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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

November 1969 United States Training and Employment Service Technical Report S-4

S-4

ED 059284

Development of USTES Aptitude Test Battery for Sewing Machine Operators, Selected 786.782 and 787.782

TM 0

U.S. DEPARTMENT OF LABOR

MANPOWER ADMINISTRATION

Technical Report on Development of USTES Aptitude Test Battery
For. . .

Sewing Machine Operators, Selected 786.782, 787.782

S-4

Including

Sewing Machine Operator, Lingerie
(garment) 786.782

Sewing Machine Operator, Men's Tailored Garments,
(garment) 786.782

Sewing Machine Operator, Regular Equipment,
(garment) 786.782

Sewing Machine Operator, Style Garments
(garment) 786.782

Sewing Machine Operator, Regular Equipment
(boot & shoe) 787.782

Straw-Hat-Machine Operator
(hat & cap) 787.782

Glove Sewer
(glove & mit.) 787.782

(Developed in Cooperation with the Alabama, Maryland, Michigan, Ohio, Oregon, Pennsylvania, Rhode Island and Wisconsin State Employment Services)

Manpower Administration
U. S. Department of Labor

November 1969

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to the recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Studies #518C, 7, 11, 460,
460A, 504, 572,
576, 589, 2669

DEVELOPMENT OF USTES APTITUDE TEST BATTERY

FOR

Sewing Machine Operators, Selected 786.782, 787.782

S-4

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for various classifications of Sewing Machine Operators. The following norms were established.

GATB Aptitudes	Minimum Acceptable GATB Scores
P - Form Perception	75
K - Motor Coordination	75
F - Finger Dexterity	80
M - Manual Dexterity	75

RESEARCH SUMMARY - VALIDATION SAMPLE

Samples:

The validation sample consists of four sub-samples of employed females in selected classifications of Sewing Machine Operator jobs in Alabama, Maryland, and Rhode Island. (Total N = 133). This study was conducted prior to the requirement of providing minority group information. Therefore, minority group composition is unknown.

Criterion:

The criterion for the various subsamples are as follows:

A-1 - earned average hourly pay

A-2 - production records

A-3 - production records

A-4 - supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analysis of aptitude mean score, standard deviations aptitude criterion correlations and selective efficiences.

Concurrent Validity:

Phi coefficient = .25 ($P/2 < .005$)

Effectiveness of Norms:

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-4 norms, 74% would have been good workers. 36% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-4 norms, only 26% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1.

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	64%	74%
Poor Workers	36%	26%

VALIDATION SAMPLE DESCRIPTION

Size:

N = 133

Occupational Status:

Employed Workers

Work Setting:

The size and location of the four subsamples are as follows:

A-1	27	West Warwick, Rhode Island
A-2	23	Troy, Alabama

A-3	47	Analusia, Alabama
A-4	36	Baltimore, Maryland

Selection Requirements:

Details regarding the methods used in the original selection of these workers by their respective employers are not known.

Principle Activities:

The job duties of the various sewing machine operators are comparable to those listed in the appendix.

Minimum Experience:

128 members of the validation sample had at least 8 months of experience. Experience data was not available for five individuals in the validation sample.

TABLE 2

Means, Standard Deviations (SD) and Ranges for Age, Education, and Experience of the combined validation sample.

	Mean	SD	Range
Age (years)	29.6	7.7	18-50
Education (years)	8.8	2.0	5-12
Experience (months)	72.1*	67.5*	8-276*

*N = 128 (Experience data were not available for five individuals).

TABLE 3

Pearson Product-Moment Correlations, between the Criterion and Age, Education, and Experience for each of the four subsamples composing the validation sample. (Since different criteria were used with each subsample, no combined criterion was obtained for the total sample.)

	A-1 (N =27)#	A-2 (N =23)	A-3 (N =47)	A-4 (N =36)
Age	-.175	.076	-.100	.312
Education	.406*	.342	.186	.396**
Experience	.348	.179	-.175	.249

*Significant at the .05 level
**Significant at the .01 level
N = 22 for Experience

EXPERIMENTAL TEST BATTERY

All tests of the GATB, B-1001 were administered to the 4 subsamples during the period covering 1946-1950. The B-1001 scores were converted to equivalent B-1002 scores.

CRITERION

In order to derive a suitable criterion for the combined sample, (individual samples were too small to establish norms) the criterion for each separate sample was dichotomized so that approximately one-third of the workers would be placed in the low criterion group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high group were designated as "good workers" and those in the low group as "poor workers". The actual range and critical score for each criterion is as follows:

Sample	Criterion	Actual Range	Critical Score
A-1	earned average hourly pay	55.4 - 117.0	80.5
A-2	production records	97 - 185	133
A-3	production records	99.8 - 310.3	136.8
A-4	supervisory ratings	34 - 63	51

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were considered for tryout in the norms on the basis of a qualitative analysis of the job duties involved and a statistical analysis of test and criterion data. Aptitudes F and M which do not have significant correlations with the criterion were considered for inclusion in the norms because the job analysis indicated that they were important for job duties and the validation sample had relatively high mean scores on these two aptitudes. With employed workers, a relatively high mean score indicates that some sample pre-selection may have taken place. Tables 4, 5, 6, and 7 show the results of the qualitative and statistical analyses.

TABLE 4

(Based on the job analyses, the aptitudes indicated appear to be important to the work performed)

P - Form Perception	Appears necessary in selecting the proper garment parts for sewing; arranging parts for sewing, guiding cloth on required stitching path (reg. equip.); to select proper straw, shaping contour, forming crown, braid etc. (straw hat.).
F - Finger Dexterity	Appears necessary in threading, removing and replacing bobbins, mount winding attachment (reg. equip.); inserting straw hat under needle feeding machine and cutting straw (straw-hat).
M - Manual Dexterity	Appears necessary to adjust and oil machine arrange parts of garments for sewing (reg. equip.) in folding and shaping straw, to manipulate braid and straw into machine (straw-hat.).

TABLE 5

Means, Standard Deviations (SD), and Ranges for the Aptitudes of the GATB

Aptitude	Means	SD	Range
G - General Learning Ability	83.5	13.9	55-121
V - Verbal Aptitude	83.8	14.0	55-118
N - Numerical Aptitude	82.7	16.5	44-115
S - Spatial Aptitude	91.7	15.5	62-123
P - Form Perception	94.0	18.4	57-143
Q - Clerical Perception	87.8	16.2	58-128
K - Motor Coordination	88.2	18.8	48-140
F - Finger Dexterity	100.4	17.2	59-137
M - Manual Dexterity	91.7	22.0	40-156

TABLE 6

Pearson Product-Moment Correlations between the Criterion and GATB Aptitudes for each of the four subsamples composing the validation sample. (Different criteria were used with each sub-sample.)

	Validation Samples			
	A-1 (N=27)	A-2 (N=23)	A-3 (N=47)	A-4 (N=36)#
G - General Learning Ability	.25	.28	.16	.45**
V - Verbal Aptitude	.25	.32	.17	.47**
N - Numerical Aptitude	.46*	.25	.22	.55**
S - Spatial Aptitude	.27	-.06	-.07	.25
P - Form Perception	.51**	.22	.10	.46**
Q - Clerical Perception	.36	.08	.09	.52**
K - Motor Coordination	.26	.48*	.32*	.43**
F - Finger Dexterity	.03	.50*	.08	.22
M - Manual Dexterity	.35	.05	.22	.23

*Significant at .05 level

**Significant at the .01 level

Corrected for Broad Categories

TABLE 7

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes of the GATB								
	G	V	N	S	P	Q	K	F	M
1. Qualitative Analysis of Aptitudes Required					X			X	X
2. Aptitude with Relatively High Means				X	X			X	X
3. Aptitudes with Relatively Low Means	X	X							
4. Aptitudes with Significant Correlations									
Criterion:* In Sample A-1			X		X				
In Sample A-2							X	X	
In Sample A-3							X		
In Sample A-4	X	X	X		X	X	X		
5. Aptitudes to be given further consideration for inclusion in trial norms			N		P		K	F	M

*In order for an aptitude to be considered for inclusion in the trial norms based on correlation the aptitude was considered only if it had a significant r with the criterion in at least two of the four samples.

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of Aptitudes N, P, K, F, and M at trial cutting scores were able to differentiate between the 64% of the sample considered good workers and the 36% of the sample considered poor workers. Trial cutting scores at five point intervals one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient is used as a basis for comparing trial norms. The optimum differentiation for the various classifications of Sewing Machine Operators was provided by the norms of P-75, K-75, F-80 and M-75. The validity of these norms is shown in Table 8 and is indicated by a Phi Coefficient of .25 (statistically significant at the .005 level).

TABLE 8

Concurrent Validity of Test Norms, P-75, K-75, F-80, and M-75

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	23	62	85
Poor Workers	26	22	48
Total	49	84	133

Phi Coefficient (ϕ) = .25 Chi Square (X_y^2) =8.6

Significance Level = P/2 $<$ .005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied in OAP-32 which is shown in Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .20 is obtained with the OAP-32 norms of P-75, F-80, and M-80 using subsamples A-1, A-2, and A-3 of the validation data. When the cross validation data are combined with the validation data a Phi Coefficient of .22 is obtained with the OAP-32 norms.

CHECK STUDY RESEARCH SUMMARY SHEET

S-4 GATB #572, 576, 589

Sewing Machine Operators, Selected (garment) 786.782, (boot & shoe, glove & mit.; hat & cap) 787.782

Check Study #1 Research Study

Sample:

Five subsamples of employed female Sewing Machine Operators in selected sewing occupations. (Total N=156) The size and location of the five subsamples are as follows:

B-1 - 36 - Milwaukee, Wisconsin
B-2 - 32 - Johnstown, Pennsylvania
B-3 - 32 - Johnstown, Pennsylvania
B-4 - 27 - Escanaba, Michigan
B-5 - 29 - Portland, Oregon

This study was conducted prior to the requirement of providing minority group information. Therefore, minority group composition is unknown.

TABLE 9

Means, Standard Deviations (SD) and Ranges for Age, Experience and the Aptitudes of the GATB

Age (years)	34.6	12.9	16-69	S-Spatial Aptitude	97.1	16.6	58-139
Education (years)	9.6	2.2	4-14	P-Form Perception	100.3#	19.2#	46-143
Experience (months)	75.1	104.7	6-504	Q-Clerical Aptitude	98.7	16.6	52-139
G-General Learning Ability	93.2	15.5	55-130	K-Motor Coordination	102.3	18.7	71-152
V-Verbal Aptitude	95.0	14.7	58-139	F-Finger Dexterity	105.0	19.6	62-153
N-Numerical Aptitude	93.3	18.6	55-130	M-Manual Dexterity	105.6	22.1	40-148

N = 151

TABLE 10

Pearson Product-Moment Correlations between the Criterion and Age, Education, Experience, and GATB Aptitudes for each of the five subsamples. (Since different criterion were used with each subsample, no combined cross-validation criterion was obtained for the total sample).

Cross Validation Samples

	B-1 (N=36)	B-2 (N=32)	B-3 (N=32)	B-4 (N=27#)	B-5 (N=29)
Age (years)	.202	-.014	-.275	-.367	-.077
Education (years)	-.103	.089	.198	.308	.433*
Experience (months)	.583**	.063	.091	.578**	.468**
G - General Learning Ability	.500**	.360*	.230	.420*	.360
V - Verbal Aptitude	.540**	.100	-.030	-.010	.240
N - Numerical Aptitude	.400*	.210	.150	.360	.410*
S - Spatial Aptitude	.420*	.430*	.440*	.350	.150
P - Form Perception	.570**	.400	.420*	.390*	.170
Q - Clerical Aptitude	.360*	.250	.230	.510**	.350
K - Motor Coordination	.340*	.270	.530**	.300	.490**
F - Finger Dexterity	.520**	.300	.410*	.350	.570**
M - Manual Dexterity	.050	-.050	.450**	.200	.100

*Significant at the .05 level
**Significant at the .01 level
#N = 22 for Aptitudes P, F, and M

Criterion:

The criterion for the various subsamples are as follows:

B - 1 - piece-work earnings
B - 2 - supervisory ratings
B - 3 - supervisory ratings
B - 4 - supervisory ratings
B - 5 - supervisory ratings

Criterion was collected in 1950.

Design:

Concurrent (test and criterion data were collected at approximately the same time.

Principle Activities:

The job duties of the occupation are comparable to those listed in the appendix.

Concurrent Validity:

Phi Coefficient = .26 P/2 < .0005

Effectiveness of the Norms:

Only 70% of the nontest-selected workers in this sample were good workers; if the workers had been test-selected with the S-4 norms, 76% would have been good workers. Thirty percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-4 norms, only 24% would have been poor workers. The effectiveness of the norms is shown graphically in Table 11.

TABLE 11
Effectiveness of S-4 Norms

	Without Tests	With Tests
Good Workers	70%	76%
Poor Workers	30%	24%

TABLE 12

Concurrent Validity of S-4 Norms of P-75, K-75, F-80 and M-75 on Check Study No. 1

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	15	88	103
Poor Workers	18	27	.45
Total	33	115	148 #

Phi Coefficient (ϕ) = .26

Chi Square (X^2_y) = 10.3

Significance Level = /2 < .0005

#Does not include 8 workers from Sample B-4 for whom complete data were not available.

CHECK STUDY RESEARCH SUMMARY SHEET

S-4 GATB # 2139

Glove Sewer (glove & mit.) 787.782

Check Study # 2 Research Summary

Sample:

58 females employed Glove Sewers in Greenvile, Alabama. This study was conducted prior to the requirement of providing minority group information. Therefore, minority group composition is unknown.

TABLE 13

Means, Standard Deviations (SD), and Pearson Product-Moment Correlations with the Criterion for Age, Education, Experience and the Aptitudes of the GATB. (B-1002A) N = 58

	Mean	SD	r
Age (years)	27.9	6.0	-.164
Education (years)	10.1	1.5	.208
Experience (months)	32.8	20.0	.286*
G -- General Learning Ability	88.1	13.3	.258
V - Verbal Aptitude	86.1	11.7	.104
N - Numerical Aptitude	87.9	15.5	.276*
S - Spatial Aptitude	89.0	15.4	.198
P - Form Perception	94.5	18.0	.318*
Q - Clerical Aptitude	93.3	14.0	.469**
K - Motor Coordination	98.4	16.8	.214
F - Finger Dexterity	101.4	16.4	.099
M - Manual Dexterity	107.3	17.3	.174

*Significant at the .05 level
**Significant at the .01 level

Criterion:

The average hourly earnings for the most recent 4 week pay periods were selected as the criterion. The production standard has been established so that 100 percent equals $1.15 per hour in earnings. Criterion was collected in 1956.

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Principle Activities:

The job duties of the occupation are comparible to those listed in the appendix.

Concurrent Validity:

Phi Coefficient = .30 $P/2 < .025$

Effectiveness of the Norms:

Only 71% of the nontest-selected workers in this sample were good workers; if the workers had been test-selected with the S-4 norms, 80% would have been good workers. Twenty-nine percent of the nontest-selected workers used in this study were poor workers; if the workers had been test-selected with the S-4 norms, only 20% would have been poor workers. The effectiveness of the norms is shown graphically in Table 14.

TABLE 14
Effectiveness of S-4 Norms

	Without Tests	With Tests
Good Workers	71%	80%
Poor Workers	29%	20%

TABLE 15
Concurrent Validity of S-4 Norms of P-75, K-75, F-80, and M-75 on Check Study # 2

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	6	35	41
Poor Workers	8	9	17
Total	14	44	58

Phi Coefficient (ϕ) = .30 Chi Square (x^2_y) = 5.3

Significance Level = $P/2 < .025$

CHECK STUDY RESEARCH SUMMARY SHEET

S-4 GATB # 2669

Sewing Machine Operator, Regular Equipment
(boot & show) 787.782

Check Study #3 Research Summary

Sample:

75 female Sewing Machine Operators employed in Columbus, Ohio.
19 Negroes and 1 Oriental were in the minority group sample.

TABLE 16
Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion for Age, Education, Experience and the Aptitudes of the GATB. N=75

	Mean	SD	Range	r
Age (years)	44.9	12.0	20-63	-.169
Education (years)	10.3	1.5	8-12	.245*
Experience (months)	102.8	80.8	12-399	.066
G - General Learning Ability	78.1	12.7	45-117	-.054
V - Verbal Aptitude	83.4	11.2	66-119	-.117
N - Numerical Aptitude	76.7	16.5	28-131	.112
S - Spatial Aptitude	86.9	14.0	58-117	-.050
P - Form Perception	87.9	20.0	33-139	.134
Q - Clerical Perception	100.2	15.3	69-143	.023
K - Motor Coordination	89.2	15.4	53-124	.237*
F - Finger Dexterity	85.1	22.6	43-137	.182
M - Manual Dexterity	81.9	18.2	36-117	.178

*Significant at the .05 level

Criterion:

The criterion data consisted of the product of the average weekly percent of efficiency and on-half of the training period for the sewing operation.
Criterion was collected in 1967.

Design:

Concurrent (test and criterion data were collected at approximately the same time.)

Principle Activities:

The job duties of the occupation are comparable to those listed in the appendix.

Concurrent Validity:

Phi Coefficient = .26 P/2 < .025

Effectiveness of the Norms:

Only 67% of the nontest-selected workers used for this study were good workers. If the workers had been test-selected with the above norms, 82% would have been good workers. Thirty-three percent of the nontest-selected workers were poor workers. If the workers had been test-selected with the above norms, only 18% would have been poor workers. The effectiveness of the norms is shown graphically in Table 17.

TABLE 17
Effectiveness of S-4 Norms

	Without Tests	With Tests
Good Workers	67%	82%
Poor Workers	33%	18%

TABLE 18
Concurrent Validity of S-4 Norms of P-75, K-75, F-80, and M-75 on Check Study # 3

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	23	27	50
Poor Workers	19	6	25
Total	42	33	75

Phi Coefficient (ϕ) = .26 Chi Square (x_y^2) = 4.9

Significance Level = P/2 < .025

FACT SHEET

Job Title: Sewing Machine Operator, Lingerie (garment) 786.782
Sewing Machine Operator, Men's Tailored Garments (garment) 786.782
Sewing Machine Operator, Style Garments (garment) 786.782
Sewing Machine Operator, Regular Equipment (boot & shoe) 787.782

Job Summary:

Operates an industrial type electrically powered sewing machine with or without special attachments, single or double needle, to perform miscellaneous sewing jobs on cottons, woolens, silks and rayons.

Work Performed:

Threads and adjusts machine: selects spool or cone of thread according to the type and color of material to be worked upon; places on spool pin of machine and passes end of thread through retainers, tension disks, springs, guide and eye of needle; moves guides, levers or adjusts knobs to regulate tension on thread and length of stitch; removes spent bobbins from case of machine and replaces with wound bobbins; clamps new needles on machine to replace bent, broken or dull ones; may attach and adjust attachments such as folding guide, presser foot, walking foot or gathering devices; mounts winding attachment and rewinds bobbins while sewing; oils machine and wipes it clean at regular intervals.

Prepares parts of garments for sewing: arranges parts of garments in bundles near machine and within reach so that parts can be joined together quickly and appropriately' selects parts by observing identification marks on edge of part and by feeling the weave of cloth.

Sews garments or garment parts: moves hand or knee lever to raise presser foot of machine, arranges parts in position for stitching, and lowers presser foot; depresses foot pedal to start machine and guides cloth with hands so that stitching follows the required path; stops machine by reversing pressure on foot pedal or "heeling" raises presser foot or pushes completed section from machine, cutting or breaking, wherever necessary, the thread that extends to needle.

Job Title: Straw-Hat-Machine Operator (hat & cap) 787.782

Job Summary:

Operates a power sewing machine to sew braid with edges overlapping in an enlarging spiral to form straw hat.

Job Title: Glove Sewer (glove & mit.) 787.782 (cross-validation #2)

Job Summary:

Operates a single needle, power sewing machine to sew precut parts of cloth and cloth-leather work gloves. Sews thumb and fingers to palm to form backs (Backer). Closes fingers and wrist to form completed gloves (Closer). Assembles sewed parts in bundles, identifies each bundle with a job ticket, and places bundles in boxes for transfer to next operation

Effectiveness of Norms:

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-4 norms, 74% would have been good workers. Thirty-six percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-4 norms, only 26% would have been poor workers **(Validation sample)**

Only 70% of the nontest-selected workers in this sample were good workers; if the workers had been test-selected with the S-4 norms, 76% would have been good workers. Thirty percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-4 norms, only 24% would have been poor workers. **(Cross Validation # 1)**

Only 71% of the nontest-selected workers in this sample were good workers; if the workers had been test-selected with the S-4 norms, 80% would have been good workers. Twenty-nine percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-4 norms, only 20% would have been poor workers. **(Cross Validation # 2)**

Only 67% of the nontest-selected workers used for this study were good workers. If the workers had been test-selected with the above norms, 82% would have been good workers. Thirty-three percent of the nontest-selected workers were poor workers. If the workers had been test-selected with the above norms, only 18% would have been poor workers. **(Cross Validation # 3)**

Applicability of S-4 Norms:

The aptitude test battery is applicable to jobs which include a majority of job duties described above.

GPO 899.344