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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 also included.

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

PRESSER, HAND (any ind.) 7-57.501  
SILK FINISHER, HAND (clean. dye & press.) 7-57.501

B-401 or S-138

U. S. Employment Service in  
Cooperation with the  
Pennsylvania and Utah State Employment Services

U. S. DEPARTMENT OF LABOR  
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STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY  
 FOR  
 PRESSER, HAND 7-57.501  
 SILK FINISHER, HAND 7-57.501

B-401 or S-138

Summary

The General Aptitude Test Battery, B-1002A, was administered to two samples of workers employed as Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501. The state in which the sample was obtained, the occupation covered, the number included in the final experimental sample and the type of criterion used for validation purposes are shown below for each sample.

<u>State</u>	<u>D.O.T. Title</u>	<u>N</u>	<u>Criterion</u>
Pennsylvania	Presser, Hand 7-57.501	53	Average hourly earnings
Utah	Silk Finisher, Hand 7-57.501	40	Supervisory ratings -- descriptive rating scale

Data for the two samples were analyzed separately and in combination. On the basis of the statistical and qualitative analysis of the data, Aptitudes Q-Clerical Perception, K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501 - B-401 or S-138

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-401 or S-138

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
Q	CB-1-B	75	Q	Part 1	80
T	CB-1-G CB-1-K	75	K	Part 8	80
F	CB-1-O CB-1-P	80	F	Part 11 Part 12	75
M	CB-1-M CB-1-N	95	M	Part 9 Part 10	90

Effectiveness of Norms

The data in Table IV-C indicate that 21 of the 32 poor workers, or 66 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 66 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 51 of the 62 workers who made qualifying test scores, or 82 percent, were good workers.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupations of Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501.

II. Samples

This study is based on two samples of workers employed as Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501 at the Phillips-Jones Corporation, Pottsville, Pennsylvania, and in several dry cleaning establishments in the Salt Lake City, Utah area. The test norms were developed on the basis of the results of both samples.

A. Sample I - Presser, Hand (Pennsylvania)

The General Aptitude Test Battery, B-1002A, was administered in February 1955 to 59 women employed as Presser, Hand 7-57.501 by the Phillips-Jones Corporation, Pottsville, Pennsylvania. There are 71 women employed in this occupation in the three plants of this company in the Pottsville area. The job is the same in all three plants so all of the groups were included in the sample. Of the 73 women employed on this job, 7 were absent on the date of testing or refused to take the test, six were eliminated from the sample because of lack of criterion data and one girl was on leave because of pregnancy. Thus the tested sample included 59 women. Of this group, three were eliminated from the sample because of age, and three because criterion data were not available for them for the same period of time as for the other workers. Therefore, the final sample for this study consists of 53 women.

The Forelady is responsible for training the new workers. Training time consists of a period of 12 weeks. There are three tasks to the job and four weeks are spent in learning each of them. The new employees are trained on all three tasks. In order to learn the pressing tasks the girls go right on the job and are helped by the other girls until they gain speed. Those who are learning to fold are put at a training table.

There are no age or experience requirements for this job but eight years of education is preferred. The selection of applicants is made by the Personnel Manager on the basis of a personal interview.

B. Sample II - Silk Finisher, Hand 7-57.501 (Utah)

The General Aptitude Test Battery, B-1002A, was administered during the period December 1955 to July 1956 to 38 women and 2 men employed as Silk Finisher, Hand 7-57.501 in several dry cleaning plants in the Salt Lake City, Utah area. There are no age or education requirements; however, all the tested workers had at least six years of education. A survey of nine plant managers indicated that six months' experience was necessary

in order for workers to achieve maximum job proficiency in this occupation. All the workers in the sample had at least six months of total experience.

Tables II-A and II-B show the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education, and experience for Samples I and II. Table II-C shows the means, standard deviations, and ranges for age, education, and experience for the Combined Sample.

The means and standard deviations of the aptitudes are comparable to general working population norms with a mean of 100 and a standard deviation of 20.

TABLE II -A

Means (M), Standard Deviations ( $\sigma$ ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

Presser, Hand 7-57.501  
Sample I  
N = 53

	M	$\sigma$	Range	r
Age (years)	29.0	7.8	18-45	-.232
Education (years)	10.2	1.8	6-12	.237
Experience	58.6	38.0	7-156	.163

TABLE II-B

Means (M), Standard Deviations ( $\sigma$ ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

Silk Finisher 7-57.501  
Sample II  
N = 40

	M	$\sigma$	Range	r
Age (years)	39.9	10.5	19-54	-.158
Education (years)	10.3	1.9	7-16	.348*
Experience (months)	50.7	51.3	2-240	.302

\* Significant at the .05 level

TABLE II-C

Means (M), Standard Deviations ( $\sigma$ ) and Ranges for Age, Education, and Experience

Presser, Hand 7-57.501  
Silk Finisher, Hand 7-57.501  
N = 93

	M	$\sigma$	Range
Age (years)	33.7	10.6	18-54
Education (years)	10.2	1.9	6-16
Experience (months)	55.2	44.4	2-240

The data in Table II-A indicate that there are no significant correlations between age, education, or experience and the criterion for Sample I. Although the negative correlation between age and the criterion is not significant, it may indicate that the younger workers tend to work somewhat faster than the others in the sample. Only 5 of the 53 women in the sample have less than the desired eighth grade education. The data in Table II-B indicate that there are no significant correlations between age or experience and the criterion for Sample II.

The significant correlation between education and the criterion indicates that there is a tendency for the better educated workers to receive higher ratings. The data in Tables II-A and II-B indicate that the two samples are suitable for test development purposes with respect to age, education, and experience, and that the analysis of data may be based on the Combined Sample where such combination can be justified statistically.

### III. Job Descriptions

Sample I

Job Title: Presser, Hand 7-57.501

Job Summary: Presses cuffs and yokes of men's shirts with a hand iron. Lays out shirt on a pressing table and presses front of shirt. Folds and pins shirt to give it a finished appearance. Places shirt on adjacent table for inspection.

Work Performed: Presses cuffs and yoke with hand iron; Lays shirt with pre-pressed collar, front up, on padded pressing table; dampens cuffs and yoke with air operated hose sprayer in preparation for pressing; sponges yoke with starch by rubbing sponge lightly over yoke; irons cuffs and yoke to give smooth finished appearance (sleeves are not ironed, only the cuff and sleeve facing). Places cardboard strip in collar band and folds over collar; runs iron over collar and rolls at the same time to give collar oval shape. Buttons top button using shoe type buttoner; pins collar at button to maintain uniform tie space; buttons remainder of shirt front in preparation for ironing.

Lays out shirt and presses front; Places collar block in shirt to keep collar in shape while handling shirt; lays out shirt, front up, on pressing table; places collar on holder which is set in table to keep shirt in place; smooths shirt by running hands over front and places shirt tail in tail clamp to take out fullness in material; smooths and pins shoulders to pressing table. Dampens front of shirt with hose sprayer; sponges shoulders and center piece of shirt between first and second button with starch. Irons shoulders and front of shirt with precise movement to obtained finished appearance; removes collar block; loops stringed price tag to second button.

Folds and pins shirt; Lays pressed shirt, face downward, on pressing table, placing collar of shirt over block to hold it in position; places tissue paper followed by insert board over back of shirt; positions metal folding board on insert board to center shirt while folding. Folds sleeves and cuffs, folds sides of shirt smoothly over metal board and pins them; folds extreme end of shirt tail up sufficiently so that another fold over the edge of the board will match with the shoulders; removes metal folding board and rapidly runs iron over back and front of shirt to give it a smooth, unwrinkled finish. May pin shirt at collar top to take fullness out of shirt between first and second button. Places shirt on adjacent table for Examiner.

Sample II

Job Title: Silk Finisher, Hand 7-57.501

Job Summary: Presses women's dresses, skirts and blouses by use of a silk finishing unit consisting of puff irons, press buck, pressing heads, steam ironing board and hand iron. Removes the deep-set wrinkles by use of the appropriate puff irons and pressing heads. Completes the final touching up of the garment on a steam ironing board with a hand iron.

Work Performed: Selects dress from incoming feed rail, slides right sleeve of dress onto sleeve-shaped puff iron; holds sleeve taut by gathering loose material underneath puff iron with left hand and excess material at shoulder of dress with right hand; steams fabric lightly by pressing steam pedal with right foot; removes deep-set wrinkles by lowering canvas head with right hand; stops steam, raises head and dries fabric with vacuum by depressing pedal with left foot.

Turns sleeve on puff iron to finish unpressed half and repeats above process. Does left sleeve in same manner as right sleeve.

Arranges right shoulder portion of dress on shoulder-shaped puff iron; holds material taut on iron; steams fabric lightly; lowers head to remove deep-set wrinkles; stops steam, raises head and dries fabric. Does left shoulder in same manner as right shoulder.

Places upper portion of back of dress on mushroom puff iron; holds material taut, steams fabric lightly; removes deep-set wrinkles by lowering canvas head; stops steam, raises head and dries fabric; places lower portion of dress back on iron and repeats process; places top portion of skirt from waistline down six inches



on iron and finishes in same way; places top portion of dress front on mushroom iron; steams lightly, lowers head, dries fabric; repeats process for lower front of dress and top portion of skirt front. Removes wrinkles from heavily gathered areas of dress by holding these portions taut over egg-shaped puff iron and steaming lightly.

Turns dress inside out and places skirt on small end of utility press buck; sprays skirt area lightly with fine water spray by pulling trigger of spray gun held in left hand; lowers hothead of press by pressing one of two buttons; steams lightly with buck steam by depressing pedal with right foot; raises head by releasing button and cools fabric by depressing vacuum pedal with left foot. Presses remaining area of skirt by same process.

Removes dress from utility press and completes necessary touch-ups on the steam ironing board. Places dress on hanger, inspects carefully and places on outgoing express rail.

#### IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to each sample.

#### V. Criteria

##### A. Sample I - Presser, Hand 7-57.501

The criterion consists of average hourly wages based on an eight week period. Although the girls work in teams of three, they work interchangeably and the hourly rate of each girl is determined by her own actual production, independently of the team. The same rates of pay and levels of production are maintained in all three plants so that the criteria were sufficiently comparable to be combined into one distribution for the 53 workers. The average hourly rates of wages for the eight week period ranged from \$.86 to \$1.46 with a mean of \$1.21 and a standard deviation of \$.16.

##### B. Sample II - Silk Finisher, Hand 7-57.501

The criterion consists of supervisors' ratings. Production records could not be used for the criterion since only one plant of the experimental sample kept such records. Also, the types of machinery used in each plant varied to the extent that if production records had been kept for the purpose of this study, they would not have been comparable. Similarly, other objective types of criterion were not possible because of the lack of uniformity from one plant to another. Therefore, it was felt that a descriptive rating scale was the best available method of obtaining a valid criterion.

Two descriptive rating scales with items covering the traits of quantity and quality of production were developed. One scale consisted of long, detailed statements of the trait and judgment levels. The other consisted of short phrases describing the trait and judgment levels. The long form (Rating Scale A) presented five judgment levels in order from poor to excellent. The short form (Rating Scale B) listed the five judgment levels at random.

In an effort to control "halo" each trait was printed separately, and supervisor rated all workers in his sample on one trait at a time. Ratings were made on the long form one week, the short form the second week, long form again the third week and the short form again the fourth week. Verbal instructions concerning the importance of the ratings and the errors of leniency and central tendency were given to the raters before ratings were made.

A total proficiency score for each scale was obtained by adding the scores on quantity and quality of production. These scores could range from 0 to 40. The product-moment correlations between the first and second ratings on Scale A (Long Form) and Scale B (Short Form) were .79 and .85, respectively. The reliability of the sum of the ratings for both scales as estimated by the Spearman-Brown prophecy formula, was .94. The reliability coefficients indicate a considerable degree of consistency in ratings on both scales. However, it was felt that ratings made over a four week period would be more valid than those made over a two week period. Therefore, the first and second ratings on Scale A and the first and second ratings on Scale B were added together to make the final criterion score. The possible range of the final criterion scores was from 8 to 40. The actual range was 12 to 38 with a mean score of 28.0 and a standard deviation of 5.4.

## VI. Statistical and Qualitative Analyses

The data for the two samples were analyzed separately and in combination on the basis of both statistical and qualitative considerations. Means, standard deviations, and correlations with the criteria were calculated for the aptitude scores for each sample separately. Means and standard deviations of the aptitude scores were also calculated for the Combined Sample.

### A. Statistical Analysis:

Tables III-A and III-B show the means, standard deviations, and Pearson product-moment correlations with the criteria for the aptitudes of the GATB, for Sample I and Sample II. Table III-C shows the means and standard deviations for the aptitudes of the GATB for the Combined Sample. The means and standard deviations of the aptitudes are comparable to general working population norms with a mean of 100 and a standard deviation of 20.

TABLE III-A

Means (M), Standard Deviations ( $\sigma$ ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Presser, Hand 7-57.501

Sample I  
N = 53

Aptitudes	M	$\sigma$	r
G-Intelligence	82.9	14.3	.242
V-Verbal Aptitude	89.2	11.4	.143
N-Numerical Aptitude	87.8	15.9	.400**
S-Spatial Aptitude	81.6	14.4	.238
P-Form Perception	98.5	22.1	.298*
Q-Clerical Perception	104.5	16.5	.332*
K-Motor Coordination	112.2	17.6	.209
F-Finger Dexterity	94.0	22.4	.319*
M-Manual Dexterity	109.2	22.9	.343*

TABLE III-B

Means (M), Standard Deviations ( $\sigma$ ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Silk Finisher, Hand 7-57.501

Sample II  
N = 40

Aptitudes	M	$\sigma$	r
G-Intelligence	96.3	17.8	.212
V-Verbal Aptitude	93.2	17.1	.084
N-Numerical Aptitude	88.7	20.6	.122
S-Spatial Aptitude	100.9	19.6	.181
P-Form Perception	99.3	20.8	.442**
Q-Clerical Perception	101.9	19.3	.322*
K-Motor Coordination	101.3	19.3	.389*
F-Finger Dexterity	96.6	22.3	.389*
M-Manual Dexterity	109.3	20.3	.658**

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

TABLE III-C

Means (M) and Standard Deviations ( $\sigma$ ) for the Aptitudes of the GATB

Presser, Hand 7-57.501  
Silk Finisher, Hand 7-57.501  
Combined Sample  
N = 93

Aptitudes	M	$\sigma$
G-Intelligence	88.7	17.2
V-Verbal Aptitude	90.9	14.3
N-Numerical Aptitude	88.2	18.1
S-Spatial Aptitude	89.9	19.4
P-Form Perception	98.9	21.5
Q-Clerical Perception	103.4	17.8
K-Motor Coordination	107.5	19.1
F-Finger Dexterity	95.2	22.4
M-Manual Dexterity	109.2	21.8

The data for Sample I, which appear in Table III-A show that Aptitude N correlates significantly with the criterion at the .01 level and Aptitudes P, Q, F, and M correlate significantly with the criterion at the .05 level of confidence. The data for Sample II which appear in Table III-B show that Aptitudes P and M correlate significantly with the criterion at the .01 level and Aptitudes Q, K, and F correlate significantly with the criterion at the .05 level of confidence. The data for the Combined Sample, which appear in Table IV-C show that the highest mean scores in decreasing order of magnitude were obtained for Aptitudes M, K, Q, and P.

B. Qualitative Analysis:

The statistical results were interpreted in the light of the job analysis data for both samples.

The job analyses for Sample I (Presser, Hand) and Sample II (Silk Finisher, Hand) indicated that the following aptitudes measured by the GATB appear to be important for both of these occupations:

Form Perception (P) - required to lay out garments on pressing table to facilitate pressing of various portions of the garment, to fold garments evenly, and to detect details of minor imperfections of the finished garments.

Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M) - required to take garments from the feed rail, to quickly turn garments over and inside out, to rapidly place garments on puff irons, to spray garments, and to depress buttons for operating machines. Also required to smooth wrinkles and straighten pleats or gathers, to quickly and accurately fold garments, and to use hand iron for final touch up process.

### C. Selection of Test Norms:

On the basis of the quantitative and qualitative evidence cited above, Aptitudes P, Q, K, F, and M were given further consideration for inclusion in the norms. Aptitudes P, K, F, and M appeared to be important on the basis of the job analysis data. Aptitudes P, Q, and F show significant correlations with the criteria for both samples. Aptitude M shows significant correlation with the criterion for Sample I and Aptitude K shows significant correlation with the criterion for Sample II. In addition, Aptitudes P, Q, K, and M show the highest mean scores for the Combined Sample. Although Aptitude N showed significant correlation with the criterion for Sample I, it was not given further consideration for inclusion in the test norms because there was no other qualitative or quantitative evidence.

Various combinations of Aptitudes P, Q, K, F, and M were selected as trial norms. Means and standard deviations of the Combined Sample (N = 93) were used as guides to set cutting scores for these trial norms. The relationship between each set of trial norms and the dichotomized criterion for each sample and for the Combined Sample was determined by means of the tetrachoric correlation technique. The results showed that the best selective efficiency was obtained for norms consisting of Aptitudes Q, K, F, and M with cutting scores of 80, 80, 75, and 90, respectively.

In test development studies, an attempt is made to develop a set of norms such that the cutting scores for each aptitude will be set at a five-point score level close to one standard deviation below the aptitude mean of the experimental sample. Adjustments of cutting scores from one standard deviation below the mean are made to effect better selective efficiency of the norms. In the case of this study, the aptitude cutting scores are each within 10 points of one standard deviation below the aptitude mean of the Combined Sample.

### VII. Concurrent Validity of Norms

In order to compute the tetrachoric correlation coefficients between the norms and the criteria and apply the Chi Square test, the criteria for the two samples were dichotomized. For Sample I, the criterion was dichotomized with an average hourly wage of \$1.15 as the critical score. This is the minimum earning level that the company feels a worker should achieve to be considered as satisfactory. Those workers who earned an average of \$1.15 or more per hour were placed in the high criterion group; all others were placed in the low criterion group. For Sample II, the criterion was dichotomized with a total score of 27 as the critical score. Those workers with a total score of 27 or more were placed in the high criterion group; all others were placed in the low criterion group.

Tables IV-A and IV-B show the relationship between test norms consisting of Aptitudes Q, K, F, and M with minimum scores of 80, 80, 75, and 90, respectively, and the dichotomized criteria for Sample I and Sample II, respectively. Table IV-C which is a composite of Tables IV-A and IV-B, shows the selective efficiency of the norms for the Combined Sample. Workers in each high crite-

riterion group have been designated as "good workers" and those in each low criterion group have been designated as "poor workers."

TABLE IV-A

Relationship between Test Norms Consisting of Aptitudes Q, K, F, and M with Critical Scores of 80, 80, 75, and 90, Respectively, and the Criterion for Presser, Hand 7-57.501

Sample I  
N = 53

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	32	37
Poor Workers	10	6	16
Total	15	38	53

$$r_{tet} = .74 \qquad X^2 = 10.905$$

$$\sigma_{r_{tet}} = .24 \qquad P/2 < .0005$$

The data in the above table indicates a significant relationship between the test norms and the criterion for Sample I.

TABLE IV-B

Relationship between Test Norms Consisting of Aptitudes Q, K, F, and M with Critical Scores of 80, 80, 75, and 90, Respectively, and the Criterion for Silk Finisher, Hand 7-57.501

Sample II  
N = 40

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	19	24
Poor Workers	11	5	16
Total	16	24	40

$$r_{tet} = .69 \qquad X^2 = 7.296$$

$$\sigma_{r_{tet}} = .26 \qquad P/2 < .005$$

The data in the above table indicate a significant relationship between the test norms and the criterion for Sample II.

TABLE IV-C

Relationship between Test Norms Consisting of Aptitudes Q, K, F, and M with Critical Scores of 80, 80, 75, and 90, Respectively, and the Criterion for the Combined Sample

Presser, Hand 7-57.501  
Silk Finisher, Hand 7-57.501  
N = 93

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	10	51	61
Poor Workers	21	11	32
Total	31	62	93

$$r_{tet} = .72$$

$$\chi^2 = 20.731$$

$$\sigma_{r_{tet}} = .17$$

$$P/2 < .0005$$

The data in the above table indicate a significant relationship between the test norms and the criterion for the Combined Sample.

### VIII. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes Q, K, F, and M with minimum scores of 80, 80, 75, and 90, respectively, are recommended as B-1002 norms for the occupations of Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501. The equivalent B-1001 norms consist of Q-75, T-75, F-80, and M-95.

### IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include four aptitudes, only those occupational aptitude patterns which include three of those four aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. The only one of the existing 23 occupational aptitude patterns which meets these criteria for this study is OAP-17, which consists of K-85, F-80, and M-80 for B-1002. The selective efficiency of OAP-17 for the Combined Sample was determined by means of the tetrachoric correlation technique. A tetrachoric correlation of .45 with a standard error of .17 was obtained, which indicates a significant relationship between OAP-17 and the criterion for this experimental sample. The proportion of the sample screened out by OAP-17 was .32, which is within the required range of .10 to .60. Therefore, it is recommended that OAP-17 be used in counseling for the occupations of Presser, Hand 7-57.501 and Silk Finisher, Hand 7-57.501.