DOCUMENT RESUME

D 061 336 TM 001 564

ITLE	Patternmaker, Metal (found.) 5-17.010; Patternmaker, Wood (found.) 5-17.020--Technical Report on Standardization of the General Aptitude Test Battery.
NSTITUTION	Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service.
EPORT NO	TR-S-132
UB DATE	Oct 58
OTE	17p.
DRS PRICE	MF-$0.65 HC-$3.29
ESCRIPTORS	*Aptitude Tests; *Cutting Scores; Evaluation Criteria; Job Applicants; *Job Skills; Metal Working Occupations; Norms; Occupational Guidance; *Patternmaking; *Personnel Evaluation; Test Reliability; Test Validity; Woodworking
DENTIFIERS	GATB; *General Aptitude Test Battery; Patternmaker

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

PATTERNMAKER, METAL (found.) 5-17.010
PATTERNMAKER, WOOD (found.) 5-17.020

B-394 or S-132

U. S. Employment Service in
Cooperation with
Minnesota, New Jersey, and New York State Employment Services

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
October 1958

GATB #2189C
2141 and 2179
Winter
1956 and 1957

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY FOR PATTERNMAKER, METAL 5-17.010 PATTERNMAKER, WOOD 5-17.020

B-394 or S-132

Summary

The General Aptitude Test Battery, B-1002A, was administered to samples of workers employed as Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020. The state in which the sample was obtained, the number included in the final experimental sample, and the type of criterion used for validation purposes are shown below for each sample.

Sample	State	N	Criterion
I	New Jersey and New York	60	Supervisory ratings
II	Minnesota	51	Supervisory ratings

Data for the samples were analyzed separately and in combination. On the basis of the statistical and qualitative evidence, Aptitudes N-Numerical Aptitude, S-Spatial Aptitude, and P-Form Perception were selected for inclusion in the test norms.

GATB Norms for Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020 - B-394 or S-132

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-394 or S-132

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Scores
N	CB-1-D CB-1-I	95	N	Part 2 Part 6	90
S	CB-1-H CB-1-F	105	S	Part 3	100
P	CB-1-A CB-1-L	80	P	Part 5 Part 7	80

Effectiveness of Norms

The data in Table V-C indicate that 20 of the 36 poor workers, or 56 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 56 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 65 of the 81 workers who made qualifying test scores, or 80 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 Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020.

II. Samples

This study is based on samples of workers employed as Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020 in 17 establishments in northern New Jersey and New York, and in various shops in the Minneapolis and St. Paul, Minnesota, area. The test norms were developed on the basis of the results of these combined samples.

Sample I - New Jersey and New York

The General Aptitude Test Battery, B-1002A, was administered to 63 men employed as Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020 in 17 establishments in northern New Jersey and New York. These establishments are all members of the Metropolitan Pattern Manufacturers Association. The names of the establishments cooperating in this study, their locations, and the numbers of individuals tested are shown below.

Establishment	Location	Number Tested
Archer & McCartney	Haledon, N. J.	11
Astor Pattern Co.	Brooklyn, N. Y.	2
Bloomfield Pattern Works	Bloomfield, N. J.	9
R. S. Casson Co.	Paterson, N. J.	1
Connel Pattern Works	New York, N. Y.	7
Greenpoint Pattern Works	Brooklyn, N. Y.	3
James Grier & Sons	Hawthorne, N. J.	3
Johnson & Kunz Co.	Long Island City, N. Y.	2
K & W Pattern Co.	Belleville, N. J.	4
Linden Pattern & Wood	W. Linden, N. J.	1
Monroe Pattern Works	Roselle Park, N. J.	2
Nelson Pattern Works	E. Orange, N. J.	4
N. J. Pattern Works	W. Paterson, N. J.	5
Rosedale Pattern Works	Hicksville, N. Y.	3
U. S. Pattern Corp.	W. Paterson, N. J.	2
T. J. White Jr. & Co.	Long Island City, N. Y.	2
Wohlgemuth Pattern Shop	New York, N. Y.	2
	Total	63

Three of the individuals tested were not included in the final experimental sample; one because he was found to be an employer, one because he had not completed the required training period, and one because he possessed personal characteristics which prevented obtaining dependable criterion information. Therefore, the final sample consisted of 60 workers. Five of these workers were classed as Patternmaker, Metal, 18 as Patternmaker, Wood, and 37 as Patternmaker, Metal and Patternmaker, Wood.

The jobs of Patternmaker, Metal and Patternmaker, Wood, are skilled occupations. The work is non-repetitive and work assignments vary with respect to equipment and techniques. In establishments concerned with both wood and metal patterns, the workers are generally interchangeable. Moreover, even where experience has been principally in working with metal, adaptation to work in wood can usually be accomplished in a short period because of the similarity in principles and processes involved. The change from wood to metal pattern work can be similarly accomplished within a relatively short period. In view of this interchangeability, conducting a single test development study for both occupations was considered warranted.

Induction into each of these occupations is usually through an apprenticeship of 5 years or through equivalent on-the-job training. Employers usually prefer to hire beginners who are between 18 and 25 years of age. A twelfth grade education is now generally required, with vocational school training in machine shop practice, mechanical drawing, foundry practice, woodworking and mathematics preferred. In the past, applicants have been selected on the basis of an interview, a check of references and scholastic achievement. The educational and selection requirements have been flexible. Many of the present workers have less than an eighth grade education and father and son relationship has been an element of consideration for selection.

Sample II - Minnesota

During the period December 1956 to January 1957, the GATB, B-1002A, was administered to 51 patternmaker apprentices and journeymen employed at various shops located in and about Minneapolis and St. Paul, Minnesota. All but one of the apprentices were tested at the school they were attending. Most of the journeymen were tested in the Minneapolis Vocational High School or the St. Paul local office according to arrangements made with the union and employers involved. Fifteen of the journeymen were tested at their place of employment. The final sample consisted of 51 men--16 apprentices and 35 journeymen.

Before becoming a journeyman, a worker must complete five years, or 10,000 hours, of apprenticeship. To become an apprentice, a person must be at least 17 years of age and be approved by the Patternmaker's Joint Apprenticeship Committee. During the apprenticeship period, each apprentice must spend a minimum of 144 hours per year in classes pertaining to patternmaking. No tests are given to select apprentices. Each apprentice must have a written apprenticeship agreement signed by his future employer.

Although the sample was drawn from a number of shops, all patternmaking shops are very similar in the tools used and work done. It is the opinion of foremen that any one Patternmaker could go from one shop to another, or one area to another, and after a short plant orientation be able to reach normal production.

Of the 35 journeymen, 11 men occasionally work with metal and one man works almost exclusively with metal. All the men were trained primarily to do wood patternmaking. The shop owners and supervisors indicate that the trend is toward training combination wood and metal patternmakers. Apprentices and journeymen were combined into one group because it was necessary to take experience into account when rating even among the journeymen.

Table II-A shows the means, standard deviations, ranges, and Pearson product-moment correlations (corrected for broad categories) with the criterion for age, education, and experience for Sample I; Table II-B shows the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education, and experience for Sample II. Table II-C shows the means, standard deviations, and ranges for age, education, and experience for the Combined Sample.

TABLE II-A

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion ($_{c}r$) for Age, Education, and Experience

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
Sample I
N = 60

	M	σ	Range	$_{c}r$
Age (years)	42.2	11.7	27-66	-.111
Education (years)	10.6	2.1	5-15	.281*
Experience (years)	20.9	13.5	5-51	-.007

* Significant at the .05 level

TABLE II-B

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

Patternmaker, Wood 5-17.020
Sample II
N = 51

	M	σ	Range	r
Age (years)	32.1	9.0	19-53	.267
Education (years)	11.5	1.2	8-14	-.213
Experience (months)	116.0	94.2	4-360	.410**

** Significant at the .01 level

TABLE II-C

Means (M), Standard Deviations (σ), and Ranges for Age, Education, and Experience

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
Combined Sample
N = 111

	M	σ	Range
Age (years)	37.6	11.7	19-66
Education (years)	11.0	1.8	5-15
Experience (months)	188.8	150.8	4-360

The data in Table II-A indicate that there are no significant correlations between age or experience and the criterion for Sample I; the correlation between education and the criterion is significant at the .05 level, indicating a tendency for the better educated workers to receive higher ratings. The data in Table II-B, indicate that no significant correlations exist between age or education and the criterion for Sample II; the correlation between experience and the criterion is significant at the .01 level. Since raters indicated that workers continued to improve for as long as 10 to 15 years, it is suggested that the significant correlation between experience and the criterion represents a true relationship between length of experience and ability to perform on the job for workers in this sample. Therefore, in order to determine the relationship between aptitude scores and job success for inexperienced workers, partial correlations between aptitudes and the criterion, with experience held constant were computed for workers in the sample.

III. Job Descriptions
(Samples I and II)
Job Titles: Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020

PATTERNMAKER, METAL

Job Summary: Shapes rough metal castings or metal stock into patterns by performing machine and hand finishing operations such as sawing, milling, boring, shaping, drilling, grinding, lathe turning, filing and soldering.

Work Performed: Determines work procedure: Examines blueprints and/or receives verbal instructions from supervisor; visualizes ultimate pattern and determines desirability of preparing pattern in one or more parts, taking into consideration problems of the final processes.

Prepares for machining: Obtains metal pattern which is rough shaped and formed as a casting; compares pattern with blueprints; marks off a full sized layout of the parts of the pattern to serve as a guide for machine operations, using a scriber and square; utilizes a shrinkage rule to calculate necessary allowances for shrinkage.

Machines pattern to required dimensions: Sets up, adjusts and operates various metal working machines such as power saw, lathe, shaper, milling machine, boring mill and drill press, in required sequence depending on design and complexity of pattern; frequently checks dimensions of the work with gages, calipers, micrometers, and shrinkage rule.

Finishes pattern: Uses machine tools such as grinders and hand tools such as files and scrapers to smooth finish completed pattern; checks final dimensions with gages, micrometers and scale to determine accuracy of work; fills in low areas with solder or wax; may paint pattern; may sharpen tools and cutters.

PATTERNMAKER, WOOD

Job Summary: Builds wooden patterns, core boxes, and match plates according to specifications shown on blueprints, using appropriate woodworking machines and hand tools to saw, screw, sand, paint, and assemble parts into finished patterns of precise dimensions.

Work Performed: Determines work procedures: Examines blueprints and/or receives verbal instructions from supervisor; determines specific pattern dimensions necessary to form a mold and designs pattern according to established principles of foundry practice.

Prepares for making pattern: Selects appropriate wood stock from which pattern is to be constructed; marks off on stock a full size layout of parts of the pattern, using marking and measuring devices such as scriber, square, and shrinkage rule; saws stock to required lengths and shapes, using proper wood-working machine and hand tools such as saws, planes, chisels, gages, drills, and routers; checks dimensions of work at various stages to insure precision and adherence to required dimensions.

Assembles pattern: Sands parts to exact final dimensions; assembles component parts into final pattern using dowels, glue, and small nails; marks identification symbols on all pieces of pattern; glues fillets along interior angles; waxes or putties irregular indentations to smooth finished surfaces; brushes finished pattern with shellac or other protective material to protect surface from dampness of molding sand.

Performs related tasks: May build wooden core boxes, master patterns and templates, using required machine and hand tools; may repair or rebuild worn or broken patterns and core boxes.

IV. Experimental Battery

All the tests of the GATB, B-1002, were administered to the samples.

V. Criterion

A. Sample I (New Jersey and New York)

Because of the number of cooperating employers and the differences in the sizes of their work forces, it was not possible to obtain comparable measures of quantity of production. Therefore, a descriptive rating scale covering different aspects of performance was devised for obtaining supervisory ratings. The scale consisted of nine items, each covering an important aspect of the job duties. Each item had five alternative statements regarding the adequacy of performance. The number of the alternative checked by the rater corresponded to the degree of performance of the worker rated, "1" indicating poor performance, and "5" indicating excellent performance. The total score on the scale is equal to the sum of the numbers checked for all nine items. First-line supervisors' ratings were obtained for all 60 workers and were used as the basis for forming the criterion. Second-line supervisors' ratings were not used because they were obtained for only 40 of the workers. The final criterion consisted of three broad categories formed by classifying the sample into three groups approximately equal in size based on their scores on the descriptive rating scale. The number of workers classified into each broad category and the quantitative score corresponding to each category, computed for purposes of the statistical analysis, are shown below:

Category	N	Quantitative Score
High	19	61
Middle	21	50
Low	20	39

2. Sample II (Minnesota)

The criterion used for this study consisted of the average weighted scores of supervisors' ratings and reratings made on a six item descriptive rating scale. At the time of rating, each rater was asked to rate each item on the scale as to its importance. Importance was defined as the amount a given trait contributed toward the worker's being an all around good patternmaker. Table XII shows the items included in the scale and the numerical values (derived from average percentage weights assigned by the raters) which were used in obtaining weighted composite scores on the criterion.

TABLE XII

Items	Weights
Accuracy	5
Speed	2
Visualization	3
Planning and sequence	3
Adaptability or ingenuity	6
Complexity	7

The raters used an instruction sheet in order to rate each item on a five-point scale. All the workers under each rater were rated on one item at a time before going on to the next. After the rater had read the description of the item, he would read additional information further describing the item and indicating the particular factors to be considered. This procedure was used to increase the standardization of the rating procedure since there were a large number of raters involved. In an attempt to equate the ratings from one supervisor to another, each man was asked to rate against all the patternmakers he had ever known and not just those presently employed in his shop. Each supervisor was also asked to rate other patternmakers who had once worked under him. These ratings were not used because of the lapse of time involved, but were intended to keep the rater more aware of the overall population of patternmakers.

Most of the raters were the shop owners. However, in the case of large companies, such as foundries, the rater was the manager of the pattern department. In many instances, foremen's ratings were also obtained. These ratings were not used because they lowered the overall reliability considerably.

Although some of the men worked occasionally on metal patterns, all the men were rated according to their abilities as wood patternmakers. It was the opinion of most supervisors that a man who is good in wood will also be good in metal, if he is given the same amount of training.

The apprentices, with one exception, were rated only by their night school instructors. The shop owners felt they could not rate the apprentices accurately since in many cases they had not yet had ample opportunity to perform. The instructors rated apprentices against other apprentices and were asked to keep in mind the number of hours each had to his credit. One apprentice, who was not attending school, was rated by his foreman. In the case of journeymen, the raters were asked to rate each man according to the way he compared to other men with the same amount of experience.

Each supervisor made ratings and reratings. The second ratings were made approximately two weeks after the initial ratings. The final criterion consisted of an average of the weighted scores of the ratings and reratings.

VI. Statistical and Qualitative Analyses

A. Statistical Analysis:

Table IV-A shows the means, standard deviations, and Pearson product-moment correlations (corrected for broad categories) with the criterion for the aptitudes of the GATB. Table IV-B shows the means, standard deviations, and partial correlations between the aptitudes of the GATB, and the criterion, with experience held constant. The reason for the partial correlations is explained in the description of the data in Table II-B. 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 IV-A

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion ($_{o}r$) for the Aptitudes of the GATB

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
Sample I

N = 60

Aptitudes	M	σ	$_{o}r$
G-Intelligence	106.8	16.4	.324*
V-Verbal Aptitude	101.3	15.9	.188
N-Numerical Aptitude	96.0	15.9	.358**
S-Spatial Aptitude	116.5	22.5	.317*
P-Form Perception	98.6	14.6	.384**
Q-Clerical Perception	97.5	13.6	.184
K-Motor Coordination	98.6	16.6	.132
F-Finger Dexterity	100.7	19.1	.281
M-Manual Dexterity	117.4	21.5	-.064

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

TABLE IV-B

Means (M), Standard Deviations (σ), and Partial Correlations between the Aptitudes of the GATB and the Criterion, with Experience Held Constant ($r_{a.c.e.}$)

Patternmaker, Wood 5-17.020
Sample II
N = 51

Aptitudes	M	σ	$r_{a.c.e.}$
G-Intelligence	114.9	12.5	.349*
V-Verbal Aptitude	105.0	12.3	.471**
N-Numerical Aptitude	105.3	12.1	.380**
S-Spatial Aptitude	128.2	15.7	.291*
P-Form Perception	108.5	15.4	.422**
Q-Clerical Perception	104.8	12.7	.280*
K-Motor Coordination	100.8	12.8	.282*
F-Finger Dexterity	110.5	19.4	-.021
M-Manual Dexterity	113.6	15.6	.127

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

TABLE IV-C

Means (M) and Standard Deviations (σ) for the Aptitudes of the GATB

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
Combined Sample
N = 111

Aptitudes	M	σ
G-Intelligence	110.5	15.3
V-Verbal Aptitude	103.0	14.5
N-Numerical Aptitude	100.3	15.0
S-Spatial Aptitude	121.3	20.7
P-Form Perception	103.1	15.8
Q-Clerical Perception	100.8	13.7
K-Motor Coordination	99.7	15.0
F-Finger Dexterity	105.2	19.8
M-Manual Dexterity	115.6	19.1

The data for Sample I which appear in Table IV-A show that Aptitudes N and P correlate significantly with the criterion at the .01 level and Aptitudes G and S at the .05 level. The data for Sample II which appear in Table IV-B show that Aptitudes V, N, and P correlate significantly with the criterion at the .01 level and Aptitudes G, S, Q, and K at the .05 level. Table IV-C, which presents means and standard deviations of the aptitudes for the Combined Sample, shows that the highest mean scores, in descending order of magnitude, were obtained for Aptitudes S, M, and G.

B. Qualitative Analysis:

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

Intelligence (G) - required in making decisions concerning proper work procedure; in laying out work assignments in an efficient sequence and manner; and in making judgments with respect to numerous calculations and measuring requirements.

Spatial Aptitude (S) - required in reading and interpreting blueprints; in visualizing the relationships between the individual parts and the completed pattern; and in visualizing the effects of shrinkage and other characteristics of wood and metal on the final dimensions of the completed pattern.

Form Perception (P) - required in reading blueprints and in distinguishing between differences in shapes, widths and lengths of objects.

Finger Dexterity (F) - required in checking the dimensions of metal patterns, using gauges, calipers, micrometers and shrinkage rule; in assembling component parts into final wood patterns, using dowels, glue and small nails; in glueing fillets along interior angles; and in using wax or putty to smooth finished surfaces of wood patterns.

Manual Dexterity (M) - required in using hand tools such as files, scrapers, saws, planes, chisels, drills and routers; in setting up, adjusting and operating machine tools such as power saws, shapers, milling machines, drill presses and various woodworking machines.

C. Selection of Test Norms:

Based on the qualitative and quantitative evidence cited above, Aptitudes G, N, S, P, and M were given further consideration for inclusion in the test norms. The evidence for each aptitude for the two samples is indicated below.

	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis	X			X	X			X	X
High Mean Score: Combined Sample	X			X					X
Significant Correlation with Criterion:									
Sample I - New Jersey and New York	X		X	X	X				
Sample II - Minnesota	X	X	X	X	X	X	X		

Although Aptitudes V, Q, and K had significant correlations with the criterion for Sample II and Aptitude F appeared to be important on the basis of the job analysis data, these aptitudes were not considered further for inclusion in the norms because there was no other qualitative or quantitative evidence of significance.

Various combinations of Aptitudes G, N, S, P, and M with appropriate cutting scores were selected as trial norms. Means and standard deviations of the Combined Sample 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 selective efficiency of norms consisting of N-90, S-100, and P-80 had good selective efficiency for each sample taken separately, and the best selective efficiency for the Combined Sample.

In addition to the data for the above mentioned Combined Sample, data were also available for a study conducted by the Minnesota Agency consisting of 11 patternmaker students at the St. Paul Vocational School and 21 patternmaker students at the Minneapolis Vocational High School. Since this study was based on a sample of trainees for the occupation of Patternmaker and the job duties of the workers in the Combined Sample (the Minnesota, New Jersey and New York samples) were similar, an attempt was made to develop a single set of norms based on data for the three studies. A comparison of the quantitative and qualitative data for these studies indicated that Aptitudes G, N, S, P, and M warranted consideration for inclusion in the norms. Various combinations of these aptitudes with appropriate cutting scores were selected as trial norms.

A comparison of the results for the three studies showed that no one set of trial norms had a significant tetrachoric correlation with the criterion for each of the three studies. Thus, no set of norms could be developed which would show good selective efficiency for all three

studies taken separately. An additional analysis showed that good selective efficiency could be obtained for the Minnesota study of employed workers and the New Jersey and New York study. Therefore, the data for these two studies were used as the basis for establishing norms for Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020.

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 these two studies were dichotomized. For Sample I, the New Jersey-New York study, those workers in the high and average categories were placed in the high criterion group, and those in the low category were placed in the low criterion group. This resulted in 20 of the 60 workers, or 33 percent of the sample, being placed in the low criterion group. For Sample II, the Minnesota study of employed workers, the criterion was dichotomized in such a way as to hold experience constant. Since several raters had said that a patternmaker continues to learn and improve for almost 15 years after completing his apprenticeship and because of the high correlation between experience and the criterion, one-third of each experience group was placed in the low criterion group. Using this method five of the 16 apprentices, five of the 16 journeymen with less than 12 years experience, and six of the 19 journeymen with more than 12 years experience were placed in the low criterion group. This resulted in 16 of the 51 workers, or 31 percent of the sample, being placed in the low criterion group.

Tables V-A and V-B show the relationship between test norms consisting of Aptitudes N, S, and P with minimum scores of 90, 100, and 80, respectively, and the dichotomized criterion for Sample I and Sample II, respectively. Table V-C, which is a composite of Tables V-A and V-B, shows the selective efficiency of the norms for the Combined Sample. Workers in each high criterion group have been designated as "good workers" and those in each low criterion group have been designated as "poor workers."

TABLE V-A

Relationship between Test Norms Consisting of Aptitudes N, S, and P with Critical Scores of 90, 100, and 80, Respectively, and the Criterion for Sample I

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
N = 60

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	8	32	40
Poor Workers	15	5	20
Total	23	37	60

$r_{tet} = .76$ $\quad X^2 = 14.815$

$\sigma_{r_{tet}} = .21$ $\quad P/2 < .0005$

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

TABLE V-B

Relationship between Test Norms Consisting of Aptitudes N, S, and P with Critical Scores of 90, 100, and 80, Respectively, and the Criterion for Sample II

Patternmaker, Wood 5-17.020
N = 51

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	2	33	35
Poor Workers	5	11	16
Total	7	44	51

$r_{tet} = .67$ $\quad X^2 = 4.082$

$\sigma_{r_{tet}} = .29$ $\quad P/2 < .025$

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

TABLE V-C

Relationship between Test Norms Consisting of Aptitudes N, S, and P with Critical Scores of 90, 100, and 80, Respectively, and the Criterion for the Combined Sample

Patternmaker, Metal 5-17.010
Patternmaker, Wood 5-17.020
N = 111

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	10	65	75
Poor Workers	20	16	36
Total	30	81	111

$r_{tet} = .69$ $\quad X^2 = 19.898$

$\sigma_{r_{tet}} = .17$ $\quad P/2 < .0005$

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

III. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data and their combined selective efficiency, Aptitudes N, S, and P, with minimum scores of 90, 100, and 80, respectively, are recommended as B-1002 norms for the occupations of Patternmaker, Metal 5-17.010 and Patternmaker, Wood 5-17.020. The equivalent B-1001 norms consist of N-95, S-105, and P-80.

IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include three aptitudes, only those occupational aptitude patterns which include the same three aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. Since none of the existing 23 occupational aptitude patterns includes Aptitudes N, S, and P, the selective efficiency of any existing occupational aptitude pattern was not determined for this sample. However, the data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.