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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)

# TECHNICAL REPORT

# ON

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

# FOR

# ELECTRIC-CORD ASSEMBLER II (elec. equip.) 9-00.91

B-521 S-244

(Supersedes B-169)



U. S. Employment Service in
Cooperation with
California and Indiana State Employment Services

April 1963

GATB # 2412

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

# ELECTRIC-CORD ASSEMBLER II (elec. equip.) 9-00.91

B- 521

(Supersedes B-169)

## Summary

The General Aptitude Test Battery, B-1002A, was administered to a final sample of 56 women employed as Electric-Cord Assembler II 9-00.91 at Pacific Electric-cord Corporation, Los Angeles, California, and Belden Manufacturing Company Richmond, Indiana. The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data and their combined selective efficiency, Aptitudes K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Electric-Cord Assembler II 9-00.91, B-521

| B-1001 | | | B-1002 | | |
|---|---|---|---|---|---|
| Aptitude | Tests | Minimum Acceptable Aptitude Score | Aptitude | Tests | Minimum Acceptable Aptitude Score |
| T | CB-1- G<br>CB-1- K | 85 | K | Part 8 | 90 |
| F | CB-1- O<br>CB-1- P | 90 | F | Part 11<br>Part 12 | 85 |
| M | CB-1- M<br>CB-1- N | 105 | M | Part 9<br>Part 10 | 100 |

## Effectiveness of Norms

The data in Table IV indicate that 13 of the 19 poor workers, or 68 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 68 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 28 of the 34 workers who made qualifying test scores, or 82 percent, were good workers.

I. Purpose

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 occupation of Electric-Cord Assembler II 9-00.91.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered during the period February 1961 to January 1962 to 73 women employed as Cord Assemblers at Pacific Electricord Corporation, Los Angeles, California, and Belden Manufacturing Company, Richmond, Indiana. In the Indiana sample, 15 women were tested and none were eliminated from the study. In the California sample, 58 women were tested, and 17 workers were eliminated from the sample because they were not performing comparable work. Thus, the final experimental sample consisted of 56 women.

Entrance requirements for this job vary with each plant. Belden Manufacturing Company will hire inexperienced applicants who are selected, tested, and referred by the Indiana Employment Agency. There were no personnel problems at the Indiana plant at the time the worker sample was tested. Pacific Electricord Corporation will hire applicants between 21 and 40 years old. There are no set requirements for education. This corporation prefers workers with at least one year of factory experience. Any type of factory experience will be acceptable. At Belden Manufacturing Company the training period consists of 8 weeks of on-the-job training. At Pacific Electricord Corporation, the training period consists of one month to three months of on-the-job training. All women in the sample perform comparable work and all are considered experienced workers.

TABLE I

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

| N = 56 | M | $\sigma$ | Range | r |
|---|---|---|---|---|
| Age (years) | 37.7 | 7.7 | 24-55 | .055 |
| Education (years) | 11.0 | 1.6 | 6-14 | .119 |
| Experience (months) | 69.6 | 73.2 | 4-402 | .305* |

*Significant at the .05 level

The significant correlation in Table I indicates that either (1) the more experienced workers performed better on the job, or (2) raters were biased in giving higher ratings to these workers.

## III. Job Description

**Job Title:** Electric-Cord Assembler II (elec. equip.) 9-00.91

**Job Summary:** Prepares electric cords for use on appliances by performing stripping, assembling and finishing operations. Performs any combination of operations such as soldering prongs, attaching plugs to wires, coating plugs, and stripping wire. Uses pliers, screw drivers, and similar hand tools, and machines such as power screw driver, rivet machine, crimping machine, blading machine, soldering machine, and injection molding machine. May set up and adjust machines, using hand tools.

**Work Performed:** Performs one or more of the following tasks in the manufacture of electric cords: Operates a Power-Driven Screwdriver to screw nuts and bolts on shell case ends of pre-assembled rubber or cloth type cords. Operates an automatic Rivet Machine to assemble cube plastic shell ends on plastic type of electric cords. Operates a Crimping Machine to snap on prong metal ends on electric cords. Operates a Blading Machine to clamp blades or prongs on end of electric cords. Operates an Injection Molding Machine (MOSLO) to form neophrene or plastic type electric cord socket plugs. Solders stripped cord ends to metal pronged terminal by dipping prong into an electric soldering pot. On completion of assembly of entire rack of cords, tears perforated Work Ticket from work order, initials work order and ticket, puts work order on rack with completed cords, and puts work ticket in Work Book.

## IV. Experimental Battery

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

## V. Criterion

The criterion consisted of supervisory ratings made on a descriptive rating scale. Two sets of ratings were prepared by the workers' immediate supervisor. The ratings were prepared during the period March 9, 1961 through May 31, 1962. Reratings were made two weeks following initial ratings. Each rating scale consisted of seven items with five alternatives for each item. The alternatives indicated the degree of proficiency attained. Weights of one through five were assigned to the alternatives so that the minimum possible total score was seven and the maximum thirty-five. The coefficient of reliability between the two ratings was .766 indicating a significant relationship. The final criterion consisted of the combined scores of the two sets of supervisory ratings. The distribution of the combined scores ranged from 36 to 66, with a mean score of 52.6 and a standard deviation of 7.3.

## VI. Qualitative and Quantitative Analyses

### A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation:

Form Perception (P) - required to visually inspect assembled pieces and molds and to look for defects in plastic molds.

Motor Coordination (K) - required to operate machines; necessary to keep steady work flow.

Finger Dexterity (F) - required to assemble small parts onto cord ends and hold positioned parts in place while fastening together with power machines; to twist ends of wire and place small parts on machine plates.

Manual Dexterity (M) - required to remove molded plugs from dies of injection molding machine; to take handful of cords prior to each operation; and to place and remove cord ends from machine.

On the basis of the job analysis data, Verbal Aptitude (V) and Numerical Aptitude (N) were rated "irrelevant" for successfully performing the duties of this job.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations ($\sigma$), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 56

| Aptitudes | M | $\sigma$ | r |
|---|---|---|---|
| G-Intelligence | 92.0 | 14.8 | .209 |
| V-Verbal Aptitude | 95.4 | 15.7 | -.003 |
| N-Numerical Aptitude | 91.4 | 19.8 | .282* |
| S-Spatial Aptitude | 90.4 | 13.8 | .240 |
| P-Form Perception | 95.8 | 18.4 | .228 |
| Q-Clerical Perception | 102.3 | 15.2 | .047 |
| K-Motor Coordination | 103.9 | 15.1 | .165 |
| F-Finger Dexterity | 103.3 | 19.7 | .068 |
| M-Manual Dexterity | 111.5 | 15.6 | .282* |

*Significant at the .05 level

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

| Type of Evidence | Aptitudes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G | V | N | S | P | Q | K | F | M |
| Job Analysis Data | | | | | | | | | |
| Important | | | | | X | | X | X | X |
| Irrelevant | | X | X | | | | | | |
| Relatively High Mean | | | | | | X | X | X | X |
| Relatively Low Sigma | X | | | X | | | | | |
| Significant Correlation with Criterion | | | X | | | | | | X |
| Aptitudes to be Considered for Trial Norms | | | | | | | K | F | M |

Trial norms consisting of various combinations of Aptitudes K, F and M with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of K-90, F-85 and M-100 had the best selective efficiency.

## VII. Validity of Norms (Concurrent)

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 34 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes K, F and M with critical scores of 90, 85 and 100, respectively, and the dichotomized criterion for Electric-Cord Assembler II 9-00.91. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Electric-Cord Assembler II 9-00.91
(K-90, F-85, M-100)

| N = 56 | Non-Qualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Workers | 9 | 28 | 37 |
| Poor Workers | 13 | 6 | 19 |
| Total | 22 | 34 | 56 |

Phi Coefficient = .43
$\chi^2$ = 10.209
P/2 < .005

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

## VIII. Conclusions

On the basis of the results of this study, Aptitudes K, F and M with minimum scores of 90, 85 and 100, respectively, have been established as B-1002 norms for Electric-Cord Assembler II 9-00.91. The equivalent B-1001 norms consist of T-85, F-90 and M-105.

## IX. Determination of Occupational Aptitude Pattern

Of the existing 35 OAP's (revised 10/61), a significant relationship between OAP-34 and the criterion for the experimental sample was obtained. The proportion of the sample screened out by OAP-34 was .34, which is within the required range of .10 to .60. Therefore, the occupation of Electric-Cord Assembler II 9-00.91 has been incorporated into OAP-34.