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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 Perceptions; 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

TRAILER ASSEMBLER 7-02.335

B-568 S-288

U. S. Employment Service
in Cooperation with
Texas State Employment Service

December 1963

GATB # 2476

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

TRAILER ASSEMBLER 7-02.335

B-568

Summary

The General Aptitude Test Battery, B-1001 was administered to a final sample of 50 men employed as Trailer Assemblers 7-02.335. The total sample was employed at Trailmobile, Inc., Longview, Texas. 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 and P-Form Perception were selected for inclusion in the final test norms.

GATB Norms for Trailer Assembler, 7-02.335

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	85	G	Part 3 Part 4 Part 6	80
S	CB-1- F CB-1- H	80	S	Part 3	75
P	CB-1- A CB-1- L	70	P	Part 5 Part 7	70

Effectiveness of Norms

The data in Table IV indicate that only 68 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 84 percent would have been good workers. 32 percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 16 percent would have been poor 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 Trailer Assembler, 7-02.335.

II. Sample

The GATB, B-1001 was administered during the period April 1956 through June 1961 to 62 men employed as Trailer Assemblers 7-02.335. Of the 62 workers tested, 12 were not included in the final sample; one on the basis of education, one on the basis of age, and 10 because they had less than six months tenure under observation of the foreman making the ratings. The final sample is comprised of 50 male employees, all of whom are considered to be experienced. Workers in the sample were hired on the basis of interviewing judgements. There were no requirements as to age, education or experience, and no tests were used in selection for employment.

TABLE I

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

N = 50	M	σ	Range	r
Age (years)	38.06	9.70	22-56	-.094
Education (years)	10.50	2.38	5-16	.187
Experience (months)	4.29	.976	1-5	.102

III. Job Description

Job Title: Trailer Assembler, 7-02.335

Job Summary: Assembles various aluminum or steel components of van, flat bed, grain or stock truck trailers into various sub-assemblies such as running gear, sides, roof, nose and doors; mounts body parts on chassis, calks and seals with calking gun and spray gun, floors trailers with wood, extruded aluminum struts or stainless steel; panels bodies with plywood or aluminum sheets, insulates with styrofoam and fiberglass batts and installs conduit, wiring, lights, brake systems and air conditioning units according to blueprints and specifications, using hand tools such as rules, steel tapes, hammers, bucking bars and screw drivers and portable pneumatic and electric tools such as impact wrenches, screw drivers and rivet guns and power tools such as table saws, band saws, joiners, planers, skill saws, radial saws, grinding wheels and flame cutting torches.

Work Performed: Assembles running gear by picking up and positioning proper axle into assembly jig. Bolts radius rod and adjustable radius rod to axle, and places inner oil seal on axle assembly. Bolts brake air chamber to axle, using impact wrench. Connects and bolts brake linkage to air chamber, and adjusts brakes with open end wrench. Assembles retractable supporting gear front end of trailer, according to blueprints; inserts and fastens prop legs to welded brackets.

Cuts piping with Friction Saw and threads on Pipe Threading Machine. Threads iron pipe into air brake tanks. Connects air tank to brake air chambers, using pliers and tube cutting tool.

Installs wiring in frame by drilling holes in template placed on electrical junction box. Threads conduit pipe through holes to connect junction box at center rear and sides of frame. Pulls wiring through conduits; pulls single wire from junction boxes to each side light junction box using Fish Line; strips portion of exposed wire in junction boxes opposite side lights and splices side light to exposed wire; threads rubber sleeve onto wire.

Assembles side, nose and roof panel section using pneumatic riveting gun.

Assembles doors by cutting to proper size and welding rubber door seals; measures sheet of Plymetal to proper dimension and positions aluminum door frame; positions template and drills rivet holes through template holes into frame and plymetal using electric drill; inserts door lock assembly.

Assembles body in assembly pit by positioning side panels taken from storage rack by crane; secures proper nose section and lowers into position with help of other workers; guides roof into position and aligns with center mark on nose section; rivets section together using Blind Riveting Gun. Mounts trailer body on chassis.

Floors trailer by installing groove oak flooring and secures to frame and bolsters; positions pre-cut sheets of plywood to form deck (under pan); places styrofoam sections across floor of trailer; slides aluminum floor boards over styrofoam, caulks area to be joined, fastens with screws.

Insulates refrigerated trailers by placing fiber glass insulation between posts, along sides of trailer, and roof bolster flanges; repeats for second layer of insulation; may panel trailers with plaster coated plywood royal-lite plastic sheet or corrugated aluminum sheets or stainless steel sheet. Places meat rack in position and installs hanger bolts through flanges; checks door fit after doors have been hung by welders.

Installs roll-up door guides along rear frames and to rear sections of trailers; Inserts door rollers into guide channel with aid of another trailer fitter and two assembly helpers; winds door cord into spring housing and sets proper tension.

Cuts aluminum conduits to proper length for leads from light receptical box to overhead top and side lights on outside of trailer body, according to blueprints; measures proper length of color wire, strips insulation from wire and inserts into lug connection; wraps connection with insulation tape; pulls rubber sleeve over joint between conduit and light bracket; pulls wires through connection panel lead in and connects to proper posts. Checks each circuit with battery and ammeter for proper function and for shorts; searches out and repairs damaged insulation or loose connections.

Installs refrigeration unit and checks temperature readings. May adjust controls for higher or lower temperature.

IV. Experimental Battery

All the tests of the GATB, B-1001, were administered to the sample group.

V. Criterion

The criterion data collected consisted of two sets of independent ratings made by the first-line supervisor using USES Form SP-21, "Descriptive Rating Scale." A period of two weeks elapsed between the first and second ratings; all ratings were made between August 1961 and January 1962. The rating scale consisted of five items covering different aspects of job performance, with five alternatives for each item. Weights of one through five, indicating the degree of job proficiency attained, were assigned to the alternatives. A reliability coefficient of .79 was obtained for the criterion. Therefore, the two sets of ratings were combined, resulting in a distribution of final criterion scores of 52-89, with a mean of 69.0 and a standard deviation of 8.8.

VI Qualitative and Quantitative Analyses

A. Qualitative Analysis

On the basis of the job analysis data, the following aptitudes were rated "important" for success in this occupation:

Intelligence (G) - required to learn and correlate a wide variety of procedures for assembly of various trailer styles and sub-assemblies.

Spatial Ability (S) - required to read blueprints and to fit parts into spaces to close tolerances by visual inspection.

Form Perception (P) - required to align and position parts to close tolerances.

Finger Dexterity (F) - required to fit a variety of rivets, bolts and screws into postion.

Manual Dexterity (M) - required in handling parts and tools, placing and fitting parts in prescribed position for accurate assembly.

On the basis of the job analysis data, Verbal Aptitude (V) was rated irrelevant for success in this occupation.

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 = 50

Aptitudes	M	σ	r
G-Intelligence	93.7	15.3	.312*
V-Verbal Aptitude	85.5	14.0	.231
N-Numerical Aptitude	92.5	18.2	.190
S-Spatial Aptitude	98.1	16.0	.276
P-Form Perception	86.8	20.3	.326*
Q-Clerical Perception	78.9	14.2	.266
A-Aiming	82.6	20.4	.218
T-Motor Speed	73.9	22.6	.035
F-Finger Dexterity	93.1	21.7	-.167
M-Manual Dexterity	113.5	22.9	-.050

*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	X
Relatively Low Sigma		X				X			
Significant Correlation with Criterion	X				X				
Aptitudes to be Considered for Trial Norms	X			X	X			X	X

Trial norms consisting of various combinations of Aptitudes G, S, P, 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-1001 norms consisting of G-85, S-80 and P-70 had the best selective efficiency. Equivelent B-1002 norms are G-80, S-75 and P-70.

VII. Validity of Norms

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 32 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 B-1001 norms consisting of Aptitudes G, S and P with critical scores of 85, 80, and 70, respectively, and the dichotomized criterion for Trailer Assembler 7-02.335. 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 Trailer Assembler 7-02.335
(G-85, S-80, P-70)

N = 50	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	7	27	34
Poor Workers	11	5	16
Total	18	32	50

Phi Coefficient = .47
χ^2 = 10.950
P/2 < .0005

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 and P with minimum scores of 85, 80 and 70, respectively, have been established as B-1001 norms for Trailer Assembler 7-02.335. The equivalent B-1002 norms consist of G-80, S-75 and P-70.

IX. Determination of Occupational Aptitude Pattern

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 35 OAP's included in Section II of the Guide to the Use of the General Aptitude Test Battery, January 1962. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.