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ABSTRACT

The initial stages of test development of the Vocational and Occupational Interest Choice Examination (VOICE), developed for Air Force recruiters, are described. Reviewed are a number of relevant occupational interest inventories from which a pool of 400 items was drawn corresponding to eight career fields: general accounting, administration, weather observation, security, radio relay equipment repair, aerospace ground equipment repair, maintenance specialization, and general purpose vehicle repair. Each item presents an activity and asks the examinee to indicate whether he likes, dislikes, or is indifferent to that activity. The instrument was administered in a field test to 4800 airmen. Described are statistical procedures used to identify satisfied personnel, develop two types of occupational interest scales, and cross-validate the procedures used in those scales. Statistical analyses indicate that the experimental inventory possesses considerable utility for distinguishing among career groups and between satisfied and dissatisfied personnel within career fields and a men-in-general group. Several recommendations are made to eliminate a number of problems prior to operational use of this instrument. Information regarding the VOICE questionnaire may be obtained by writing to the authors at Educational Testing Service, Princeton, N.J. 08540. (RC)

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Stage I Development of VOICE

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EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY

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SECTION I

Introduction

With the advent of an all-volunteer recruitment policy, the United States Air Force is replacing automated assignment of enlisted recruits to career fields with a guaranteed assignment program. Until recently, the majority of Air Force enlistees have been assigned to career fields by a computer assignment system. Early in basic training they were given an overview and audio-visual presentation of the fields available to them and asked to indicate their choices. The assignments, made by computer at the conclusion of basic training, used variables such as the number of persons needed in each field and the preferences expressed by the enlistees.

In 1971, USAF recruiters began offering, prior to enlistment, guaranteed assignment in any one of 26 Air Force career fields. Since then, the program has expanded so that now, in 1973, there are approximately 132 career fields from which an enlistee may choose.

Should this program expand even further, the responsibilities traditionally assumed by recruiters would be altered considerably. In addition to promoting the Air Force as a career, recruiters would be placed in the role of vocational counselors, guiding recruits to potentially far-reaching commitments. The implications for reenlistment are obvious.

However, to guide men into rewarding careers, the recruiters will need either a much broader background in counseling than most of them now have or effective devices for measuring the vocational interests of recruits. Vocational interest inventories, or questionnaires, are used extensively for

this purpose by high school and college counselors. Unfortunately they are not appropriate for Air Force personnel. The questions, or items, do not reflect the nature of the activities of an enlisted man on duty. Furthermore, degree-of-job-satisfaction is not a factor in the interest scales, or scores, of the inventories used in schools and colleges. These scales reflect either the respondent's membership in an occupational group or his response to groups of homogeneous items.

The Air Force needs a vocational-interest inventory for use in conjunction with their aptitudinal selection measures. The inventory should be designed specifically for Air Force recruiters who are administering a guaranteed assignment program. This report describes the initial stages of the development of such an instrument called the Vocational and Occupational Interest Choice Examination (VOICE).

A Brief Review of Vocational Interest Measures

Vocational interest measurement has one of the oldest and most successful records in the history of psychological testing. Two excellent summaries and evaluations of the published inventories can be found in Buros (1965) and Robinson, Athanasiou, and Head (1969). Much of this section is based upon Chapter 13 of Robinson et al, where concise evaluations of 13 interest inventories, also reviewed in Buros, are presented in addition to a review of one developed since Buros' publication. In this section, some of the difficulties and shortcomings of many interest inventories that render their use by the Air Force inappropriate are enumerated. The aim is not to unjustly criticize these inventories, because many of them, especially the Strong and Kuder, have been used with considerable success in guidance programs but to explain why VOICE was developed for the Air Force's recruiting programs.

The Strong Vocational Interest Blank is one of the most highly regarded and well-researched inventories available. However, it has some psychometric problems, such as out-of-date norms and possible response set. Although the scale authors are continually making improvements, there is one problem that renders the Strong inapplicable for the Air Force; almost all the items and scales refer to occupations at the top fifth of the occupational status hierarchy. Very few refer to nonprofessional occupations, which largely make up the choices available to the enlisted man. Furthermore, the number of scales (112 on one form) makes interpreting a profile complex; and scoring the scales by hand is a tedious process, although a computerized scoring system could minimize this problem.

The Kuder Preference Record--Occupational and Vocational are two highly rated and frequently used inventories. The occupational form was designed to compete with the Strong. The chief criticism of the Kuder forms has been against the interpretations of results based on the forced choice method of responding. Buros points out the difficulties of interpreting results in either a normative or an ipsative mode. It is believed that recruiters would have considerable difficulty making accurate and useful interpretations with either form.

One recently published inventory which might have been considered for use by the Air Force is the Minnesota Vocational Interest Inventory. This inventory was designed to measure the nonprofessional occupational interests of men who enlist in the Navy. Development of the Minnesota Inventory, funded by the Office of Naval Research, began in 1946. In its evolution, the inventory moved from a military setting to a nonprofessional civilian setting. The item format is the same as that used in the Kuder

inventories and suffers from the same limitations created by the use of the forced choice format. Both occupational and homogeneous scales are presented. Buros does not review the Minnesota Inventory, but Robinson et al give it very favorable treatment.

The Gordon Occupational Checklist was also designed for use in measuring nonprofessional vocational interests. It has been criticized because scores are given on a priori scales, with only an afterthought for item analysis. Also, there is some difficulty with the definitions of the scales, as well as with the underlying factor structure.

Other inventories that could be considered are the Picture Interest Inventory, Guilford-Zimmerman Interest Inventory, How-Well-Do-You-Know-Your-Interests, Geist Picture Interest Inventory, Curtis Interest Scale, Fowler-Permeuter Interest Record, Career-Finder, and Qualifications Record. All of them have numerous shortcomings: most frequently, poor item construction and analysis, potential response set, statistical problems, and psychometric inadequacies of reliability, homogeneity, discrimination, and cross-validation.

SECTION II

Development of Instruments

An Overview

Eight career fields were selected by the project directors, in consultation with the contract monitor, to serve as a basis for developing the interest inventory. Each field was in the guaranteed assignment program as of May 1, 1972, had a high inward flow of personnel, and was selected so that it represented two career fields from each aptitude index of the Airman Qualifying Examination--Mechanical, Administrative, Electric, and General. The Airman Qualifying Examination was the operational selection and classifying instrument used by the Air Force during the time period of the contract.

After the career fields had been selected, the ETS project directors met with Air Force personnel in San Antonio and Washington, D. C., to discuss general considerations relevant to the project and a variety of more specific topics related to it. Discussion centered on the relation of the interest inventory to the needs of the Air Force for selection in both the guaranteed enlistment program and the automated assignment system. Background materials for writing items for the interest inventory were procured. Sampling considerations and the advantages and disadvantages of various plans were discussed. Job satisfactions were briefly discussed and a list of a priori percentages for job satisfaction was obtained for the eight selected career fields. VOICE became the acronym for the inventory.

An item pool of 400 interest items was constructed at ETS and reviewed on the basis of job analysis data and job descriptions outlined in the Airman Classification Manual. This manual gives a detailed description of

each career field and the related fields that appear in the Dictionary of Occupational Titles (1969). A short job satisfaction questionnaire was also constructed.

After approval of the inventory and questionnaire by Headquarters USAF, 4800 airmen were selected from bases throughout the world for field testing, validating, and norming the instruments. The inventories were mailed to the airmen through their Consolidated Base Personnel Officer (CBPO). One follow-up mailing was sent to the CBPOs.

To obtain information for comparative purposes, recruits in basic training were administered only the interest items of the inventory. This group--called men-in-general--was compared with satisfied airmen in each career field and also served in an attempt to estimate reliability coefficients. Multiple discriminant analysis and stepwise regression were used extensively in the development and validation of both the occupational and a priori scales. A cross-validation procedure was used to estimate the scale accuracy.

Details of the Selection of Eight AFSC Career Fields

To select eight career fields for the inventory, the project directors requested that background information provided by the Air Force include the Airman Qualifying Examination (AQE) entry requirements for a number of fields. The information received included a Uniform Airman Record summary of the frequency and percent of enlisted personnel assigned by AFSC as of December 31, 1971; an Airman Classification Chart; AQE requirements by career field; Air Force Specialty Codes included in the guaranteed assignment program; and three booklets about the guaranteed enlistment program.

Using these materials, a list was made of all jobs in the Guaranteed Assignment Program for which Current Job Analyses were available. For

each job the frequency (N) of enlisted personnel assignment was indicated and also the minimum AQE aptitude requirement as of June 1971. Since it was desirable to select from each AQE aptitude index one career field with a high and one career field with a low score requirement, the career fields were sorted by type of aptitude requirement (i.e., Administrative, General, Electrical, and Mechanical), then by high score requirement (at least 80 in Electrical, 60 in General and Administrative, and 50 in Mechanical), and then by low score (40 or less in Administrative, General, and Mechanical, and 50 or less in Electrical). This sorting resulted in eight groups of career fields.

From each group, the three fields with the largest Ns were selected for consideration, except for General-high which had only two fields of potential interest. A total of 23 (7 x 3 = 21 + 2 = 23) career fields were considered for final selection. Brief descriptions of these fields were examined and discussed with the contract monitor, and on the basis of the magnitude of N, similarity, and judgment, the eight fields given in Table 1 were selected. Career fields considered but not selected appear in Table 2.

AQE score distributions for each aptitude type and job classification in each field were requested so the fields could be compared for overlap in AQE scores. No significant overlap was found for career fields in the same area.

Development of VOICE

Construction of the interest scales began with an inventory of the ETS test collection (including 49 interest measures) and a review of all relevant occupational interest inventories. From these sources an item proof of 400 occupational interest items were written. It was decided,

Table 1

Eight Career Fields

Aptitude Type	Aptitude Score Required	Minimum Score	AFSC	N	Title
Administrative	High	A80	671X0	1,702	General Accounting Specialist
	Low	A40	702X0	35,571	Administration Specialist
General	High	G80	252X1	3,369	Weather Observer
	Low	G40	811X0	21,074	Security Specialist
Electrical	High	E80	304X0	4,496	Radio Relay Equipment Repairman
	Low	M/E40	421X3	8,533	Aerospace Ground Equipment Repairman
Mechanical	High	M/E50	431X1C	23,583	Maintenance Specialist - Jet Aircraft, 1 & 2 Engine
	Low	M40	473X0	3,773	General Purpose Vehicle Repairman

Table 2

Backup Career Fields

Aptitude Type	Aptitude Score Required	Minimum Score	AFSC	N	Title
Administrative	High	A80	671X3	4,095	Disbursement Accounting Specialist
	High	A60	732X0	10,984	Personnel Specialist
	Low	A40	702X0A	3,441	Administration Specialist - Publications, Documentation, Administrative Communications Management
	Low	A40	271X0	3,854	Air Operations Specialist
General	High	G60	902X0	9,514	Medical Service Specialist
	Low	G40	571X0	8,525	Fire Protection Specialist
	Low	G40	922X0	2,413	Protective Equipment Specialist
Electrical	High	E80	303X2	3,632	AC&W Radar Repairman
	High	E80	325X1	3,030	Avionics Instrument Systems Specialist
	Low	M/E40	421X2	3,854	Aircraft Pneudraulic Repairman
	Low	M/E50	545X0	2,384	Refrigeration & Air Conditioning Specialist
Mechanical	High	E/M60	362X1	1,567	Telephone Switching Repairman, Electro/Mechanical
	High	M/E50	431X1A	8,127	Maintenance Specialist - Reciprocating Engine Aircraft
	Low	M40	551X0	2,865	Pavements Maintenance Specialist
	Low	M40	547X0	1,594	Heating Systems Specialist

for scoring purposes, to assign related items to separate interest scales or groups, for example, mechanical, computational, clerical, and so forth. An a priori scale approach was planned for two reasons. First, the significance of response to single items is not very reliable. Second, the scale definitions would provide guidelines for writing items if alternate or parallel forms of the inventory were needed. Since occupational scales were to be developed, a pool of miscellaneous items were also written.

The items were based on two principal criteria: (1) each item would be assigned to one of 14 scales thought to be relevant to Air Force career fields (with the exception of the items assigned to the miscellaneous category) and (2) the language of the items should be appropriate for the probable reading level of recruited Air Force personnel.

Each item presents an activity (e.g., "Tinker with a broken sewing machine") and asks the examinee to indicate whether he likes, dislikes, or is indifferent to the activity. The items were listed singly, not in groups. This format was chosen for its simplicity and efficiency. Zuckerman (1953) showed that individual item arrangement is more efficient than triad arrangement in terms of response time. Perry (1953) conducted another study in which the item pools were of equal size and triads were compared with individual items. Although a slight superiority was shown for the triads, it was not consistent. Items arranged individually also have the advantage of being easier to score.

The scales originally developed resulted from a thorough review of the major occupational interest inventories extant and adaptations of them which were, in the judgment of the investigators, related to the Air Force Career Fields. In addition, a review of the jobs within the various career

fields suggested other scales which had no counterparts in other published inventories. In the course of writing the items, it became apparent that some of the scales originally planned were not feasible because of the ambiguity of content or of the number of items that could be written. The result was a tentative set of 14 definable scales. These scales and the number of items in each are listed in Table 3.

When the items were being written, two reference sources proved most helpful. One was AFM 39-1 (Department of the Air Force, 1970) which contained specific descriptions of Air Force jobs. The second was the Dictionary of Occupational Titles (DOT) (1969). It was thought that candidates for the Air Force would probably be more familiar with the nonmilitary counterparts of Air Force jobs, so that, where possible, the DOT descriptions of jobs similar to those described in AFM 39-1 were also used as source material.

The next step was to send the 400 items in the proposed inventory format to the ETS Test Development Division for review. Revisions were made as a result of this review and the items were sent to the Air Force Personnel Research Laboratory for review and approval. Their helpful comments led to an extensive revision aimed at improving face validity and representing more accurately the job types available to enlisted men in the Air Force. In the course of the review process, approximately 20 percent of the original items were either modified or eliminated, and new items were substituted. In one case an entire scale (Textile Services) was eliminated. The final version of the interest inventory consisted of 400 items grouped in four general sections: Occupations (90 items), Work Tasks (210 items), Leisure Activities (70 items), and Desired Learning Experiences (30 items).

Table 3

Original Scales for Item Pool

Scale	Number Of Items	Scale	Number Of Items
Mechanical	37	Computational	34
Academic	26	Health Service	36
M-Scale	34	Pedagogy	15
Outdoors	41	Food Service	20
Scientific	34	Textile Service	15
Electronic	34	Audiographic	15
Clerical	35	Miscellaneous	24

The scales listed in Table 3 were revised, and the final version contained 13 separate scales in addition to a pool of miscellaneous items. The scales and their item numbers are listed in Table 4.

Development of Job Satisfaction Scales

Prior to developing a job satisfaction scale, a search was conducted for existing job satisfaction scales and research dealing with them. The 13 scales given by Robinson et al (Chapter 5, 1969) were examined in considerable detail. It was concluded that there are several factors that may affect job satisfaction. In general, the factors could be characterized as either extrinsic or intrinsic. In order to include each significant factor, a draft scale of 47 items was developed. Four subscales were then devised, and the draft submitted to the ETS Test Development Division for review and to the Air Force Personnel Research Laboratory for review and trial testing. Comments and suggestions received from ETS's Test Development Division and from the Air Force were incorporated in the final version.

Four job satisfaction scales were developed and titled, "Job," "Peer," "Supervision," and "Air Force." The 16-item Job scale was designed to measure intrinsic satisfaction with the actual work activities. The 10-item Peer scale was designed to measure satisfaction with one's fellow co-workers. The Supervision scale contained 12 items and measured satisfaction with one's supervisor. The Air Force scale was a brief 8-item scale aiming to measure satisfaction with working conditions in the Air Force. Items were written in brief form, often consisting of only one word. Items were also stated in such a way that positive response to some items would indicate satisfaction and to other items dissatisfaction.

Table 4

Final Interest Scales and Items in Each

Scales	Items
Audiographic:	5, 22, 55, 56, 63, 83, 104, 115, 134, 141, 157, 175, 203, 218, 222, 225, 228, 358
Food Service:	6, 13, 21, 48, 86, 121, 127, 167, 179, 234, 245, 253, 264, 324, 328, 376, 381, 392
Pedagogy:	80, 119, 129, 170, 171, 182, 183, 186, 211, 220, 229, 235
M-Scale	2, 10, 14, 17, 19, 27, 32, 36, 46, 58, 60, 64, 108, 160, 190, 214, 345, 354, 363, 368
Leadership:	2, 32, 46, 54, 149, 196, 209, 214, 215, 234, 236, 265, 300
Computational:	1, 15, 16, 74, 91, 105, 139, 151, 152, 156, 166, 169, 174, 187, 242, 248, 250, 252, 271, 301, 340, 371, 374, 389, 390, 399
Health Service:	4, 20, 21, 57, 62, 66, 85, 99, 113, 142, 144, 154, 162, 193, 210, 213, 237, 238, 244, 249, 254, 256, 265, 268, 274, 278, 378, 385
Scientific:	16, 26, 66, 70, 82, 88, 95, 97, 103, 112, 138, 140, 147, 192, 199, 217, 219, 223, 227, 232, 243, 257, 258, 313, 341, 361, 364, 372, 375, 386, 388, 391, 394, 395
Electronic:	3, 25, 68, 82, 83, 92, 96, 109, 136, 145, 159, 163, 195, 197, 207, 239, 259, 260, 262, 267, 276, 277, 279, 282, 317, 323, 336, 338, 350, 357, 400
Mechanics:	26, 35, 45, 49, 84, 87, 92, 94, 111, 135, 143, 148, 153, 155, 158, 164, 191, 194, 202, 204, 205, 246, 255, 261, 271, 275, 290, 296, 311, 320, 322, 325, 327, 331, 332, 334, 343, 344, 348, 384
Clerical:	7, 9, 12, 18, 39, 42, 52, 67, 72, 76, 107, 114, 117, 120, 122, 126, 131, 137, 150, 165, 173, 176, 185, 188, 201, 206, 216, 231, 240, 241, 247, 263, 269, 270, 272, 273, 281, 286, 373, 380
Outdoors:	10, 11, 17, 27, 29, 30, 32, 33, 34, 41, 43, 44, 47, 77, 110, 125, 177, 180, 189, 226, 230, 302, 312, 319, 326, 333, 352, 353, 355, 356, 362, 367, 369
Academic:	215, 266, 285, 303, 307, 309, 310, 314, 315, 316, 321, 329, 330, 335, 337, 339, 347, 351, 365, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400
Miscellaneous:	8, 23, 24, 28, 31, 37, 38, 40, 50, 51, 53, 59, 61, 65, 69, 71, 73, 75, 78, 79, 81, 89, 90, 93, 100, 101, 102, 106, 116, 118, 123, 124, 128, 130, 132, 133, 146, 161, 168, 172, 178, 181, 184, 198, 200, 208, 212, 221, 224, 233, 251, 280, 283, 284, 287, 288, 289, 291, 292, 293, 294, 295, 297, 298, 299, 304, 305, 306, 308, 318, 342, 346, 349, 359, 360, 365, 370

The four job satisfaction scales are modifications of scales used in the Job Description Index (JDI) of Locke, Smith and Hulin (1965). An approach similar to that used in the JDI was considered appropriate because of its low verbal level and research indicating that the JDI scales have predictive, convergent, and discriminant validity, as well as internal consistency and stability (Robinson et al, 1969, pp. 105-107).

SECTION III

Field Test

VOICE was administered in a field test to a sample consisting of 4800 airmen, 600 from each of the eight selected career fields. To be in the sampling frame for a given career, an airman needed to have both AQE scores on file and at least six, but not more than 42, months of on-the-job experience. A simple random sample of personnel within each career field was selected from the airman tape files maintained by the Computational Sciences Division of the Air Force Human Resources Laboratory.

Preparatory Steps

The following information was obtained for each participant: his social security number (SSAN), CBPO, and career field. The men were grouped and listed by CBPO. The Personnel Research Laboratory supplied mailing labels for the selected airmen (2 sets), mailing labels for the CBPOs (3 sets), rosters of selected airmen by CBPO (3 sets), initial and follow-up letters to CBPOs and airmen, and a magnetic computer tape containing the AQE scores, Air Force Service Career codes, and SSANs of the 4800 selected airmen.

The Role of the CBPO

The participants in the field test were distributed among 128 CBPOs throughout the world. Each participating CBPO was notified by headquarters USAF that he would be receiving an approved interest survey which should be distributed to identified personnel. Initial and follow-up mailings to the CBPOs, by the contractor, contained a letter from the Personnel Research Division outlining the project, instructions for survey administration, a roster of the participating airmen, and preaddressed sealed packets for

distribution to the men. Each sealed packet contained a VOICE booklet, answer sheet, introductory letter, pencil, and business reply envelope. The men were told to return their completed VOICE booklets directly to the ETS project directors.

The initial mailing of VOICE to CBPOs began January 12, 1973. On January 19, a postal card was sent to each CBPO indicating that materials had been mailed and requesting cooperation by quickly distributing the materials. Follow-up mailings to nonrespondents began February 5 and were continued until March 9.

In early March, the Contract Monitor telephoned CBPOs in the continental United States whose bases ETS reported had either a large nonresponse rate or a large nonresponse for the Security Specialist career. We were particularly interested in Security Specialists' responses because this group had a low response rate (less than 300 returns at the time), and it was believed that a minimum of 300 useable answer sheets from each career would be necessary to develop the scales. The response rate from those bases that were called increased significantly, particularly from those with large numbers of Security Specialist nonrespondents.

Collection of the Completed Inventories

To control the flow of the large amounts of material from the field test, a system of clerical updating was used for the inventories as they passed through the various stages of processing. An illustration of a control sheet appears in Exhibit 1. As can be seen, there was space for indicating such information as the participant's social security number (SSAN), his name, general comments, answer sheet number (A/S#), follow-up answer sheet number (A/S#2), the date his material was received, the date of scan-editing, and ready for scoring (SCRIBE).

CBPO NUMBER - EH
INSTALLATION LOCATION
NAME - EIELSON
ID - AF8
STATE/COUNTRY - ALS
ORGANIZATION DATA - 5010 COMBAT SUPPORT GP/DPMQS

5010 COMBAT SUPPORT GP/DPMQS
ATTN SURVEY CONTROL OFFICER (EH)
APO SEATTLE 98737

A/S# 1088 - 1111

A/S#	DAFSC	EDCSA	CBPO NR	Comments	A/S #	A/S # (2)	Date Rec'd	To AF for Follow-up	Scan-Edit Date	Ready for SCRIBE
1088	2521		EH	Sections 2-5 Blank	1088 ✓	—	2/13	—	2/28	Omit
1089	2521		EH	Returned Response	1089 ✓	—	2/13	—	2/28	Omit
1090	2521		EH	2nd w/o PCS PCS	1090 ✓	7257 ✓	4/16 2/27	—	4/17 2/28	Omit
1091	2521		EH	Omit 2nd A/S duplicate	1091 ✓	7258 ✓	4/16 3/20	—	4/16 3/20	✓
1092	2521		EH	2nd complete TDY	1092 ✓	7259 ✓	4/16 2/27	—	4/16 2/28	~~Omit~~ ✓
1093	2521		EH		1093 ✓	—	2/13	—	2/28	✓
1094	4213	730110	EH	PCS	1094 ✓	7260 ✓	2/27	—	2/28	Omit
1095	4213		EH		1095	7216 ✓	4/16	—	4/16	✓
1096	4213		EH	2nd complete Avbot	1096 ✓	7262 ✓	4/16 2/27	—	4/16 2/28	✓ ~~Omit~~
1097	4213	730321	EH	PCS	1097 ✓	7263 ✓	4/16 2/27	—	4/16 2/28	Omit
1098	4213		EH		1098 ✓	—	2/13	—	2/28	✓
1099	4730		EH	2nd complete ~~In Hospital~~	1099 ✓	7264	4/16 2/27	—	4/16 2/28	✓ ~~Omit~~
1100	4730		EH		1100 ✓	—	2/13	—	2/28	✓
1101	4730		EH		1101 ✓	—	2/13	—	2/28	✓
1102	4730		EH	2nd complete ~~Sections 2-5 Blank~~	1102 ✓	7265	4/16 2/27	—	4/16 2/28	✓ ~~Omit~~
1103	4730		EH		1103 ✓	—	2/13	—	2/28	✓
1104	4[illegible]		EH		1104 ✓	—	2/13	—	2/28	✓
1105	6711		EH		1105 ✓	—	2/13	—	2/28	✓
1106	6711		EH		1106 ✓	—	2/13	—	2/28	✓
1107	6711	730310	EH		1107 ✓	—	2/13	—	2/28	✓
1108	6711		EH		1108 ✓	—	2/13	—	2/28	✓
1109	6711		EH		1109 ✓	—	2/13	—	2/28	✓
1110	6711		EH		1110 ✓	—	2/13	—	2/28	✓
1111	7020	730310	EH		1111 ✓	—	2/13	—	2/28	✓

As the completed inventories were received, they were checked in, and the scan-editing process was begun. The purpose of the scan-editing was to check the answer sheets as follows:

1. Checked to see that SSAN, AFSC, and A/S# were properly gridded;
2. Identified inventories that were incomplete in any of the sections;
3. Identified inventories with "patterned" responses as well as multiple responses to items; and
4. Identified respondents whose AFSC numbers did not correspond to those on record.

Detailed scan-edit procedures are given in Exhibit 2.

Inventories were collected until 3537 had been returned. Of those returned, 3104 were found to be useable. All AFSCs had more than 300 useable returns, which was considered the minimum number required for analysis. Most returns found in the scan-edit to be unuseable were blank or incomplete, or the airman had been discharged or separated, or he reported himself to be in a different career field from that supplied by the Personnel Research Laboratory. A complete tally of the useable and unuseable returns by career field and reason for nonuse appear in Table 5.

The response rates achieved for the various CBPOs were also calculated. They were generally high. Of the 128 CBPOs involved, 111 achieved response rates of 60 percent or better. A list of the CBPOs from whom cooperation was requested is given in Table 6 with the number of inventories mailed to the CBPO and the response rate achieved.

Exhibit 2

CONTROL AND SCAN-EDIT PROCEDURES

Control Sheets are in order by answer sheet number.

When answer sheet arrives

1. Find proper control sheet.
2. Fill in A/S# (for second mailing use A/S# (2)).
3. Fill in date received.
4. Fill in Scan-Edit date (see below for procedures).
5. Check Ready for SCRIBE box if there are no scan-edit problems.

Scan-Edit procedures are as follows:

1. On back, check to see if A/S# is gridded; if not, grid it.
2. Check to see that all items have been answered. Look also for obvious patterning and for multiple responses to one question. Note all discrepancies in general comment area of control sheet. Some of the possible problems are listed below.
   A. If Sections 1 to 4 are incomplete, put answer sheet in the appropriate stack.
   B. If Section 5 is incomplete, put answer sheet in appropriate stack. These will be scored but Job Satisfaction will not be rated.
   C. If obvious patterning occurs, put in appropriate stack. Decisions will be made at a later time.
   D. If there is a multiple response to one question, put in appropriate stack for a later decision.
   E. If AFSC does not agree with that provided by the AF, put in appropriate stack so we can check with the AF for resolution.
   F. If the airman has returned a blank answer sheet, put in the appropriate stack. These will be resolved later.
3. Erase any excess marks on the paper.
4. Fill in any partial marks.
5. Turn to front page. Repeat Step 1.
6. See if AFSC is gridded. If not, grid, using 0 in the fourth digit. See if AFSC is the same as that on the roster.
7. Check that SSAN is gridded. If not, grid.
8. Repeat Steps 2, 3, and 4.
9. Tally AFSC numbers.
10. Put in SCRIBE stack.

Table 5

Test Administration

Useable Returns		Unuseable Returns	
AFSC	Number	Reason	Number
2521	457	Incomplete	121
3040	409	Patterned Responses	22
4213	361	Wrong AFSC Number	51
4311	364	Completed by wrong SSAN	1
4730	346	Answer Sheet Number Unknown	5
6711	467	Returned Blank, no reason	37
7020	385	Claimed One Completed	9
8110	315	Separated or Discharged	86
Total	3104	Transferred or Reassigned	25
		PCS	33
		TDY	11
		AWOL or Deserter Status	4
		Patient Status	2
		Military Confinement	3
		On Leave	1
		Addressee Unknown on Base	22
		Total	433

GRAND TOTAL: 3537

Table 6

Response Rate by CBPO

Code	Base	Sent	Percent Responding	Code	Base	Sent	Percent Responding	Code	Base	Sent	Percent Responding
AF	APO, New York	13	100.00	GF	Goodfellow, TX	6	100.00	RF	APO, New York	43	60.47
AH	APO, New York	36	52.78	GK	APO, New York	9	100.00	RJ	Randolph, TX	20	90.00
AK	Patrick, FL	2	100.00	GM	Grand Forks, ND	81	40.74	RM	Reese, TX	18	83.33
AM	Altus, OK	59	66.10	GW	Griffiss, NY	44	81.82	RP	APO, New York	33	100.00
AU	Andrews, D. C.	47	70.21	HB	APO, New York	29	58.62	RT	Richard, Gebaur, MO	18	94.44
AX	APO, New York	16	87.50	HD	Hamilton, CA	37	86.49	RX	Robins, GA	98	75.51
AY	APO, New York	18	88.89	HF	Hancock, NY	38	65.79	SA	USAFPCS, VA	24	91.67
BB	Barksdale, LA	5	100.00	HH	Pentagon, D. C.	1	0.00	SJ	APO, New York	65	78.46
BD	Beale, CA	56	62.50	HI	APO, San Francisco	5	60.00	SM	Seymour Johnson, NC	58	46.55
BF	APO, New York	41	85.37	HL	APO, San Francisco	48	91.67	SP	Shaw, SC	88	79.55
BH	Bergstrom, TX	117	95.73	HP	Hill, UT	19	84.21	SQ	Sheppard, TX	37	89.19
BL	APO, New York	43	76.74	HS	Holloman, NM	61	55.74	MT	Moody, GA	13	100.00
BN	Blytheville, AR	27	70.37	HV	Homestead, FL	82	69.51	MU	McClellen, CA	16	81.25
BP	Bolling, D. C.	22	72.73	KB	APO, San Francisco	69	57.97	NJ	Nellis, NV	92	63.04
BV	Brooks, TX	5	100.00	KF	Keesler, MS	76	84.21	OD	Offutt, NE	113	80.53
BX	Grissom, IN	22	68.18	KH	Kelly, TX	8	100.00	OP	APO, Seattle	65	47.69
CC	APO, New York	8	75.00	KJ	Kelly, TX	3	66.67	PE	APO, New York	4	100.00
CD	Cannon, NM	77	68.83	KL	Kelly, TX	10	70.00	PF	Patrick, FL	14	100.00
CF	Carswell, TX	28	75.00	KM	Kincheloe, MI	26	34.62	PJ	Pease, NH	56	64.29
CH	Castle, CA	30	40.00	KU	APO, San Francisco	27	48.15	PS	Plattsburgh, NY	50	76.00
CK	Chanute, IL	46	91.30	KV	Kirkland, NM	25	88.00	ST	APO, New York	26	96.15
CO	Columbus, MO	32	68.75	KY	Sawyer, MI	58	63.79	TE	Tinker, OK	169	66.27
CZ	Craig, AL	24	95.83	LJ	Lackland, TX	26	65.38	TJ	APO, New York	42	69.05
DF	Davis, MO	75	90.67	LK	Hanscom, MA	17	76.47	TX	Tyndall, FL	29	65.52
DM	Dover, DE	40	85.00	LP	Little Rock, AR	36	63.89	UP	APO, New York	52	63.46
DT	Duluth Airport, MN	20	75.00	LQ	Lockbourne, OH	16	75.00	US	AF Academy, CO	6	100.00
DW	Dyess, TX	38	63.16	LS	Loring, ME	54	62.96	VH	Vance, OK	8	87.50
EB	Edwardo, CA	33	75.76	LU	Los Angeles, CA	2	100.00	VQ	Vandenberg, CA	17	100.00
ED	Elgin, FL	66	95.45	LW	Lowry, CO	21	57.14	WE	Wright Patterson, OH	24	79.17
EE	Elgin Auxillary, FL	32	84.38	LY	Luke, AZ	61	70.49	WG	Forrestal Bldg, D. C.	10	50.00
EH	APO, Seattle	30	100.00	MA	Macdill, FL	72	69.44	WM	Webb, TX	20	65.00
EJ	Ellsworth, SD	72	83.33	MB	Malmstrom, MT	73	75.34	WP	Westover, MA	36	86.11
EL	APO, Seattle	89	78.65	MD	March, CA	9	100.00	WT	Whiteman, MO	41	80.49
EM	England, LA	36	50.00	ME	Mather, CA	17	70.59	WU	APO, New York	21	80.95
EP	Peterson, CO	30	90.00	MG	Maxwell, AL	23	73.91	WV	Williams, AZ	30	100.00
ER	APO, Seattle	1	100.00	MK	McConnell, KS	28	67.86	WZ	Wurtsmith, MI	47	68.09
FC	Fairchild, WA	39	71.79	ML	APO, New York	11	90.91	YM	APO, San Francisco	48	100.00
FJ	Forbes, DS	44	40.91	MM	McCoy, FL	21	61.90	MN	McGuire, NJ	47	65.96
FT	Ft. George G. Meade, MD	6	100.00	WY	Wright Patterson, OH	2	50.00	MP	Minot, ND	64	78.13
FW	F. E. Warren, WY	62	56.45	PV	Pope, NC	47	76.60	MW	Mountain Home, ID	42	83.33
GB	George, CA	72	63.89	RC	APO, New York	13	76.92	MY	Myrtle Beach, SC	62	69.35
									TOTAL	4800	73.52

Administration to Basic Trainees

In order to obtain a "men-in-general" group, as well as to estimate the test-retest reliability of VOICE, the inventory was administered to a group of airmen who reported for experimental testing during basic training. VOICE was administered to 312 men in their sixth day of training. A sample of 211 from this same group took VOICE again on their twenty-ninth and last day of basic training to attempt to estimate the reliability of VOICE. From this total, 209 valid cases were used as the men-in-general group. Some of the men from the original group were lost because of discharges, setbacks to other flights, sick call on the test date, and various other reasons. Since it was difficult to know in advance exactly how many airmen would report for testing, every man in each flight was tested until the 200 which the project directors had requested was reached.

Data Transcription and Editing

Useable answer sheets were batched (the unuseable ones were not processed) and the responses transcribed on magnetic tape by means of a special purpose scoring machine called SCRIBE (Scanning, Comparing, Recording Instrument for Better Education). A quality control check indicated that the probability of more than one error per 100,000 transcriptions was less than 0.01. All errors found were corrected.

Data from the SCRIBE file were merged with the file obtained from the Personnel Research Division tape giving AQE scores for the participating airmen. This combined file was checked by the computer to see:

1. Whether each airman on the SCRIBE file had corresponding AQE data. In each case, when records were found on the SCRIBE file without AQE scores, a check of the answer sheets for these cases

indicated that the SSANs had been gridded incorrectly. Corrections were made and the records matched.

2. Whether each Side 1 of an airman's answer sheet had a corresponding Side 2 answer sheet. Errors of this sort resulted from incorrectly gridding the answer sheet number. Errors, when found, were resolved and the file corrected.
3. Whether the AFSCs were valid in the sense of being one of the eight selected. Errors in these cases were also due to incorrect gridding.
4. Whether each response was "in range." Responses to the interest items were coded by the integers 1 through 3, and items on the job satisfaction scale were coded 1 through 4.
5. Whether five or fewer items not appearing in a block had been omitted. When this occurred, the "indifferent" code was imputed for the interest items and the "sometimes" and "seldom" codes were imputed with equal probability for the job satisfaction items.

SECTION IV

Statistical Analysis

This section describes the statistical procedures that were used to identify satisfied personnel, develop both occupational and a priori interest scales, and cross-validate the procedures used in those scales. Scales were developed on the basis of airmen who expressed satisfaction with their career field and on the basis of a group of airmen in basic training. First the scales were developed independently in two half-samples and subsequently cross-validated. Final scales were determined by combining half-samples.

Construction of Half-Samples

Prior to analyzing job satisfaction data and developing scales, two half-samples were constructed. All airmen were grouped according to their career fields. Within each of the eight fields, each airman was ranked by his total AQE score. The total AQE score was the sum of the four normal deviates corresponding to the percentile scores usually reported for the scale. As a final step, each pair of airmen (in rank order) within each career field was considered and one of the two randomly assigned to Sample 1, the other to Sample 2. The result of this procedure was the formation of two half-samples of airmen in each of the eight career fields. The total AQE score was equal in expectation for half-samples in the same career field. The recruits forming the men-in-general group were also randomly divided. (This was a simple random division since no AQE scores were available for this group). Except where indicated, all of the analyses described were performed twice, once for each half-sample.

Item Selection for A Priori Interest Scales

To achieve more efficient scoring and eliminate heterogeneous items, a backward selection procedure was used to reduce the number of items forming an a priori scale. All a priori scales were limited to a maximum of 16 items. In the case of scales with fewer than 16 items, the only items eliminated were those with negative correlations with the total scale score. The decision to use 16 items was based on the findings of Katz, Norris, and Halpern (1970), who achieved internal consistencies above 190 for interest items in eleven of twelve interest scales, using a similar item response format.

Identical procedures were used independently with each half-sample and, subsequently, the combined sample, to select items for the recommended a priori scales. The procedure is summarized below:

1. Compute the correlation between each item in the pool assigned to a scale and the total score based on the remaining items in the same pool. Items were scored on the basis of 1 = dislike, 2 = indifferent, 3 = like, and each item was given an equal weight in computing the total scale score.
2. Select the item with the lowest item-total correlation and discard that item.
3. Rescore the scale total, eliminating the item identified in the previous step. Recompute new item-total correlations.
4. Repeat steps 2 and 3 until 16 items remain.
5. Eliminate items with negative item-total correlations if fewer than 16 items were in the scale item pool.

This process illustrates the logic of the scale construction. If this strategy were implemented on the computer, the several rescorings

would be time consuming and expensive. Identical results can be obtained by manipulating the variance-covariance matrix of items. For each item p, the correlation with the total score based on the remaining items was computed by

$$r_p(t.p) = \left(\sum_{\substack{d=1 \\ d\neq p}}^{k} S_{pj}\right) \Big/ \left(\left(\sum_{\substack{i=1 \\ i\neq p}}^{k}\sum_{\substack{d=1 \\ j\neq p}}^{k} S_{ij}\right)(S_{pp})\right)^{1/2} . \qquad (1)$$

The quantity $r_p(t.p)$ indicates the correlation of interest. The notation $(t.p)$ has been used in the subscript to show that the pth item has been removed from the total. The number of items is denoted by k, and the covariance of items i and j is denoted by S_{ij}.

When the pth item was identified as having the lowest item-total correlation, correlations were formed by calculating

$$r_{p'}(t.pp') = \left(\sum_{\substack{d=1 \\ d\neq p \\ d\neq p'}}^{k} S_{p'j}\right) \Big/ \left(\left(\sum_{\substack{i=1 \\ i\neq p \\ i\neq p'}}^{k}\sum_{\substack{d=1 \\ d\neq p \\ d\neq p'}}^{k} S_{ij}\right)(S_{p'p'})\right)^{1/2} , \qquad (2)$$

and the pth item with the lowest value of $r_{p'}(t.pp')$ was dropped. This process was continued until 16 items remained.

The process just described was designed to achieve a high degree of homogeneity among scale items. Internal consistency coefficients (coefficient alpha) were computed for each scale after item selection as follows:

$$\alpha = \frac{k}{k-1}\left[1 - \sum_{i}^{k} s_i^2/s_t^2\right] \qquad (3)$$

where k represents the number of items in the scale, S_i^2 the item variance, and S_t^2 the total scale variance for the k items. Whenever internal consistencies were calculated, as in the occupational keys and the job satisfaction scales, the same method was used.

Identifying Satisfied and Dissatisfied Personnel

A two-phase plan was initiated to assign individuals to each career field to satisfied and dissatisfied groups. First, within each field, satisfied and dissatisfied groups were formed according to their responses to the overall job satisfaction question (Item 417). Personnel responding "very satisfied" or "moderately satisfied" were classed in the satisfied group, and those "moderately dissatisfied" or "very dissatisfied" were classed in the dissatisfied group. Second, a stepwise regression analysis (Draper and Smith, 1966, p. 171) was performed within each field to find the linear function of the four satisfaction scores which best separated the satisfied from the dissatisfied personnel. This linear function was then used to rank all personnel within a career field in terms of "satisfaction." The first N_s subjects with the highest scores were chosen as the satisfied group where N_s corresponded to the number of subjects indicating overall satisfaction in Item 417. This resulted in the proportions of satisfied and dissatisfied personnel within each field being the same as those estimated from the overall question.

Determining Occupational Scales

Within each career field the zero order correlations between each interest item and a dichotomous criterion were computed. The dichotomous criterion was scored 1 if the subject was a member of the satisfied career field group and 0 for the comparison group, which was always men-in-general. The 50 items having the highest correlations (regardless of

sign) with the group membership criterion were selected from the 400 items. These 50 items served as independent variables in a stepwise regression analysis with the dichotomous criterion. This procedure was equivalent to a stepwise discriminant analysis for the two-group case (Beaton, 1964) and served the purpose of selecting a final set of items. Items were added until the increment in the squared multiple correlation was less than 0.0025. The variables added up to this point constituted the occupational scale with unit weights, the weights arrived at through the stepwise regression analysis were retained for comparative purposes. It was necessary to reduce the search for items to comprise these scales from 400 to 50, because 400 independent variables are too large for most stepwise regression computer programs. Also, scales consisting of as few items as possible make scoring easier. It was believed that 50 items would provide a manageable pool and be large enough to produce occupational scales of sufficient quality.

Predicting Criterion Groups with A Priori Scales

A similar procedure was used to arrive at the best linear function of a priori scale scores for separating each group of satisfied personnel from men-in-general within each career field. A stepwise regression analysis was performed, using the dichotomous criterion representing group membership. Scales adding at least 0.0025 to the squared multiple correlation were retained.

Multiple Group Discriminant Analysis

Using the 13 final a priori scale scores, a 16-group discriminant analysis (Cooley and Lohnes, 1962, Chapter 6) was performed on the eight satisfied and eight dissatisfied career groups. A similar 16-group analysis was also performed using the occupational scales. The purpose of the discriminant analysis was, in part, to validate the scales further

but also to check the positions of the various groups in the discriminant space. For example, the analysis would determine the proximity of the two groups from a similar career field in relation to groups from other career fields. Evidence of this nature would provide supplementary evidence as to the validity and usefulness of the scales developed.

Cross-Validation

The scoring weights derived from the series of stepwise regression analyses in one half-sample were applied to the data in the other half-sample. Within each field the appropriate occupational scale score or linear function of a priori scales was used to predict whether the subject was classified as a member of the satisfied group or of the men-in-general group. Dissatisfied personnel were not included in the cross-validation. Classification rules which minimized the probability of misclassification were developed for each career.

For each individual, the probability of membership in one of the two groups could be computed according to the formula (Cooley and Lohnes, 1962, p. 138):

$$P_{ij}\,[H_j|Y_i] = \left[\frac{p_j}{s_j} e^{\frac{-[y_j - \bar{y}_j]^2}{2s_j^2}}\right] \Big/ \left[\sum_k \frac{p_k}{s_k} e^{\frac{-[y_k - \bar{y}_k]^2}{2s_k^2}}\right] \quad (4)$$

where $P[H_j|Y_i]$ indicates the probability that the ith person with scores y_i on the derived linear function of items or scales belongs to group H_j. In this case, there are two groups H_1 and H_2. The p_j is the proportion of satisfied personnel obtained in the cross-validation sample; the s_j is the estimate of the standard deviation of the linear function or score estimated from the analysis sample.

By taking the logarithm of the numerator of the quantity on the right side of the equation and substituting the sample quantities, the following classification rule is obtained:

$$C = \left[\log \frac{N_c}{NS_c} - \frac{(y - \bar{y}_c)^2}{2s_c^2} \right] - \left[\log \frac{N_m}{NS_m} - \frac{(y_i - \bar{y}_m)^2}{2s_m^2} \right] \quad (5)$$

where N_c is the number of subjects classified as satisfied in a given career group in Sample 2; N_m is the number of subjects in the men-in-general group in Sample 2; $N = N_c + N_m$; S_c and S_m are the standard deviations of Y estimated for the given career group and the men-in-general group respectively in Sample 1; $\bar{Y}_c$ and $\bar{y}_m$ are the estimated means of the function Y in Sample 1 for the career group and men-in-general group respectively.

If $C \geq 0$, a subject was classified in the career group. If $C < 0$, the subject was classified in the men-in-general group.

Hits and Misses were computed as follows:

1. If $C \geq 0$ and the subject was in the career group, classify as a career hit.
2. If $C < 0$ and the subject was in the career group, classify as a career miss.
3. If $C \geq 0$ and the subject was in the men-in-general group, classify as a men-in-general miss.
4. If $C < 0$ and the subject was in the men-in-general group, classify as a men-in-general hit.

For the occupational scales the proportions of hits (correct classifications) obtained with unit weighting were compared with the

proportions of hits obtained using the exact weights estimated in the discriminant analysis. For the a priori scales, weights rounded off to integer values were compared to the exact weights.

Obtaining Final Estimates

Once the cross-validation was completed, data from the two half-samples were recombined and final scales were derived on the basis of all the data. That is, the steps performed for each half-sample were carried out for the entire sample. Satisfied and dissatisfied groups were defined, items for the a priori scales were selected, and occupational scales were developed using the entire sample of satisfied airmen within a career field as the criterion group and the entire men-in-general sample as the reference group. A final set of linear functions of the a priori scales were also developed in this way. The cross-validity estimates can be regarded, then, as lower bound estimates for the error in the classification rules based on the entire sample, since they are based on only half the data.

In addition, all means, standard deviations, and intercorrelations were computed for the final scales, and test-retest correlations for all scales were computed on a subsample of 209 men-in-general.

SECTION V

Results

In this section the results of the statistical analyses are presented. Analyses relating to the job satisfaction questionnaire are presented initially, followed by those for the development and validation of the a priori and occupational scales.

Characteristics of the Job Satisfaction Scales

The four job satisfaction scales, Job, Peer, Supervision, and Air Force, appear to possess a sufficient degree of reliability and some discriminant validity, as can be seen in Table 7. This table gives the correlations between the four job satisfaction scales, as well as the correlation between the satisfaction scales and the single, overall job satisfaction item. The estimates of internal consistency have been placed in parentheses.

The estimates of internal consistency for the Job and Supervision scales were comparable to those reported for Smith's JDI (Robinson et al, 1969, pp. 105-106), which were in excess of 0.80 for her five scales. Internal consistencies for the Peer and Air Force scales were considerably below that standard. Although the Air Force scale had only eight items and the lowest internal consistency, the Supervision scale had the highest internal consistency, even though the Job scale had more items.

Judging from the magnitude of the correlations between scales, the four scales do not appear to be statistically independent. This result was also reported for the JDI. However, the high correlation reported for the JDI between Work and People was not found between the VOICE scales for Job and Peer, even though the two pairs of scales are similar. These

Table 7

Satisfaction Scale Reliabilities[a] and Intercorrelations

Scale	Job	Peer	Supervision	Air Force	Overall
Job	(.840)	.348	.466	.454	.722
Peer		(.742)	.476	.351	.260
Supervision			(.884)	.379	.343
Air Force				(.597)	.373

[a]Internal consistency coefficients are shown in parentheses. The correlations were based on the total sample of 3072 airmen.

positive correlations indicate that the VOICE job satisfaction scales may be measuring a general job satisfaction factor to a large extent.

The four correlations between each of the scales and the single, overall job satisfaction item indicate that each scale is positively associated with overall satisfaction. However, satisfaction with the intrinsic nature of the work activities which a career entails, as reflected in the Job scale, is of major importance.

Development of Rules for Classifying Satisfied Personnel

Table 8 shows the multiple correlations for the total sample between scores on the job satisfaction scales and the single overall-satisfaction question. Within the eight careers, the correlations ranged from 0.68 to 0.60. The standardized regression weights for the four scales indicate, with a high degree of consistency, that the score on the Job scale is of paramount importance in predicting how an airman responds to the overall job satisfaction question. When t-tests of the significance of standardized regression weights are performed, they show that in most instances the contributions of the remaining scales were not significant. Inspection of Table 8 also reveals that the regression systems for the eight careers were highly similar (in that weights for Job were high), though the proportions of satisfied personnel differed within each field. Table 9 shows the regression weights and multiple correlations for the half-samples.

Total job satisfaction scores for each career field were generated using these regression systems. Groups of satisfied and dissatisfied personnel were distinguished by cutting scores determined by the proportions of satisfied personnel estimated within each career field. Table 9 shows the regression weights and multiple correlations for the half-samples.

Table 8

Standard Regression Weights and Multiple Correlations for Four Satisfaction Scales Used to Predict Satisfied Versus Dissatisfied Personnel Within Career[a]

TOTAL SAMPLE

Career	Job	Peer	Supervisor	Air Force	Multiple r
Weather Observer	.6691[b] (.0406)	-.0512 (-.0061)	.0149 (.0009)	.0532 (.0064)	.6840[b]
Radio Relay Repairman	.6494[b] (.0419)	-.0512 (.0058)	-.0056 (-.0004)	.0696 (.0086)	.6697[b]
Ground Equipment Repairman	.5992[b] (.0381)	-.0987[b] (-.0107)	.0072 (.0004)	.1000[b] (.0124)	.6181[b]
Aircraft Maintenance	.5866[b] (.0409)	-.0156 (-.0018)	.0601 (.0037)	.0062 (.0007)	.6128[b]
Vehicle Repairman	.5865[b] (.0363)	.1052[b] (.0111)	-.0262 (-.0016)	.0235 (.0027)	.6268[b]
Accounting Specialist	.6236[b] (.0380)	-.0511 (-.0054)	-.0395 (-.0024)	.1425[b] (.0169)	.6627[b]
Administration Specialist	.6497[b] (.0410)	.0209 (.0020)	-.0696 (.0048)	-.0114 (-.0013)	.6315[b]
Security Specialist	.6150[b] (.0368)	.0329 (.0029)	-.0155 (-.0008)	-.0272 (-.0027)	.6010[b]

[a] Raw score regression weights shown in parentheses.

[b] Significantly different from zero at .01 level.

Table 9

Standard Regression Weights and Multiple Correlations for Four Satisfaction Scales Used to Predict Satisfied Versus Dissatisfied Personnel Within Career[a]

SAMPLE 1

Career	Job	Peer	Supervisor	Air Force	Multiple r
Weather Observer	.7109(.0422)	-.1147(-.0133)	.0060(.0004)	.0467(.0467)	.6914
Radio Relay Repairman	.6445(.0418)	-.0576(-.0062)	.0006(.0000)	.0950(.0112)	.6793
Ground Equipment Repairman	.5615(.0381)	-.0905(-.0102)	.0065(.0004)	.1289(.0160)	.6049
Aircraft Maintenance	.5850(.0411)	.0129(.0015)	.0774(.0048)	-.0196(-.0024)	.6242
Vehicle Repairman	.6187(.0394)	.0180(.0019)	-.0225(-.0013)	.0651(.0077)	.6424
Accounting Specialist	.5545(.0347)	-.0288(-.0030)	.0607(.0038)	.1356(.0155)	.6540
Administration Specialist	.6015(.0382)	.0180(.0016)	-.0136(-.0009)	-.0274(-.0032)	.5912
Security Specialist	.6480(.0400)	.0493(.0044)	.0360(.0019)	-.1302(-.0130)	.6322

SAMPLE 2

Career	Job	Peer	Supervisor	Air Force	Multiple r
Weather Observer	.6317(.0394)	.0176(.0022)	.0089(.0006)	.0643(.0076)	.6809
Radio Relay Repairman	.6558(.0421)	-.0561(-.0068)	-.0053(-.0004)	.0419(.0054)	.6607
Ground Equipment Repairman	.6293(.0378)	-.1050(-.0111)	.0286(.0017)	.0666(.0083)	.6333
Aircraft Maintenance	.5838(.0405)	-.0559(-.0066)	.0358(.0021)	.0482(.0057)	.6037
Vehicle Repairman	.5763(.0348)	-.1905(-.0199)	-.0467(-.0029)	-.0199(-.0022)	.6236
Accounting Specialist	.6816(.0405)	-.0670(-.0071)	-.1267(-.0077)	.1322(.0163)	.6831
Administration Specialist	.6887(.0432)	.0080(.0008)	-.1145(-.0081)	.0319(.0038)	.6795
Security Specialist	.5573(.0320)	-.0214(-.0019)	-.0390(-.0019)	.0893(.0089)	.5849

[a]Raw score regression weights shown in parentheses.

Total job satisfaction scores for each career field were generated using these regression systems. Groups of satisfied and dissatisfied personnel were distinguished by cutting scores determined by the proportions of satisfied and dissatisfied responses to the overall satisfaction question. Table 10 shows the numbers of satisfied and dissatisfied personnel in each career, along with the proportion of men in each field who were satisfied with their jobs.

Since only satisfied personnel were to be used in developing scales, a desirable outcome would have been for substantial numbers of men within each career to have indicated satisfaction with their work. Unfortunately, in five of the eight careers fewer than half the men indicated satisfaction with their jobs. Within Security Specialist only 24.4 percent were satisfied, which reduced the total sample of satisfied personnel within this field to 43 in Sample 1 and 32 in Sample 2. This suggests that an initial screening to identify satisfied personnel might have been useful. VOICE could have been administered to airmen identified as satisfied and to a sample of those who were dissatisfied.

Selection of Items for the A Priori Scales

The items for the VOICE a priori scales (Table 11) were selected independently for each half-sample, according to the statistical procedures described earlier. Since the objective was to construct homogeneous scales, the responses of every airman with a valid AFSC were used to choose the scale items regardless of the degree of job satisfaction the men expressed. The resulting sample sizes were 1537 for Sample 1 and 1535 for Sample 2.

The items selected in the half-samples were relatively consistent. In six of the thirteen scales, identical items were chosen. Five scales had fewer than four items that were unique for half-samples. Only the Scientific and Outdoor scales were substantially different.

Table 10

Assignments to Satisfied and Dissatisfied Groups Within Career

	Sample 1		Sample 2		
Career	Satisfied	Dissatisfied	Satisfied	Dissatisfied	Percentage Satisfied (Total)
Weather Observer	108	119	117	110	49.6
Radio Relay Repairman	111	92	115	88	55.7
Ground Equipment Repairman	71	103	72	102	41.1
Aircraft Maintenance	98	86	92	92	51.6
Vehicle Repairman	92	80	93	79	53.8
Accounting Specialist	126	105	132	98	56.0
Administration Specialist	87	105	94	97	47.3
Security Specialist	43	111	32	122	24.4
Total	736	801	747	788	48.3

Table 11

Items Selected for A Priori Scale for Samples 1 and 2

Scale	Audio-graphic		Food Service		Pedagogy		M-Scale		Leadership		Computa-tional		Health Service		Scientific		Electronic		Outdoors		Mechanics		Clerical		Academic	
Sample	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Items	22	22	6	6	80	80	10	10	32	32	1	1	20	20	66	66	25	25	11	11	35	35	7	7	215	215
	55	55	13	13	129	129	17	17	46	46	16	16	21	21	70	70	68	68	17	17	45	45	9	9	266	266
	56	56	21	21	170	170	19	19	54	54	139	74	57	57	82	147	82	82	27	27	49	49	12	12	303	303
	63	63	48	48	171	171	27	36	149	149	151	91	62	62	88	192	83	83	29	41	84	84	39	18	307	307
	83	83	86	86	182	182	32	46	196	196	156	105	66	66	258	199	267	267	30	43	87	87	52	39	309	309
	104	104	121	121	183	183	36	58	209	209	166	139	85	85	313	217	276	276	32	44	320	311	67	52	310	310
	115	115	127	127	186	186	46	60	214	214	169	151	99	99	341	219	277	277	319	47	322	320	72	67	314	315
	134	134	167	167	211	211	58	64	215	215	174	156	113	113	361	223	279	279	326	77	325	322	76	72	315	316
	141	141	234	234	220	220	60	108	234	234	187	166	142	142	364	227	282	282	333	110	327	325	107	76	316	321
	157	157	253	253	229	229	160	160	236	236	242	169	144	144	372	232	317	317	352	125	331	327	114	107	321	329
	175	175	264	264	235	235	190	190	265	265	248	174	265	265	375	243	323	323	353	177	332	331	117	114	329	335
	203	203	324	324			214	214	300	300	250	187	268	268	386	257	336	336	355	180	334	332	120	117	330	337
	218	218	328	328			345	345			301	242	274	274	388	258	338	338	356	189	343	343	122	120	335	339
	225	225	376	376			354	354			340	248	278	278	391	313	350	350	362	226	344	344	286	122	337	347
	228	228	381	381			363	363			371	250	378	378	394	341	357	357	367	230	348	348	373	373	351	366
	358	358	392	392			368	368			374	301	385	385	395	361	400	400	369	302	384	384	380	380	366	371

The differences in the Scientific scales of the two samples can probably be attributed to their orientation. The eleven items unique to the Sample 1 scale can be associated with academic activities; for example, reading about great scientists and studying astronomy, chemistry, meteorology, microscopes, nuclear reactions, physics, and radiation belts. These are all activities and courses likely to take place in schools and colleges. On the other hand, the items unique in Sample 2 represent a technical and operational orientation--performing experiments, determining concentrations, helping scientists, devising special equipment, determining the age of foods, keeping data records, classifying rocks, and using microscopes.

As for the two Outdoor scales, the activities of Sample 1 are chiefly leisure activities, those of Sample 2 represent occupations. The Sample 1 scale included canoeing, hunting, sailing, fishing, camping, playing softball, picnicing, and riding trail bikes. The Sample 2 occupations and activities are performed outdoors: longshoremen, lineman, lumberjack, mason, surveyor, mowing lawns, pouring concrete, planing trees, and roofing.

Of course, these conclusions are speculative, but they do suggest considerations for further development of the a priori scales. The factor structure of the inventory and its relation to the a priori scales appear to be important. Since the a priori scales served as a model for constructing items, analysis of the factor structure of the total inventory would serve as a test of the a priori structure and would possibly provide alternative formulations for broad area scales like the a priori scales.

The items selected for the a priori scales, on the basis of Sample 1 combined with Sample 2, are given in Table 12. In the Scientific scale, most of the competing items came from Sample 2; thus the scale is oriented

Table 12

Items in A Priori Scales Based on Combined Data

Scale	Items
Audiographic	22. Draftsman
	55. Photoengraver
	56. Photographer
	63. Printer
	83. Television cameraman
	104. Draw blueprints for a bridge
	115. Take aerial photographs
	134. Draw graphs
	141. Draw maps from photographs
	157. Operate a 16mm movie camera
	175. Make drawings with a compass, triangle, ruler, and other instruments
	203. Operate a printing press
	218. Record speeches with a cassette recorder
	225. Record the sound track for a motion picture
	228. Develop photographs
	358. Join a photography club
Food Service	6. Baker
	13. Chef
	21. Dietitian
	48. Meat cutter
	86. Waiter
	121. Mix pancake batter
	127. Plan menus
	167. Decorate cakes
	234. Manage a cafeteria
	253. Work as a short-order cook
	264. Run a food catering service
	324. Improve a recipe
	328. Buy food for a cookout
	376. Chinese cooking
	381. Food processing
	392. Nutrition
Pedagogy	80. Teacher
	129. Explain a complicated chart to a group of people
	170. Give on-the-job training
	171. Correct test papers
	182. Help write questions for a test
	183. Teach someone to read
	186. Demonstrate the proper way to use a power tool
	211. Teach someone how to solve a problem
	220. Administer an intelligence test
	229. Give a talk before a small group
	235. Help a high school student with his homework
M-Scale	10. Boxer
	17. Construction worker
	19. Customs agent
	27. Explosives detonator
	32. Football coach
	36. Highway patrolman
	46. Manager (warehouse)
	58. Pilot
	60. Policeman
	160. Stop a prison riot
	190. Take part in a military drill
	214. Organize a military drill team
	345. Go trap shooting
	354. Become a karate expert
	363. Collect rifles and pistols
	368. Belong to a gun club
Leadership	32. Football coach
	46. Manager (warehouse)
	54. Personnel manager
	149. Supervise workers on an assembly line
	196. Supervise an inventory of textile goods
	209. Supervise work in a garage
	214. Organize a military drill team
	215. Organize and lead a study group
	234. Manage a cafeteria
	236. Be in charge of employing people for a business
	265. Supervise activities for mentally ill patients
	300. Organize recreational activities for a group of people
Computational	1. Accountant
	16. Computer programmer
	74. Statistician
	91. Find information in numerical tables
	139. Compile statistical tables
	151. Write a computer program
	156. Solve arithmetic problems
	166. Work with numbers
	169. Use a table of logarithms to solve a mathematics problem
	174. Find the errors in a computer program
	187. Prepare income tax returns for other people
	242. Correct errors made by another person in an arithmetic problem
	248. Use an adding machine to check hand calculations
	250. Operate a machine that sorts punched cards
	301. Devise shortcut methods for adding numbers
	374. Calculus

Table 12

Items in A Priori Scales Based on Combined Data (Continued)

Scale	Items
Health Service	20. Dental hygienist
	21. Dietitian
	57. Physical therapist
	62. Practical nurse
	66. Psychologist
	85. Veterinarian
	99. Take blood pressure readings
	113. Give first aid to accident victims
	142. Assist a surgeon during an operation
	144. Help rescue someone from a fire
	265. Supervise activities for mentally ill patients
	268. Help give physical examinations
	274. Assist a dentist by cleaning teeth
	278. Fill prescriptions for a doctor
	378. Disease prevention
	385. Human physiology
Scientific	66. Psychologist
	70. Scientist
	88. Weather forecaster
	192. Determine concentrations of ethyl alcohol in a liquid
	199. Help a scientist perform an experiment
	217. Devise special scientific equipment for an experiment
	219. Determine the age of a fossil
	227. Use a microscope to classify bacteria
	243. Classify rocks by their physical properties
	257. Solve problems by analyzing them logically
	258. Determine the cost of operation of a new machine
	313. Read articles about science
	341. Demonstrate your work at a science fair
	361. Collect and classify insects
	388. Microscopes
	394. Physics
Electronic	25. Electrician
	68. Radio mechanic
	82. Technician (electronics)
	83. Television cameraman
	267. Use a voltmeter
	276. Find and replace defective transistors
	277. Plan an electrical system for a house
	279. Use a soldering iron
	282. Test television tubes
	317. Build a stereo system
	323. Build an antenna for a ham radio set
	336. Tinker with old radios
	338. Read about electronics
	350. Take a telephone apart to see how it works
	357. Build a radio
	400. Wiring diagrams
Outdoors	11. Carpenter
	17. Construction worker
	27. Explosives detonator
	41. Longshoreman
	43. Lineman (electric company)
	44. Lumberjack
	77. Surveyor
	177. Pour concrete for highway construction
	189. Plan trees in a forest
	226. Install lightning rods on buildings
	230. Help put a new roof on an old house
	319. Go canoeing
	333. Ride a trail bike through the woods
	355. Go sailing
	356. Learn survival techniques for living in the wilderness
	369. Go camping
Mechanics	35. Gunsmith
	45. Machinist
	49. Mechanic (automobile)
	84. Toolmaker
	87. Watchmaker
	311. Work mechanical puzzles
	320. Fix a leaky faucet
	322. Tinker with a broken sewing machine
	325. Build a model of a jet engine
	327. Take apart a mechanical toy and see how it works
	331. Tune-up a car
	332. Invent a new tool
	343. Change the oil in a car
	344. Rebuild a lawn-mower engine
	348. Adjust a carburetor
	384. How different types of engines work

Table 12

Items in A Priori Scales Based on Combined Data (Continued)

Scale		Items
Clerical	7.	Bank teller
	9.	Bookkeeper
	12.	Cashier in a bank
	18.	Court stenographer
	39.	Keypunch operator
	52.	Office worker
	67.	Purchasing agent
	72.	Shipping clerk
	76.	Stock clerk
	107.	Type letters
	114.	Make out invoices
	117.	Answer a telephone and give people information
	120.	Take dictation using shorthand
	122.	Sort mail
	373.	Bookkeeping
	380.	Efficient methods for filing and retrieving office records
Academic	215.	Organize and lead a study group
	266.	Take detailed notes from a lecture
	303.	Read poetry
	307.	Browse through a library
	309.	Visit a museum
	310.	Read a novel
	314.	Play bridge
	315.	See a Broadway play
	316.	Participate in a debate
	321.	Discuss a painting
	329.	Read Shakespeare's plays
	335.	Listen to an opera
	337.	Do crossword puzzles
	347.	Go to a symphony concert
	351.	Watch a ballet
	366.	Read books on future space flight

toward technical aspects of scientific endeavor. The Outdoor scale contains items predominantly indicating outdoor occupations, although there are a significant number related to outdoor leisure activity.

As indicated previously, the a priori scales were constructed with the aim of selecting items that were homogeneous. Internal consistency coefficients were calculated, using coefficient alpha, for each scale in each half-sample and the combined sample. These coefficients are presented in Table 13. The Sample 2 coefficients were larger than those obtained for Sample 1 for each scale; the coefficients for the combined sample were between those obtained for Samples 1 and 2. The coefficients obtained were less than those obtained by Katz et al (1970, p. 38), who achieved internal consistencies above 0.90 for 10 of 12 scales, but they were approximately the same as those presented in the examiner manual for the Kuder Preference Record-Vocational (Kuder, 1956, p. 21).

Selection of A Priori Scales for Cross-Validation

In using a priori scales to discriminate the occupational interests of recruits from those of airmen satisfied with their specific careers, it is desirable to use fewer than the 13 scales. Moreover, it can be assumed that satisfaction in each career field depends upon various combinations of interests. For example, one would expect interest in mechanics to be essential to satisfaction with the work of a General Purpose Vehicle Repairman; one would not expect interest in mechanics to be a factor in satisfaction with work as an Administration Specialist.

In order to determine which a priori scales to use for the cross-validation and what weights to apply to them, a stepwise regression analysis was performed for the scales developed for each half-sample. The dependent variable in these analyses was either satisfaction with a career field or

Table 13

Internal Consistencies for the A Priori Scales for The Two Half Samples and the Combined Sample

	Internal Consistency[a]		
Scale	Sample 1	Sample 2	Combined
Audiographic	.8914	.8983	.8949
Food Service	.8907	.8974	.8941
Pedagogy	.8906	.9007	.8957
M-Scale	.8131	.8236	.8167
Leadership	.8458	.8515	.8486
Computational	.9255	.9317	.9274
Health Service	.8985	.9007	.8996
Scientific	.9089	.9293	.9279
Electronic	.9404	.9445	.9425
Outdoors	.8230	.8935	.8711
Mechanics	.9208	.9233	.9227
Clerical	.8955	.9006	.8988
Academic	.8811	.8932	.8921

[a]Measures of internal consistency obtained by calculating coefficient alpha,

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i}^{k} s_i^2}{s_t^2}\right) \qquad (6)$$

where k is the number of items in the scale; s_i^2 is the item variance; and s_t^2 is the total variance.

membership in the men-in-general group. Analyses were performed independently for each field and each half-sample. Scales were included until the increase in the squared multiple correlation was less than 0.0025. The resulting scales for each career field in each half-sample, the combined sample, and their weights appear in Tables 14 through 21. A negative weight in the tables indicates that individuals in the career field scored higher than individuals in the men-in-general group. Standardized regression weights, multiple correlations, and standard errors are also given in these tables.

The scales indicated by the analysis to reflect satisfaction with a given career field are logical. For example, Mechanics was the first scale, and thus the scale with the highest zero order correlation with the criterion, selected among men in the two careers in the Mechanics AQE requirement group (Aircraft Maintenance Specialist and General Purpose Vehicle Repairman). Similarly, the Electronic scale was the first scale selected among personnel serving as Radio Relay Equipment Repairman and Ground Equipment Repairman, the Computational scale among Accounting Specialists, and the Clerical scale among the Administration Specialists.

Selection of Items for the Occupational Scale

Occupational scales were developed for each of the eight careers. They were developed independently in each half-sample for cross-validation and in the combined sample for the recommended occupational scale. The stepwise regression technique used was equivalent to a discriminant analysis, which gives weights to independent variables (items in this case) so membership in one of two groups can be predicted with a minimum of error. The two groups considered were satisfied airmen in the career field for the scale being constructed and recruits serving as men-in-general.

Table 14

Weights for A Priori Scales Selected for Weather Observer

	Sample 1			Sample 2			Combined		
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4965	0.2044	Intercept		-0.4078	0.1793	Intercept		-0.4912	0.4912
Scale				Scale				Scale			
Scientific	0.4105	0.0243	0.0055	M-Scale	-0.4268	-0.0322	0.0055	Scientific	0.2937	0.0164	0.0037
M-Scale	-0.3143	-0.0238	0.0060	Scientific	0.2227	0.0126	0.0049	M-Scale	-0.3540	-0.0266	0.0043
Health Service	-0.2255	-0.0151	0.0049	Outdoors	0.2297	0.0160	0.0057	Outdoors	0.1528	0.0116	0.0046
Food Service	0.1644	0.0126	0.0049	Academic	0.1010	0.0066	0.0049	Electronic	-0.2647	-0.0140	0.0033
Electronic	-0.2681	-0.0140	0.0048	Electronic	-0.2280	-0.0121	0.0045	Computational	0.1801	0.0104	0.0034
Academic	0.1261	0.0086	0.0050	Pedagogy	0.2796	0.0230	0.0071	Health Service	-0.1499	-0.0097	0.0036
Clerical	-0.1625	-0.0113	0.0049	Leadership	-0.2697	-0.0237	0.0077	Food Service	0.1503	0.0109	0.0035
Computational	0.1981	0.0111	0.0047	Food Service	0.1233	0.0086	0.0049	Clerical	-0.1119	-0.0080	0.0039
Mechanics	0.1102	0.0064	0.0052	Health Service	-0.0938	-0.0060	0.0049	Academic	0.0961	0.0063	0.0034
Outdoors	0.0565	0.0050	0.0072	Mechanics	0.0918	0.0053	0.0050	Mechanics	0.1282	0.0074	0.0036
				Computational	0.0523	0.0030	0.0040	Pedagogy	0.1244	0.0101	0.0052
								Leadership	-0.1301	-0.0114	0.0063

Table 15

Weights for A Priori Scales Selected for Radio Relay Equipment Repairman

	Sample 1			Sample 2			Combined		
	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.3274	0.1876		-0.2874	0.1779		-0.2962	0.1328
Scale									
Electronic	0.3881	0.0196	0.0036	0.3381	0.0177	0.0035	0.3576	0.0184	0.0026
M-Scale	-0.3581	-0.0264	0.0061	-0.3989	-0.0311	0.0054	-0.3851	-0.0291	0.0037
Scientific	0.2144	0.0125	0.0054	0.1984	0.0141	0.0050	0.1068	0.0079	0.0040
Pedagogy	-0.2347	-0.0179	0.0066	-0.1618	-0.0135	0.0070	0.1816	0.0100	0.0035
Computational	0.2336	0.0128	0.0045	0.1124	0.0065	0.0043	-0.1211	-0.0093	0.0042
Clerical	-0.1889	-0.0133	0.0051	0.1259	0.0070	0.0046	0.1899	0.0109	0.0034
Leadership	0.2358	0.0204	0.0089	-0.1020	-0.0066	0.0051	-0.1159	-0.0081	0.0036
Audiographic	-0.1881	-0.0118	0.0049	0.0720	0.0052	0.0049	0.1304	0.0098	0.0035
Food Service	0.1700	0.0134	0.0052	-0.0700	-0.0044	0.0048	-0.1403	-0.0089	0.0035
Health Service	-0.1287	-0.0085	0.0052				-0.0958	-0.0062	0.0036
Outdoors	-0.0559	-0.0044	0.0058						

Table 16

Weights for A Priori Scales Selected for Aerospace Ground Equipment Repairman

	Sample 1			Sample 2			Combined		
	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.5146	0.2084		-0.5362	0.1935		-0.5723	0.1457
Scale									
Electronic	0.2750	0.0129	0.0052	0.3944	0.0193	0.0038	0.2942	0.0141	0.0036
M-Scale	-0.1892	-0.0138	0.0067	-0.2534	-0.0184	0.0061	-0.3070	-0.0222	0.0046
Mechanics	0.2381	0.0131	0.0059	0.1963	0.0130	0.0060	0.1083	0.0059	0.0039
Pedagogy	-0.2046	-0.0149	0.0074	-0.1379	-0.0082	0.0056	0.1792	0.0122	0.0048
Food Service	0.2136	0.0159	0.0061	-0.0958	-0.0049	0.0051	-0.1408	-0.0084	0.0040
Health Service	-0.1832	-0.0113	0.0056	0.1599	0.0087	0.0054	0.1402	0.0098	0.0040
Computational	0.1453	0.0077	0.0049	-0.1108	-0.0079	0.0073	-0.0918	-0.0054	0.0041
Audiographic	-0.1589	-0.0096	0.0058	0.1012	0.0067	0.0054	0.1301	0.0070	0.0042
Outdoors	-0.1195	-0.0093	0.0075	-0.0803	-0.0047	0.0057	-0.1350	-0.0098	0.0051
Academic	0.1063	0.0066	0.0058				0.0563	0.0036	0.0040
							-0.0631	-0.0032	0.0041

Table 17

Weights for A Priori Scales Selected for Aircraft Maintenance Specialist - Jet Aircraft 1 & 2 Engine

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4819	0.2299	Intercept		-0.4134	0.1827	Intercept		-0.4741	0.1432
Scale				Scale				Scale			
Mechanics	0.3752	0.0222	0.0042	Outdoors	0.3677	0.0242	0.0052	Mechanics	0.3089	0.0181	0.0041
M-Scale	-0.3086	-0.0240	0.0065	M-Scale	-0.3874	-0.0299	0.0059	M-Scale	-0.3617	-0.0277	0.0049
Food Service	0.1818	0.0145	0.0061	Mechanics	0.2874	0.0167	0.0058	Outdoors	0.2740	0.0196	0.0047
Academic	-0.1525	-0.0104	0.0056	Audiographic	-0.1338	-0.0081	0.0056	Academic	-0.1542	-0.0100	0.0040
Computational	0.1133	0.0064	0.0053	Computational	0.1169	0.0066	0.0050	Food Service	0.1070	0.0082	0.0042
Health Service	-0.0689	-0.0044	0.0055	Health Service	-0.0886	-0.0054	0.0047	Health Service	-0.1226	-0.0077	0.0040
Clerical	-0.0698	-0.0047	0.0060	Pedagogy	0.0968	0.0074	0.0073	Leadership	0.1003	0.0085	0.0058
Leadership	0.1036	0.0091	0.0103	Academic	-0.0639	-0.0040	0.0053	Electronic	-0.0760	-0.0039	0.0037
Pedagogy	-0.0813	-0.0063	0.0082	Electronic	-0.0702	-0.0036	0.0052	Scientific	0.0848	0.0046	0.0041
								Audiographic	-0.0563	-0.0035	0.0042

Table 18

Weights for A Priori Scales Selected for General Purpose Vehicle Repairman

	Sample 1			Sample 2			Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.2390	0.1654	Intercept		-0.2427	0.1667	Intercept		-0.1503	0.1188
Scale				Scale				Scale			
Mechanics	0.6057	0.0359	0.0041	Mechanics	0.4049	0.0236	0.0042	Mechanics	0.5166	0.0301	0.0036
M-Scale	-0.2678	-0.0200	0.0071	M-Scale	-0.3529	-0.0259	0.0054	M-Scale	-0.3847	-0.0285	0.0046
Outdoors	-0.2018	-0.0150	0.0062	Audiographic	-0.2722	-0.0160	0.0047	Audiographic	-0.2132	-0.0124	0.0038
Audiographic	-0.1648	-0.0096	0.0052	Outdoors	0.2961	0.0195	0.0049	Academic	-0.1395	-0.0087	0.0036
Leadership	0.2377	0.0197	0.0087	Health Service	-0.1260	-0.0077	0.0046	Leadership	0.1363	0.0114	0.0058
Pedagogy	-0.2670	-0.0198	0.0078	Pedagogy	0.1453	0.0112	0.0070	Outdoors	0.1338	0.0092	0.0042
Computational	0.1472	0.0080	0.0048	Academic	-0.1516	-0.0093	0.0049	Computational	0.0857	0.0049	0.0035
Academic	-0.0790	-0.0050	0.0055	Computational	0.1108	0.0063	0.0049	Health Service	-0.0677	-0.0042	0.0035
								Electronic	-0.0585	-0.0030	0.0034

Table 19

Weights for A Priori Scales Selected for General Accounting Specialist

	Sample 1			Sample 2			Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.5374	0.1853	Intercept		-0.3877	0.1549	Intercept		-0.5392	0.1140
Scale				Scale				Scale			
Computational	0.5860	0.0306	0.0039	Computational	0.5578	0.0303	0.0027	Computational	0.6070	0.0328	0.0026
M-Scale	-0.3789	-0.0288	0.0060	M-Scale	-0.3723	-0.0269	0.0043	M-Scale	-0.3186	-0.0236	0.0040
Electronic	-0.2107	-0.0107	0.0045	Electronic	-0.3228	-0.0164	0.0044	Electronic	-0.3039	-0.0154	0.0032
Mechanics	0.1256	0.0071	0.0050	Mechanics	0.1785	0.0099	0.0046	Mechanics	0.1509	0.0084	0.0034
Health Service	-0.1875	-0.0124	0.0044	Food Service	0.0908	0.0067	0.0039	Health Service	-0.1469	-0.0095	0.0031
Food Service	0.1193	0.0089	0.0046	Audiographic	-0.0847	-0.0053	0.0043	Food Service	0.0874	0.0065	0.0032
Outdoors	0.1185	0.0100	0.0060					Pedagogy	-0.1325	-0.0103	0.0045
Leadership	0.2287	0.0204	0.0078					Leadership	0.1112	0.0100	0.0054
Pedagogy	-0.2020	-0.0157	0.0065					Audiographic	-0.1017	-0.0065	0.0033
Audiographic	-0.0970	-0.0063	0.0049					Outdoors	0.0755	0.0056	0.0040
Academic	0.0764	0.0048	0.0044					Scientific	0.0740	0.0041	0.0032
Clerical	-0.0549	-0.0038	0.0047								

Table 20

Weights for A Priori Scales Selected for Administration Specialist

	Sample 1			Sample 2			Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.8471	0.2140	Intercept		-0.7064	0.2055	Intercept		-0.8098	0.1466
Scale				Scale				Scale			
Clerical	0.1523	0.0095	0.0052	Clerical	0.2354	0.0148	0.0061	Clerical	0.1762	0.0111	0.0041
M-Scale	-0.3403	-0.0236	0.0063	M-Scale	-0.2960	-0.0222	0.0067	M-Scale	-0.2502	-0.0182	0.0041
Food Service	0.2194	0.0169	0.0058	Audiographic	-0.1765	-0.0109	0.0052	Food Service	0.1521	0.0109	0.0040
Electronic	-0.1402	-0.0068	0.0052	Computational	0.2359	0.0129	0.0054	Audiographic	-0.1632	-0.0099	0.0036
Computational	0.1495	0.0082	0.0049	Food Service	0.0697	0.0047	0.0059	Computational	0.1958	0.0109	0.0040
Audiographic	-0.1746	-0.0104	0.0056	Scientific	-0.2338	-0.0127	0.0061	Academic	0.1247	0.0076	0.0039
Leadership	0.2078	0.0170	0.0098	Health Service	0.1327	0.0078	0.0057	Scientific	-0.1415	-0.0075	0.0044
Pedagogy	-0.1611	-0.0117	0.0077	Outdoors	0.0860	0.0059	0.0064	Pedagogy	-0.1169	-0.0087	0.0057
Academic	0.0900	0.0058	0.0055	Academic	0.1212	0.0073	0.0053	Leadership	0.0841	0.0069	0.0071
Mechanics	0.0614	0.0033	0.0056	Leadership	-0.0798	-0.0066	0.0093	Health Service	0.0556	0.0033	0.0040
				Mechanics	0.0475	0.0028	0.0048				

Table 21

Weights for A Priori Scales Selected for Security Specialist

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.5090	0.2300	Intercept		-0.4737	0.1929	Intercept		-0.5064	0.1500
Scale				Scale				Scale			
Clerical	0.1713	0.0094	0.0050	M-Scale	0.2554	0.0143	0.0063	Clerical	0.1325	0.0071	0.0043
Outdoors	-0.1452	-0.0104	0.0055	Electronic	-0.0714	-0.0027	0.0049	Electronic	-0.1476	-0.0059	0.0029
Food Service	0.1479	0.0101	0.0060	Health Service	0.2706	0.0125	0.0054	Leadership	-0.2144	-0.0147	0.0067
Pedagogy	-0.1588	-0.0101	0.0069	Leadership	-0.3364	-0.0214	0.0090	M-Scale	0.1068	0.0065	0.0041
Audiographic	0.1129	0.0059	0.0052	Clerical	0.1409	0.0070	0.0059	Computational	0.1218	0.0056	0.0039
Academic	-0.0789	-0.0043	0.0057	Scientific	-0.2658	-0.0110	0.0056	Food Service	0.0490	0.0030	0.0043
				Computational	0.1734	0.0075	0.0051	Scientific	-0.1508	-0.0065	0.0040
				Mechanics	-0.1206	-0.0052	0.0055	Health Service	0.0911	0.0046	0.0042
				Academic	0.0721	0.0035	0.0052	Audiographic	0.0938	0.0047	0.0043
				Food Service	-0.0778	-0.0044	0.0059				
				Outdoors	0.0590	0.0031	0.0059				

The number of items selected for each scale, multiple correlation, and number of satisfied airmen in each career field are presented in Table 22 for each half-sample. Few items were selected for both Samples 1 and 2--no scale had more than ten. A detailed list of the items selected, along with the standardized regression weight, the regression weights, and their standard errors appear in Tables 23 through 31. Negative regression weights indicate an item was preferred by the men-in-general group. Thus, for the Weather Observer scale based on combined samples, satisfied members of the career field responded more favorably than men-in-general to studying meteorology, planing and taking care of a vegetable garden, studying calculus, making weather forecasts, visiting a museum, helping write questions for a test, writing a computer program, learning to navigate a boat, being a teacher, drawing blueprints for a bridge, and solving geometry problems. Compared to men-in-general, they tended to dislike marching in a parade, watching drag racing, organizing a military drill team, installing a telephone, fighting a fire, and constructing mathematical tables.

Two sets of weights were retained for the half-sample analyses and cross-validation. One set was the actual regression weights; the others were plus or minus one, depending on the sign of the regression weight.

Means and Standard Deviations

Means and standard deviations for all final scales were computed for each career field and men-in-general and are presented in Table 32. All scale scores were first converted to a scale with a mean of 50 and a standard deviation of 10 for the entire sample of 3072 airmen in the eight career fields. The men-in-general data were not used in obtaining the conversion parameters, but means and standard deviations for the men-in-general are reported on the converted scale.

Table 22

Number of Items, Multiple Correlation, and Number of Satisfied Airmen in the Career Field

SAMPLE 1

Occupational Scale	Items	Multiple r	Number Satisfied
Weather Observer	19	.7529	108
Radio Relay Repairman	29	.7914	111
Ground Equipment Repairman	28	.7291	71
Aircraft Maintenance	29	.7090	98
Vehicle Repairman	27	.7640	92
Accounting Specialist	17	.8289	126
Administration Specialist	15	.7108	87
Security Specialist	38	.7369	43

SAMPLE 2

Occupational Scale	Items	Multiple r	Number Satisfied
Weather Observer	22	.7649	117
Radio Relay Repairman	21	.7524	115
Ground Equipment Repairman	24	.7148	72
Aircraft Maintenance	24	.6385	92
Vehicle Repairman	23	.7723	93
Accounting Specialist	18	.8151	132
Administration Specialist	23	.6781	94
Security Specialist	27	.7520	32

Table 23

Weights for Occupational Scale Items Selected for Weather Observer

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4018	0.1275	Intercept		-0.4091	0.1252	Intercept		-0.4295	0.0849
Items				Items				Items			
386	0.1744	0.0993	0.0352	190	-0.1098	-0.0717	0.0410	386	0.0950	0.0555	0.0254
103	-0.1940	-0.1210	0.0381	394	-0.0224	-0.0128	0.0371	108	-0.2041	-0.1290	0.0255
169	0.2141	0.1259	0.0340	260	-0.1903	-0.1134	0.0318	302	0.1455	0.0856	0.0204
88	0.2053	0.1226	0.0327	182	0.1606	0.0970	0.0319	334	-0.1555	-0.1000	0.0213
43	-0.1232	-0.0748	0.0288	302	0.1216	0.0715	0.0277	374	0.1222	0.0666	0.0236
302	0.1310	0.0766	0.0294	336	-0.1570	-0.1021	0.0294	138	0.1423	0.0851	0.0238
224	-0.0785	-0.0458	0.0314	214	-0.1351	-0.0823	0.0356	214	-0.1744	-0.1076	0.0246
214	-0.1339	-0.0838	0.0350	88	0.0676	0.0400	0.0383	309	0.0901	0.0595	0.0231
337	0.1465	0.0897	0.0302	1[illegible]	0.1588	0.1002	0.0281	259	-0.1736	-0.1049	0.0217
137	-0.1082	-0.0719	0.0323	374	0.1533	0.0842	0.0332	182	0.0798	0.0489	0.0231
112	-0.1120	-0.0696	0.0377	305	-0.1069	-0.0668	0.0310	151	0.0954	0.0558	0.0230
334	-0.0599	-0.0379	0.0298	5	0.0597	0.0343	0.0266	30	-0.0923	-0.0565	0.0209
390	0.0784	0.0466	0.0325	80	0.1285	0.0759	0.0291	390	0.0722	0.0438	0.0231
326	-0.0764	-0.0431	0.0289	31	-0.1143	-0.0710	0.0285	80	0.0725	0.0430	0.0204
95	-0.1053	-0.0622	0.0347	312	0.0697	0.0426	0.0288	104	0.0818	0.0471	0.0208
313	0.0952	0.0578	0.0393	138	0.1210	0.0727	0.0414	105	-0.1164	-0.0688	0.0255
40	0.0621	0.0371	0.0275	151	0.0851	0.0499	0.0304	340	0.0911	0.0530	0.0242
144	-0.0728	-0.0488	0.0349	109	-0.0685	-0.0438	0.0341				
307	0.0637	0.0384	0.0304	211	-0.0929	-0.0570	0.0340				
				375	0.0899	0.0534	0.0349				
				108	-0.0907	-0.0583	0.0402				
				50	0.0565	0.0322	0.0263				

Table 24

Weights for Occupational Scale Items Selected for Radio Relay Equipment Repairman

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.0136	0.1292	Intercept		-0.3274	0.1408	Intercept		-0.3400	0.0958
Items				Items				Items			
276	0.1441	0.0816	0.0492	276	0.1278	0.0755	0.0439	276	0.1697	0.0985	0.0350
108	-0.1415	-0.0899	0.0407	190	-0.1563	-0.1032	0.0444	108	-0.1618	-0.1031	0.0273
169	0.1871	0.1091	0.0414	394	0.1532	0.0889	0.0402	394	0.1094	0.0633	0.0279
2	-0.2098	-0.1295	0.0286	2	-0.1640	-0.0982	0.0279	2	-0.1830	-0.1109	0.0201
23	-0.1895	-0.1247	0.0312	302	0.1864	0.1067	0.0281	302	0.1555	0.0931	0.0206
302	0.1910	0.1176	0.0284	117	-0.0860	-0.0546	0.0316	117	-0.1099	-0.0715	0.0220
176	-0.1603	-0.1044	0.0305	374	0.2328	0.1290	0.0360	70	0.0638	0.0391	0.0229
128	-0.1212	-0.0689	0.0306	70	0.0939	0.0560	0.0354	374	0.1126	0.0611	0.0266
136	0.1657	0.1005	0.0438	108	-0.1112	-0.0713	0.0390	128	-0.0683	-0.0401	0.0224
195	-0.1557	-0.0919	0.0409	131	-0.0990	-0.0809	0.0413	190	-0.1065	-0.0708	0.0288
68	0.1002	0.0619	0.0386	214	-0.0954	-0.0581	0.0379	262	-0.1194	-0.0705	0.0250
374	0.1025	0.0546	0.0421	282	0.0820	0.0496	0.0407	68	0.1054	0.0651	0.0254
340	-0.1265	-0.0754	0.0362	340	-0.1188	-0.0701	0.0327	169	0.1210	0.0709	0.0274
338	0.1273	0.0745	0.0402	312	0.0683	0.0415	0.0294	340	-0.0870	-0.0515	0.0254
92	-0.1178	-0.0723	0.0360	22	0.0784	0.0459	0.0284	168	-0.0842	-0.0528	0.0228
151	0.1552	0.0903	0.0341	395	-0.0904	-0.0522	0.0327	283	0.0629	0.0493	0.0276
262	-0.1592	-0.0939	0.0384	92	0.0986	0.0587	0.0335	277	-0.1146	-0.0662	0.0279
291	0.0859	0.0546	0.0305	400	-0.1031	-0.0578	0.0354	336	0.0731	0.0428	0.0251
4	-0.0784	-0.0483	0.0295	140	0.0977	0.0564	0.0350	104	0.0609	0.0354	0.0207
394	0.1663	0.0960	0.0388	375	-0.0961	-0.0569	0.0376	60	-0.0490	-0.0285	0.0220
277	-0.1264	-0.0723	0.0392	320	0.0680	0.0420	0.0329	282	0.0924	0.0546	0.0307
371	-0.1171	-0.0698	0.0378					195	-0.0957	-0.0573	0.0292
82	0.0988	0.0639	0.0394					163	0.0908	0.0542	0.0315
190	-0.0759	-0.0509	0.0388								
282	0.1100	0.0642	0.0412								
313	-0.0873	-0.0519	0.0365								
311	0.0307	0.0185	0.0312								
36	0.1262	0.0757	0.0409								
60	-0.1234	-0.0736	0.0401								

Table 25

Weights for Occupational Scale Items Selected for Aerospace Ground Equipment Repairman

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4118	0.1492	Intercept		-0.2494	0.1318	Intercept		-0.3717	0.0945
Items				Items				Items			
108	-0.2590	-0.1536	0.0431	267	0.2316	0.1259	0.0406	397	0.0822	0.0428	0.0278
322	0.0853	0.0450	0.0423	298	-0.1442	-0.0760	0.0318	108	-0.1870	-0.1106	0.0302
109	0.1763	0.0976	0.0365	190	-0.1581	-0.0941	0.0420	2	-0.1381	-0.0821	0.0231
144	-0.1833	-0.1120	0.0369	397	0.1187	0.0627	0.0384	267	0.2310	0.1273	0.0307
267	0.1923	0.1069	0.0431	176	-0.1233	-0.0734	0.0348	176	-0.1864	-0.1107	0.0243
312	0.0801	0.0442	0.0324	2	-0.1738	-0.1026	0.0340	312	0.1257	0.0711	0.0220
176	-0.2364	-0.1398	0.0369	35	0.1463	0.0807	0.0310	109	0.1667	0.0910	0.0244
230	0.0867	0.0468	0.0355	109	0.1803	0.0969	0.0371	144	-0.1584	-0.0961	0.0251
203	0.1054	0.0629	0.0377	400	0.1777	0.0908	0.0396	302	0.1090	0.0617	0.0229
2	-0.1384	-0.0819	0.0327	145	-0.2273	-0.1224	0.0449	190	-0.1181	-0.0716	0.0291
169	0.1391	0.0797	0.0343	43	0.1447	0.0837	0.0370	93	0.0884	0.0561	0.0275
25	0.0897	0.0519	0.0380	276	-0.1861	-0.0996	0.0525	25	0.0986	0.0578	0.0258
277	-0.1354	-0.0710	0.0472	195	0.2105	0.1171	0.0458	207	-0.1279	-0.0706	0.0369
202	0.1899	0.1037	0.0406	207	-0.2666	-0.1485	0.0506	104	0.1050	0.0566	0.0226
279	-0.2217	-0.1251	0.0443	210	-0.0993	-0.0540	0.0333	102	0.0995	0.0573	0.0275
331	0.1073	0.0622	0.0386	108	-0.1189	-0.0703	0.0403	202	0.1348	0.0744	0.0318
336	-0.0877	-0.0457	0.0422	104	0.0706	0.0382	0.0324	276	-0.1272	-0.0684	0.0363
190	-0.0866	-0.0536	0.0413	102	0.0572	0.0336	0.0390	145	-0.1180	-0.0629	0.0303
195	-0.2249	-0.1220	0.0518	82	0.1389	0.0793	0.0418	344	0.1124	0.0611	0.0282
164	0.0825	0.0457	0.0421	68	-0.1232	-0.0702	0.0409	163	0.0946	0.0511	0.0320
163	0.1229	0.0687	0.0495	384	0.1074	0.0613	0.0405	255	-0.0978	-0.0547	0.0326
294	-0.1548	-0.0859	0.0436	282	0.1223	0.0677	0.0508	279	-0.0716	-0.0406	0.0283
102	0.1356	0.0761	0.0429	136	-0.1200	-0.0651	0.0475				
320	0.0781	0.0459	0.0410	239	0.0929	0.0471	0.0407				
283	0.0760	0.0573	0.0470								
325	0.0646	0.0353	0.0375								
45	0.0960	0.0548	0.0386								
84	-0.0927	-0.0551	0.0425								

Table 26

Weights for Occupational Scale Items Selected for Aircraft Maintenance Specialist - Jet Aircraft 1 & 2 Engine

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.3060	0.1627	Intercept		-0.5465	0.1800	Intercept		-0.4941	0.1178
Items				Items				Items			
108	-0.2650	-0.1653	0.0444	190	-0.1841	-0.1164	0.0519	108	-0.2277	-0.1406	0.0298
209	0.2767	0.1604	0.0379	344	0.0486	0.0279	0.0470	275	0.0544	0.0330	0.0283
2	-0.1803	-0.1126	0.0330	71	0.0568	0.0320	0.0377	2	-0.1540	-0.0940	0.0237
299	0.1956	0.1140	0.0364	312	0.0998	0.0592	0.0366	47	0.0904	0.0557	0.0252
104	0.1638	0.0930	0.0335	176	-0.1291	-0.0791	0.0396	331	0.0844	0.0522	0.0307
176	-0.1663	-0.1041	0.0376	125	0.0799	0.0550	0.0460	214	-0.1096	-0.0653	0.0306
283	0.1433	0.1107	0.0449	333	0.1109	0.0798	0.0453	328	0.1358	0.0812	0.0244
128	-0.1532	-0.0866	0.0308	108	-0.1652	-0.1012	0.0445	104	0.1010	0.0569	0.0228
132	0.1067	0.0702	0.0409	101	0.0982	0.0719	0.0478	176	-0.1575	-0.0974	0.0255
190	-0.0134	-0.0087	0.0481	47	0.1063	0.0635	0.0391	133	0.0677	0.0431	0.0290
344	-0.2075	-0.1188	0.0495	362	0.0670	0.0490	0.0449	390	0.0706	0.0411	0.0248
343	0.1277	0.0777	0.0481	94	0.1566	0.0922	0.0437	205	-0.1320	-0.0749	0.0278
136	0.1714	0.1008	0.0434	2	-0.1126	-0.0678	0.0360	343	0.0930	0.0569	0.0310
279	-0.1469	-0.0876	0.0430	291	0.0754	0.0426	0.0360	291	0.0722	0.0422	0.0250
291	0.0876	0.0527	0.0381	99	-0.1160	-0.0703	0.0373	101	0.0780	0.0614	0.0336
84	-0.1554	-0.0941	0.0416	49	-0.1269	-0.0785	0.0486	209	0.0905	0.0534	0.0276
45	0.1033	0.0636	0.0412	25	0.0883	0.0543	0.0395	177	-0.0870	-0.0545	0.0304
331	0.1595	0.0994	0.0488	200	0.0740	0.0425	0.0380	312	0.0574	0.0335	0.0235
214	-0.0803	-0.0493	0.0460	390	0.0997	0.0590	0.0379	190	-0.0797	-0.0512	0.0345
47	0.0588	0.0373	0.0375	35	0.0679	0.0395	0.0351	283	0.0622	0.0474	0.0331
145	-0.0989	-0.0549	0.0413	322	-0.1016	-0.0575	0.0426				
133	0.1069	0.0704	0.0439	214	-0.0715	-0.0413	0.0440				
348	-0.1069	-0.0658	0.0546	132	-0.0752	-0.0472	0.0436				
266	-0.0777	-0.0556	0.0415	275	0.0748	0.0448	0.0447				
275	-0.1136	-0.0695	0.0472								
202	0.1156	0.0678	0.0426								
296	-0.0732	-0.0451	-0.0439								
397	-0.1122	-0.0626	0.0440								
400	0.0900	0.0502	0.0367								

Table 27

Weights for Occupational Scale Items Selected for General Purpose Vehicle Repairman

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4231	0.1496	Intercept		-0.2342	0.1153	Intercept		-0.2236	0.0998
Items				Items				Items			
291	0.1647	0.0933	0.0352	148	0.0811	0.0446	0.0483	291	0.1631	0.0905	0.0226
108	-0.0963	-0.0594	0.0414	2	-0.1749	-0.1003	0.0295	2	-0.1516	-0.0866	0.0210
209	0.1507	0.0844	0.0338	45	0.1752	0.1026	0.0336	190	-0.1805	-0.1143	0.0269
2	-0.0820	-0.0471	0.0318	190	-0.1621	-0.1006	0.0317	135	0.1464	0.0819	0.0269
144	-0.1577	-0.0995	0.0341	267	0.2177	0.1238	0.0327	218	-0.1390	-0.0820	0.0242
344	0.0567	0.0332	0.0483	83	-0.1911	-0.1114	0.0309	209	0.1528	0.0869	0.0238
190	-0.1355	-0.0875	0.0411	218	-0.2375	-0.1397	0.0308	83	-0.1277	-0.0740	0.0215
28	0.1136	0.0901	0.0387	205	-0.2645	-0.1486	0.0372	45	0.1395	0.0826	0.0251
14	-0.0684	-0.0484	0.0365	279	0.1574	0.0940	0.0343	267	0.1542	0.0882	0.0245
205	-0.2046	-0.1167	0.0382	71	0.1049	0.0602	0.0329	205	-0.1820	-0.1030	0.0272
271	0.1834	0.0993	0.0344	400	0.1486	0.0779	0.0283	108	-0.0731	-0.0443	0.0265
89	0.1111	0.0626	0.0360	145	-0.1990	-0.1099	0.0359	145	-0.1364	-0.0757	0.0254
3	-0.1137	-0.0654	0.0291	135	0.1665	0.0928	0.0422	344	0.1190	0.0687	0.0300
45	0.1432	0.0861	0.0372	209	0.1213	0.0705	0.0325	71	0.0681	0.0398	0.0243
133	0.1171	0.0763	0.0345	88	-0.0953	-0.0544	0.0298	271	0.0679	0.0367	0.0246
176	-0.0940	-0.0593	0.0377	49	-0.1271	-0.0788	0.0392	49	-0.1064	-0.0671	0.0283
145	-0.1786	-0.1000	0.0365	224	0.1419	0.0818	0.0366	155	0.0935	0.0554	0.0320
202	0.1248	0.0715	0.0316	291	0.1119	0.0612	0.0295	176	-0.0958	-0.0599	0.0257
290	0.0669	0.0418	0.0359	359	-0.0928	-0.0519	0.0279	283	0.0679	0.0523	0.0295
296	-0.0777	-0.0477	0.0402	90	0.1233	0.0688	0.0309	351	-0.0617	-0.0444	0.0261
318	-0.1016	-0.0623	0.0349	386	-0.0820	-0.0438	0.0295	90	0.0857	0.0480	0.0228
331	0.1244	0.0778	0.0480	348	0.0793	0.0485	0.0356	386	-0.0650	-0.0347	0.0214
90	0.0572	0.0321	0.0319	17	-0.0702	-0.0406	0.0306				
84	-0.0770	-0.0459	0.0364								
322	0.0796	0.0448	0.0358								
238	-0.0728	-0.0464	0.0387								
254	0.0732	0.0417	0.0356								

Table 28

Weights for Occupational Scale Items Selected for General Accounting Specialist

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.4993	0.1072	Intercept		-0.4359	0.1058	Intercept		-0.5021	0.0797
Items				Items				Items			
1	0.2957	0.1676	0.0266	1	0.2365	0.1355	0.0259	1	0.2727	0.1555	0.0199
108	-0.2508	-0.1619	0.0307	190	-0.1191	-0.0785	0.0333	190	-0.1330	-0.0894	0.0282
273	0.1798	0.1025	0.0303	201	0.1903	0.1115	0.0356	201	0.0961	0.0553	0.0277
302	0.2238	0.1375	0.0241	259	-0.1699	-0.1029	0.0279	302	0.1296	0.0798	0.0173
26	-0.1355	-0.0837	0.0248	334	-0.1384	-0.0855	0.0251	259	-0.0754	-0.0450	0.0195
67	0.1202	0.0727	0.0265	374	0.1156	0.0651	0.0238	26	-0.0820	-0.0506	0.0188
160	-0.1080	-0.0673	0.0250	119	-0.1241	-0.0727	0.0248	169	0.1631	0.0932	0.0233
151	0.1073	0.0628	0.0257	214	-0.1146	-0.0713	0.0307	214	-0.0914	-0.0579	0.0244
43	-0.1084	-0.0664	0.0251	151	0.1102	0.0650	0.0270	151	0.1259	0.0741	0.0196
150	-0.1807	-0.1103	0.0333	83	-0.1091	-0.0650	0.0253	305	-0.0981	-0.0621	0.0188
247	0.1329	0.0743	0.0303	67	0.0500	0.0298	0.0258	67	0.1028	0.0618	0.0202
337	0.1202	0.0739	0.0254	139	-0.1380	-0.0817	0.0320	105	-0.1065	-0.0611	0.0228
40	-0.0609	-0.0376	0.0259	74	0.1297	0.0767	0.0293	187	0.0776	0.0432	0.0229
190	-0.0753	-0.0516	0.0340	280	0.1035	0.0629	0.0277	54	-0.0900	-0.0533	0.0196
156	-0.1325	-0.0777	0.0304	187	0.1230	0.0688	0.0301	74	0.1046	0.0627	0.0210
169	0.1136	0.0635	0.0294	305	-0.0795	-0.0509	0.0275	139	-0.0907	-0.0534	0.0234
380	-0.0958	-0.0531	0.0267	91	-0.1088	-0.0646	0.0289	247	0.1320	0.0755	0.0257
379	0.0806	0.0447	0.0263	166	0.0894	0.0530	0.0293	206	-0.0805	-0.0498	0.0208
				80	0.0660	0.0382	0.0235	337	0.0682	0.0409	0.0183
								150	-0.0605	-0.0375	0.0233
								43	-0.0682	-0.0430	0.0200
								108	-0.0662	-0.0427	0.0246
								166	0.0904	0.0544	0.0262
								156	-0.0871	-0.0517	0.0258

Table 29

Weights for Occupational Scale Items Selected for Administration Specialist

Sample 1				Sample 2				Combined			
	Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight		Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.7599	0.1453	Intercept		-0.6753	0.1727	Intercept		-0.9750	0.1176
Items				Items				Items			
247	0.1333	0.0768	0.0367	18	0.2145	0.1427	0.0371	9	0.0922	0.0536	0.0258
108	-0.3741	-0.2272	0.0315	2	-0.1279	-0.0798	0.0345	108	-0.2450	-0.1481	0.0302
304	0.2710	0.1717	0.0343	9	0.0946	0.0542	0.0352	286	0.1298	0.0748	0.0249
35	-0.1136	-0.0645	0.0336	190	-0.1719	-0.1062	0.0359	18	0.1513	0.1034	0.0284
8	0.1642	0.1249	0.0414	302	0.1336	0.0785	0.0331	283	0.1321	0.1025	0.0366
122	0.0843	0.0538	0.0350	187	0.1476	0.0867	0.0351	110	-0.1275	-0.0689	0.0231
368	-0.1103	-0.0604	0.0313	130	-0.1556	-0.1037	0.0377	302	0.0998	0.0596	0.0257
82	-0.1583	-0.0887	0.0309	110	-0.0688	-0.0373	0.0311	304	0.1674	0.1031	0.0273
379	0.1869	0.0975	0.0312	28	0.1431	0.1044	0.0399	327	-0.0935	-0.0531	0.0263
78	0.1194	0.0859	0.0443	284	0.1528	0.0847	0.0302	8	0.1169	0.0848	0.0305
26	-0.1215	-0.0690	0.0312	97	-0.1710	-0.0984	0.0352	190	-0.1481	-0.0927	0.0309
201	-0.1838	-0.1092	0.0413	325	-0.1429	-0.0807	0.0342	12	-0.1159	-0.0724	0.0288
1	0.1628	0.0876	0.0307	286	0.1134	0.0645	0.0345	16	0.0874	0.0534	0.0271
98	0.1020	0.0836	0.0470	33	-0.1051	-0.0637	0.0335	391	-0.1041	-0.0588	0.0248
327	-0.0707	-0.0388	0.0327	314	0.0785	0.0516	0.0365	382	0.0889	0.0499	0.0230
				16	0.1117	0.0681	0.0360	234	0.1017	0.0617	0.0255
				52	-0.1059	-0.0628	0.0361	270	-0.1377	-0.0910	0.0315
				80	0.0870	0.0488	0.0333	30	-0.0618	-0.0360	0.0235
				290	-0.0760	-0.0446	0.0342	93	0.0837	0.0568	0.0298
				398	0.1165	0.0757	0.0411	187	0.0974	0.0578	0.0272
				7	-0.0772	-0.0463	0.0367	308	-0.0631	-0.0376	0.0262
				391	-0.0947	-0.0548	0.0390	122	0.0694	0.0423	0.0261
				60	-0.0696	-0.0384	0.0314	263	-0.0979	-0.0575	0.0293
								151	0.0748	0.0424	0.0262
								299	-0.0520	-0.0286	0.0260
								20	-0.0666	-0.0432	0.0276
								52	0.0697	0.0408	0.0265
								361	0.0648	0.0416	0.0288

Table 30

Weights for Occupational Scale Items Selected for Security Specialist

	Sample 1			Sample 2			Combined		
	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight	Standard Regression Weight	Regression Weights	Standard Error of Weight
Intercept		-0.5072	0.2588		-0.8464	0.1451		-0.5178	0.1430
Items									
122	0.1312	0.0734	0.0461	19	0.1655	0.0735	0.0292	19	0.2031	0.0979	0.0239
285	-0.2074	-0.1224	0.0388	83	-0.1684	-0.0782	0.0300	2	-0.1778	-0.0924	0.0248
304	0.2366	0.1322	0.0392	125	0.0587	0.0314	0.0369	334	-0.1863	-0.1021	0.0262
254	-0.2715	-0.1336	0.0362	334	-0.1502	-0.0815	0.0351	304	0.1853	0.0953	0.0264
306	0.2085	0.1067	0.0386	39	0.1350	0.0618	0.0292	108	-0.1592	-0.0788	0.0265
334	-0.1423	-0.0776	0.0341	219	-0.3024	-0.1363	0.0329	8	0.1045	0.0678	0.0312
2	-0.0858	-0.0455	0.0353	321	0.1553	0.0783	0.0318	101	0.1094	0.0746	0.0316
8	0.1291	0.0905	0.0459	89	-0.1533	-0.0669	0.0289	151	0.1516	0.0697	0.0338
26	-0.2003	-0.0976	0.0339	302	0.1711	0.0774	0.0297	327	-0.0595	0.0276	0.0262
113	0.1769	0.0888	0.0350	378	0.1691	0.0778	0.0357	60	0.1548	0.0704	0.0220
213	-0.0914	-0.0462	0.0337	214	-0.2188	-0.0970	0.0290	302	0.0877	0.0440	0.0262
71	0.1329	0.0719	0.0340	64	0.2242	0.1141	0.0327	90	-0.1148	-0.0519	0.0235
40	0.1234	0.0618	0.0377	101	0.1491	0.0911	0.0397	61	-0.1134	-0.0537	0.0240
203	0.1549	0.0867	0.0464	116	-0.2035	-0.0922	0.0300	18	0.1038	0.0640	0.0306
61	0.1063	0.0513	0.0345	290	0.1603	0.0732	0.0344	285	-0.0779	-0.0472	0.0300
131	-0.1031	-0.0701	0.0542	2	-0.1601	-0.0806	0.0297	378	0.1238	0.0582	0.0261
264	-0.1421	-0.0789	0.0443	218	-0.1504	-0.0675	0.0305	299	-0.1017	-0.0459	0.0255
328	0.1152	0.0596	0.0390	54	0.1733	0.0756	0.0277	377	-0.1086	-0.0481	0.0236
190	-0.0522	-0.0281	0.0410	385	0.1617	0.0695	0.0333	203	0.1097	0.0565	0.0289
174	0.1088	0.0514	0.0379	368	0.1623	0.0701	0.0273	270	-0.1207	-0.0680	0.0331
206	-0.1001	-0.0512	0.0431	325	-0.1120	-0.0473	0.0302	96	-0.0959	-0.0469	0.0262
352	-0.0714	-0.0527	0.0485	60	0.1096	0.0457	0.0270	58	-0.0705	-0.0343	0.0240
39	-0.1695	-0.0870	0.0410	390	-0.0885	-0.0389	0.0297	206	-0.1160	-0.0574	0.0328
58	-0.0715	-0.0365	0.0360	283	0.1140	0.0707	0.0451	174	0.1145	0.0523	0.0324
19	0.0765	0.0398	0.0354	209	-0.0831	-0.0377	0.0337	250	-0.1296	-0.0627	0.0316
292	0.1222	0.0751	0.0534	107	-0.0747	-0.0351	0.0314	196	0.0864	0.0449	0.0343
250	0.0911	0.0467	0.0450	18	0.0622	0.0366	0.0339	21	-0.0794	-0.0506	0.0329
18	0.0810	0.0511	0.0450					122	0.0945	0.0489	0.0319
108	-0.0921	-0.0483	0.0415					324	0.0747	0.0407	0.0295
179	-0.0287	-0.0358	0.0919					247	-0.0863	-0.0442	0.0330
110	-0.0622	-0.0285	0.0327					39	0.0741	0.0364	0.0265
377	-0.0632	-0.0300	0.0339					328	0.0705	0.0341	0.0270
9	0.0590	0.0322	0.0397								
201	-0.0704	-0.0367	0.0475								
63	-0.0415	-0.0244	0.0395								
28	0.0420	0.0290	0.0480								
380	0.0987	0.0459	0.0446								
263	-0.1073	-0.0559	0.0547								

Table 31

Items in Occupational Scales Based on Combined Data

Scale		Items
Weather Observer	386.	Meteorology
	108.	March in a parade
	302.	Plant and take care of a vegetable garden
	334.	Watch drag racing
	374.	Calculus
	138.	Make weather forecasts
	214.	Organize a military drill team
	309.	Visit a museum
	259.	Install a telephone
	182.	Help write questions for a test
	151.	Write a computer program
	30.	Fire fighter
	390.	Navigation of boats
	80.	Teacher
	104.	Draw blueprints for a bridge
	105.	Construct mathematical tables
	340.	Solve geometry problems
Radio Relay Repairman	276.	Find and replace defective transistors
	108.	March in a parade
	394.	Physics
	2.	Air Force officer
	302.	Plant and take care of a vegetable garden
	117.	Answer a telephone and give people information
	70.	Scientist
	374.	Calculus
	128.	Arrest a traffic violator
	190.	Take part in a military drill
	262.	Perform maintenance on a computer
	68.	Radio mechanic
	169.	Use a table of logarithms to solve a mathematics problem
	340.	Solve geometry problems
	168.	Sell automobiles
	283.	Varnish floors
	277.	Plan an electrical system for a house
	336.	Tinker with old radios
	104.	Draw blueprints for a bridge
	60.	Policeman
	282.	Test television tubes
	195.	Repair household electrical appliances
	163.	Find a problem in an electric circuit and fix it
Ground Equipment Repairman	397.	Refrigeration systems
	108.	March in a parade
	2.	Air Force officer
	267.	Use a voltmeter
	176.	Write letters
	312.	Go for a 20-mile hike
	109.	Assemble circuit boards for television sets on a production line
	144.	Help rescue someone from a fire
	302.	Plant and take care of a vegetable garden
	190.	Take part in a military drill
	93.	Upholster chairs
	25.	Electrician
	207.	Install electrical outlets in a building
	104.	Draw blueprints for a bridge
	102.	Splice cables
	202.	Install an air-conditioning system
	276.	Find and replace defective transistors
	145.	Rewire the electrical system in a car
	344.	Rebuild a lawn-mower engine
	163.	Find a problem in an electric circuit and fix it
	255.	Plan installation of a heating system
	279.	Use a soldering iron
Aircraft Maintenance	108.	March in a parade
	275.	Fix a broken lock
	2.	Air Force officer
	47.	Mason
	331.	Tune-up a car
	214.	Organize a military drill team
	328.	Buy food for a cookout
	104.	Draw blueprints for a bridge
	176.	Write letters
	133.	Help load cartons onto trucks
	390.	Navigation of boats
	205.	Dismantle large machines with hand tools
	343.	Change the oil in a car
	291.	Set up and operate a milling machine
	101.	Dig a ditch
	209.	Supervise work in a garage
	177.	Pour concrete for highway construction
	312.	Go for a 20-mile hike
	190.	Take part in a military drill
	283.	Varnish floors

Table 31

Items in Occupational Scales Based on Combined Data (Continued)

Scale		Items
Vehicle Repairman	291.	Set up and operate a milling machine
	2.	Air Force officer
	190.	Take part in a military drill
	135.	Perform routine maintenance on farm tractors
	218.	Record speeches with a cassette recorder
	209.	Supervise work in a garage
	83.	Television cameraman
	45.	Machinist
	267.	Use a voltmeter
	205.	Dismantle large machines with hand tools
	108.	March in a parade
	145.	Rewire the electrical system in a car
	344.	Rebuild a lawn-mower engine
	71.	Sheetmetal worker
	271.	Measure meachanical parts to determine wear
	49.	Mechanic (automobile)
	155.	Adjust the brakes on an automobile
	176.	Write letters
	283.	Varnish floors
	351.	Watch a ballet
	90.	Writer
	386.	Meteorology
Accounting Specialist	1.	Accountant
	190.	Take part in a military drill
	201.	Prepare a monthly financial statement for a company
	302.	Plant and take care of a vegetable garden
	259.	Install a telephone
	26.	Engineer (locomotive)
	169.	Use a table of logarithms to solve a mathematics problem
	214.	Organize a military drill team
	151.	Write a computer program
	305.	Write articles for automobile magazines
	67.	Purchasing agent
	105.	Construct mathematical tables
	187.	Prepare income tax returns for other people
	54.	Personnel manager
	74.	Statistician
	139.	Compile statistical tables
	247.	Keep detailed records of expenses for a clothing store
	206.	Take inventory for a department store
	337.	Do crossword puzzles
	150.	Balance a checkbook
	43.	Lineman (electric company)
	108.	March in a parade
	166.	Work with numbers
	156.	Solve arithmetic problems
Administration Specialist	9.	Bookkeeper
	108.	March in a parade
	286.	Increase your typing speed
	18.	Court stenographer
	283.	Varnish floors
	110.	Clear stumps and brush with a bulldozer
	302.	Plant and take care of a vegetable garden
	304.	Do volunteer work
	327.	Take apart a mechanical toy and see how it works
	8.	Barber
	190.	Take part in a military drill
	12.	Cashier in a bank
	16.	Computer programmer
	391.	Nuclear reactors
	382.	Foreign languages
	234.	Manage a cafeteria
	270.	Prepare a written summary of a telephone conversation
	30.	Fire fighter
	93.	Upholster chairs
	187.	Prepare income tax returns for other people
	308.	Build a model airplane
	122.	Sort mail
	263.	Organize a file system for an office
	151.	Write a computer program
	299.	Inspect aircraft for defective parts
	20.	Dental hygienist
	52.	Office worker
	361.	Collect and classify insects

Table 31

Items in Occupational Scales Based on Combined Data (Continued)

Scale		Items
Security Specialist	19.	Customs agent
	2.	Air Force officer
	334.	Watch drag racing
	304.	Do volunteer work
	108.	March in a parade
	8.	Barber
	101.	Dig a ditch
	151.	Write a computer program
	327.	Take apart a mechanical toy and see how it works
	60.	Policeman
	302.	Plant and take care of a vegetable garden
	90.	Writer
	61.	Postman
	18.	Court stenographer
	285.	Learn more about your job by going to school
	378.	Disease prevention
	299.	Inspect aircraft for defective parts
	377.	Classical music
	203.	Operate a printing press
	270.	Prepare a written summary of a telephone conversation
	96.	Install a radio in a car
	58.	Pilot
	206.	Take inventory for a department store
	174.	Find the errors in a computer program
	250.	Operate a machine that sorts punched cards
	196.	Supervise an inventory of textile goods
	21.	Dietitian
	122.	Sort mail
	324.	Improve a recipe
	247.	Keep detailed records of expenses for a clothing store
	39.	Keypunch operator
	328.	Buy food for a cookout

Table 32

Means (M) and Standard Deviations (σ) for All Final Scales

	Weather Observer				Radio Relay Repairman				Ground Equipment Repairman				Aircraft Maintenance			
	Satisfied		Dissatisfied		Satisfied		Dissatisfied		Satisfied		Dissatisfied		Satisfied		Dissatisfied	
	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
Audiographic	52.707	9.101	50.093	9.038	51.013	9.568	50.609	10.134	51.338	9.809	50.582	9.281	50.777	9.938	50.836	10.106
Food Service	51.821	10.904	51.391	10.127	50.506	10.150	49.400	9.448	51.172	10.681	49.775	9.787	50.436	9.446	49.191	9.645
Pedagogy	53.542	8.315	50.898	10.135	50.275	10.144	47.774	9.977	49.737	9.922	48.386	9.533	49.502	9.561	48.416	10.115
M-Scale	49.588	9.378	45.603	9.396	49.420	9.128	46.109	7.856	52.972	9.555	50.516	9.820	53.837	9.336	51.168	9.858
Leadership	50.630	9.390	47.911	9.681	49.089	10.057	46.179	9.272	51.052	10.365	48.735	9.910	51.012	9.763	48.828	9.997
Computational	52.819	8.925	48.687	9.833	52.199	9.225	49.229	9.695	49.597	9.812	49.846	9.594	47.911	9.102	47.506	9.789
Health Service	51.897	9.289	51.502	10.104	50.317	9.522	47.970	8.415	49.555	9.962	50.064	9.840	49.510	9.699	49.505	9.973
Scientific	55.302	8.105	52.691	9.203	54.106	8.958	51.252	9.086	49.304	10.052	50.352	10.030	48.866	9.527	48.721	10.366
Electronic	49.493	9.024	46.211	9.570	57.288	7.662	52.551	9.574	55.657	8.347	52.602	9.781	52.599	8.690	51.100	9.698
Mechanics	49.335	9.630	46.332	10.356	52.951	8.746	49.976	9.879	54.720	8.798	50.210	9.176	54.919	8.059	52.666	9.357
Clerical	50.328	9.018	45.905	8.569	48.323	9.278	47.044	9.082	50.942	10.570	49.018	9.528	49.668	9.673	48.675	9.831
Outdoors	50.422	8.762	49.306	9.884	51.595	9.328	49.719	9.927	52.880	9.662	50.219	9.617	54.215	9.208	52.677	9.229
Academic	54.541	8.621	54.470	9.580	50.867	9.523	49.629	9.329	48.911	10.303	48.736	9.638	47.477	9.046	47.695	9.237
Weather Observer	57.935	7.271	54.779	8.817	52.021	9.108	51.120	9.475	47.748	9.631	49.165	9.603	47.769	8.660	48.006	10.611
Radio Relay Repairman	51.739	9.279	52.651	9.005	57.938	7.991	56.122	9.518	51.033	9.181	51.886	9.472	49.033	9.635	49.898	9.278
Ground Equipment Repairman	48.961	9.347	48.354	9.371	52.673	9.421	52.272	9.716	56.646	8.055	53.180	8.566	52.134	10.211	53.194	9.641
Aircraft Maintenance	49.495	9.651	48.906	9.915	52.450	9.523	50.718	9.910	52.195	9.123	50.831	9.319	54.806	8.908	53.549	9.847
Vehicle Repairman	45.267	8.052	47.060	8.553	50.980	8.543	50.947	8.022	54.478	9.276	51.239	8.511	54.167	9.440	54.999	10.565
Accounting Specialist	52.152	9.137	52.807	8.886	49.440	9.461	50.474	8.278	45.471	8.976	49.037	8.635	45.410	8.136	47.305	8.707
Administration Specialist	51.631	9.237	49.666	9.414	48.391	8.879	48.278	8.813	48.433	9.242	50.432	9.719	46.061	9.236	48.278	10.138
Security Specialist	49.787	9.301	51.011	9.817	47.967	9.985	50.185	9.243	49.194	9.184	51.644	9.101	48.632	9.720	51.394	11.076
Job Satisfaction	58.258	6.248	41.783	5.907	58.550	5.203	43.025	6.223	57.878	4.898	42.529	6.623	58.011	5.048	43.676	5.547
Peer Satisfaction	55.905	7.177	50.019	9.479	53.054	7.988	49.156	10.368	49.211	8.893	46.250	10.015	51.838	8.455	46.859	9.152
Supervision	37.663	7.755	29.492	9.837	36.924	8.126	30.007	9.705	32.889	9.122	26.072	9.185	34.544	8.647	27.022	9.940
Air Force	55.372	7.913	46.746	9.798	54.938	7.368	46.388	9.816	53.381	8.792	46.330	8.666	52.611	8.736	44.533	9.335

Vehicle Repairman				Accounting Specialist				Administration Specialist				Security Specialist				Men-In-General	
Satisfied		Dissatisfied		Satisfied		Dissatisfied		Satisfied		Dissatisfied		Satisfied		Dissatisfied			
M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
46.645	11.136	46.479	11.088	49.277	9.960	48.022	9.366	49.501	10.308	47.676	9.146	50.371	10.831	51.179	9.760	50.264	9.952
47.527	9.781	47.424	9.732	50.718	10.402	49.763	9.208	52.638	10.587	47.812	9.307	50.138	9.864	49.528	9.388	49.033	9.410
46.788	9.533	46.156	10.456	53.134	9.827	51.255	9.211	52.180	10.291	48.564	9.983	50.425	9.958	50.487	10.081	50.477	10.584
51.995	9.848	50.452	11.213	48.632	9.552	46.372	9.213	51.730	10.241	49.171	9.911	55.943	10.410	52.241	9.784	55.302	10.041
48.821	9.979	46.729	9.980	53.676	9.121	50.867	8.848	54.166	10.445	49.272	9.874	52.031	10.329	50.901	10.216	51.978	10.047
45.416	9.295	44.358	9.416	57.774	8.562	45.920	8.125	51.938	9.566	47.679	10.056	49.393	10.348	48.497	9.660	48.082	9.242
46.845	9.571	46.717	9.855	49.646	9.757	49.325	9.665	52.703	10.983	50.012	11.066	52.077	9.564	51.828	10.429	51.053	10.387
45.499	10.318	45.960	10.383	50.878	9.462	49.806	9.348	48.840	10.177	46.731	9.698	47.930	10.611	49.232	10.155	48.824	9.838
52.562	9.170	49.825	9.908	45.802	9.813	43.129	9.381	47.421	9.490	46.407	9.912	47.596	10.787	50.116	9.697	49.546	10.189
56.120	7.495	53.023	9.055	46.301	10.287	45.285	9.523	47.758	9.609	45.562	9.839	48.565	10.541	49.607	9.834	49.848	9.550
47.637	9.953	45.735	9.009	56.190	8.738	49.623	8.637	57.166	10.287	49.404	9.675	53.594	11.249	51.241	10.300	50.939	9.747
51.664	10.431	49.924	11.701	46.360	9.120	46.944	9.524	47.306	9.474	46.877	10.558	49.686	10.222	51.826	9.972	50.099	9.572
44.427	9.268	44.103	8.652	52.166	10.042	52.774	9.566	52.021	10.355	47.962	9.948	49.126	9.741	50.377	9.918	49.294	9.976
42.679	9.586	44.309	9.249	53.501	9.461	53.298	8.630	48.011	9.019	47.217	9.358	46.163	9.715	48.358	9.638	42.958	8.405
47.254	8.895	48.480	10.043	47.776	9.310	49.906	8.915	43.730	8.773	45.942	9.434	41.521	9.004	48.740	10.492	40.171	8.725
52.760	8.940	51.200	9.867	45.847	8.866	47.216	9.335	44.537	9.911	46.628	9.789	44.944	10.424	50.027	10.521	41.124	8.448
53.109	9.085	51.593	9.928	46.933	9.304	47.615	9.473	45.875	9.506	45.519	9.769	45.630	10.512	50.337	10.539	41.463	8.981
60.015	7.834	56.731	10.138	45.269	8.232	46.530	8.621	45.117	9.808	46.017	8.812	45.267	10.129	49.210	9.790	42.790	8.288
43.455	8.630	45.348	8.238	60.826	8.226	57.375	8.994	49.686	9.113	48.355	9.859	45.493	9.676	47.848	8.950	40.473	8.480
44.362	10.191	44.584	10.047	55.942	8.955	53.233	9.018	55.818	9.008	50.570	10.064	49.880	10.558	50.554	9.620	41.911	8.730
47.084	10.250	47.586	9.804	47.918	9.374	50.546	10.123	51.711	10.329	50.272	10.424	57.045	8.882	52.101	10.001	42.012	8.622
58.968	6.044	43.027	6.192	58.573	6.120	42.202	5.904	59.008	5.693	43.204	6.047	55.607	4.635	39.263	5.753		
51.410	9.009	44.715	10.155	53.720	9.025	48.497	10.575	52.838	10.923	46.758	10.658	48.440	8.529	47.440	10.872		
33.985	9.141	26.856	9.676	38.268	8.659	31.030	9.720	37.894	8.354	34.210	8.772	35.299	8.953	28.480	10.133		
51.163	10.157	43.757	8.979	54.775	8.256	45.495	9.395	55.959	9.308	49.634	9.706	52.944	8.863	45.928	9.947		

For the most part, the men-in-general means and standard deviations closely approximate the overall values of 50 and 10. The largest departure from the mean of 50 occurred for the M-Scale. This is not surprising since this particular scale entered early into the stepwise regression systems with more consistency than any other a priori scale. One might speculate that the difference is in large part the result of a shift in mean scores, which would occur as a recruit gains experience with military life. To put it another way, many of the activities or careers described in the M-Scale may lose some of their appeal once they are more directly encountered by an individual. Interestingly, satisfied personnel within all eight career fields had higher mean scores on both the M-Scale and the leadership scale than did their dissatisfied counterparts. Other a priori scales exhibited predictable patterns with high mean scores for satisfied personnel within the satisfied career fields logically related to a particular scale. Satisfied Accounting Specialists, for example, obtained a mean of 57.774 on the Computational scale versus a mean of 45.920 for dissatisfied Accounting Specialists and 48.082 for men-in-general. Similarly, satisfied Radio Relay Repairmen obtained a mean score of 57.288 on the Electronics scale versus 52.511 for those dissatisfied within the same career field and 49.546 for men-in-general.

The occupational scale means exhibit a different but expected pattern. The highest means, of course, are obtained by the satisfied individuals in the career for which the scale was developed, the lowest for men-in-general, with the difference in means between these two groups averaging about one and one-half standard deviations. The dissatisfied personnel within the same career fields, however, achieved means almost as high as the satisfied personnel. A clear implication, on the basis of the occupational scales,

is that almost as many dissatisfied personnel would be placed in their present career fields as would satisfied airmen.

One factor which may, in part, account for this result is the explicit selection which took place when the career personnel involved in the present study were originally assigned to their respective fields. In order to be assigned to the Weather Observer field, for example, a man had to have an AQE General score at or above the 80th percentile. Thus, the Weather Observer group was subjected to explicit selection on General AQE and to incidental selection on all variables correlated with General AQE. An item might reveal differences between the men-in-general group and the satisfied career groups merely because the item was subject to the effects of incidental selection. If most items in a scale fell into this category, one would expect the results to be fairly close to the results shown in Table 32. It can be seen that the a priori scales which were not subjected to incidental selection during their construction exhibit a different pattern, with larger mean differences between satisfied and dissatisfied groups on the scales logically related to a given career group. Judging from the data presented in Table 32, use of the a priori scales on a purely logical basis would probably result in fewer dissatisfied personnel being reassigned to the same career.

The method which employs a men-in-general versus a career criterion group has been used as the primary technique in keying occupational inventories. Clark (1961) sates "...a scoring key will be considered good if it does a good job of separating workers in a given occupation from workers in general." Campbell (1971) comments on the Strong Vocational Interest Blank: "The main purpose of men-in-general is to establish the general level of popularity of an item; this can then be compared with the

rate of endorsement of the occupational sample to locate items that the members of the criterion sample answer differently from the reference sample."

In the recommendations section, several possible alternatives to the traditional use of a men-in-general group are suggested.

Correlations among the Scales

Correlations among the various scales are given in Table 33. Those for the occupational scales, in the upper portion of the triangular matrix, are generally low, with the possible exception of a clustering of the career fields with Electrical and Mechanical AQE requirements. The interest correlations for these four careers tend to be moderately high, although considerably lower than those presented by Campbell (1971, pp. 36-41) for occupations of a similar nature.

Correlations among the a priori scales are given in the right corner of the triangular matrix. Each correlation is positive, in contrast to that found by Clark (1961, p. 65) and Kuder (1956, p. 21) and similar to that obtained by Katz et al (1970, p. 33). The fact that some inventories report predominantly positive intercorrelations, while others report intercorrelations that are mixed in sign, most likely represents the differences in item format used. If a forced-choice format is used, as in Clark and Kuder, correlations of a mixed nature are like to result. On the other hand, if there is no constraint on responding to an item, a general willingness to respond either favorably or unfavorably will be indicated by the positive correlations.

In order to get some notion of the structure of the relationship among the a priori scales, scales having intercorrelations greater than 0.60 were identified. Similarly, scales correlating between 0.55 and 0.60 were

Table 33

Correlations Among Scales

	Weather Observer	Radio Relay Repairman	Ground Equipment Repairman	Aircraft Maintenance	Vehicle Repairman	Accounting Specialist	Administration Specialist	Security Specialist	Academic	Audiographic	Clerical	Computational	Electronic	Food Service	Health Service	Leadership	Mechanics	M-Scale	Outdoors	Pedagogy
Radio Relay Repairman	43																			
Ground Equipment Repairman	16	51																		
Aircraft Maintenance	21	41	64																	
Vehicle Repairman	-22	26	56	63																
Accounting Specialist	44	17	-08	-14	-25															
Administration Specialist	42	07	04	00	-20	47														
Security Specialist	09	-02	14	10	-02	11	38													
Academic	63	19	01	16	-26	17	36	01												
Audiographic	50	31	27	43	01	-05	21	02	50											
Clerical	29	-10	01	14	-12	18	55	16	40	46										
Computational	59	24	04	14	-15	39	50	06	49	51	67									
Electronic	21	51	48	57	38	-26	-08	-12	21	57	22	33								
Food Service	30	08	16	36	01	-06	33	22	51	47	48	34	30							
Health Service	43	07	05	24	-13	-03	26	15	57	54	45	43	30	59						
Leadership	36	-09	01	25	-05	-03	37	07	53	54	69	56	31	55	62					
Mechanics	08	30	50	73	58	-33	-18	-13	14	46	18	20	75	32	26	31				
M-Scale	04	-17	11	35	14	-37	-08	03	20	44	34	23	42	36	46	55	53			
Outdoors	17	22	44	67	39	-33	-08	06	24	51	18	15	55	41	40	35	65	63		
Pedagogy	60	08	00	21	-14	09	35	02	65	56	53	61	30	47	62	74	25	36	32	
Scientific	71	44	16	29	-10	11	23	00	65	65	34	61	48	43	65	50	33	33	38	64

noted. The interrelationships of the scales were represented as a network, with the scales serving as points and the correlations above 0.60 as arcs forming the network (Figure 1). One can see three clusters forming. One represents Electronic-Mechanics-Outdoors-M-Scale activities, a second represents the remaining scales except for Food Service, which stands alone even though it relates somewhat to the scales in the second cluster.

The purpose of presenting data in this form is to provide some suggestions for modifying the a priori scales in subsequent studies. It should be emphasized that the subject of this report is the initial phase in the development of an effective vocational interest inventory. The primary purpose of this phase was to develop an item pool, field test the pool, and construct experimental scales. Subsequent efforts should be aimed at modifying the experimental scales, adding new scales, and deleting redundant or misleading scales. Examination of Figure 1 may suggest modifications of the a priori scales. For example, the Scientific and Pedagogy scales each have correlations of 0.60 or more with five other scales. Furthermore, four of the five high correlations are common for both scales. This suggests that it might be profitable to attempt to combine these scales.

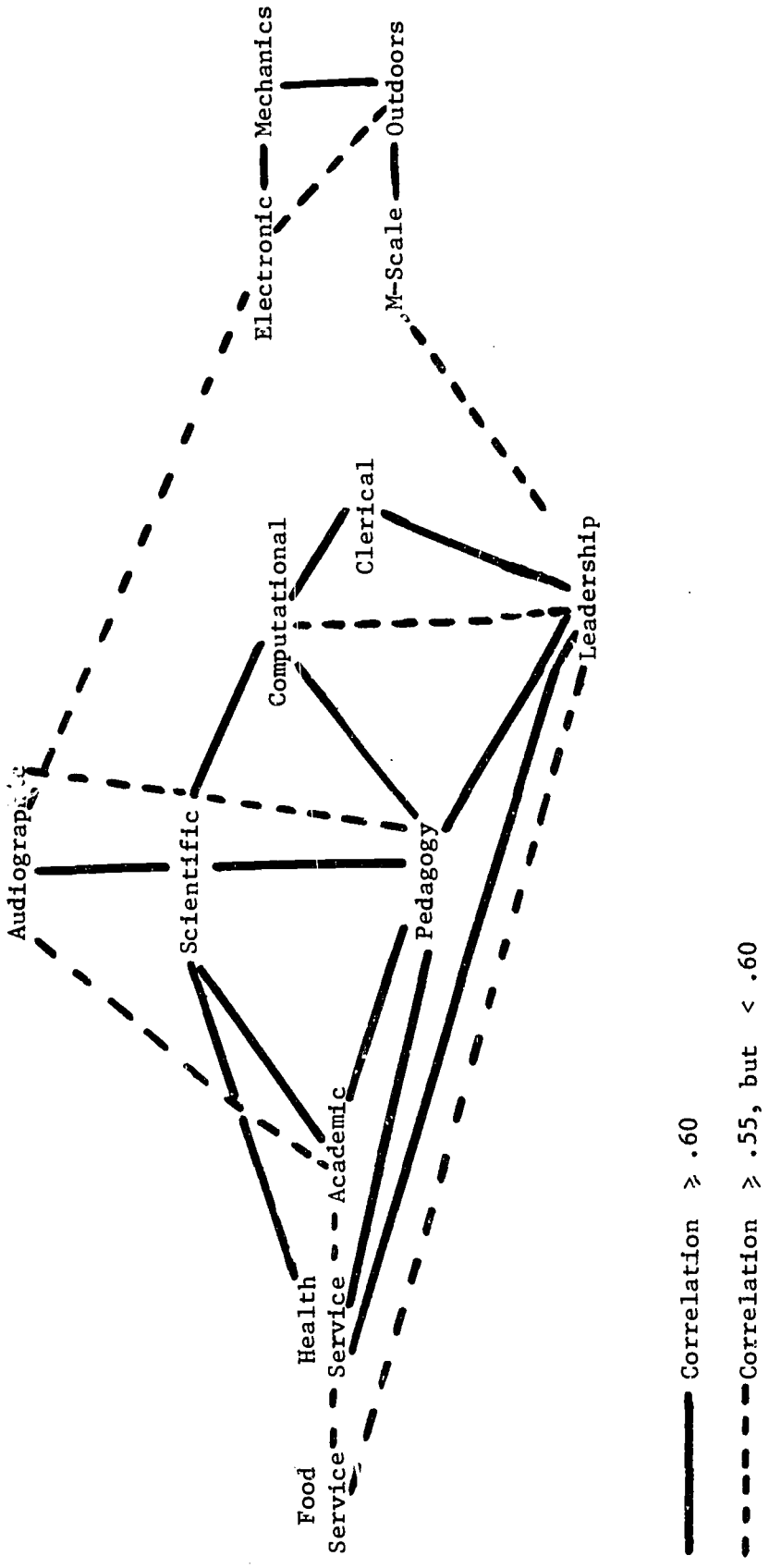
Correlations between the a priori scales and the occupational scales appear in the lower left corner of the matrix in Table 33. These correlations seem logical, in that scales for career fields that are mechanical in nature correlate highly with mechanical interest. The same holds generally for Electronic and Clerical career fields.

Test-Retest Reliability Estimation for the Scales

In order to estimate the reliability of the scales obtained from the combined sample, scores on the scales obtained from the two administrations

Figure 1

Network Illustrating the Interrelationship
Between the A Priori Scales



of VOICE to the subsample of 209 men-in-general were correlated. It should be recalled that these men were in basic training at the time of both administrations.

The correlations were low in comparison to those for other interest scales. Correlations ranged from 0.35 to 0.55 for the occupational scales, with virtually all scales having correlations within 0.05 of 0.50. Correlations for the a priori scales were higher and ranged from 0.54 to 0.74. Due to the fact that these correlations were considerably lower than those obtained by both Strong on the Vocational Interest Blank and Clark on the Minnesota Vocational Interest Inventory (they consistently obtained test-retest correlations of 0.80 or higher for their scales) and lower than one might expect by examining the internal consistency estimates, the validity of these correlations as reliability estimates must be questioned.

In obtaining estimates of reliability for an instrument administered on two separate occasions, the instrument must be administered independently and under identical conditions. In theoretical terms, this means that the distributions must be identical for each trial; that is, the expected value or mean of the measurement must be the same for both administrations. Furthermore, the variances must be the same for both administrations. For detailed discussion of conditions necessary for a test-retest correlation to serve as an estimate of reliability, the reader is referred to Lord and Novick (1968, Sections 3.3 and 3.4).

To determine whether the correlations obtained were valid estimates of reliability, the conditions were examined to see how appropriate they were. The differences between the raw score means and raw score variances for each trial were obtained and are presented for each scale in Table 34.

Table 34

Differences in Raw Score Means, Raw Score Variances,
And Their Significance for Two Repeated Trials

Scale	Difference In Means $\bar{x}_1 - \bar{x}_2$	Variance On Trial 1 $V(x_1)$	Variance On Trial 2 $V(x_2)$	Significant Difference Variances	Significant Difference Means
Weather Observer	-1.62	17.54	16.21	No	Yes
Radio Relay Repairman	-1.23	18.92	16.70	No	Yes
Ground Equipment Repairman	-0.50	11.31	9.40	No	Yes
Aircraft Maintenance	-0.96	18.25	16.86	No	Yes
Vehicle Repairman	-0.44	13.62	14.78	No	No
Accounting Specialist	-0.89	12.74	11.74	No	Yes
Administration Specialist	-1.48	20.72	16.48	Yes	*
Security Specialist	-0.91	14.53	10.47	Yes	*
Audiographic	1.59	69.30	59.32	No	Yes
Food Service	1.53	57.56	37.93	Yes	*
Pedagogy	0.57	41.25	39.51	No	No
M-Scale	0.50	50.26	43.82	No	No
Leadership	0.43	41.12	31.39	Yes	*
Computational	1.70	86.12	70.80	Yes	*
Health Service	1.10	68.32	61.92	No	No
Scientific	1.42	94.83	82.99	No	Yes
Electronic	0.99	98.63	97.35	No	No
Mechanics	0.73	75.67	71.95	No	No
Clerical	1.12	70.50	52.01	Yes	*
Outdoors	0.55	46.82	46.15	No	No
Academic	2.34	71.41	62.06	No	Yes

*Statistical tests of the significance of the mean differences were not performed in cases where significant heterogeneity of variance was concluded.

In addition, an F-test was performed to test the equality of the raw score variances, and a t-test was performed to assess the significance of the difference in means where the variances were concluded to be identical. The significance level used was the 0.05 level, with a "yes" entry in Table 34 indicating significance.

Certain features of the data stand out. For example, all the differences in the means have the same sign for each type scale. Although this result is difficult to interpret for the occupational scale, since both positive and negative items weights comprise a scale, an interpretation can be made for a priori scales. Apparently, there was a greater tendency to dislike items on the second administration, which was reflected in the consistently positive mean differences. Also, with one exception, the raw score item variances for the first administration were larger than those obtained on the second administration.

In examining the significance tests, six of 21 tests for equality of variance were significant. Eight of 15 tests for zero mean differences were significant. Only seven scales failed to achieve significant differences in either raw score mean or variance. These results, taken simultaneously, indicate that the conditions, which were necessary to validate the correlations obtained as accurate reliability estimates, were generally not satisfied. Thus, the obtained correlations cannot be used as reliability estimates.

Further evidence of the lack of parallelism between the two VOICE administrations appears in Table 35, which gives the correlations among the a priori scales for the two administrations. The upper-right triangular matrix represents correlations obtained for the first administration, the lower-left triangular matrix represents correlations obtained for the

Table 35

Correlations Among A Priori Scales for Two Administrations[a] of VOICE

	Audio-graphic	Food Service	Pedagogy	M-Scale	Leadership	Computational	Health Service	Scientific	Electronic	Mechanics	Clerical	Outdoors	Academic
Audiographic		.3941	.4983	.3295	.4687	.5764	.4272	.7048	.6711	.4903	.3009	.4515	.5755
Food Service	.4967		.4553	.3734	.5749	.3946	.4901	.4330	.2805	.2952	.3713	.3796	.4511
Pedagogy	.6843	.6036		.4138	.7552	.6496	.5917	.6196	.3672	.2339	.5129	.3109	.6444
M-Scale	.5670	.5046	.6217		.5697	.2133	.4253	.3291	.3107	.4998	.1551	.6919	.3842
Leadership	.6075	.6837	.8420	.6832		.5859	.6141	.5052	.3387	.2950	.6409	.3494	.5509
Computational	.6679	.5527	.7453	.4538	.6776		.4403	.6280	.4190	.2077	.5609	.1743	.5265
Health Service	.6026	.6362	.7444	.5949	.7407	.6178		.6151	.3407	.2486	.3723	.4280	.5122
Scientific	.7182	.5224	.6813	.5435	.5813	.6956	.7018		.5646	.3419	.2337	.4741	.7122
Electronic	.7107	.4319	.4733	.4680	.4643	.5196	.4257	.5887		.7218	.1054	.5351	.3749
Mechanics	.5734	.4667	.4219	.6017	.4592	.4077	.4085	.5102	.7345		.0324	.6166	.2609
Clerical	.4885	.5827	.6716	.4612	.7845	.6835	.6048	.4162	.3024	.2911		.0234	.3281
Outdoors	.5740	.4700	.4861	.7252	.4500	.3586	.4490	.5211	.5755	.6908	.2988		.3947
Academic	.6212	.6204	.7118	.5579	.6850	.6403	.6711	.7493	.4662	.4515	.5394	.4549	

[a]First administration correlations are above the diagonal; second administration, below.

second administration. If one expected the conditions of the two administrations to produce equal scores and variances for both administrations, one would expect the correlations among the scales to be equal, at least to the extent achieved in the previous samples. This did not happen. The correlations for the second administration were consistently higher than those of the first, indicating more consistent responses to all items in the second administration. Since the correlations differed considerably, one must conclude that reliability was not being measured.

The correlations obtained however may be of some use. If the means vary with time, as the data suggest, the correlations are known to underestimate the true reliability (Cochran, 1970).

The actual correlations obtained for each scale have not been presented since such a presentation might result in an inaccurate condemnation of the scale reliabilities. Estimation of scale reliabilities should be performed in the future under rigid conditions so that the estimates may be reported.

Cross-Validation

The percentages of correct classifications (hits) within each career field, using each of four different methods, are presented separately for each half-sample in Table 36. Two base rates are shown (at the far right) for comparative purposes. Base 1 is a "maximum blind strategy" in that it will yield the highest possible percentage of expected hits with the absence of any information that might relate individuals to groups. Under such conditions, classifying all individuals in the larger of the two groups will achieve the most hits. Base 2 represents proportional random assignment--a less than optimal strategy but one that might be employed in a situation where no useful information about individuals is

Table 36

Percent Correct Classifications Achieved Using Four Different Methods

SAMPLE 1

Career	Exact Occupational	Unit Occupational	Exact A Priori	Integer A Priori	Base 1	Base 2
Weather Observer	77.6	77.6	71.9	82.1	58.9	51.6
Radio Relay Repairman	78.6	80.5	75.2	77.8	58.3	51.4
Ground Equipment Repairman	74.3	78.8	68.6	69.0	68.6	56.9
Aircraft Maintenance	71.1	70.4	64.0	75.7	61.3	52.2
Vehicle Repairman	79.8	80.2	83.1	82.2	62.8	53.3
Accounting Specialist	86.8	77.9	78.6	78.6	55.2	50.1
Administration Specialist	69.8	78.1	64.5	68.0	64.0	53.9
Security Specialist	78.8	69.7	78.3	56.6	78.3	66.0
Total Percent Correct	77.8	77.9	72.7	74.4	62.8	53.9

SAMPLE 2

Career	Exact Occupational	Unit Occupational	Exact A Priori	Integer A Priori	Base 1	Base 2
Weather Observer	80.1	79.4	73.9	74.3	57.0	51.0
Radio Relay Repairman	81.1	81.9	75.6	75.6	57.8	51.2
Ground Equipment Repairman	74.0	71.8	68.3	65.6	68.3	56.7
Aircraft Maintenance	71.3	70.9	62.3	66.8	62.8	53.3
Vehicle Repairman	79.8	79.4	69.8	71.4	62.5	53.1
Accounting Specialist	85.0	81.2	69.3	72.8	54.0	50.3
Administration Specialist	68.3	62.2	65.5	63.9	62.2	53.0
Security Specialist	82.9	72.9	82.9	63.6	82.9	71.6
Total Percent Correct	77.9	75.3	70.7	69.7	62.4	54.3

available, but where quotas must be met. Under this system, individuals are assigned at random to one of two groups until a quota is filled for one of the groups. The same classification proportions or probabilities were used to compute the base rates as were used in the classification functions.

Except for Security Specialist, all of the methods bettered the base rates with some consistency in both samples. Since so few individuals were classified as satisfied within Security Specialist, it is not surprising that the cross-validation yielded unimpressive results in this field. As Table 36 shows, the occupational scales appeared to be superior to the a priori scales for classifying individuals accurately. Nevertheless, Table 36 indicates that both types of scales possess considerable value for classification purposes.

Though there was virtually no difference between the unit weights and exact regression weights for the occupational scales in Sample 1, there appeared to be a slight difference in favor of the regression weights in Sample 2 when the total percentages of correct hits were considered. There appeared to be little difference between the regression weights and the integer weights when the a priori scales were used to classify individuals.

Table 37 shows the percent of correct classifications within career groups and men-in-general groups. Since the decision rules used for classification were aimed at minimizing the <u>total</u> number of errors, there tended to be some overassignment to the larger men-in-general group. It is important to recognize that the within-group hits do not imply that the interest scales developed are better for the men-in-general group. Had the satisfied career groups been larger than men-in-general, the overassignment would have been to the career groups.

Table 37

Percent Correct Classifications Achieved within Career and Men-In-General (MIG) Groups Using Four Different Methods

SAMPLE 1

Career	Exact Occupational		Unit Occupational		Exact A Priori		Integer A Priori	
	Career	MIG	Career	MIG	Career	MIG	Career	MIG
Weather Observer	59.3	90.3	76.9	80.0	35.2	97.4	83.3	81.3
Radio Relay Repairman	68.5	91.0	76.6	83.2	57.7	87.7	85.6	72.3
Ground Equipment Repairman	22.5	98.1	67.6	83.9	0.0	100.0	70.4	68.4
Aircraft Maintenance	31.6	96.1	65.3	73.5	8.2	99.4	81.6	70.3
Vehicle Repairman	59.8	91.6	81.5	79.4	48.9	98.7	85.9	80.0
Accounting Specialist	81.7	91.0	84.9	86.5	71.4	84.5	73.8	82.6
Administration Specialist	21.8	96.8	65.5	85.2	1.1	100.0	66.7	69.7
Security Specialist	4.7	99.4	41.9	77.4	0.0	100.0	41.9	60.6

SAMPLE 2

Career	Exact Occupational		Unit Occupational		Exact A Priori		Integer A Priori	
	Career	MIG	Career	MIG	Career	MIG	Career	MIG
Weather Observer	66.0	91.0	74.4	83.2	50.4	91.6	67.5	79.4
Radio Relay Repairman	67.0	91.6	76.5	85.8	59.1	87.7	83.5	69.7
Ground Equipment Repairman	26.4	96.1	65.3	74.8	0.0	100.0	81.9	58.1
Aircraft Maintenance	42.4	88.4	65.2	74.2	0.0	99.4	64.1	68.4
Vehicle Repairman	62.4	90.3	71.0	84.5	34.4	77.5	82.8	64.5
Accounting Specialist	87.9	82.6	89.4	74.2	47.7	87.7	72.0	73.5
Administration Specialist	36.2	87.7	56.4	65.8	11.7	98.1	66.0	62.6
Security Specialist	0.0	100.0	34.4	80.6	0.0	100.0	56.3	65.2

Discriminant Analyses

The first discriminant analysis with 16 groups and the a priori scale scores as independent variables extracted 13 latent roots and 13 corresponding discriminant functions. Table 38 presents the 13 vectors, or orthogonal linear functions, of the a priori scales. It may be seen that the first two functions accounted for most of the variation among the 16 groups. Table 39 presents the "centroids" of each group on each discriminant function.

Figure 2 presents the configuration of the 16 groups in the two dimensions, defined by the first two discriminant functions. The first discriminant function is characterized by a relatively large positive weight for the Computational scale and relatively large negative weights for the Electronic and Mechanics scales. The two Accounting Specialist groups had the highest negative positions on this discriminant function; the highest positive values were accorded the two Vehicle Repairman groups. The factor underlying the first dimension might be interpreted as a bipolar factor, with one end characterized by high interest in Computational tasks and low interest in Mechanics and Electronics and the other end characterized by high interest in Mechanics and Electronics and low interest in Computational tasks.

The second discriminant function can also be interpreted as a bipolar factor. One end is characterized by high scores on Electronics and Science and low scores on Clerical, and the other end is characterized by the reverse pattern. The most extreme groups are the satisfied Radio Relay Repairman group and the satisfied Administration Specialists.

In terms of the distances between groups on the first two discriminant functions, the satisfied and dissatisfied groups within a career field are

Table 38

Discriminant Function Weights for Thirteen A Priori Scales

Scales	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function	Ninth Function	Tenth Function	Eleventh Function	Twelfth Function	Thirteenth Function
Audiographic	.0036	.0767	.0418	-.1154	-.0338	-.0628	.0363	.0444	.0145	.0044	.0064	-.0270	-.0100
Food Service	.0731	.0977	-.0216	.0498	-.0184	.0653	.0026	-.0181	.0744	.0015	.0178	-.0028	.0044
Pedagogy	-.0119	-.0248	.0636	-.0038	-.0706	.0184	.0276	-.0295	-.0370	.0353	.0280	-.0120	.0165
M-Scale	-.0813	-.1838	-.0670	-.1210	-.0673	-.0083	.0992	-.0767	.0256	.0190	-.0191	.0022	-.0000
Leadership	.0121	-.0870	.0186	.1383	.1078	-.0624	-.0939	-.0430	-.0061	-.0198	.0305	.0073	-.0173
Computational	.3048	.0186	-.1478	.2049	.0754	-.0958	.0292	-.0248	.0255	-.0201	-.0230	-.0083	.0062
Health Service	-.0654	-.0643	.0634	-.1772	.0745	.0042	-.0103	-.0018	-.0237	-.0542	-.0137	-.0071	.0069
Scientific	.0715	.2069	.0189	.0758	-.1293	.0716	.0905	.0204	-.0176	-.0076	.0200	.0258	-.0081
Electronic	-.2250	.2087	-.3304	-.1812	.0970	.0201	-.0540	-.0352	-.0104	.0142	.0058	.0050	.0038
Mechanics	-.2171	-.1216	.1771	.2901	-.0896	.0676	-.0076	.0105	-.0184	-.0201	-.0195	-.0140	-.0028
Clerical	-.0648	-.2872	-.1034	-.1137	-.1103	.0786	-.0157	.0970	-.0236	.0110	-.0019	.0113	.0013
Outdoors	.0318	.0951	.0713	.0216	-.0144	-.1305	-.0711	.0557	.0055	-.0017	.0047	.0179	.0070
Academic	.1773	.0493	.0294	-.0772	-.0197	-.0125	-.0998	-.0316	-.0041	.0194	-.0433	-.0003	-.0045

Table 39

Group Centroids for Discriminant Analysis Using
A Priori Scales as Independent Variables

SATISFIED

Group	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function	Ninth Function	Tenth Function	Eleventh Function	Twelfth Function	Thirteenth Function
Weather Observer	-.3910	-.3374	-.1393	-.0563	.8613	-.1419	-.4280	.2056	.4501	-.2730	-.1743	-.0132	.1731
Radio Relay Repairman	.1051	-.6820	.7257	-.0345	-.0763	-.0167	.0533	.3806	.4742	.4504	-.1468	.2155	.0530
Ground Equipment Repairman	.3417	-.0321	.4402	-.0300	.1060	.0057	.6440	.3272	-.3811	-.6585	-.0045	.4926	-.6748
Aircraft Maintenance	.3855	.0888	-.1169	-.2404	.4000	.4997	.2073	.0746	-.4502	.1300	-.8516	-.5030	.3459
Vehicle Repairman	.5890	.2347	-.2964	-.6659	-.0950	-.2524	.1948	.1170	.5566	.2297	.5614	-.2163	.2194
Accounting Specialist	-.7089	.4391	.4346	-.6536	.0116	.2370	-.1939	-.3466	.0473	.1695	-.0292	-.0835	-.4682
Administration Specialist	-.2223	.6269	.2241	.3637	.2127	-.9353	.5194	-.1210	-.0289	.3276	-.2199	-.0241	.2678
Security Specialist	.0261	.5126	.0082	.5549	.3086	.1814	-.7487	.4624	-.5513	-.3063	.8429	.3465	.3884

DISSATISFIED

Group	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function	Ninth Function	Tenth Function	Eleventh Function	Twelfth Function	Thirteenth Function
Weather Observer	-.4679	-.5531	-.7628	.1245	.0162	-.2017	.3183	.0550	-.2816	.4223	.0868	-.0363	-.4678
Radio Relay Repairman	-.0065	-.5757	.2009	-.0403	2497	-.3210	.0031	-.9360	-.1289	-.6453	.0678	-.2551	.3935
Ground Equipment Repairman	.0906	-.2117	.3632	.2255	-.2861	.0551	-.3461	.0965	-.4817	.5043	.3085	-.6435	-.0700
Aircraft Maintenance	.2567	-.0402	-.2219	-.0188	.1470	.4393	.0093	-.7164	-.0516	.5219	.0649	.0993	.1718
Vehicle Repairman	.4442	.0525	-.3942	-.3620	-.2363	-.4461	-.5644	.0565	-.0167	-.2439	-.3102	-.0389	-.5893
Accounting Specialist	-.5688	-.0199	-.2268	-.3333	-.5402	.3401	.4398	.4408	-.0170	-.3077	.1110	.0261	.5457
Administration Specialist	-.0847	.2284	-.1531	.4709	-.7569	.0511	-.3421	.0723	.3831	-.0172	-.6584	.2252	.0382
Security Specialist	.2112	.2691	-.0855	.6956	.1771	.5057	.2339	-.1685	.4777	-.3038	.3516	-.3813	-.3667

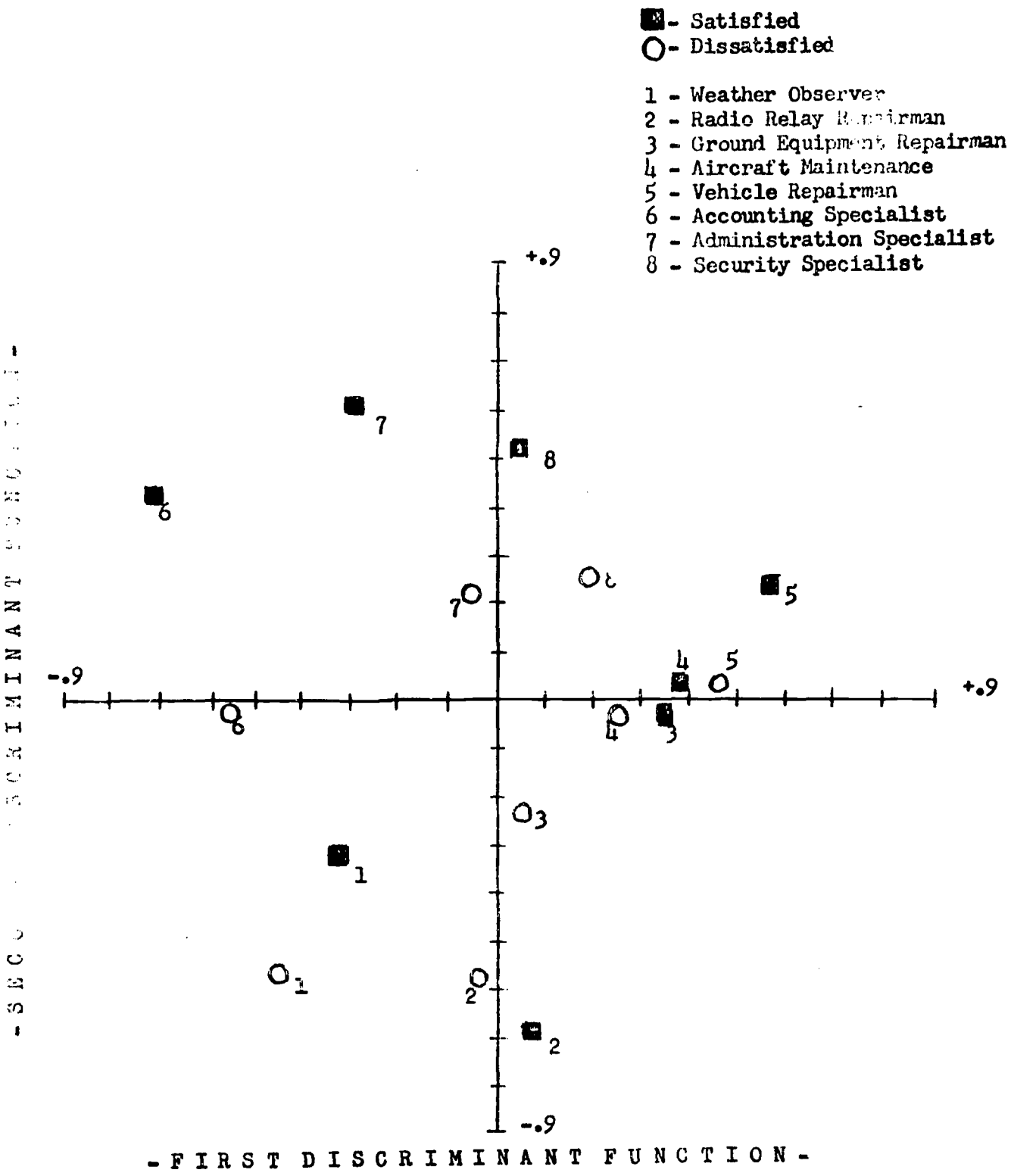


Fig. 2 Placement of Group Centroids in Discriminant Space Defined by the First Two Discriminant Functions of the A Priori Scales

relatively close. This suggests that the interest patterns of the two groups within a field are more similar than for groups in different fields, which is to be expected. Some exceptions do occur, however. For example, the satisfied Ground Equipment Repairman and dissatisfied Vehicle Repairman fall into a fairly tight cluster with the two Aircraft Maintenance groups.

The second discriminant analysis was performed with the 16 groups again serving as dependent variables and the eight occupational scales serving as the independent variables. Table 40 presents the eight latent vectors derived. Table 41 presents the centroids of each group on each discriminant function. The first two latent vectors from this analysis can also be interpreted as bipolar factors with each having one high positive and one high negative weight corresponding to a scale. As Figure 3 shows, the configuration of the 16 groups on the first two discriminant functions is quite similar to that in Figure 2.

Suggested Inventory Items

The total number of items that would be needed to construct all scales in final form for an inventory is 246. These items are listed by number in Table 42.

Conclusion

Our statistical analyses indicate that the experimental inventory possesses considerable utility for distinguishing among career groups and for distinguishing between satisfied and dissatisfied personnel within career fields and a men-in-general group. The sample sizes used to develop the occupational scales were minimal at best and in some cases, inadequate. Campbell (1971) suggested using two independent samples of 200, stressing homogeneity and making sure that men who perform the occupation in some

Table 40

Discriminant Function Weights for Eight Occupational Scales

Scale	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function
Weather Observer	-.0996	-.1441	.0426	.2512	-.0669	-.0423	-.0676	.0366
Radio Relay Repairman	-.0105	-.3378	.0556	-.1717	.0933	.0473	-.0126	.0207
Ground Equipment Repairman	.1273	-.0145	.0142	-.0724	-.1711	-.1260	.0116	-.0483
Aircraft Maintenance	-.0720	.0369	-.0194	.0363	-.0033	.1535	.1532	-.0230
Vehicle Repairman	.2791	.0371	-.2329	.0954	.0481	-.0543	-.0807	.0818
Accounting Specialist	-.2857	.0146	-.2851	-.0148	.0456	-.0531	.0612	-.0288
Administration Specialist	-.0775	-.2009	.0314	-.1554	-.0803	.0618	-.0217	.0596
Security Specialist	.0319	-.0299	.1580	.0445	.0964	.0859	.0632	.0257

Table 41

Group Centroids for Discriminant Analysis Using Occupational Scales as Independent Variables

SATISFIED

Group	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function
Weather Observer	-0.4136	-0.3862	0.2902	0.7417	-0.6323	0.1448	-0.4067	0.1714
Radio Relay Repairman	0.0074	-0.7551	-0.0122	-0.5403	0.1017	0.6929	-0.0878	0.0134
Ground Equipment Repairman	0.3666	-0.0776	-0.0088	-0.3130	-1.0054	-0.5651	-0.2087	-0.2322
Aircraft Maintenance	0.3117	-0.0031	-0.1102	0.4507	-0.2038	0.7126	0.6382	-0.5610
Vehicle Repairman	0.6701	0.2489	-0.5725	0.2342	0.1103	0.0600	-0.4924	0.3367
Accounting Specialist	-0.7668	0.3042	-0.8068	-0.1530	-0.2000	0.0845	0.1223	-0.2344
Administration Specialist	-0.2530	0.6766	0.3802	-0.3468	-0.0881	0.5897	-0.2672	0.7858
Security Specialist	0.0030	0.5006	0.7870	0.3820	0.6137	-0.5009	0.3364	-0.2264

DISSATISFIED

Group	First Function	Second Function	Third Function	Fourth Function	Fifth Function	Sixth Function	Seventh Function	Eighth Function
Weather Observer	-0.3175	-0.4387	0.0956	0.4384	0.4006	-0.1913	-0.1445	0.1098
Radio Relay Repairman	0.0011	-0.5854	-0.0278	-0.3928	0.3789	-0.1831	-0.0459	0.0560
Ground Equipment Repairman	0.0903	-0.1360	0.0845	-0.4515	-0.2440	-0.4281	0.2782	0.1740
Aircraft Maintenance	0.2833	0.0041	-0.1521	0.1722	-0.0748	-0.1760	0.5625	0.5443
Vehicle Repairman	0.4480	0.0833	-0.4052	0.1592	0.3899	0.0603	-0.4121	-0.1643
Accounting Specialist	-0.5071	-0.0055	-0.3698	0.0162	0.2547	-0.3132	0.1561	0.1031
Administration Specialist	-0.0953	0.3215	0.3568	-0.2725	0.1224	0.0022	-0.5626	-0.7950
Security Specialist	0.1718	0.2483	0.4711	-0.1247	-0.0762	0.0107	0.5342	0.0811

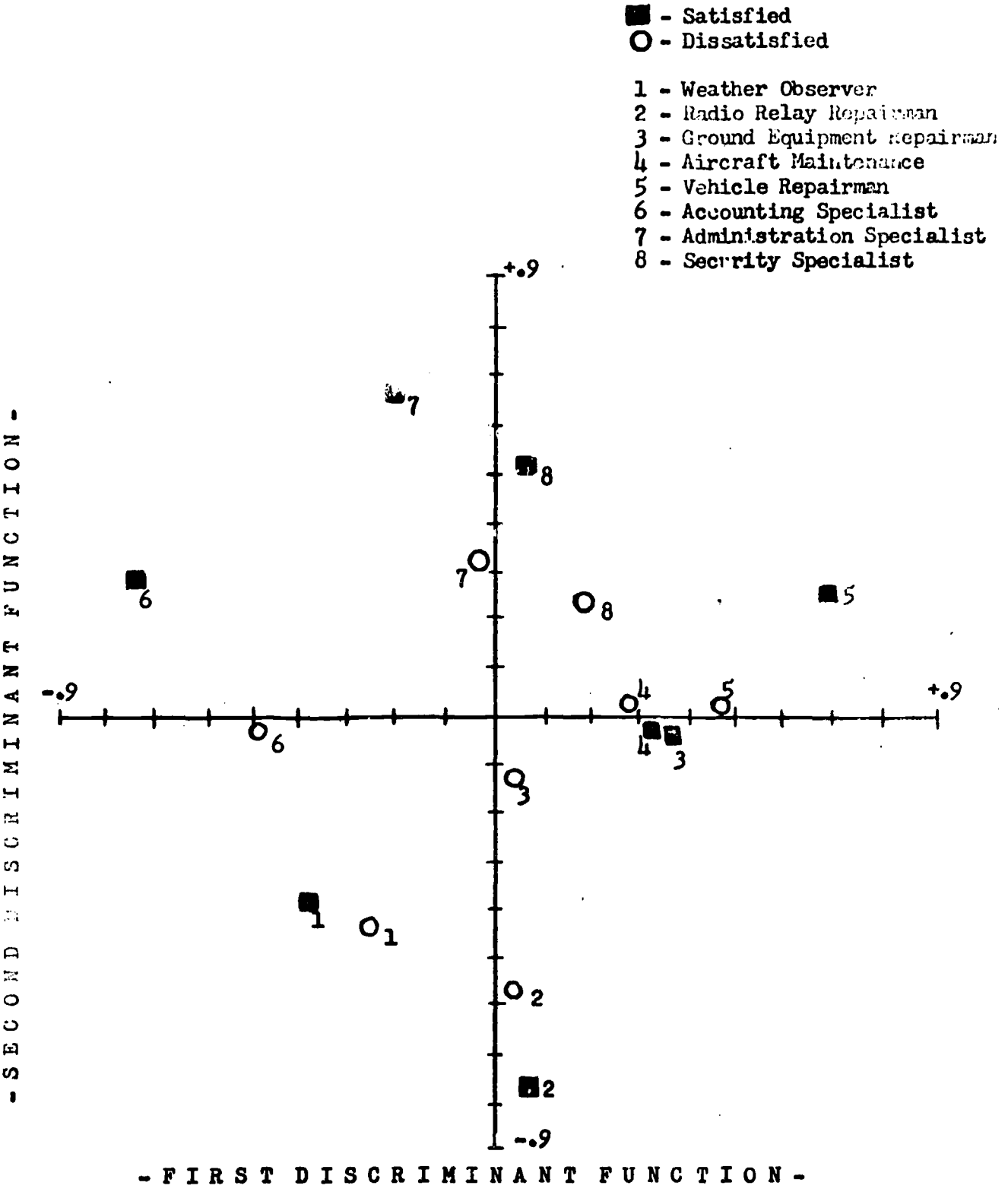


Fig. 3 Placement of Group Centroids in Discriminant Space Defined by the First Two Discriminant Functions of the Occupational Scales

Table 42

Suggested Items for Vocational Interest Inventory

1	62	129	205	276	335
2	63	133	206	277	336
6	66	134	207	278	337
7	67	135	209	279	338
8	68	138	211	282	340
9	70	139	214	283	341
10	71	141	215	285	343
11	72	142	217	286	344
12	74	144	218	291	345
13	76	145	219	299	347
16	77	149	220	300	348
17	80	150	225	301	350
18	82	151	226	302	351
19	83	155	227	303	354
20	84	156	228	304	355
21	85	157	229	305	356
22	86	160	230	307	357
25	87	163	234	308	358
26	88	166	235	309	361
27	90	167	236	310	363
30	91	168	242	311	366
32	93	169	243	312	368
35	96	170	247	313	369
36	99	171	248	314	373
39	101	174	250	315	374
41	102	175	253	316	376
43	104	176	255	317	377
44	105	177	257	319	378
45	107	182	258	320	380
46	108	183	259	321	381
47	109	186	262	322	382
48	110	187	263	323	384
49	113	189	264	324	385
52	114	190	265	325	386
54	115	192	266	327	388
55	117	195	267	328	390
56	120	196	268	329	391
57	121	199	270	331	392
58	122	201	271	332	394
60	127	202	274	333	397
61	128	203	275	334	400

unusual form are not included. The sample sizes used tc develop the final occupational scales for the eight career fields of VOICE ranged from 75 for Security Specialist to 258 for Accounting Specialist. The cross-validation results which were based on only half the number used for the final scales reflect the differences in sample sizes in the different careers. In fields where large samples were available, the occupational scales generally crossed better than in fields where smaller sample sizes were available. The cross-validity estimtes are, of course, lower bound estimates of validity since they are based on only half the sample.

SECTION VI

Recommendations

For most of the Air Force career fields included in the field test of VOICE, the validity of the occupational and a priori scales as measures of recruits' vocational interests has been demonstrated. The evidence presented in this report indicates that by means of these scales it is possible to classify men with considerable accuracy in either an occupational or basic recruit group.

However, a number of problems have come to light which require solution prior to the operational use of VOICE. Among these problems are the similarity of the interest patterns observed in dissatisfied and satisfied groups within a career, the rather small criterion groups which were available, and the apparent shift in the interest patterns of basic recruits over a period of three weeks. Although a final set of items is recommended for the inventory, it is suggested that the following additional research be undertaken.

1. Conduct a Longitudinal Study of Interest

   In this development effort, the scales of the inventory were validated using a standard cross-validation technique. Although this method of validating measures is worthwhile, it fails to examine the facet of validity that deals with prediction. In other words, do the interest scales, or scores, obtained early in an airman's service predict his subsequent satisfaction with his Air Force career field? This is an essential aspect of validity that must be confirmed prior to the adoption of any measure of vocational interest.

Associated with this problem is the question of whether interests change as a result of experience in a career. It should be recalled that the mean scores, produced in this field test for the occupational scales, showed that airmen dissatisfied with their careers were closer in their interests to satisfied airmen in the same career than they were to men-in-general. One reason for this may be that airmen who are dissatisfied with a career field do, nevertheless, acquire some interests in common with those of men who like the field. Knowledge of the job, alone, may cause this. The validity of this hypothesis needs to be examined.

Also, a longitudinal study would allow the examination of the stability of many items comprising the M-scale. For example, two items, "March in a parade" and "Take part in a military drill," appear in a number of scales. These items appeared to identify satisfied personnel, in that men satisfied with their careers tended to dislike these activities more than men-in-general. However, this may have been due to the fact that the men-in-general had not been extensively exposed to such activities. After some experience in military service, recruits' interest in these activities may decline regardless of their satisfaction with their careers. By identifying items such as these, which may correlate with time and thus be useless for prediction, the validity of the scales would be increased.

Such a longitudinal study could be conducted by following the men-in-general group used in this field test. Repeated annual administration of VOICE to these men would provide an initial

group, to be followed by subsequent groups of new recruits until a sample size is reached that would allow significant longitudinal inference.

2. Expand the Men-In-General Group

Closely associated with the longitudinal study could be the establishment of accurate statistical data for men-in-general. The importance of obtaining sound estimates for the distributions of responses cannot be overstated. The men-in-general group is used in either the development or validation of all scales for VOICE.

Strong (1954, Chapter 21) illustrates the effects of different men-in-general groups on correlations, scoring weights, and occupational clusters. His first men-in-general sample consisted of a few thousand men he happened to test during development of the Vocational Interest Blank. He modified this sample by using various U. S. Bureau of the Census statistics on employed men. Since then, several revisions of the men-in-general group have taken place. The group developed in 1969 includes some 1,000 men, stratified by general occupational area and specific occupation (Campbell, 1971, pp. 398-399, for a detailed listing of occupations).

The statistical standards of the men-in-general group used to test VOICE do not compare to Strong. We urge that the group be revised until it possesses sufficient quality. Under simple random sampling, a sample size of 625 airmen ensures that the standard deviation of a proportion will be less than 0.02.

The precision could undoubtedly be increased by using stratified sampling. Men-in-general could be stratified by numerous variables (AQE score range, career field, and biographical information are possibilities) in conjunction with other studies of their interest. There is no doubt that scales developed with such a sample would be more accurate.

3. Test the Factor Structure of the A Priori Scales

As stated in the section describing the development of the a priori scales, an underlying structure was hypothesized for the inventory, and items were written accordingly. Whether that structure was, in actuality, realized is open to question. A factor analysis of the items in VOICE would serve to answer the question. The analysis could be conducted immediately without collecting additional data.

The results of a factor study might indicate that the a priori scales should be modified. For example, the factor analysis might suggest that the Pedagogy and Scientific scales be combined or that the Outdoor scale be divided into two separate scales.

4. Revise the Job Satisfaction Scale

The evidence gathered indicates that the nature of the work itself is of overwhelming importance in determining how satisfied an airman is with his career. Rather than include scales which attempt to measure other factors, it is suggested that the job content scale be made more reliable by adding items and performing an item selection such as that performed for the a priori scales in the present study.

5. Investigate the Use of Continuous Criterion for Prediction

An alternative to a two group criterion should be investigated. A multiple regression approach with a continuous criterion would seem to have the most promise. It would develop inventory scales against a continuous criterion of satisfaction. An individual could then be classified on the basis of a combination of manpower requirements in various fields and the satisfaction scores predicted for him in each of several fields.

6. Examine Methodological Problems

A number of methodological questions surround the traditional procedures used to key interest inventories. The effects of explicit selection on AQE scores are not clear; i.e., men are eligible for certain careers only within a given AQE score range. For example, it would not be necessary to use the Weather Observer's scale for anyone with an AQE General score of less than the minimum required score of 80. Thus, discrimination should be only between satisfied Weather Observers and those men-in-general whose AQE score qualifies them. Such explicit selection could have considerable impact, particularly when the occupational scale approach is used.

Along the same line, there are undoubtedly other selection factors producing self-selection. To what extent these factors affect the interest scales and decision rules arrived at is not clear. It may be possible to perform range-restriction correlations of some kind of the within-career personnel, using a men-in-general sample to achieve more useful results. Both a theoretical and an empirical approach to these questions are needed.

7. Estimate Test-Retest Reliability

The establishment of reasonable standards of measurement error for a psychological test is paramount in a developmental effort. When an instrument contains a significant degree of measurement error, its usefulness as an indicator of present status or a predictor of future behavior is questionable. In psychological measurement, measurement error is defined in terms of reliability coefficients and is frequently estimated by obtaining correlations between two administrations of a test.

If a correlation between scores on two administrations is to serve as an estimate of reliability, the administrations must be conducted independently and under identical conditions. Furthermore, the distributions of the test scores for the two administrations must be identical.

It is recommended that such a reliability study be conducted under strict control. The subjects for this study should not be in basic training, but rather in the field. This would make the assumption of equal variance more likely to occur in practice. The test should be administered under supervised conditions on both occasions and under conditions in which the men are at ease so that measurement of their interests can take place with minimum error.

8. Establish Methodology for Differential Assignment

No attempt was made to differentiate career interests among two or more of the various career fields at one time. The inventory may classify a man to an occupational area as opposed to men-

in-general. However, in the actual recruiting situation, the man who conceivably have interests identified to more than one career area must be assigned to only one area. In a situation such as this, the comparability of interest scores must be taken into consideration. To do this, an investigation should focus on interest scales which differentiate between a number of career fields being considered simultaneously.

9. Develop Additional Scales

The occupations represented in the present study were necessarily limited. It is strongly recommended that development of a greater variety of occupational scales than the eight in the present study. It is suggested, however, that this step not be carried out until some of the questions and issues addressed in the preceding recommendations have been answered.

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APPENDIX A

Letter to Airmen

Follow-up Letter to Airmen

Letter to CBPO

Follow-up Letter to CBPO

VOICE Questionnaire

DEPARTMENT OF THE AIR FORCE
AFHRL PERSONNEL RESEARCH DIVISION (AFSC)
LACKLAND AIR FORCE BASE, TEXAS 78236

REPLY TO ATTN OF: PEPP

SUBJECT: Administration of USAF Vocational and Occupational Interest Survey (USAF SCN 73-33)

TO: DPMQS/Survey Control Officer

1. Reference is made to HQ USAF/ACMR letter, 20 Dec 1972, Vocational and Occupational Interest Choice Examination Survey.

2. Educational Testing Service, under Government contract with the Personnel Research Division of the AF Human Resources Laboratory, is developing an occupational interest inventory (VOICE) for Air Force use. This inventory will eventually be used to assist in job placement of new recruits. In order to accomplish this research, these inventories need to be administered to a selected sample of Air Force personnel.

3. Attached are inventory packets and a list of enlisted personnel assigned to units under your jurisdiction who were selected to participate in the field testing of this inventory. We are requesting your cooperation in distributing these packets. The listing includes identification data on all selected personnel and an indication of those personnel who are expected to arrive at a unit under your jurisdiction within the time period of the survey administration. If the airman is expected to arrive within the next two weeks after receipt of the survey packets, hold this material for him until he arrives. If personnel indicated on the roster have been transferred, we would appreciate your forwarding these materials to them as soon as possible. Respondents are requested to return all materials directly to Educational Testing Service upon completion.

4. We greatly appreciate your assistance in the distribution of the enclosed packets. If you have any questions or require additional information, contact Dr. Guinn, Personnel Research Division, Lackland AFB, Texas, AUTOVON 473-3967.

FOR THE COMMANDER

RALPH S. HOGGATT, Colonel, USAF
Chief, Personnel Research Division

2 Atch
1. Roster
2. Inventory Packets

DEPARTMENT OF THE AIR FORCE
AFHRL PERSONNEL RESEARCH DIVISION (AFSC)
LACKLAND AIR FORCE BASE, TEXAS 78236

REPLY TO ATTN OF: PEPP

SUBJECT: Follow-up on Administration of USAF Vocational and Occupational Survey (USAF SCN 73-33)

TO: DPMQS/Survey Control Officer

1. Reference is made to HQ USAF/ACMR letter, 20 Dec 1972, Vocational and Occupational Choice Examination Survey.

2. Approximately two weeks ago, you received a number of inventories to be distributed to personnel under your jurisdiction in support of a research project being conducted by Educational Testing Service (ETS) under contract with the Personnel Research Division.

3. As of this date, one or more of your personnel have not, as yet, returned the materials to Educational Testing Service which were originally distributed. Since it is very important that as many of the selected personnel as possible complete the inventory, we are again requesting that you distribute the enclosed packets to those personnel designated on the attached roster. In addition, we would appreciate your encouraging them to complete the inventory as soon as possible and return it directly to ETS.

4. Thank you again for your cooperation and assistance in this project. If you have any questions, contact Dr. Guinn at the Personnel Research Division, Lackland AFB, Texas, AUTOVON 473-3967.

FOR THE COMMANDER

RALPH S. HOGGATT, Colonel, USAF
Chief, Personnel Research Division

2 Atch
1. Roster
2. Inventory Packets

DEPARTMENT OF THE AIR FORCE
AFHRL PERSONNEL RESEARCH DIVISION (AFSC)
LACKLAND AIR FORCE BASE, TEXAS 78236

REPLY TO ATTN OF: PEPP

SUBJECT: Vocational and Occupational Interest Questionnaire (SCN 73-33)

TO: Selected USAF Enlisted Personnel

1. The attached questionnaire, the Vocational and Occupational Interest Choice Examination (VOICE), is part of a study being conducted under contract by Educational Testing Service (ETS) for the Personnel Research Division of the Air Force Human Resources Laboratory. This questionnaire is designed to obtain information regarding your interests in various occupational areas and job activities. The aim of the study is to help in assigning future Air Force recruits into career specialties corresponding more closely with their interests. In order to gain information to be used in this research, we are requesting a select group of enlisted personnel to complete all five sections of VOICE. Since our project depends on your participation, it is very important that we receive your answers promptly.

2. VOICE is not a test of ability; there are no right or wrong answers. Your best answers are those that accurately indicate your true feelings. The information requested is for official research purposes only and will NOT be placed in your personnel records or made available to your supervisor or commander. Read the directions carefully, then work quickly. Only your Social Security Account Number (SSAN) is required on the answer sheet which is placed inside the questionnaire packet. Do not write in the booklet; mark answers only on the answer sheet with the pencil provided. Do not use a pen. The answer sheet will be scored by machine so make your marks dark and only within the boxes provided on your answer sheet.

3. It is requested that the attached questionnaire be completed as soon as possible. Upon completion, return the questionnaire, answer sheet, and pencil in the self-addressed envelope directly to Educational Testing Service, Developmental Research Division, Princeton, New Jersey, 08540.

4. Thank you for your cooperation in this project.

FOR THE COMMANDER

RALPH S. HOGGATT, Colonel, USAF
Chief, Personnel Research Division

1 Atch
Questionnaire packet

DEPARTMENT OF THE AIR FORCE
AFHRL PERSONNEL RESEARCH DIVISION (AFSC)
LACKLAND AIR FORCE BASE, TEXAS 78236

REPLY TO ATTN OF: PEPP

SUBJECT: Follow-up on Completion of Vocational and Occupational Interest Questionnaire

TO: Selected USAF Enlisted Personnel

1. Approximately two weeks ago, a VOICE questionnaire was sent to you. As of today, your reply has not been received. Since it is very important that we obtain completed questionnaires from everyone contacted in this study so that the results of our research will be valid, we are enclosing another copy of the questionnaire to be completed and returned to Educational Testing Service. If you have already mailed your previous questionnaire, disregard this second request.

2. VOICE is not a test of ability; there are no right or wrong answers. Your best answers are those that accurately indicate your true feelings. All of your answers will be kept CONFIDENTIAL and will be used for research purposes only. Read the directions carefully, then work quickly. When you have finished, return all materials provided in the self-addressed envelope to Educational Testing Service, Developmental Research Division, Princeton, New Jersey, 08540.

3. Thank you again for your participation in this research project.

FOR THE COMMANDER

RALPH S. HOGGATT, Colonel, USAF
Chief, Personnel Research Division

1 Atch
Questionnaire packet

V O I C E

Vocational Occupational Interest Choice Examination

Information regarding the VOICE questionnaire may be obtained by writing to the authors at Educational Testing Service, Princeton, New Jersey 08540.

APPENDIX B

Maximum Likelihood Placement Using Eight Satisfied Career Groups

Maximum Likelihood Placement Using Eight Satisfied Career Groups

An alternative placement strategy consisted of the following steps:

1. Using satsified groups only, perform a discriminant analysis with the eight groups as dependent variables and the a priori scales as independent variables.
2. Use the following function to make placement decisions

$$F_{ij} = X_{ij}' \; D_j^{-1} \; X_{ij} + \log |D_j| - 2 \log P_j \quad ;$$

where X_{ij}' is a vector of discriminant scores for the ith individual taken as deviations from the jth group mean, D_j^{-1} is the inverse of the jth group covariance matrix, and P_j is the a priori (or a posteriori) probability of membership in the jth group.

In the present study, F was computed for each of the eight groups for each individual. The individual was then assigned to the group for which the function F was lowest in algebraic value, since the lowest algebraic value would correspond to the highest probability. The P_j were estimated in the half-samples as

$$N_k \; / \; \sum_{i=1}^{8} N_j \quad ,$$

where N_j is the number of satisfied personnel in group j in the half-sample.

The discriminant functions and classification rules from one half-sample were applied to the other half-sample so that an estimate of the accuracy of the classification scheme could be made.

Tables 1 and 2 present the results of the eight-group discriminant analyses for the two half-samples using a priori scales. Since the percentage variance accounted for beyond the 4th latent root was minimal, only the first four discriminant functions were employed in the cross-validation.

Table 3 shows the cross-validated predicted and actual placements using the first four discriminant functions and the function F derived from one half-sample to make placements in the other half-sample. The numbers in the diagonals represent hits and the off-diagonal entries represent misses.

Though both hit rates are relatively low--14.4 percent in Sample 1, and 19.1 percent in Sample 2--both hit rates are higher than the expected hit rate given proportional random assignment and in Sample 2 the cross-validated hit rate exceeded the maximal blind strategy of assigning everyone to the largest group.

Since the sample sizes were somewhat small for estimating the number of parameters involved, it may be of interest to examine the "shrinkage" which occurred as placement rules were first applied to the sample on which they were developed and then to the holdout sample. The hit rate for the rules developed on Sample 1 shrank from 20.5 percent (when applied to Sample 1) to 19.1 percent (when applied to Sample 2). The rules developed on Sample 2 showed a hit rate of 23.2 percent when applied to Sample 2 which shrank to 14.4 percent when crossed to Sample 1.

Though the results reported in Table 3 suggests that the method may not be overly promising, scoring procedures based on results for the total sample can be specified. If a computer is available the 13 a priori

scores (based on the final sets of items specified in the final report) can be entered as variables into the following set of equations:

$$F_{ij} = 2\log P_j - X_{ij}' D_j^{-1} X_{ij} - \log |D_j| \quad ,$$

where X_{ij} in a vector of discriminant function deviation scores for individual i, expressed as deviations from the jth group mean, D_j is the jth group dispersion matrix and P_j is an a priori or assigned probability for the jth group. The individual would be assigned to the group for which F_{ij} was highest in algebraic value.

The information necessary to perform these calculations is presented as Tables 4, 5, and 6 of the report.

Table 4 shows the weights for the first four discriminant functions derived from data for the total sample. Table 5 presents the discriminant function means for each of the eight career field satisfied groups and Table 6 presents the variance-covariance matrices for the eight groups.

The vector X in the above equation can be rewritten as

$$X = B\, Y_{ij} - M_j \quad ,$$

where B is a 4x13 matrix of discriminant function coefficients, M_j is a 4x1 vector of means, and Y_{ij} is the 13x1 vector of a priori test scores for individual i.

If we let $A_j = B' D_j^{-1} M_j$; a 13x1 vector

$C_j = B' D_j^{-1} B$; a 13x13 matrix

$K_j = M_j' D_j^{-1} M_j$; a scalar.

The classification equation can be written in terms of the original scores

$$F_{ij} = 2\log P_j - Y'_{ij} [C_j Y_{ij} - 2A_j] - K_j - \log |D_j| \quad .$$

Since $2\log P_j$, K_j and $\log D_j$ are all scalar quantities the equation can be expressed as

$$F_{ij} = Y'_{ij} [C_j Y_{ij} - 2A_j] + g_j$$

where $g_j = 2\log P_j - K_j - \log |D_j|$.

Table 1

Group Centroids and Discriminant Function Weights for Sample 1

Group Centroids

Group	First Root	Second Root	Third Root	Fourth Root
% Explained Variance	41.51	31.22	11.22	9.91
Weather Observer	-.2861	-.4970	-.9122	.1917
Radio Relay Repairman	.1981	-.8338	.5260	-.1438
Ground Equipment Repairman	.3168	-.1054	.1186	-.0507
Aircraft Maintenance	.3625	.1840	-.1730	.1713
Vehicle Repairman	.5422	.3989	.0099	.5789
Accounting Specialist	-.7220	.0201	.4233	.6621
Administration Specialist	.4547	.4341	.0497	-.5150
Security Specialist	.0432	.3991	-.0423	-.8945

Discriminant Function Weights

Test	First Root	Second Root	Third Root	Fourth Root
Audiographic	-.0569	.0134	.1192	.0155
Food Service	.0179	.0796	-.0207	-.0191
Pedagogy	-.0192	-.0066	.1257	.0210
M-Scale	-.0996	-.1077	.0313	.1591
Leadership	-.0118	-.0508	-.1500	-.0808
Computational	.2661	.1238	-.2365	-.2544
Health Service	-.0151	-.1076	-.0436	.1311
Scientific	.0686	.2894	.3178	-.0081
Electronic	-.2870	.3478	-.3387	.2491
Mechanics	.1756	-.0028	.0053	-.0900
Clerical	-.2648	-.2843	.1421	-.3002
Outdoors	.1511	-.2751	.0057	.1745
Academic	.1292	.0453	-.0251	.0162

Table 2

Group Centroids and Discriminant Function Weights for Sample 2

Group Centroids

Group	First Root	Second Root	Third Root	Fourth Root
% Explained Variance	41.76	28.01	14.37	11.21
Weather Observer	.1415	.5712	.3803	.6092
Radio Relay Repairman	-.4193	.7182	-.0640	-.3088
Ground Equipment Repairman	-.3382	.0220	-.3727	-.4837
Aircraft Maintenance	-.2431	-.1744	.3536	.0092
Vehicle Repairman	-.3353	-.5074	.6480	-.1188
Accounting Specialist	.7857	.1589	.3491	-.5372
Administration Specialist	.3115	-.1941	-.4461	-.0522
Security Specialist	.0972	-.5944	-.8482	.8823

Discriminant Function Weights

Test	First Root	Second Root	Third Root	Fourth Root
Audiographic	.0369	-.1279	.0750	-.1002
Food Service	-.0133	-.1127	.0293	.0166
Pedagogy	-.0206	-.0044	-.0351	-.1407
M-Scale	-.0239	.1941	.2238	-.1558
Leadership	-.0530	.1358	-.1290	.2070
Computational	-.2741	-.1441	-.0695	.2028
Health Service	.0056	.0715	.1746	-.0865
Scientific	-.0074	-.2157	-.1922	-.0785
Electronic	.4185	-.2355	.3866	.2166
Mechanics	.0323	.2787	-.3441	.0137
Clerical	-.1090	.1923	.1134	.0280
Outdoors	.1142	.0084	-.1785	-.0324
Academic	-.0569	-.0745	.0304	-.0956

Table 3

Predicted and Actual Placements

Sample 1 Mode with Rules Derived from Sample 2

Actual	Predicted							
	Weather Observer	Radio Relay Repairman	Ground Equipment Repairman	Aircraft Maintenance	Vehicle Repairman	Accounting Specialist	Administration Specialist	Security Specialist
Weather Observer	8.0	10.0	0.0	13.0	22.0	51.0	4.0	0.0
Radio Relay Repairman	5.0	15.0	0.0	14.0	14.0	59.0	4.0	0.0
Ground Equipment Repairman	1.0	11.0	0.0	6.0	14.0	34.0	4.0	1.0
Aircraft Maintenance	6.0	7.0	0.0	9.0	19.0	53.0	4.0	0.0
Vehicle Repairman	4.0	11.0	0.0	8.0	23.0	43.0	3.0	0.0
Accounting Specialist	12.0	23.0	0.0	14.0	18.0	49.0	10.0	0.0
Administration Specialist	2.0	16.0	0.0	13.0	10.0	44.0	2.0	0.0
Security Specialist	7.0	3.0	0.0	8.0	9.0	13.0	3.0	0.0

Hit Rate	14.4%
Maximal Blind Strategy	17.1%
Proportional Random Assignment	13.4%

Sample 2 Mode with Rules Derived from Sample 1

Actual	Predicted							
	Weather Observer	Radio Relay Repairman	Ground Equipment Repairman	Aircraft Maintenance	Vehicle Repairman	Accounting Specialist	Administration Specialist	Security Specialist
Weather Observer	16.0	44.0	0.0	0.0	8.0	44.0	3.0	2.0
Radio Relay Repairman	13.0	38.0	0.0	0.0	8.0	52.0	3.0	1.0
Ground Equipment Repairman	13.0	19.0	0.0	1.0	5.0	31.0	3.0	0.0
Aircraft Maintenance	17.0	30.0	0.0	0.0	11.0	31.0	2.0	1.0
Vehicle Repairman	13.0	31.0	0.0	0.0	17.0	29.0	2.0	1.0
Accounting Specialist	18.0	29.0	0.0	1.0	10.0	68.0	3.0	3.0
Administration Specialist	10.0	30.0	0.0	0.0	12.0	36.0	3.0	3.0
Security Specialist	6.0	11.0	0.0	1.0	3.0	8.0	2.0	1.0

Hit Rate	19.1%
Maximal Blind Strategy	17.7%
Proportional Random Assignment	13.7%

Table 4

Discriminant Function Coefficients for 13 A Priori Scales

Test	First Function	Second Function	Third Function	Fourth Function
Audiographic	0.0286	-0.0546	0.0652	-0.1198
Food Service	-0.0220	-0.0824	0.0038	0.0053
Pedagogy	0.0080	0.0225	0.0063	-0.1321
M-Scale	-0.0201	0.1790	0.1731	-0.0662
Leadership	-0.0156	0.0896	-0.1467	0.1602
Computational	-0.3249	-0.1605	-0.2004	0.2301
Health Service	0.0372	0.0952	0.1461	-0.0131
Scientific	-0.0318	-0.2752	-0.0980	-0.1823
Electronic	0.3270	-0.3020	0.3112	0.2955
Mechanics	0.1715	0.2873	-0.3175	-0.0999
Clerical	-0.0863	0.2485	0.1701	0.0102
Outdoors	0.0266	-0.0693	-0.1088	-0.0117
Academic	-0.1216	-0.0472	0.0788	-0.0414

Table 5

Discriminant Function Means for Eight Career Groups

Group	First Function	Second Function	Third Function	Fourth Function
Weather Observer	-1.3388	0.7948	3.6504	2.3194
Radio Relay Repairman	-5.0461	2.2399	4.7408	0.1385
Ground Equipment Repairman	-5.6164	-1.2505	4.6536	0.1912
Aircraft Maintenance	-5.4189	-2.4607	5.5677	1.3061
Vehicle Repairman	-6.3829	-3.9292	6.2557	1.0586
Accounting Specialist	1.7624	-0.8524	6.0258	0.7989
Administration Specialist	1.3827	1.2556	4.6937	2.8285
Security Specialist	1.4342	1.2750	4.8044	2.7769

Table 6

Group Variance-Covariance Matrices for Four Discriminant Functions

Weather Observer

	Function I	Function II	Function III	Function IV
Function I	17.869458	0.334782	1.151974	-0.095476
Function II	0.334782	13.548618	0.750726	-1.291568
Function III	1.151974	0.750726	6.298863	-0.507477
Function IV	-0.095476	-1.291568	-0.507477	6.885397

Radio Relay Repairman

Function I	15.543922	-0.660748	1.389888	0.155789
Function II	-0.660748	15.509681	-0.036551	-1.606539
Function III	1.389888	-0.036551	6.056647	1.041942
Function IV	0.155789	-1.606539	1.041942	5.294343

Ground Equipment Repairman

Function I	18.686464	1.677989	0.104962	1.263272
Function II	1.677989	15.973304	-1.184658	-1.491408
Function III	0.104962	-1.184658	4.922754	1.236838
Function IV	1.263272	-1.491408	1.236838	6.368880

Aircraft Maintenance

Function I	14.494880	-0.494734	0.813933	1.660305
Function II	-0.494734	12.195809	-0.941040	-1.480030
Function III	0.813933	-0.941040	5.124807	0.832031
Function IV	1.660305	-1.480030	0.832031	5.860572

Table 6

Group Variance-Covariance Matrices for Four Discriminant Functions (Continued)

Vehicle Repairman

	Function I	Function II	Function III	Function IV
Function I	17.476279	0.595258	0.497820	1.057727
Function II	0.595258	14.491776	-3.650410	-2.115980
Function III	0.497820	-3.650410	6.234617	1.714179
Function IV	1.057727	-2.115980	1.714179	4.231098

Accounting Specialist

Function I	23.186726	-1.861915	3.426546	0.086638
Function II	-1.861915	13.251934	-0.668078	1.296739
Function III	3.426546	-0.668078	6.793523	-1.498070
Function IV	0.086638	1.296739	-1.498070	5.713929

Administration Specialist

Function I	39.223298	-5.485263	13.699161	-1.669189
Function II	-5.485263	1.560913	0.869285	-1.192340
Function III	13.699161	0.869285	14.560174	-5.574727
Function IV	-1.669189	-1.192340	-5.574727	2.657848

Security Specialist

Function I	39.824478	-5.643034	13.652323	-1.558059
Function II	-5.643034	1.570250	0.770197	-1.161131
Function III	13.652323	0.770197	14.177051	-5.373455
Function IV	-1.558059	-1.161131	-5.373455	2.565294