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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. (AG)

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Condenser Winder (electronics) 6-98.070
Stamper II (electronics) 9-68.20
Welder, Spot (electronics) 6-85.060

B-492 S-219

U. S. Employment Service in
Cooperation with
South Carolina State Employment Service

February 1963

GATB #2361

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B-492

Summary

The General Aptitude Test Battery, B-1002A, was administered to a final sample of 60 female workers employed by the General Electric Company, Irmo, South Carolina. 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 G-Intelligence, S-Spatial Aptitude, K-Motor Coordination and F-Finger Dexterity were selected for inclusion in the final test norms.

GATB Norms for Condenser Winder (electronics) 6-98.070, Stamper II (electronics) 9-68.20, and Welder, Spot (electronics) 6-85.060. B-492.

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
G	CB-1- H CB-1- I CB-1- J	80	G	Part 3 Part 4 Part 6	75
S	CB-1- F CB-1- H	80	S	Part 3	75
T	CB-1- G CB-1- K	80	K	Part 8	85
F	CB-1- O CB-1- P	95	F	Part11 Part12	90

Effectiveness of Norms

The data in Table IV indicate that 11 of the 21 poor workers, or 52 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 52 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 32 of the 42 workers who made qualifying test scores, or 76 percent, were good workers.

TECHNICAL REPORT

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 Condenser Winder 6-98.070, Stamper II 9-68.20 and Welder, Spot 6-85.060.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered in August and September of 1960 to sixty female workers employed as Condenser Winders 6-98.070, Stampers II 9-68.20 and Welders, Spot 6-85.060. Workers are selected for employment after having been pre-screened without the use of tests by the South Carolina State Employment Service. The Personnel Officer of the plant interviews these applicants once a week at the local office where they receive application blanks to be filled out. These are later called in to the plant for a subsequent interview by the Personnel Officer and, with the approval of the Supervisor in the plant, are hired. All workers are required to have a complete physical examination and are required to pass visual acuity and color vision tests. High school graduates are preferred. The personal and physical characteristics desired by the company are as follows: females between the ages of 18 and 40; stable workers from the surrounding area who have been housewives or who have had jobs working with their hands. On-the-job training is given; training time of four weeks is considered sufficient.

TABLE I

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

N = 60	M	σ	Range	r
Age (years)	30.8	7.6	17-50	-.047
Education (years)	11.2	1.1	8-13	-.174
Experience (months)	18.8	1.6	3-54	.230

There are no significant correlations between age, education or experience and the criterion. The data in Table I indicate that the sample is suitable for test development purposes.

III. Job Description

Job Title: Condenser Winder 6-98.070, Stamper II 9-68.20 and Welder, Spot 6-85.060.

Job Summaries:

Condenser Winder--Operates a winding machine that wraps the foil and paper for the capacitor: Reads instructions as to width and length of foils and number of wraps to be made. Cleans machine by wiping with a cloth that has been saturated with a cleaning solvent. Selects proper paper and foil from drawing list information. Removes cones and places correct roll of paper on spindles. Replaces cone, threads paper to arbor with the threader bar. Removes top arbor half, starts paper on bottom half of arbor, then replaces top half. Starts machine and rolls enough paper to see that paper is properly aligned. If out of line, adjusts spindles for proper alignment. Using scrap foil, places one foil on right side of machine with lead towards operator and one foil on left side with lead away from operator. Depresses pedal to start machine and winds rolls. Winds three good rolls before starting production. When machine is operating properly, starts production by feeding the two corresponding foils from table rack into the roll. When enough paper is wound, stops machine and cuts the roll. Secures short piece of tape from tape dispenser and tapes end of roll to prevent unwinding. Tests roll on roll tester for diameter and length. Repeats procedure until all rolls are wound. Cleans machine when necessary. Keeps records of number and size of rolls wound.

Stamper II--Operates a stamping machine to label capacitors with trademark and other necessary identifying information: Cleans machine with cloth that has been saturated with a cleaning solvent to remove dirt or grease. Checks drawing list to determine label and other information to be stamped on capacitor. Secures proper type and sets same in proper position in type box. Sets in enough spaces to fill out lines and hold type in position. Tightens all screws lightly and taps type with wooden block to seat properly. Locks type securely by tightening set screws. Places type holder in receptacle of machine and locks in place with wing screw. Places small amount of ink on inking plate and rolls with rubber roller to give even coating. Transfers ink to brass feed roll on machine by means of roller. Prints label on piece of paper and checks to see if label is correct in all details. If machine is properly set, places capacitor on pad and rolls it across the ink imprint. Checks for clear and sharp lettering and for centering of the label. To label polar units, selects the proper size block containing the plus (+) signs and sets them in type box in proper position so that the plus (+) signs will be stamped on the capacitor correctly. Checks all labels on capacitor, and relabels if label is not clear. Maintains record of number and type of capacitors labeled.

Welder, Spot--Operates a power welding machine to weld tantalum leads to foil: Checks instructions as to length and width of foil and size and length of leads. Also checks to determine number of welds to make. Checks valve that controls gas to shield weld. Checks electrodes for proper alignment to see that one is directly over the other. Turns on switches and checks position of controls on heat program timer. Using scrap foil, checks to see if machine is operating properly; if not, adjusts or calls set-up-man. When machine has been adjusted and is ready to operate, takes foil and folds it over on one end and places it in proper position on welder. Inserts lead wire and performs necessary number of welds properly spaced. Folds foil over and repeats welds on other side. Inspects for physical appearance, correct lead angle, wrinkles, tears, etc. Keeps record of number and types of welds completed.

IV. Experimental Battery

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

V. Criterion

The criterion consisted of broad category ratings, in 10 categories, made by the immediate supervisor during October-December 1960. Ratings were based on the workers ability to produce. The range of final criterion scores was 13-44, with a mean of 29.6 and a standard deviation of 5.9.

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 these occupations.

Intelligence (G) - required in reading, interpreting and following instructions as to length of foil and size and length of leads.

Spatial Aptitude (S) - required in reading and interpreting blueprints, charts and graphs.

Form Perception (P) - required in the visual inspection of Tantalum strips; in placing material in proper position for welding; in placing and in identifying materials in winding and in setting type and labeling properly.

Finger Dexterity (F) and Manual Dexterity (M) - required in the manipulation of welding machine winder, and labeler; in handling material for inspection; in placing materials in proper position for welding, which is exact and demanding; and in setting type and operating labeler.

On the basis of the job analysis data, V-Verbal Aptitude was considered irrelevant for the performance of the job duties for these occupations.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N =60

Aptitudes	M	σ	r
G-Intelligence	92.0	10.8	.139
V-Verbal Aptitude	90.4	12.2	.058
N-Numerical Aptitude	94.8	13.8	.137
S-Spatial Aptitude	93.0	12.4	.069
P-Form Perception	102.7	13.4	.154
Q-Clerical Perception	108.4	15.6	.038
K-Motor Coordination	106.6	13.0	.154
F-Finger Dexterity	107.4	16.8	.264*
M-Manual Dexterity	99.8	17.4	.112

*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	x
Irrelevant		x							
Relatively High Mean						x	x	x	
Relatively Low Sigma	x	x		x			x		
Significant Correlation with Criterion								x	
Aptitudes to be Considered for Trial Norms	G			S			K	F	

Trial norms consisting of various combinations of Aptitudes G, S, K, and F with appropriate cutting scores were evaluated against the criterion by the tetrachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of G-75, S-75, K-85 and F-90 had the best selective efficiency.

VII. Validity of Norms (Concurrent)

The validity of the norms was determined by computing the tetrachoric correlation between the test norms and the criterion and applying the Chi Square test The criterion was dichotomized by placing35 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 G, S, K and F with critical scores of 75, 75, 85 and 90, respectively, and the dichotomized criterion for Condenser Winder 6-98.070, Stamper II 9-68.20 and Welder, Spot 6-85.060. 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 Condenser Winder 6-98.070, Stamper II 9-68.20 and Welder, Spot 6-85.060.
(G-75, S-75, K-85 and F-90)

N = 60	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	7	32	39
Poor Workers	11	10	21
Total	18	42	60

$r_{tet} = .57$ $\quad \chi^2 = 6.154$

$\sigma_{r_{tet}} = .22$ $\quad P/2 < .01$

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 G, S, K and F with minimum scores of 75, 75, 85 and 90, respectively, have been established as B-1002 norms for Condenser Winder 6-98.070, Stamper II 9-68.20 and Welder, Spot 6-85.060. The equivalent B-1001 norms consist of G-80, S-80, T-80 and F-95.

IX. Determination of Occupational Aptitude Pattern

The specific norms established for this study did not meet the requirements for incorporation in any of the existing 35 OAP's (revised 10/61). The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.

Map II - Correspondence Between Tracts with Low Family Income and Those with High Unemployment , April 1960 Memphis, Tenn.

Tracts falling in lowest quartile for income

Tracts falling in highest quartile for male unemployment

Tracts falling in lowest quartile for income and highest quartile for male unemployment

Range of median family income, lowest quartile — Tract median 1,872–3,205

Range of male unemployment rate, highest quartile — Tract rate 15.0–6.9