach, 1971, 1973) and to terminate their employment at a higher frequency than are satisfied workers (Gannon & Northern, 1971; Hulin, 1966; Porter & Steers, 1973; Porter, Steers, Mowday, & Boulian, 1974; Sheppard, 1967; Waters & Roach, 1971, 1973).

A research program was initiated recently to improve the quality of vocational guidance and job placement in the Air Force. The specific objectives were to develop a standardized assessment system for measuring occupational interests at the point of entry and to evaluate the utility of this information for estimating eventual satisfaction on the job. It was anticipated that improvement of initial assignment decisions would lead to an overall increase in general satisfaction in the enlisted force to the extent that persons were assigned to careers more consistent with their vocational preferences.

The research program resulted in the development of the Vocational Interest-Career Examination (VOICE), a general purpose occupational interest inventory suitable for use during the pre-assignment job counseling. The initial item pool was constructed by the Educational Testing Service under contract to the Air Force (Echternacht, Reilly, & McCaffrey, 1973). Subsequent research efforts in-house were directed toward refining the scaling procedures (Alley, Wilbourn, & Berberich, 1976) and conducting a large scale predictive validation of the instrument (Alley, Berberich, & Wilbourn, 1977). A final contract effort by Psychometrics, Inc., obtained normative statistics for the instrument on a nationwide high school sample stratified by grade, sex, race, and geographic area (Berger & Berger, 1977).

The intent of this report is to integrate and summarize current research findings on the VOICE in the format of a users guide. A general nontechnical description of the instrument is given together with associated scoring methods and rationales. The two primary types of scales available (basic interest and occupational) are outlined in separate sections of the report. Each is described in some detail as are psychometric properties and potential applications for job placement. Evidence bearing on the construct and criterion related validity of the inventory is also summarized. In the last section, implications for future research and application are discussed.

II. GENERAL DESCRIPTION OF THE VOICE

The VOICE is a 300-item vocational interest inventory requiring approximately 30 minutes to administer. Individual items are presented in booklet form and consist of occupational titles, work tasks, leisure time activities, and desired learning experiences. Respondents indicate relative preferences for each item in a standard like-indifferent-dislike (LID) format. Item responses can be converted to two types of scales: (a) basic interest scales, and (b) occupational scales. The basic scales represent measures of general interest in various occupational and technical areas. They were constructed by grouping items of similar content into 18 independent sets and are useful primarily for descriptive purposes. The occupational scales were designed specifically for use in evaluating alternative areas of assignment in specific occupational clusters. They reflect the extent to which a respondent will be satisfied in a particular occupation based upon his present interest patterns. Both sets of scales are applicable to either males or females considering entry into vocational and technical career fields.

The VOICE inventory and associated scoring technology differ in many respects from inventories currently available. Item responses are obtained in a free rather than a forced-choice format to preclude difficulties with ipsative scoring. Developmental samples are large and well differentiated on the basis of sex to permit stable generalizations for both male and female respondents. Rigorous statistical techniques underlie the scale construction procedures as well as the predictive validation. And finally, career satisfaction rather than career choice serves as the point of reference in evaluating the utility of the instrument for purposes of career counseling and job placement.

A standardized VOICE assessment can serve multiple functions. First it provides a descriptive basis for feedback to someone who may be uncertain about his or her interests and how they relate to the work environment. Second, it yields information to decision-makers (recruiters, counselors, job assignment specialists) about the preferences (likes and dislikes) of people who are seeking entry into a vocational or technical career. The main difference between the results obtained from the VOICE and the informal knowledge gained through self-study or conversation with knowledgeable people is the systematic nature of the assessment and presentation of results. Scores on each of the basic interest scales may be used for comparison between content areas for a given respondent (i.e., interest in administration vs. interest in electronics) or for comparison between a respondent's interest in a given area and those of a standard reference group. These scales are most useful for discussion and planning of broad vocational objectives not necessarily related to any specific occupation. The scores on the occupational scales serve as a basis for evaluating alternative job assignments in terms of suitability of interests and expected satisfaction. Decisions such as these are most commonly made at the entry level although the scales would also have applicability for reassignment actions. The VOICE inventory and standard answer sheet are shown in Appendix A.

III. BASIC INTEREST SCALES

Description

There are 18 basic interest scales available from the VOICE. The scales, shown in Table 1, range in length from 7 to 20 items and measure general interests in a variety of content areas. The content areas have been designed to cover the broadest possible range of interests in the vocational and technical domain and include measures of Office Administration, Electronics, Heavy Construction, Science, Outdoors, Medical Service, Aesthetics, Mechanics, Food Service, Law Enforcement, Audiographics, Mathematics, Agriculture, Teacher/Counseling, Marksman, Craftsman, Drafting, and Automated Data Processing. All items within each scale are homogeneous in a sense that each is assumed to measure the same underlying dimension. The Office Administration items, for example, measure interest in clerical, administrative, and business related activities.

The rationale underlying the development and use of the basic interest scales has been well documented in previous literature (Alley, Berberich, & Wilbourn, 1977; Campbell, 1974; Campbell, Borgen, Eastes, Johansson, & Peterson, 1967; Clark, 1961; Kuder, 1942). Given responses to a large number of items, it is often desirable to seek some means for summarizing response patterns in a smaller, more manageable set of scores. Ideally, measures of this sort have certain properties which make them very useful for counseling purposes: (a) they represent a comprehensive reference system covering an entire domain of interests, (b) they are easily interpretable inasmuch as they tend to focus in specific content areas, (c) they are reasonably independent in a statistical sense, and (d) they represent highly reliable measures in each content area. The term "homogeneous scales" is used to distinguish them from occupational scales that may be empirically related to an external criterion (such as job satisfaction or occupational group membership) but may be heterogeneous in content.

Construction of the VOICE basic interest scales proceeded from a statistical analysis of item relationships within the inventory. Item responses from a large group of male and female respondents were

Table 1. **VOICE Basic Interest Scales**

Scale	No. Items	Basic Description
Office Administration	20	Measures interests in clerical, administrative, and business related activities (typing, filing, use of adding machine, etc).
Electronics	20	Measures interests in maintenance and repair of electrical/electronic devices (radios, television, household appliances, etc.).
Heavy Construction	20	Measures interests in activities and occupations requiring heavy physical demands (construction worker, lumberjack, masonry, welding, etc.).
Science	20	Measures interests in physical sciences, laboratory methods, and apparatus, experimentation, and reporting.
Outdoors	15	Measures interests in outdoor recreational and sports activities, physical fitness, and survival training.
Medical Service	20	Measures interests in para-medical activities including physicians assistant, nursing, emergency medical operations, and physical therapy.
Aesthetics	15	Measures interests in fine arts, literature, music, and classical dance.
Mechanics	15	Measures interests in mechanics (primarily automotive), engine maintenance, and troubleshooting.
Food Service	15	Measures interests in food processing, cooking, planning menus, and related activities.
Law Enforcement	15	Measures interests in security police and allied service occupations (firefighter, forest ranger, explosives expert, etc.).
Audiographics	10	Measures interests in photography, motion pictures, and audio-recording.
Mathematics	12	Measures interests in basic numerical operations (including algebra and trigonometry), computing devices, and related activities.
Agriculture	15	Measures interests in caring for plants and animals, horticulture, veterinary sciences, forestry, etc.
Teacher/Counseling	10	Measures interests in people-oriented activities (teaching, counseling, public speaking, organizing recreational groups, etc.).
Marksman	7	Measures interests in collecting firearms, hunting, shooting, and general marksmanship.
Craftsman	7	Measures interests in activities and occupations fine detail work (jewelry making, tailor, metal working, etc.).
Drafting	7	Measures interests in mechanical drawing, drafting, and graphic arts.
Automated Data Processing	7	Measures interests in computer operations, programming, and use of ancillary devices (keypunch, card sorter, etc.).

correlated, factored, and rotated to a meaningful solution. The 18 factors that emerged from the analysis were identified and interpreted on the basis of those items having the highest statistical relationship to each factor. Male-female differences in the factor structure were minimal. Once the factors were identified,

integer-weighted scales were constructed using the procedures outlined below. Factor loadings for items within each dimension were rank ordered from highest to lowest. Items were selected to represent a given dimension beginning with those with the highest loadings and continuing until one of two criteria was met: (a) a maximum of 20 items was selected or (b) item loadings fell below an arbitrary cutoff of .30. As a check on the procedure, supplementary analyses were performed to verify that the subscales developed using the procedure were similar in meaning to their original factor score equivalents. The results of these analyses indicated that the amount of information loss resulting from integer-weighted scoring was approximately 15% and was considered to be within acceptable limits.

Psychometric Characteristics

Individual items in the VOICE are scored 3 = like, 2 = indifferent, and 1 = dislike. A response that is missing or duplicated is rescaled equal to 2. Scale scores on the basic interest scales are obtained by summing scores across items in each scale as listed in Table B1. Two sets of item numbers are provided for each scale. The first column refers to the original 400-item version of the inventory (Form A), and the second refers to a recent update which contains a subset of only 300 items (Form B).

Subscale intercorrelations for the male and female recruit samples and internal consistency reliability estimates (Alpha coefficients) are shown in Table 2. There was a moderate degree of positive intercorrelation among the scales, more so among males than females. Correlations in the .60's were noted for the following scale combinations: for males, Science-Aesthetics, Heavy Construction-Mechanics, Science-Mathematics, Office Administration-Mathematics, Office Administration-Teacher/Counseling, Medical Service-Teacher/Counseling, Aesthetics-Teacher/Counseling, Outdoors-Marksman, Food Service-Craftsman and Science-Drafting; for females, Heavy Construction-Electronics, Mechanics-Heavy Construction, Agriculture-Outdoors and Drafting-Audiographics. Correlates of this magnitude reflect common variance between the aforementioned scales in the range of 36-48%. Among the remaining subscale combinations, estimates of common variance ranged from zero to 36%. Scale reliabilities varied between .88 to .98 for males and between .84 to .98 for females. These values, which are quite high by most commonly accepted standards, indicate the extent that items within scales are measuring a common attribute.

Raw score means and standard deviations for each of the scales are shown in Table 3. Scale score ranges and normative characteristics for two standardization groups are provided. The groups represent (a) volunteer Air Force recruits and (b) U.S. high school students in grades 10 through 12. The Air Force standardization group consisted of a random sample of 22,745 volunteer recruits (males = 10,035; females = 12,710) surveyed during basic training in the period 1972–1975. Recruits range in age from 17 to 22 years. Their educational backgrounds vary between 11 and 16 years of formal training although the vast majority have completed high school. Racial composition of the group paralleled that of all accessions during the time period (18% Black; 82% non-Black). The high school standardization group was obtained through a nationwide probability sample of 12,146 high school students (males = 6,090; females = 6,056) enrolled in grades 10 through 12 during the 1975–76 school year. Respondents in this group were stratified according to race, sex, grade, and geographic region.

A comparison of male and female average scores in the recruit sample indicates that males typically scored higher on Electronics, Heavy Construction, Mechanics, Law Enforcement, and Marksman subscales. Female recruits, as a group, typically scored higher on Office Administration, Medical Service, Aesthetics, Food Service, Audiographics, Agriculture, and Teacher/Counseling. Much the same pattern of differences can be noted in the high school standardization group. As a general trend, the Air Force recruits had higher mean scores and showed greater variability across all scales than did the high school students although there were some exceptions (most notably Food Service and Craftsman). The only measure on which respondents consistently scored above the midpoint was the Outdoors subscale. On the remaining scales, average scores for both groups were typically at or below the midpoint.

Table 2. **VOICE Subscale Intercorrelations and Reliability Indices**

Scale	Correlations																		Alpha Coefficients[a]	
	OA	EL	HC	SC	OD	MS	AE	ME	FS	LE	AU	MA	AG	TC	MK	CF	DF	DP	Males	Females
Office Administration		28	20	40	19	55	52	13	52	27	44	60	26	64	14	52	41	56	.97	.97
Electronics	09		48	49	37	29	30	59	28	25	49	42	33	31	38	40	48	53	.98	.98
Heavy Construction	05	60		19	43	25	18	67	42	47	29	14	58	19	50	46	31	13	.96	.96
Science	04	46	28		40	61	60	21	35	27	58	63	42	58	27	41	60	53	.98	.98
Outdoors	05	31	42	34		33	39	44	27	45	42	26	58	39	66	21	36	17	.94	.91
Medical Service	22	10	14	41	29		58	16	52	42	52	43	48	66	24	51	43	40	.97	.97
Aesthetics	18	23	18	50	36	32		12	52	26	56	51	43	69	19	47	48	37	.95	.94
Mechanics	05	74	69	29	41	11	15		25	34	28	15	40	15	53	30	30	18	.97	.97
Food Service	35	16	29	16	36	30	34	17		34	43	35	50	47	23	60	35	27	.95	.95
Law Enforcement	13	30	45	30	44	39	26	37	20		36	15	51	37	48	32	24	15	.94	.92
Audiographics	14	44	35	46	43	27	47	35	31	36		41	45	55	34	53	62	46	.95	.94
Mathematics	47	38	17	46	16	16	28	21	18	12	24		24	59	14	38	53	58	.96	.96
Agriculture	00	33	51	41	61	32	39	38	44	40	47	12		43	47	41	39	13	.94	.95
Teacher/Counseling	41	20	16	39	32	49	55	15	35	38	41	38	28		22	45	49	44	.94	.92
Marksman	01	45	52	29	56	17	19	55	12	48	32	13	39	17		26	29	14	.92	.92
Craftsman	34	38	41	30	22	28	36	31	54	23	50	29	37	33	22		47	40	.88	.84
Drafting	14	48	37	56	34	17	44	36	23	25	62	45	40	34	31	46		46	.92	.92
Automated Data Processing	53	37	12	26	07	14	13	20	12	11	23	49	00	26	11	28	28		.94	.94

Note. — Upper half males (N = 10,035); lower half females (N = 12,710). Decimals omitted.

[a]Alpha coefficient of internal consistency (Cronbach, 1951) corrected for test length.

Table 3. **Means and Standard Deviations for the Basic Interest Scales**

Basic Interest Scale	Range	Mid-Point	Air Force Recruits				U.S. High School Students			
			Males		Females		Males		Females	
			$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Office Administration	20–60	40	32.3	10.7	37.8	11.5	30.7	8.7	36.7	9.8
Electronics	20–60	40	40.2	12.8	32.5	12.2	37.4	9.9	27.2	8.3
Heavy Construction	20–60	40	34.3	10.0	27.5	8.4	35.1	9.7	26.0	6.9
Science	20–60	40	38.0	12.7	38.2	12.8	35.8	9.9	32.7	9.9
Outdoors	15–45	30	36.5	6.9	36.7	5.8	34.9	7.0	34.8	6.0
Medical Service	20–60	40	33.4	10.6	40.8	11.5	31.8	9.2	39.3	9.9
Aesthetics	15–45	30	26.1	7.7	31.8	7.4	24.0	6.8	28.2	7.4
Mechanics	15–45	30	31.6	9.0	25.1	8.7	30.3	8.5	21.8	6.8
Food Service	15–45	30	21.4	6.3	26.7	7.4	23.2	6.5	28.9	7.3
Law Enforcement	15–45	30	29.2	7.3	26.9	6.9	27.4	6.8	24.6	6.3
Audiographics	10–30	20	20.8	5.8	22.3	5.4	19.6	5.4	20.7	5.2
Mathematics	12–36	24	21.5	7.4	22.1	7.4	19.8	6.4	19.9	6.5
Agriculture	15–45	30	28.0	7.2	31.0	8.0	28.2	6.7	29.5	7.3
Teacher/Counseling	10–30	20	19.3	5.7	22.2	5.3	17.0	5.0	20.6	5.2
Marksman	7–21	14	15.4	4.3	11.5	4.2	14.6	4.1	10.0	3.2
Craftsman	7–21	14	9.9	3.0	11.2	3.0	10.1	2.7	11.5	2.9
Drafting	7–21	14	13.2	4.2	13.1	4.3	12.8	3.8	12.1	3.7
Automated Data Processing	7–21	14	13.8	4.5	13.9	4.4	12.4	3.9	12.6	3.9

Applications

The basic interest scales are primarily descriptive in nature. Scale scores represent quantitative measurements of vocational interest in designated content areas and are designed for use in any research or applied setting where the intent is to provide a comprehensive summary of interest data for one or more individuals. Since the scales are referenced to content area rather than specific specialties, they are best suited for general purpose use, i.e., exploratory research, broad-based vocational planning, and discussion. Scores on each of the scales are useful for making comparisons between areas for a given individual or for comparison between a respondent's interest in a particular area and those of a standard reference group—Air Force recruits or U.S. high school students in general.

When vocational interest data are used for comparative purposes, it is often more meaningful to convert raw scores obtained on the scales to a standardized metric system with a fixed mean and standard deviation. The availability of normative data cited previously provides the basis for converting individual test scores.

Tables C1 and C2 show one such transformation in the form of T scores where the average value of each subscale for a given reference group is set at 50 and the standard deviation of scores around that average is set at a value of 10. The conversions are based on the normative data for male and female Air Force recruits shown previously in Table 3. A profile of transformed scores for a randomly selected male recruit is shown in Figure 1. The subscales are listed in the left margin. Across the bottom of the illustration, T values range from 20 to 80 with the larger number indicating a higher affinity for the keyed activities. Both raw-score and T-score equivalents are shown for each subscale. This respondent displayed marked preferences on the Science and Aesthetics subscales. Somewhat lower, but still above average, were scores obtained on the Outdoors, Audiographics, Agriculture, and Teacher/Counseling subscales. Below average scores may be noted on Mechanics, Automated Data Processing, Office Administration, and Marksman. Similar T-score transformations referenced to the U.S. high school population may be found in Tables C3 and C4 for males and females, respectively.

VOICE INTEREST PROFILE

SCALE	SCORE RAW	SCORE T
1. Office Administration	21	39
2. Electronics	30	42
3. Heavy Construction	26	42
4. Science	55	63
5. Outdoors	42	58
6. Medical Service	30	47
7. Aesthetics	39	67
8. Mechanics	18	35
9. Food Service	17	43
10. Law Enforcement	24	43
11. Audiographics	26	59
12. Mathematics	23	52
13. Agriculture	33	57
14. Teacher/Counseling	24	58
15. Marksman	11	40
16. Craftsman	12	57
17. Drafting	15	54
18. Auto. Data Proc.	7	35

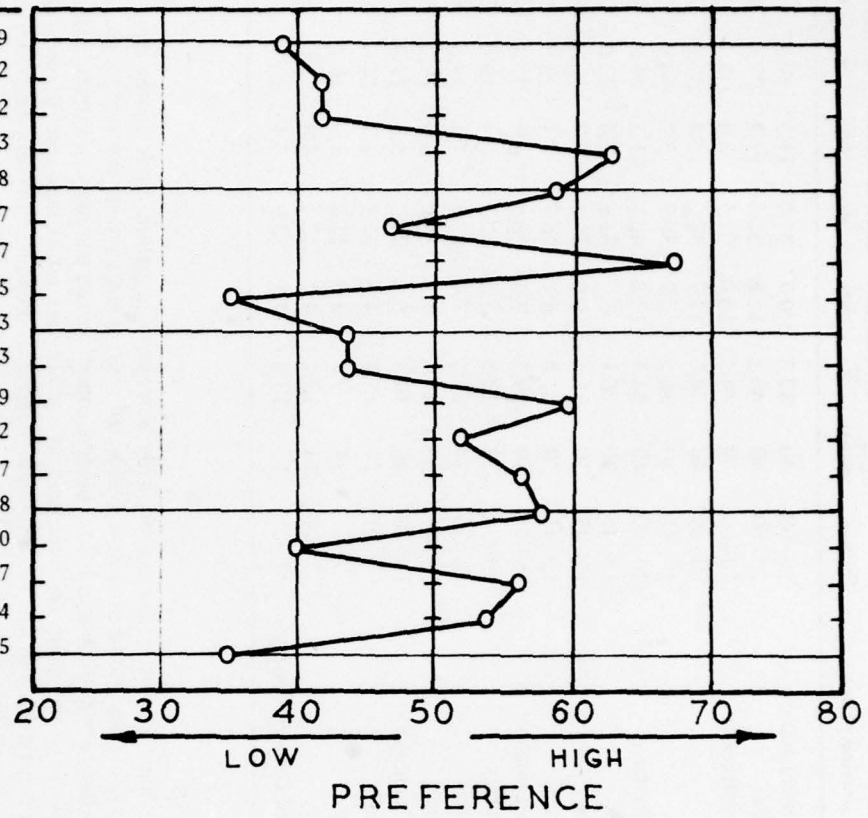

Figure 1. **VOICE Basic Interest Profile.**

The interpretation of VOICE standard scores in terms of an assumed normal distribution is fairly straightforward: A male recruit obtaining a score of 50 on any of the subscales may be said to have scored at the mean for male recruits in general. Scores above 50 would indicate higher than average appreciation for the activities associated with the scale while scores below 50 would indicate lower interest. A score of 60 would be considered one standard deviation above the mean and may be interpreted as high relative to the standardization population. A score at two standard deviations above the mean would be very high while a score at three standard deviations, which would seldom occur, would be extremely high. Similar interpretations could be placed on scores falling at various increments below the mean of 50. The standard error of measurement for these scores, based on internal consistency reliabilities, indicates a fairly narrow band of uncertainty associated with a given true score estimate (± 1.5 to ± 4.0 points). As a general rule, the range of values ± 7 points from an observed score on the basic interest scales would usually include a person's true score value (conservatively estimated to be 7 out of 10 times). This calculation is based on scores at the extreme ranges on the most unreliable scale. For less extreme scores, a confidence interval of ± 5 points would suffice. Similarly, a score difference of 10 points between individuals on the same scale or for the same individual on different scales could be interpreted as a substantial difference (i.e., one for which the 70% confidence interval for score differences would not include a difference of zero). Grouped data on a scale ($N > 25$) would be considered different if mean values differed by at least 5 points on the T-score metric.[1]

IV. OCCUPATIONAL SCALES

Description

Twenty occupational scales are available from the VOICE. Each measure is specifically referenced to a Department of Defense (DoD) occupational job cluster (Table 4). The clusters represent an exhaustive categorization of all Air Force specialties into one of the 20 groups (Department of Defense, 1975). All but three (Armaments & Munitions, Firefighter, and Security Police) are appropriate for either male or female job counseling. The scales provide direct estimates of expected job satisfaction for each career field in the set and can be used for making specific comparisons between alternative assignments.

The construction of the occupational scales was based on a statistical analysis of interest effects and reported satisfaction in Air Force occupations. A large sample of recruits who were administered the VOICE prior to assignment was followed-up after approximately a year on the job. The purpose of the follow-up was to determine the extent to which the recruits were satisfied within their respective assignments. Each scale represents a prediction based on separate career-level regression equations that estimate job satisfaction based on prior interests. The equations combine various subsets of the basic interest scales into empirically weighted composites that forecast the degree of satisfaction expected across the 20 occupational clusters.

Psychometric Characteristics

Procedures for obtaining occupational scores for a given respondent are somewhat complex from a computational standpoint. Each score requires two sets of information (Table 5). In the score vector are each of the 18 basic interest raw scores. The regression weight vector contains corresponding weights for each scale reflecting the relative contribution of the scales to the prediction of job satisfaction in the occupational cluster, in this case, the Medical Care career (30). A respondent's estimated satisfaction is obtained by cross-multiplying the basic interest scores with the appropriate weight and adding the products across all scales. The result is adjusted by the last entry in column (2) on the table. The scores on the occupational scales range generally from 200 to 800 with a midpoint at 500. The estimated satisfaction for the respondent whose scores are shown in the table is 675 on the scale.

[1] See Stanley (1971) for an excellent discussion of reliability theory and its application to the interpretation of test scores.

Table 4. **VOICE Occupational Scales and Component AFSCs**

Occupational Scale	DoD Code	Air Force Specialty Code
Radio/Radar Equipment Repair	10	304X0, 304X4, 304X6, 307X0, 328X0, 304X1, 328X3, 328X4, 325X0, 328X1, 329X0, 303X1, 303X2, 303X3, 309X0, 328X2
Miscellaneous Electronic Equipment Repair	1X	321X0, 322X1, 320X0, 323X0, 316X1, 316X0, 317X0, 316X2, 317X , 306X0, 306X1, 362X2, 363X0, 304X5, 341X1, 342X0, 343X0, 302X0, 324X0, 325X1, 326X0, 326X1, 326X2, 403X0, 404X0, 991X3, 463X0, 305X4
Radar and Air Traffic Control	22	270X0, 276X0, 272X0
Miscellaneous Communications and Intelligence Specialties	2X	207X1, 207X2, 202X0, 203X1, 205X0, 203X0, 206X0, 204X0, 821X0, 293X3, 274X0
Medical Care	30	901X0, 902X0, 912X5, 902X2, 914X0, 914X1, 913X0
Miscellaneous Medical and Dental Specialties	3X	904X0, 904X1, 909X0, 905X0, 903X0, 981X0, 982X0
Technical and Allied Specialties	4X	230X0, 231X1, 232X0, 233X0, 233X4, 236X1, 791X1, 221X0, 222X0, 553X0, 223X1, 231X1, 251X0, 252X1, 464X0, 991X7, 871X0, 871X1
Administration	51	702X0, 704X0, 705X0, 906X0, 602X0, 605X0, 605X1, 391X0, 433X0, 271X0
Miscellaneous Administrative Specialties and Clerks	5X	732X0, 732X1, 511X0, 691X0, 511X1, 554X0, 671X1, 672X0, 671X3, 645X0, 651X0, 915X0, 701X0, 741X1, 990X5, 751X0, 791X0, 291X0
General Aircraft Mechanic	600	431X0, 431X1
Aircraft Engine Mechanic	601	432X0, 432X1
Aircraft Accessories Mechanic	602	421X1, 421X2, 421X3, 422X1, 423X0, 424X0, 424X1, 425X0
Armaments and Munitions	64	461X0, 462X0
General Mechanic	6X	534X0, 472X1, 473X0, 472X0, 361X0, 361X3, 361X1, 362X1, 362X3, 362X4, 443X0, 442X0, 541X0, 543X0
Utilities Maintenance	72	545X0, 546X0, 547X0, 552X5, 563X0, 566X0, 542X0, 542X1
Firefighter	78	571X0, 923X0
Material Receipt, Storage and Issue	82	630X0, 631X0, 601X4, 647X0, 611X0
Security Police	83a	811X0
Law Enforcement	83b	812X0
Miscellaneous Services and Supply	8X	621X0, 622X0, 742X0, 600X0, 603X0, 991X9, 812X1, 114X0, 581X0, 607X0, 922X0

Table 5. **Procedures for Estimating Job Satisfaction in the Medical Care Career Area**

Subscales	Raw Score (1)	Raw Score Weights for 30-Medical Care (2)	Products (1) x (2)
Office Administration	58	2.18	126.44
Electronics	60	.21	12.60
Heavy Construction	42	.78	32.76
Science	60	1.60	96.00
Outdoors	45	−.99	−44.55
Medical Service	48	3.20	153.60
Aesthetics	45	−.07	−3.15
Mechanics	43	.17	7.31
Food Service	35	1.94	67.90
Law Enforcement	37	.24	8.88
Audiographics	28	.61	17.08
Mathematics	36	−1.14	−41.04
Agriculture	43	.99	42.57
Teacher/Counseling	30	−3.73	−111.90
Marksman	21	1.03	21.63
Craftsman	15	−4.44	−66.60
Drafting	21	−5.98	−125.58
Automated Data Processing	14	−2.28	−31.92
Constant		512.90	512.90
			Σ = 674.93

The scores obtained on the occupational scales are interpretable from either an absolute or normative reference point. Since the scores represent expected values on the job satisfaction criterion variable (defined as 200 = Very Dissatisfied, 400 = Dissatisfied, 600 = Satisfied, 800 = Very Satisfied), they may be interpreted with reference to the original anchor points. A score of 675 would be somewhat above the "satisfied" level on the scale. Two persons having similar scores may be said to have a similar expectation in the career field. Similar interpretations would apply in comparisons between different career fields for the same individual. Five hundred would represent a theoretical midpoint or indifference value for the scales. Under circumstances where comparisons are to be made with a reference group, procedures have also been established for converting the raw, absolute values to a standardized metric. These procedures are based on means and standard deviations of the raw scores obtained for the Air Force standardization sample. Table 6 shows normative data for the occupational scale scores by sex group. No direct conversion tables have yet been developed since the need for this type of reference system has not been established in an operational setting. The reader will note that some of the composites are shown to have zero variance. This reflects the fact that for five of the 20 specialties, no significant relationship between measured interests and subsequent satisfaction could be detected. There is some uncertainty at present whether the negative findings are attributable to insufficient sampling of respondents in these occupations, possible heterogeneity of job types within the cluster, or simply incomplete specifications of the relevant interest dimensions. The topic appears to warrant further investigation. Meanwhile, the zero-variance composites serve as place-fillers and as general reference points in the system. Expectations for personnel assigned to these clusters are based simply on the grand-mean on the job-satisfaction criterion for incumbents. The expectations are the same for all prospective recruits since they are not dependent on measured interests.

Table 6. **Means and Standard Deviations for the Occupational Scales – Air Force Recruits**

Occupational Scale	Males		Females	
	$\bar{X}$	SD	$\bar{X}$	SD
Radio/Radar Equipment Repair	610	44	567	48
Miscellaneous Electronic Equipment Repair	565	48	538	54
Radar and Air Traffic Control	588	66	575	64
Miscellaneous Communications and Intelligence Specialties	561	0	520	0
Medical Care	608	47	628	52
Miscellaneous Medical and Dental Specialties	661	59	671	62
Technical and Allied Specialties	644	0	660	0
Administration	536	37	561	75
Miscellaneous Administrative Specialties and Clerks	569	38	573	47
General Aircraft Mechanic	531	41	465	82
Aircraft Engine Mechanic	581	60	485	144
Aircraft Accessories Mechanic	514	64	464	66
Armaments and Munitions	434	0	–	–
General Mechanic	547	65	495	63
Utilities Maintenance	645	0	530	0
Firefighter	653	0	–	–
Material Receipt, Storage and Issue	451	45	457	47
Security Police	406	71	–	–
Law Enforcement	541	79	538	76
Miscellaneous Services and Supply	500	63	467	68

Note. – Standard deviations of zero denote composites without significant predictive variance. Dash (–) denotes composites without female representation. Score range for each scale typically varies between 200 and 800 although individual scores outside this range are not uncommon.

Applications

The VOICE occupational scales are designed for use in vocational counseling and job placement at the entry level. Information provided by the scales would be valuable for any recruit who by virtue of limited experience or uncertainty about Air Force occupations may be undecided as to which career field to pursue. Scores on the occupational scales may also be applicable to enlisted persons in general who may be desirous of and eligible for reassignment to another career field.

The usefulness of a vocational interest inventory for counseling and job placement purposes depends to a large measure on the extent to which it yields relevant occupational data for differential assignment. The process of transforming scale scores on the basic interest measures to occupational scales is accomplished through the use of career-specific regression equations which optimally weight the subscales to predict satisfaction within each occupational cluster. Figure 2 illustrates expected values for a random recruit in all 20 occupational areas. In terms of absolute satisfaction, this recruit would probably be best suited for assignment to Radar and Air Traffic Control, Technical and Allied Specialties, Utilities Maintenance, or Firefighter. He would be least likely to find a satisfying career in Security Police; Material Receipt, Storage, and Issue; or the Mechanical specialties.

VOICE occupational scales most nearly correspond to the empirical scales provided by some commercially available inventories, most notably the Strong Vocational Interest Blank (Strong, 1966) and the Strong-Campbell Interest Inventory (Campbell, 1974). Whereas most of these inventories focus on college-oriented professional occupations, the VOICE concentrates on clerical, service, and blue collar careers that typically do not require general education beyond the high school level (although some technical training may be involved).

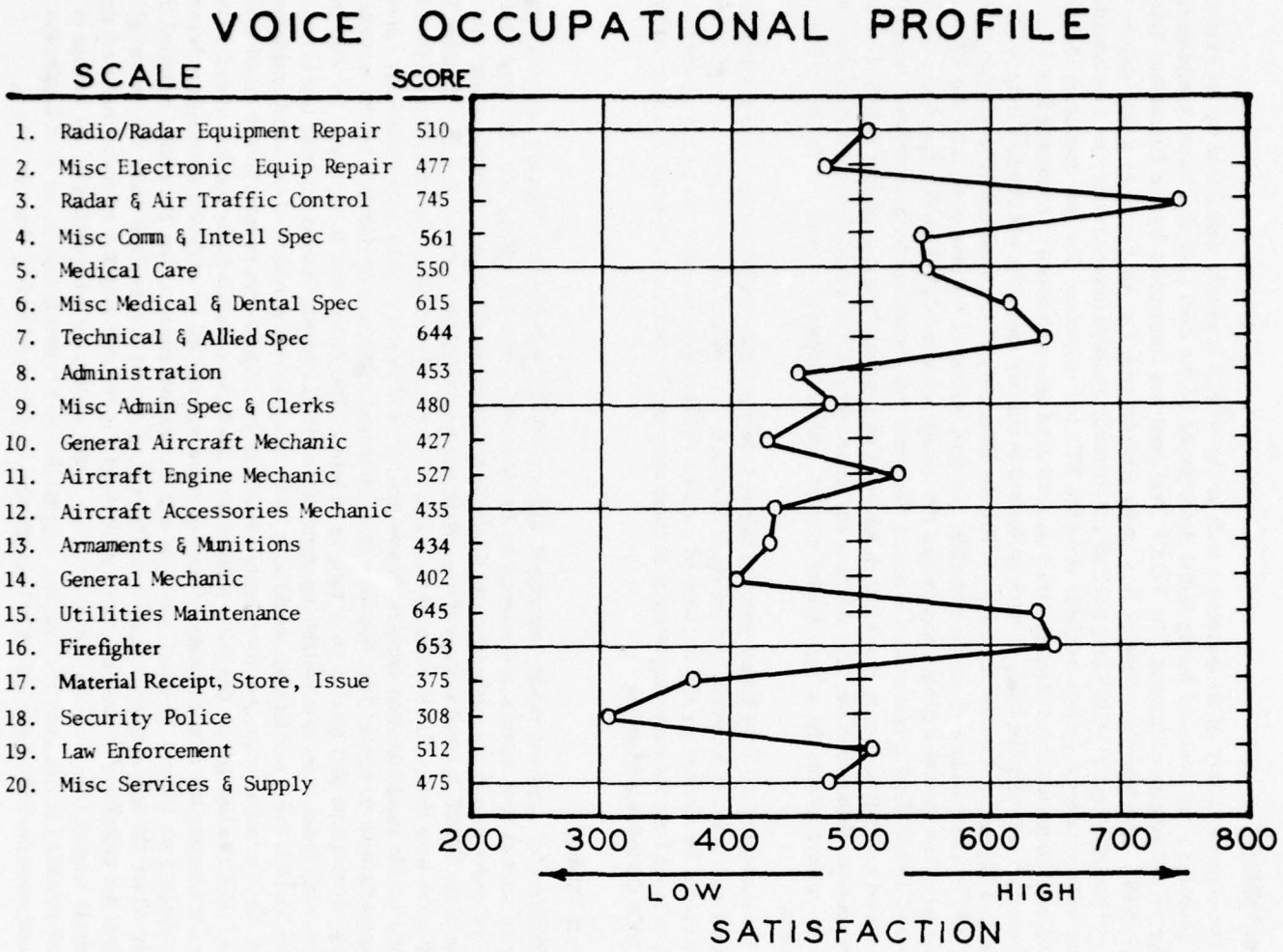

Figure 2. **VOICE Occupational Profile.**

V. VALIDITY

Content Validity

The content validity of an instrument such as the VOICE is usually determined by the extent to which procedures are followed during initial development of the item pool that insure comprehensive coverage of the domain of interest. The VOICE item pool was constructed by the Educational Testing Service (ETS), an independent research firm under contract with the Air Force. As a first step in the process of constructing the VOICE item pool, all commercially available interest inventories were assembled together with vocational surveys available from the ETS test collection. The test developers identified common and unique features of each inventory and evaluated each with regard to content and item format. Documentation regarding the kinds of work performed in military specialties was obtained from Air Force Manual 39-1 (Department of the Air Force, 1970), the Dictionary of Occupational Titles (Department of Labor, 1969), and reference to similar materials. The final version of the item pool contained 400 items grouped into four general sections: occupations (90 items), work tasks (210 items), leisure activities (70 items), and desired learning experience (30 items). Each item was constructed for independent presentation in a standard Likert-type format. No forced choice items were included, to avoid potential difficulties with ipsative scoring. Throughout the item development phase, every effort was made to construct items that would be understandable to a high school student without previous experience in the civilian job community.

The content of the VOICE item pool was believed to be as representative as possible of the domain of vocational and technical interests. The net result of efforts to provide a comprehensive coverage of these factors cannot be assessed strictly in terms of content validity. Evidence that the item pool did in fact provide a broad basis for evaluating interests in these areas can be evaluated more fully based on evidence provided in the following sections.

Construct Validity

Evidence of construct validity associated with the VOICE subscales has been accumulated from a variety of sources both internal and external to the item pool. Construct validity concerns the extent to which test scales provide comprehensive and internally consistent measures of hypothesized attributes. In the case of the VOICE, internal analysis of item relationships provided one basis for such an evaluation. The VOICE scales were defined on the basis of two parallel factor analyses of item responses obtained from the male and female standardization samples. Procedures followed in this exercise were statistically rigorous and comprehensive in scope. Two 400-item intercorrelation matrices were factored by the method of principal components and rotated to a varimax criterion. The intent was to represent the 400 item responses with fewer, more interpretable measures of vocational interests. Results indicated that 18 factors, common to both males and females, would serve as an adequate representation of the vocational interest domain. The 18 factors accounted for roughly one-half of the original item variance in both samples. Unit weighted subscales based upon this factor solution were developed using the factor loadings of each item as a basis for construction. The adequacy of the procedure was verified by analyzing relationships between scores obtained on the unit weighted subscales and the original factor scores. The results indicated that virtually all of the information contained in the original factors was available from the unit-weighted subscales. An evaluation of internal item consistencies for the unit-weighted subscales indicated alpha coefficients ranging from the high 80s to mid 90s. These indices are interpretable as the average of all split-half reliability coefficients. The evidence suggests that by all internal criteria, the VOICE subscales are both comprehensive and reliable indices of homogeneous content as defined by the scale titles.

Convergent and discriminant validity. The recent emphasis on developing common testing procedures across the military services provided a rationale for analyzing the construct validity of the VOICE with respect to comparable instruments of both the Army and Navy. A reference sample consisting of 1,390 recruits was administered the Navy Vocational Interest Inventory (NVII), the Army Classification Inventory (ACI), and the VOICE. The NVII contains 190 forced-choice item triads that require respondents

to select the most and least preferred alternatives presented with each item set. The inventory yields nine area scores of the same general type as the 18 homogeneous VOICE subscales (Clark, 1961). The inventory also yields occupational composites in 15 Navy specialties designated "lambda" scores (Dann, 1974). The Army Classification Inventory (Bayroff & Fuchs, 1970), as used in their operational selection and classification program, provides interest measures in four general areas: Mechanical, Administrative, Electronics, and Combat. These scales are briefly summarized in Table 7, which also provides correlations between each of the 18 VOICE subscales and the cross-service instruments. Correspondence between inventories was evaluated in two ways. First, simple bivariate correlations between individual VOICE

Table 7. **Correlations Between Scales on the VOICE, NVII and ACI in the Construct Validation Sample**
(N = 1,390)

	VOICE Scales																	
Scale	**OA**	**EL**	**HC**	**SC**	**OD**	**MS**	**AE**	**ME**	**FS**	**LE**	**AU**	**MA**	**AG**	**TC**	**MK**	**CF**	**DF**	**DP**
NVII – Lambda Scores																		
Quartermaster	−33	34	28	22	42	−12	−08	42	−21	18	13	08	23	−04	36	−08	29	00
Sonar Technician	−41	(57)	39	17	32	−18	−19	58	−19	13	08	02	18	−19	39	−02	19	03
Electronic Technician	−41	(59)	39	21	31	−17	−17	58	−18	12	09	05	19	−19	38	−01	22	05
Radio Man	−30	54	31	15	31	−22	−18	51	−24	13	09	07	12	−14	37	−05	21	10
Data Processing	−13	40	22	18	32	−18	−16	41	−24	11	06	22	08	−04	31	−09	21	16
Store Keeper	41	−21	−21	−14	03	−13	−08	−18	−16	02	−09	21	−18	16	−05	−17	−07	17
Commissary Man	−37	14	36	−12	33	−22	−29	42	03	18	−09	−17	24	−22	34	−12	−03	−24
Engine Man	−44	49	51	−02	27	−29	−32	(66)	−17	12	−05	−11	17	−31	42	−02	10	−09
Boiler Man	−42	51	50	−01	27	−29	−32	65	−28	12	−04	−10	16	−30	42	−02	11	−07
Electrician's Mate	−42	(57)	46	06	28	−25	−27	63	−18	11	01	−04	16	−26	40	−01	14	−02
Equipment Operator	−44	45	50	−03	30	−29	−31	63	−17	14	−05	−13	19	−29	42	−04	11	−12
Aviation Ordinance Man	−43	47	47	02	32	−27	−29	62	−17	15	−02	−08	19	−27	43	−04	13	−08
Air Control Man	−35	37	29	23	42	−11	−10	44	−20	20	13	07	21	−05	38	−08	27	01
Aviation Electrician	−41	(57)	44	11	30	−22	−24	62	−19	12	04	−02	17	−24	41	−01	17	01
Hospital Corpsman	−08	−08	−10	47	30	(50)	25	−11	01	23	20	17	28	30	08	−06	16	02
NVII – Area Scores																		
Mechanical	−39	53	48	−06	14	−32	−27	(64)	−13	02	−05	−13	07	−34	33	04	09	−07
Health	06	−14	−18	45	08	(58)	27	−23	11	10	16	16	17	25	−07	04	07	07
Office	(61)	−32	−40	−06	−23	07	12	−45	−01	−14	−03	24	−28	23	−30	−01	−10	27
Electrical	−23	(68)	19	04	03	−23	−14	39	−15	−03	08	−01	−05	−22	18	04	07	17
Food Service	−11	−24	−09	−10	−04	02	01	−15	(44)	−01	−03	−15	09	−05	−09	−01	−13	−24
Carpentry	−10	−25	25	−31	06	−17	−14	09	07	01	−23	−21	14	−10	08	−04	−04	−32
Sales Office	17	−24	−35	26	01	27	40	−41	08	03	23	18	00	37	−21	02	14	10
Clean Hands	42	−24	−30	−04	−15	09	09	−36	−04	00	03	14	−22	20	−19	−01	−06	22
Outdoors	−31	24	40	−12	(21)	−19	−36	44	−16	09	−24	−12	14	−26	29	−10	−03	−18
ACI																		
Combat	−19	19	36	19	45	09	01	31	−01	39	09	01	29	04	46	00	14	−04
Mechanical	−06	57	58	17	32	01	02	(69)	11	24	18	07	30	01	43	21	24	09
Electronics	20	(69)	24	55	26	23	29	34	13	17	35	64	21	32	24	25	43	46
Administrative	(61)	00	−19	26	05	29	35	−17	10	03	21	43	−04	47	−09	16	18	38

OA – Office Administration
EL – Electronics
HC – Heavy Construction
SC – Science
OD – Outdoors
MS – Medical Service
AE – Aesthetics
ME – Mechanics
FS – Food Service
LE – Law Enforcement
AU – Audiographics
MA – Mathematics
AG – Agriculture
TC – Teacher/Counseling
MK – Marksman
CF – Craftsman
DF – Drafting
DP – Automated Data Processing

Note. – Circles denote interesection of similar or same-named scales.

subscales and those of the NVII and ACI were examined for one-to-one relationships among the subscales. Correlations between same or similar named scales are circled in the table. According to Campbell and Fiske (1959), these correlations may be interpreted as measures of convergent validity—the expected correspondence between two independent measures that purport to assess the same trait. Discriminant validity, on the other hand, requires that correlations between different traits measured by independent assessment procedures be uniformly "low."

All 15 convergent validities (circled in Table 7) were found to be significant well beyond the .01 level. There were, however, varying degrees of correspondence between individual VOICE subscales and those obtained from other inventories. Correlates above .60 were found for the Office Administration, Electronics, Mechanics, and Mathematics subscales. The Office Administration subscale, for example, correlated .61 with the NVII Office scale and .61 with the ACI Administrative scale. The VOICE Electronics subscale correlated .68 with the NVII Electrical measure and .69 with the corresponding scale in the ACI. Somewhat lower but still indicative of significant overlapping variance were scores on the VOICE Electronics subscale and the NVII Sonar Technician, Electronic Technician, Radio Man, Boiler Man, Electrician's Mate, and Aviation Electrician. The Heavy Construction subscale correlated in the 50s with scales on both the NVII and the ACI. The Medical Service subscale correlated .50 with the NVII Hospital Corpsman measure and .58 with the NVII Health scale. Correlations between the VOICE Mechanics scale and the NVII Mechanical scale was .64 and .69 with the ACI Mechanical scale. Although other significant relationships were found, they were, in most cases, not large enough to verify direct one-to-one correspondence between the scales. The two "outdoor" scales, in particular, were found to measure different constructs as evidenced by their intercorrelation value of .21. Items from the VOICE scale deal exclusively with outdoor activities of a health or recreational nature. The NVII-Area scale appears to include references to occupations typically performed outdoors such as those associated with the VOICE Heavy Construction and Mechanics subscales.

Evidence of the discriminant validity of the scales may also be noted in Table 7. The convergent validities circled in the table were, for the most part, among the largest values found at the intersection of any of the principal scales in either rows or columns. For example, the correlation between the VOICE Electronics subscale and the NVII Electronic Technician scale (.58) was much higher than for all other Lambda scales, with the exception of the three specialties designated Sonar Technician (.57), Electrician's Mate (.57), and Aviation Electrician (.57). A comparison across the row values indicates that the .58 correlation between VOICE-Electronics and NVII Electronic Technician is also higher, except for the Mechanics subscale, than that found for any of the remaining VOICE subscales. Overall, the convergent and discriminant validities evidenced by the VOICE are well within the limits of acceptability by most psychometric standards.

Reference may also be made to a series of multiple correlation analyses which indicated that the VOICE subscales generally replicated scores on the NVII and the ACI more completely than could these inventories replicate the VOICE subscales (Alley et al., 1977). Neither the NVII nor the ACI were able to estimate individual VOICE subscales with the same degree of accuracy.

Criterion-Related Validity

Concurrent analyses. Assessment of relationships between interest measures and external criteria (career choice or job satisfaction) typically follows one of two basic designs: concurrent and predictive. Concurrent validity is evaluated at a single point in time—usually after incumbents have spent a minimum amount of time on the job. Predictive relationships are evaluated on the basis of two assessment periods. Vocational interests are assessed prior to entry into an occupation and at some later point in time, analyses are conducted to determine if the interest measures can forecast subsequent criterion behaviors.

During the early developmental phases of the effort, the VOICE was administered to a group of approximately 3,000 first-term airmen randomly sampled from eight Air Force specialties. The purpose of this study was to determine if interests and job satisfaction within each of the career fields were significantly related when both were measured concurrently. That is, could a person satisfied in a particular

career field be distinguished from those who are dissatisfied on the basis of their measured interests? A summary of these relationships is presented in Table 8. In the Accounting Specialist career field, for example, the subscales with the highest validities in descending order of magnitude were Office Administration, Automated Data Processing, and Mathematics. The multiple correlation based upon all 18 scales combined to predict job satisfaction within the career field was estimated to be .45. Across all specialties, the multiple Rs ranged from a high of .46 in the Security Specialist and Aerospace Ground Equipment Repairman careers to a low of .25 in Aircraft Maintenance. All of these correlations were significant at or beyond the .01 level. The results of these analyses were quite promising. The implication was that dissatisfaction within these careers may be at least partially attributable to inconsistencies between measured interests and actual assignments. While the data were indicative of potential relationships that might be relevant for initial job placement, the conclusions were confounded by the fact that both types of assessment (vocational interest and job satisfaction) were measured at the same point in time. If vocational interests were influenced in any way by experience on the job, then the possibility existed that such differences might not be evident prior to actual assignment to the career field. Such inferences would require a longitudinal sample in which vocational interests were measured at point of entry into service and job satisfaction measured after some minimum experience on the job.

Table 8. **Concurrent Relationships Between the VOICE Basic Interest Scales and Overall Job Satisfaction in Eight Air Force Specialties**

AFSC	Career Field	N	Subscales with Highest Validity			Multiple R (All scales combined)
671X0[a]	Accounting Specialist	467	OA (.38)	DP (.26)	MA (.23)	.45
702X0	Administrative Specialist	385	OA (.38)	DP (.26)	MA (.17)	.44
252X1	Weather Observer	457	DP (.26)	MA (.22)	MK (.20)	.36
811X0	Security Specialist	315	LE (.33)	EL (−.13)	AU (−.13)	.46
304X0	Radio Relay Equipment Repairman	409	EL (.37)	DP (.22)	MA (.17)	.43
421X3[b]	Aerospace Ground Equipment Repairman	361	ME (.33)	HC (.24)	EL (.18)	.46
431X1 (C)	Aircraft Maintenance (Jet)	364	ME (.18)	EL (.12)	HC (.12)	.25
473X0[c]	Vehicle Repairman	346	ME (.33)	HC (.16)	FS (−.12)	.44

OA – Office Administration
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MS – Medical Service
AE – Aesthetics
ME – Mechanics
FS – Food Service
LE – Law Enforcement
AU – Audiographics
MA – Mathematics
AG – Agriculture
TC – Teacher/Counseling
MK – Marksman
CF – Craftsman
DF – Drafting
DP – Automated Data Processing

Note. – Bivariate and multiple correlations are significant at or beyond the .01 level.

[a] AFSC designation 671X0 changed to 672X0, 672X1 and 672X2 on 30 Apr 72.

[b] AFSC designation 421X3 changed to 423X5 on 30 Apr 76.

[c] AFSC designation 473X0 changed to 472X2 on 31 May 75.

Predictive Analyses. While there have been many studies reporting the relationships between interest and job satisfaction when both are measured concurrently (Dann, 1974; Echternacht et al., 1973; Perry, 1955; Schwebel, 1950), the results from longitudinal studies have been much less consistent in these findings. While Brandt and Hood (1968), Kuder (1966), Lipsett and Wilson (1954), and Strong (1955) reported some success in predicting job satisfaction over time, Butler, Crinnion, and Martin (1972), Carp (1958), Dolliver, Irvin, and Bigley (1972), Schletzer (1966), Schweiker (1959), Trimble (1965), and Zytowski (1976) failed to detect any significant relationships between measured interests and subsequent job satisfaction. To provide some definitive guidelines on the use of vocational interest inventories in general and the VOICE in particular for job placement, a longitudinal study was designed to evaluate empirical relationships between interests measured at point of entry into the Air Force and eventual job

satisfaction after approximately 1 year on the job. The potentially moderating effects due to sex and aptitude were also investigated. The analysis focused on 20 occupational clusters as defined in the DoD occupational conversion table (Department of Defense, 1975). A brief description of these categories is shown in Table 9 with the approximate number of respondents sampled in each group. In the first phase of the analysis, men and women entering basic training at Lackland AFB were administered both the VOICE and the Armed Services Vocational Aptitude Battery (ASVAB) prior to entry into a particular specialty. The ASVAB is a differential aptitude test used by the Department of Defense for selection and classification purposes. As used by the Air Force, the test yields four standard aptitude indices (AI): Administrative, Electronics, General, and Mechanical. The entire sample was resurveyed after approximately 12 months on the job (a) to determine the Air Force occupation to which the men and women were eventually assigned and (b) to evaluate how satisfied they were with the assignment. Satisfaction with assignment was obtained from responses to a general survey item in which the respondents were asked to evaluate their level of satisfaction with their present occupation on a 4-point scale ranging from very dissatisfied to very satisfied. To investigate the extent of predictive relationships between the interest and aptitude measures and later job satisfaction, multiple regression analyses (Ward & Jennings, 1973) were performed within each DoD category. Statistical significance of the effects were evaluated with F statistics and associated probability values.

Table 9. **Predictive Relationships Between VOICE Basic Interest Scales and Overall Job Satisfaction**

DoD Code	Occupational Group	N	Multiple Correlations	
			Separate Male and Female Equations	Combined Equations
10	Radio/Radar Equipment Repair	647	.33**	.27**
1X	Miscellaneous Electronic Equipment Repair	631	.32**	.26**
22	Radar and Air Traffic Control	303	.42*	.33*
2X	Miscellaneous Communications and Intelligence	389	.32^{ns}	.26^{ns}
30	Medical Care	483	.36**	.29**
3X	Miscellaneous Medical and Dental Specialties	207	.47^{ns}	.42**
4X	Technical and Allied Specialties	272	.28^{ns}	.22^{ns}
51	Administration	1,777	.32**	.28**
5X	Miscellaneous Administrative Specialties and Clerks	1,126	.26**	.23**
600	General Aircraft Mechanic	1,366	.32**	.28**
601	Aircraft Engine Mechanic	411	.48**	.41**
602	Aircraft Accessories Mechanic	595	.39**	.32**
64	Armaments and Munitions	415	–	.21^{ns}
6X	General Mechanic	365	.37^{ns}	.31**
72	Utilities Maintenance	177	.54*	.35^{ns}
78	Firefighter	162	–	.37^{ns}
82	Material Receipt, Storage and Issue	555	.27^{ns}	.23*
83a	Security Police	651	–	.35**
83b	Law Enforcement	351	.44**	.36**
8X	Miscellaneous Servics and Supply	405	.38*	.32**

*Significant at tne .05 level.
**Significant at the .01 level.
^{ns}Non-Significant.
(–) In occupations restricted to male entrants.

The results indicated that, with few exceptions, the VOICE subscales were useful for predicting job satisfaction within a majority of DoD occupations. Aptitude variables were found to contribute only minimally if at all to the prediction of the satisfaction criterion. A summary of these analyses is provided in Table 9. The relationships between interests at time of entry and subsequent job satisfaction were statistically significant in 15 of the 20 categories when analyzed apart from other factors and when baseline effects due to sex were held constant. For the most part, the functional relationships between interests and satisfaction were found to be very similar for male and female respondents.

As may be noted in Table 9, the multiple correlations using separate VOICE equations for males and females within each occupation ranged from a low of .26 in the Miscellaneous Administrative Specialties and Clerks to a high of .48 in Aircraft Engine Mechanic. Common equations for both sex groups yielded validities ranging from a low of .22 (Technical and Allied Specialties) to a high of .42 (Miscellaneous Medical and Dental Specialties).

Selected relationships between individual subscales and the satisfaction criterion may be found in Table 10. Included in the table are both zero-order correlations (R) and raw score regression weights (R-Wt) associated with each scale. The correlation values indicate the extent to which reported satisfaction in a given occupational cluster varied as a function of individual subscale scores. As noted in Table 10, there were significant positive relationships between satisfaction in the Electronics field (10) and interest scores on the Electronics, Heavy Construction, Mechanics, Law Enforcement, Marksman, and Automated Data Processing subscales. On the other hand, satisfaction in Electronics correlated negatively with pre-service interests in Aesthetic activities. In the Medical career field (30), satisfaction was positively correlated to scores on Science, Medical Service, Food Service, and Agriculture. Relationships between interest and satisfaction were found to differ between men and women assigned to the Administrative area (51). The data indicate that job satisfaction among females was more highly related to prior interests than was satisfaction among males. Aside from Office Administration, which was a significant predictor for both groups, there were only two additional correlates in the male group as opposed to 12 in the female group. These differences were reflected in the multiple correlations also shown in the table (.20 versus .38). Similar sex differences were noted for General Aircraft Mechanic (601), where again job satisfaction among females was more predictable than it was among males. Overall satisfaction in the Mechanical specialties seemed to be most consistently related in both samples to scores on Heavy Construction, Mechanics, Medical Service (Negative) and Law Enforcement. Finally, the principal correlates in the Law Enforcement cluster (83b) included scores obtained on Outdoors, Law Enforcement, Agriculture, and Marksman subscales.

Unique contributions of the subscales in predicting job satisfaction may also be noted in Table 10. The raw score regression weights associated with each scale indicate the amount of increase or decrease in job satisfaction that might be expected for every increase in one unit on a given subscale, at fixed levels on all other subscales. In the Electronics cluster (10), for example, each increase of 1 point in the Electronics scale would yield a corresponding increase of 2.5 points in expected satisfaction at fixed levels on the remaining subscales. It will be noted that the pattern of unique contributions to prediction indexed by these weights varies considerably across scales within a single occupation. These data are consistent with the view that satisfaction in a given job cluster may involve interests in more than one domain. Similarly, the disparity in the weights associated with a given subscale across different occupations would indicate the extent to which differing work environments may have common referents in the interest scales. The full matrix of regression weights for estimating job satisfaction from the basic interest scales may be found in Appendix B (Table B2).

Overall, the results of these analyses represent the most conclusive evidence to date that measured interests at time of entry into an occupation are predictive of later satisfaction on the job. The implications with regard to the use of vocational interest data for job-placement are that (a) such information would benefit prospective recruits by forecasting which of several occupational fields are most likely to yield the highest degree of personal satisfaction and (b) assignment procedures based on the assessment would generally yield a more satisfied work force. Consequent benefits to the service as an employer are likely to

Table 10. **Individual Contribution of the Basic Interest Scales to the Prediction of Overall Job Satisfaction in Selected Occupational Groups**

	Occupational Group													
	Electronics (10)		Medical Care (30)		Administration (51)				Mechanics (601)				Law Enforcement (83b)	
	M/F Combined		M/F Combined		Males		Females		Males		Females		M/F Combined	
VOICE Subscales	R	Reg Wgt	R	Reg Wgt	R	Reg Wgt	R	Reg Wgt	R	Reg Wgt	R	Reg Wgt	R	Reg Wgt
Office Administration	03	− .1	08	2.2	13**	3.0	28**	5.8	07	.3	− 23*	0	07	5.0
Electronics	20**	2.5	− 01	.2	− 01	.6	− 09**	−1.1	04	−.4	19	−2.1	− 02	−.7
Heavy Construction	11*	−1.0	05	.8	− 01	.3	− 07*	−2.7	14*	1.0	26**	4.6	09	1.2
Science	04	−.4	09**	1.6	− 05	−.4	− 14**	−1.3	− 12*	.8	− 02	.8	03	2.9
Outdoors	03	−2.1	04	−1.0	− 02	.7	− 07*	−1.3	11	2.1	02	−1.7	12*	1.0
Medical Service	− 04	−1.5	21**	3.2	03	.7	− 10**	−1.6	− 13*	.1	− 23*	−2.0	01	−2.0
Aesthetics	− 09*	−2.7	04	−.1	00	−.6	− 03	.8	− 07	−1.7	− 01	−2.2	− 02	−2.4
Mechanics	14**	−.4	03	.2	00	1.0	− 03	3.4	18**	2.8	26**	5.2	02	−2.2
Food Service	− 01	1.4	12**	1.9	06*	1.7	07*	.0	− 04	1.8	21*	−2.8	05	1.4
Law Enforcement	11*	2.4	08	.2	00	−.5	12**	−2.3	05	2.6	13	2.0	25**	7.8
Audiographics	04	−.3	01	.6	03	−1.7	11**	−4.2	− 02	−1.9	− 06	.0	− 02	−1.0
Mathematics	06	.8	00	−1.1	01	−2.9	08*	.1	− 10	−1.0	− 08	.1	02	−1.0
Agriculture	03	1.6	10*	1.0	− 05	−2.3	03	3.1	− 02	−.8	08	2.4	13**	2.3
Teacher/Counseling	− 02	−.1	03	−3.7	06*	2.7	01	−.7	− 08	−1.1	00	−1.0	06	−.4
Marksman	13**	2.9	02	1.0	− 04	−1.9	11**	−1.7	00	−3.2	17	3.9	10*	−.9
Craftsman	03	.2	03	−4.4	01	−2.9	04	4.2	− 07	−5.5	− 14	−3.9	− 07	−8.1
Drafting	08	1.9	− 08	−6.0	− 05	−2.0	03	1.2	− 02	−1.8	02	−.7	− 07	−4.7
Automated Data Proc	12**	1.9	− 03	−2.3	− 03	−.8	07*	−2.4	− 12*	2.4	01	−.6	− 08	−6.4
Multiple R	27		29		20		38		32		57		36	
Constant		516		513		538		569		436		443		392

Note. — Decimals omitted for correlations; multiple R's are significant beyond the .05 level.

*Significant at the .05 level.

**Significant at the .01 level.

accrue to the extent that satisfied employees cause fewer medical or disciplinary problems and tend to remain in service for longer periods of time.

Research is currently underway to extend the validation of the VOICE to include direct assessment of its utility in forecasting personnel tenure. Respondents in each of the 20 occupational clusters are being followed over time to determine the effects of initial assignment on later decisions to leave the service. Some preliminary findings in the Security Police and Law Enforcement career fields suggest that first-year attrition is at least partially dependent on prior interests (Guinn, Wilbourn, & Kantor, 1977).

VI. SUMMARY AND IMPLICATIONS FOR FUTURE RESEARCH AND APPLICATION

The present report describes scales and supporting empirical documentation associated with the Vocational Interest-Career Examination. The instrument provides a reliable quantitative basis for describing the vocational interests of people who may have little or no experience on the job and for relating this information to the appropriate choice of an occupational area. Basic interest and occupational scales are defined in terms of their relevant psychometric properties and potential applications in vocational counseling and job placement. Studies bearing on the reliability and validity of the scales for purposes of estimating future job satisfaction are summarized to provide users of the instrument with appropriate source material.

While evidence cited in the report strongly supports the efficacy of using vocational interest data as input to personnel guidance decisions, there remains a number of topical areas that appear to warrant further investigation. The breadth of coverage represented by the factor-referenced basic interest scales was found to be sufficient for the large majority of career fields included in the predictive validation. There were, however, instances where no significant relationship could be detected between measured interests as defined in the scales and eventual job satisfaction in selected career areas. It is uncertain at present whether the negative findings were due to insufficient sampling of respondents in those areas, possible heterogeneity of job types within a single cluster, or incomplete specification of vocational interest dimensions. Extending the validation sample to include additional subjects would seem to provide the most promising basis for evaluating competing hypotheses.

The interpretation of male-female differences in relationships between interests and reported satisfaction, detected in some of the career fields, would benefit if more were known about the exact job composition of the two groups. Present findings that job satisfaction is more predictable for the females assigned to administration and mechanical areas than for males might be understandable, for example, if females as a group were found to perform duties of a more homogeneous nature. Since both the administration and mechanical career fields were quite large in comparison to the other samples, the possibility also exists that similar differences in the smaller occupational groups would have been detected if the statistical tests had been more sensitive.

The use of complex functional forms to relate interests to satisfaction were necessarily constrained by the broad scope of the study. More detailed investigation of selected career fields, where adequate samples can be obtained, would provide opportunities for closer evaluation of possible effects due to these types of relationships. Possible non-linear effects in the aptitude/interest area remain unexplored as do potential interactive influences between aptitudes and interests.

Further inquiry should be made into the possibilities for capitalizing on commonalities between career field specific prediction equations. Hierarchical clustering of occupations based on homogeneity of regression equations (Bottenberg & Christal, 1961) or a factorial analysis of the occupational scales might lead to a more parsimonious representation of the groups and perhaps suggest additional interpretations for the findings. These analyses would be desirable from a practical standpoint as well, particularly, if the results of the study were used operationally.

The criterion of interest in the study, job satisfaction, was presented as being important to both the individual and his employer. Employer concern was predicated on the functioning of the construct as intervening between the employee and potential adverse consequences on the job (i.e., performance and tenure). Future efforts are required, however, to extend the validation design to include other criteria of interest which might be affected in a positive way with the use of more sophisticated job-placement techniques. These would include training outcomes, utilization of medical facilities, effectiveness on the job, and retention.

Recent advances in computerized testing and counseling systems provide yet another avenue of potential research in the vocational interest domain. Virtually all operational testing programs, including interest, aptitude, or personality testing, rely on paper-and-pencil administration as the basic vehicle for data gathering. The use of interactive computer terminals permits not only rapid access to scoring and interpretive routines but also provides the capability for adapting the item presentation sequence to elicit more detailed information in specific areas of uncertainty. Some preliminary research suggests the possibility of considerable time savings as well (Weiss, 1976).

Finally, the rationale and empirical findings from the VOICE project should be reconsidered, in future investigations, with a view toward establishing a common reference system for both individuals and jobs. This requires a more general concept of job placement than is traditionally found in the literature. Basically, it involves the development of parallel measurement systems in which both people and jobs are treated as being conceptually the same. If a person's measured interests in "electronics" can be determined, so too can all possible jobs be ordered on the extent to which they provide opportunities for intrinsic satisfaction in the "electronics" area. The implication is that the two properties interact in determining suitability for a given assignment. In place of 15, 20, or more separate equations, each representing expected satisfaction in a particular career, the requirement exists for only one; expressing satisfaction as a joint function of person and job characteristics and their interactions. A common system of measurements would allow increased flexibility in interpolation and extrapolation to occupations which have not yet been observed but which can be specified in terms of measured properties. The empirical basis of such a system is contained in the present analysis although much work remains to be done to synthesize the results into a general model.

Operational Implications

Practitioners in research, personnel, and clinical settings will find the VOICE to be a valuable adjunct to the measurement technology normally associated with vocational counseling and job-placement. The instrument provides capability for making a reliable and comprehensive assessment of vocational interests, for comparing interest in various content areas within and between individuals, and for evaluating occupational environments with respect to expected job satisfaction. Experimental applications are recommended initially, given the current developmental status of the instrument. The data from a VOICE assessment should be used, at this point, to supplement rather than supplant expert judgment, experience, and training on the part of the occupational specialist and self-insight on the part of the respondent. An incremental approach toward incorporating vocational interest data into an institutional personnel system would be advisable for two reasons: it allows evidence about the serviceability and utility of the instrument to accumulate, and it precludes potential negative outcomes associated with replacing an informal but working system with one that may have unanticipated problems. It should be pointed out, however, that an assessment conducted on a voluntary basis and designed to assist both the employer and the prospective job applicant would typically involve fewer risks, for example, than establishing a selection program based on aptitude testing. In the vocational interest domain, it would be counterproductive to establish hard requirements for entry into specific specialties. If information developed from the assessment conflicts with what is known about a potential applicant, such data must be used with due regard for conditions and phenomena that have not yet been incorporated into the interest assessment procedure.

Administrative requirements associated with the use of the VOICE would vary depending on the nature of the application (i.e., purpose, number to be tested, resource constraints, etc.). In limited

application of the basic interest scales, prospective users would require only booklets, answer sheets, and scoring templates. Hand processing would probably suffice if the number of respondents was fairly low. The occupational scales would require similar materials and would, in addition, necessitate having access to some form of machine-processing capability. Large scale use of the inventory would require machine-processing regardless of the type of scales used. Research is currently underway to eliminate any redundancy that may exist in the occupational scales and to simplify the scoring procedures, but these techniques have not yet been documented.

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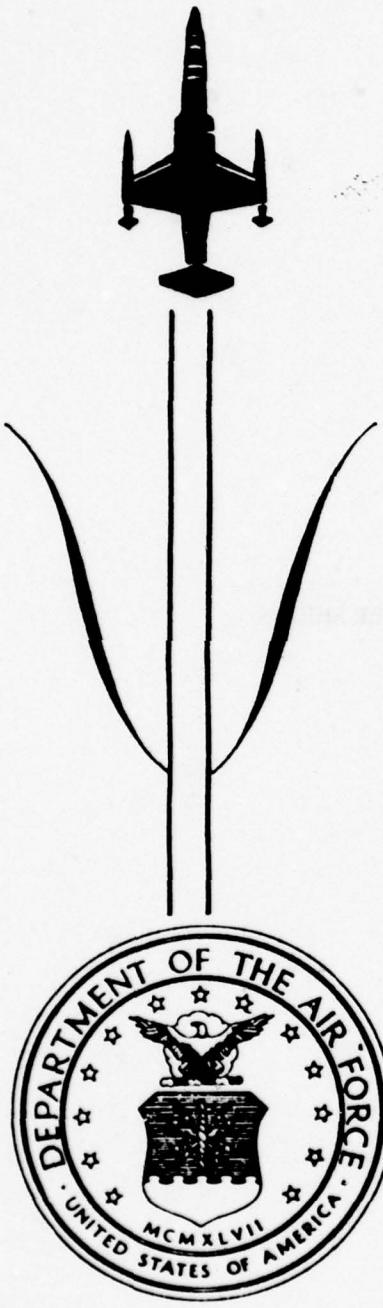
APPENDIX A: VOICE INVENTORY BOOKLET AND ANSWER SHEETS

VOCATIONAL INTEREST-CAREER EXAMINATION

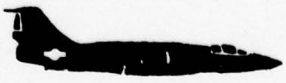
Form E



VOICE

Personnel Research Division
Brooks Air Force Base, Texas 78235

Educational Testing Service
Princeton, New Jersey 08540



AIR FORCE HUMAN RESOURCES LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

SCN 7333

PRIVACY ACT STATEMENT

AUTHORITY: Statue 10 U.S.C. 8012; Executive Order 9397, November 1943; AFR 80-51, Management of Research and Development Requirements in Personnel Training and Education Programs; AFR 178-9, Air Force Military Survey Program.

PRINCIPAL PURPOSES: These data are being collected by the Air Force Human Resources Laboratory to develop an occupational assignment system which takes into account vocational interests at time of entry into service.

ROUTINE USES: Information provided by respondents will be combined into statistical summaries for official research purposes only. On occasion it may also be used as a basis for follow-up assessment. Individual identity will be treated confidentially as will responses to specific items.

DISCLOSURE IS VOLUNTARY. There will be no adverse personnel actions taken if you choose not to participate. However, the Air Force personnel system continues to improve only with your assistance in providing data necessary to make refinements. Your cooperation in this effort would be appreciated.

(VOICE)

The purpose of this inventory is to determine which of a number of occupations you would like. This is *not* an intelligence test or a test of special abilities. There are no right answers. *The right answer for you is the one that best describes your liking for the type of work or activity presented.* All your marks should be made on the answer sheet provided with this booklet. Make sure you use the soft lead pencil provided or any other soft lead pencil. Do not mark on the booklet.

Section 1: Jobs

The first set of items are job titles about which you may or may not know something. For each job, indicate whether or not you would like that kind of work. Don't worry about whether you would be good at the job or about your lack of training for it. Forget how much money you could make or whether you could get ahead in it. Think only about whether or not you like the job.

Blacken the oval labeled "L" if you *LIKE* that kind of work or activity.
Blacken the oval labeled "I" if you are *INDIFFERENT* (don't care one way or another).
Blacken the oval labeled "D" if you *DISLIKE* that kind of work or activity.

1. Air Force officer
2. Air traffic control specialist
3. Ambulance driver
4. Artist
5. Baker
6. Barber
7. Boxer
8. Chef
9. Clergyman
10. Computer operator
11. Computer programmer
12. Construction worker
13. Customs agent
14. Dental hygienist
15. Dietitian
16. Draftsman
17. Editor (newspaper)
18. Electrician
19. Explosives detonator
20. Farmer
21. Fire fighter
22. Fire inspector
23. Football coach
24. Forest ranger
25. Gardener
26. Gunsmith
27. Highway patrolman
28. Interior decorator
29. Jeweler
30. Keypunch operator
31. Librarian
32. Lumberjack
33. Mason
34. Meat cutter
35. Mechanic (automobile)
36. Musician
37. Newspaper reporter
38. Office worker
39. Photoengraver
40. Photographer
41. Physical therapist
42. Pilot
43. Plumber
44. Policeman
45. Postman
46. Practical nurse
47. Printer
48. Prison guard
49. Private investigator
50. Psychologist
51. Radio mechanic
52. Scientist
53. Sheetmetal worker
54. Shoe repairman
55. Steamfitter
56. Surveyor
57. Tailor
58. Taxi driver
59. Teacher
60. Technician (electronics)
61. Television cameraman
62. Toolmaker
63. Veterinarian
64. Waiter
65. Watchmaker
66. Weather forecaster
67. Welder
68. Writer

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Section 2: Work Tasks

The following items consist of a list of duties you might perform on any number of jobs. For each item indicate whether you would like to perform that duty or not. Don't worry about whether you would be good at it or about your lack of training or the money you might make while doing the duty.

Blacken the oval labeled "L" if you *LIKE* that kind of work or activity.
Blacken the oval labeled "I" if you are *INDIFFERENT* (don't care one way or the other).
Blacken the oval labeled "D" if you *DISLIKE* that kind of work or activity.

69. Find information in numerical tables
70. Upholster chairs
71. Replace valves in an engine
72. Write a scientific report
73. Install a radio in a car
74. Mix chemical compounds
75. Sew clothes from patterns
76. Take blood pressure readings
77. Investigate insurance claims
78. Dig a ditch
79. Use chemical laboratory apparatus
80. Draw blueprints for a bridge
81. Construct mathematical tables
82. Work as a game warden
83. March in a parade
84. Clear stumps and brush with a bulldozer
85. Record observations from scientific instruments
86. Give first aid to accident victims
87. Make out invoices
88. Take aerial photographs
89. Drive a gasoline truck
90. Teach marksmanship
91. Mix pancake batter
92. Train animals
93. Pick fruit in an orchard
94. Mow lawns, clip hedges and brushes, and trim trees
95. Plan menus
96. Arrest a traffic violator
97. Be a witness at a criminal trial
98. Do heavy physical labor
99. Help load cartons onto trucks
100. Draw graphs
101. Perform routine maintenance on farm tractors
102. Repair a television set
103. Check a list of supplies received against those ordered
104. Make weather forecasts
105. Work in a scientific laboratory
106. Draw maps from photographs
107. Assist a surgeon during an operation
108. Thread pipe by machine
109. Help rescue someone from a fire
110. Rewire the electrical system in a car
111. Install heavy machinery in a factory
112. Perform experiments using laser beams
113. Overhaul a tractor engine
114. Balance a checkbook
115. Write a computer program
116. Take x-rays of broken bones
117. Adjust the brakes on an automobile
118. Solve arithmetic problems
119. Operate a 16mm movie camera
120. Repair cameras
121. Repair small electrical motors
122. Stop a prison riot
123. Sew on buttons
124. Fit eyeglasses
125. Find a problem in an electric circuit and fix it
126. Work with numbers
127. Decorate cakes
128. Sell automobiles
129. Use a table of logarithms to solve a mathematics problem
130. Give on-the-job training
131. Drive a tractor on a farm
132. Make out work schedules
133. Find the errors in a computer program
134. Make drawings with a compass, triangle, ruler, and other instruments
135. Pour concrete for highway construction
136. Carry out dirty dishes in a restaurant
137. Work outdoors
138. Teach someone to read
139. Fight a forest fire
140. Keep personnel records on employees
141. Prepare income tax returns for other people
142. Make out checks for payment of business bills
143. Plant trees in a forest
144. Take part in a military drill
145. Determine concentrations of ethyl alcohol in a liquid
146. Repair household electrical appliances
147. Supervise an inventory of textile goods
148. Help a scientist perform an experiment
149. Prepare a monthly financial statement for a company
150. Operate a printing press

GO ON TO THE NEXT PAGE

151. Take inventory for a department store
152. Install electrical outlets in a building
153. Remove stains from clothing
154. Supervise work in a garage
155. Work in a hospital
156. Teach someone how to solve a problem
157. Fill potholes in a street
158. Give antirabies shots to dogs
159. Organize a military drill team
160. Organize and lead a study group
161. Devise special scientific equipment for an experiment
162. Determine the age of a fossil
163. Collect garbage
164. Draw a topographical map of the United States
165. Operate a bulldozer or power shovel
166. Record the sound track for a motion picture
167. Use a microscope to classify bacteria
168. Develop photographs
169. Give a talk before a small group
170. Help put a new roof on an old house
171. Make mimeograph copies of a letter
172. Experiment on plants with different types of fertilizer
173. Manage a cafeteria
174. Help a high school student with his homework
175. Work out special diets for sick people
176. Test other people's vision using an eye chart
177. Design a circuit board
178. File cards alphabetically
179. Correct errors made by another person in an arithmetic problem
180. Classify rocks by their physical properties
181. Perform physical therapy
182. Work as a bartender
183. Replace defective parts on a rifle
184. Keep detailed records of expenses for a clothing store
185. Use an adding machine to check hand calculations
186. Take blood samples from humans
187. Operate a machine that sorts punched cards
188. Work as a short-order cook
189. Listen to people's problems and try to help them
190. Give injections to people for immunizations
191. Solve problems by analyzing them logically
192. Install a telephone
193. Inspect television receivers during assembly for incorrect wiring
194. Work on old bicycles
195. Perform maintenance on a computer
196. Organize a file system for an office
197. Run a food catering service
198. Supervise activities for mentally ill patients
199. Help give physical examinations
200. Schedule appointments for other people
201. Help prepare the payroll for a business
202. Assist a dentist by cleaning teeth
203. Find and replace defective transistors
204. Plan an electrical system for a house
205. Fill prescriptions for a doctor
206. Paint insignia on aircraft
207. Test television tubes
208. Play an instrument in a band
209. Learn more about your job by going to school
210. Decode messages written in code
211. Weave woolen material
212. Apply coats of plaster to walls and ceilings
213. Design a dragster
214. Work on an assembly line
215. Rivet sheet metal
216. Make ice cream
217. Have your own radio show
218. Organize recreational activities for a group of people

GO ON TO THE NEXT PAGE

Section 3: Spare Time Activities

The following consist of some activities that you might like to do in your spare time. Indicate whether or not you would like to do each of the following.

Blacken the oval labeled "L" if you *LIKE* that kind of work or activity.
Blacken the oval labeled "I" if you are *INDIFFERENT* (don't care one way or the other).
Blacken the oval labeled "D" if you *DISLIKE* that kind of work or activity.

219. Devise shortcut methods for adding numbers
220. Plant and take care of a vegetable garden
221. Read poetry
222. Do volunteer work
223. Write articles for automobile magazines
224. Work for a political cause
225. Browse through a library
226. Build a model airplane
227. Read a novel
228. Go for a 20-mile hike
229. Read articles about science
230. Play bridge
231. See a Broadway play
232. Participate in a debate
233. Belong to a church group
234. Go canoeing
235. Discuss a painting
236. Build an antenna for a ham radio set
237. Improve a recipe
238. Go deer hunting
239. Buy food for a cookout
240. Read Shakespeare's plays
241. Play chess
242. Tune-up a car
243. Ride a trail bike through the woods
244. Watch drag racing
245. Listen to an opera
246. Tinker with old radios
247. Do crossword puzzles
248. Read about electronics
249. Watch educational television
250. Solve geometry problems
251. Tune a musical instrument
252. Change the oil in a car
253. Rebuild a lawn-mower engine
254. Go trap shooting
255. Read short stories
256. Go to a symphony concert
257. Adjust a carburetor
258. Exercise for physical fitness
259. Watch a ballet
260. Spend a week at the seashore
261. Go on a picnic
262. Become a karate expert
263. Go sailing
264. Learn survival techniques for living in the wilderness
265. Build a radio
266. Join a photography club
267. Dance
268. Be a skydiver
269. Go fishing
270. Collect rifles and pistols
271. Travel to foreign countries
272. Play softball
273. Belong to a gun club
274. Go camping
275. Hit a punching bag

GO ON TO NEXT PAGE

Section 4: Desired Learning Experiences

The following consist of a series of things you might want to study. Indicate whether or not you would like to learn, or have enjoyed learning, about each of the following.

Blacken the oval labeled "L" if you *LIKE* that kind of work or activity.
Blacken the oval labeled "I" if you are *INDIFFERENT* (don't care one way or the other).
Blacken the oval labeled "D" if you *DISLIKE* that kind of work or activity.

276. Algebra
277. Astronomy
278. Bookkeeping
279. Calculus
280. Chemistry
281. Chinese cooking
282. Classical music
283. Disease prevention
284. Efficient methods for filing and retrieving office records
285. Food processing
286. Foreign languages
287. How different types of engines work
288. Meteorology
289. Modern jazz
290. Microscopes
291. How to multiply numbers on a desk calculator
292. Navigation of boats
293. Nuclear reactors
294. Nutrition
295. Performance of emergency medical operations
296. Radiation belts in space
297. How to raise tropical plants
298. Textiles
299. Use of slide rule
300. Wiring diagrams

STOP

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GENERAL ANSWER SHEET TYPE D

FRONT PAGE (SIDE NO. 1)

GENERAL DIRECTIONS — SIDE 1

1. In the boxes located at the bottom of the "NAME GRID",print as much of your last name, first name, and middle initial as possible. Notice there is a separate section for each name and middle initial. Locating the proper oval above each letter of your name, blacken in the oval completely using a soft lead pencil.

2. Under "DATE", blacken in the ovals for today's date.

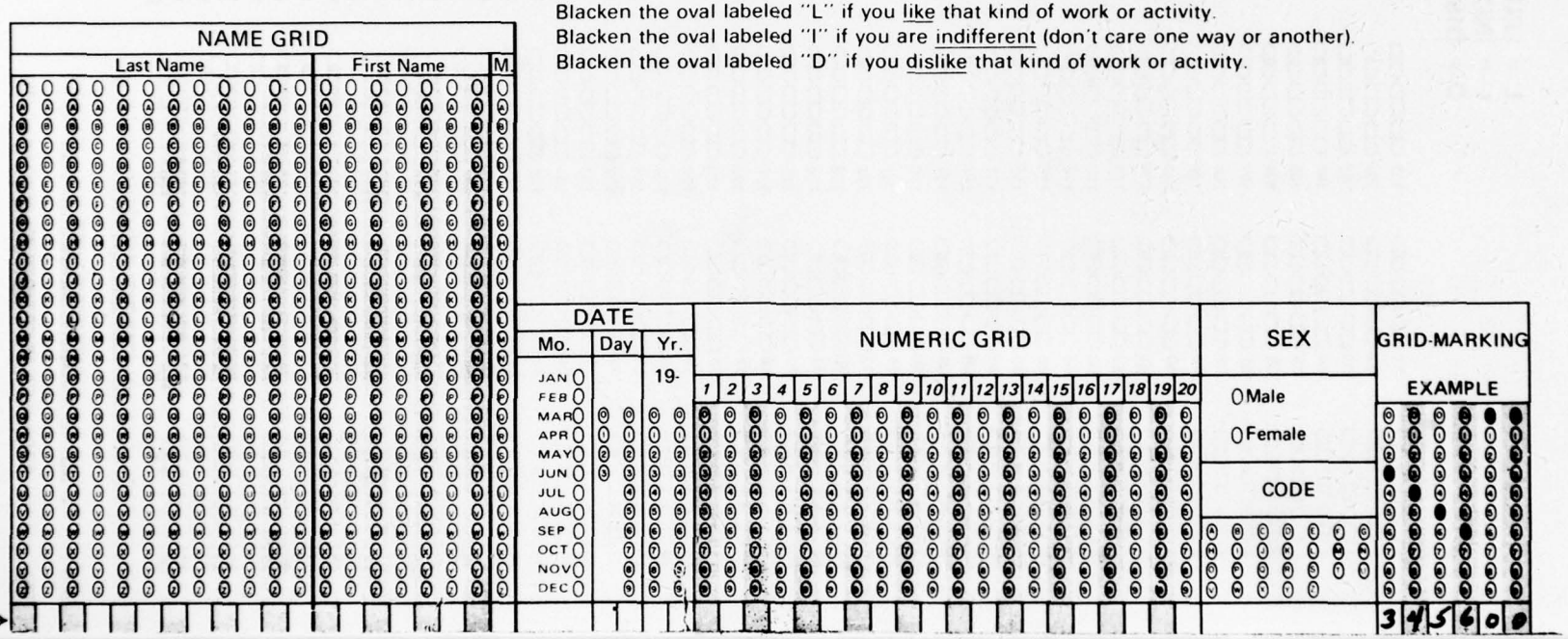
3. In the first nine (9) boxes at the bottom of the "NUMERIC GRID", print your social security account number. Locating the proper oval above each number of your SSAN, blacken in the ovals.

4. Under the heading "SEX", blacken the appropriate oval.

GENERAL DIRECTIONS — SIDE 2

All your marks should be made on the answer sheet provided. Make sure you use a soft lead pencil. Do not mark on the booklet. For each item, you are to indicate whether you would like, are indifferent to, or would dislike the type of work or activity given.

Blacken the oval labeled "L" if you like that kind of work or activity.
Blacken the oval labeled "I" if you are indifferent (don't care one way or another).
Blacken the oval labeled "D" if you dislike that kind of work or activity.



L = LIKE
I = INDIFFERENT
D = DISLIKE

1	51	101	151	201	251
2	52	102	152	202	252
3	53	103	153	203	253
4	54	104	154	204	254
5	55	105	155	205	255
6	56	106	156	206	256
7	57	107	157	207	257
8	58	108	158	208	258
9	59	109	159	209	259
10	60	110	160	210	260
11	61	111	161	211	261
12	62	112	162	212	262
13	63	113	163	213	263
14	64	114	164	214	264
15	65	115	165	215	265
16	66	116	166	216	266
17	67	117	167	217	267
18	68	118	168	218	268
19	69	119	169	219	269
20	70	120	170	220	270
21	71	121	171	221	271
22	72	122	172	222	272
23	73	123	173	223	273
24	74	124	174	224	274
25	75	125	175	225	275
26	76	126	176	226	276
27	77	127	177	227	277
28	78	128	178	228	278
29	79	129	179	229	279
30	80	130	180	230	280
31	81	131	181	231	281
32	82	132	182	232	282
33	83	133	183	233	283
34	84	134	184	234	284
35	85	135	185	235	285
36	86	136	186	236	286
37	87	137	187	237	287
38	88	138	188	238	288
39	89	139	189	239	289
40	90	140	190	240	290
41	91	141	191	241	291
42	92	142	192	242	292
43	93	143	193	243	293
44	94	144	194	244	294
45	95	145	195	245	295
46	96	146	196	246	296
47	97	147	197	247	297
48	98	148	198	248	298
49	99	149	199	249	299
50	100	150	200	250	300

REAR PAGE (SIDE NO. 2)

APPENDIX B: PROCEDURES FOR OBTAINING INDIVIDUAL SCORES ON THE BASIC INTEREST AND OCCUPATIONAL SCALES

Table B1. **VOICE Item Key for the Basic Interest Scales – Forms A and B**

Office Administration		Electronics		Heavy Construction		Science		Outdoors		Medical Service		Aesthetics		Mechanics		Food Service	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
52	38	25	18	17	12	70	52	180	137	20	14	303	221	49	35	6	5
114	87	68	51	44	32	95	72	312	228	57	41	306	224	94	71	13	8
137	103	82	60	47	33	97	74	319	234	62	46	307	225	96	73	86	64
150	114	136	102	59	43	103	79	326	238	99	76	310	227	135	101	121	91
173	132	145	110	71	53	112	85	333	243	113	86	315	231	148	113	127	95
185	140	159	121	84	62	140	105	345	254	142	107	316	232	155	117	167	127
187	141	163	125	89	67	147	112	349	258	154	116	321	235	209	154	179	136
188	142	195	146	101	78	192	145	352	260	210	155	329	240	290	213	234	173
196	147	207	152	110	84	199	148	353	261	213	158	335	245	305	223	253	188
201	149	239	177	116	89	217	161	355	263	237	175	339	249	331	242	264	197
206	151	259	192	132	98	219	162	356	264	238	176	342	251	334	244	297	216
231	171	260	193	133	99	227	167	360	268	244	181	346	255	343	252	324	237
241	178	276	203	143	108	243	180	362	269	249	186	347	256	344	253	328	239
247	184	277	204	146	111	313	229	367	272	256	190	351	259	348	257	376	281
248	185	282	207	177	135	372	277	369	274	265	198	377	282	384	287	381	285
263	196	323	236	212	157	375	280			268	199						
269	200	336	246	224	165	386	288			274	202						
273	201	338	248	230	170	388	290			278	205						
373	278	357	265	289	212	391	293			378	283						
380	284	400	300	296	215	395	296			393	295						

Table B1 (*Continued*)

Law Enforcement		Audio-graphics		Mathematics		Agriculture		Teacher/ Counseling		Marksman		Craftsman		Drafting		Automated Data Processing	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
4	3	55	39	91	69	29	20	80	59	35	26	38	29	5	4	15	10
19	13	56	40	105	81	33	24	170	130	119	90	63	47	22	16	16	11
27	19	83	61	156	118	34	25	183	138	246	183	73	54	104	80	39	30
30	21	115	88	166	126	85	63	211	156	326	238	75	55	134	100	151	115
31	22	141	106	169	129	106	82	215	160	345	254	78	57	141	106	174	133
36	27	157	119	242	179	123	92	229	169	363	270	87	65	175	134	250	187
60	44	158	120	301	219	124	93	235	174	368	273	98	75	222	164	262	195
64	48	225	166	340	250	125	94	254	189								
65	49	228	168	371	276	172	131	257	191								
100	77	358	266	374	279	180	137	300	218								
128	96			389	291	189	143										
130	97			399	299	213	158										
144	109					232	172										
160	122					302	220										
184	139					396	297										

Note. — Form A contains 400 items. Form B represents a later revision containing only 300 items. Items scored 3 = Like; 2 = Indifferent; 1 = Dislike. Missing or otherwise invalid responses recoded = 2.

Table B2. **Regression Weights for Estimating Overall Job Satisfaction from the Basic Interest Scales**

VOICE Subscales	Occupational Group																		
	10	1X	22	2X	30	3X	4X	51	5X	600	601	602	64	6X	72	78	82	83a	83b	8X
Office Administration	−.1	−.8	2.0		2.2	1.8		4.6	1.3	−.4	−1.0	−1.5		1.1			3.1	2.3	5.0	−1.0
Electronics	2.5	2.4	−1.2		.2	−.6		.0	−.7	−.5	1.3	.9		3.4			.7	−2.3	−.7	1.2
Heavy Construction	−1.0	.5	1.2		.8	2.0		−1.2	1.2	1.5	2.1	.2		2.9			2.9	−1.8	1.2	1.9
Science	−.4	−1.6	3.7		1.6	1.2		−1.0	−.2	.9	−1.1	.7		−.9			−1.0	−.4	2.9	1.1
Outdoors	−2.1	−2.3	8.2		−1.0	6.4		.2	−.9	.3	.9	2.0		.2			−.7	−.4	1.0	−.1
Medical Service	−1.5	−1.6	−2.9		3.2	3.0		−.9	−1.3	−1.0	−3.4	−1.6		2.0			−.3	−2.5	−2.0	−4.3
Aesthetics	−2.7	.5	−3.3		−.1	−.8		.2	−.4	−1.2	2.4	−1.0		.9			1.3	−1.7	−2.4	−.8
Mechanics	−.4	−2.0	−.6		.2	1.6		1.7	.4	3.8	3.8	1.7		2.5			−1.3	2.1	−2.2	−3.2
Food Service	1.4	2.2	−2.8		1.9	1.4		.8	1.2	−.2	−2.2	1.1		2.1			2.2	3.5	1.4	6.2
Law Enforcement	2.4	−1.5	2.8		.2	−1.3		−1.4	−.2	2.4	4.3	1.5		−1.3			.7	4.6	7.8	4.6
Audiographics	−.3	−3.4	−.2		.6	−6.7		−2.7	−2.1	−1.1	−1.2	−4.1		−1.4			.3	−3.6	−1.0	−.8
Mathematics	.8	2.8	−.8		−1.1	−.6		−1.4	.0	−.3	−1.6	.3		.0			−1.9	.2	−1.0	−2.5
Agriculture	1.6	3.4	−2.4		1.0	−4.5		1.1	−1.2	.9	−.6	4.7		.4			.1	3.2	2.3	1.2
Teacher Counseling	−.1	−1.2	3.1		−3.7	.9		.1	1.5	−.6	.7	−.2		−4.5			1.2	.0	−.4	2.2
Marksman	2.9	5.1	−5.7		1.0	−6.4		−2.4	−.8	−.5	−2.7	−1.6		−1.8			.4	6.9	−.9	3.4
Craftsman	.2	−1.1	5.7		−4.4	−8.8		1.5	4.0	−3.8	−4.5	−10.1		−7.2			−7.7	−3.3	−8.1	−4.0
Drafting	1.9	−.3	3.4		−6.0	5.7		−.2	−4.4	−1.1	−.1	.8		−3.8			−2.7	−.5	−4.7	−1.2
Automated Data Processing	1.9	5.1	−7.1		−2.3	−.1		−1.1	4.7	1.2	1.0	5.0		−1.3			−2.2	−2.8	−6.4	.0
Constant	516.3	532.1	384.1		512.9	529.8		532.9	592.5	401.8	479.3	343.9		433.6			372.2	324.6	392.2	375.5

APPENDIX C: T-SCORE CONVERSION TABLES FOR THE BASIC INTEREST SCALES

Table C1. **T-Score Conversion Tables for Male Air Force Recruits**

Office Administration		Electronics		Heavy Construction		Science		Outdoors		Medical Service		Aesthetics		Mechanics		Food Service	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
20	38	20	34	20	37	20	36	15	19	20	37	15	36	15	31	15	40
21	39	21	35	21	38	21	37	16	20	21	38	16	37	16	33	16	41
22	40	22	35	22	39	22	37	17	22	22	39	17	38	17	34	17	43
23	41	23	36	23	40	23	38	18	23	23	40	18	40	18	35	18	45
24	42	24	37	24	40	24	39	19	25	24	41	19	41	19	36	19	46
25	43	25	38	25	41	25	40	20	26	25	42	20	42	20	37	20	48
26	44	26	38	26	42	26	41	21	28	26	43	21	43	21	38	21	49
27	45	27	39	27	43	27	41	22	29	27	44	22	45	22	39	22	51
28	46	28	40	28	44	28	42	23	30	28	45	23	46	23	40	23	53
29	47	29	41	29	45	29	43	24	32	29	46	24	47	24	41	24	54
30	48	30	42	30	46	30	44	25	33	30	47	25	49	25	43	25	56
31	49	31	42	31	47	31	44	26	35	31	48	26	50	26	44	26	57
32	50	32	43	32	48	32	45	27	36	32	49	27	51	27	45	27	59
33	51	33	44	33	49	33	46	28	38	33	50	28	52	28	46	28	61
34	52	34	45	34	50	34	47	29	39	34	51	29	54	29	47	29	62
35	52	35	46	35	51	35	48	30	41	35	52	30	55	30	48	30	64
36	53	36	46	36	52	36	48	31	42	36	52	31	56	31	49	31	65
37	54	37	47	37	53	37	49	32	43	37	53	32	58	32	50	32	67
38	55	38	48	38	54	38	50	33	45	38	54	33	59	33	51	33	68
39	56	39	49	39	55	39	51	34	46	39	55	34	60	34	53	34	70
40	57	40	49	40	56	40	52	35	48	40	56	35	62	35	54	35	72
41	58	41	50	41	57	41	52	36	49	41	57	36	63	36	55	36	73
42	59	42	51	42	58	42	53	37	51	42	58	37	64	37	56	37	75
43	60	43	52	43	59	43	54	38	52	43	59	38	65	38	57	38	76
44	61	44	53	44	60	44	55	39	54	44	60	39	67	39	58	39	78
45	62	45	53	45	61	45	56	40	55	45	61	40	68	40	59	40	80
46	63	46	54	46	62	46	56	41	57	46	62	41	69	41	60	41	81
47	64	47	55	47	63	47	57	42	58	47	63	42	71	42	62	42	83
48	65	48	56	48	64	48	58	43	59	48	64	43	72	43	63	43	84
49	66	49	56	49	65	49	59	44	61	49	65	44	73	44	64	44	86
50	67	50	57	50	66	50	59	45	62	50	66	45	74	45	65	45	87
51	67	51	58	51	67	51	60			51	67						
52	68	52	59	52	68	52	61			52	68						
53	69	53	60	53	69	53	62			53	69						
54	70	54	60	54	70	54	63			54	70						
55	71	55	61	55	71	55	63			55	70						
56	72	56	62	56	72	56	64			56	71						
57	73	57	63	57	73	57	65			57	72						
58	74	58	64	58	74	58	66			58	73						
59	75	59	64	59	75	59	67			59	74						
60	76	60	65	60	76	60	67			60	75						

Table C1 (*Continued*)

Law Enforcement		Audio-graphics		Mathematics		Agriculture		Teacher/ Counseling		Marksman		Craftsman		Drafting		Automated Data Processing	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
15	31	10	31	12	37	15	32	10	34	7	30	7	40	7	35	7	35
16	32	11	33	13	38	16	33	11	35	8	33	8	44	8	37	8	37
17	33	12	35	14	40	17	35	12	37	9	35	9	47	9	40	9	39
18	35	13	37	15	41	18	36	13	39	10	37	10	50	10	42	10	42
19	36	14	38	16	43	19	37	14	41	11	40	11	54	11	45	11	44
20	37	15	40	17	44	20	39	15	42	12	42	12	57	12	47	12	46
21	39	16	42	18	45	21	40	16	44	13	44	13	61	13	49	13	48
22	40	17	44	19	47	22	42	17	46	14	47	14	64	14	52	14	51
23	41	18	45	20	48	23	43	18	48	15	49	15	67	15	54	15	53
24	43	19	47	21	49	24	44	19	49	16	51	16	71	16	57	16	55
25	44	20	49	22	51	25	46	20	51	17	54	17	74	17	59	17	57
26	45	21	50	23	52	26	47	21	53	18	56	18	78	18	61	18	59
27	47	22	52	24	53	27	49	22	55	19	58	19	81	19	64	19	62
28	48	23	54	25	55	28	50	23	56	20	61	20	84	20	66	20	64
29	49	24	56	26	56	29	51	24	58	21	63	21	88	21	68	21	66
30	51	25	57	27	57	30	53	25	60								
31	52	26	59	28	59	31	54	26	62								
32	54	27	61	29	60	32	56	27	63								
33	55	28	63	30	62	33	57	38	65								
34	56	29	64	31	63	34	58	29	67								
35	58	30	66	32	64	35	60	30	69								
36	59			33	66	36	61										
37	60			34	67	37	63										
38	62			35	68	38	64										
39	63			36	70	39	65										
40	64					40	67										
41	66					41	68										
42	67					42	70										
43	68					43	71										
44	70					44	72										
45	71					45	74										

Table C2. T-Score Conversion Tables for Female Air Force Recruits

Office Administration		Electronics		Heavy Construction		Science		Outdoors		Medical Service		Aesthetics		Mechanics		Food Service	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
20	34	20	40	20	41	20	36	15	12	20	32	15	27	15	38	15	34
21	35	21	41	21	42	21	37	16	14	21	33	16	29	16	40	16	36
22	36	22	41	22	43	22	37	17	16	22	34	17	30	17	41	17	37
23	37	23	42	23	45	23	38	18	18	23	34	18	31	18	42	18	38
24	38	24	43	24	46	24	39	19	19	24	35	19	33	19	43	19	40
25	39	25	44	25	47	25	40	20	21	25	36	20	34	20	44	20	41
26	40	26	45	26	48	26	40	21	23	26	37	21	35	21	45	21	42
27	41	27	45	27	49	27	41	22	25	27	38	22	37	22	46	22	44
28	41	28	46	28	51	28	42	23	26	28	39	23	38	23	48	23	45
29	42	29	47	29	52	29	43	24	28	29	40	24	39	24	49	24	46
30	43	30	48	30	53	30	44	25	30	30	41	25	41	25	50	25	48
31	44	31	49	31	54	31	44	26	31	31	41	26	42	26	51	26	49
32	45	32	50	32	55	32	45	27	33	32	42	27	44	27	52	27	50
33	46	33	50	33	57	33	46	28	35	33	43	28	45	28	53	28	52
34	47	34	51	34	58	34	47	29	37	34	44	29	46	29	54	29	53
35	48	35	52	35	59	35	47	30	38	35	45	30	48	30	56	30	54
36	48	36	53	36	60	36	48	31	40	36	46	31	49	31	57	31	56
37	49	37	54	37	61	37	49	32	42	37	47	32	50	32	58	32	57
38	50	38	55	38	63	38	50	33	44	38	48	33	52	33	59	33	58
39	51	39	55	39	64	39	51	34	45	39	48	34	53	34	60	34	60
40	52	40	56	40	65	40	51	35	47	40	49	35	54	35	61	35	61
41	53	41	57	41	66	41	52	36	49	41	50	36	56	36	63	36	63
42	54	42	58	42	67	42	53	37	51	42	51	37	57	37	64	37	64
43	54	43	59	43	69	43	54	38	52	43	52	38	58	38	65	38	65
44	55	44	59	44	70	44	55	39	54	44	53	39	60	39	66	39	67
45	56	45	60	45	71	45	55	40	56	45	54	40	61	40	67	40	68
46	57	46	61	46	72	46	56	41	58	46	55	41	63	41	68	41	69
47	58	47	62	47	73	47	57	42	59	47	55	42	64	42	69	42	71
48	59	48	63	48	74	48	58	43	61	48	56	43	65	43	71	43	72
49	60	49	64	49	76	49	58	44	63	49	57	44	66	44	72	44	73
50	61	50	64	50	77	50	59	45	64	50	58	45	68	45	73	45	75
51	61	51	65	51	78	51	60			51	59						
52	62	52	66	52	79	52	61			52	60						
53	63	53	67	53	80	53	62			53	61						
54	64	54	68	54	82	54	62			54	61						
55	65	55	69	55	83	55	63			55	62						
56	66	56	69	56	84	56	64			56	63						
57	67	57	70	57	85	57	65			57	64						
58	68	58	71	58	86	58	65			58	65						
59	68	59	72	59	88	59	66			59	66						
60	69	60	73	60	89	60	67			60	67						

Table C2 (*Continued*)

Law Enforcement		Audiographics		Mathematics		Agriculture		Teacher/ Counseling		Marksman		Craftsman		Draftsman		Automated Data Processing	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
15	33	10	27	12	36	15	30	10	27	7	39	7	36	7	36	7	34
16	34	11	29	13	38	16	32	11	29	8	41	8	39	8	38	8	37
17	36	12	31	14	39	17	33	12	31	9	44	9	42	9	40	9	39
18	37	13	33	15	41	18	34	13	33	10	46	10	46	10	43	10	41
19	39	14	35	16	42	19	35	14	35	11	49	11	49	11	45	11	43
20	40	15	37	17	43	20	36	15	36	12	51	12	53	12	47	12	46
21	41	16	39	18	45	21	37	16	38	13	53	13	56	12	50	13	48
22	43	17	40	19	46	22	39	17	40	14	56	14	59	14	52	14	50
23	44	18	42	20	47	23	40	18	42	15	58	15	63	15	54	15	53
24	46	19	44	21	49	24	41	19	44	16	61	16	66	16	57	16	55
25	47	20	46	22	50	25	42	20	46	17	63	17	70	17	59	17	57
26	49	21	48	23	51	26	44	21	48	18	65	18	73	18	61	18	59
27	50	22	50	24	53	27	45	22	50	19	68	19	76	19	64	19	62
28	52	23	51	25	54	28	46	23	51	20	70	20	80	20	66	20	64
29	53	24	53	26	55	29	47	24	53	21	72	21	83	21	69	21	66
30	55	25	55	27	57	30	49	25	55								
31	56	26	57	28	58	31	50	26	57								
32	57	27	59	29	59	32	51	27	59								
33	59	28	61	30	61	33	52	28	61								
34	60	29	62	31	62	34	54	29	63								
35	62	30	64	32	63	35	55	30	65								
36	63			33	65	36	56										
37	65			34	66	37	57										
38	66			35	67	38	59										
39	68			36	69	39	60										
40	69					40	61										
41	70					41	62										
42	72					42	64										
43	73					43	65										
44	75					44	66										
45	76					45	67										

Table C3. **T-Score Conversion Tables for Male High School Students**

Office Administration		Electronics		Heavy Construction		Science		Outdoors		Medical Service		Aesthetics		Mechanics		Food Service	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
20	37	20	32	20	34	20	34	15	21	20	37	15	36	15	32	15	37
21	38	21	33	21	35	21	35	16	23	21	38	16	38	16	33	16	38
22	40	22	34	22	36	22	36	17	24	22	39	17	39	17	34	17	40
23	41	23	35	23	37	23	37	18	25	23	40	18	41	18	35	18	41
24	42	24	36	24	38	24	38	19	27	24	41	19	42	19	36	19	43
25	43	25	37	25	39	25	39	20	28	25	42	20	44	20	37	20	45
26	44	26	38	26	40	26	40	21	30	26	43	21	45	21	39	21	46
27	45	27	39	27	41	27	41	22	31	27	44	22	47	22	40	22	48
28	46	28	40	28	42	28	42	23	33	28	45	23	48	23	41	23	49
29	48	29	41	29	43	29	43	24	34	29	46	24	50	24	42	24	51
30	49	30	42	30	44	30	44	25	35	30	48	25	51	25	43	25	52
31	50	31	43	31	45	31	45	26	37	31	49	26	52	26	44	26	54
32	51	32	44	32	46	32	46	27	38	32	50	27	54	27	46	27	55
33	52	33	45	33	47	33	47	28	40	33	51	28	55	28	47	28	57
34	53	34	46	34	48	34	48	29	41	34	52	29	57	29	48	29	58
35	54	35	47	35	49	35	49	30	43	35	53	30	58	30	49	30	60
36	56	36	48	36	50	36	50	31	44	36	54	31	60	31	50	31	62
37	57	37	49	37	51	37	51	32	45	37	55	32	61	32	51	32	63
38	58	38	50	38	53	38	52	33	47	38	56	33	63	33	53	33	65
39	59	39	51	39	54	39	53	34	48	39	57	34	64	34	54	34	66
40	60	40	52	40	55	40	54	35	50	40	58	35	66	35	55	35	68
41	61	41	53	41	56	41	55	36	51	41	60	36	67	36	56	36	69
42	62	42	54	42	57	42	56	37	53	42	61	37	68	37	57	37	71
43	64	43	55	43	58	43	57	38	54	43	62	38	70	38	59	38	72
44	65	44	56	44	59	44	58	39	55	44	63	39	71	39	60	39	74
45	66	45	57	45	60	45	59	40	57	45	64	40	73	40	61	40	75
46	67	46	58	46	61	46	60	41	58	46	65	41	74	41	62	41	77
47	68	47	59	47	62	47	61	42	60	47	66	42	76	42	63	42	79
48	69	48	60	48	63	48	62	43	61	48	67	43	77	43	64	43	80
49	70	49	61	49	64	49	63	44	63	49	68	44	79	44	66	44	82
50	72	50	62	50	65	50	64	45	64	50	69	45	80	45	67	45	83
51	73	51	63	51	66	51	65			51	70						
52	74	52	64	52	67	52	66			52	72						
53	75	53	65	53	68	53	67			53	73						
54	76	54	66	54	69	54	68			54	74						
55	77	55	67	55	70	55	69			55	75						
56	79	56	68	56	71	56	70			56	76						
57	80	57	69	57	72	57	71			57	77						
58	81	58	70	58	73	58	72			58	78						
59	82	59	71	59	74	59	73			59	79						

Table C3 (*Continued*)

Law Enforcement		Audio-graphics		Mathematics		Agriculture		Teacher/ Counseling		Marksman		Craftsman		Drafting		Automated Data Processing	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
15	31	10	32	12	37	15	30	10	36	7	31	7	38	7	34	7	36
16	33	11	33	13	39	16	31	11	38	8	34	8	42	8	37	8	38
17	34	12	35	14	40	17	33	12	40	9	36	9	46	9	39	9	41
18	36	13	37	15	42	18	34	13	41	10	38	10	49	10	42	10	43
19	37	14	39	16	44	19	36	14	43	11	41	11	53	11	45	11	46
20	39	15	41	17	45	20	37	15	45	12	43	12	57	12	47	12	48
21	40	16	43	18	47	21	39	16	47	13	46	13	60	13	50	13	51
22	42	17	45	19	48	22	40	17	49	14	48	14	64	14	53	14	54
23	43	18	46	20	50	23	42	18	51	15	50	15	68	15	55	15	56
24	44	19	48	21	51	24	43	19	53	16	53	16	71	16	58	16	59
25	46	20	50	22	53	25	45	20	55	17	55	17	75	17	61	17	61
26	47	21	52	23	55	26	46	21	57	18	58	18	79	18	63	18	64
27	49	22	54	24	56	27	48	22	59	19	60	19	83	19	66	19	66
28	50	23	56	25	58	28	49	23	61	20	62	20	86	20	68	20	69
29	52	24	58	26	59	29	51	24	63	21	65	21	90	21	71	21	71
30	53	25	59	27	61	30	52	25	65								
31	55	26	61	28	62	31	54	26	67								
32	56	27	63	29	64	32	55	27	69								
33	58	28	65	30	66	33	57	28	71								
34	59	29	67	31	67	34	58	29	73								
35	61	30	69	32	69	35	60	30	75								
36	62			33	70	36	61										
37	64			34	72	37	63										
38	65			35	73	38	64										
39	67			36	75	39	66										
40	68					40	67										
41	70					41	69										
42	71					42	70										
43	72					43	71										
44	74					44	73										
45	75					45	74										

Table C4. **T-Score Conversion Tables for Female High School Students**

Office Administration		Electronics		Heavy Construction		Science		Outdoors		Medical Service		Aesthetics		Mechanics		Food Service	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
20	32	20	41	20	41	20	37	15	17	20	30	15	32	15	40	15	37
21	33	21	42	21	42	21	38	16	18	21	31	16	33	16	41	16	32
22	34	22	43	22	44	22	39	17	20	22	32	17	34	17	42	17	33
23	35	23	44	23	45	23	40	18	22	23	33	18	36	18	44	18	35
24	36	24	46	24	47	24	41	19	23	24	34	19	37	19	45	19	36
25	37	25	47	25	48	25	42	20	25	25	35	20	38	20	47	20	37
26	38	26	48	26	50	26	43	21	27	26	36	21	40	21	48	21	39
27	39	27	49	27	51	27	44	22	28	27	37	22	41	22	50	22	40
28	40	28	50	28	52	28	45	23	30	28	38	23	42	23	51	23	42
29	41	29	52	29	54	29	46	24	32	29	39	24	44	24	53	24	43
30	42	30	53	30	55	30	47	25	33	30	40	25	45	25	54	25	44
31	43	31	54	31	57	31	48	26	35	31	41	26	47	26	56	26	46
32	44	32	55	32	58	32	49	27	37	32	42	27	48	27	57	27	47
33	45	33	56	33	60	33	50	28	38	33	43	28	49	28	59	28	48
34	46	34	58	34	61	34	51	29	40	34	44	29	51	29	60	29	50
35	47	35	59	35	63	35	52	30	42	35	45	30	52	30	61	30	51
36	48	36	60	36	64	36	53	31	43	36	46	31	53	31	63	31	52
37	49	37	61	37	66	37	54	32	45	37	47	32	55	32	64	32	54
38	50	38	62	38	67	38	55	33	46	38	48	33	56	33	66	33	55
39	51	39	64	39	68	39	56	34	48	39	49	34	57	34	67	34	57
40	52	40	65	40	70	40	57	35	50	40	50	35	59	35	69	35	58
41	53	41	66	41	71	41	58	36	51	41	51	36	60	36	70	36	59
42	54	42	67	42	73	42	59	37	53	42	52	37	62	37	72	37	61
43	55	43	68	43	74	43	60	38	55	43	53	38	63	38	73	38	62
44	56	44	70	44	76	44	61	39	56	44	54	39	64	39	75	39	63
45	57	45	71	45	77	45	62	40	58	45	55	40	66	40	76	40	65
46	58	46	72	46	79	46	63	41	60	46	56	41	67	41	78	41	66
47	59	47	73	47	80	47	64	42	61	47	57	42	68	42	79	42	67
48	60	48	75	48	82	48	65	43	63	48	58	43	70	43	80	43	69
49	61	49	76	49	83	49	66	44	65	49	59	44	71	44	82	44	70
50	62	50	77	50	84	50	67	45	66	50	60	45	72	45	83	45	71
51	63	51	78	51	86	51	68			51	61						
52	64	52	79	52	87	52	69			52	62						
53	65	53	81	53	89	53	70			53	63						
54	66	54	82	54	90	54	71			54	64						
55	67	55	83	55	92	55	72			55	65						
56	68	56	84	56	93	56	73			56	66						
57	69	57	85	57	95	57	74			57	67						
58	70	58	87	58	96	58	75			58	68						
59	71	59	88	59	98	59	76			59	69						

Table C4 (*Continued*)

Law Enforcement		Audiographics		Mathematics		Agriculture		Teacher/ Counseling		Marksman		Craftsman		Drafting		Automated Data Processing	
Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T	Raw	T
15	34	10	29	12	37	15	30	10	29	7	40	7	34	7	36	7	35
16	36	11	31	13	39	16	31	11	31	8	43	8	37	8	38	8	38
17	37	12	33	14	40	17	32	12	33	9	46	9	41	9	41	9	40
18	39	13	35	15	42	18	34	13	35	10	50	10	44	10	44	10	43
19	41	14	37	16	44	19	35	14	37	11	53	11	48	11	47	11	45
20	42	15	39	17	45	20	36	15	39	12	56	12	51	12	49	12	48
21	44	16	40	18	47	21	38	16	41	13	59	13	55	13	52	13	51
22	45	17	42	19	48	22	39	17	43	14	62	14	58	14	55	14	53
23	47	18	44	20	50	23	41	18	45	15	65	15	62	15	57	15	56
24	49	19	46	21	51	24	42	19	47	16	68	16	65	16	60	16	58
25	50	20	48	22	53	25	43	20	48	17	72	17	69	17	63	17	61
26	52	21	50	23	54	26	45	21	50	18	75	18	72	18	66	18	63
27	53	22	52	24	56	27	46	22	52	19	78	19	76	19	68	19	66
28	55	23	54	25	57	28	47	23	54	20	81	20	79	20	71	20	68
29	57	24	56	26	59	29	49	24	56	21	84	21	83	21	74	21	71
30	58	25	58	27	60	30	50	25	58								
31	60	26	60	28	62	31	52	26	60								
32	61	27	62	29	64	32	53	27	62								
33	63	28	63	30	65	33	54	28	64								
34	65	29	65	31	67	34	56	29	66								
35	66	30	67	32	68	35	57	30	68								
36	68			33	70	36	58										
37	69			34	71	37	60										
38	71			35	73	38	61										
39	73			36	74	39	62										
40	74					40	64										
41	76					41	65										
42	77					42	67										
43	79					43	68										
44	81					44	69										
45	82					45	71										