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MEASUREMENT OF INTEREST PATTERNS

Annual Report
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Measurement of Interest Patterns

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Report prepared by:

Kenneth E. Clark
Project Director
Helen H. Gee
Dallis Perry
Research Fellows

with the assistance of
Diane Albitz
Joyce S. Smith
Research Assistants

Department of Psychology
University of Minnesota
Minneapolis 14, Minnesota

Chapter I

Introduction

The several chapters of this report describe the work of the project on interest measurement as it has progressed along various lines. This chapter describes the general scope of the project, and indicates the present status of data collection. Chapter II summarizes the work completed at this time in the development of Navy and civilian scoring keys for the Vocational Interest Inventory. Chapter III summarizes several studies aiming to determine the degree to which interests as measured with the Navy Vocational Interest Inventory are a factor in school achievement in the Navy. Chapter IV presents summaries of studies designed to indicate the manner in which interest measures are related to on-the-job performance in civilian occupations. Chapter V is a summary of the work of Dr. Dallis Perry, who has compared forced-choice and multiple-choice responses using the Navy Vocational Interest Inventory in its present and in modified form, and the Strong Vocational Interest Blank. Chapter VI describes the methods developed in the project to portray measured interests in profile form, and presents mean profiles for each of a substantial number of Navy rates. It is intended that these profiles assist in the determination of the most efficient number of scoring keys required to give an adequate description of a Navy man's interests. The necessary key intercorrelations have not yet been completed, however.

Preceding years of work on this project have aimed primarily at the collection of adequate numbers of completed Vocational Interest Inventories from enough widely varied groups both within and without the Naval establishment to permit the development of scoring keys to reflect

differing interest patterns. The first requirement was the development of the Vocational Interest Inventory itself with sufficient variety of content to permit the reflection of interests of almost any occupational group. With such an inventory in hand, the next major task was the administration of the inventory to a variety of civilian and Navy occupational groups. This is a never-ending job, for, unless one has the resources of the U.S. Census Bureau, one cannot hope to collect samples of adequate size and geographic distribution in each of the more important occupational groups. The degree to which some success in obtaining good coverage of civilian and Navy groups has been attained can be assessed by examination of the list of groups on whom data are available, as presented later in this chapter.

The bulk of the work done with measured interests has aimed primarily at showing the differences in interest patterns of workers in one occupation as compared with workers in another occupation, or with workers-in-general. That such an emphasis is placed is understandable, since observed differences are large and sometimes spectacular, and are stable over long periods of time. Much less attention has been paid to the more important questions relating to the manner in which such interest measures ought to be used with an individual, especially in terms of the degree to which such scores permit the prediction of either job satisfaction, job mobility, or success in training or on the job. This sort of study is difficult, for if it is to be done adequately, it must involve the administration of an interest inventory early in the career of a worker, and subsequent follow-up. Data for this purpose have been collected as part of the long term plans of this project, but, by and large, have not matured to the point where they may be utilized for testing the worth

of measured interests as predictive measures. The groups on whom such data have been collected are listed at the end of this chapter.

Continuing throughout the work of this project have been a variety of studies aimed at the improved scoring of interest inventories. The general belief held in our work has been that the multiple-weights scoring system used by Strong is unnecessarily difficult, and that simpler scoring procedures will result in keys fully as good as his, and perhaps better. The experimentation with various scoring methods has operated on the premise that, much more important than finding optimum weights, it is essential to select items for inclusion in a key in such a manner as to capitalize on item interrelationships as well as item validities in the development of a key which, even with a small number of items, will provide maximum differentiation between groups. While it is impossible in terms of current knowledge to resolve the conflict between homogeous keys and empirically developed, factorially complex keys, the work of the project has been more toward determining the effectiveness of the latter than in exploring the usefulness of the former.

The feasibility of any vocational interest measure will in all probability be determined more in terms of its ease of administration, scoring, and use, than in the ultimate evidences of its usefulness for prediction of success on the job, job mobility, or, for Navy men, even re-enlistment rates. A continuing problem for this project has been the exploration of methods for reducing the time involved in the administration of the interest inventory, and in the labor involved in scoring and reporting results in such a manner as to permit the use of the resulting scores for classification, assignment, or counseling purposes. One sort of work in this area has been the experimentation with unit-weight keys. These, it

seems safe to say, have been demonstrated to be as good as multiple-weight keys. Another type of work is the reduction in the number of keys required for scoring. Profiles for 42 Navy rates scored on 19 Navy keys are presented in Chapter VI, and will be used along with later work, to attempt some such reduction in scoring. It seems clear that a substantially smaller number of scoring keys can describe the differential interests of these groups. Even with a smaller number of keys, however, it would be most helpful if, within each, an even smaller number of items be scored than is our current practice. Some work is being done in this area. If it proves successful, it may be possible to reduce markedly the total number of items in the inventory (currently 190 triads, or 570 items), and to reduce/somewhat more than one-half the administration time of the inventory.

A summary of the work done in data collection, and an indication of the resources of this project for exploring some of these related issues is given best, perhaps, by the following list of groups to whom the inventory has been administered:

A. Rated Men in the Navy

1. Receiving Station Groups

Rate	Title	N
AC	Air Controlman	3
AD	Aviation Machinist's Mate	261
AE	Aviation Electrician's Mate	41
AF	Aviation Photographer's Mate	15
AK	Aviation Storekeeper	45
AL & AT	Aviation Electroncisman and Aviation Electronics Technician	253
AM	Aviation Structural Mechanic	111
AO	Aviation Ordnanceman	19
BM	Boatswain's Mate	367
BT	Boilerman	247
BU	Builder	75
CD	Driver	47

Rate	Title	N
CE	Construction Electrician's Mate	29
CM	Mechanic	29
CS	Commissaryman	435
CT	Communications Technician	126
DC	Damage Controlman	313
DK	Disbursing Clerk	45
DM	Draftsman	4
DT	Dental Technician	12
EM	Electrician's Mate	250
EN	Engineman	237
ET	Electronics Technician	205
FC & FT	Firecontrolman and Firecontrol Technician	274
FP	Pipefitter	106
GM	Gunner's Mate	609
HM	Hospital Corpsman	451
IC	I.C. Electrician	14
IM	Instrumentman	5
JO	Journalist	9
LI	Lithographer	2
MA	Machine Accountant	1
ME	Metalsmith	39
ML	Molder	2
MM	Machinist's Mate	254
MN	Mineman	3
MR	Machinery Repairman	12
MU	Musician	3
OM	Opticalman	3
PH	Photographer's Mate	17
PI	Printer	3
PM	Patternmaker	1
PN	Personnel Man	59
PR	Parachute Rigger	14
QM	Quartermaster	195
RD	Radarman	285
RM	Radioman	257
SD	Steward	70
SH	Ship's Serviceman	74
SK	Storekeeper	146
SO	Sonarman	28
SW	Steelworker	5
TD	Tradesman	2
TE	Teleman	23
TM	Torpedoman's Mate	15
UT	Utilities Man	10
YN	Yeoman	415

2. Rated Men in U.S. Navy from Sources other than Receiving Stations

Rate	Source	N
AD	Jacksonville	243
AD (Instructors)	Memphis	292
AM (Instructors)	Memphis	165
AM (Civilian employees)	Alameda NAS	146
AM (Supervisors, civilian employees)	Alameda NAS	45
AO (Instructors)	Memphis	77

2. Rated Men in U.S. Navy from other sources (Cont.)

Rate	Source	N
AT (Instructors)	Memphis	101
BM	Great Lakes	65
BT	Great Lakes	49
C	Great Lakes	250
I	Great Lakes	24
DT	Washington, D.C.	72
EM	Great Lakes	46
EN	Great Lakes	37
ET	Great Lakes	58
GM	Great Lakes	50
HM	Great Lakes	11
MM	Great Lakes	63
QM	Great Lakes	42
YN	Great Lakes	32
YN	Bu.Pers.	102
Miscellaneous Groups	Great Lakes	200+

3. Groups of Rated Men in Technical Training Schools

EH & GM School, Naval Gun Factory, Washington, D.C. - Class B	168
Advanced FC School, Anacostia Naval Gun Factory, Wash, D.C.-Class B	271
ET School, Great Lakes - Class A	547
AT & AL School, NATTC Memphis - Class A	354
AD School, NATTC, Memphis - Class A	461

4. Naval Recruits

Great Lakes Recruits	2600

B. Civilian Groups

1. Employed Workers in Civilian Occupations

Bakers	115	Plasterers	72
Bakery Employees	29	Plumbers & Pipefitters	634
Carpenters	313	Pressmen	80
Electricians	363	Printers	316
Foremen	64	Sales Clerks (Retail Store)	95
I.B.M. Operators	193	Salesmen (New Car)	35
Machine Operators	104	Sheet Metal Workers	470
Machinists	223	Shipping and Stock Clerks	304
Mechanics (Truck)	162	Truck Drivers	172
Milk Wagon Drivers	152	Warehousemen	84
Painters	201		

2. Student Groups

Dunwoody Industrial Institute (Test - Retest)		100
Minneapolis Vocational High School Seniors (Test - Retest)		90
Apprentices		600+
St. Paul Washington High School	Freshmen	105
	Sophomores	101
(Male)	Juniors	91
	Seniors	89
University of Minnesota Sophomores (Test - Retest 1954)		135

B. Civilian Groups (Cont.)
3. Industrial Groups

Eastman Kodak, Rochester, N.Y.
Manor Baking Co., Dallas, Texas
Prudential Insurance Co., Newark, N.J.

Minnesota Vocational Interest Inventory and Navy Vocational Interest Inventory Keys

Keys developed as of October 1953

A. Navy Keys (Receiving Station Groups, Type III Keys)

AD Aviation Machinist's Mate
AT Aviation Electronics Technician and Aviation Electronicsman
BM Boatswain's Mate
BT Boilerman
CS Commissaryman
CT Communications Technician
DC Damage Controlman
EM Electrician's Mate
EN Engineman
ET Electronics Technician
FC Firecontrolman and Firecontrol Technician
GM Gunner's Mate
HM Hospital Corpsman
MM Machinist's Mate
QM Quartermaster
RD Radarman
RM Radioman
SK Storekeeper
YN Yeoman

B. Civilian Keys

Bakers (Type III)
Carpenters (Type I)
Electricians (Type III)
I.B.M. Operators (Type I)
Machinists (Type III)
Mechanics (Type I)
Milk Wagon Drivers (Type I)
Painters (Type III)
Plasterers (Type III)
Plumbers (Type III)
Pressman (Type III)
Printers (Type I)
Sheet Metal Workers (Type III)
Minneapolis Shipping & Stock Clerks (Type III)
Truck Drivers (Type III)
Warehousemen (Type III)

N.B. For description of Type I and Type III Keys see Chapter II.

CHAPTER II

Development of Scoring Keys

Previous reports of this project (see especially Technical Reports Numbers 1, 2, and 5) have described the procedures followed in the selection of items for various occupational scoring keys for the Vocational Interest Inventory. It is not the purpose of this chapter to repeat this description, but rather to indicate the current status of work in the development of such keys. This can be done most efficiently by tabular presentation: Tables 1 and 2 include the essential information of this chapter.

Listed in Table 1 are the keys which have been developed for various Navy rates. The rates on which such keys have been developed are, in general, the more populous Navy rates: that is, they are those rates which appeared in largest numbers in a sample of 10,000 Navy men being processed through Navy Receiving Stations who, as part of this processing, completed the Vocational Interest Inventory.

Each key has been used in scoring the group on which it was developed (the "Original" criterion group), and a Navy Men-in-General Group (NMIG) obtained by drawing a stratified random sample from the sample of 10,000 Receiving Station examinees. (Stratification was performed so as to match in the sample the distribution of rates in the total Navy as of the time of administration of the inventories). Whenever a cross-validation group was available, either because a sample was large enough to warrant splitting it, or because a sample was available from another source, it also was scored on the relevant key, and the results included in Table 1.

Numbers of items used in a key, numbers of men in each sample, and

Table 1

Validity and Reliability Data on All Current Navy Vocational Interest Inventory Keys

					Criterion Groups								
		NMIG			Original				Cross-Validation				Test-Retest
Key	Items	N	M	SD	N	M	SD	%Overlap	N	M	SD	%Overlap	Reliability
AD	49	200	12.3	8.0	261	20.7	6.5	56	292	21.7	6.3	51	.75
AT	62	200	4.6	9.2	253	17.6	7.7	44	101	19.6	7.2	36	.84
BM	72	186	-2.2	7.3	367	6.8	7.2	53					.73
BT	45	200	4.6	7.5	247	11.5	7.7	65					.81
CS	62	200	-12.3	9.4	281	7.4	11.4	34	154	6.6	11.2	36	.81
CT	60	200	-5.6	9.6	126	6.6	8.7	50					.81
DC	68	197	-1.6	8.9	189	11.6	8.5	45	124	12.5	8.5	42	.79
EM	67	200	10.8	11.5	250	24.4	8.5	50	46	22.6	10.0	58	.87
EN	70	200	13.3	12.2	237	24.4	8.0	58	37	25.2	7.1	54	.84
ET	71	200	2.0	10.2	217	19.4	8.6	35	46	19.5	8.8	36	.86
FC	60	200	5.4	8.8	274	16.8	9.2	53	246	18.4	8.8	46	.80
GM	68	200	14.9	11.4	300	24.6	9.4	64	(a)*309	21.7	10.3	76	.85
									(b)* 50	24.2	8.0	63	
HM	69	200	-0.6	12.3	239	25.1	17.2	38	212	25.0	16.5	37	.84
MM	61	200	1.1	7.8	254	9.5	7.2	58	63	11.1	7.8	52	.76
QM	65	200	-8.3	8.8	195	3.5	8.7	50	42	3.2	9.2	53	.74
RD	69	197	-1.7	6.9	144	8.0	6.4	47	141	4.3	7.0	67	.82
RM	67	200	0.7	9.2	237	14.0	9.1	46					.85
SK	64	200	-8.2	14.4	146	13.9	14.9	45					.88
YN	70	200	-6.7	14.6	227	18.2	16.2	42	(a)*188	18.0	15.6	41	.85
									(b)*102	16.0	17.3	48	

*(a) and (b) refer to first and second cross-validation groups

means and standard deviations are presented for each key. The general effectiveness of each key in differentiating men in the criterion group from the NMIG sample is indicated by the "% Overlap" figure. This value is the percentage of area in one distribution that lies within the other distribution: 100% overlap indicates that the two means are identical; 10% overlap would indicate a large difference in means, with very little overlap of distributions.

Each of these keys does a very satisfactory job of separating the criterion from the reference group. The poorest job, as indicated by highest percentages of overlap, is done by the BT and GM keys. Even here, however, the means of the two groups are about one standard deviation apart, and are about as much separated as one might hope to get them, in view of the diversity of responsibilities of men in these rates. (Note that the practical magnitude of the difference is the point under discussion here: the statistical significance of the difference is neither considered nor reported, since even these smallest differences are of much greater than borderline significance. Thus, the difference between the BT and NMIG groups is almost ten times the standard error of the difference.)

Perhaps of more interest than the amount of original overlap between criterion and reference groups is the amount of overlap when a cross-validation sample is used. Fourteen keys have been cross-validated. In general, these keys stand up pretty well when used with a new sample, with at least eleven of the fourteen keys doing about as well or better with the second group. The one key dropping markedly in discriminating ability on cross-validation is the RD key. It may be that items in the inventory do not sample adequately the activities of radarmen, or it may be that the original and cross-validation groups differ in some essential characteristic.

In the last column of Table 1 are presented coefficients of reliability,

obtained by administering the inventory to 90 men students at Dunwoody Industrial Institute in Minneapolis on two different occasions a month apart, and scoring these inventories on each of the keys available. The level of reliability of keys if fairly high, especially when one considers the rather small number of items scored in each key.

Table 2 presents data which parallels for civilian keys that presented for Navy rates. Keys are identified at type I or III in the title to indicate the way in which they were developed. Type I keys are those developed by selecting those items with the largest differences in response between criterion and reference groups. Type III keys select from among the best items, in terms of differences between criterion and reference groups, those with the lowest intercorrelations, in order to maximize the differential power of the key. In general, type I keys still being used are those which already do a very good job of differentiating the two groups. Keys developed for Navy rates are all Type III keys.

With civilian groups, the reference population is called Tradesmen-in-General (TIG), and is composed of workers from fourteen different civilian occupations. These groups are obtained, in the main , from the Minneapolis - St. Paul area. Cross-validation groups are obtained by developing a key for a sample from one city and cross-validating it against a sample from the other.

The degree of separation of criterion and reference groups is high. These values compare favorably with those obtained for Navy rates. For the small number of cross-validations possible, it appears that these keys are generally satisfactory, except possibly for the Shipping and Stock Clerks key. Test-retest reliabilities are at about the same general level as for Navy keys, but show more variability.

Table 2

Validity and Reliability Data on All Current Civilian Keys of the Minnesota Vocational Interest Inventory

Key	Items	TIG N	TIG M	TIG SD	Criterion Groups: Original N	Original M	Original SD	Original %Overlap	Cross-Validation N	Cross-Validation M	Cross-Validation SD	Cross-Validation %Overlap	Test-Retest Reliability
Bakers III	63	225	-11.2	7.1	115	0.5	8.4	45					.71
Carpenters I	69	225	10.6	4.4	313	16.6	4.4	49					.73
Electricians III	63	275	13.7	8.5	189	29.6	6.2	28	174	28.8	6.3	31	.86
I.B.M. Operators I	93	300	-12.9	12.6	107	14.2	14.9	32	86	17.7	11.2	20	.83
Machinists III	66	225	10.5	8.6	223	22.8	7.0	43					.83
Mechanics I	70	225	27.7	12.7	162	40.3	8.6	55					.88
Milk Wagon Drivers I	68	225	-16.5	9.7	152	-1.5	9.4	43					.89
Painters III	63	225	2.9	7.1	201	15.4	6.9	37					.84
Plasterers III	66	225	5.0	5.4	72	14.8	4.8	34					.71
Plumbers III	63	225	14.2	6.8	172	24.0	5.5	43	(a)*225	21.9	6.3	56	.75
									(b)*237	21.8	5.9	55	
Pressmen III	61	225	2.6	5.3	80	13.6	4.6	28					.65
Printers I	76	225	-13.9	10.8	316	6.2	11.8	37					.87
Sheetmetal Workers III	66	225	11.1	7.6	167	21.0	7.0	49	303	20.4	5.6	48	.83
Shipping and Stock Clerks III	66	225	-16.0	7.4	225	-6.0	8.8	54	79	-10.4	9.4	74	.73
Truck Drivers III	69	240	12.2	7.4	172	24.3	6.4	38					.76
Warehousemen III	64	225	-5.0	7.0	84	5.1	7.2	47					.78

*(a) and (b) refer to first and second cross-validation groups

The data presented in Tables 1 and 2 represent a completion of one phase of the work of this project, in that keys have now been developed on all of the more significant samples obtained from the civilian and Navy sources we have used. The work in key development has demonstrated the possibility of separating out both civilian groups and Navy groups in terms of their measured vocational interests. The degree of separation proves to be as great as is obtained by Strong in his work with professional groups. And these results are obtained by scoring a fairly small number of items on a simple unit -weights basis.

That various civilian and Navy occupational groups differ from each other in their measured interests suggests both that some self-sorting on the basis of interests occur, and that self-sorting might be improved upon by the use of an interest inventory in counseling or in assigning to duty. Such use, would presumably reduce the amount of changing of jobs by persons who fail to match jobs and interests in their first vocational choices. In addition, however, it is profitable to examine, in a longitudinal study if possible, the relations between measured interests and job satisfaction, or school performance, or on-the-job performance. Those studies which have been done with our vocational interest inventory are summarized in the succeeding chapters.

Chapter III

Achievement and Interest Relationships in the Navy Setting

It has been shown in the preceding chapter that real differences in interests exist amoung various Navy enlisted rates, and that the Navy Vocational Interest Inventory does differentiate among the interests of these groups. The next question that arises concerning the value of an interest measure as an aid in the utilization of personnel is that of its value as a predictive instrument. Studies have accordingly been undertaken to investigate specifically the relationships among measured interests, aptitudes as measured by the Navy Basic Classification Battery, and achievement as indicated by final marks in Navy Technical Schools.

Three samples of Navy school students were studied: 354 students at the Class "A" AT School at Memphis, 464 students from the Class "A" AD School at Memphis, and 547 students from the Class "A" School for ET's at Great Lakes. (Class "A" Schools train enlisted men for duties in a rate at the 3rd class level, and are more or less introductory training programs. AT's are Aviational Electronic Technicians; AD's are Aviation Machinist's Mates; ET's are Electronic Techicians.) The procedures followed in data collection and analysis were essentially the same for the three groups, and may be described as follows:

The samples are made up of the men from four or five entire classes in each of the separate schools who received their training between 1950 and 1952. The schools in which the men were enrolled were Class A schools which prepare men for entering specific navy rates. Excepting less than one percent of each sample, the men came to the Class A schools directly from recruit training. All men had taken the Navy Basic Classification Battery including the following aptitude tests: Navy General Classification

Test (GCT), Arithmetical Reasoning Test (Arith) and Mechanical Aptitude Test (Mech). For the two Navy Aviation student groups, scores on the Clerical Aptitude Test (Cler) were also available. The Navy Vocational Interest Inventory was administered during the course of training in each of the Class A schools. In as much as achievement was measured by final numerical grades in the technical school training courses, only those men are included in the samples who successfully completed the courses.

Multiple regression methods were used to gain insight into relationships between interest and ability measures as they are linearly combined to predict school grade achievement. In order to gain further insight into the manner in which a motivational variable such as interest functions in an achievement setting of this kind, analysis of each sample includes computations of the correlation of interest with achievement when general ability is held constant at various levels. For the ET sample the correlations of arithmetical reasoning and mechanical aptitude with achievement when general ability is held constant were also computed.

Table 3 which shows the means and standard deviations of each of the three samples on the variables employed in the studies, highlights the fact that we are not dealing with groups that are representative of the average navy enlisted man. However, since the Navy Basic Classification Battery was originally standardized so as to approximate the conditions that would exist under full mobilization, the means set at 50 and the S.D.'s at 10 are probably not representative of the present total Navy complement either. Recruitment standards under other than full mobilization conditions such as now exist would result in higher mean scores and some restrictions in range of abilities. The men used in the present studies have undergone still further selection on the basis of their performance on these tests as well as on the basis of successful

completion of the technical school courses.

Table 3

Means and Standard Deviations of Navy Aviation Technical School Students on Ability, Interest and Achievement Measures

	354 AT Students		461 AD Students		547 ET Students	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Gen'l. Classif. Test	63.66	5.16	59.46	5.44	65.35	4.77
Arithmetic Reasoning	62.30	5.19	59.98	5.54	63.06	6.25
Mechanical Aptitude	58.51	7.02	54.43	7.57	60.65	6.31
Clerical Aptitude	55.33	7.21	53.26	7.43		
Interest	25.22	13.67	9.97	6.69	16.76	9.11
Final Average Grade	75.71	4.51	76.11	5.35	73.71	5.87

We do not know the means and Standard Deviations of the present total Navy complement, but the situation as described does permit the inference that the groups with which we are here concerned are restricted in ranges of abilities and that this restriction is less severe in terms of the present total Navy complement than it would be under full mobilizatio...

The Electronics Technician Sample

The interest scores for this group are based on one of the revised scoring keys for the Navy Vocational Interest Inventory. Items for this "ET" key were selected on the basis of high or moderately high percentage difference in response between a criterion group of rated Electronics Technicians and a reference group of Navy-Men-In-General (high validity index), and on the basis of low correlation with total score. The overlap of the original ET group with Navy-Men-In-General was only 35% (see Table 1). When the key was cross-validated using another sample

of rated ET's, overlap was practically the same (36%). The mean of the cross validation sample of ET's on this key was 19.5 and the standard deviation, 8.8. As can be seen in Table 3, the present sample of students compares favorably with rated ET's in their measured interests.

In Table 4 is shown a matrix of intercorrelations of the variables used to predict achievement in Navy Electronics Technician Technical School. The separate correlations of each variable with the criterion, β coefficients and significance data are also given. The β coefficients, which are standard partial regression coefficients, would, in a prediction equation, be combined with standard scores and are, therefore, directly comparable.

Table 4

Correlation Matrix and β Coefficients for Prediction of Achievement in Navy Electronics Technician School (N = 547 ET school students)

	Arith.	Mech.	Interest	School Grade	β Coeff.	$\frac{b}{SEb}$
GCT	.24***	.21***	.03	.19***	.1272	3.06**
Arith.		.00	.00	.14***	.1137	2.80**
Mech.			.01	.18***	.1499	3.72***
Interest				.30***	.2994	7.60***

** Significant at the 1 per cent level
*** Significant at the 0.1 per cent level

For this group, interests account for more of the variation in school grades than do any of the measures of general and special ability. While general ability is significantly correlated with both arithmetic and mechanical aptitudes, none of these measures are correlated with interest, indicating that the interest measure makes a unique contribution to the prediction of final average Electronics Technician School grades. The

multiple correlation of the four combined predictor variables with the criterion of achievement is .40. The F ratio is 25.67 which is significant at beyond the 0.1 percent level.

An attempt was made further to clarify the role of an interest variable in the prediction of achievement by observing the correlations between these two variables when general ability is held constant at various levels. The results are given in Table 5.

Table 5

Electronics Technician Sample,
Means, Standard Deviations and Correlations between
Interests and Achievement at Various Levels of General Ability

GCT Levels	N	r Int. and Achiev.	Interest Scores		Achievement Scores	
			M	S.D.	M	S.D.
70 and above	106	.13	17.83	8.21	76.03	5.59
67-69	131	.34**	16.73	8.41	74.42	5.63
64-66	138	.28**	15.53	9.73	72.17	5.58
61-63	81	.47**	17.84	10.40	73.78	6.16
60 and below	91	.34**	16.46	8.71	72.37	5.64
40-76	547	.30**	16.76	9.11	73.71	5.87

**Significant at the 1 per cent level

Explicitly limiting the range of general ability appears to bring incidental about a variable amount of limitation in the ranges of the interest and achievement variables with whose correlation we are concerned. As might be expected on the basis of the fact that GCT and achievement are significantly correlated over the entire range of ability, the effect on achievement of holding general ability constant is most marked at the higher levels. When general ability is very high (70 or above), a very marked upward shift in mean achievement score occurs as well as a notable

decrease in standard deviation. Mean score on the interest variable shifts proportionally less than, but in the same direction as, the mean achievement score. Incidental decrease in the standard deviation of the interest variable is even more marked than in the case of achievement. It is quite possible that these marked incidental restrictions in the ranges of the correlated variables obscure what is actually a real positive relationship between interests and achievement even at a high level of ability. Although there is, in the overall range of the general ability measure, no correlation between ability and interest, the marked decrease in standard deviation of interests at a high level of ability suggests that at this level a positive relation between these variables does exist.

At a GCT level which is just under the mean for this group (M = 65.35) variability of both interest and achievement variables is maximized. Here, holding constant general ability has allowed what is probably a fairly accurate estimate of correlation of interest with achievement to emerge, and the correlation at .47 is fairly high.

At all other GCT levels, in spite of the fact that one or both of the ranges of the correlated variables are restricted, significant moderate correlations are obtained.

Probably due to the substantial correlations that exist between GCT and the special ability measures over the entire range of the distributions, the effectiveness of the special abilities in predicting achievement at various levels of general ability is partially obscured. It appears from these data (see Table 6) however, that it is precisely those aspects of the special abilities that are related to the general ability measure that make these variables effective in the prediction of achievement in this setting. Note the variations of the standard deviations of the arithmetic distributions at the various levels of ability,

Assuming that the relationship between general ability and arithmetic aptitude varies at different levels of ability, we would expect that where that relationship was strongest, the incidental restriction of the standard deviation of the arithmetic distribution would be greatest. It is precisely at these levels of ability, however, (GCT scores from 61-63 and 64-66) that significant correlations of arithmetic aptitude with achievement are obtained.

Table 6

Electronics Technicians Sample
Means, Standard Deviations and Correlations of Arithmetic and Mechanical Aptitudes with Achievement at Various Levels of General Ability

GCT Scores	N	r Arith. & Achiev.	r Mech.& Achiev.	Arith. M	Arith. SD	Mech. M	Mech. SD
70 and above	106	.07	.03	65.79	8.05	62.39	6.03
67-69	131	.08	.12	63.51	5.59	61.22	6.57
64-66	138	.21*	.07	61.93	3.84	60.13	6.24
61-63	81	.24*	.19	62.57	4.82	60.65	5.48
60 and below	91	-.02	.10	61.38	7.57	58.59	6.32
40-76	547	.14**	.18**	63.06	6.25	60.65	6.31

* Significant at the 5 per cent level
**Significant at the 1 per cent level

At other levels of ability where the ranges in arithmetic aptitude are not so restricted, the correlations with achievement are not significantly different from zero.

The only correlation of mechanical aptitude with achievement when general ability is held constant that approaches significance is that at the 61-63 general ability level. Here again the same phenomenon is suggested.

Aviation Electronics Technicians and Electronicsmen

This group was tested and scored on the Navy Vocational Interest Inventory before refinements in item selection had been applied to the scoring keys. The interest key used on this group was one for which items were selected only on the basis of percentage difference in response between rated Aviation Electronics Technicians and a reference group of civilian tradesmen-in-general. The student group compares well with the rated criterion group on which the key is based, but it is expected that the present refined AT key now in use would be more effective than the one used in this study.

The intercorrelation matrix and related data for this group are shown in Table 7. For this group a measure of clerical aptitude was also available, but made no significant contribution to the regression equation and was accordingly dropped.

Table 7

Correlation Matrix and β Coefficients for Prediction of Achievement in Navy Aviation Electronics Technician and Electronicsman School (N = 354 AT School Students)

	GCT	Arith.	Mech.	Cler.	Int.	School Grade	B Coeff.§	b/SEb
GCT		.14	.09	-.03	.05	.25	.1846	3.81***
Arith.			-.02	.21	.08	.30	.2695	5.36***
Mech.				-.17	-.07	.23	.2355	4.86***
Clerical					-.05	.01		
Interest						.24	.2279	4.74***

*** Significant at the 0.1 per cent level

§ These are the final standard partial regression coefficients arrived at after removal of the Clerical Aptitude Test from the regression equation.

With the exception of the GCT and Arithmetic tests, none of the remaining

predictor variables were significantly correlated, nor were their separate correlations with the criterion significantly different from one another. This set of conditions results in β coefficients which do not differ significantly and we find measured interest, GCT, Mech. and Arith. scores accounting for approximately equivalent amounts of variance in Aviation Electronics Technical school grades.

The multiple correlation coefficient resulting from linear combination of the four effective variables is .48. The F-ratio is 26.20, which is significant beyond the 0.1 per cent level of significance.

The relationships between interest and achievement when general ability is held constant[1] are shown in Table 8.[1]

Table 8

Aviation Electronics Technician and Electronicsmen
Means, Standard Deviations and Correlations between Interest and Achievement when General Ability is Held Constant at Various Levels

GCT Scores	N	r Int.&Ach.	Interest Scores M	Interest Scores S.D.	Achiev. Scores M	Achiev. Scores S.D.
69 and above	72	.21	26.25	12.50	78.00	4.56
66-68	69	.31**	24.45	13.80	75.34	4.98
63-65	72	.10	25.90	13.85	75.92	4.13
60-62	64	.26*	25.55	15.75	74.74	4.52
57-59	42	.16	19.00	12.50	73.78	3.64
56 and below	35	-.05	23.15	14.30	74.50	4.46
49-77	354	.21**	24.95	14.00	75.60	4.64

* Significant at the 5 per cent level
** Significant at the 1 per cent level

[1]Data for this Table and Table 10 are taken from:Kurz, Lloyd Allen;"A Study of the Relationship Between Interest and Achievement in Air Technical Training in the Navy," unpublished M.A. thesis. All of the data used in the analysis of Aviation Electronics Technicians and Aviation Machinists Mates was collected by Mr. Kurz. His thesis is on file at Ohio State University.

These data do not offer as consistent a picture of relationships between interest and achievement as was the case with the Electronics Technician Group. Possibly the small N's in the subsamples are partially responsible. It appears here that except at the lowest level of ability, where incidental restriction of the ranges of either of the correlated variables does not occur, significant positive correlations are obtained between interests and achievement. At the 66-68 GCT level, only range of interests is somewhat restricted, and at the 60-62 GCT level only range of achievement is restricted; at both of these levels significant correlations are obtained. At all other levels the standard deviations of both interest and achievement are affected by the explicit control of general ability and significant relationships fail to appear. The reason for a negative correlation at the lowest level of ability is difficult to assess. The number of cases involved is very small, and while the suggestion is apparent that below a given level of ability interest may not be an effective variable in prediction of achievement, the whole question requires further specific investigation.

Aviation Machinists Mates

The interests of this group were, like the AT sample, scored on a key whose items were selected only on the basis of percentage difference in response between a criterion group of rated Navy men and a reference group of civilian tradesmen-in-general. Here too it is believed that the later refined keys would be more effective.

The multiple correlation results for this group are given in Table 9. In this case we find that Mech., measured interest and GCT account for nearly all of the predictable variance. Though all the partial regression coefficients are significant at the 0.1 per cent level, Mech., which correlates substantially with the other two effective variables, is

significantly more heavily weighted.

Table 9

Correlation Matrix and β Coefficients for Prediction of Achievement in Navy Aviation Machinists Mate School
(N = 461 AD School Students)

	GCT	Arith.	Mech.	Cler.	Int.	School Grade	β Coeff.§	$\frac{b}{SEb}$
GCT		.12	.23	-.02	.04	.24	.1463	3.59***
Arith.			.07	.32	.00	.10		
Mech.				-.12	.32	.47	.3754	8.74***
Clerical				-.05	-.10			
Interest						.31	.1835	4.38***

*** Significant at the 0.1 per cent level
§ Standard partial regression coefficients after removal of arithmetic reasoning and clerical aptitude tests.

The multiple correlation coefficient for this group is .52 using only three variables, and the F-ratio is 56.87, significant at the 0.1 per cent level.

An incidental development, which may be of interest for other multiple regression studies of groups involved in activities of a mechanical nature, arose in the analysis of this group. In the original solution of the normal equations--in which all five of the variables were included--the coefficient for arithmetic aptitude was significant at the 5 per cent level. When, however, the clerical aptitude test, which correlated .32 with arithmetic and -.10 with the achievement criterion, was removed from the regression equation because of its lack of significance, a reduction in significance level of the arithmetic test was simultaneously affected. The clerical test had apparently acted as a suppressor variable which allowed the arithmetic test to make an effective contribution. The combined effect of these two variables is not, in this instance, sufficient to warrant their retention in the multiple regression equation (R changes

from .525 to .517 with their removal), the possibility of the use of clerical aptitude as a suppressor variable in the prediction of mechanical types of achievement is suggested.

The effect on the relationship between interest and achievement when general ability is held constant is presented in Table 10.

Table 10

Aviation Machinists Mates
Means, Standard Deviations and Correlations Between Interest and Achievement when General Ability is Held Constant at Various Levels

GCT Scores	N	r Int.&Ach.	Interest Scores M	Interest Scores S.D.	Achiev. Scores M	Achiev. Scores S.D.
66 and above	67	.41**	10.40	7.02	79.24	5.32
63-65	62	.22	10.18	6.88	77.04	5.01
60-62	119	.62**	9.46	6.88	76.08	4.62
57-59	101	.29**	10.58	5.86	75.43	5.16
54-56	52	.32*	10.42	6.58	75.04	5.22
51-53	38	.41**	7.14	6.36	75.18	6.14
50 and under	25	-.01	11.06	5.64	74.10	5.94
38-73	464	.31**	9.92	6.68	76.10	5.40

* Significant at the 5 per cent level
** Significant at the 1 per cent level

As with the Electronics Technician Group, significant correlations with achievement are found at nearly every level of ability. The r = .62 at the 60-62 GCT level suggests that when learning ability is just adequate, the motivational aspects of interests may play an important role in school achievement.

At levels up to and including the median level of general ability, correlation between interest and achievement varies directly with the degree to which range of interest is affected by the explicit control of GCT,

regardless of the effect of GCT on range of achievement. It is interesting to note also that at the higher GCT levels, control of this variable restricts only the range of achievement, and at lower GCT levels only range of interest is affected. Without further knowledge of the stability and real extent of this apparent shifting of interaction among ability, motivation and achievement variables, however, it can only be noted and marked for future consideration.

The analyses presented in this chapter are in large part inconclusive, since they do not indicate in any consistent fashion how interest measures of the sort we have developed may be used for the specific purpose of improved prediction of school success. Even so, some interesting points are suggested. It is apparent, for instance, that within groups homogeneous with regard to ability there are still marked differences in school achievement. At least some of this variance is related to measured interests, which suggests that attention to motivational and other non-cognitive variables is required. A profitable course of action for this project would seem to be to continue to conduct explorations in this area, using not only school achievement as a criterion, but also later performance in fleet activities.

Chapter IV

Achievement and Interest Relationships in the Civilian Setting

The determination of the relationship between measured interests and on the job performance of civlian workers is not one of the primary goals of this project. However, through cooperation with other companies or agencies it is possible on occasion to obtain kinds of information at relatively little expense, either in time or money. One study using information so obtained has been completed; two others with possibilities for providing useful information are in process and are described in this chapter.

Tabulating Equipment Operators

Dr. Kenneth F. Schenkel accomplished the research which was his doctoral dissertation in a study aimed at predicting the proficiency ratings received by tabulating machine operators. This work was done in cooperation with the Minnesota State Employment Service, which supplied the General Aptitude Test Battery, administered and scored it, and this project, which supplied the Vocational Interest Inventory, and developed a scoring key for tabulating equipment operators.

169 tabulator operators from 35 firms in the twin cities of Minneapolis and St. Paul were used in the study; 114 were men, 55 were women; 138 were employed on International Business Machine equipment, 31 on Remington Rand. The scoring key for the interest inventory was based on reponses of 107 men; the characteristics of this key are described in Chapter II.

An indication of the nature of the sample studied, and of the differences between men and women operators on the several variables

used may be obtained by examination of Table 12.

Table 12

Means (M), Standard Deviations (SD), and F Values
from the Analysis of Variance in Cross Classifications

Variable§	Males N=114 M	SD	Females N=55 M	SD	F
GATB Tests					
G	124.2	15.0	112.8	13.6	22.53*
V	116.5	15.8	110.0	16.2	6.09
N	121.4	14.9	110.2	15.8	20.38*
S	120.6	19.2	114.4	15.9	4.26
P	116.4	15.9	118.9	15.8	0.00
Q	110.9	15.6	116.8	15.7	4.96
A	103.6	14.8	103.9	13.9	0.00
T	103.9	16.1	108.6	15.3	3.23
F	105.9	18.6	108.6	17.1	0.00
M	98.7	19.7	99.4	18.2	0.00
NVII	44.2	14.8	40.9	10.3	2.11
Prof. Rating	20.0	5.6	17.9	5.2	5.16
Hoppock	68.0	12.0	73.4	10.0	8.10*
Remmers	32.0	7.3	33.3	8.5	0.00

*Significant at the 1% level.

§The symbols used in this column refer to the following: G: General Learning Aptitude; V: Verbal Aptitude; N: Numerical Aptitude; S: Space Perception; P: Form Perception; Q: Clerical Aptitude; A: Aiming; T: Motor Speed; F: Finger Dexterity; M: Manual Dexterity; NVII: Navy Vocational Interest Inventory; Prof. Rating: the proficiency criterion; Hoppock: Hoppock Job Satisfaction Blank No. 12; Remmers: Miller-Remmers Attitude Towards a Vocation Scale.

The analysis of interrelationships was made with the total group, men and women combined, even though on several of the variables significant and substantial sex differences were observed. In the work done to attempt the prediction of the criterion ratings with the tests available, a profile analysis method of the sort generally used by the U. S. Employment Service was used. The first step was an examination of the criterion ratings, which, upon analysis, were found to have a reliability of .82. The next step, determining the correlation between each variable and these ratings

produced the results shown in Table 12.

Table 12

Correlations of Aptitude Test Scores and NVII Scores with the Proficiency Criterion

Variables	r (N=169)
G	.30**
V	.24**
N	.32**
S	.13
P	-.01
Q	.18*
A	.12
T	.08
F	.15*
M	.04
NVII	.18*

**Significantly greater than zero at the 1% level
* Significantly greater than zero at the 5% level

It will be seen that there are no high validities, although several are significantly greater than zero. Profiles developed using various procedures failed consistently to include the vocational interest inventory score as one of the more useful predictors. Some basis for this failure may be observed in the interrelationships between variables as shown in Table 13. While the interest score does relate to proficiency, it relates, in this sample, even more to the aptitude measures which do the better job of predicting the proficiency criterion.

The results of this study would thus suggest that interest inventory scores do not relate markedly to measures of on-the-job performance. This conclusion is not entirely warranted, however, since this study represents only a cross section of persons employed in a given occupation, and yields

no great insight into processes of job selection, job tryout and change, and eventual satisfaction in a vocation. When only those persons who have

Table 13

Correlations Between Variables for Tabulating Equipment Operators (N=169)

Variables	Aptitudes G	N	F	Proficiency Rating	NVII	Hoppock	Remmers
Prof. Rating	.30	.32	.15		.18	.13	.21
NVII	.16	.36	-.01	.18		.07	.22
Hoppock	-.09	-.06	.08	.13	.07		.33
Remmers	.14	.10	.01	.21	.22	.33	

been employed and retained, and who have been willing to remain on a particular job, it is difficult to determine to what extent the relationships between variables observed within this sample describe the process by which these persons became eligible to be included in the sample. This is a particularly important problem in interest measurement, since the processes by which an occupational group is selected, or changes in its interests, in such a way as to make possible the development of keys of the sort we find, are processes that are only poorly understood.

Partly on the basis of dissatisfaction with the amount of information yielded by such cross-sectional studies, and partly because offers were received by research persons interested in using the vocational interest inventory for experimental purposes, two additional studies, described very briefly below, are in process.

Skilled Tradesmen in an Eastern Company

A large eastern company employs sizable numbers of skilled tradesmen, especially in the trades of electrician, plumber, carpenter, sheet metal

worker, machinist, and mechanic, but with possibilities, in addition, for samples of I.B.M. workers, truck drivers, and warehousemen. This project has arranged for the collection of inventory responses from workers as they are enrolled in skilled trades classes, with the understanding that, in return for the local experimental use of our inventory scoring keys in the selection and classification of employees, we will receive later information on the progress of these men. A performance review on each man is made semi-annually. Such information should, in the long run, provide valuable information on the usefulness of interest inventory scores of the sort available with the Vocational Interest Inventory.

(Also being obtained from this company are completed inventories from men who have been on the job for some time. These data are immediately useful for cross-validation purposes, but also may be used to determine the relationship between measured interests and performance in the same manner as was done in the preceding section with tabulating machine operators. With the data from the first performance review available, some analyses have been completed; these indicate, generally, little or no relationship between interest scores and proficiency on the job. The same limitations of these data exist as was true for the tabulating machine operators.)

Baking Company Employees

Dr. Robert W. Ellis, Personnel Director of the Manor Baking Company of Dallas, Texas, is working with this project in the study of relationships between on-the-job performance and interest scores, and the usefulness of such scores in the selection and placement of employees. Through his efforts, completed inventory responses have been received from 118 bakery route salesmen, 29 route builders and sales managers, and 139 production and other workers. The Manor Baking Company has obtained proficiency ratings on a

substantial number of these persons, and especially on route salesmen. The ratings for this latter group have been shown to have high reliabilities, and ought to be reasonably predictable.

The work with Dr. Ellis promises to be rather interesting, partly because of the opportunity, again, for longitutinal studies on the role of interests in job selection and career development, but partly also because the highest relationships found between achievement and interests heretofore have been with employees engaged in sales operations. It shall be interesting to see whether the sort of relations observed with life insurance salesmen, for example, are also observed with such a markedly different sort of sales situation as the bakery route salesman finds.

Follow-up of High School Students

In 1948 all of the men students in the Freshman, Sophomore, Junior, and Senior classes of the Washington High School in St. Paul were administered the vocational interest inventory. This high school was selected since a large portion of the men students enter the skilled trades. No steps have as yet been taken to follow-up on this group of persons, although such a follow-up is possible. Such an undertaking does not indicate directly the role of interests in performance on the job, but, when some of the studies outlined in the preceding sections are completed, it may well be that this follow-up will be indicated as the logical next step.

Chapter V

A Comparison of Forced-Choice and L-I-D Items

The present study was undertaken to determine whether forced-choice interest items give better results than L-I-D interest items. As the study developed, it became apparent that the data collected for the investigation of this problem would provide information of value with regard to certain other topics as well. These topics were cross-validation of existing interest keys; the relative merits of multiple-weight and unit-weight interest keys; and the relative performance of items in the Strong Vocational Interest Blank and the Minnesota Vocational Interest Inventory.

Three interest inventories were used in the present study. One was the Strong Vocational Interest Blank. The other two were based on the Minnesota Vocational Interest Inventory. Form F was composed of 138 forced-choice triads taken directly from the Minnesota Vocational Interest Inventory. Form M was composed of the same items as Form F, but in L-I-D form. The 138 triads were chosen on the basis of their known discrimination between Navy yeomen and tradesmen-in-general and between shipping and stock clerks and tradesmen-in-general. The number of triads was reduced to 138 from 190 in order to reduce the time required for the inventories. The known discriminations were used to select the items because one of the groups to be studied was Navy Yeomen, a clerical occupation.

The three interest inventories were given to groups of yeomen and college students. Yeomen were used because they were an available occupational group for whom similar keys are available on both the Strong Vocational Interest Blank and the Minnesota Vocational Interest Inventory. Totals of 135 yeomen and 167 college students completed all three inventories correctly.

The yeomen's inventories were scored on the existing Strong Office Worker key and on the existing Yeomen and Shipping-Stock Clerk keys of the Minnesota Vocational Interest Inventory. Distributions of the scores for each key were compared with the distributions of scores of criterion and reference groups for each key to provide an indication of validity of the key for the present group of yeomen. Consideration of reported personal characteristics of the present yeomen indicated that they were very similar to the criterion yeomen but were younger and had more education than the criterion groups for either of the other two keys.

Table 14

Means and Standard Deviations of Scores on Yeoman Key of Criterion and Validation Yeomen and Navy Men-in-General Samples

Group	Mean	σ	N
Criterion Yeomen	24.2	41.2	102
Validation Yeomen	23.4	35.6	135
Navy Men-in-General	-26.8	41.2	200

It was found that the distribution of scores for the present yeomen group on the Yeoman key was almost exactly the same as the distribution for the criterion yeomen. The comparison was made in terms of mean score and of amount of overlapping of the groups with each other and with Navy men-in-general. On the Shipping-Stock Clerk key the distributions of scores of both yeomen groups were quite similar to the distribution for the criterion shipping and stock clerk group in terms of amount of overlapping with the

Table 15

Mean Differences and Percentages of Overlapping of Three Groups on Yeoman Key

Groups Compared	Percentage Overlap	Mean Difference	C.R.	Significance Level
Navy M-I-G vs. Criterion Yeomen	53.5	51.0	10.19	P<.0001
Navy M-I-G vs. Validation Yeomen	52.4	50.2	11.55	P .0001
Criterion Yeomen vs. Validation Yeomen	99.2	0.8	0.15	P=.8808

Table 16

Means and Standard Deviations on Shipping-Stock Clerk Key of Samples of Shipping and Stock Clerks, Yeomen and Tradesmen-in-General

Group	Mean	σ	N
Shipping-Stock Clerks	5.3	9.7	79
Criterion Yeomen	7.3	11.5	50
Validation Yeomen	4.4	10.6	135
Tradesmen-in-General	-9.5	8.9	240

latter and with tradesmen-in-general and in terms of mean scores. The present yeoman group, however, obtained a distribution of scores on Strong's Office Worker key which was significantly different from the distribution of scores of criterion office workers on the same key. The comparison was made in terms of means, amount of overlapping of the two groups and percentages of letter ratings. Also, the yeoman distribution, although it was quite different from the distribution of men-in-general scores on the key was not as different from

Table 17

Mean Differences and Percentages of Overlapping of Four Groups on Shipping-Stock Clerk Key

Groups Compared	Percentage Overlapping	Mean Difference	C.R.	Significance Level
T-I-G vs. Shipping-Stock Clerks	42.0	14.8	12.03	P .0001
T-I-G vs. Criterion Yeomen	40.8	16.8	13.12	P .0001
T-I-G vs. Validation Yeomen	47.6	13.9	12.87	P .0001
Validation Yeomen vs. Shipping-Stock Clerks	96.5	0.9	0.63	P=.5286
Criterion Yeomen vs. Validation Yeomen	89.6	2.9	1.55	P=.1212

Table 18

Means and Standard Deviations on Strong Office Worker Key of Office Worker, Yeoman and Men-in-General Samples

Group	Mean	σ	N
Office Workers	56.1	34.2	326
Yeomen	37.9	35.6	135
Men-in-General	-1.7	41.4	500

the latter as was the distribution for criterion office workers. It was concluded that the Yeoman key cross-validates almost perfectly and that the validity of the Shipping-Stock Clerk key generalizes quite satisfactorily to yeomen. It was also concluded that the validity of Strong's Office Worker key does not satisfactorily generalize to yeomen in general. The evidence was not sufficient to indicate for certain whether the latter result is due to inade-

Table 19

Mean Differences and Percentages of Overlapping of Three Groups on Strong Office Worker Key

Groups Compared	Percentage Overlapping	Mean Difference	C.R.	Significance Level
M-I-G vs. Office Workers	44.4	57.8	21.81	P .0001
M-I-G vs. Yeomen	60.7	39.6	11.06	P .0001
Yeomen vs. Office Workers	79.4	18.2	5.05	P .0001

quacy of the Office Worker key or to differences between yeomen and civilian office workers.

Further information about the three existing keys was sought by examining the scores obtained by yeomen who indicated occupational satisfaction as compared with those indicating occupational dissatisfaction. The satisfied

Table 20

Means, Standard Deviations and Mean Differences on Three Keys of Occupationally Satisfied and Non-Satisfied Yeomen

	N	Mean	σ	Mean Diff.	C.R.	Significance Level
Yeoman Key						
Choose same career	85	32.0	34.0	21.7	3.40	P=.0006
Choose different career	50	10.3	36.8			
Shipping-Stock Clerk Key						
Choose same career	85	7.9	8.6	9.4	4.08	P .0002
Choose different career	50	-1.5	11.0			
Office Worker Key						
Choose same career	85	48.0	32.4	27.3	4.57	P .0002
Choose different career	50	20.7	34.2			

Table 21

Mean Differences and Percentages of Overlapping of Occupationally Satisfied Yeomen with Criterion and Reference Groups for Office Worker Key

Groups Compared	Percentage Overlapping	Mean Difference	C.R.	Significance Level
Satisfied Yeomen vs. Men-in-General	50.0	49.7	12.5	P .0001
Satisfied Yeomen vs. Office Workers	90.4	8.1	2.0	P=.0432

group obtained significantly higher scores than the dissatisfied group on all three keys. The mean scores of the satisfied group were higher on both the Yeoman and Shipping-Stock Clerk keys than those of the criterion groups for these keys, indicating that the keys are more valid for satisfied yeomen than for yeomen in general. Although the mean score of the satisfied yeomen was significantly lower on the Office Worker key than that of the criterion group for the key, the overlapping of the two groups was 90 per cent. The Office Worker key is, therefore, quite valid for occupationally satisfied yeomen. It appears that the failure of the validity of the Office Worker key to generalize completely to yeomen in general is due to a difference between the kind of people who go into Navy office work and the kind who go into civilian office work.

It was concluded, finally that any of the three keys studied would be useful in the selection and assignment of yeomen.

For the study of the item form, item content, and weighting method problems six experimental keys were constructed. The 167 students were divided into two groups, and both a unit-weight key and a multiple-weight key were constructed for each of the three inventories to differentiate one student

group (criterion groups) from the yeoman group. The keys were then cross-validated by applying them to the second (cross-validation) student group. Strong's weighting system was used for the multiple-weight keys. The unit-weight keys were constructed by giving a weight of one to all items showing a difference of 20 per cent or more between the yeoman and criterion student groups. For all keys positive weights were given when yeomen had the higher percentage, and negative weights were given when students had the higher percentage.

The measures used as criteria for superiority of a key were mean differences and amounts of overlapping among the yeoman and two student groups. A better key is indicated by less overlapping and greater mean differences between the yeoman group and the student groups and by more overlapping and less mean difference between the two student groups. It was pointed out that difference in amount of overlapping is the most important indication of relative effectiveness of keys. Number of items and weights scored on a key and time required to complete an inventory were used as secondary criteria of the usefulness of the experimental keys.

The comparison of weighting methods was made by comparing the multiple-weight key for each inventory with the unit-weight key for the same inventory. Since differentiation of each pair of three groups was considered, and since there were three inventories, there were nine comparisons altogether. All six keys gave significant mean differences between yeoman and student groups. One, a multiple-weight key, gave a significant difference between the two student groups. Of the nine differences in amount of overlapping, five favored unit-weight keys and two, including the only statistically significant difference, favored multiple-weight keys. Two differences were zero. It was concluded that the two weighting methods produce no differences in validity. Since

Table 22

Percentages of Overlapping of Yeoman, Criterion Student and Cross-Validation Student Groups on Six Experimental Keys

Key and Groups Compared	Tilton Overlapping
Strong - Unit-Weight	
YN vs. CS	20.2
YN vs. C-VS	22.4
CS vs. C-VS	88.4
Strong - Multiple-Weight	
YN vs. CS	23.1
YN vs. C-VS	25.5
CS vs. C-VS	86.0
Form M*- Unit-Weight	
YN vs. CS	32.5
YN vs. C-VS	33.4
CS vs. C-VS	98.2
Form M*- Multiple-Weight	
YN vs. CS	31.0
YN vs. C-VS	35.4
CS vs. C-VS	92.7
Form F**- Unit-Weight	
YN vs. CS	27.3
YN vs. C-VS	25.0
CS vs. C-VS	96.5
Form F**- Multiple-Weight	
YN vs. CS	29.6
YN vs. C-VS	27.3
CS vs. C-VS	98.1

* Form M is an L-I-D inventory.
** Form F is a forced-choice inventory.

there were many more items scored and scoring weights used in the multiple-weight keys, the use of unit-weight keys will result, however, in a considerable saving in time over the use of multiple-weight keys, at least if hand-scoring is to be done.

Two sets of items with different content were compared by comparing the keys based on the Strong Vocational Interest Blank with the keys based on the L-I-D form (Form M) of items from the Minnesota Vocational Interest Inventory. Since there were two keys for each inventory, and since each pair of three groups was being differentiated on each key, there were six comparisons to be made. All four keys satisfactorily differentiated yeomen from both student groups. The Strong keys, however, also provided considerable differentiation between the two student groups. Both unit-weight keys and multiple-weight keys for the Strong inventory provided less overlapping of yeomen with each student group than did the comparable keys for Form M. Three of the four differences were statistically significant. The Strong keys provided much more differentiation between the two student groups than did the Form M keys. The differences were not statistically significant, although they approached significance at the five percent level. These results mean that the Strong keys provided greater validity and cross-validity than the Form M keys according to one criterion, but that, according to another criterion, the cross-validities of the Strong keys were not as satisfactory as those of the Form M keys.

The relative importance of differentiating criterion and cross-validation groups from a reference group and, on the other hand, of not differentiating criterion and cross-validation groups from each other was discussed. It was pointed out that satisfactory differentiation of criterion and cross-validation groups from a reference group is essential. However, if these differentiations

are satisfactory, variations in differentiation of cross-validation groups from criterion groups may be more important. This is particularly true when norms are based on criterion groups. A decrease in standard deviation on the Strong keys from the criterion group to the cross-validation group was cited as the chief reason for the lower amount of overlapping between the two groups provided by the Strong keys.

Since the distributions of percentage differences for the Strong and Form M inventories were quite similar, it was concluded that greater heterogeneity of content in the Strong inventory was responsible for its greater differentiation of yeoman and student groups. No reason was suggested to account for its greater differentiation of student groups from each other.

The relative effectiveness of forced-choice and L-I-D items was investigated by comparing the results of keys based on Form F, a forced-choice inventory, with keys based on Form M, an L-I-D inventory composed of the same items as were used in Form F. Again, since there were two keys for each inventory, and since three groups were differentiated on each key, there were six comparisons to be made. All four keys satisfactorily differentiated the yeomen from both student groups. None of the keys differentiated the student groups from each other. Of the six differences in amount of overlapping, four favored Form F, but the differences were slight. Three of these were statistically significant. One difference was zero, and the remaining difference favored Form M but was not statistically significant. It was concluded that forced-choice items give better validity than L-I-D items, though the difference is slight.

There were more items and scoring weights on the unit-weight Form F key than on the unit-weight Form M key. On the multiple-weight keys, however, there were about the same number of items for both inventories but fewer

weights for Form F than Form M. It appears that forced-choice items provide more large percentage differences than L-I-D items do and that the restriction on number of weights available from forced-choice items does not result in lower validity.

There were no differences in time required to complete the two inventories.

Perhaps the most important implications of the present study are found in the investigation of existing keys. As evidence continues to be added that the validities of interest keys are high and stable, our confidence in the application of such keys will increase.

The experimental aspects of the study provided tentative answers to some questions but raised other questions. It appears that somewhat greater validity of interest keys can be obtained by using forced-choice items than by using L-I-D items. It also appears that unit-weights will not only provide the same results as Strong's multiple weights but will do so more efficiently.

Of the variables studied, heterogeneity of item content had most effect on validity, though its effect in the present study was not consistent. Although the instability of keys based on heterogeneous items has not been reported elsewhere, further investigation of this point might be in order.

In summary, the present results suggest that heterogeneous items in forced-choice form, given unit scoring weights, produce the most valid and most efficient interest keys. It is important to note, however, that the total range of amount of (Tilton) overlapping for the yeoman vs. criterion student differentiation was only 12 per cent. For the yeoman vs. cross-validation student differentiation it was 13 per cent, and for the student vs. student differentiation it was 20 per cent. And none of these three ranges has the same keys at both extremes as either of the others. Furthermore,

although many differences were statistically significant, even the most significant difference was quite small.

It is the present writer's preference to use the most effective method, as empirically determined, even if the resulting improvement is slight. It appears, however, that in selecting any of the techniques of interest measurement considered in the present investigation, personal preference may provide as adequate a basis for selection as any. The possible exception is in choosing a weighting method, in which careful consideration should be given to the greater efficiency of unit weights.

Chapter VI

Interest Profiles of Men in Various Navy Rates on Nineteen Navy Keys

The collection and reporting of results of analysis of data related to the interests of Navy and civilian wo :ers tends to proceed with primary emphasis on reporting of the results of statistical analyses. This sort of emphasis tends to obscure an important contribution of interest research in providing another source of information about the relationships between rates, in the Navy, and occupations in civilian life.

To permit the use of our work for this more general purpose, this chapter presents profiles of mean scores obtained by scoring small samples of men in each of 42 rates on the 19 keys currently available for Navy rates. These profiles are included in the latter part of this chapter. A few words of explanation of the form used in presentation are required:

1. At the top of each page the group being scored is listed. Navy abbreviations of rates are used; these can be identified by reference to Table 1 on page 9 of this report.

2. Down the left hand side of each profile are listed the scores obtained for the group being scored, for each key. These scores are means, and are in the same units used in Table 1, page 9.

3. As indicated at the bottom of each profile, a score of 40 is set as the mean of Navy Men-in-General, and a score of 60 as the mean of the criterion group. Thus, any score above 50 is closer to the mean of the criterion group than to the mean of Navy Men-in-General, while any score below 50 is closer to the mean of the latter group.

These profiles are presented without discussion at this time. They have been prepared for use in connection with an analysis of correlations between scoring keys. When this latter analysis is completed, this project

will be interested in discussing these profiles at length.

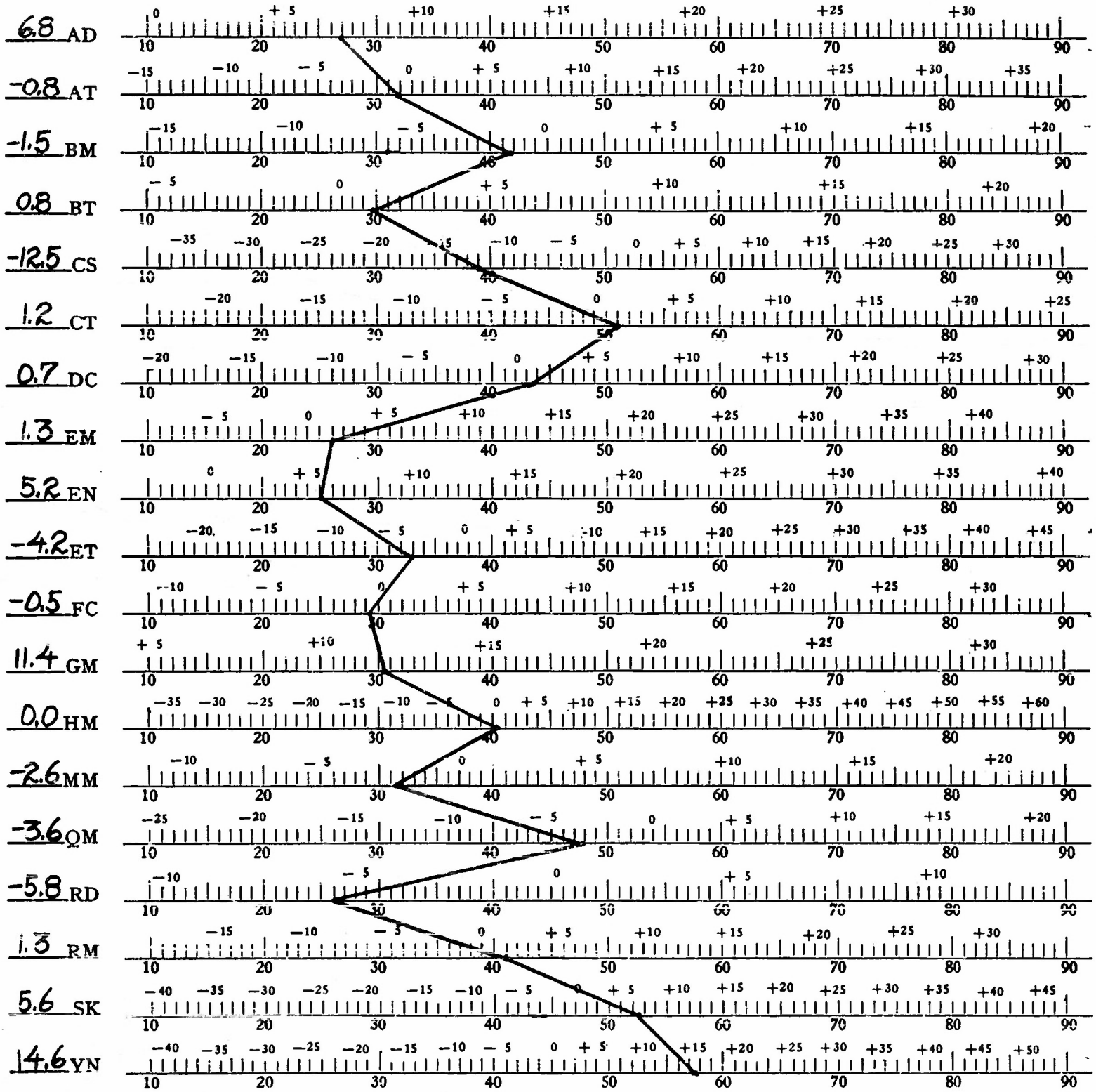
Even without a correlation matrix, certain of the profiles attract the interest of the reader. The profile for AO's, for example, reflects the absence of a distinguishing pattern of interests that is almost remarkable. This is the same rate with whom we had difficulty in building an empirical key that would do a good job in differentiating AO's from other Navy men. The ET profile is quite unusual, suggesting a sort of versatility of interests paralleling our knowledge of their abilities. The similarity of patterns of PN's, SK's, and YN's is striking. For the reader who enjoys guessing factors reflected in profiles of this sort, it is suggested that the RM profile be examined.

Note:

The profiles which follow have been bound face down and in reverse order so as to place mean scores for groups at the outside instead of the inside margin. Though it is a bit unconventional, this makes them easier to read.

Profile of Mean Scores of 25 YN's

On Nineteen Navy Keys of the Vocational Interest Inventory



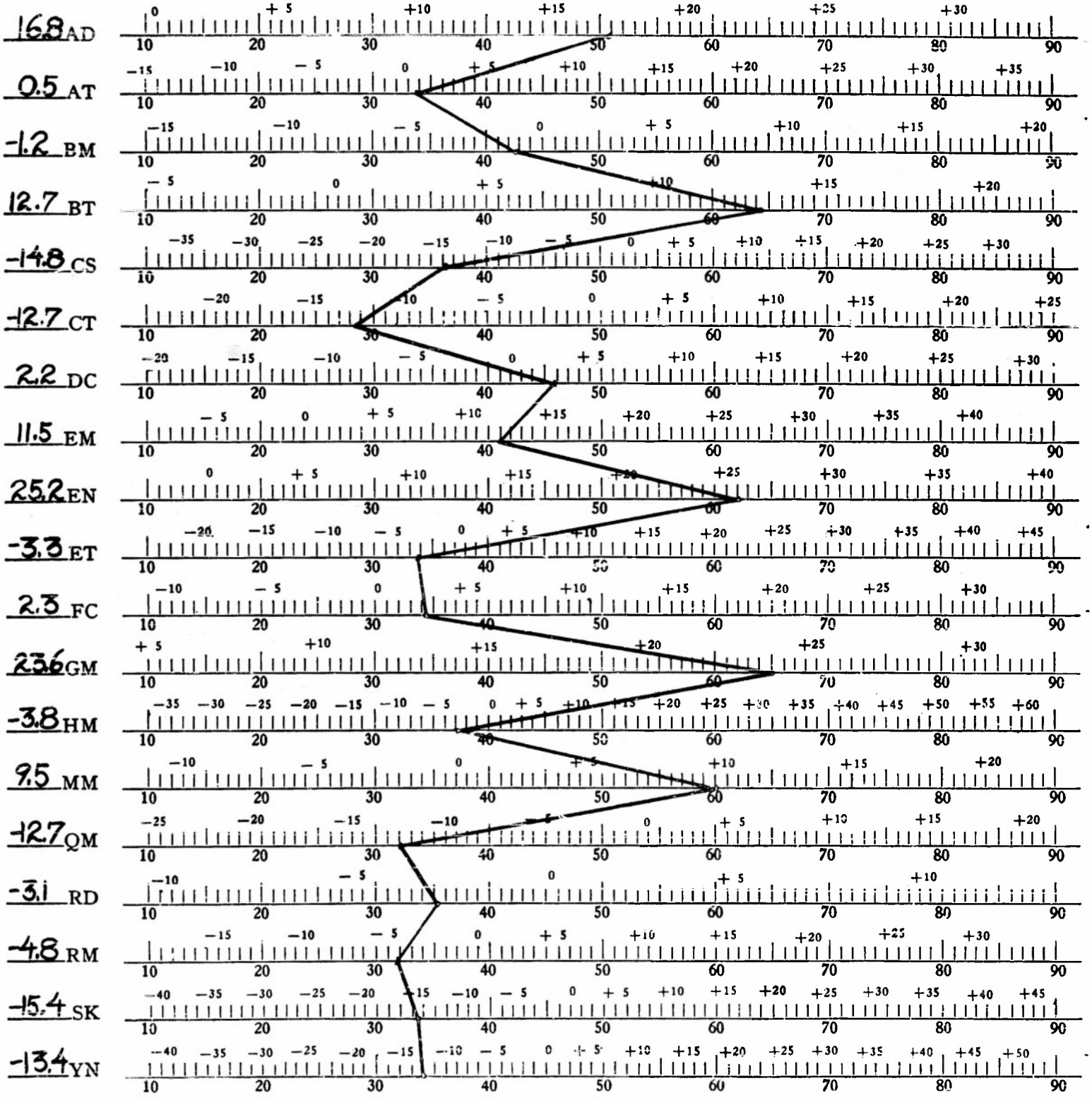
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 10 UT's

On Nineteen Navy Keys of the Vocational Interest Inventory



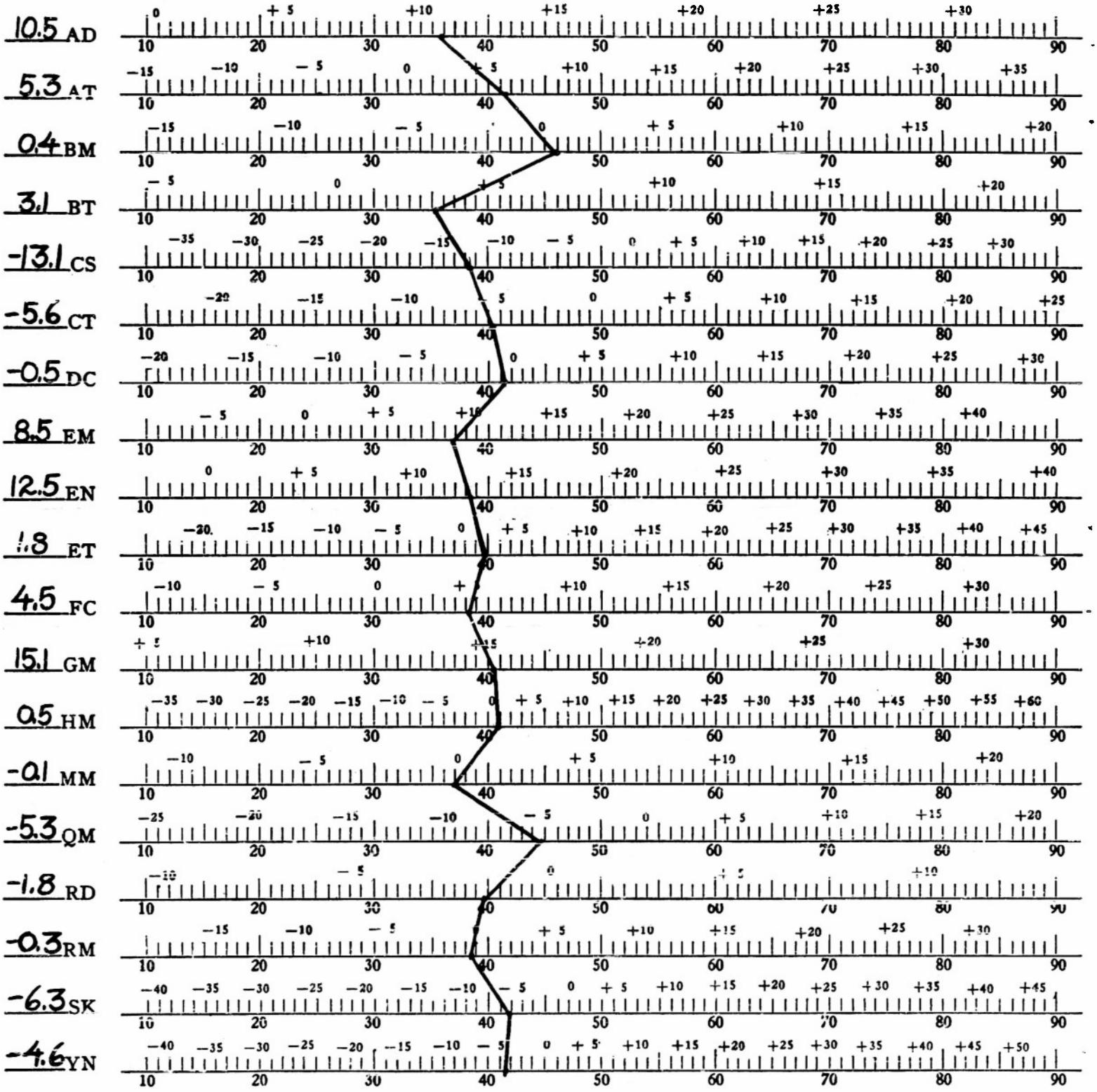
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 15 TM's

On Nineteen Navy Keys of the Vocational Interest Inventory



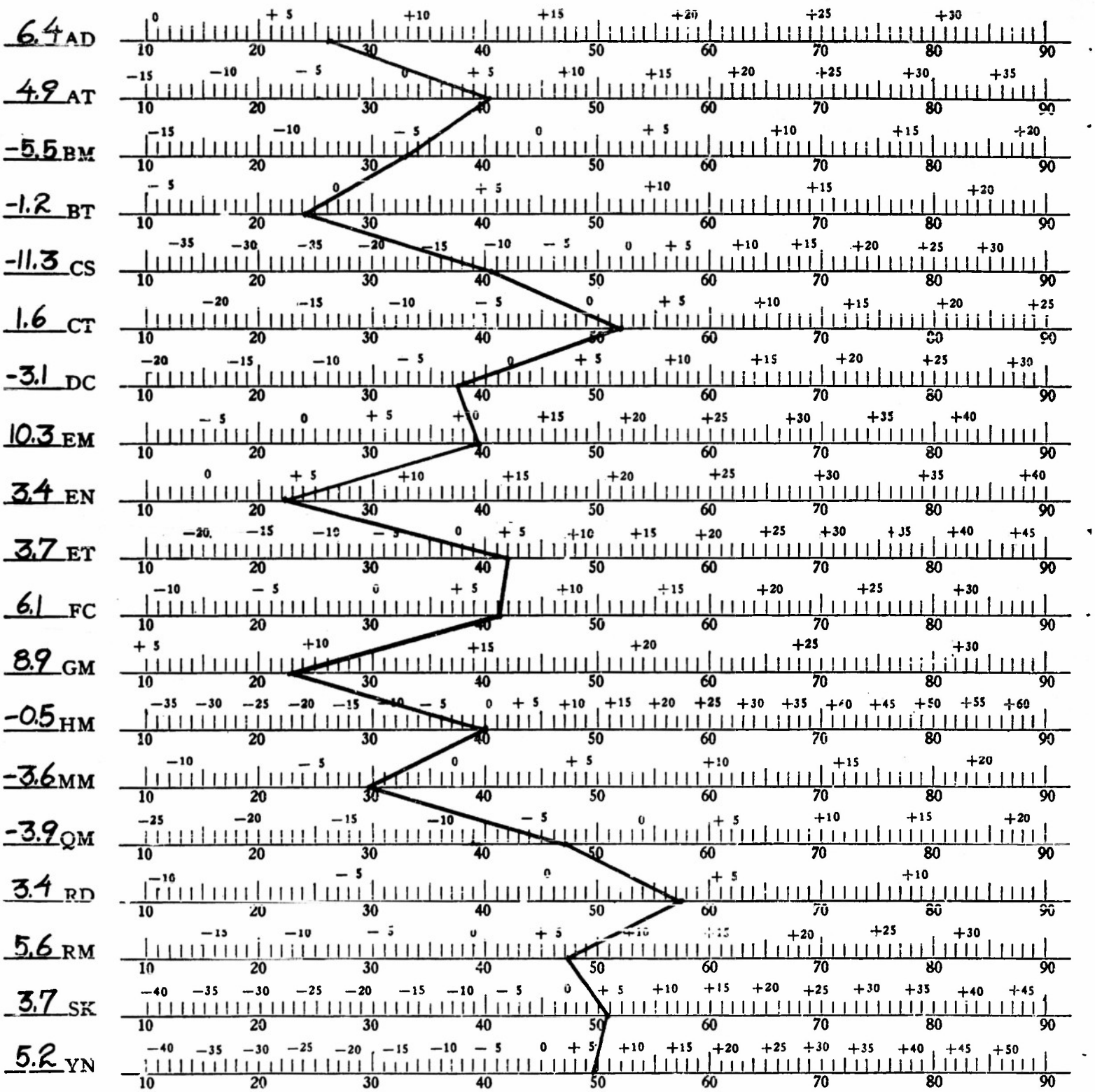
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 23 TE's

On Nineteen Navy Keys of the Vocational Interest Inventory



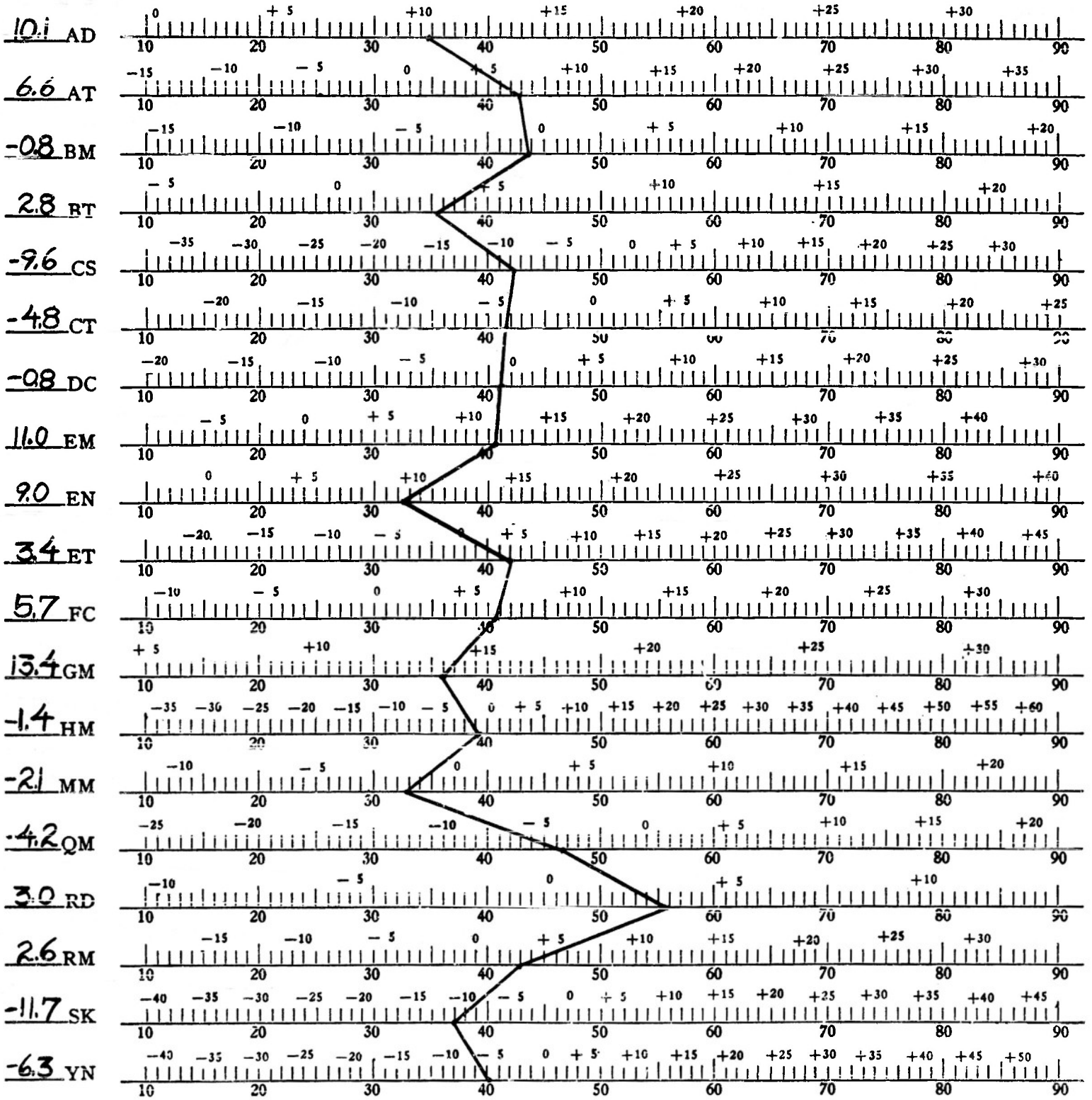
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 SO's

On Nineteen Navy Keys of the Vocational Interest Inventory



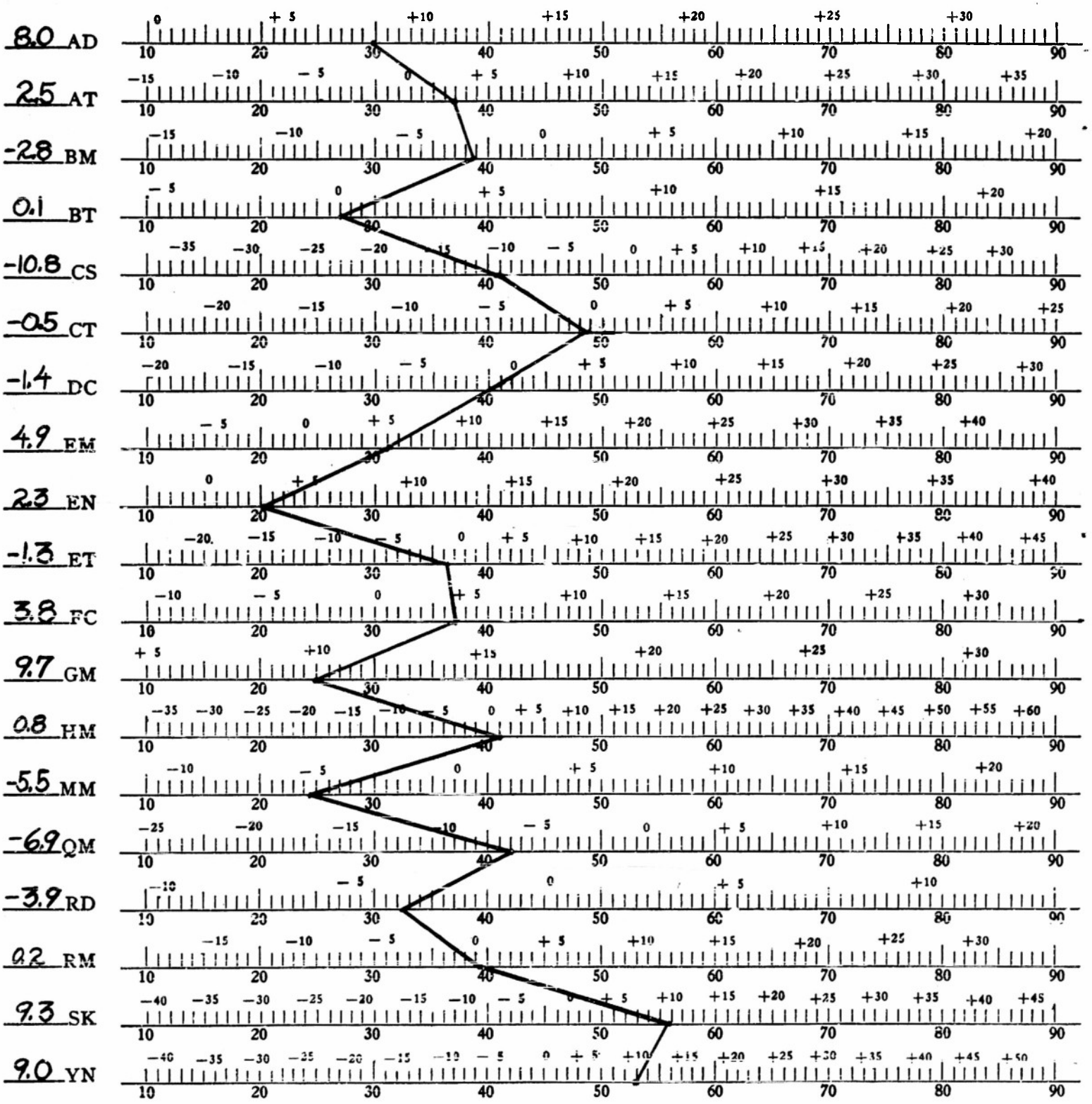
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 SK's

On Nineteen Navy Keys of the Vocational Interest Inventory



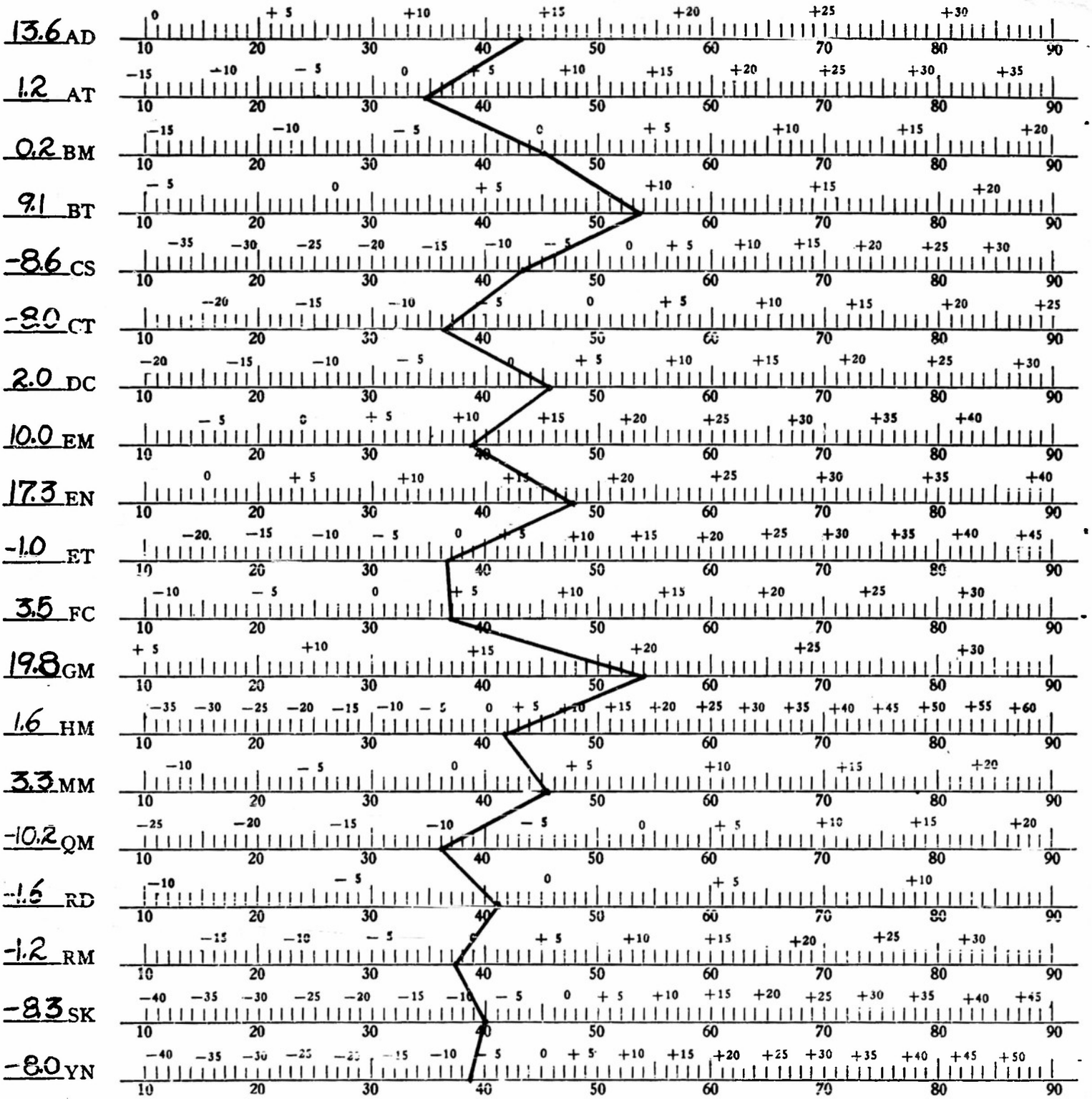
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 SH's

On Nineteen Navy Keys of the Vocational Interest Inventory



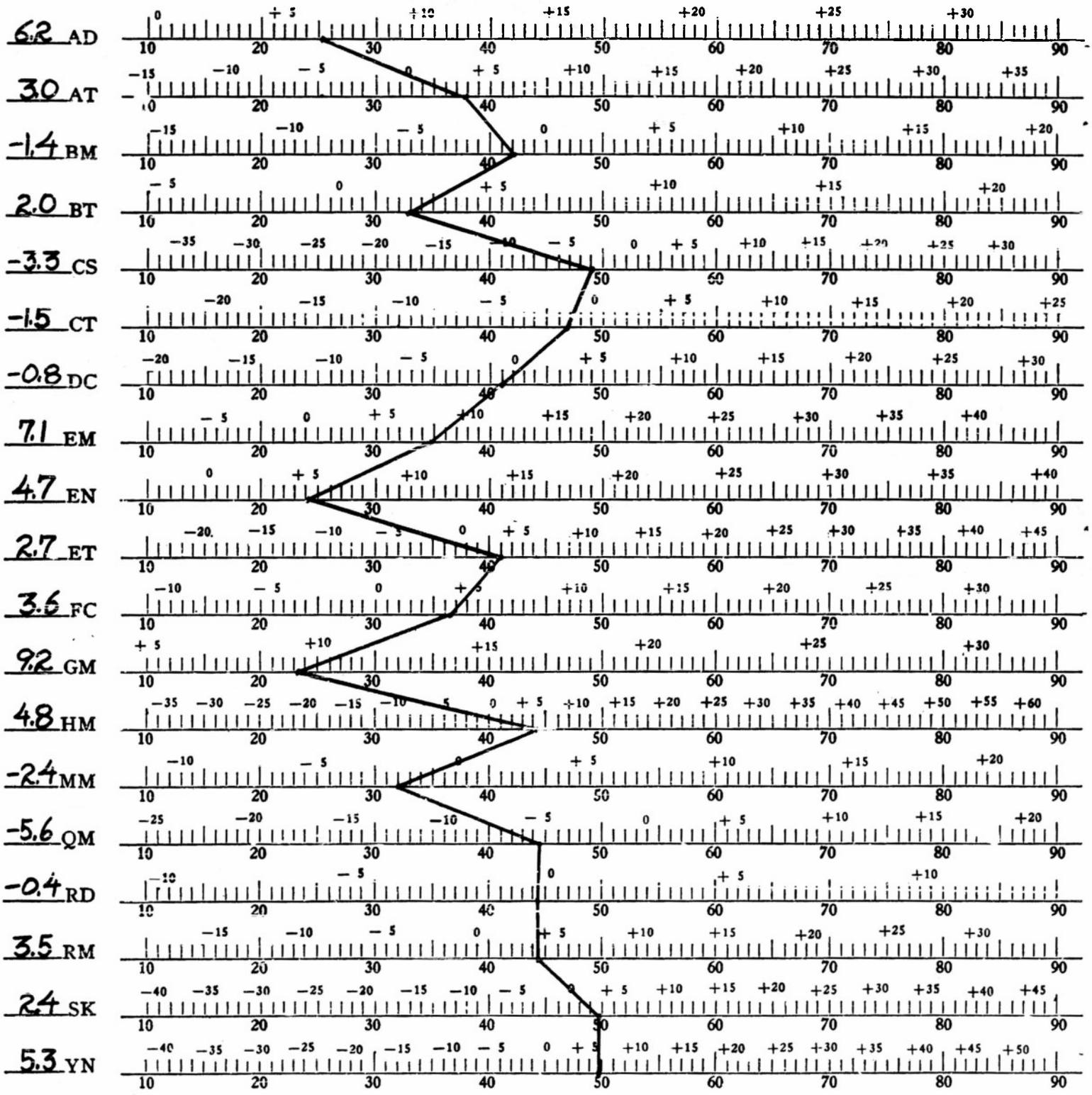
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 SD's

On Nineteen Navy Keys of the Vocational Interest Inventory



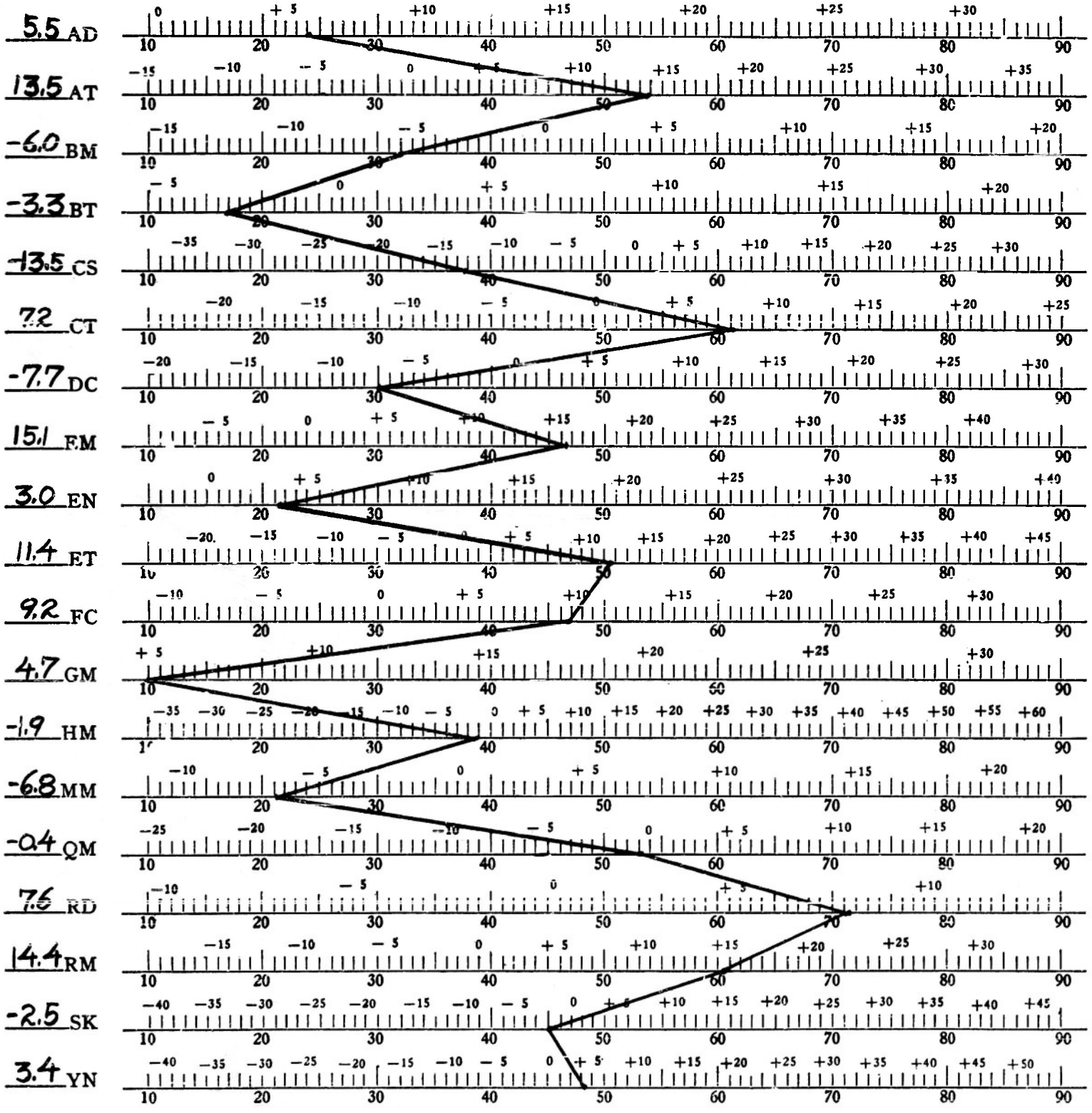
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of RM's

On Nineteen Navy Keys of the Vocational Interest Inventory



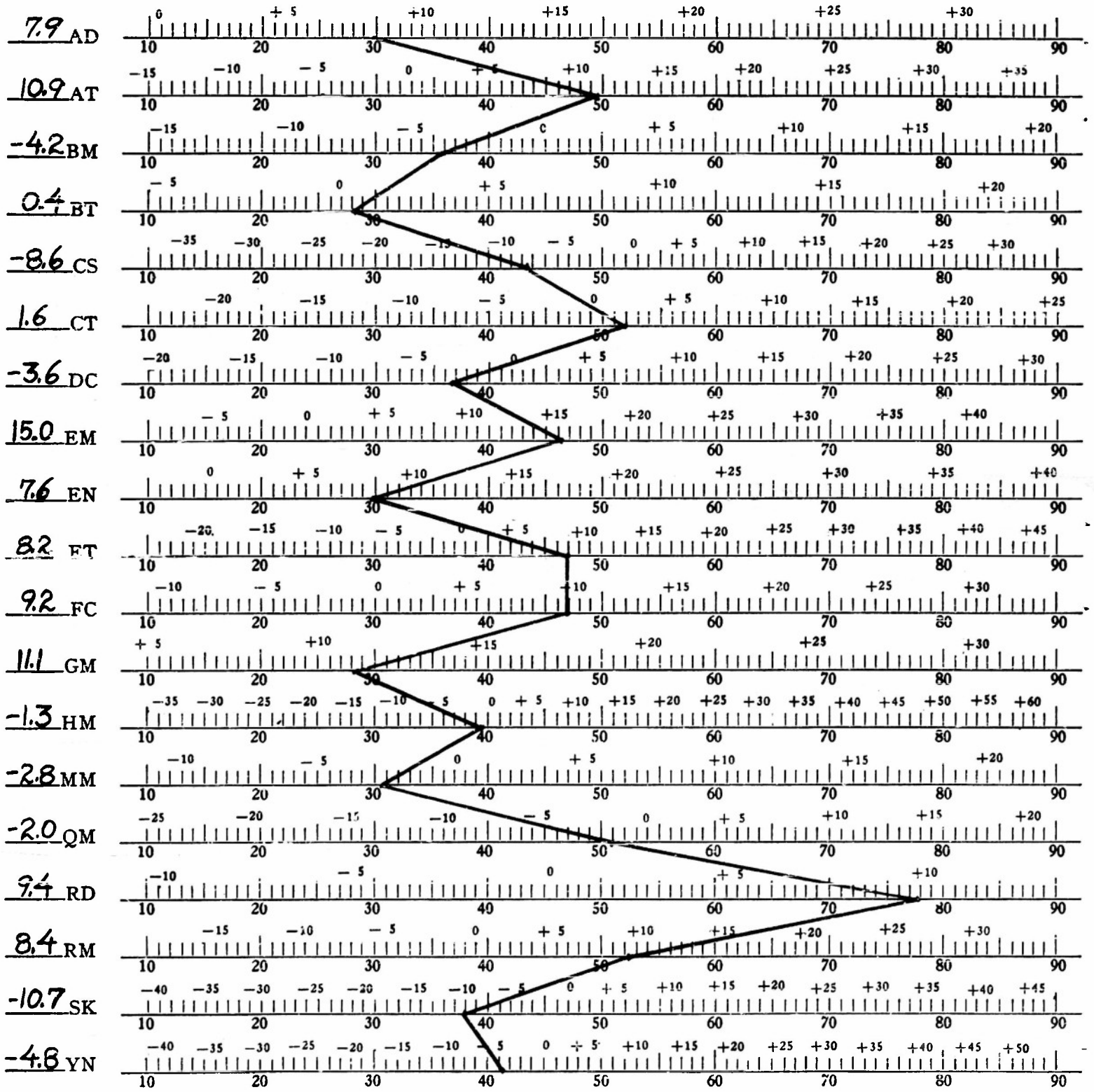
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 RD's

On Nineteen Navy Keys of the Vocational Interest Inventory



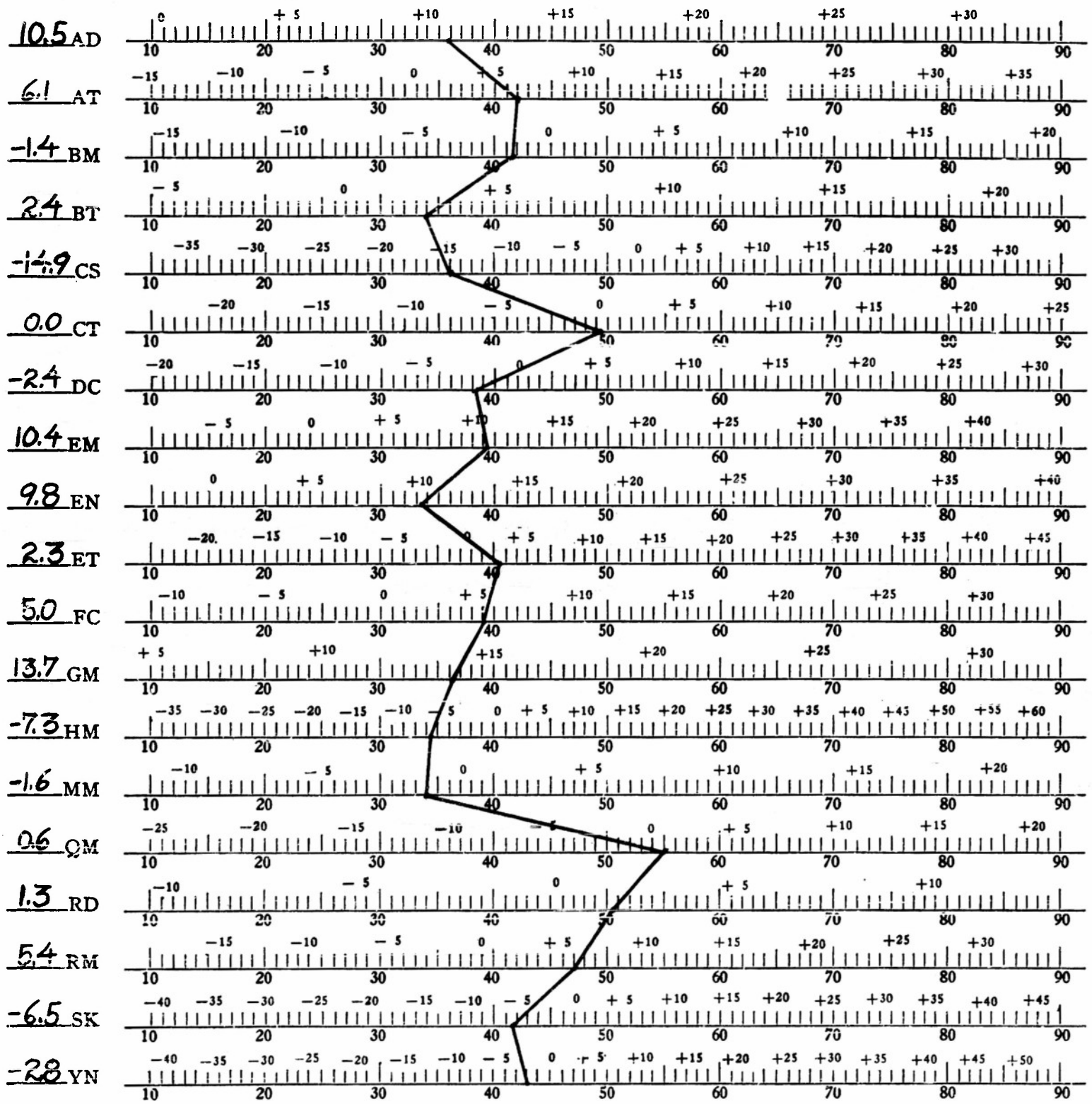
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 QM's

On Nineteen Navy Keys of the Vocational Interest Inventory



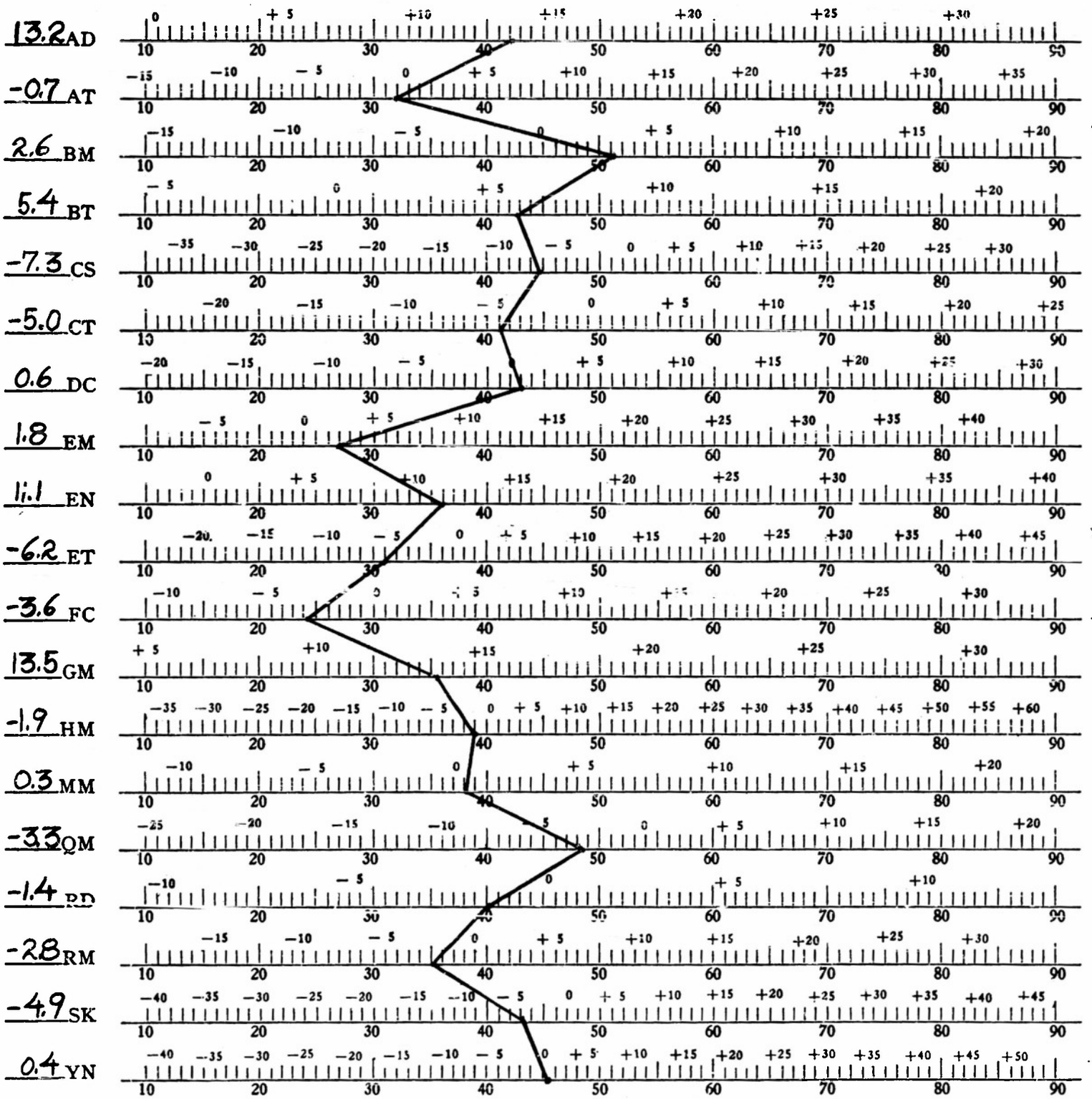
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 14 PR's

On Nineteen Navy Keys of the Vocational Interest Inventory



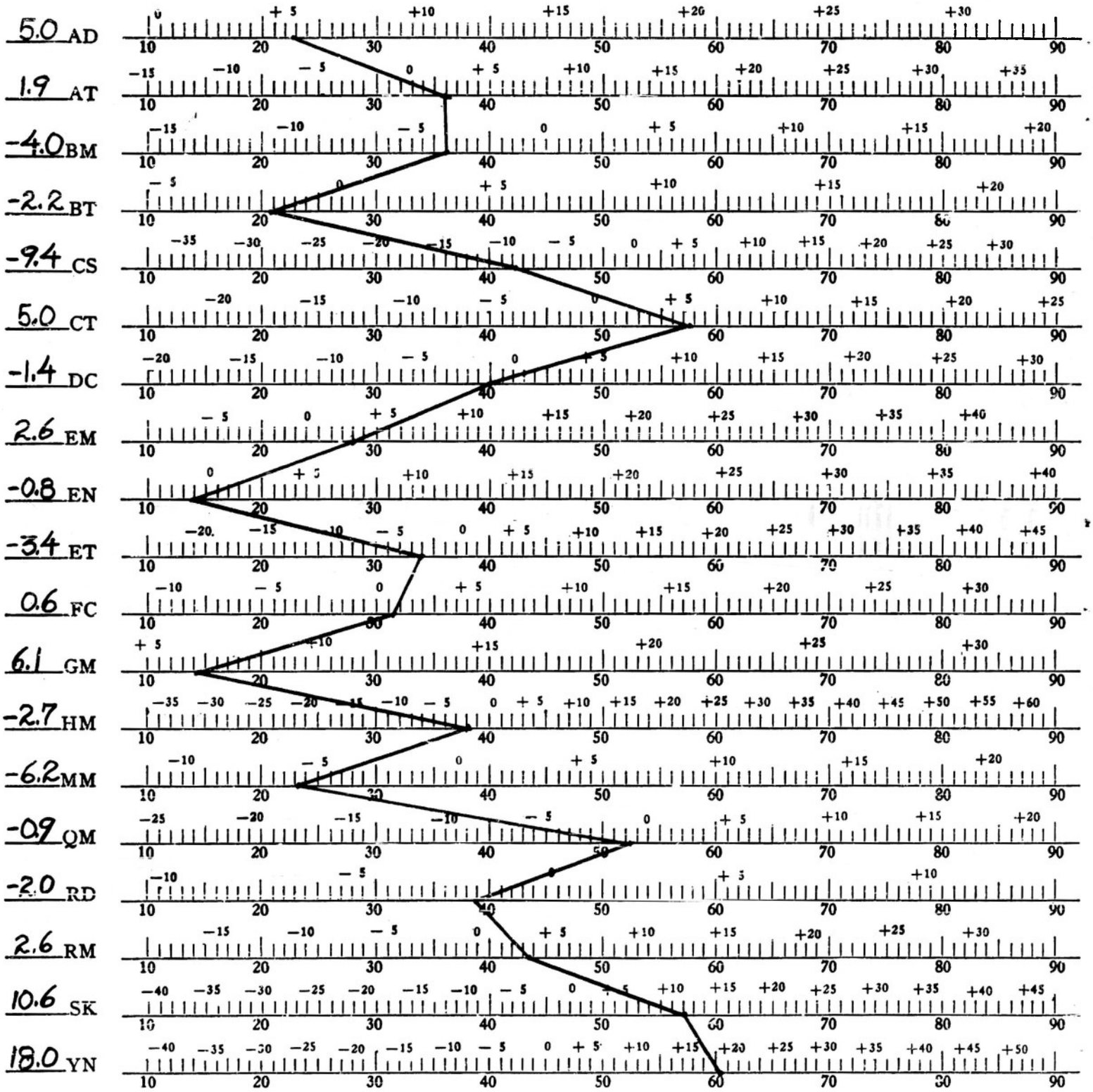
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 PN's

On Nineteen Navy Keys of the Vocational Interest Inventory



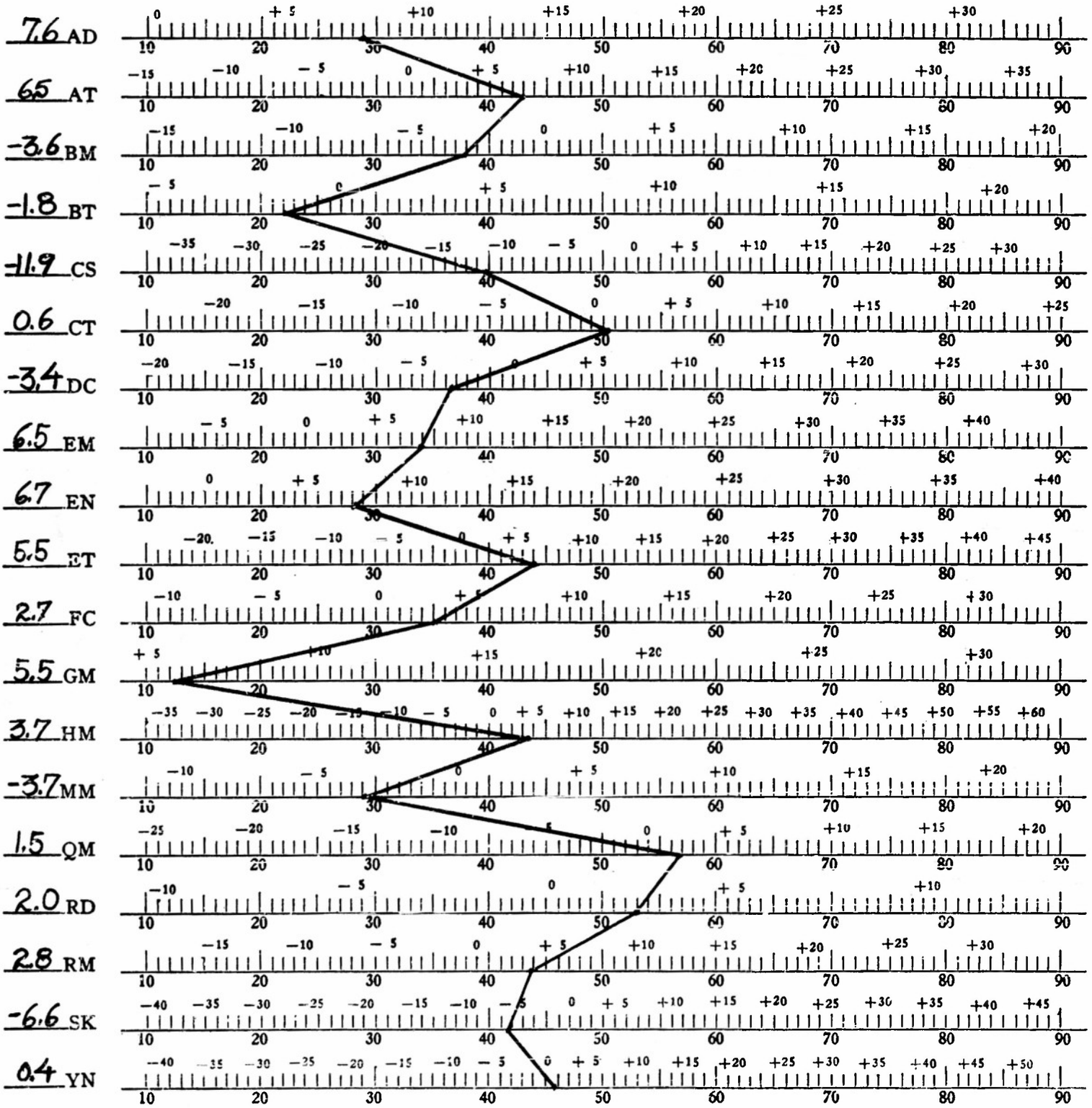
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 17 PH's

On Nineteen Navy Keys of the Vocational Interest Inventory



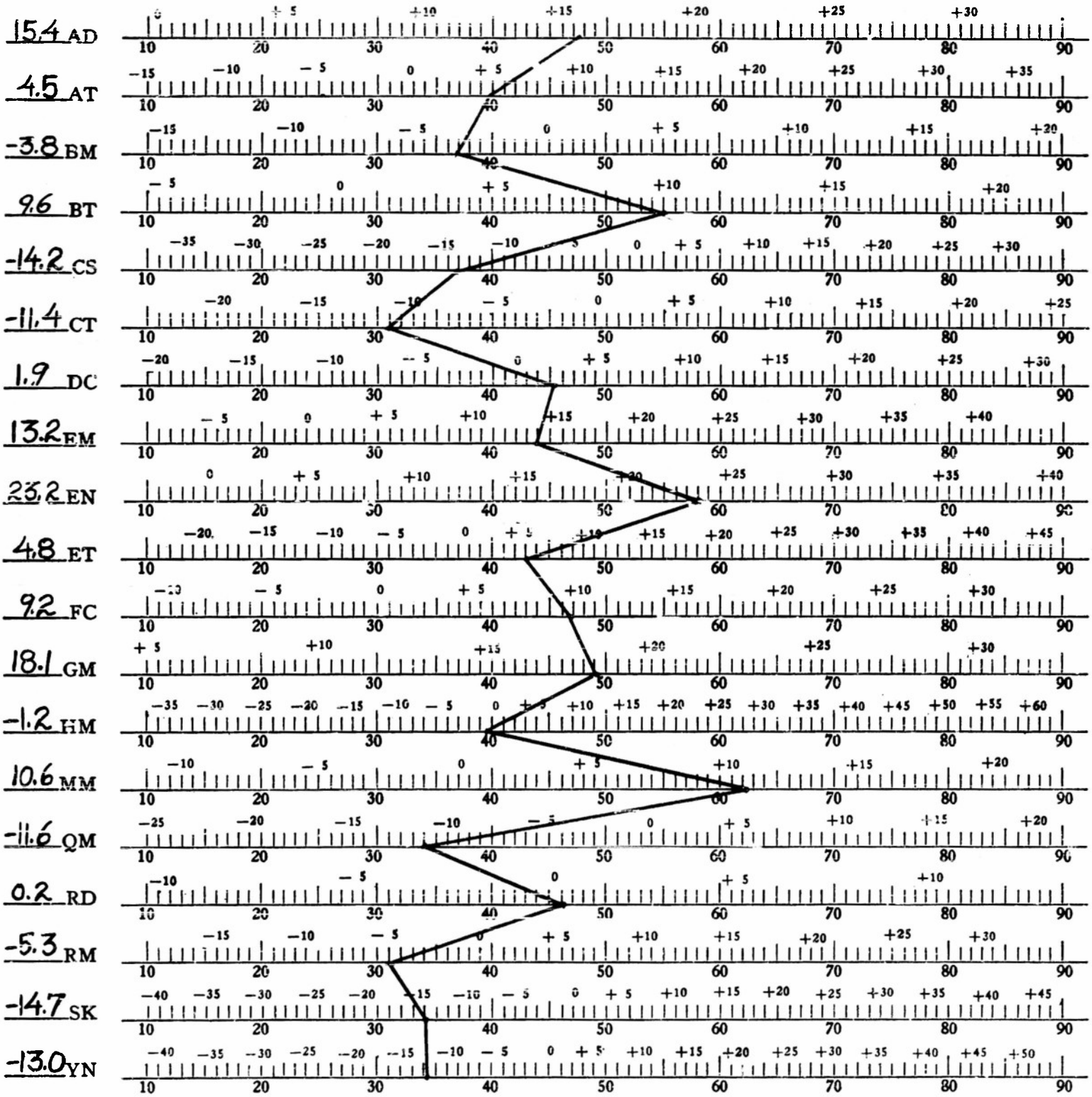
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 12 MR's

On Nineteen Navy Keys of the Vocational Interest Inventory



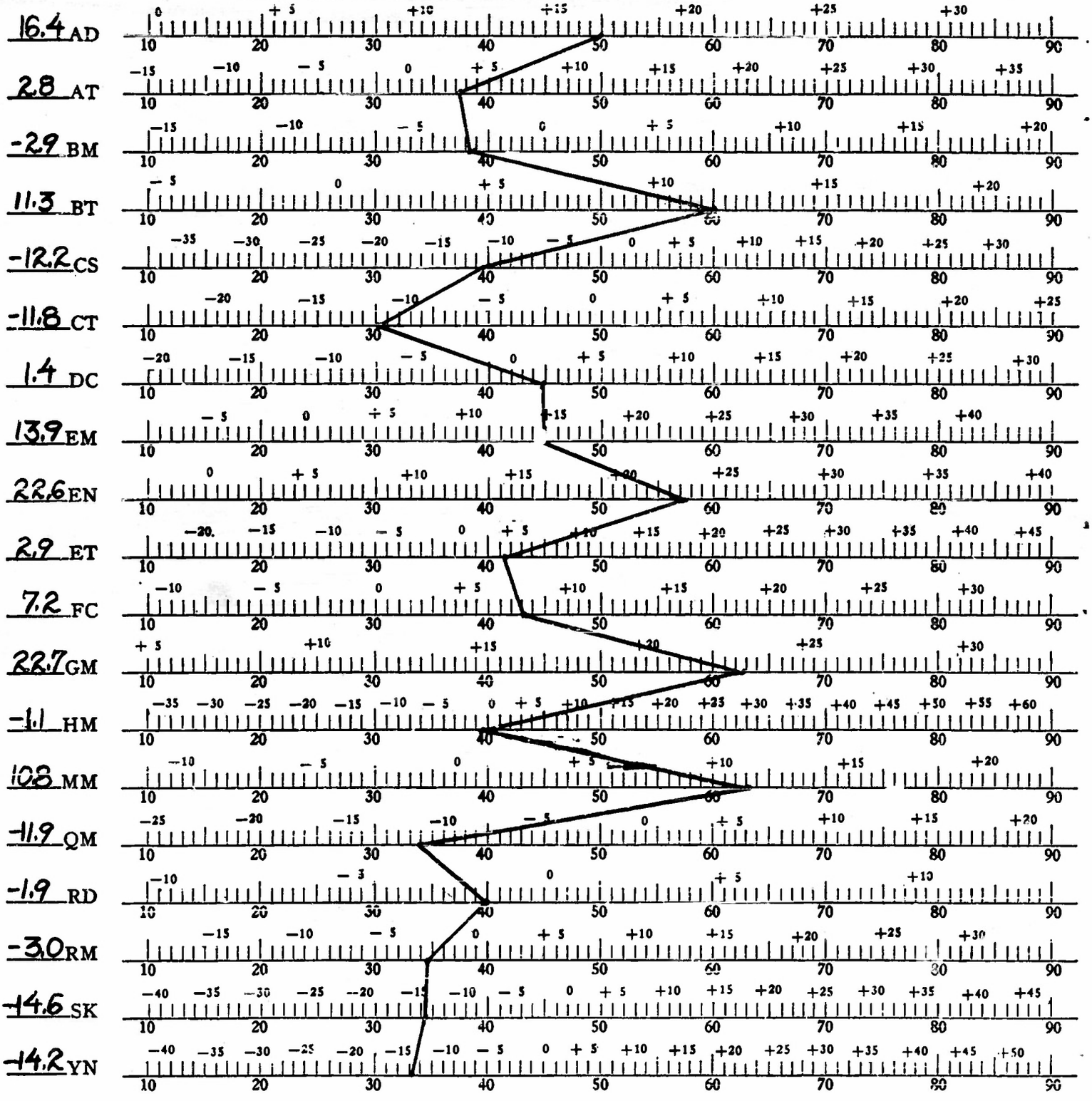
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 MM's

On Nineteen Navy Keys of the Vocational Interest Inventory



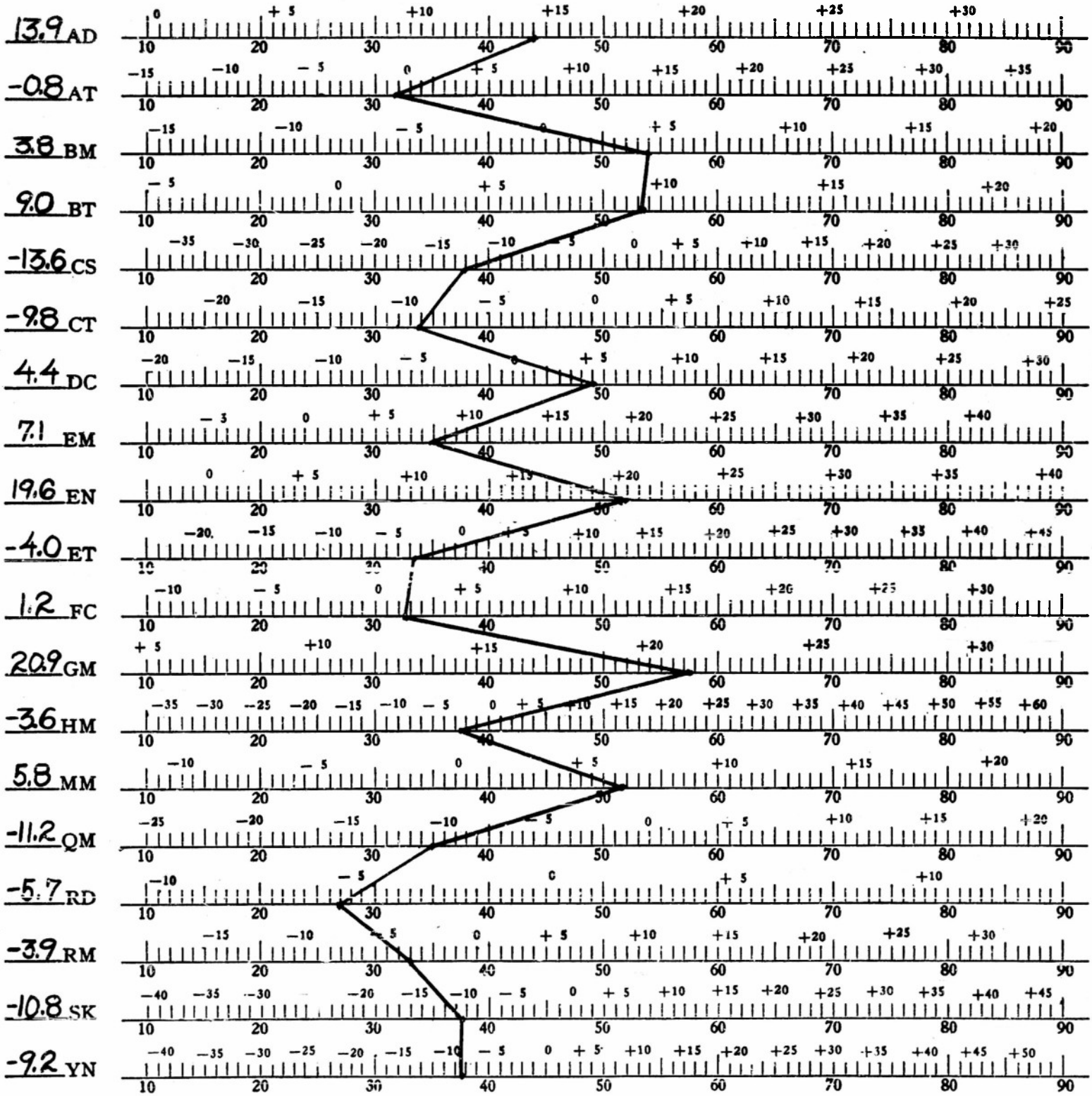
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 ME's

On Nineteen Navy Keys of the Vocational Interest Inventory



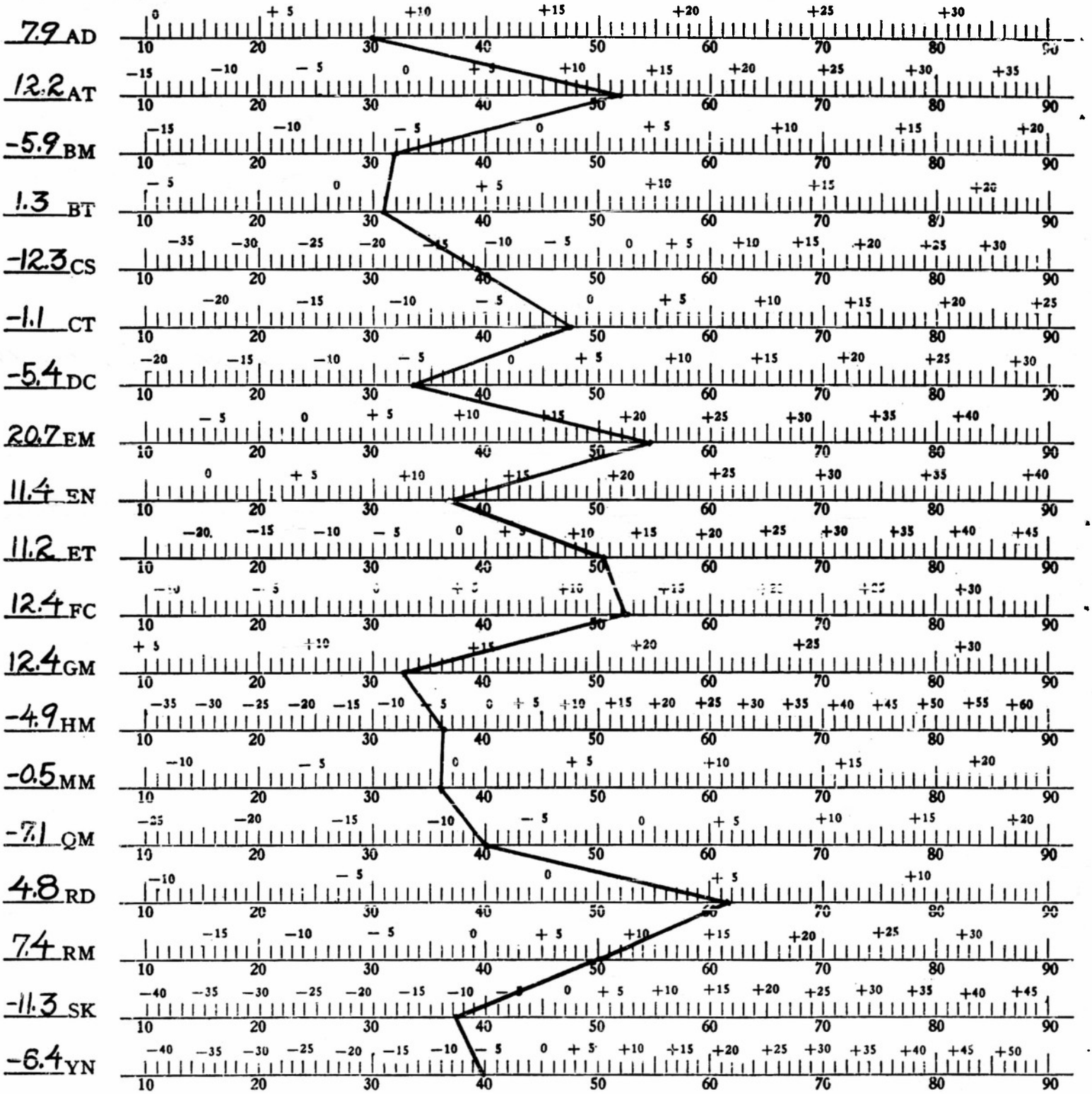
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 14 IC's

On Nineteen Navy Keys of the Vocational Interest Inventory



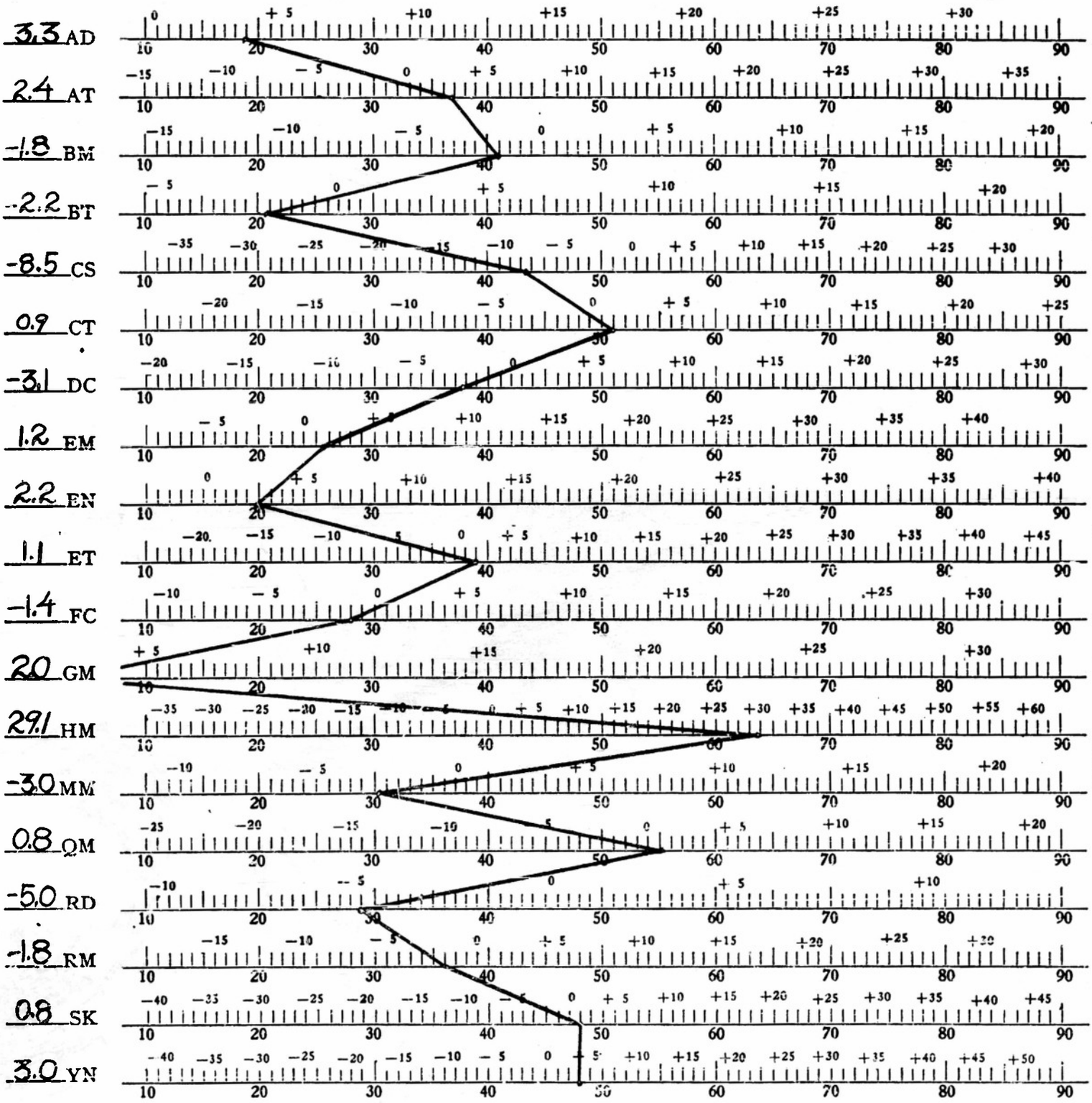
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 HM's

On Nineteen Navy Keys of the Vocational Interest Inventory



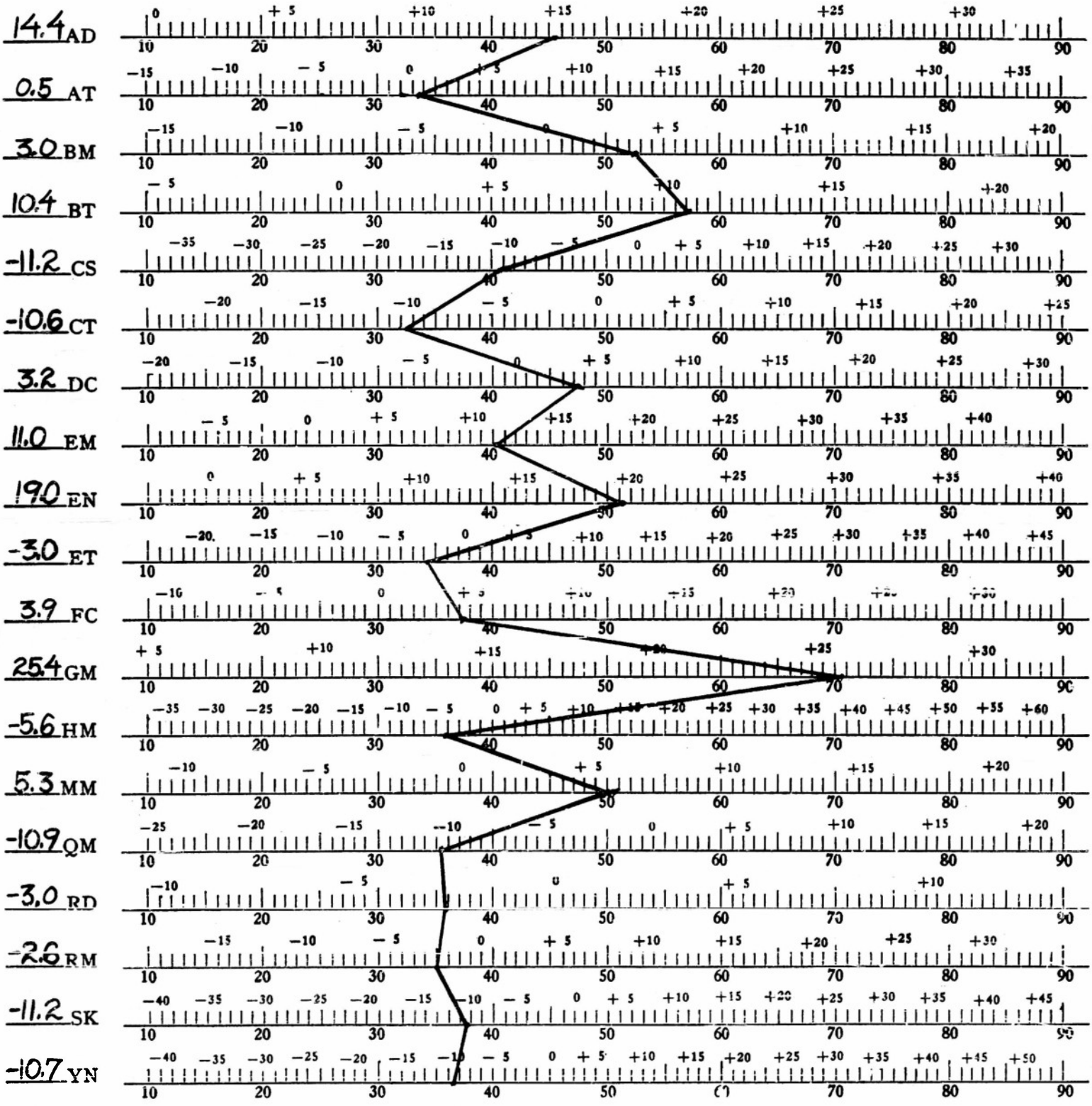
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 GM's

On Nineteen Navy Keys of the Vocational Interest Inventory



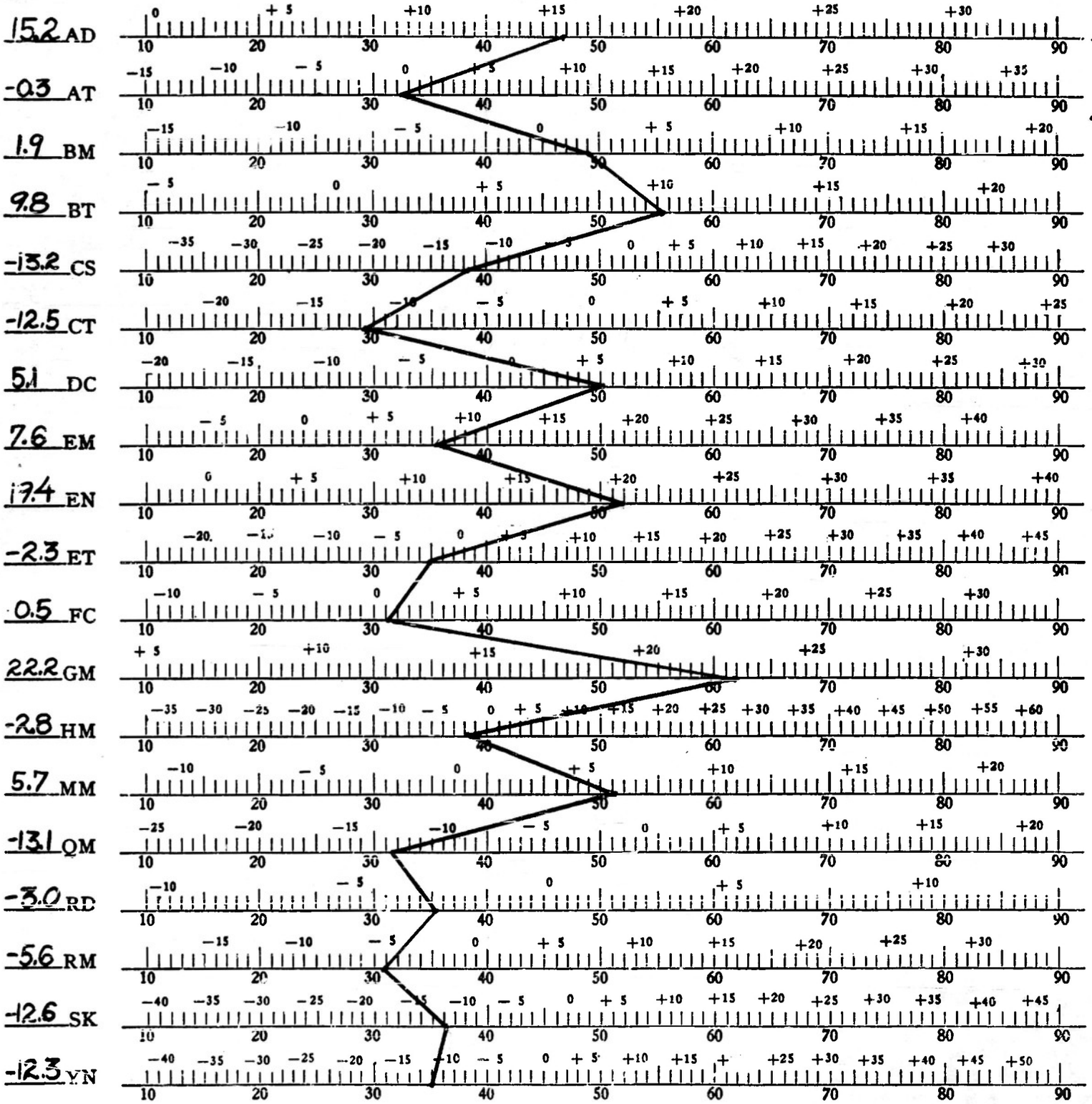
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 FP's

On Nineteen Navy Keys of the Vocational Interest Inventory



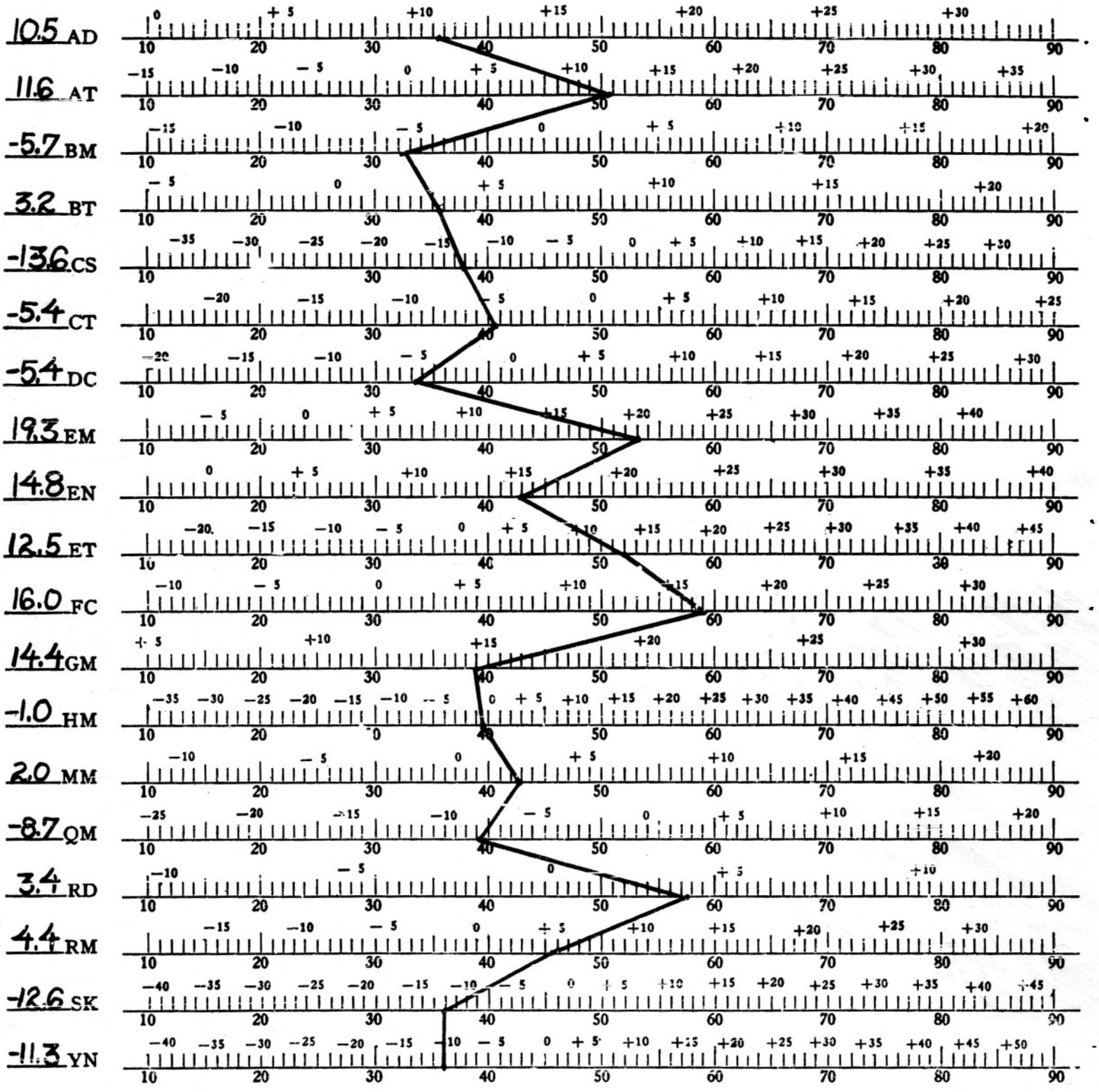
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 FC's and FT's

On Nineteen Navy Keys of the Vocational Interest Inventory



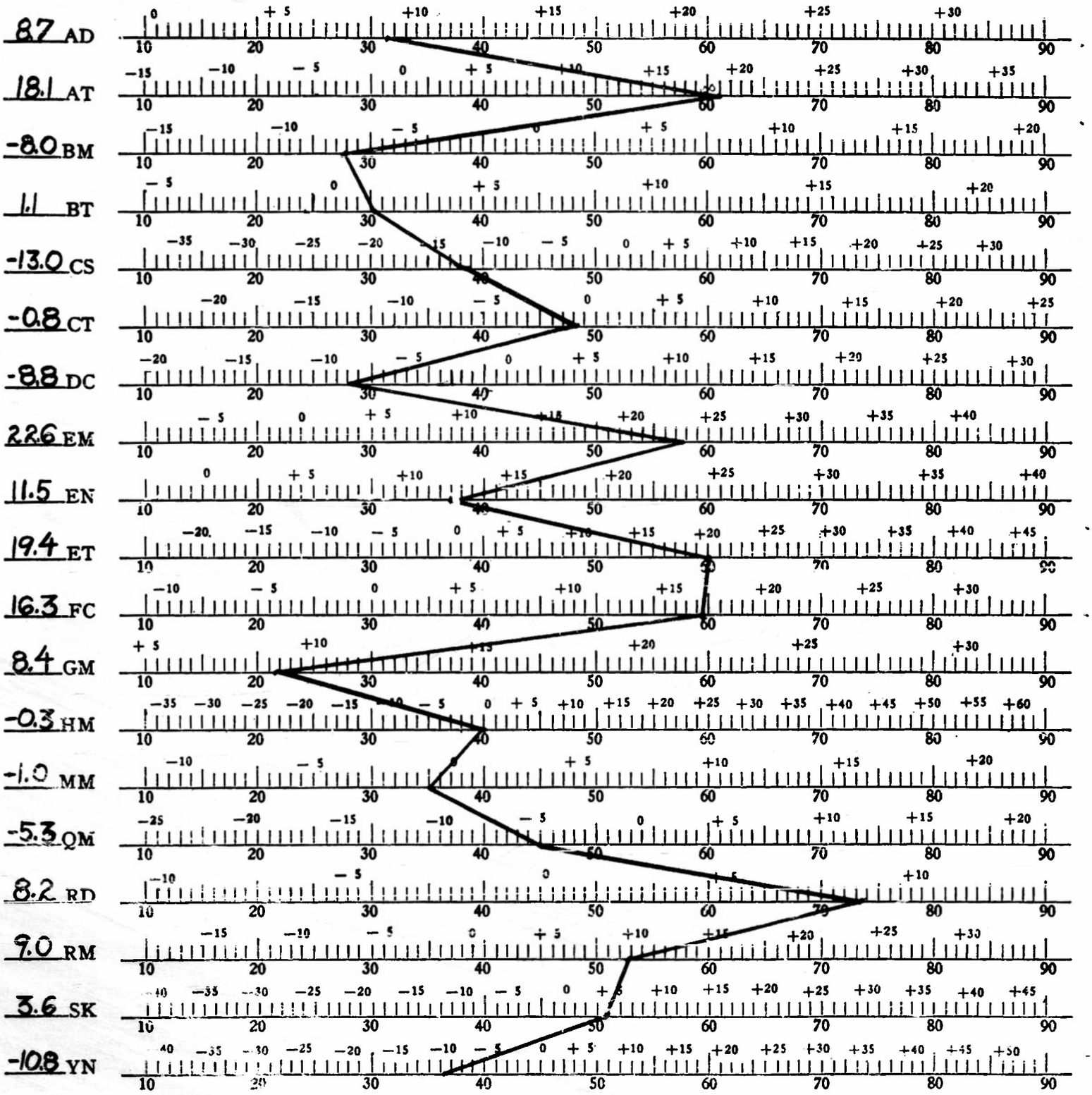
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 ET's

On Nineteen Navy Keys of the Vocational Interest Inventory



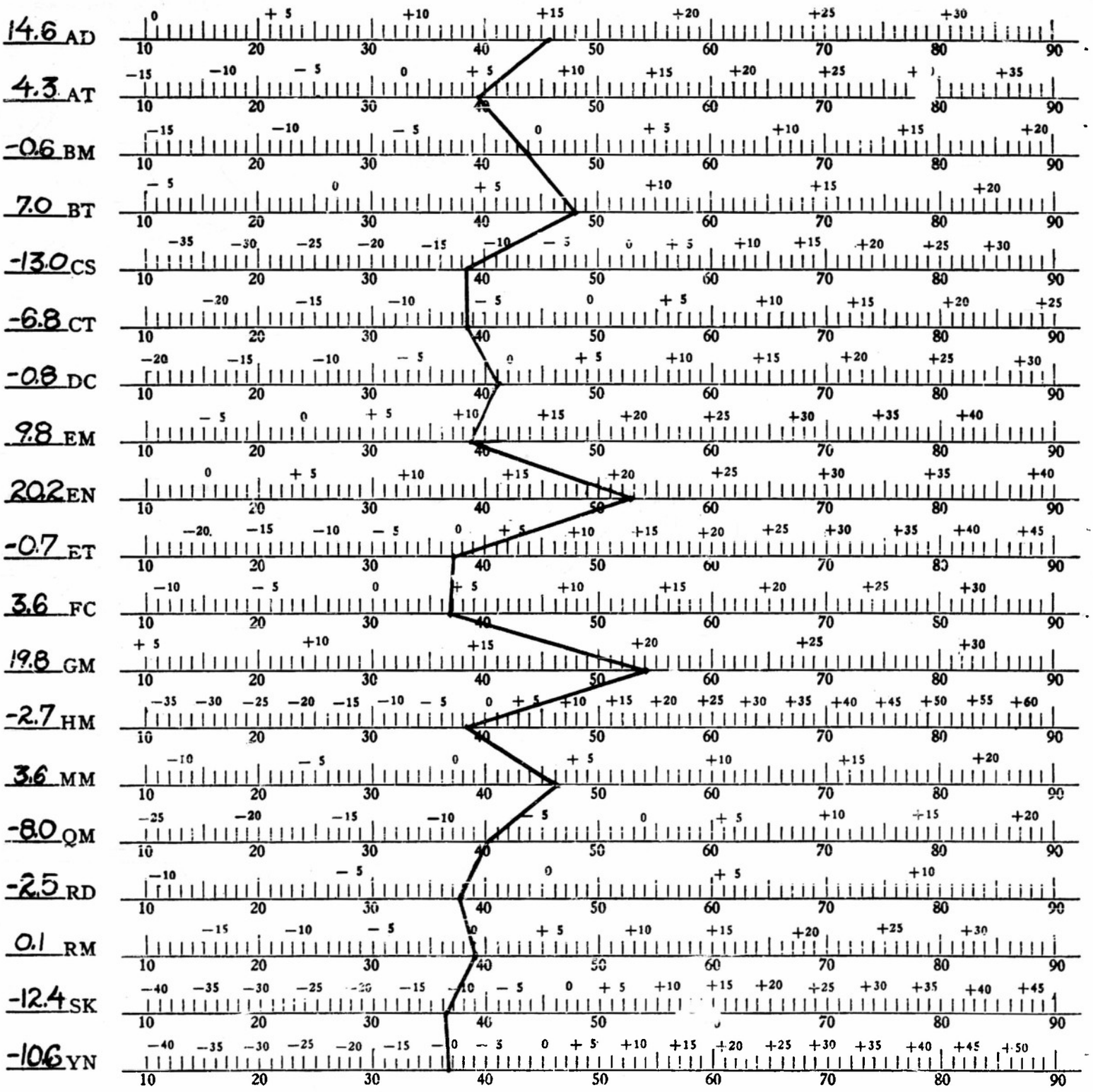
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 EN's

On Nineteen Navy Keys of the Vocational Interest Inventory



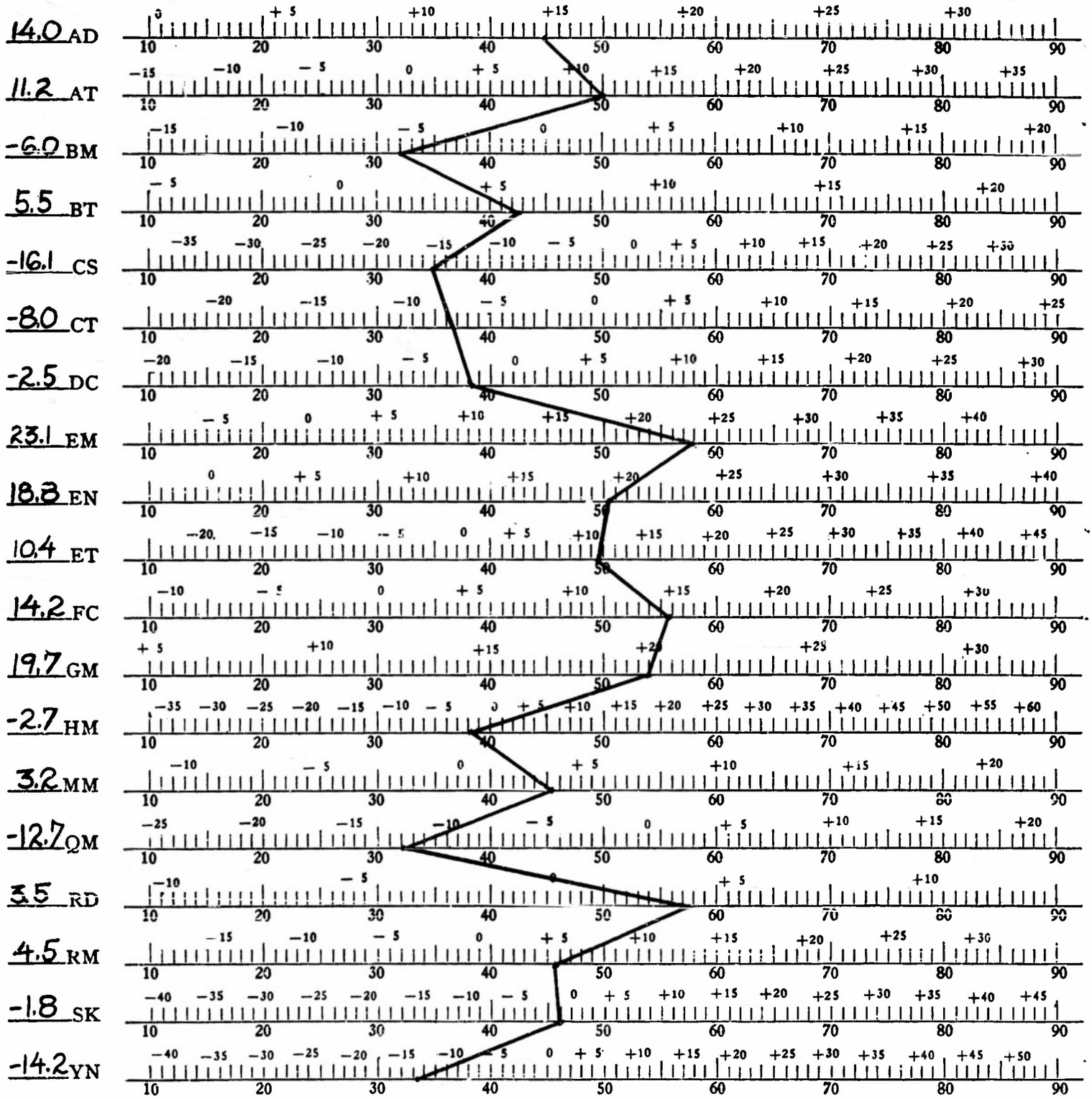
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 EM's

On Nineteen Navy Keys of the Vocational Interest Inventory



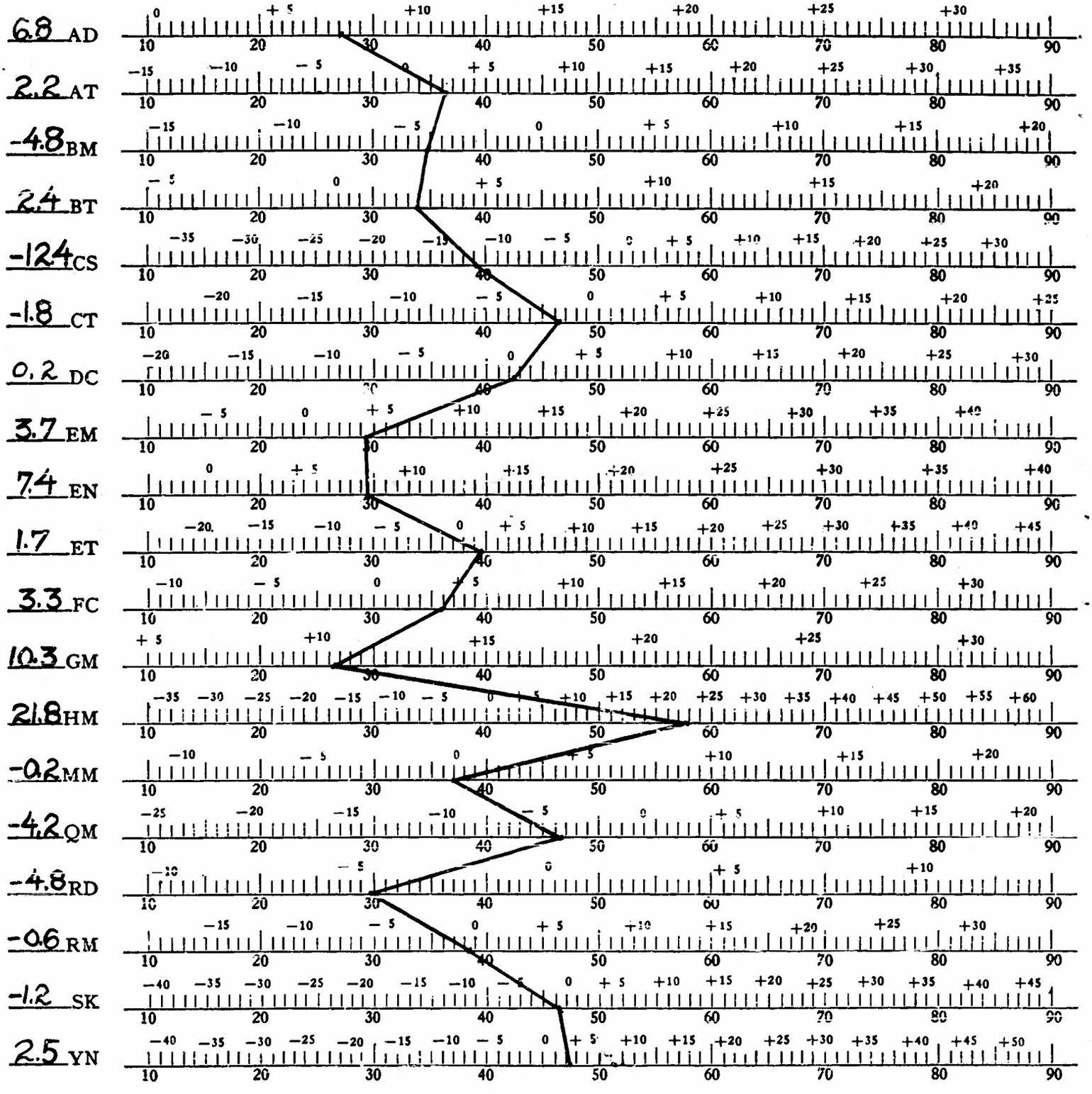
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (M ... of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 12 DT's

On Nineteen Navy Keys of the Vocational Interest Inventory



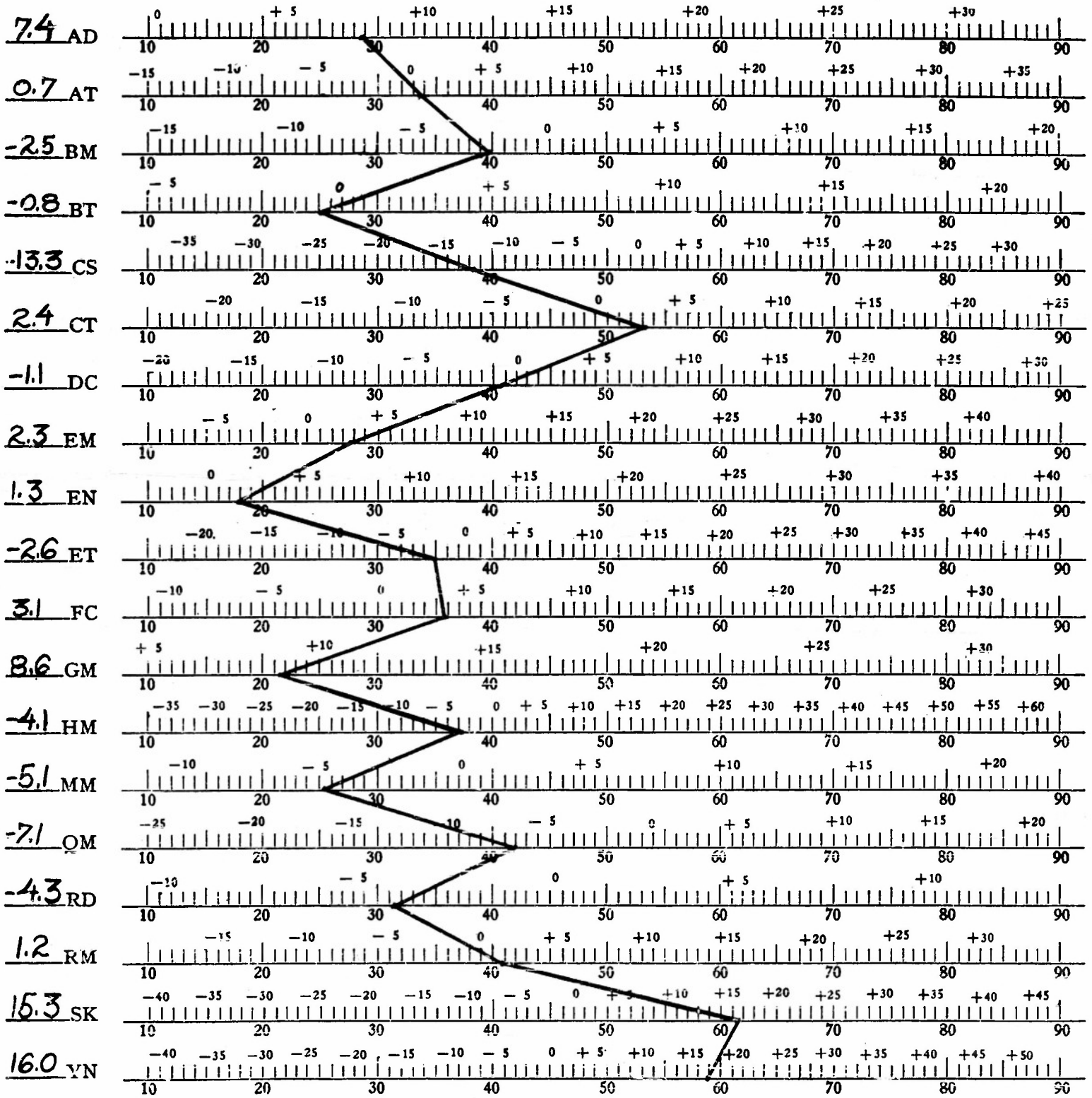
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-Ceneral on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 DK's

On Nineteen Navy Keys of the Vocational Interest Inventory



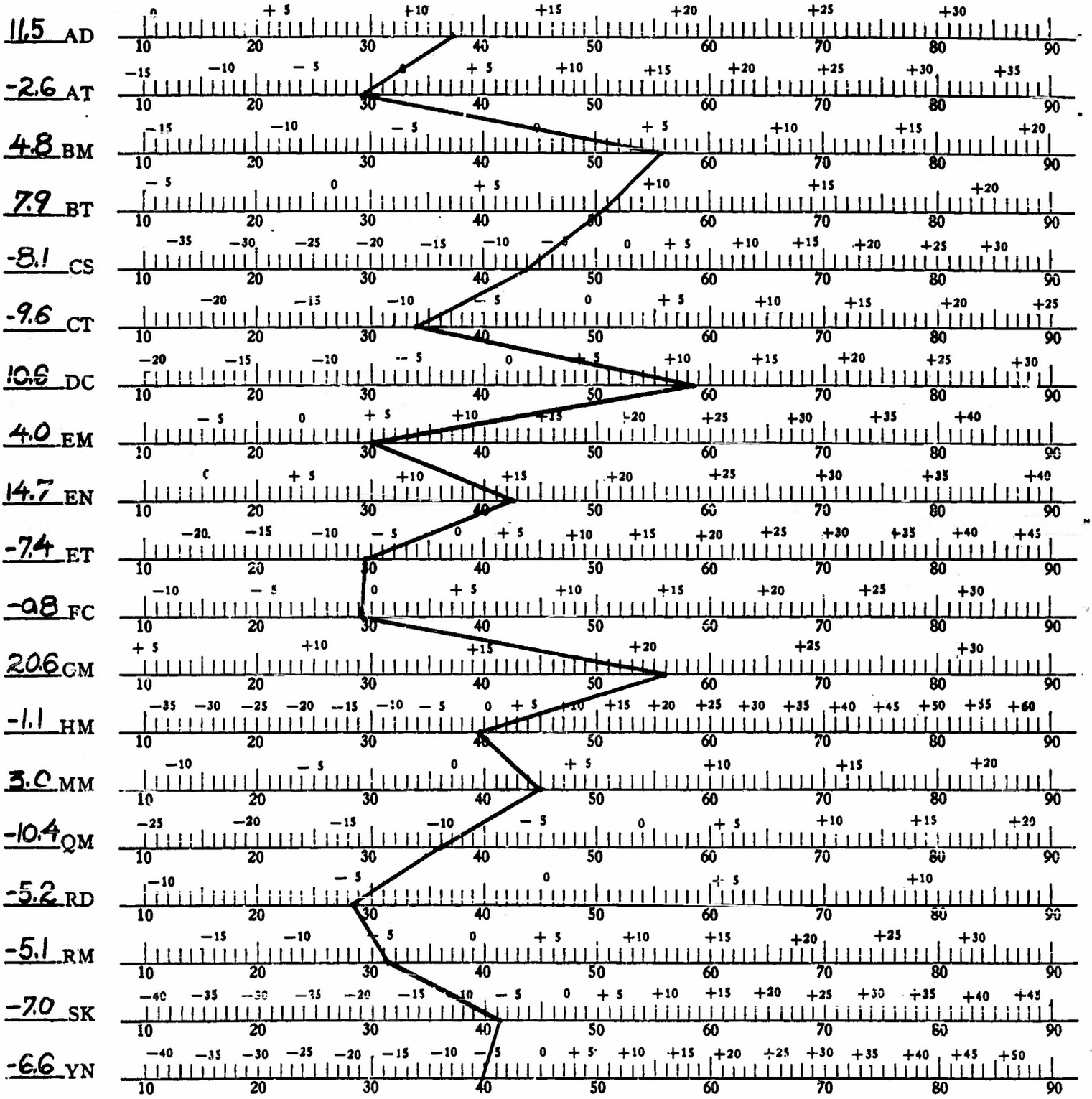
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 DC's

On Nineteen Navy Keys of the Vocational Interest Inventory



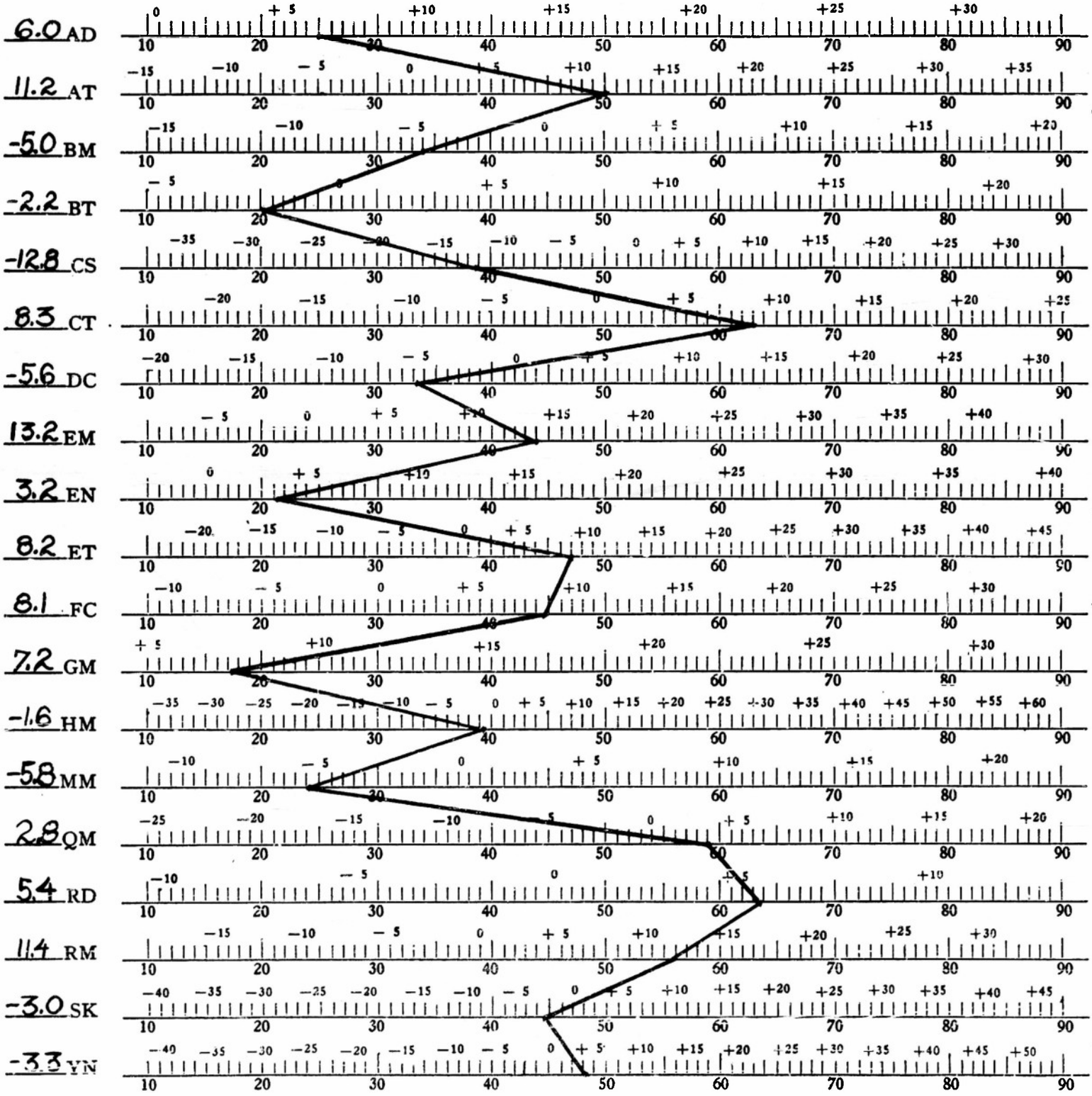
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 CT's

On Nineteen Navy Keys of the Vocational Interest Inventory



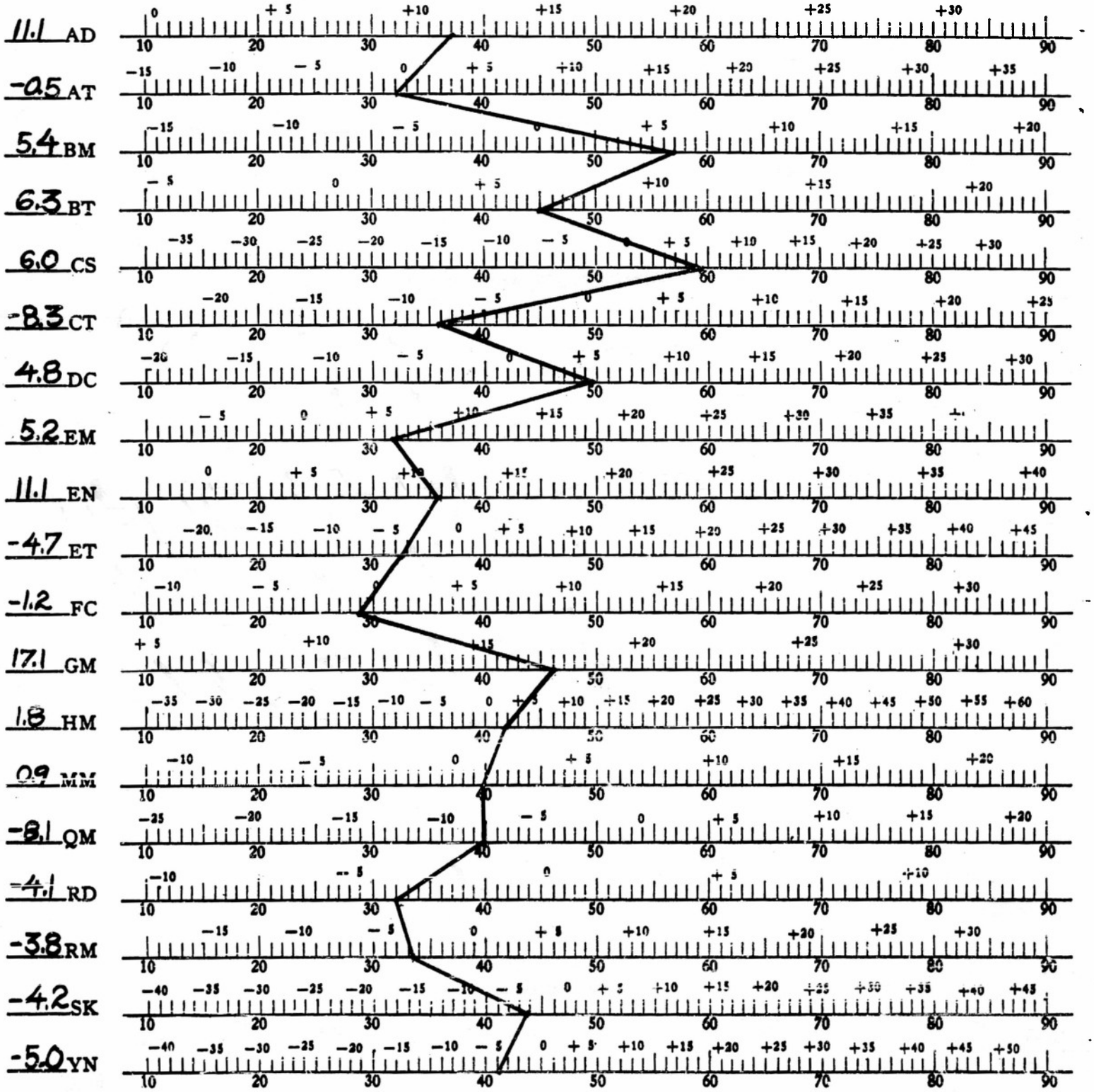
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 CS's

On Nineteen Navy Keys of the Vocational Interest Inventory



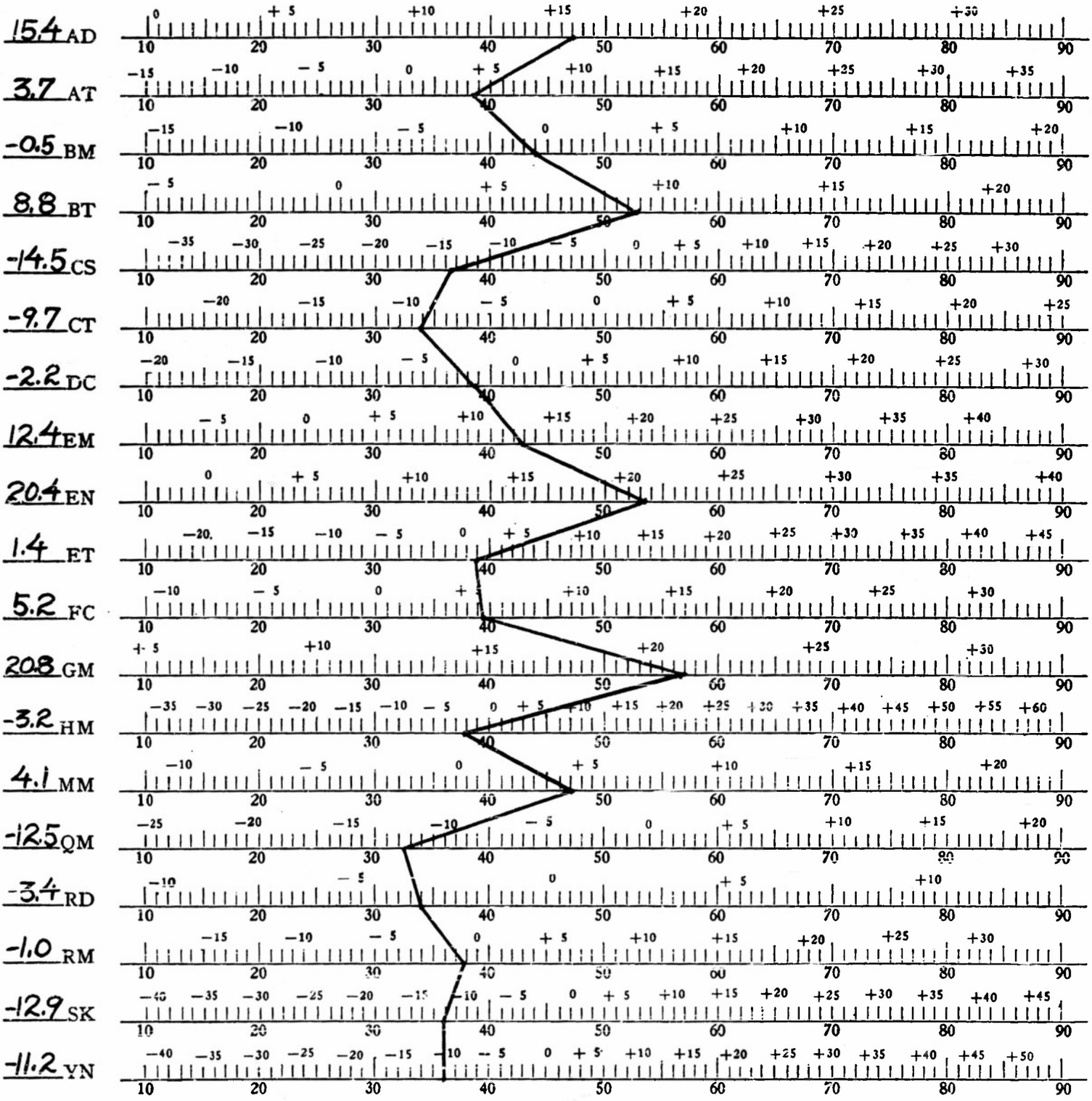
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 CM's

On Nineteen Navy Keys of the Vocational Interest Inventory



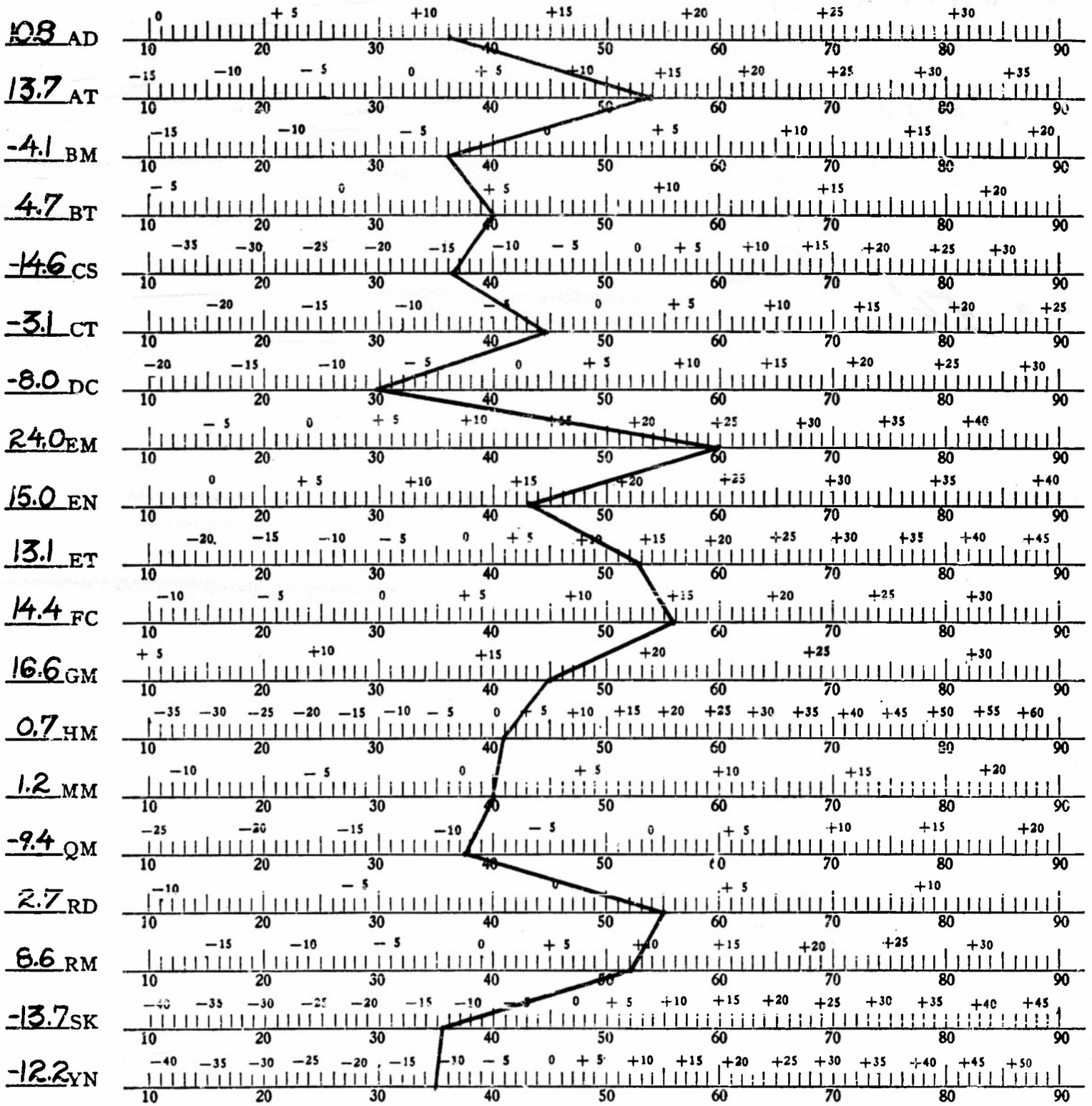
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 CE's

On Nineteen Navy Keys of the Vocational Interest Inventory



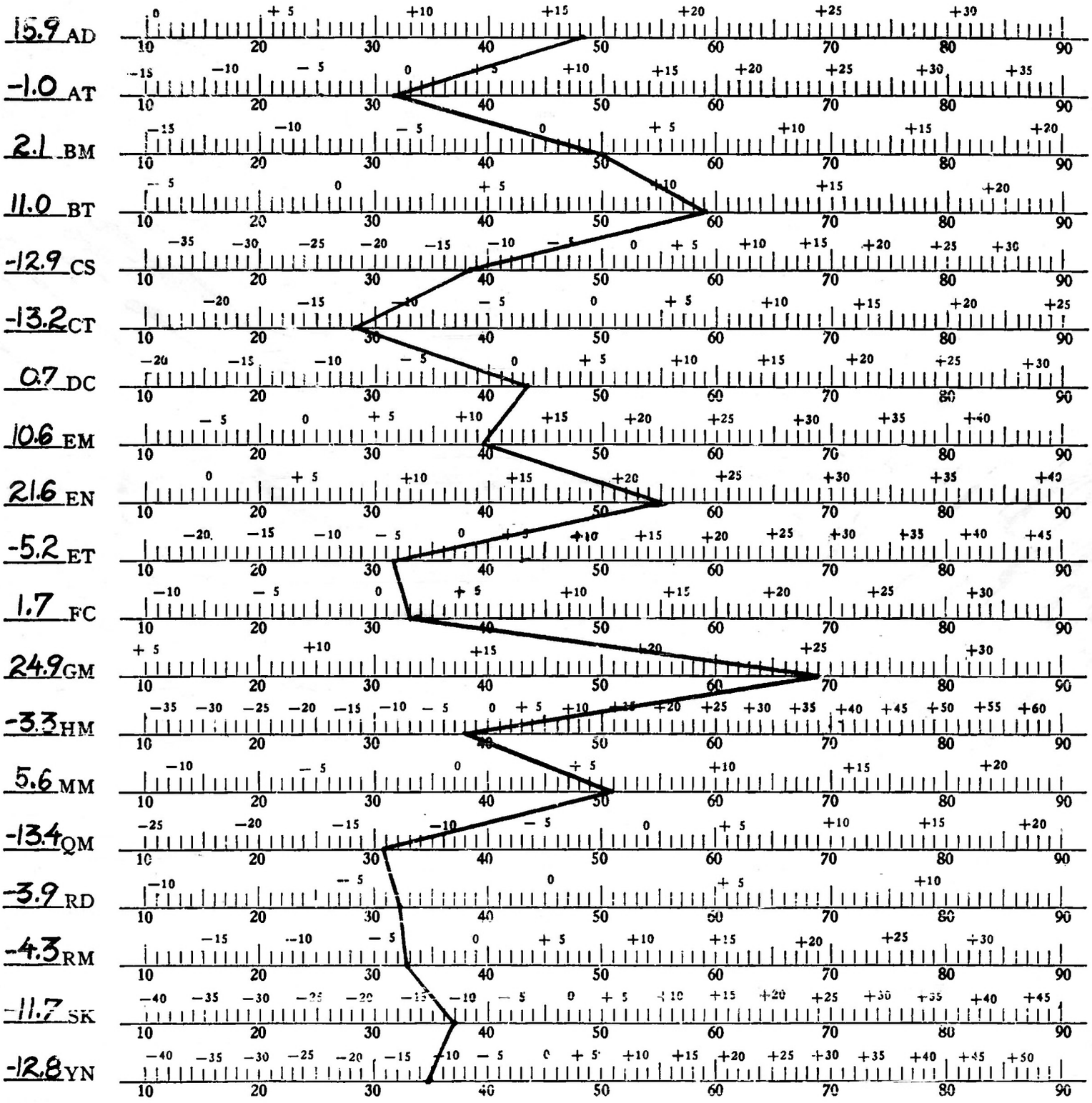
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 CD's

On Nineteen Navy Keys of the Vocational Interest Inventory



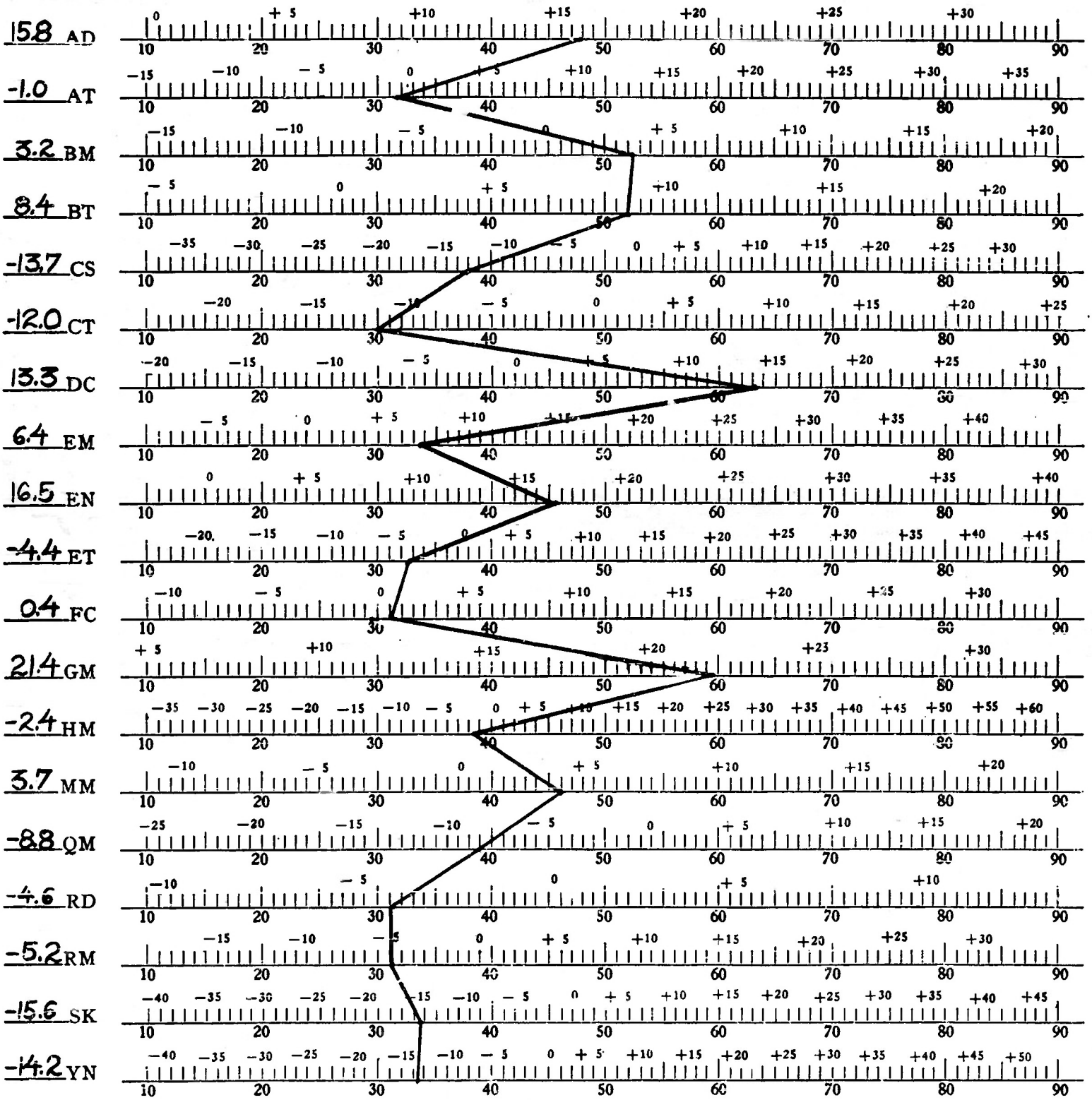
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 BU's

On Nineteen Navy Keys of the Vocational Interest Inventory



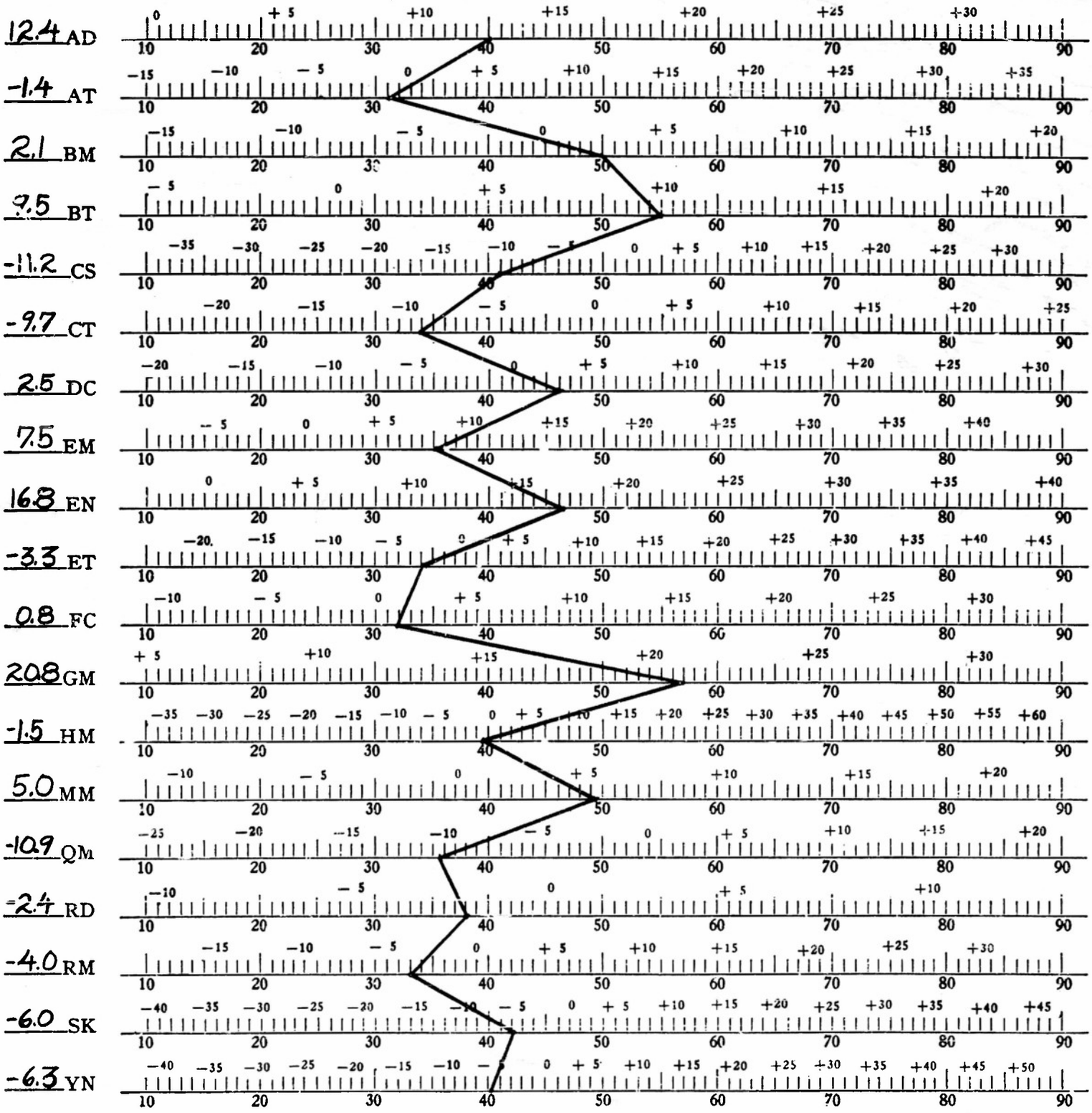
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 BT's

On Nineteen Navy Keys of the Vocational Interest Inventory



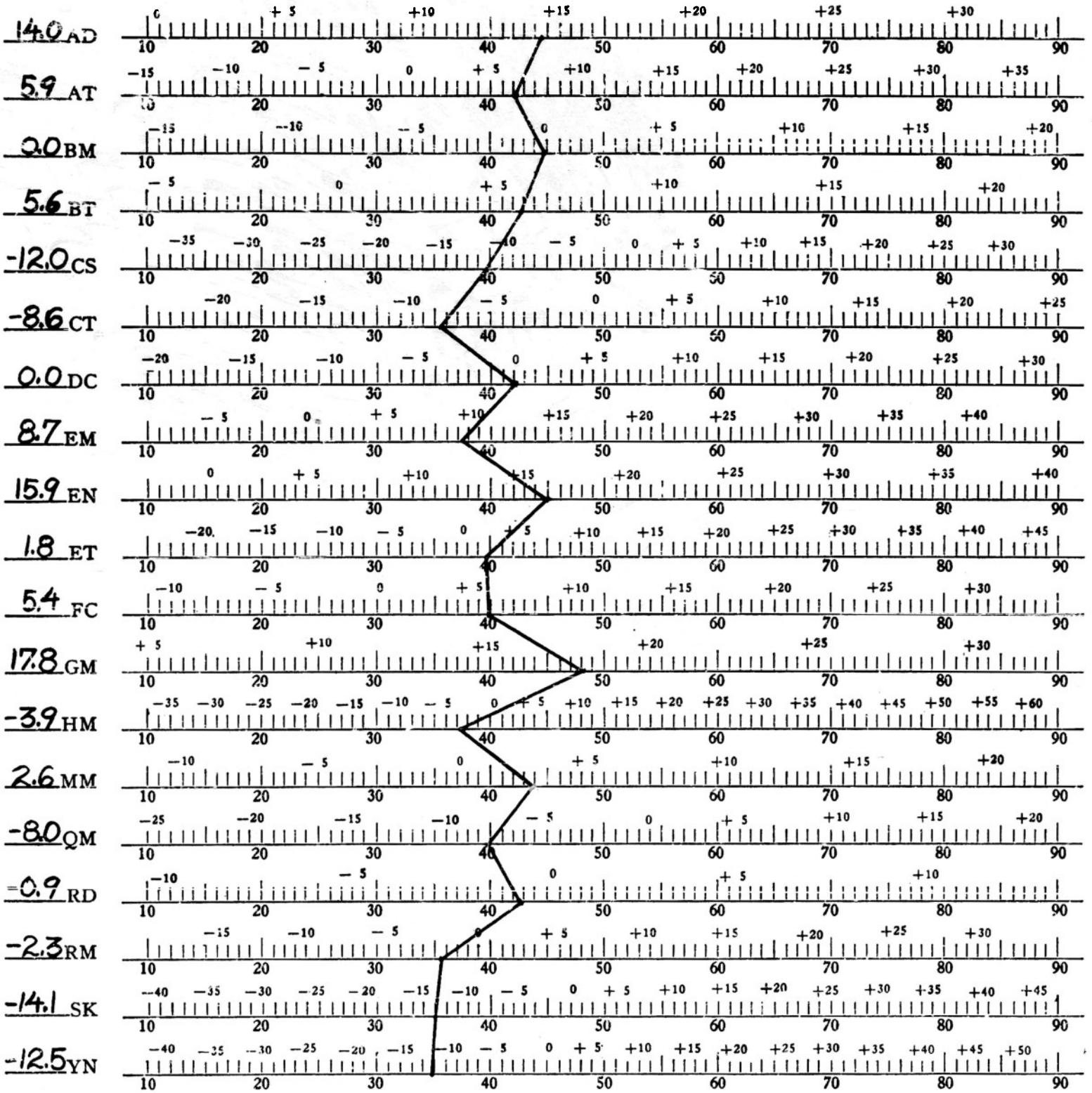
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 19 AO's

On Nineteen Navy Keys of the Vocational Interest Inventory



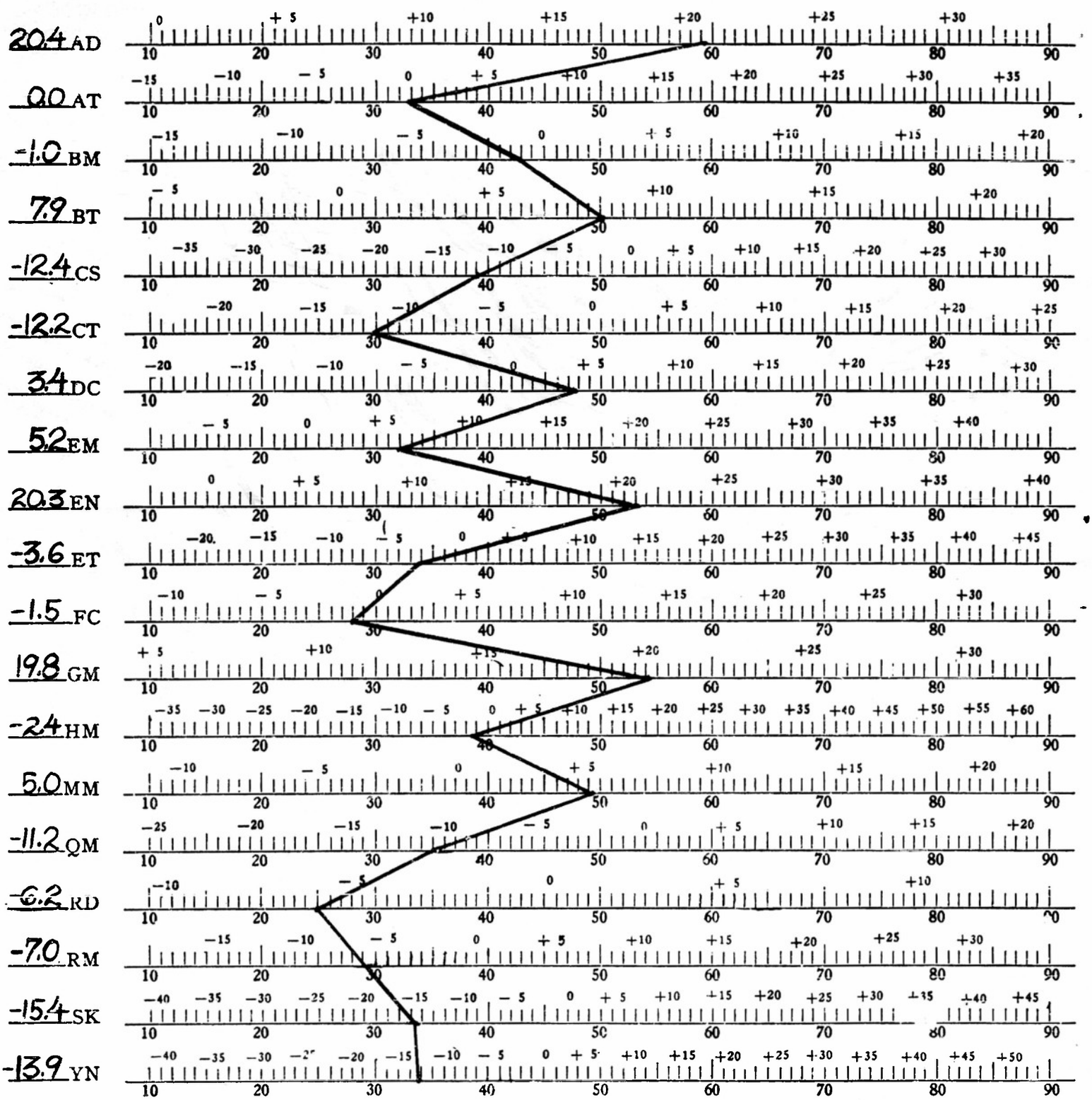
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AM's

On Nineteen Navy Keys of the Vocational Interest Inventory



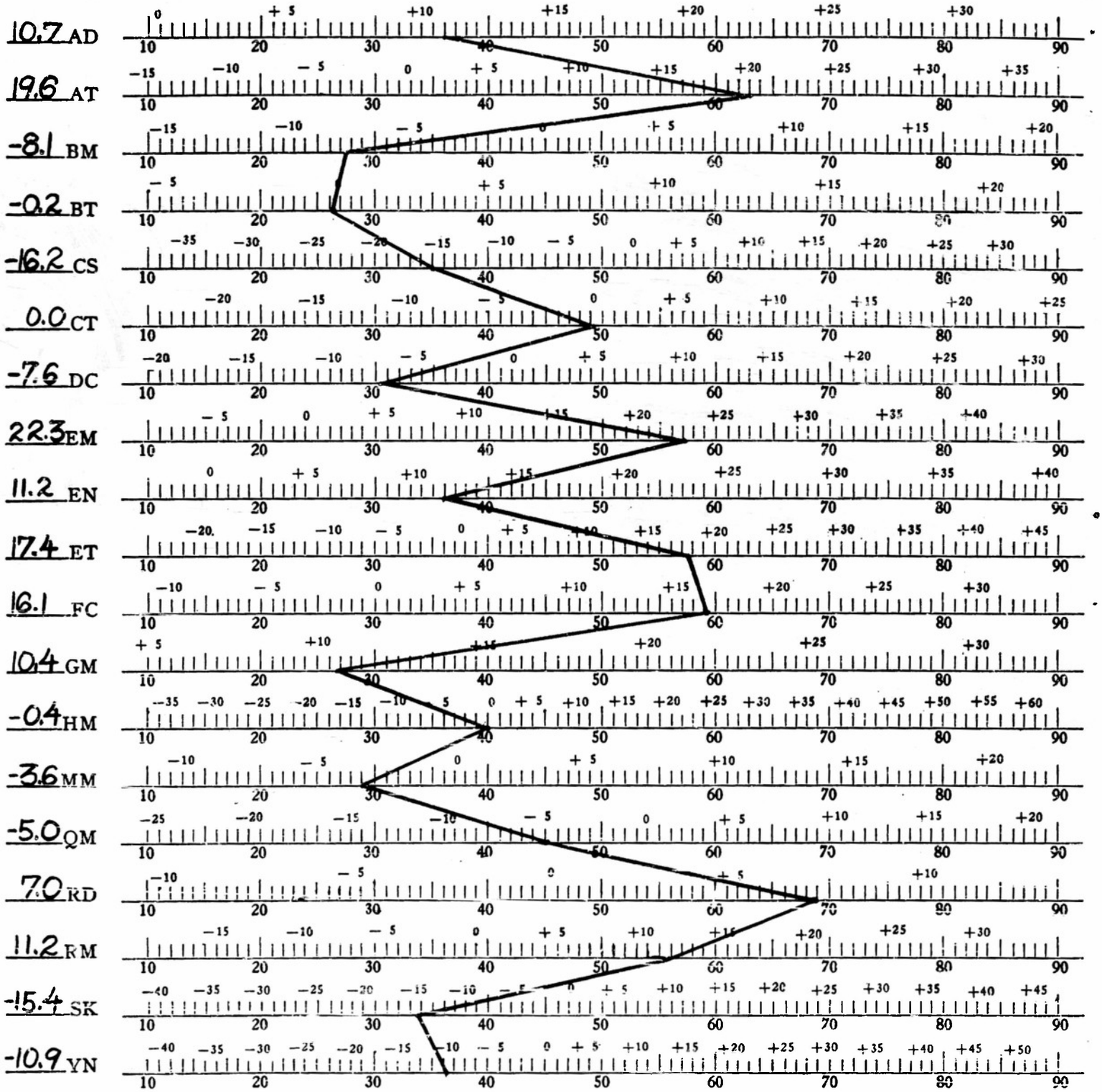
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AL's and AT's

On Nineteen Navy Keys of the Vocational Interest Inventory



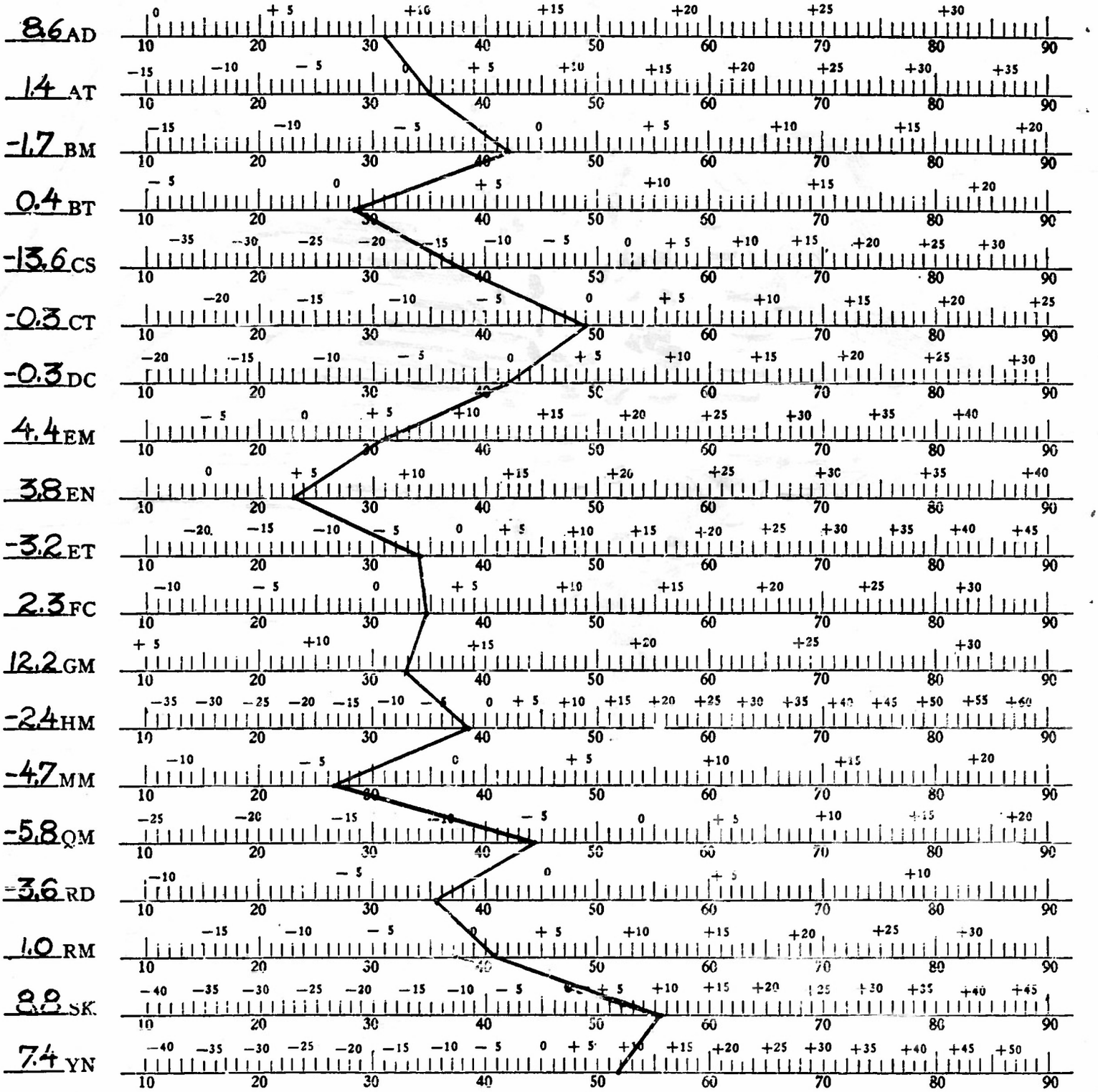
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AK's

On Nineteen Navy Keys of the Vocational Interest Inventory



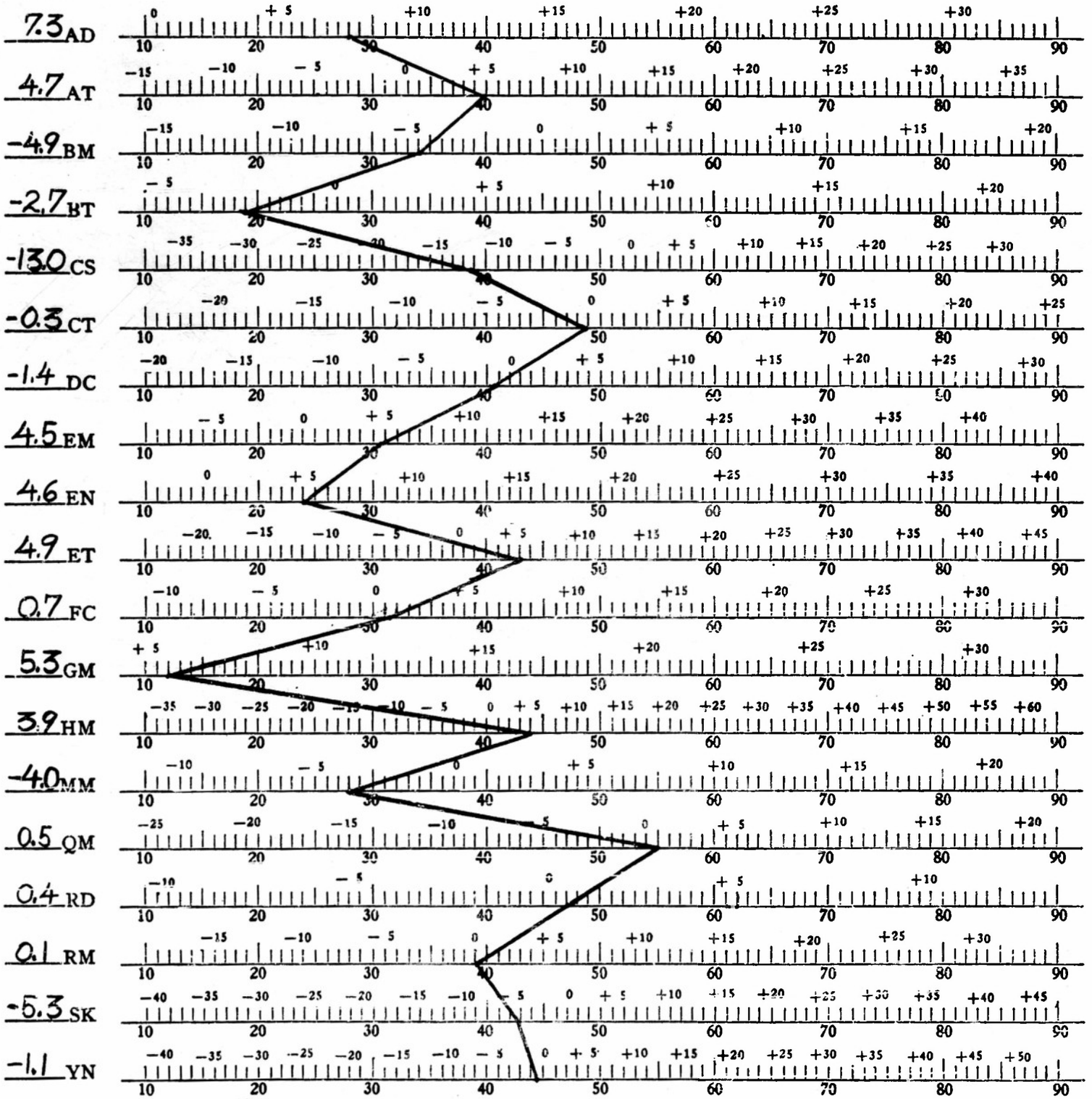
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AF's

On Nineteen Navy Keys of the Vocational Interest Inventory



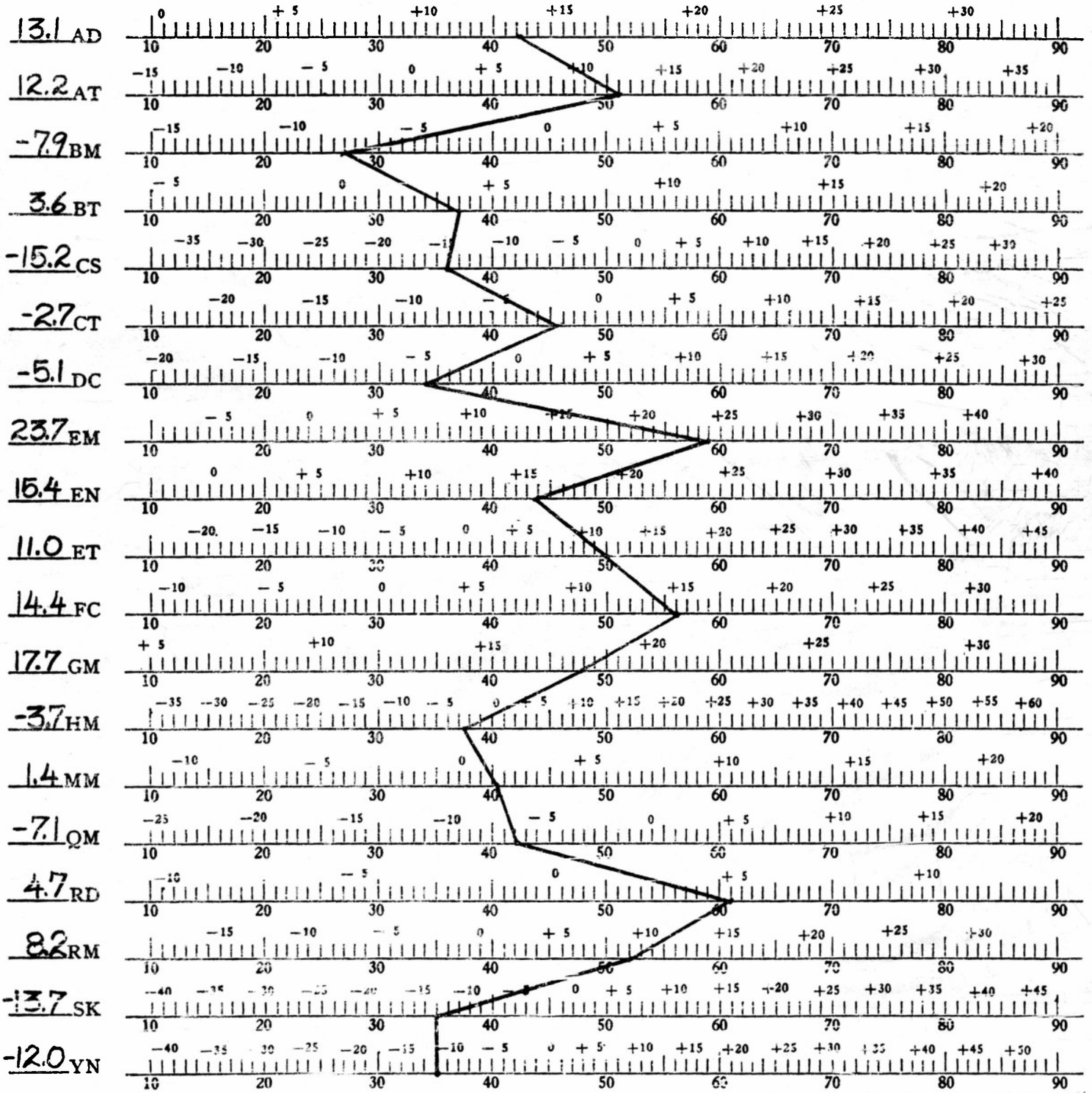
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AE's

On Nineteen Navy Keys of the Vocational Interest Inventory



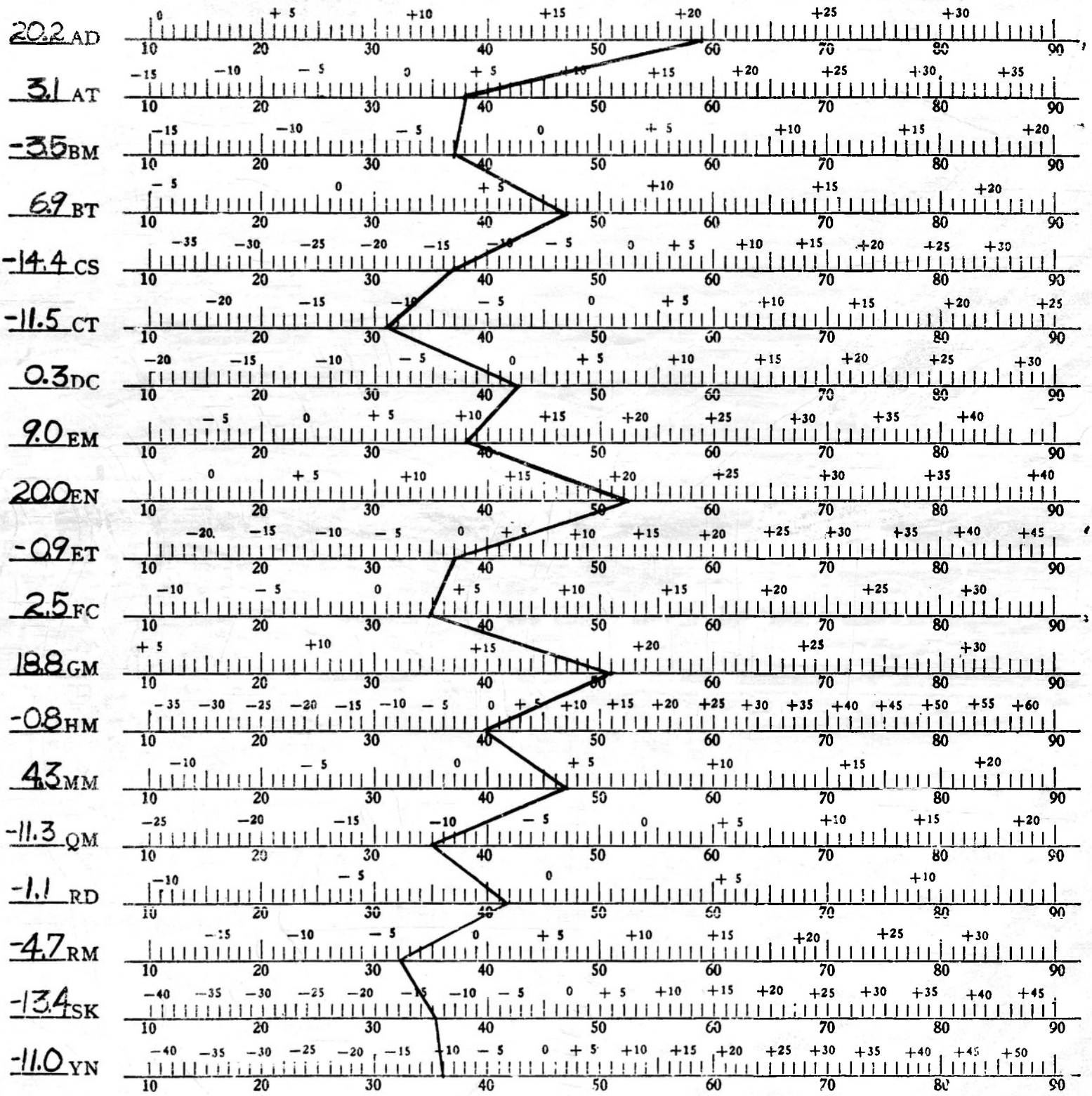
NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.

Profile of Mean Scores of 25 AD's

On Nineteen Navy Keys of the Vocational Interest Inventory



NOTE: A score of 40 represents the mean of the distribution of scores of Navy Men-in-General on a given key. (Mean of "reference" group.)

A score of 60 represents the mean of the distribution of scores of men in the rate being scored with a given key. (Mean of "Criterion" group.)

Generally, not more than about ten per cent of Navy Men-in-General will score higher than 60 on a given key, whereas about fifty per cent of men in the rate will score above this point.