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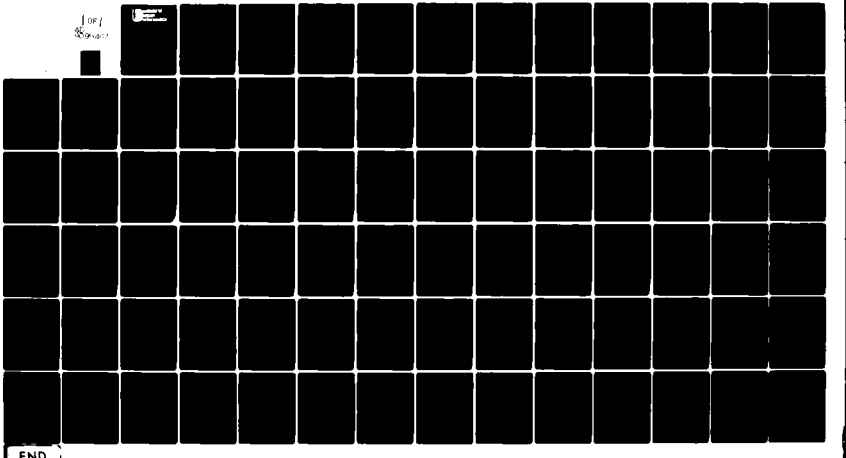

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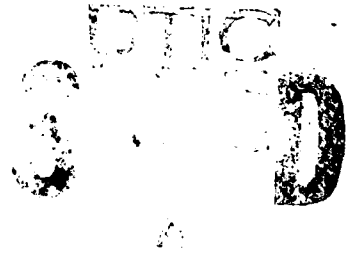
AN INVESTIGATION OF FITNESS AND HEALTH PARAMETERS IN A U.S. NAVY POPULATION



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to anthropometric assessment. Upon anatomizing the data, it was found that the population of Navy personnel studied was no more healthy than the average American male.

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(6) An Investigation of Fitness and Health Parameters in a U.S. Navy Population

By

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An Investigation of Fitness and Health Parameters In A U.S. Navy Population

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The United States Armed Forces have both a deterrent and covert combat responsibility. First, by maintaining a constant state of combat readiness they present a show of force that hopefully will dissuade any other nation from taking hostile action against the United States, its protectorates or allies. In the event this approach and parallel diplomatic efforts fail, the U.S. military forces must be immediately capable of launching, supporting, and eventually winning a combat engagement.

When America's capabilities in these areas are discussed at the strategic planning levels, the conversation normally centers around our weapon systems and logistic support capabilities. Unfortunately, the capabilities of the human element in the combat and combat-support roles are frequently not considered. The image of "Our American Fighting Man" seems to cloud the possibility that this American tradition may be less than capable of handling the rigors of sustained combat. It is easy and convenient to believe that because our military men are supposed to be fit enough to fight that they, in fact, are. The tradition of the U.S. Marines and the Army's Rangers and Green Berets is one that is easily transferable to our entire combat contingent. The trained observer,

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however, is aware that these generalities and assumptions can lead to potentially lethal miscalculations in manpower management. It is conceivable that more than twenty five percent of our fighting force is so de-conditioned or are burdened with such health problems as to make them ineffective in sustained warfare. To immediately cut our combat personnel readiness which is already undermanned, would seem to have catastrophic consequences.

The U.S. Marines are the recognized leaders in physical fitness. They have definitive procedures for assessing fitness and body composition in Marine personnel. Their fitness program, enhanced by Espirt de Corps, and consequent peer pressure is supported by a strong physical fitness and weight control order requiring minimum standards of fitness (3). This order is supported by a command interest that provides for fitness training while on the job.

The United States Navy has just begun a physical fitness management program (4). The long range effectiveness of this program, however, is unknown. At present, it is reasonable to speculate that the Navy's health and fitness levels are lower than those of the Marine Corps.

The stand is commonly taken that the requirements of Navy personnel in combat are not as rigorous as those of the Marine Corps. While this fact remains debatable it is generally regarded that the reasonably sedentary job protocol of Navy personnel carries an inherent tendency for down-grading of any basic physical skills. In these circumstances, individuals assume lifestyle characteristics of the general population and the consequent debilitating injuries and illnesses. Most significantly, this inherent degeneration reduces the Navy Personnel capabilities to respond to emergencies. It is clear, therefore, that all military personnel have a common need to develop and maintain a state of health and physical

fitness allowing them to effectively perform their daily jobs without undue fatigue and with sufficient energy reserves to respond to emergencies.

The execution of a Navy health and fitness management system, while long overdue, introduces problems likely to interfere with its effective implementation. The information needed to profile the fitness levels of Navy personnel to prescribe fitness routines and to monitor program effectiveness, is not available. Based on these facts, this study was conducted to provide Navy authorities with an initial look at some specific health and fitness information that may assist in more effective manpower management. The following objectives were used to guide the study:

a. To evaluate cardio-respiratory, and neuromuscular parameters as related to a normal United States, civilian male population.

b. To consider body composition analysis using hydrostatic weighing compared to anthropometric assessment, in order to make recommendations concerning the possibility of adopting existing Marine Corps percent fat equations or creating Navy specific equations.

c. Investigate age and its association to performance characteristics.

d. To make recommendations, based on the results of the pilot study concerning future program development and needed research.

METHOD

The subject population was randomly selected from the total population of the Naval Military Personnel Command in Washington, D.C. Two age cells were used. Fifty-one males thirty four years and younger were randomly selected into Cell One. Cell Two, contained fifty males, thirty five years of age and older. No distinction was made between officers and enlisted in the subject selection process.

All research was conducted at the Institute of Human Performance (IHP) laboratory in Fairfax, Virginia. The subjects, once selected, were given an information packet by IHP that outlined the types of tests they were to be given. This packet explained that they should come to the laboratory in a fasting state (having consumed nothing other than water for at least twelve hours) and should bring running shoes and shorts, a bathing suit, towel and whatever grooming supplies they preferred. A Navy Project Officer was responsible for coordinating the scheduling of subjects and providing for their transportation to the laboratory.

Immediately, upon arriving at the laboratory, blood chemistries were taken for a standard SMA-21 with High Density Lipoprotein analysis. Each subject then completed a medical history form and an informed consent. The voluntary nature of this study and the minimal but potential risk was emphasized.

The following test protocol was followed:

Body Composition: Body composition was determined through the use of the hydrostatic method of density calculation (under water), described in an earlier publication (2). The formula by Siri (5) was used to determine lean body weight (LBW), absolute fat weight (FW), relative or percent fat (P Fat), and ideal body weight (IBW). Residual lung volume, needed for the

hydrostatic procedures, was calculated by the single breathe nitrogen dilution data obtained on an Ohio 2300 pulmonary analysis system.

A battery of seven skinfolds, and nine circumferences were taken to develop an anthropometric profile of the subjects. The anthropometric measurements, and hydrostatically determined body composition data were analyzed in conjunction with available Marine Corps equations to determine the applicability of the Marine formulas for use on Navy personnel.

Cardiovascular Analysis: Cardiovascular analysis began with a resting 12-lead EKG. The resting EKG, in conjunction with the medical history and body composition data were evaluated by a physician to determine the subject acceptability to proceed with testing.

All 101 subjects were initially diagnosed as normal, permitting continuation of testing with a multi-stage Bruce Protocol maximal effort treadmill test. The Bruce test started with a slow walk at 1.7 mph with the treadmill at a ten percent grade. Automatic increase in both speed and elevation occurred every three minutes. The subjects continued until one of the following criteria were met:

a. The subject voluntarily discontinued the test.
b. The subject could no longer maintain pace with the treadmill.
c. The technician or physician aborted the test due to unacceptable physical or EKG changes.

The tests were conducted within the guidelines of the American College of Sports Medicine and the American Heart Association. Aerobic capacity (maximum oxygen consumption) was predicted based on the total time the subject performed on the treadmill.

Neuromuscular Analysis: Neuromuscular analysis involved the measurement of:

- right and left grip strength
- static shoulder strength
- dynamic strength of the legs, chest, shoulders, and arms
- leg power (standing long jump)
- flexibility (Wells and Dillion sit and reach test)
- bent knee sit-ups
- push-ups

All dynamic strength tests were based on a perceived five-repetition maximum.

RESULTS AND DISCUSSION

This paper addresses basically three research areas. First, a health and physical fitness profile was developed and analyzed in relationship to a normal male (civilian) population. Secondly, body composition was considered from two interrogatives: (1) can currently available USMC percent fat equations be used on a Navy population and (2) can a simple and accurate equation be developed using a Navy population? The third area of consideration was the affect of age on performance. In the next paragraph of the results and discussion section, each of these research areas will be discussed. For clarity, a conclusion section will follow each of the individual research areas.

Health and Physical Fitness Profile: Table I provides descriptive data for important variables examined in this study. The first three (age, height, and weight) are traditional measurements available to the Navy. The stratified random selection of personnel from the Naval Military Personnel Command yielded a sample group with an average age of thirty-four years, with a range between eighteen and fifty-five inclusive. A more detailed analysis of age and its affect on fitness parameters will be discussed later in this report.

The sample population averaged 176.6 centimeters in height and weighed 79.1 kilograms. The sample group were generally shorter, heavier, and on the average five years younger than Marines tested in a similar study by Wright and Wilmore (8). The Navy characteristics were not significantly different from the general male adult population of civilians averaging thirty-four years of age.

Items four and six, deal with percent fat as determined by hydrostatic weighing. By simply multiplying total body weight by percent fat,

TABLE I

A PROFILE OF HEALTH AND PHYSICAL FITNESS

VARIABLES OF 101 U.S. NAVY PERSONNEL

VARIABLE NO.	NAME	MEAN	STANDARD DEVIATION	ST. ERR. OF MEAN	COEFF. OF VARIATION	SMALLEST VALUE	LARGEST VALUE	RANGE	TOTAL FREQUENCY
1.	Age	34.495	7.653	.7615	.22187	18.000	55.000	37.000	101
2.	Height	176.581	6.670	.6670	.09484	159.766	190.754	30.988	100
3.	Weight	79.054	11.623	1.1565	.06703	57.380	114.669	57.289	101
4.	Lean Weight	63.357	5.933	.5904	.04247	49.805	77.928	28.123	101
5.	Fat Weight	15.654	7.143	.7108	.20674	3.946	41.686	37.740	101
6.	Percent Fat	19.131	6.166	.6136	.32232	6.180	36.370	30.019	101
7.	Push-up	24.949	14.490	1.4563	.58078	2.000	76.000	74.000	99
8.	Sit-up	44.000	15.978	1.5978	.36313	16.000	82.000	66.000	100
9.	Muscle Endurance	34.350	13.575	1.3575	.39521	9.000	77.500	68.500	100
10.	Hip Flexibility	31.679	8.621	.8576	.69126	10.16	53.34	43.180	101
11.	Long Jump	211.333	22.784	2.2900	.27386	157.48	259.08	101.600	99
12.	Right Grip	37.820	8.451	.8581	.22346	10.000	64.000	54.000	97
13.	Left Grip	36.189	8.088	.8212	.22349	12.000	58.000	46.000	97
14.	Pull Down	109.220	14.791	1.4791	.13542	82.000	175.000	93.000	100
15.	Strength	182.039	26.827	2.7099	.14737	109.000	273.000	164.000	98

TABLE I (Con'd)

VARIABLE NO.	NAME	MEAN	STANDARD DEVIATION	ST. ERR. OF MEAN	COEFF. OF VARIATION	SMALLEST VALUE	LARGEST VALUE	RANGE	TOTAL FREQUENCY
16.	Bench Press	53.744	12.778	1.284	.10785	27.216	95.709	68.493	99
17.	Shoulder Press	38.281	7.445	.7483	.08822	22.680	68.040	45.360	99
18.	Curl	24.004	5.102	.5128	.09642	9.072	45.360	36.288	99
19.	Leg Press	136.995	28.979	2.9125	.09595	63.504	226.799	163.295	99
20.	Resting Heart Rate	66.158	12.315	1.2254	.18614	40.000	96.000	56.000	101
21.	Resting Systolic	122.178	9.425	.9378	.07714	98.000	146.000	48.000	101
22.	Resting Diastolic	78.812	7.962	.7923	.10103	60.000	98.000	38.000	101
23.	Heart Rate Submaximal	145.584	14.667	1.4594	.10075	110.000	180.000	70.000	101
24.	Systolic Submaximal	166.356	16.503	1.6421	.09920	132.000	218.000	86.000	101
25.	Diastolic Submaximal	74.723	9.137	.9092	.12228	50.000	102.000	52.000	101
26.	Heart Rate Maximum	183.545	12.191	1.2131	.06642	155.000	225.000	70.000	101
27.	Sysolic Maximum	184.770	16.728	1.6728	.09053	144.000	224.000	80.000	100
28.	Diastolic Maximum	74.430	9.003	.9003	.12096	58.000	100.000	42.000	100
29.	Treadmill	9.356	1.649	.1641	.17624	4.200	13.300	9.100	101
30.	Maximum VO_2	36.038	6.805	.6805	.18884	22.160	52.870	30.710	100

TABLE I (Con'd)

VARIABLE NO.	NAME	MEAN	STANDARD DEVIATION	ST. ERR. OF MEAN	COEFF. OF VARIATION	SMALLEST VALUE	LARGEST VALUE	RANGE	TOTAL FREQUENCY
31.	Cardiac Risk Profile	23.307	4.681	.4658	.20086	14.000	37.000	23.000	101
32.	Fitness Score	35.360	13.575	1.3575	.38392	6.000	61.000	55.000	100
33.	Cholesterol	193.190	36.190	3.6190	.18733	92.000	307.000	215.000	100
34.	Uric Acid	6.055	1.390	.1390	.22960	3.200	14.100	10.900	101
35.	Glucose	91.970	10.981	1.0981	.11939	69.000	154.000	85.000	100
36.	Triglycerides	113.930	72.285	7.2285	.63447	35.000	529.000	494.000	100
37.	High Density Lipoprotein	42.170	11.783	1.1783	.27943	14.000	90.000	76.000	100
38.	Lipid Risk Index	1.039	.593	.0593	.57083	.300	3.000	2.700	100

one determines absolute or total body fat. In the present sample, the average Navy male weighs 79 kilograms of which sixteen kilograms is fat. Lean weight (fat free) is determined by subtracting total fat from total body weight which leaves 63 kilograms of lean mass for the average. The sample population was quite homogeneous in lean weight with a coefficient of variation* of less than ten percent of the average lean weight. Alternatively, the coefficient of variation for fat weight was 45.8 percent of the sample average giving an absolute range in fat weight of 3.9 to 41.7 kilograms. These observations imply that the predominate explanation for weight variability among Navy personnel is due to variance in fat weight.

The total fat weight of sixteen kilograms represented nineteen percent of the total body weight. The generally accepted definition of obesity is: when the body fat portion of total body weight is equal to or greater than twenty percent of total body weight, a male is obese. This definition and the ramifications of being obese can be related to the exceptional incidence of cardiovascular disease in the United States. The study sample's average percent fat is, therefore, equivalent to that considered at the maximum acceptable level normally projected as necessary to maintain reduced risk to cardiovascular disease. Alternatively, it can be stated that the study's average percent fat is three percent greater than the recommendated average for body fat in a generally healthy population (sixteen percent).

Since the subject group tested represented only a random sample of Navy personnel, the use of inferential statistics was employed to project the probable range of scores within which the average score would be

*The coefficient of variation describes the amount of variablility among the sample subjects free of any measurement units.

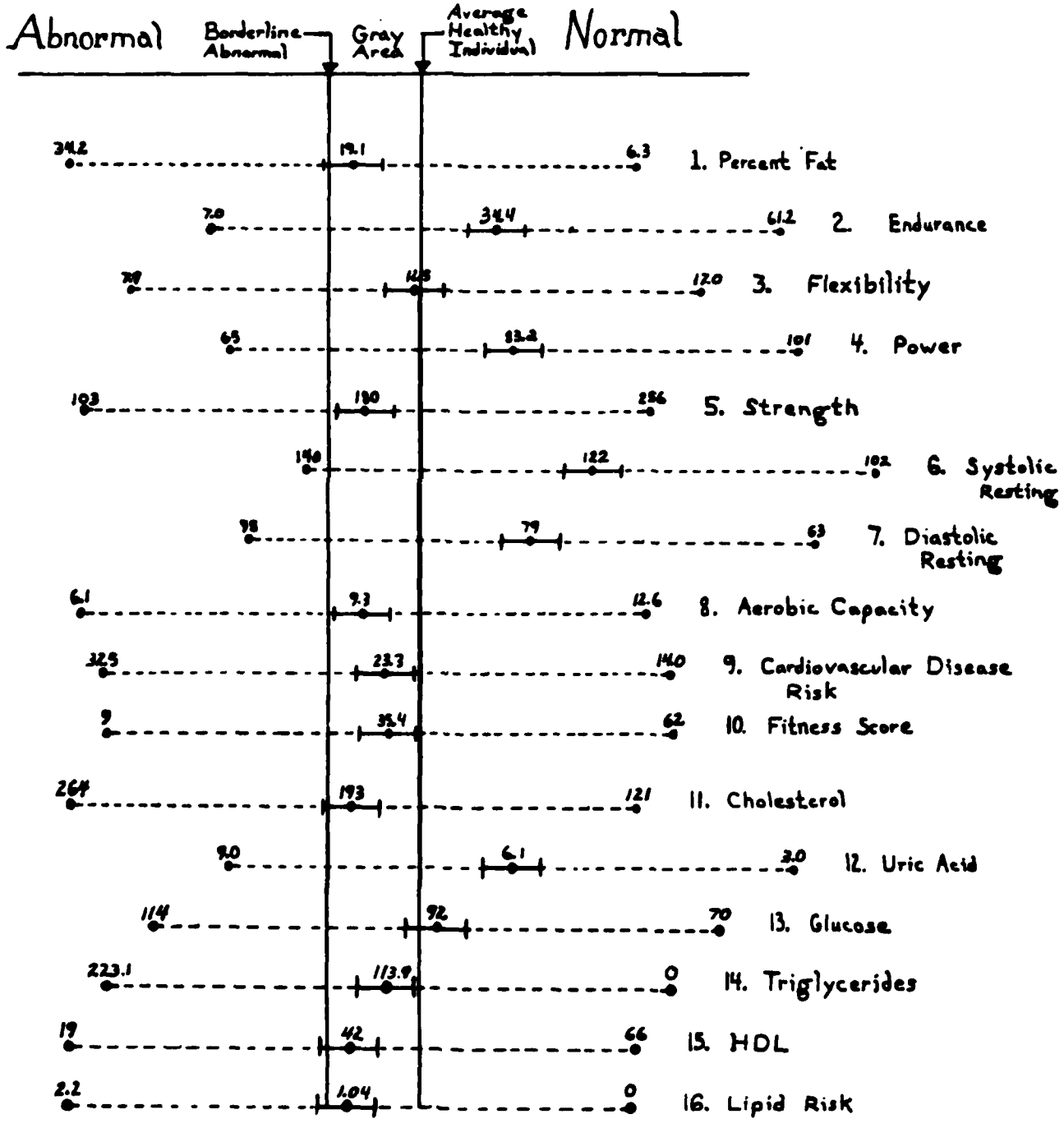
found if the entire Navy had been tested. Figure 1 graphically displays this statistical approach. The percent fat average for this study population (nineteen percent) is projected for the total male Navy population to be between 17.7 and 20.2 percent. This area is represented in the graph by the solid horizontal line marked with the pilot study average of nineteen percent. The extended and dashed horizontal line represents the probable range of percent fat scores or the limits within which ninety-five percent of all scores are expected to be found in the U.S. Navy population. It is interesting to note that the actual range of scores for percent fat, as listed in Table I, are outside the ninety-five percentile range as presented in Figure 1. If a normal curve is presumed, then the individuals at each end of the statistical spectrum (six percent and thirty-six percent) are members of very small clubs - each area containing only two and a half percent of the total population.

When one uses a statistical procedure for determining frequency distribution of percent fat in the Navy's total population, it can be shown that at least 43.7 percent of 213,392* individuals are currently in the abnormal area (equal to or greater than twenty percent).

Based on discussions with the Navy's physical fitness officer, it is understood that the Navy intends to recognize twenty percent body fat at that point where body fat is potentially a health program. Individuals at this point will be informed that action should be taken to protect their health and to improve physical performance by reducing their total body fat. From a purely administrative standpoint, the Navy will reportedly utilize twenty-four percent, above which administrative action may be taken. The present data suggest that at twenty-four percent fat,

*From Navy Military Personnel statistics, second quarter FY80, 31 March 1980 Regular and Reserve Active Duty Males

FIGURE 1: The relationship between the present study mean scores and predicted means and ranges of scores of the entire U.S. Navy Population. All data is compared to a civilian scale ranging from normal healthy to abnormal.



24.8 percent of the population or 104,889 individuals would require administrative action.

The health/fitness profile presented in Figure 1, helps the observer to realize other relationships. For instance, the perpendicular line labeled Borderline Abnormal separates the graphic display into two areas, Normal and Abnormal. The perpendicular line to its right labeled, Average Healthy Individuals, bisects horizontal lines at sites representative of scores that would be achieved by average healthy individuals. The area between these two lines, for want of a better title, is labeled the gray area. It is in this area that individuals are transforming from healthy and fit, to increased high risk of disease and deterioration of physical performance. Once crossing the borderline abnormal line, individuals find themselves at high risk to attending health and fitness problems.

With the above orientation in mind, it can be seen in Figure 1 that in all cases the average or mean values for the health and fitness parameters presented are within the normal area. What is alarming, however, is that eleven of the sixteen parameters project that the typical Navy personnel is in the gray area. When it is recognized that the average healthy and borderline abnormal lines are derived from a non-military (i.e. civilian) population, the current status of the Navy population is suspect at best. Since this preliminary study represents a cross sectional analysis of Navy personnel, the question of any directional change in health/fitness parameters is unknown. Under the assumption, however, that the health/fitness lifestyle characteristics of Navy personnel parallels the civilian population, we may project that these parameters are in a constant state of deterioration unless some form of intervention is introduced.

The neuromuscular evaluation battery included: muscular endurance

index (push-ups and sit-ups divided by two); flexibility (Wells and Dillon sit and reach test); muscular power (long jump); muscular strength index (sum of right grip, left grip, and static pull down); and individual strength maneuvers (bench press, should press, arm curl, and leg press). The first four of these indexes and tests are also profiled in Figure 1.

The muscular endurance index had twenty-five and forty-four repetitions for push-ups and sit-ups respectively. This compared to twenty-six and thirty-seven repetitions in a civilian scale. The results for hip flexibility are judged less favorable, in that the average appears in the gray area. The Navy population projected average is 2.54 centimeters less flexible on the average than simularly aged civilians. Once again using inferential statistics, the projection of the pilot study flexibility data to the total Navy results suggest that 23.3 percent have unacceptable hip flexibility. Since it has previously been established that lack of flexibility in the hamstring and low back predisposes one to low back disorders (1), we may conclude that such disorders should occur at above average frequencies within the Navy population.

Muscular power is projected into the good category and indicates that the Navy group has a 210.8 centimeter average as compared to a 205.7 centimeter long jump average for civilians. Alternatively the muscular strength category reveals potential neuromuscular problems. The following comparison can be made:

Variable	Navy	Civilian
Right Grip	38 kg.	54 kg.
Left Grip	36	47
Static Pull Down	109	116
Strength Index	182	217

Considering the comparison and the many shipboard tasks that require significant levels of arm and shoulder strength, one must question the acceptance of this sample's muscular strength for projection to the Fleet Navy. The alternative is to except a high performance decrement in shipboard strength related tasks.

A more positive sign can be obtained by looking at more traditional weight training maneuvers. The following comparison is offered:

Variable	Navy	Civilian
Bench Press	58 kg.	58 kg.
Shoulder Press	38	39
Arm Curl	24	33
Leg Press	134	130

The Navy's leg press advantage corresponds favorably to their muscular power performance mentioned earlier. The bench press and shoulder press both require tricep muscle action as prime movers in elbow extension and are very simular between Navy and civilian groups. The civilian advantage in arm curl corresponds to their advantage in the static arm pull down, primarily because each event requires the bicep brachi as prime movers for elbow flexion .

The heart rate and blood pressure characteristics of the sample population were well within normal limits. The resting, sub maximal, and maximal heart rates were 66.2, 145.6, and 183.5 beats per minute respectively. The resting systolic and diastolic blood pressures averaged 122/79, 166/75, and 185/74 mmHg at rest, sub maximal, and maximal work levels respectively.

The aerobic capacity of the sample groups (36.0 ml/kg) was average for subjects thirty-four years of age. Only nineteen percent of the Navy population are projected to possess poor aerobic capacity levels.

Alternatively 44.0 percent are estimated to exhibit at least moderate risk to the development of cardiovascular disease within the next six years while only 12.9 percent possess below average risk. Analysis of blood parameters bearing on the health status of Navy personnel, revealed all parameters were on the average within limits generally accepted as normal. However, 42.0 and 33.4 percent of Navy personnel are estimated to currently possess elevated cholesterol and triglyceride levels: blood measures commonly identified as risk predictors for cardiovascular disease.

Health and Physical Fitness Profile Conclusion: In order to provide an additional visual display of the data derived from this study, Appendix A, has been prepared. The histograms of this appendix show the distribution of scores for this pilot study group. Frequency of score occurrence and cumulative frequencies are also displayed. As one studies these histograms, it is not difficult to understand that the general health and fitness status of the population of Navy personnel is not unlike the general population of civilian adult males. It may be concluded that rather than represent the elite American, they are in fact, no more than a mirror image of the average male. These observations raise severe questions concerning the health and fitness readiness of Navy personnel and their capabilities to engage in sustained warfare. The Navy forces have an unacceptable number of individuals with excess body fat, restricted flexibility, and reduced aerobic capacity to sustain prolonged activities required of combat personnel. It is projected that a high percentage of Navy personnel has and/or will develop low back disorders sufficient to seriously impair their effectiveness even to complete minimal physical tasks. Additionally, the incident of cardiovascular disease should mirror the epidemic morbidity and mortality rates typical of the general adult population.

Body Composition:

Formulae useful in estimating body composition parameters have been developed previously. These formulae, developed for one population, have not generally met with success when projected to an alternative population. This was also shown to be the case when formulae developed for civilian populations were applied to military personnel (6). No effort has been made to validate the use of formula developed on one military unit, for other military units.

The Institute of Human Performance, under a contract awarded by the Marine Corps previously developed an estimation formula for percent body fat in Marine Corps males (7). Accordingly, the usefulness of this formula for Navy personnel was examined. The formula based on waist size and neck size is:

Percent Fat = 0.528 + (.740 *Waist (cm)) - (1.1249 *Neck (cm))

Application of the formula to Navy personnel yields a validity coefficient (multiple R) of 0.88 with a standard error of estimate of 2.97 percent. These values compare favorable with the original validation statistics based on 297 Marine Corp personnel. Actually, the Wright/Dotson (7) revision of the original Wright/Wilmore study (8) had a smaller R (.81) with a correspondingly larger standard error (3.67). This would appear to be abnormal in that an equation derived from a specific population will normally have a higher R on that population than when the equation is used on a separate population. The small N of the Navy pilot study, plus a high degree of homogenity within the group, probably accounts for this occurrence. Although, the possibilities look good for using the Marine Corps equation on a Navy population, this cannot totally be justified by using the information presently available.

The formula overestimates Navy personnels' percent fat by 0.886 percent for subjects with ten percent fat and underestimates by 0.714 percent for subjects with thirty-five percent fat. In addition, the formula projects average positive/negative bias for Navy personnel of varying ages. Personnel eighteen years of age are overestimated by 0.73 percent, while subjects at fifty-five years have their percent fat underestimated by 1.003 percent. Personnel with percent fat values and age closer to the average for Navy personnel will exhibit smaller errors of estimation employing the Marine Corps formula.

It is considered desirable to have an equation that is to be used on a large population developed from a reasonably sized sample of that population. The principle of population specificity is very evident in the area of body composition. The seven skinfolds and nine circumferences taken on this population were anlyzed in two ways. First a computer run was made selecting only the best circumference predictors. In this case, waist circumference was selected first and produced an R=.926 with a Standard Error (S.E.) of 2.30. Thigh circumference was the next selection, but increased the R to only .931 (S.E. = 2.24). Wrist was the third circumference selected but made no significant improvement in the equation. This data would indicate that waist circumference alone is sufficient to accurately predict percent fat. The second computer run allowed for the call up of skinfolds. In this circumstance, waist (R=.926) was again the first variable to be selected. The computer next selected the chest skinfold which improved the R to .935 (S.E. = 2.17). The third variable was thigh circumference and it improved the R to .939 (S.E. = 2.12). Abdominal No. 1 circumference, as the fourth selection, did not improve upon the equation.

The waist measure has always been known as a valid and reliable predictor of percent fat. It would be interesting to determine how this measure would fair if a larger more heterogeneous study population were examined. In order to see more graphically the relationship of this percent fat data to waist girth and other variables, a University of California BMDP6D program was run. The scatter plots produced by this computer program are shown in Appendix B.

Body Composition Conclusion:

We may conclude that the Marine Corps formula has potential for use in estimating percent fat levels for Navy personnel except individuals at extreme age and percent fat levels. These subjects, particularly the older more obese individual, may have typical errors of estimation of over four percent. Considering the principle of population specificity, it should be recognized that a formula for Navy personnel should be developed using an appropriate size study population. The indicators are very strong that waist circumference alone could be used as a predictor of percent fat. The present study provides definitive support that selected anthropometric measures can be identified as predictors of body composition measures in Navy personnel. This should be varified with further studies.

Age Group Analysis:

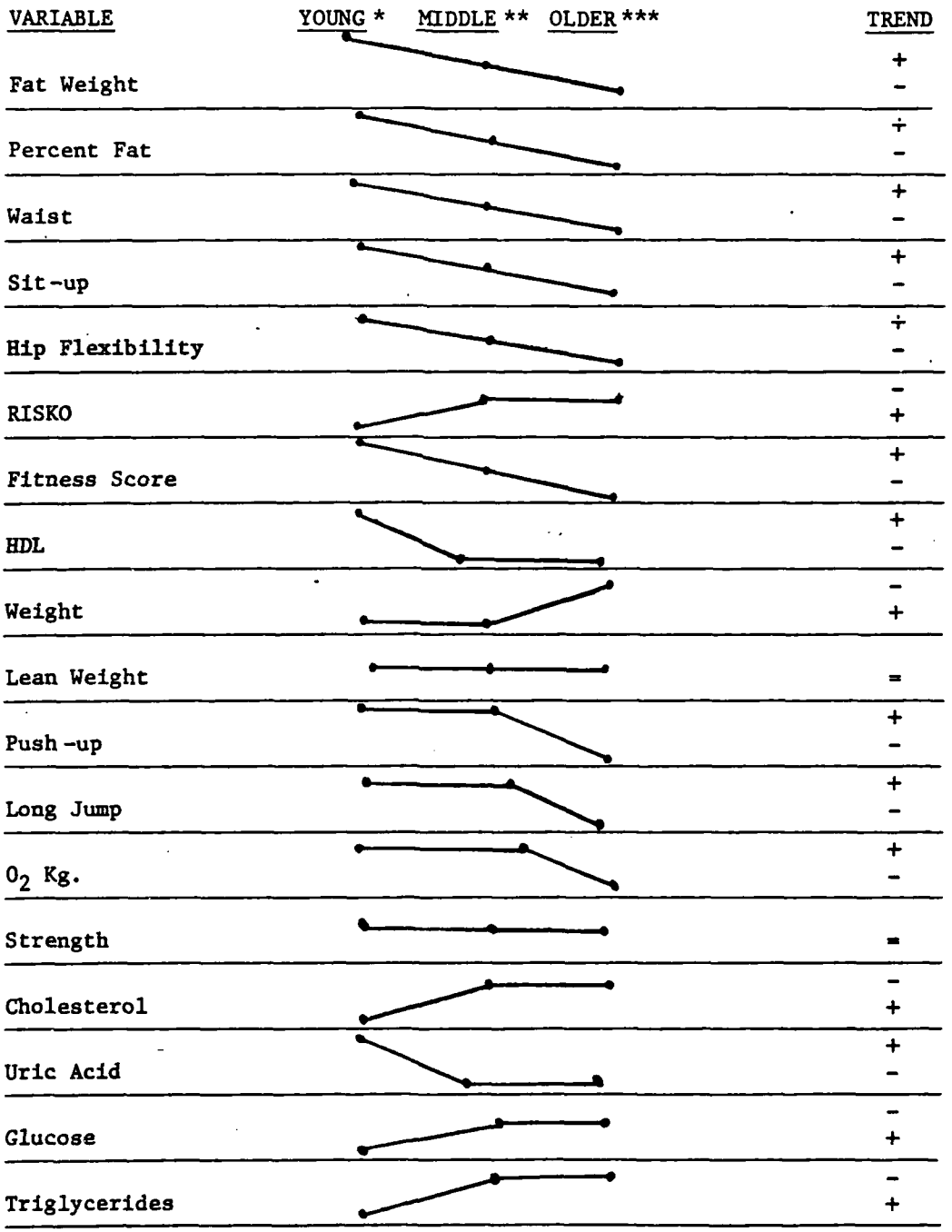
The 101 Navy personnel were subdivided into three age groups to assess the impact of age upon physical performance and health parameters. For purposes of analysis, the age categories were set at eighteen to twenty-three, twenty-four to thirty-six, and thirty-seven and above years. Results of this analysis are presented in Figure 2.

The data of Figure 2 revealed that in almost all cases the trend across age groups shows a deterioration in physical performance and health parameters. Significant changes between the young and middle aged subjects were observed for fat weight, percent fat, waist size, sit-ups, hip flexibility, Risko, fitness levels, and HDL. Degeneration observed for these variables continued into the older age groups in all cases except for Risko and HDL. It was also noted that the rate of deterioration observed between young and middle aged personnel was maintained into the older personnel groups, and in many cases the deterioration was accelerated.

Variables reflecting delayed changes until the older age groups were standing long jumps, push-ups, oxygen intake, and total body weight. In each case, however, the deterioration observed between the middle aged and older age groups were substantial.

No significant changes were observed for muscular strength, lean body weight, and the blood variables of cholesterol, uric acid, glucose, and triglycerides. It should be noted, however, that the generally large variances typical of blood parameters leads to reduced statistical power when drawing conclusions relative to the trend for these variables. Two observations are worth noting. First, in all cases except for uric acid, the trend of the blood parameters is to change across age groups in the undesired direction. Second, the important parameter of HDL was observed

FIGURE 2: Age and its affect on health and physical performance parameters.



*Young = 18 through 23 years of age.
**Middle = 24 through 36 years of age.
***Older = 37 and older.

to significantly decrease across the three age groups. This significant reduction in HDL drastically reduces the protection level afforded by high levels of HDL. Thus, while the blood parameters show non-significant but deteriorating trends across age groups, the dynamic interaction between the protective levels of HDL and this degenerative trend place the status of Navy personnel at elevated risks to coronary heart disease.

Age Group Conclusions:

As in the body composition section, BMD Bivariate plots (Appendix C) have been run to further show the relationships between age and various health and physical fitness variables. Once again, a strong parallel exists between Navy personnel and a civilian population. It can be anticipated that health and physical fitness deteriorates with age. In most cases, this is a rapidly accelerating phenomena in the older age group. The important concept to realize, however, is that age is not associated with the health and physical fitness parameters studied in an absolute way. Moderate, well planned exercise can significantly retard and in some cases, reverse the apparent effect of age on these parameters. To purposely allow these degenerative processes to occur based on the fallacy that they are controlled by age is a great misjustice.

RECOMMENDATIONS FOR FUTURE PROGRAM DEVELOPMENT AND NEEDED RESEARCH

The average Navy male closely resembles his civilian counterpart of the same age. The health and physical fitness profile suggests a person who is at a high risk of cardiovascular disease. Muscular strength and aerobic capacity, two physiological factors one would expect should be high in a military individual are, in fact, dangerously low. This evidence indicates that an intervention program or physical fitness development program should be designed and enforced.

The Navy program should have as its primary goal the improvement of aerobic capacity. It can reasonably be expected that as aerobic capacity improves through regular training, that other benefits would accrue (i.e. reduction in body fat; increased muscular endurance, reduced total cholesterol and increases in HDL, and a consequent reduction in risk to cardiovascular disease).

The strength profile should receive specific attention in any planned fitness program. This comment is made based on the assumption that strength is an important factor aboard ship in a normal work routine, as well as a combat emergency. While a requirement for aerobic fitness can easily be defined simply on health merits, strength often is tied more to the requirements of a particular job. Task analysis studies should be accomplished to determine the extent to which strength should be trained.

The Navy should conduct additional studies in the area of body composition assessment. It would appear from the results of this report that highly valid and extremely simple anthropometric techniques for determining percent fat can be determined. It is recommended that a study be

commissioned using a subject population of sufficient size to develop Navy specific prediction equations. The evidence of this report would also suggest that as an intrum procedure, the Marine Corps equations do have predictive values when applied to a Navy male population.

Age seemingly has an affect on health and fitness parameters. It is recommended that physiological profile data be obtained on a larger population of males, and that statistical procedures be employed to hold age constant. Through this technique the investigator can demonstrate the actual affect, if any, that age has on each health and fitness parameter.

As a pilot study, this paper was designed to develop a basic core of data that would provide needed information on the health and fitness status of the U.S. Navy. The title of, "Pilot Study", would infer that if the research data gathered is indeed meaningful from the users (U.S. Navy) standpoint, then additional data should be obtained. It is recommended that a system be established so that individuals reporting to Washington from a Fleet Navy command, be scheduled for profile testing. If they are tested within a reasonable time, the data could be reliably projected to the Fleet Navy. This procedure could be continued until a sufficient total population size is obtained as well as any subpopulations the Navy feels are important.

This report obviously deals only with the male Navy. With the current influx of females into what were tradionally male jobs, there is a tremendous need for physiological profile information. It is recommended, therefore, that this study be continued and involve a women contingent.

ACKNOWLEDGEMENTS

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APPENDIX A

HISTOGRAMS OF HEALTH AND PHYSICAL FITNESS VARIABLE OF 101, U.S. NAVY PERSONNEL

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11	Situp		HIST	7
41	Muscular Endurance		HIST	8
12	Hip Flexibility		HIST	9
13	Long Jump		HIST	10
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HISTOGRAM OF VARIABLE 2 AGE

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	34.495	7.650

INTERVAL NAME	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
* 18.000 +X	1	1	1.0	1.0
* 19.000 +X	1	2	1.0	2.0
* 20.000 +X	1	3	1.0	3.0
* 21.000 +XXX	3	6	3.0	5.9
* 22.000 +	0	6	.0	5.9
* 23.000 +XXXXX	5	11	5.0	10.9
* 24.000 +	0	11	.0	10.9
* 25.000 +XXX	3	14	3.0	13.9
* 26.000 +XX	2	16	2.0	15.8
* 27.000 +XX	2	18	2.0	17.8
* 28.000 +XXXXXX	6	24	5.9	23.8
* 29.000 +XXX	3	27	3.0	26.7
* 30.000 +XXXX	4	31	4.0	30.7
* 31.000 +XXX	3	34	3.0	33.7
* 32.000 +XXXXX	5	39	5.0	38.6
* 33.000 +XXX	3	42	3.0	41.6
* 34.000 +XXXXX	5	47	5.0	46.5
* 35.000 +XXX	3	50	3.0	49.5
* 36.000 +XXXXXXX	7	57	6.9	56.4
* 37.000 +XXXXXXX	7	64	6.9	63.4
* 38.000 +XXXXXXXXXX	10	74	9.9	73.3
* 39.000 +XXXXX	5	79	5.0	78.2
* 40.000 +XXXX	4	83	4.0	82.2
* 41.000 +XX	2	85	2.0	84.2
* 42.000 +XX	2	87	2.0	86.1
* 43.000 +XXXXX	5	92	5.0	91.1
* 44.000 +	0	92	.0	91.1
* 45.000 +XX	2	94	2.0	93.1
* 46.000 +XX	2	96	2.0	95.0
* 47.000 +	0	96	.0	95.0
* 48.000 +	0	96	.0	95.0
* 49.000 +X	1	97	1.0	96.0
* 50.000 +X	1	98	1.0	97.0
* 51.000 +X	1	99	1.0	98.0
* 52.000 +X	1	100	1.0	99.0
* 53.000 +	0	100	.0	99.0
* 54.000 +	0	100	.0	99.0
* 55.000 +X	1	101	1.0	100.0
* 56.000 +	0	101	.0	100.0
* 57.000 +	0	101	.0	100.0
* 58.000 +	0	101	.0	100.0
* 59.000 +	0	101	.0	100.0
* 60.000 +	0	101	.0	100.0
*LAST +	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 3 WEIGHT

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	174.283	25.624

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 110.00	+	0	0	.0	.0
# 115.00	+	0	0	.0	.0
# 120.00	+	0	0	.0	.0
# 125.00	+	0	0	.0	.0
# 130.00	+XX	2	2	2.0	2.0
# 135.00	+X	1	3	1.0	3.0
# 140.00	+XXX	3	6	3.0	5.9
# 145.00	+XXXXX	5	11	5.0	10.9
# 150.00	+XXXXXXX	7	18	6.9	17.8
# 155.00	+XXXXXXXX	8	26	7.9	25.7
# 160.00	+XXXXXXXXX	9	35	8.9	34.7
# 165.00	+XXX	3	38	3.0	37.6
# 170.00	+XXXXXXXX	8	46	7.9	45.5
# 175.00	+XXXXXX	6	52	5.9	51.5
# 180.00	+XXXXXXXXX	10	62	9.9	61.4
# 185.00	+XXXXXXXXXX	11	73	10.9	72.3
# 190.00	+XXXXXXX	7	80	6.9	79.2
# 195.00	+XXX	3	83	3.0	82.2
# 200.00	+XXXXX	5	88	5.0	87.1
# 205.00	+XX	2	90	2.0	89.1
# 210.00	+XX	2	92	2.0	91.1
# 215.00	+XX	2	94	2.0	93.1
# 220.00	+X	1	95	1.0	94.1
# 225.00	+	0	95	.0	94.1
# 230.00	+XX	2	97	2.0	96.0
# 235.00	+XX	2	99	2.0	98.0
# 240.00	+	0	99	.0	98.0
# 245.00	+	0	99	.0	98.0
# 250.00	+	0	99	.0	98.0
# 255.00	+XX	2	101	2.0	100.0
# 260.00	+	0	101	.0	100.0
# 265.00	+	0	101	.0	100.0
# 270.00	+	0	101	.0	100.0
# 275.00	+	0	101	.0	100.0
# 280.00	+	0	101	.0	100.0
# 285.00	+	0	101	.0	100.0
# 290.00	+	0	101	.0	100.0
# 295.00	+	0	101	.0	100.0
# 300.00	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 6 PFAT

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	19.131	6.166

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 1.0000	+	0	0	.0	.0
# 2.0000	+	0	0	.0	.0
# 3.0000	+	0	0	.0	.0
# 4.0000	+	0	0	.0	.0
# 5.0000	+	0	0	.0	.0
# 6.0000	+	0	0	.0	.0
# 7.0000	+X	1	1	1.0	1.0
# 8.0000	+X	1	2	1.0	2.0
# 9.0000	+XX	2	4	2.0	4.0
# 10.000	+X	1	5	1.0	5.0
# 11.000	+XXXX	4	9	4.0	8.9
# 12.000	+XXXXXX	6	15	5.9	14.9
# 13.000	+XXXX	4	19	4.0	18.8
# 14.000	+XXXX	4	23	4.0	22.8
# 15.000	+XXXXXXX	7	30	6.9	29.7
# 16.000	+XXX	3	33	3.0	32.7
# 17.000	+XXXXXXXXX	9	42	8.9	41.6
# 18.000	+XXXXXX	6	48	5.9	47.5
# 19.000	+XX	2	50	2.0	49.5
# 20.000	+XXXXXX	6	56	5.9	55.4
# 21.000	+XXXX	4	60	4.0	59.4
# 22.000	+XXXX	4	64	4.0	63.4
# 23.000	+XXXXX	5	69	5.0	68.3
# 24.000	+XXXXXXXXX	9	78	8.9	77.2
# 25.000	+XXXXX	5	83	5.0	82.2
# 26.000	+XXXXXXX	7	90	6.9	89.1
# 27.000	+XXX	3	93	3.0	92.1
# 28.000	+	0	93	.0	92.1
# 29.000	+XXX	3	96	3.0	95.0
# 30.000	+X	1	97	1.0	96.0
# 31.000	+X	1	98	1.0	97.0
# 32.000	+XX	2	100	2.0	99.0
# 33.000	+	0	100	.0	99.0
# 34.000	+	0	100	.0	99.0
# 35.000	+	0	100	.0	99.0
# 36.000	+	0	100	.0	99.0
# 37.000	+X	1	101	1.0	100.0
# 38.000	+	0	101	.0	100.0
# 39.000	+	0	101	.0	100.0
# 40.000	+	0	101	.0	100.0
# 41.000	+	0	101	.0	100.0
# 42.000	+	0	101	.0	100.0
# 43.000	+	0	101	.0	100.0
# 44.000	+	0	101	.0	100.0
# 45.000	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 8 WAIST

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	35.162	3.650

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 26.000	+	0	0	.0	.0
# 26.500	+	0	0	.0	.0
# 27.000	+	0	0	.0	.0
# 27.500	+X	1	1	1.0	1.0
# 28.000	+	0	1	.0	1.0
# 28.500	+	0	1	.0	1.0
# 29.000	+X	1	2	1.0	2.0
# 29.500	+	0	2	.0	2.0
# 30.000	+XXX	3	5	3.0	5.0
# 30.500	+XXX	3	8	3.0	7.9
# 31.000	+XXXX	4	12	4.0	11.9
# 31.500	+XXXXXX	6	18	5.9	17.8
# 32.000	+XXXXXX	6	24	5.9	23.8
# 32.500	+XXXXX	5	29	5.0	28.7
# 33.000	+XXXX	4	33	4.0	32.7
# 33.500	+XXX	3	36	3.0	35.6
# 34.000	+XXXX	4	40	4.0	39.6
# 34.500	+XXXXXX	6	46	5.9	45.5
# 35.000	+XXXX	4	50	4.0	49.5
# 35.500	+X	1	51	1.0	50.5
# 36.000	+XXXXXXX	7	58	6.9	57.4
# 36.500	+XXXXXXXXX	9	67	8.9	66.3
# 37.000	+XXXX	4	71	4.0	70.3
# 37.500	+XXXXXXXX	8	79	7.9	78.2
# 38.000	+XXXXXX	6	85	5.9	84.2
# 38.500	+XXX	3	88	3.0	87.1
# 39.000	+XX	2	90	2.0	89.1
# 39.500	+XX	2	92	2.0	91.1
# 40.000	+	0	92	.0	91.1
# 40.500	+	0	92	.0	91.1
# 41.000	+	0	92	.0	91.1
# 41.500	+XX	2	94	2.0	93.1
# 42.000	+XXX	3	97	3.0	96.0
# 42.500	+	0	97	.0	96.0
# 43.000	+	0	97	.0	96.0
# 43.500	+X	1	98	1.0	97.0
# 44.000	+X	1	99	1.0	98.0
# 44.500	+	0	99	.0	98.0
# 45.000	+	0	99	.0	98.0
# 45.500	+X	1	100	1.0	99.0
# 46.000	+X	1	101	1.0	100.0
# 46.500	+	0	101	.0	100.0
# 47.000	+	0	101	.0	100.0
# 47.500	+	0	101	.0	100.0
# 48.000	+	0	101	.0	100.0
# 48.500	+	0	101	.0	100.0
# 49.000	+	0	101	.0	100.0
# 49.500	+	0	101	.0	100.0
# 50.000	+	0	101	.0	100.0
# 50.500	+	0	101	.0	100.0
# 51.000	+	0	101	.0	100.0
# 51.500	+	0	101	.0	100.0
# 52.000	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 10 PUSHUP

SYMBOL	COUNT	MEAN	ST.DEV.
X	99	24.949	14.490

INTERVAL NAME		FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 2.0000	+X	1	1	1.0	1.0
# 4.0000	+	0	1	.0	1.0
# 6.0000	+XXX	3	4	3.0	4.0
# 8.0000	+XX	2	6	2.0	6.1
# 10.000	+XXXXXXXX	8	14	8.1	14.1
# 12.000	+XXXXX	5	19	5.1	19.2
# 14.000	+XX	2	21	2.0	21.2
# 16.000	+XXXXXXXX	8	29	8.1	29.3
# 18.000	+XXX	3	32	3.0	32.3
# 20.000	+XXXXXXXXXX	11	43	11.1	43.4
# 22.000	+XXXX	4	47	4.0	47.5
# 24.000	+XXX	3	50	3.0	50.5
# 26.000	+XXXXXXXXXXXX	14	64	14.1	64.6
# 28.000	+XXX	3	67	3.0	67.7
# 30.000	+XXXXXXXXXX	11	78	11.1	78.8
# 32.000	+XXXX	4	82	4.0	82.8
# 34.000	+X	1	83	1.0	83.8
# 36.000	+XX	2	85	2.0	85.9
# 38.000	+X	1	86	1.0	86.9
# 40.000	+XXXX	4	90	4.0	90.9
# 42.000	+X	1	91	1.0	91.9
# 44.000	+X	1	92	1.0	92.9
# 46.000	+	0	92	.0	92.9
# 48.000	+	0	92	.0	92.9
# 50.000	+X	1	93	1.0	93.9
# 52.000	+	0	93	.0	93.9
# 54.000	+X	1	94	1.0	94.9
# 56.000	+X	1	95	1.0	96.0
# 58.000	+	0	95	.0	96.0
# 60.000	+	0	95	.0	96.0
# 62.000	+	0	95	.0	96.0
# 64.000	+	0	95	.0	96.0
# 66.000	+X	1	96	1.0	97.0
# 68.000	+	0	96	.0	97.0
# 70.000	+	0	96	.0	97.0
# 72.000	+	0	96	.0	97.0
# 74.000	+	0	96	.0	97.0
# 76.000	+XXX	3	99	3.0	100.0
# 78.000	+	0	99	.0	100.0
# 80.000	+	0	99	.0	100.0
# 82.000	+	0	99	.0	100.0
# 84.000	+	0	99	.0	100.0
# 86.000	+	0	99	.0	100.0
# 88.000	+	0	99	.0	100.0
# 90.000	+	0	99	.0	100.0
#LAST	+	0	99	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 11 SITUP

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	44.000	15.973

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 2.0000	+	0	0	.0	.0
# 4.0000	+	0	0	.0	.0
# 6.0000	+	0	0	.0	.0
# 8.0000	+	0	0	.0	.0
# 10.000	+	0	0	.0	.0
# 12.000	+	0	0	.0	.0
# 14.000	+	0	0	.0	.0
# 16.000	+X	1	1	1.0	1.0
# 18.000	+XX	2	3	2.0	3.0
# 20.000	+XXXX	4	7	4.0	7.0
# 22.000	+XX	2	9	2.0	9.0
# 24.000	+XX	2	11	2.0	11.0
# 26.000	+XXX	3	14	3.0	14.0
# 28.000	+XX	2	16	2.0	16.0
# 30.000	+XXXXXXX	7	23	7.0	23.0
# 32.000	+XXXXX	5	28	5.0	28.0
# 34.000	+XXXX	4	32	4.0	32.0
# 36.000	+XXXXXX	6	38	6.0	38.0
# 38.000	+XX	2	40	2.0	40.0
# 40.000	+XXXX	4	44	4.0	44.0
# 42.000	+XXXXX	5	49	5.0	49.0
# 44.000	+XXX	3	52	3.0	52.0
# 46.000	+XXXXXX	6	58	6.0	58.0
# 48.000	+XXXXX	5	63	5.0	63.0
# 50.000	+XXXXX	5	68	5.0	68.0
# 52.000	+XXXX	4	72	4.0	72.0
# 54.000	+XX	2	74	2.0	74.0
# 56.000	+XXX	3	77	3.0	77.0
# 58.000	+XXXX	4	81	4.0	81.0
# 60.000	+XXX	3	84	3.0	84.0
# 62.000	+XXXX	4	88	4.0	88.0
# 64.000	+	0	88	.0	88.0
# 66.000	+X	1	89	1.0	89.0
# 68.000	+XXX	3	92	3.0	92.0
# 70.000	+XX	2	94	2.0	94.0
# 72.000	+X	1	95	1.0	95.0
# 74.000	+	0	95	.0	95.0
# 76.000	+XX	2	97	2.0	97.0
# 78.000	+	0	97	.0	97.0
# 80.000	+X	1	98	1.0	98.0
#LAST	+XX	2	100	2.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 41 MUSCLEND

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	34.050	13.575

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
* 5.0000	+	0	0	.0	.0
* 7.0000	+	0	0	.0	.0
* 9.0000	+X	1	1	1.0	1.0
* 11.000	+	0	1	.0	1.0
* 13.000	+X	1	2	1.0	2.0
* 15.000	+XXX	3	5	3.0	5.0
* 17.000	+XXXXX	5	10	5.0	10.0
* 19.000	+XXXXX	5	15	5.0	15.0
* 21.000	+X	1	16	1.0	16.0
* 23.000	+XXXX	4	20	4.0	20.0
* 25.000	+XXXXXXXX	8	28	8.0	28.0
* 27.000	+XXXX	4	32	4.0	32.0
* 29.000	+XXXXXX	6	38	6.0	38.0
* 31.000	+XXXXXXXXXX	10	48	10.0	48.0
* 33.000	+XXX	3	51	3.0	51.0
* 35.000	+XXXX	4	55	4.0	55.0
* 37.000	+XXXXX	5	60	5.0	60.0
* 39.000	+XXXXXX	6	66	6.0	66.0
* 41.000	+XXXXXXXXX	9	75	9.0	75.0
* 43.000	+XXX	3	78	3.0	78.0
* 45.000	+XXX	3	81	3.0	81.0
* 47.000	+XXX	3	84	3.0	84.0
* 49.000	+XXX	3	87	3.0	87.0
* 51.000	+XX	2	89	2.0	89.0
* 53.000	+XX	2	91	2.0	91.0
* 55.000	+XX	2	93	2.0	93.0
* 57.000	+X	1	94	1.0	94.0
* 59.000	+X	1	95	1.0	95.0
* 61.000	+X	1	96	1.0	96.0
* 63.000	+XX	2	98	2.0	98.0
* 65.000	+	0	98	.0	98.0
* 67.000	+	0	98	.0	98.0
* 69.000	+	0	98	.0	98.0
* 71.000	+	0	98	.0	98.0
* 73.000	+	0	98	.0	98.0
* 75.000	+	0	98	.0	98.0
*LAST	+XX	2	100	2.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 12 HIPFLEX

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	12.472	3.394

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
* 1.0000	+	0	0	.0	.0
* 1.5000	+	0	0	.0	.0
* 2.0000	+	0	0	.0	.0
* 2.5000	+	0	0	.0	.0
* 3.0000	+	0	0	.0	.0
* 3.5000	+	0	0	.0	.0
* 4.0000	+X	1	1	1.0	1.0
* 4.5000	+X	1	2	1.0	2.0
* 5.0000	+X	1	3	1.0	3.0
* 5.5000	+	0	3	.0	3.0
* 6.0000	+XX	2	5	2.0	5.0
* 6.5000	+X	1	6	1.0	5.9
* 7.0000	+	0	6	.0	5.9
* 7.5000	+XXX	3	9	3.0	8.9
* 8.0000	+XXX	3	12	3.0	11.9
* 8.5000	+	0	12	.0	11.9
* 9.0000	+XXX	3	15	3.0	14.9
* 9.5000	+XXXXXX	6	21	5.9	20.8
* 10.000	+XXX	3	24	3.0	23.8
* 10.500	+XXXXXX	6	30	5.9	29.7
* 11.000	+XX	2	32	2.0	31.7
* 11.500	+XXX	3	35	3.0	34.7
* 12.000	+XXXXXXXXXXX	11	46	10.9	45.5
* 12.500	+XXXXXXXXXX	10	56	9.9	55.4
* 13.000	+XXX	3	59	3.0	58.4
* 13.500	+XXXXXX	6	65	5.9	64.4
* 14.000	+XXXXX	5	70	5.0	69.3
* 14.500	+XXXX	4	74	4.0	73.3
* 15.000	+XXXXXXX	7	81	6.9	80.2
* 15.500	+XXXX	4	85	4.0	84.2
* 16.000	+X	1	86	1.0	85.1
* 16.500	+XXXXXX	6	92	5.9	91.1
* 17.000	+X	1	93	1.0	92.1
* 17.500	+XXX	3	96	3.0	95.0
* 18.000	+X	1	97	1.0	96.0
* 18.500	+	0	97	.0	96.0
* 19.000	+XX	2	99	2.0	98.0
* 19.500	+	0	99	.0	98.0
* 20.000	+X	1	100	1.0	99.0
* 20.500	+	0	100	.0	99.0
* 21.000	+X	1	101	1.0	100.0
* 21.500	+	0	101	.0	100.0
* 22.000	+	0	101	.0	100.0
* 22.500	+	0	101	.0	100.0
* 23.000	+	0	101	.0	100.0
* 23.500	+	0	101	.0	100.0
* 24.000	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 13 LONGJP

SYMBOL	COUNT	MEAN	ST.DEV.
X	99	83.202	8.970

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 44.000	+	0	0	.0	.0
# 46.000	+	0	0	.0	.0
# 48.000	+	0	0	.0	.0
# 50.000	+	0	0	.0	.0
# 52.000	+	0	0	.0	.0
# 54.000	+	0	0	.0	.0
# 56.000	+	0	0	.0	.0
# 58.000	+	0	0	.0	.0
# 60.000	+	0	0	.0	.0
# 62.000	+X	1	1	1.0	1.0
# 64.000	+XX	2	3	2.0	3.0
# 66.000	+XXX	3	6	3.0	6.1
# 68.000	+X	1	7	1.0	7.1
# 70.000	+X	1	8	1.0	8.1
# 72.000	+XXXXX	5	13	5.1	13.1
# 74.000	+XXXXXX	6	19	6.1	19.2
# 76.000	+XXXXX	5	24	5.1	24.2
# 78.000	+XXXXX	5	29	5.1	29.3
# 80.000	+XXXXXXXXX	9	38	9.1	38.4
# 82.000	+XXXXXXXXX	9	47	9.1	47.5
# 84.000	+XXXXXX	6	53	6.1	53.5
# 86.000	+XXXX	4	57	4.0	57.6
# 88.000	+XXXXXXXXX	9	66	9.1	66.7
# 90.000	+XXXXXXXXXXX	12	78	12.1	78.8
# 92.000	+XXXXXXX	7	85	7.1	85.9
# 94.000	+XXXXX	5	90	5.1	90.9
# 96.000	+XXXXX	5	95	5.1	96.0
# 98.000	+XX	2	97	2.0	98.0
# 100.00	+X	1	98	1.0	99.0
# 102.00	+X	1	99	1.0	100.0
# 104.00	+	0	99	.0	100.0
# 106.00	+	0	99	.0	100.0
# 108.00	+	0	99	.0	100.0
# 110.00	+	0	99	.0	100.0
# 112.00	+	0	99	.0	100.0
#LAST	+	0	99	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 14 GRIPRT

SYMBOL	COUNT	MEAN	ST.DEV.
X	97	37.820	8.451

INTERVAL NAME		FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
* 18.000	+XX	2	2	2.1	2.1
* 20.000	+X	1	3	1.0	3.1
* 22.000	+	0	3	.0	3.1
* 24.000	+XXXX	4	7	4.1	7.2
* 26.000	+XXX	3	10	3.1	10.3
* 28.000	+XXXX	4	14	4.1	14.4
* 30.000	+XXX	3	17	3.1	17.5
* 32.000	+XXXXXXXX	8	25	8.2	25.8
* 34.000	+XXXX	4	29	4.1	29.9
* 36.000	+XXXXXXXXX	10	39	10.3	40.2
* 38.000	+XXXXXXX	7	46	7.2	47.4
* 40.000	+XXXXXXXXXXXXX	14	60	14.4	61.9
* 42.000	+XXXXXXXXXXXXXX	15	75	15.5	77.3
* 44.000	+XXXX	4	79	4.1	81.4
* 46.000	+XXXXXXX	7	86	7.2	88.7
* 48.000	+XXXX	4	90	4.1	92.8
* 50.000	+XX	2	92	2.1	94.8
* 52.000	+XXX	3	95	3.1	97.9
* 54.000	+	0	95	.0	97.9
* 56.000	+X	1	96	1.0	99.0
* 58.000	+	0	96	.0	99.0
* 60.000	+	0	96	.0	99.0
* 62.000	+	0	96	.0	99.0
* 64.000	+X	1	97	1.0	100.0
* 66.000	+	0	97	.0	100.0
* 68.000	+	0	97	.0	100.0
* 70.000	+	0	97	.0	100.0
* 72.000	+	0	97	.0	100.0
* 74.000	+	0	97	.0	100.0
* 76.000	+	0	97	.0	100.0
* 78.000	+	0	97	.0	100.0
* 80.000	+	0	97	.0	100.0
* 82.000	+	0	97	.0	100.0
* 84.000	+	0	97	.0	100.0
* 86.000	+	0	97	.0	100.0
* 88.000	+	0	97	.0	100.0
#LAST	+	0	97	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 15 GRIPLT

SYMBOL	COUNT	MEAN	ST.DEV.
X	97	36.189	8.088

INTERVAL NAME		FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 18.000	+XXX	3	3	3.1	3.1
# 20.000	+	0	3	.0	3.1
# 22.000	+XX	2	5	2.1	5.2
# 24.000	+XX	2	7	2.1	7.2
# 26.000	+XXX	3	10	3.1	10.3
# 28.000	+XXXXXXX	7	17	7.2	17.5
# 30.000	+XXX	3	20	3.1	20.6
# 32.000	+XXXXXX	6	26	6.2	26.8
# 34.000	+XXXXXXXXXX	11	37	11.3	38.1
# 36.000	+XXXXXXXXXXXXXXXX	17	54	17.5	55.7
# 38.000	+XXXXXX	6	60	6.2	61.9
# 40.000	+XXXXXXXX	8	68	8.2	70.1
# 42.000	+XXXXXXXXXXX	12	80	12.4	82.5
# 44.000	+XXXXXXX	7	87	7.2	89.7
# 46.000	+XX	2	89	2.1	91.8
# 48.000	+XX	2	91	2.1	93.8
# 50.000	+XXX	3	94	3.1	96.9
# 52.000	+X	1	95	1.0	97.9
# 54.000	+	0	95	.0	97.9
# 56.000	+X	1	96	1.0	99.0
# 58.000	+X	1	97	1.0	100.0
# 60.000	+	0	97	.0	100.0
# 62.000	+	0	97	.0	100.0
# 64.000	+	0	97	.0	100.0
# 66.000	+	0	97	.0	100.0
# 68.000	+	0	97	.0	100.0
# 70.000	+	0	97	.0	100.0
# 72.000	+	0	97	.0	100.0
# 74.000	+	0	97	.0	100.0
# 76.000	+	0	97	.0	100.0
# 78.000	+	0	97	.0	100.0
# 80.000	+	0	97	.0	100.0
# 82.000	+	0	97	.0	100.0
# 84.000	+	0	97	.0	100.0
# 86.000	+	0	97	.0	100.0
# 88.000	+	0	97	.0	100.0
#LAST	+	0	97	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 16 PULLD

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	109.220	14.791

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 40.000	+	0	0	.0	.0
# 45.000	+	0	0	.0	.0
# 50.000	+	0	0	.0	.0
# 55.000	+	0	0	.0	.0
# 60.000	+	0	0	.0	.0
# 65.000	+	0	0	.0	.0
# 70.000	+	0	0	.0	.0
# 75.000	+	0	0	.0	.0
# 80.000	+	0	0	.0	.0
# 85.000	+XXX	3	3	3.0	3.0
# 90.000	+XXXX	4	7	4.0	7.0
# 95.000	+XXXXXXXXXXXXXXXXX	17	24	17.0	24.0
# 100.00	+XXXXXXX	7	31	7.0	31.0
# 105.00	+XXXXXXXX	8	39	8.0	39.0
# 110.00	+XXXXXXXXXXX	12	51	12.0	51.0
# 115.00	+XXXXXXXXXXXXXX	15	66	15.0	66.0
# 120.00	+XXXXXXXXXXXXXXXXX	18	84	18.0	84.0
# 125.00	+XXXXX	5	89	5.0	89.0
# 130.00	+XXXX	4	93	4.0	93.0
# 135.00	+XXX	3	96	3.0	96.0
# 140.00	+XXX	3	99	3.0	99.0
# 145.00	+	0	99	.0	99.0
# 150.00	+	0	99	.0	99.0
# 155.00	+	0	99	.0	99.0
# 160.00	+	0	99	.0	99.0
# 165.00	+	0	99	.0	99.0
# 170.00	+	0	99	.0	99.0
# 175.00	+X	1	100	1.0	100.0
# 180.00	+	0	100	.0	100.0
# 185.00	+	0	100	.0	100.0
# 190.00	+	0	100	.0	100.0
# 195.00	+	0	100	.0	100.0
# 200.00	+	0	100	.0	100.0
# 205.00	+	0	100	.0	100.0
# 210.00	+	0	100	.0	100.0
#LAST	+	0	100	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 39 STRENGTH

SYMBOL	COUNT	MEAN	ST.DEV.
X	98	182.039	26.827

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
< 105.00	+	0	0	.0	.0
< 110.00	+X	1	1	1.0	1.0
* 115.00	+	0	1	.0	1.0
* 120.00	+X	1	2	1.0	2.0
* 125.00	+	0	2	.0	2.0
* 130.00	+XXXX	4	6	4.1	6.1
* 135.00	+X	1	7	1.0	7.1
* 140.00	+	0	7	.0	7.1
* 145.00	+	0	7	.0	7.1
* 150.00	+XX	2	9	2.0	9.2
* 155.00	+XXXX	4	13	4.1	13.3
* 160.00	+XXXXXX	6	19	6.1	19.4
* 165.00	+XXXX	4	23	4.1	23.5
* 170.00	+XXXXX	5	28	5.1	28.6
* 175.00	+XXXXXX	6	34	6.1	34.7
* 180.00	+XXXXXXXXXXXXXX	15	49	15.3	50.0
* 185.00	+XXXXX	5	54	5.1	55.1
* 190.00	+XXXXXXXX	8	62	8.2	63.3
* 195.00	+XXXXXXXX	8	70	8.2	71.4
* 200.00	+XXXXXXXX	8	78	8.2	79.6
* 205.00	+XXXX	4	82	4.1	83.7
* 210.00	+XX	2	84	2.0	85.7
* 215.00	+XX	2	86	2.0	87.8
* 220.00	+XXXXXX	6	92	6.1	93.9
* 225.00	+XX	2	94	2.0	95.9
* 230.00	+XX	2	96	2.0	98.0
* 235.00	+X	1	97	1.0	99.0
* 240.00	+	0	97	.0	99.0
* 245.00	+	0	97	.0	99.0
* 250.00	+	0	97	.0	99.0
* 255.00	+	0	97	.0	99.0
* 260.00	+	0	97	.0	99.0
* 265.00	+	0	97	.0	99.0
* 270.00	+	0	97	.0	99.0
* 275.00	+X	1	98	1.0	100.0
* 280.00	+	0	98	.0	100.0
* 285.00	+	0	98	.0	100.0
* 290.00	+	0	98	.0	100.0
* 295.00	+	0	98	.0	100.0
* 300.00	+	0	98	.0	100.0
>LAST	+	0	98	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 30 TMILL

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	9.309	1.003

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 5.5000	+X	1	1	1.0	1.0
# 5.7500	+	0	1	.0	1.0
# 6.0000	+	0	1	.0	1.0
# 6.2500	+X	1	2	1.0	2.0
# 6.5000	+	0	2	.0	2.0
# 6.7500	+	0	2	.0	2.0
# 7.0000	+XX	2	4	2.0	4.0
# 7.2500	+XXXXXXX	7	11	6.9	10.9
# 7.5000	+XXXX	4	15	4.0	14.9
# 7.7500	+XXXX	4	19	4.0	18.8
# 8.0000	+XXXXX	5	24	5.0	23.8
# 8.2500	+XX	2	26	2.0	25.7
# 8.5000	+XXXXXXXXXX	10	36	9.9	35.6
# 8.7500	+XXX	3	39	3.0	38.6
# 9.0000	+XXXX	4	43	4.0	42.6
# 9.2500	+XXXX	4	47	4.0	46.5
# 9.5000	+XXXXXXXXXX	10	57	9.9	56.4
# 9.7500	+X	1	58	1.0	57.4
# 10.000	+XXXXXXXXXX	10	68	9.9	67.3
# 10.250	+XX	2	70	2.0	69.3
# 10.500	+XXXXXXXXX	9	79	8.9	78.2
# 10.750	+XXXXX	5	84	5.0	83.2
# 11.000	+XXXX	4	88	4.0	87.1
# 11.250	+XXXX	4	92	4.0	91.1
# 11.500	+X	1	93	1.0	92.1
# 11.750	+	0	93	.0	92.1
# 12.000	+XXX	3	96	3.0	95.0
# 12.250	+XX	2	98	2.0	97.0
# 12.500	+	0	98	.0	97.0
# 12.750	+X	1	99	1.0	98.0
# 13.000	+XX	2	101	2.0	100.0
# 13.250	+	0	101	.0	100.0
# 13.500	+	0	101	.0	100.0
# 13.750	+	0	101	.0	100.0
# 14.000	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 32 RISKO

SYMBOL	COUNT	MEAN	ST.DEV.
X	101	23.257	4.651

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 12.000	+	0	0	.0	.0
# 13.000	+	0	0	.0	.0
# 14.000	+X	1	1	1.0	1.0
# 15.000	+	0	1	.0	1.0
# 16.000	+XXXX	4	5	4.0	5.0
# 17.000	+XXX	3	8	3.0	7.9
# 18.000	+XXXXXXXX	8	16	7.9	15.8
# 19.000	+XXXXXXXXX	9	25	8.9	24.8
# 20.000	+XXXXXXXXXX	10	35	9.9	34.7
# 21.000	+X	1	36	1.0	35.6
# 22.000	+XXXXXXXXXXXXXX	14	50	13.9	49.5
# 23.000	+XXXXXXX	7	57	6.9	56.4
# 24.000	+XXXXX	5	62	5.0	61.4
# 25.000	+XXXXXXX	7	69	6.9	68.3
# 26.000	+XXXXXXXX	8	77	7.9	76.2
# 27.000	+XXXXXX	6	83	5.9	82.2
# 28.000	+XXXXX	5	88	5.0	87.1
# 29.000	+XX	2	90	2.0	89.1
# 30.000	+XX	2	92	2.0	91.1
# 31.000	+XXXXX	5	97	5.0	96.0
# 32.000	+	0	97	.0	96.0
# 33.000	+XX	2	99	2.0	98.0
# 34.000	+X	1	100	1.0	99.0
# 35.000	+	0	100	.0	99.0
# 36.000	+	0	100	.0	99.0
# 37.000	+X	1	101	1.0	100.0
# 38.000	+	0	101	.0	100.0
# 39.000	+	0	101	.0	100.0
# 40.000	+	0	101	.0	100.0
# 41.000	+	0	101	.0	100.0
# 42.000	+	0	101	.0	100.0
# 43.000	+	0	101	.0	100.0
# 44.000	+	0	101	.0	100.0
#LAST	+	0	101	.0	100.0
	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80				

HISTOGRAM OF VARIABLE 33 FITSCOR

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	35.290	13.627

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
[illegible]	+X	1	1	1.0	1.0
[illegible]	+	0	1	.0	1.0
[illegible]	+XX	2	3	2.0	3.0
12.000	+	0	3	.0	3.0
14.000	+X	1	4	1.0	4.0
16.000	+XXXX	4	8	4.0	8.0
18.000	+XX	2	10	2.0	10.0
20.000	+XXXXXX	6	16	6.0	16.0
22.000	+X	1	17	1.0	17.0
24.000	+XXXXXXXXX	9	26	9.0	26.0
26.000	+XXXXX	5	31	5.0	31.0
28.000	+XXXX	4	35	4.0	35.0
30.000	+XXXXXXXX	8	43	8.0	43.0
32.000	+X	1	44	1.0	44.0
34.000	+XXXXXXXX	8	52	8.0	52.0
[illegible]	+XXX	3	55	3.0	55.0
38.000	+XXXX	4	59	4.0	59.0
40.000	+XXXXXX	6	65	6.0	65.0
42.000	+X	1	66	1.0	66.0
44.000	+XXXX	4	70	4.0	70.0
46.000	+XXX	3	73	3.0	73.0
[illegible]	+XXXXX	5	78	5.0	78.0
50.000	+XXXXXX	6	84	6.0	84.0
52.000	+XXX	3	87	3.0	87.0
54.000	+XXXXX	5	92	5.0	92.0
56.000	+XX	2	94	2.0	94.0
58.000	+XXX	3	97	3.0	97.0
60.000	+	0	97	.0	97.0
62.000	+XXX	3	100	3.0	100.0
64.000	+	0	100	.0	100.0
66.000	+	0	100	.0	100.0
HIGHER	+	0	100	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 34 CHOL

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	190.190	30.190

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 110.00	+X	1	1	1.0	1.0
# 115.00	+	0	1	.0	1.0
# 120.00	+	0	1	.0	1.0
# 125.00	+	0	1	.0	1.0
# 130.00	+XX	2	3	2.0	3.0
# 135.00	+XX	2	5	2.0	5.0
# 140.00	+X	1	6	1.0	6.0
# 145.00	+	0	6	.0	6.0
# 150.00	+XXX	3	9	3.0	9.0
# 155.00	+XXXXX	5	14	5.0	14.0
# 160.00	+XXX	3	17	3.0	17.0
# 165.00	+XXXXXX	6	23	6.0	23.0
# 170.00	+XXXXXX	6	29	6.0	29.0
# 175.00	+XXXXXX	6	35	6.0	35.0
# 180.00	+XXX	3	38	3.0	38.0
# 185.00	+XXXXX	5	43	5.0	43.0
# 190.00	+XXXX	4	47	4.0	47.0
# 195.00	+XXXXX	5	52	5.0	52.0
# 200.00	+XXXXX	5	57	5.0	57.0
# 205.00	+XXXXXXXXXX	10	67	10.0	67.0
# 210.00	+XX	2	69	2.0	69.0
# 215.00	+XXXX	4	73	4.0	73.0
# 220.00	+XXXXX	5	78	5.0	78.0
# 225.00	+XXXX	4	82	4.0	82.0
# 230.00	+XXXX	4	86	4.0	86.0
# 235.00	+XXX	3	89	3.0	89.0
# 240.00	+XXXX	4	93	4.0	93.0
# 245.00	+XX	2	95	2.0	95.0
# 250.00	+X	1	96	1.0	96.0
# 255.00	+X	1	97	1.0	97.0
# 260.00	+	0	97	.0	97.0
# 265.00	+X	1	98	1.0	98.0
# 270.00	+	0	98	.0	98.0
# 275.00	+	0	98	.0	98.0
# 280.00	+	0	98	.0	98.0
# 285.00	+	0	98	.0	98.0
# 290.00	+	0	98	.0	98.0
# 295.00	+	0	98	.0	98.0
# 300.00	+X	1	99	1.0	99.0
# 305.00	+	0	99	.0	99.0
# 310.00	+X	1	100	1.0	100.0
#LAST	+	0	100	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 35 URIC

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	6.055	1.390

INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
< 3.0000	+	0	0	.0	.0
< 3.2500	+X	1	1	1.0	1.0
< 3.5000	+	0	1	.0	1.0
< 3.7500	+	0	1	.0	1.0
< 4.0000	+X	1	2	1.0	2.0
< 4.2500	+XXXX	4	6	4.0	6.0
< 4.5000	+XXXX	4	10	4.0	10.0
< 4.7500	+X	1	11	1.0	11.0
< 5.0000	+XXXXXXXXXXX	12	23	12.0	23.0
< 5.2500	+XXXXXX	6	29	6.0	29.0
< 5.5000	+XXXXXXXXXX	11	40	11.0	40.0
< 5.7500	+XXXX	4	44	4.0	44.0
< 6.0000	+XXXXXXXXX	9	53	9.0	53.0
< 6.2500	+XXXXXX	6	59	6.0	59.0
< 6.5000	+XXXXXXXXXX	11	70	11.0	70.0
< 6.7500	+XXXXX	5	75	5.0	75.0
< 7.0000	+XXXXXX	6	81	6.0	81.0
< 7.2500	+XXXXXXX	7	88	7.0	88.0
< 7.5000	+XXX	3	91	3.0	91.0
< 7.7500	+XX	2	93	2.0	93.0
< 8.0000	+XXXX	4	97	4.0	97.0
< 8.2500	+X	1	98	1.0	98.0
< 8.5000	+	0	98	.0	98.0
< 8.7500	+	0	98	.0	98.0
< 9.0000	+	0	98	.0	98.0
< 9.2500	+	0	98	.0	98.0
< 9.5000	+	0	98	.0	98.0
< 9.7500	+	0	98	.0	98.0
< 10.000	+X	1	99	1.0	99.0
< 10.250	+	0	99	.0	99.0
< 10.500	+	0	99	.0	99.0
< 10.750	+	0	99	.0	99.0
< 11.000	+	0	99	.0	99.0
< 11.250	+	0	99	.0	99.0
< 11.500	+	0	99	.0	99.0
< 11.750	+	0	99	.0	99.0
< 12.000	+	0	99	.0	99.0
< 12.250	+	0	99	.0	99.0
< 12.500	+	0	99	.0	99.0
< 12.750	+	0	99	.0	99.0
< 13.000	+	0	99	.0	99.0
< 13.250	+	0	99	.0	99.0
< 13.500	+	0	99	.0	99.0
< 13.750	+	0	99	.0	99.0
< 14.000	+	0	99	.0	99.0
< 14.250	+X	1	100	1.0	100.0
< 14.500	+	0	100	.0	100.0
>LAST	+	0	100	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 36 GLUC

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	71.970	10.901

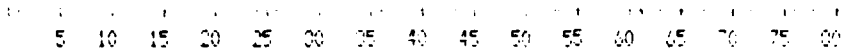
INTERVAL NAME	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
# 40.000	+	0	0	.0	.0
# 44.000	+	0	0	.0	.0
# 48.000	+	0	0	.0	.0
# 52.000	+	0	0	.0	.0
# 56.000	+	0	0	.0	.0
# 60.000	+	0	0	.0	.0
# 64.000	+	0	0	.0	.0
# 68.000	+	0	0	.0	.0
# 72.000	+X	1	1	1.0	1.0
# 76.000	+XXX	3	4	3.0	4.0
# 80.000	+XXXXXXXXX	9	13	9.0	13.0
# 84.000	+XX	2	15	2.0	15.0
# 88.000	+XXXXXXXXXXXXXXXXXX	18	33	18.0	33.0
# 92.000	+XXXXXXXXXXXXXXXXXXXXXXXXXX	26	59	26.0	59.0
# 96.000	+XXXXXXXXXXXXXXXXXXX	19	78	19.0	78.0
# 100.00	+XXXXXXXXXX	10	88	10.0	88.0
# 104.00	+XXXX	4	92	4.0	92.0
# 108.00	+X	1	93	1.0	93.0
# 112.00	+XXX	3	96	3.0	96.0
# 116.00	+XX	2	98	2.0	98.0
# 120.00	+X	1	99	1.0	99.0
# 124.00	+	0	99	.0	99.0
# 128.00	+	0	99	.0	99.0
# 132.00	+	0	99	.0	99.0
# 136.00	+	0	99	.0	99.0
# 140.00	+	0	99	.0	99.0
#LAST	+X	1	100	1.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

HISTOGRAM OF VARIABLE 37 TRIG

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	113.730	72.205

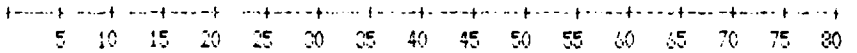
INTERVAL NAME	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
* 30.000																	0	0	.0	.0
* 35.000	+																1	1	1.0	1.0
* 40.000	+XX																2	3	2.0	3.0
* 45.000	+XXX																3	6	3.0	6.0
* 50.000	+XX																2	8	2.0	8.0
* 55.000	+X																1	9	1.0	9.0
* 60.000	+XXXX																4	13	4.0	13.0
* 65.000	+XXXXX																5	18	5.0	18.0
* 70.000	+XXXXX																5	23	5.0	23.0
* 75.000	+XXXXX																5	28	5.0	28.0
* 80.000	+XXXXX																5	33	5.0	33.0
* 85.000	+XXXXXX																6	39	6.0	39.0
* 90.000	+XXXXX																5	44	5.0	44.0
* 95.000	+XX																2	46	2.0	46.0
* 100.00	+XXXXXXXX																8	54	8.0	54.0
* 105.00	+XXXXXXXX																8	62	8.0	62.0
* 110.00	+XX																2	64	2.0	64.0
* 115.00	+XX																2	66	2.0	66.0
* 120.00	+XXXX																4	70	4.0	70.0
* 125.00	+XXX																3	73	3.0	73.0
* 130.00	+X																1	74	1.0	74.0
* 135.00	+XXX																3	77	3.0	77.0
* 140.00	+XX																2	79	2.0	79.0
* 145.00	+X																1	80	1.0	80.0
* 150.00	+XXX																3	83	3.0	83.0
* 155.00	+XXX																3	86	3.0	86.0
* 160.00	+X																1	87	1.0	87.0
* 165.00	+XX																2	89	2.0	89.0
* 170.00	+X																1	90	1.0	90.0
* 175.00	+																0	90	.0	90.0
* 180.00	+																0	90	.0	90.0
* 185.00	+																0	90	.0	90.0
* 190.00	+X																1	91	1.0	91.0
* 195.00	+X																1	92	1.0	92.0
* 200.00	+X																1	93	1.0	93.0
* 205.00	+																0	93	.0	93.0
* 210.00	+																0	93	.0	93.0
* 215.00	+																0	93	.0	93.0
* 220.00	+																0	93	.0	93.0
* 225.00	+X																1	94	1.0	94.0
* 230.00	+X																1	95	1.0	95.0
* 235.00	+																0	95	.0	95.0
* 240.00	+																0	95	.0	95.0
* 245.00	+																0	95	.0	95.0
* 250.00	+																0	95	.0	95.0
* 255.00	+																0	95	.0	95.0
* 260.00	+																0	95	.0	95.0
* 265.00	+																0	95	.0	95.0
* 270.00	+X																1	96	1.0	96.0
* 275.00	+																0	96	.0	96.0
* 280.00	+																0	96	.0	96.0
* 285.00	+																0	96	.0	96.0
* 290.00	+																0	96	.0	96.0
* 295.00	+																0	96	.0	96.0
* 300.00	+X																1	97	1.0	97.0
* 305.00	+																0	97	.0	97.0
*LAST	+XXX																3	100	3.0	100.0



HISTOGRAM OF VARIABLE 38 HDL

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	42.170	11.780

INTERVAL NAME		FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
< 14.000	+XX	2	2	2.0	2.0
< 17.000	+XXX	3	5	3.0	5.0
< 20.000	+XXXXXXX	7	12	7.0	12.0
< 23.000	+XXXXXXXX	8	20	8.0	20.0
< 26.000	+XXXXXXXXXXX	11	31	11.0	31.0
< 29.000	+XXXXXXXXXXXXXXXX	16	47	16.0	47.0
< 32.000	+XXXXXXXXXXXXXXXXXX	18	65	18.0	65.0
< 35.000	+XXXXX	5	70	5.0	70.0
< 38.000	+XXXXXXX	7	77	7.0	77.0
< 41.000	+XXX	3	80	3.0	80.0
< 44.000	+XXXXXXXX	3	83	3.0	83.0
< 47.000	+XXXX	4	87	4.0	87.0
< 50.000	+X	1	88	1.0	88.0
< 53.000	+XX	2	90	2.0	90.0
< 56.000	+X	1	91	1.0	91.0
< 59.000	+	0	91	.0	91.0
< 62.000	+XX	2	93	2.0	93.0
< 65.000	+	0	93	.0	93.0
< 68.000	+X	1	94	1.0	94.0
< 71.000	+	0	94	.0	94.0
< 74.000	+	0	94	.0	94.0
< 77.000	+	0	94	.0	94.0
< 80.000	+X	1	95	1.0	95.0
< 83.000	+	0	95	.0	95.0
< 86.000	+	0	95	.0	95.0
< 89.000	+	0	95	.0	95.0
>LAST	+	0	95	.0	95.0



HISTOGRAM OF VARIABLE 40 LIPIDROK

SYMBOL	COUNT	MEAN	ST.DEV.
X	100	1.030	.503

INTERVAL MIDPOINT		FREQUENCY INT.	FREQUENCY CUM.	PERCENTAGE INT.	PERCENTAGE CUM.
.00000	+	0	0	.0	.0
.10000	+XXXXX	5	5	5.0	5.0
.20000	+XXXXXXXXX	9	14	9.0	14.0
.30000	+XXXX	4	18	4.0	18.0
.40000	+XXXXXXXXXXXXXXX	15	33	15.0	33.0
.50000	+XXXXXX	6	39	6.0	39.0
.60000	+XXXXXXXXXXXX	12	51	12.0	51.0
.70000	+XXXXXXXXXXXXXXX	15	66	15.0	66.0
.80000	+X	1	67	1.0	67.0
.90000	+XXXXXXXX	8	75	8.0	75.0
1.0000	+X	1	76	1.0	76.0
1.1000	+XXXXXXX	7	83	7.0	83.0
1.2000	+	0	83	.0	83.0
1.3000	+XXX	3	86	3.0	86.0
1.4000	+	0	86	.0	86.0
1.5000	+	0	86	.0	86.0
1.6000	+XXXXX	5	91	5.0	91.0
1.7000	+	0	91	.0	91.0
1.8000	+XXX	3	94	3.0	94.0
1.9000	+	0	94	.0	94.0
2.0000	+	0	94	.0	94.0
2.1000	+	0	94	.0	94.0
2.2000	+	0	94	.0	94.0
2.3000	+	0	94	.0	94.0
2.4000	+	0	94	.0	94.0
2.5000	+XX	2	96	2.0	96.0
2.6000	+XX	2	98	2.0	98.0
2.7000	+	0	98	.0	98.0
2.8000	+	0	98	.0	98.0
2.9000	+	0	98	.0	98.0
3.0000	+XX	2	100	2.0	100.0
3.1000	+	0	100	.0	100.0
3.2000	+	0	100	.0	100.0
3.3000	+	0	100	.0	100.0
3.4000	+	0	100	.0	100.0
3.5000	+	0	100	.0	100.0
&LAST	+	0	100	.0	100.0

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

APPENDIX B

SCATTER PLOTS OF PERCENT FAT AS COMPARED TO VARIOUS HEALTH AND PHYSICAL FITNESS VARIABLES IN 101, U.S. NAVY PERSONNEL

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HORIZONTAL VARIABLE NO.	NAME	VERTICAL VARIABLE NO.	NAME	GROUP NAME	PLOT SYMBOL	PAGE NO.
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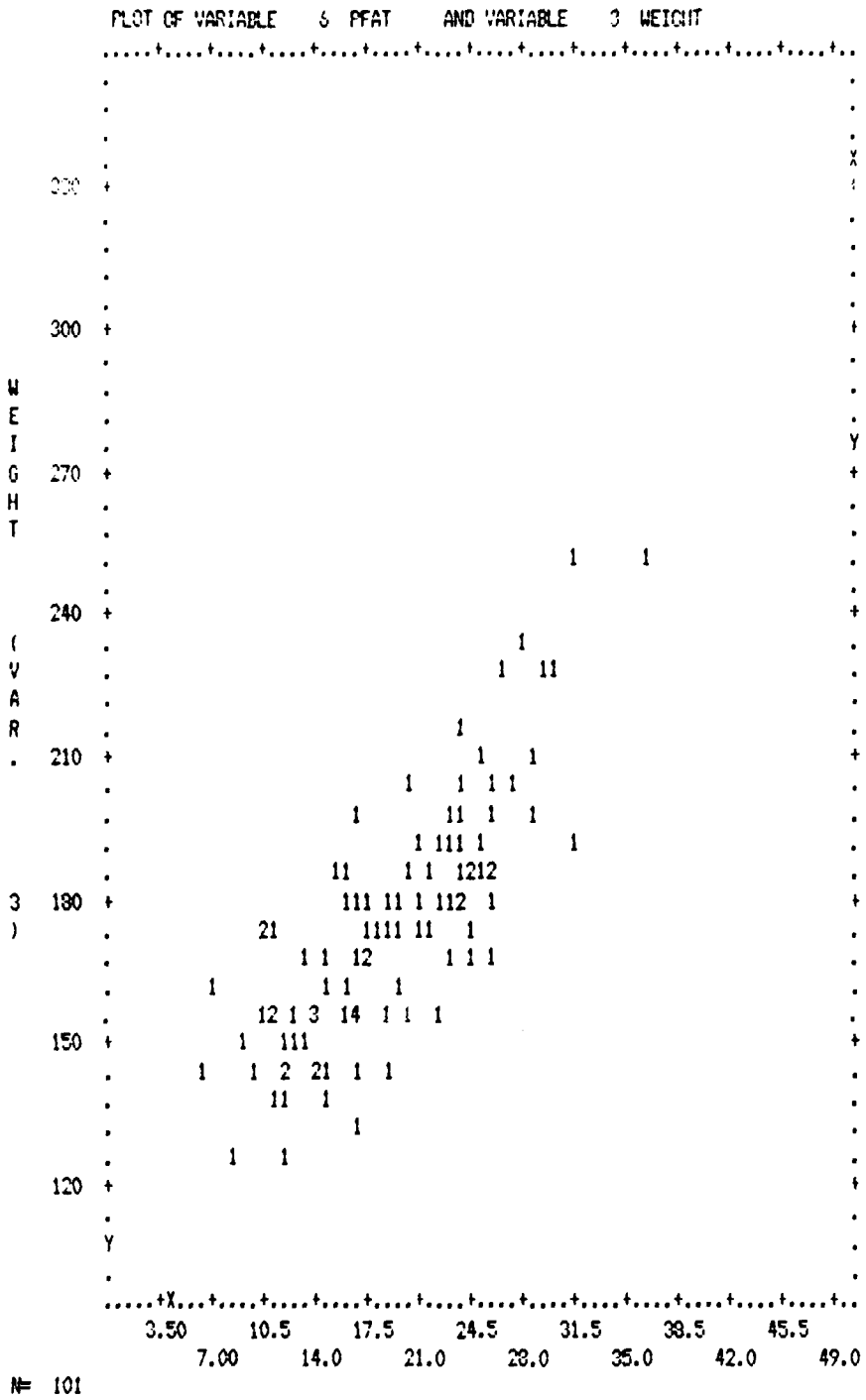
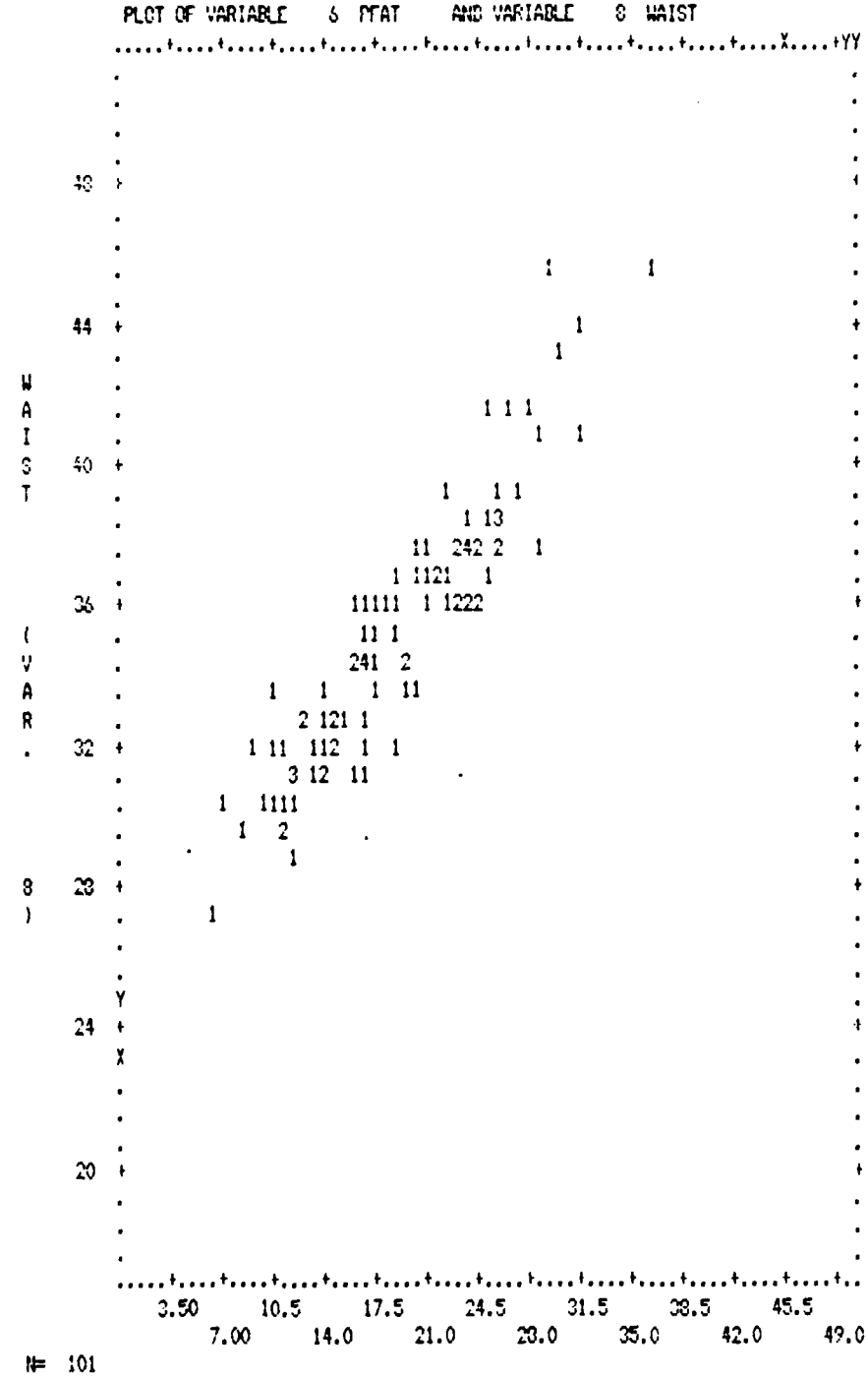
6	PFAT	8	Waist		. . . . .	3
6	PFAT	10	Pushup		. . . . .	4
6	PFAT	11	Situp		. . . . .	5
6	PFAT	12	Hipflex		. . . . .	6
6	PFAT	13	Longjump		. . . . .	7
6	PFAT	30	Treadmill		. . . . .	8
6	PFAT	32	Riski		. . . . .	9
6	PFAT	33	Fitness Score		. . . . .	10
6	PFAT	34	Cholesterol		. . . . .	11
6	PFAT	41	Muscular Endurance		. . . . .	12



N= 101
COR= .300 PFAT (VAR. 6)

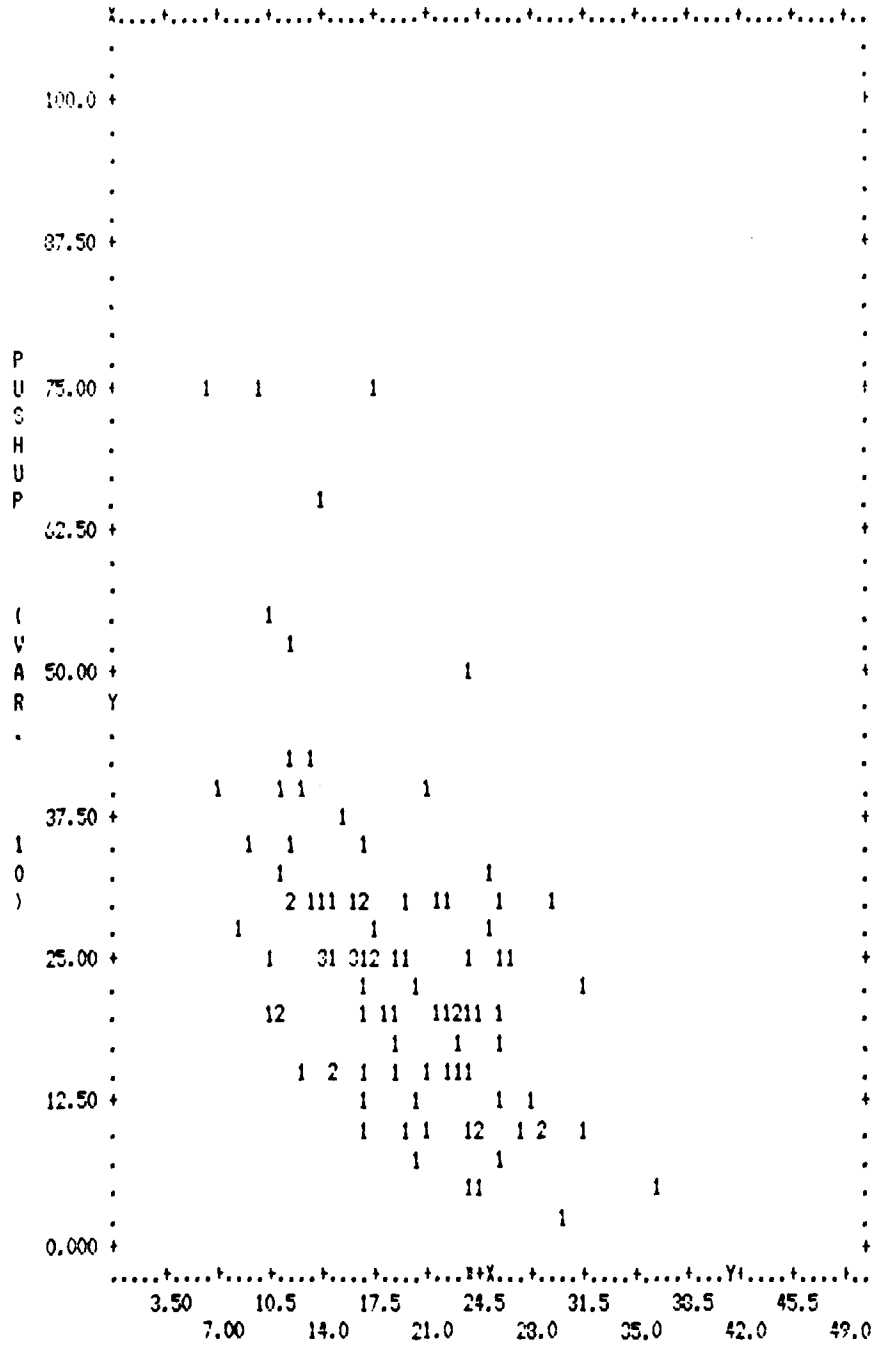
	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	17.131	6.1664	X= .19263*Y 14.440	13.800
Y	174.28	25.624	Y= 3.0262*X+ 110.65	208.29



N= 101
COR= .924

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.131	6.1664	X= 1.5612*Y-35.765	5.6033
Y	35.162	3.6500	Y= .54708*X+ 24.696	1.9635

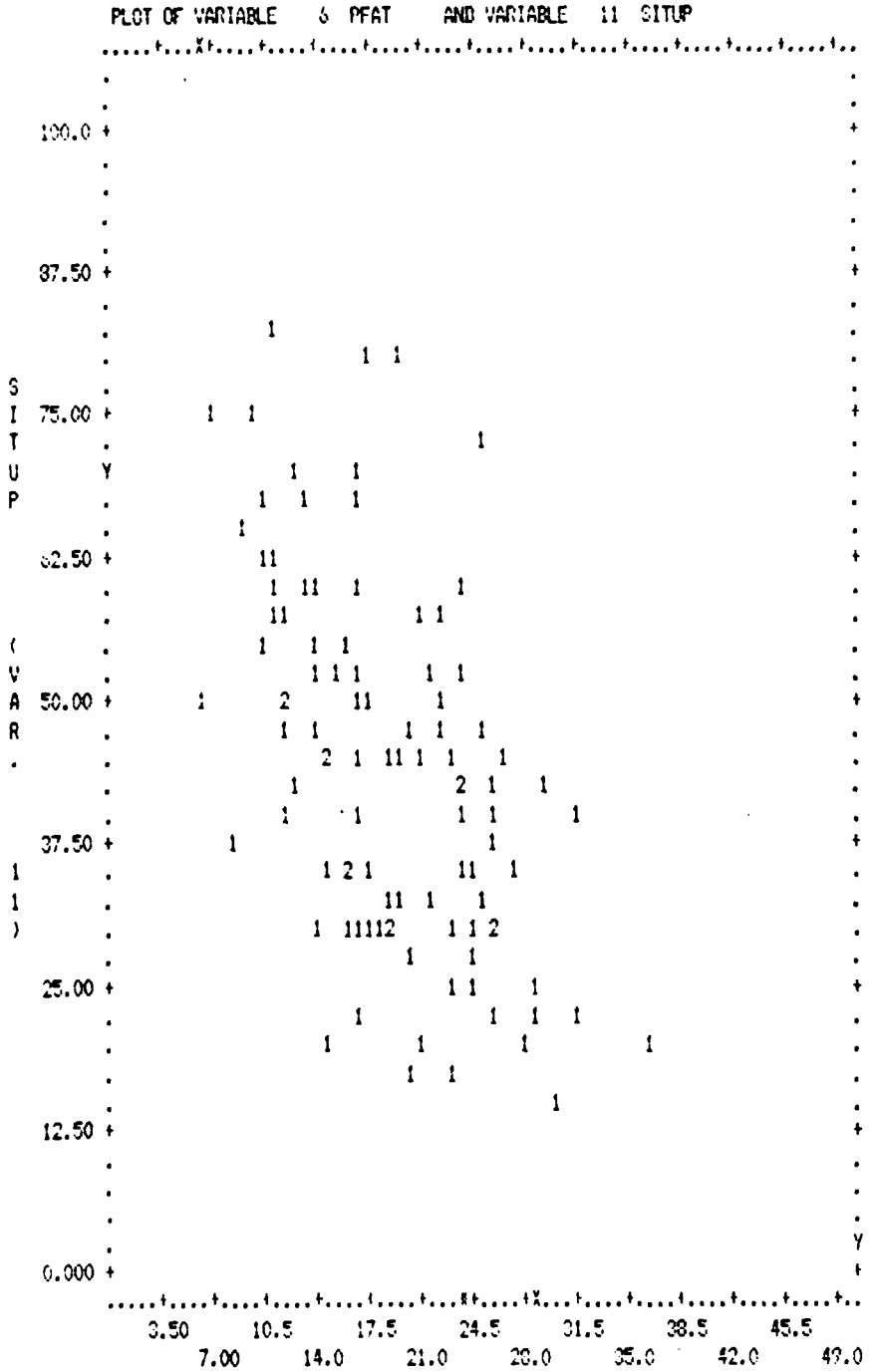
PLOT OF VARIABLE 6 PFAT AND VARIABLE 10 PUSHUP



N= 99
COR=-.533

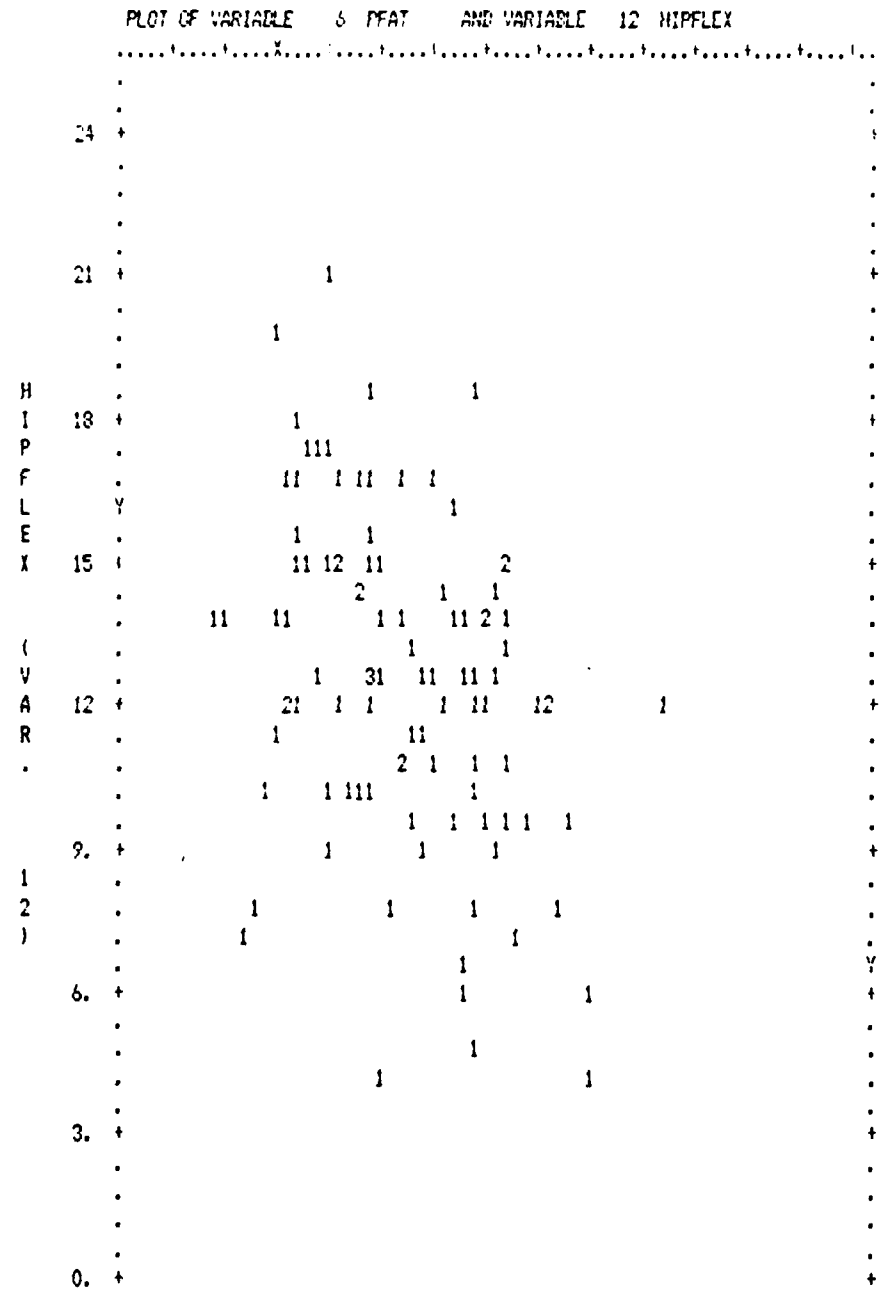
PFAT (VAR. 6)

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	12.027	6.1838	X=-.22729*Y+ 24.698	27.674
Y	24.949	14.400	Y=-1.2480*X+ 48.696	151.96



N= 100
COR=-.524

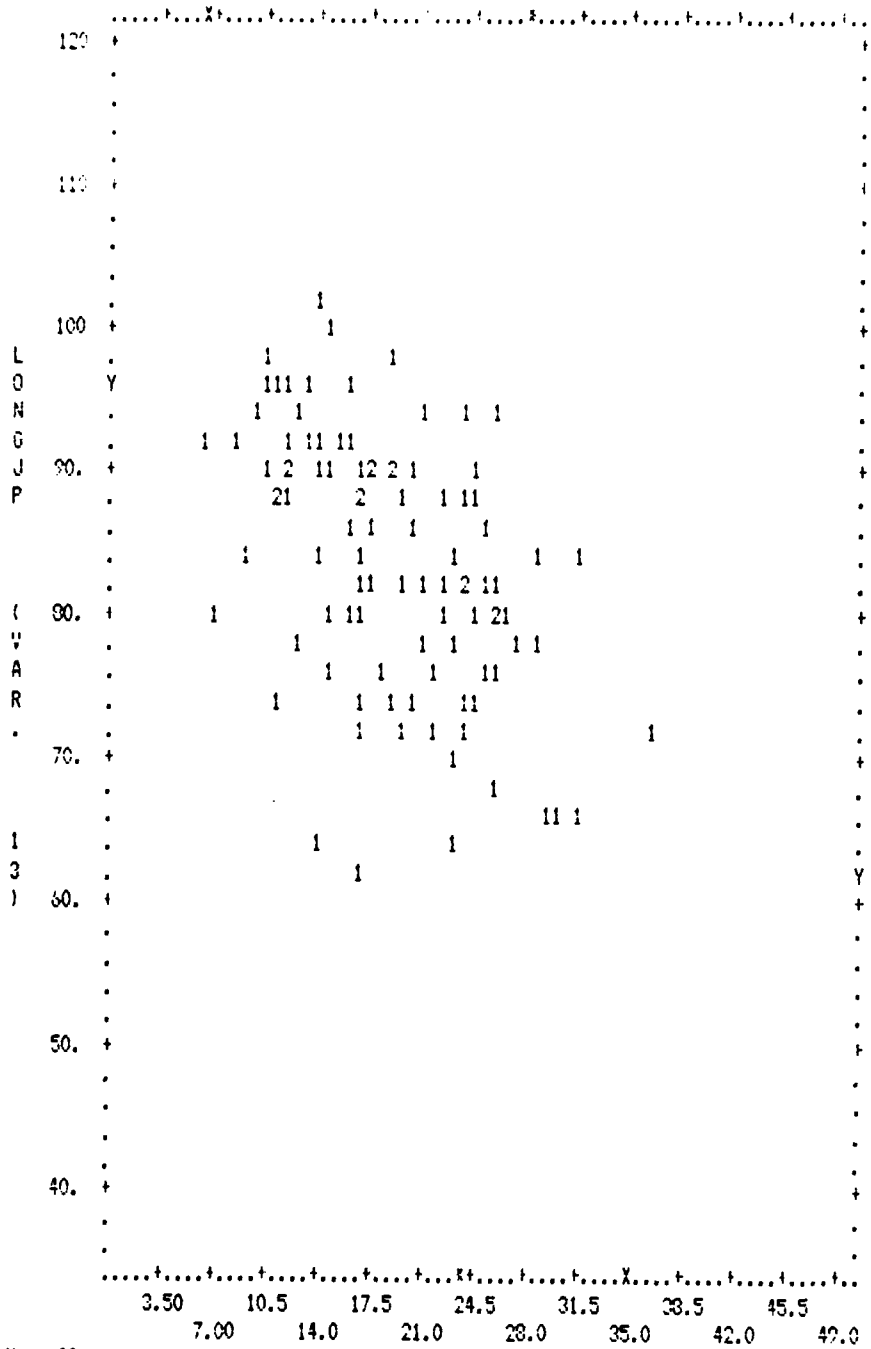
	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.086	6.1808	X=-.20272*Y+ 28.000	27.994
Y	44.000	15.970	Y=-1.3547*X+ 69.856	187.03



N= 101
COR= .352

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.131	6.1664	X=-.63964*Y+ 27.109	33.643
Y	12.472	3.3943	Y=-.19381*X+ 16.180	10.195

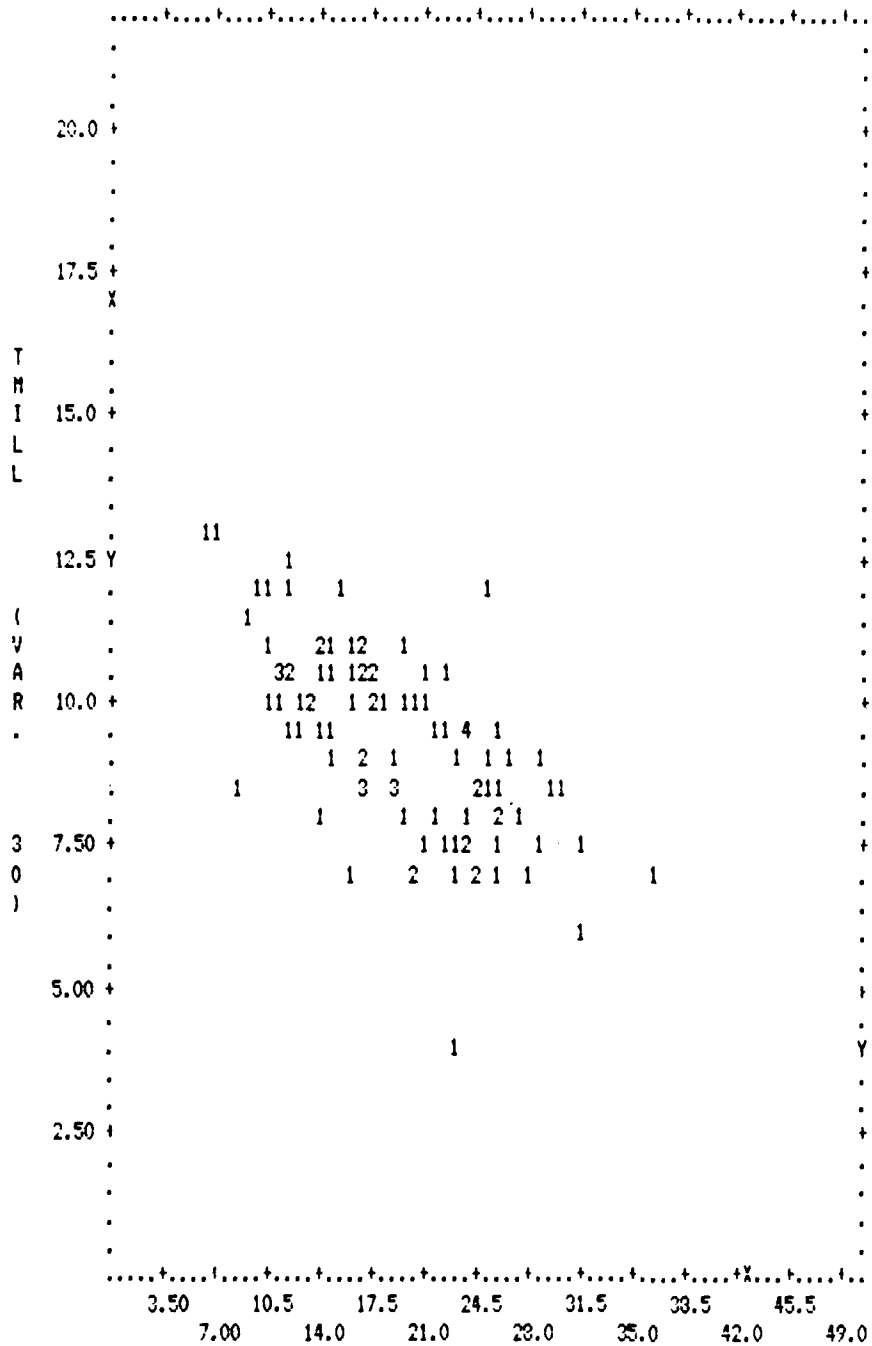
PLOT OF VARIABLE 6 PEAT AND VARIABLE 13 LONGJP



N= 99

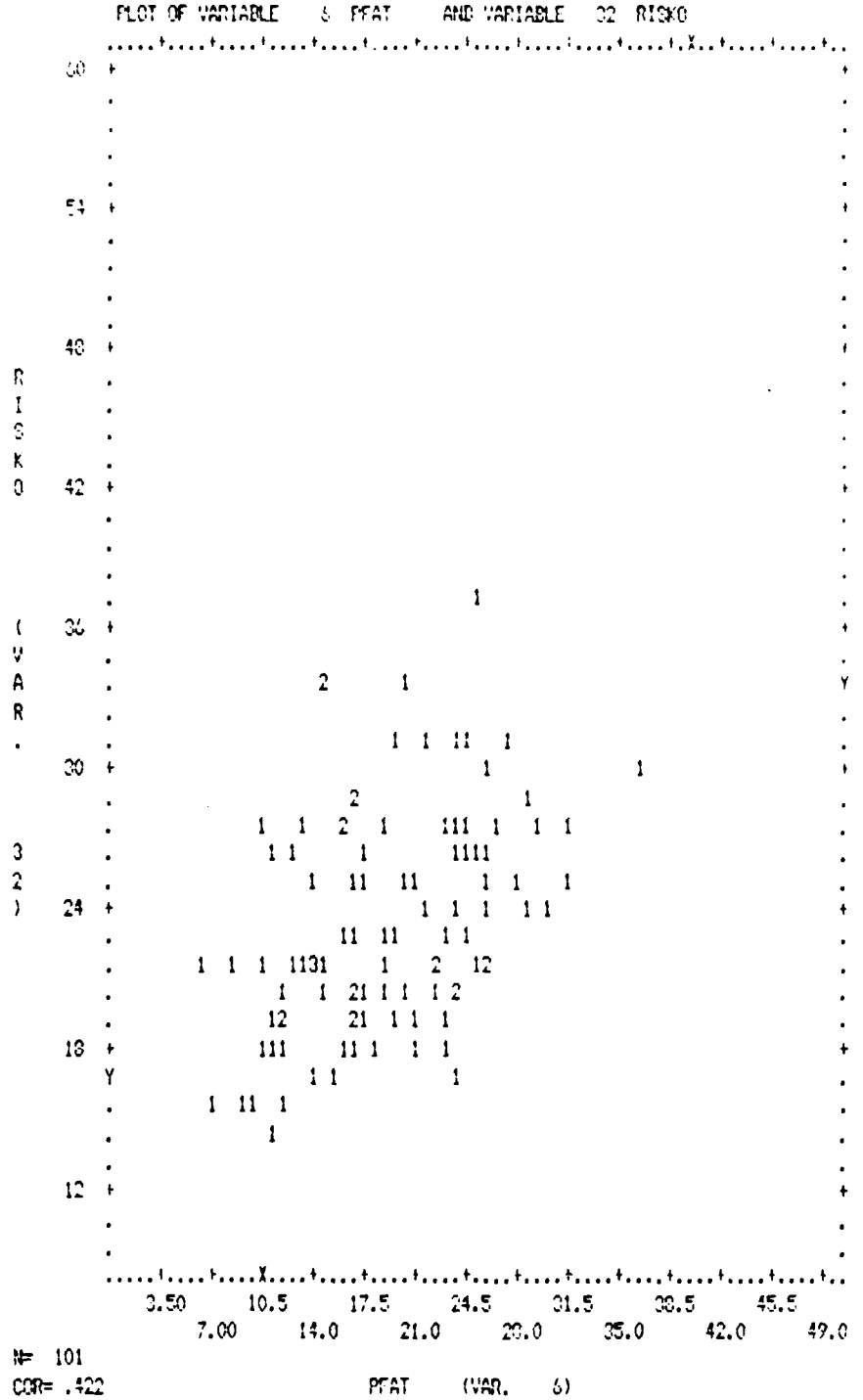
COR= .478

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	18.994	6.1421	X=-.32708*Y+ 46.208	20.416
Y	83.202	8.9705	Y=-.69748*X+ 96.454	62.746



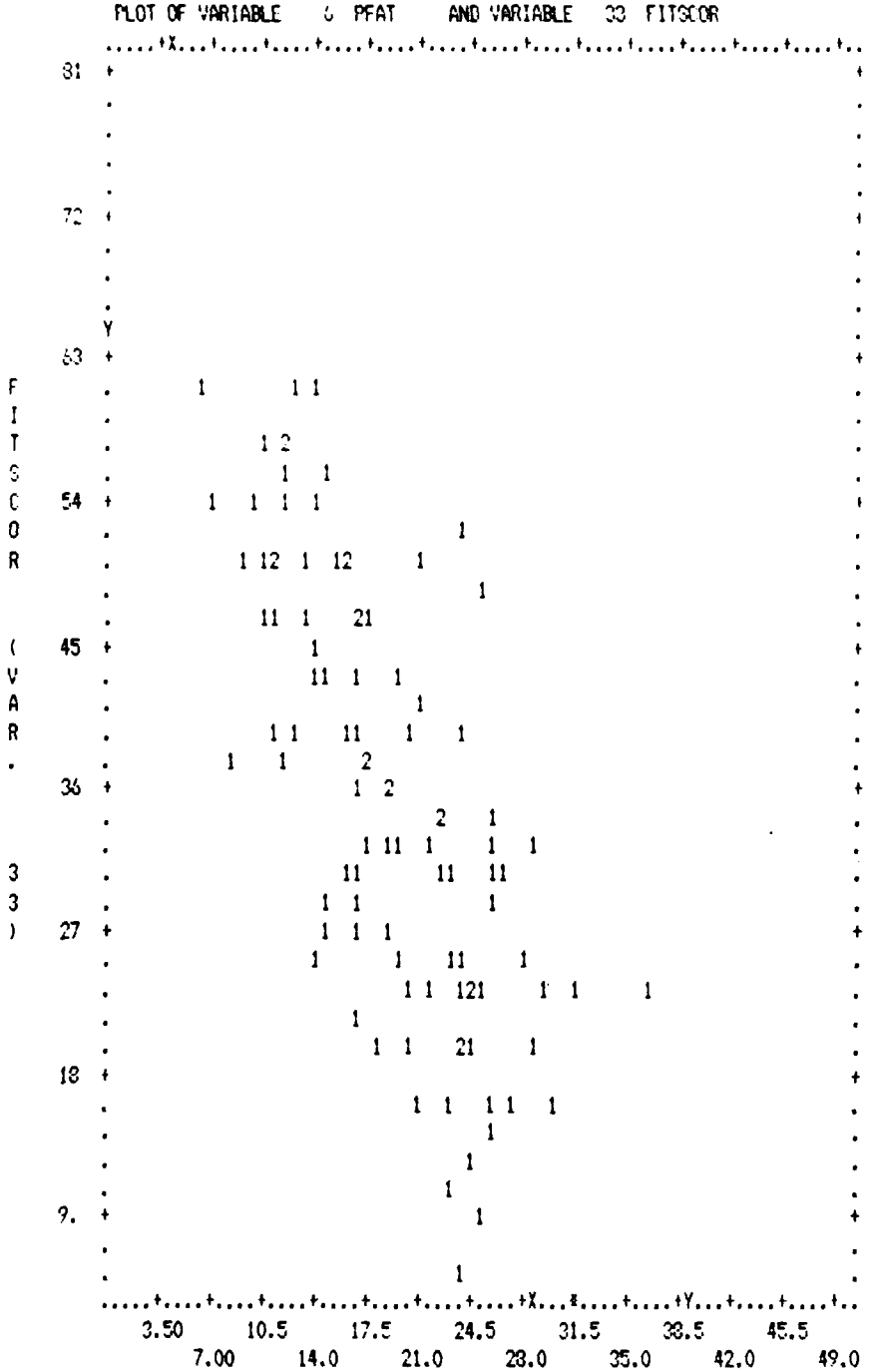
N= 101
COR= .660

	MEAN	ST.DEV.	REGRESSION LINE.	RES.MS.
X	19.131	6.1664	X=-2.5324*Y+ 42.770	21.678
Y	9.3087	1.6027	Y=-.17154*X+ 12.590	1.4643



N= 101
COR= .422

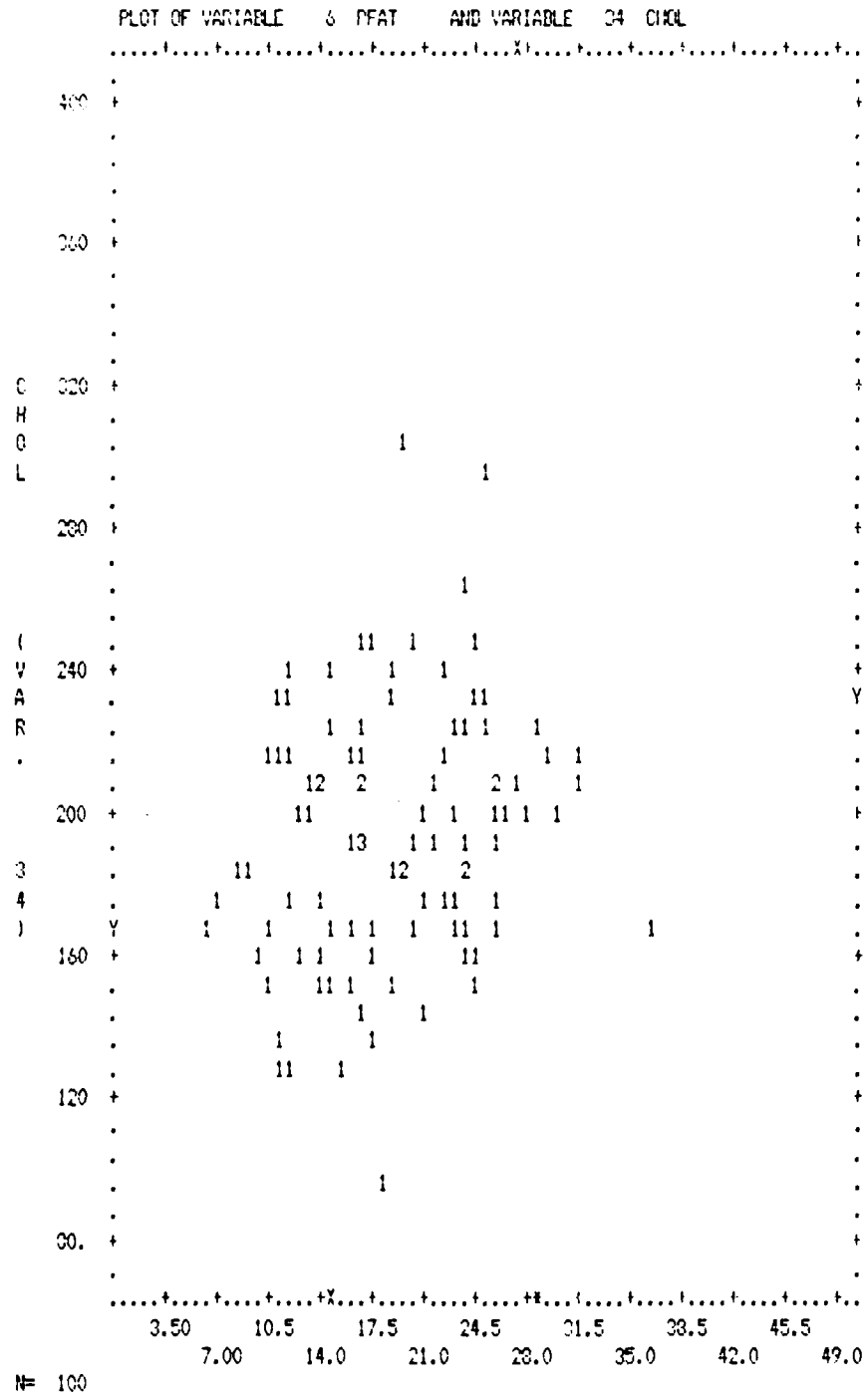
	MEAN	ST.DEV.	REGRESSION LINE	REG.NO.
X	19.131	6.1664	X= .55565*Y+ 6.1909	31.574
Y	23.307	4.6813	Y= .32024*X+ 17.180	18.197



N= 100

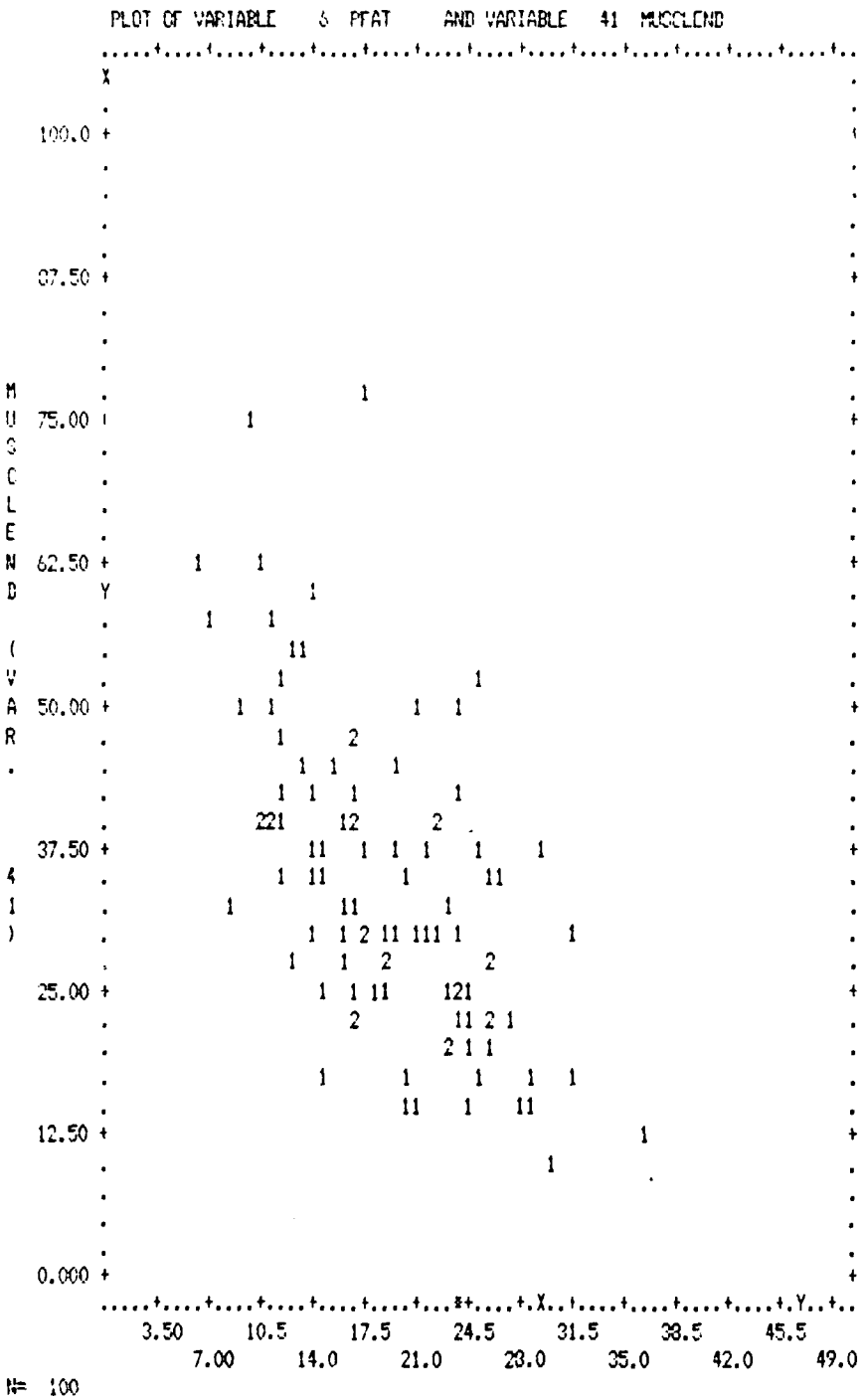
COR=-.692

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.009	6.0726	X=-.30835*Y+ 29.091	19.417
Y	35.290	13.627	Y=-1.5527*X+ 64.804	97.773



N= 100
COR= .212

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.037	6.1239	X= .03508*Y+ 12.105	36.181
Y	193.19	36.130	Y= 1.2533*X+ 169.33	1260.6



N= 100
COR=-.599 PFAT (VAR. 6)

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	19.086	6.1808	X=-.27258*Y+ 28.450	24.760
Y	34.350	13.575	Y=-1.3150*X+ 59.448	119.44

APPENDIX C

SCATTER PLOTS OF AGE AS COMPARED TO VARIOUS HEALTH AND PHYSICAL FITNESS VARIABLES IN 101, U.S. NAVY PERSONNEL

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HORIZONTAL VARIABLE NO. NAME	VERTICAL VARIABLE NO. NAME	GROUP NAME	PLOT SYMBOL	PAGE NO.
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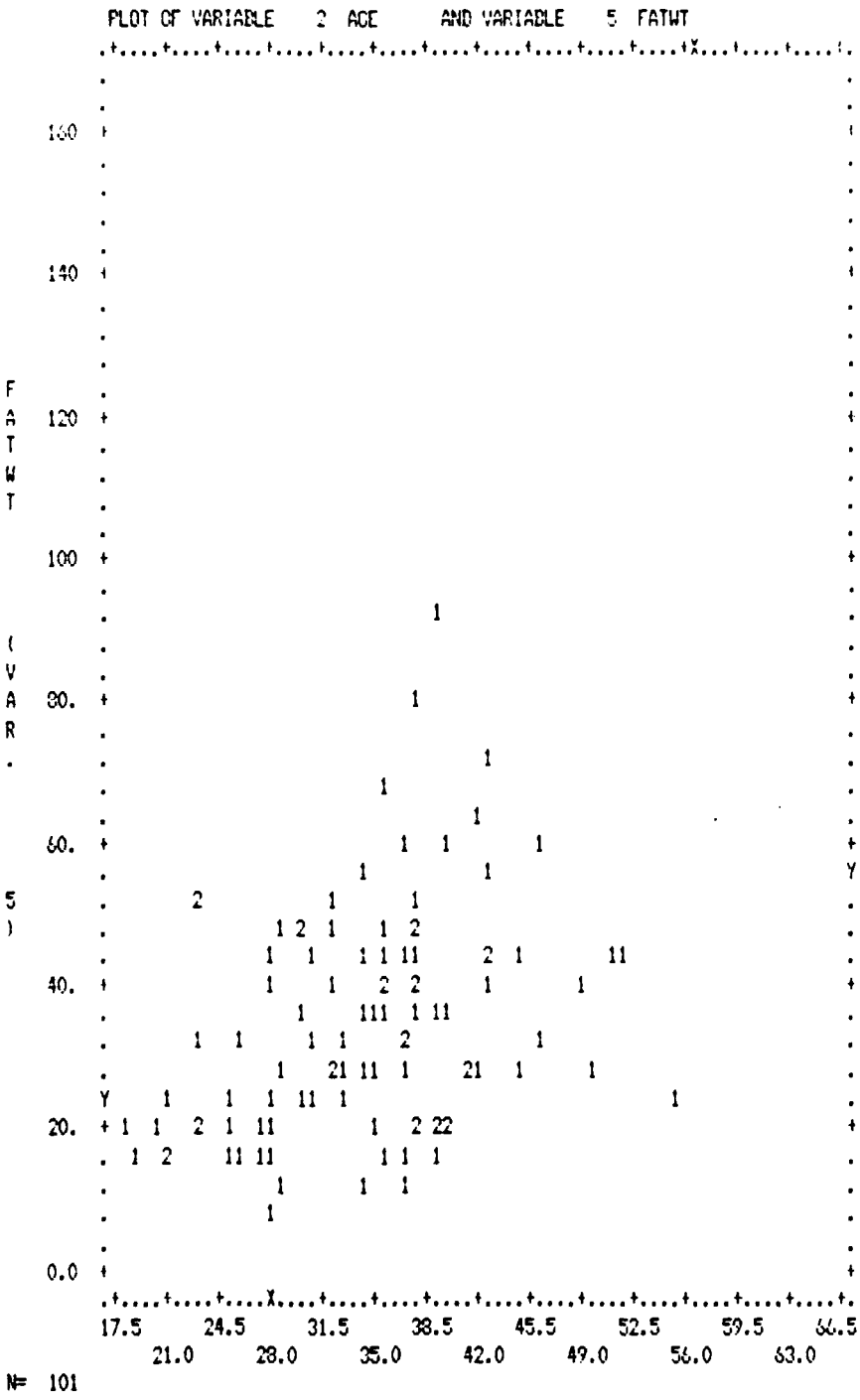
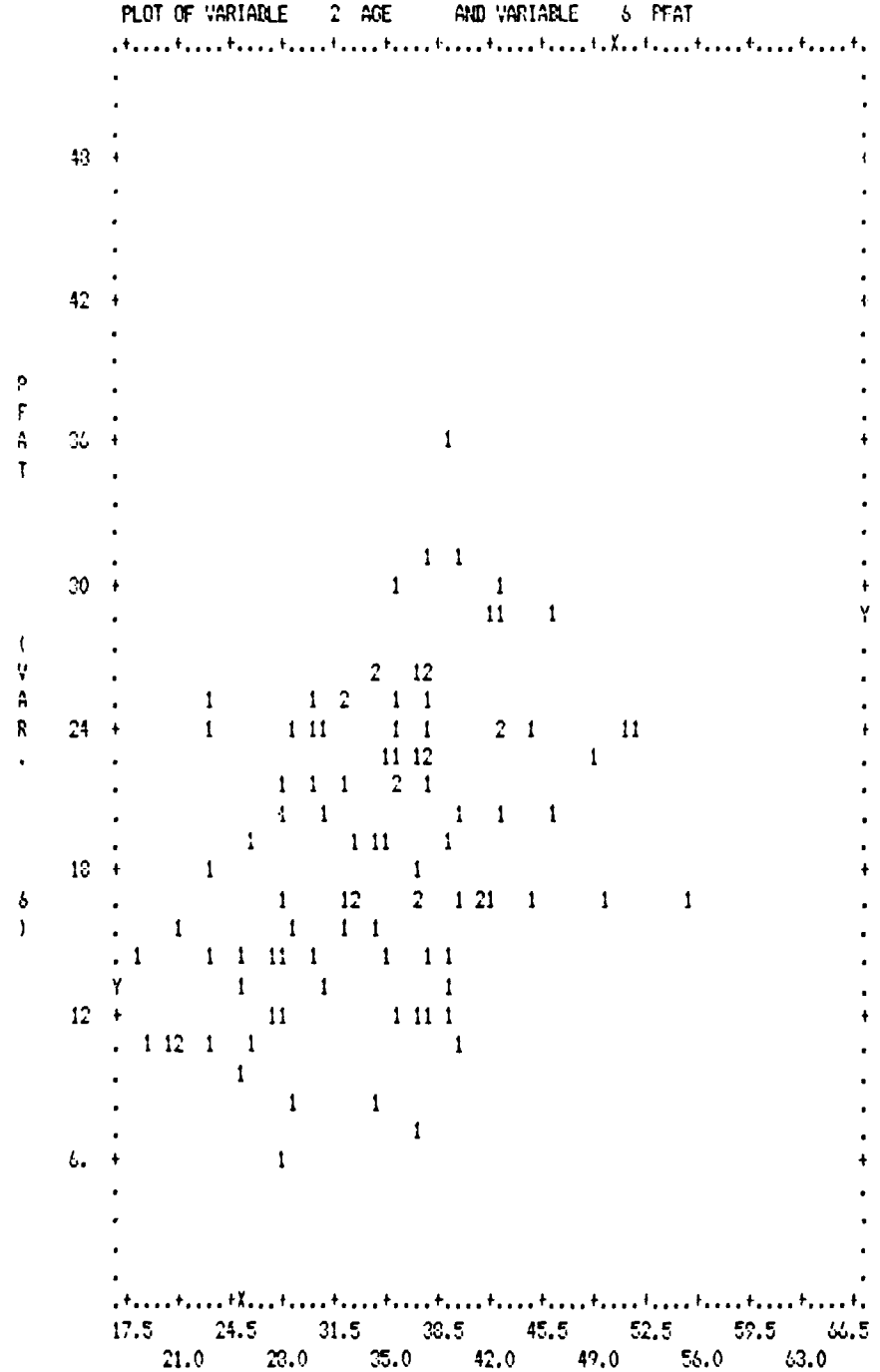
2 AGE	6 PFAT		. . . . .	3
2 AGE	10 Pushup		. . . . .	4
2 AGE	11 Situp		. . . . .	5
2 AGE	41 Muscular Endurance		. . . . .	6
2 AGE	12 Hipflex		. . . . .	7
2 AGE	13 Longjump		. . . . .	8
2 AGE	39 Strength		. . . . .	9
2 AGE	30 Treadmill		. . . . .	10
2 AGE	32 Risko		. . . . .	11
2 AGE	33 Fitness Score		. . . . .	12



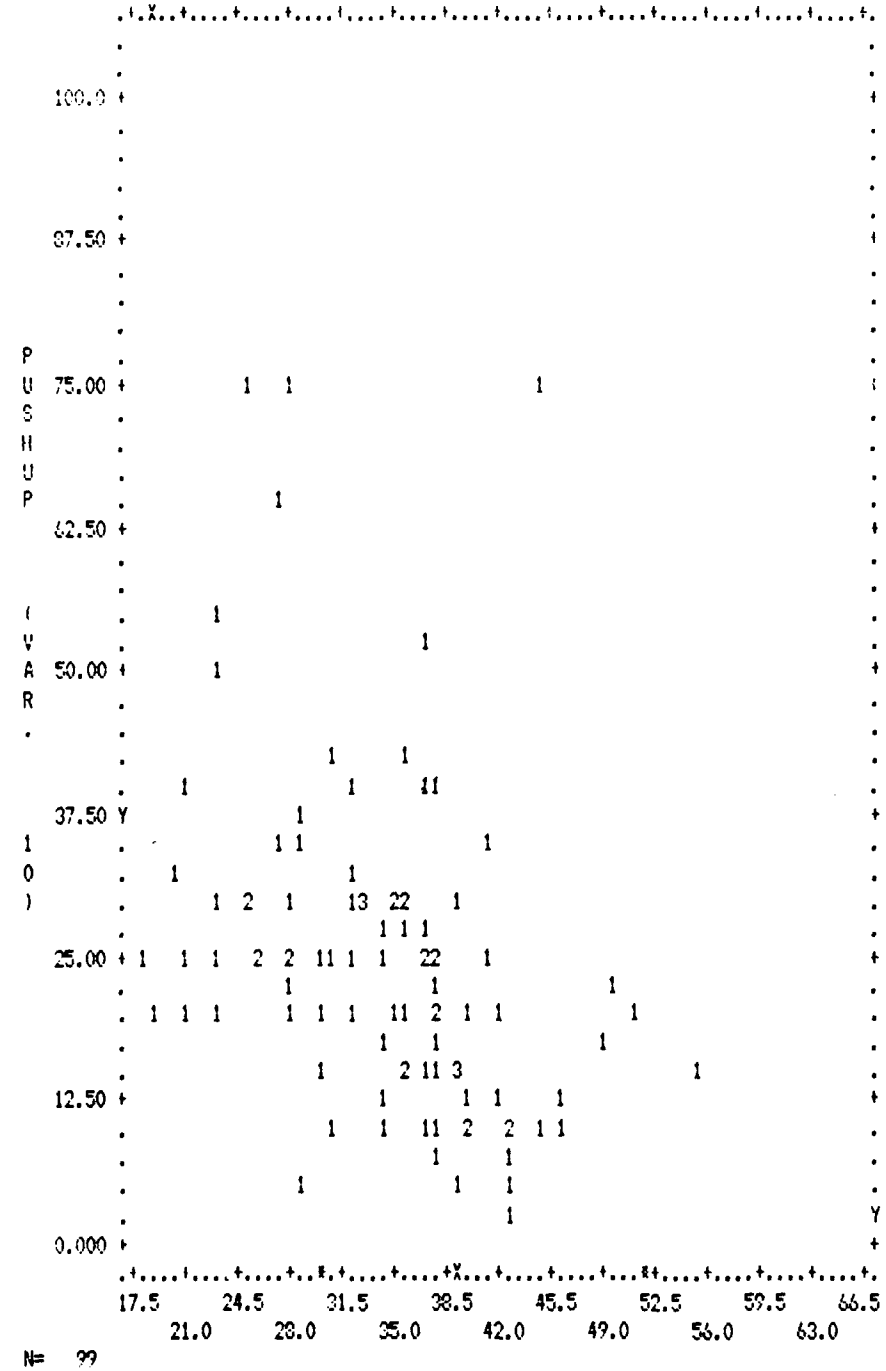
N= 101
COR= .329

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.495	7.6533	X= .15091*Y+ 28.970	52.759
Y	34.552	15.748	Y= .67705*X+ 11.197	223.38



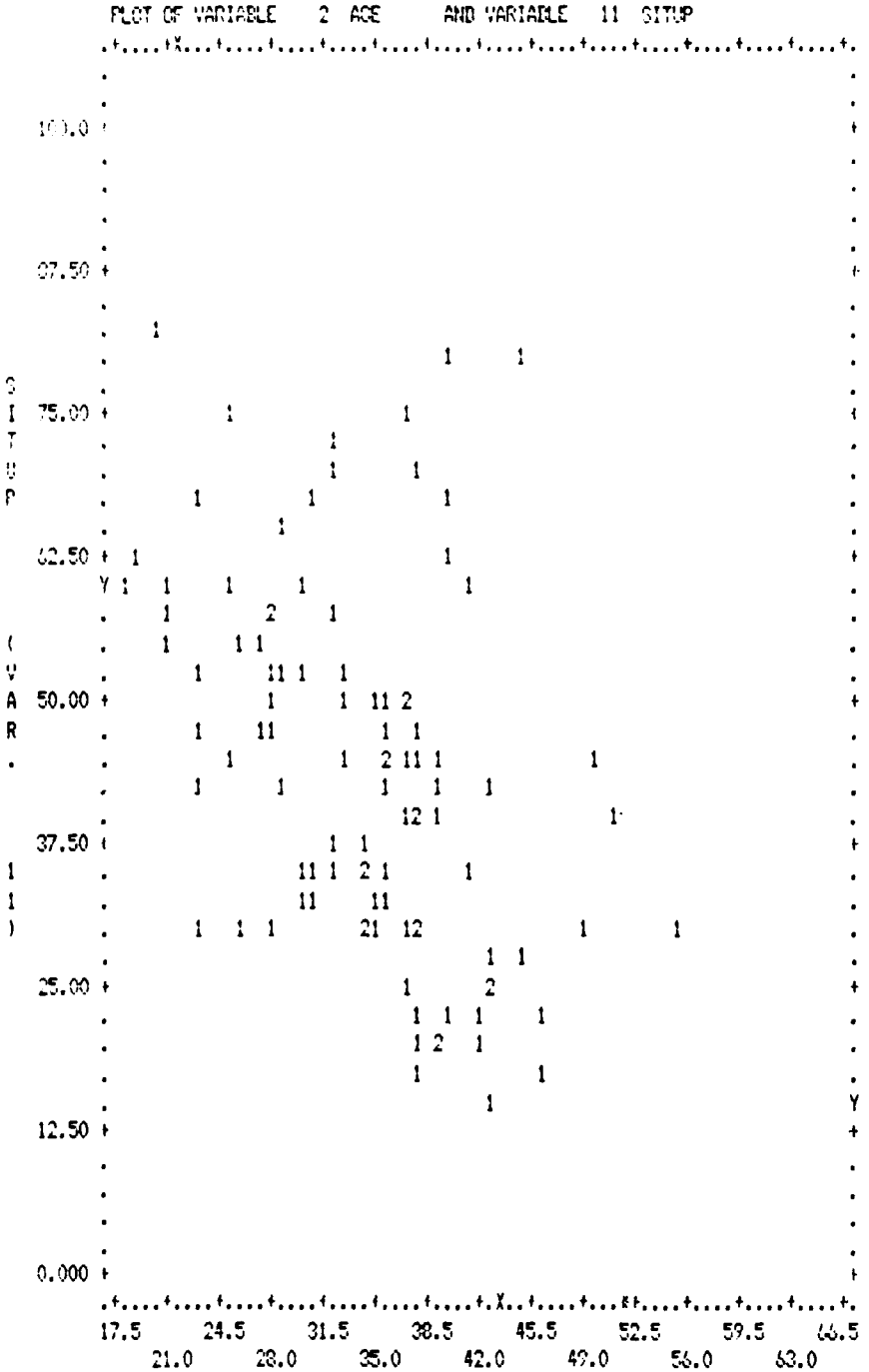
N= 101
COR= .386 AGE (VAR. 2)

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.495	7.6533	X= .47840*Y+ 25.341	50.371
Y	19.131	6.1664	Y= .31062*X+ 8.4164	32.700



N= 99
COR=-.358

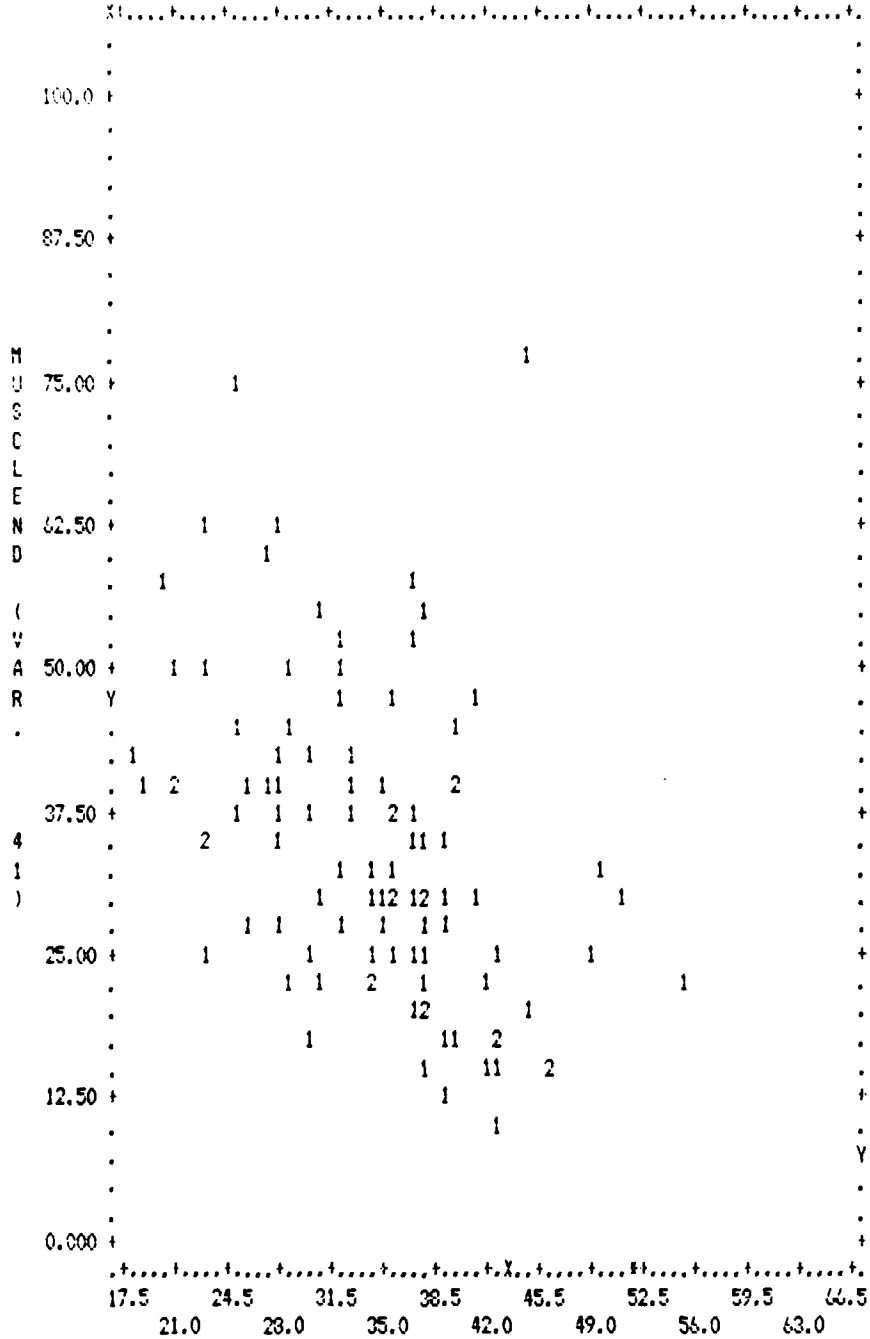
	MEAN	ST.DEV.	REGRESSION LINE	REC.MS.
X	34.364	7.5112	X=-.18551*Y+ 38.992	42.699
Y	24.949	14.490	Y=-.69040*X+ 48.674	184.96



N= 100
COR=-.425

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.220	7.4858	X=-.19930*Y+ 43.089	46.344
Y	44.000	15.978	Y=-.80793*X+ 75.160	211.23

PLOT OF VARIABLE 2 AGE AND VARIABLE 41 MUSCLEND

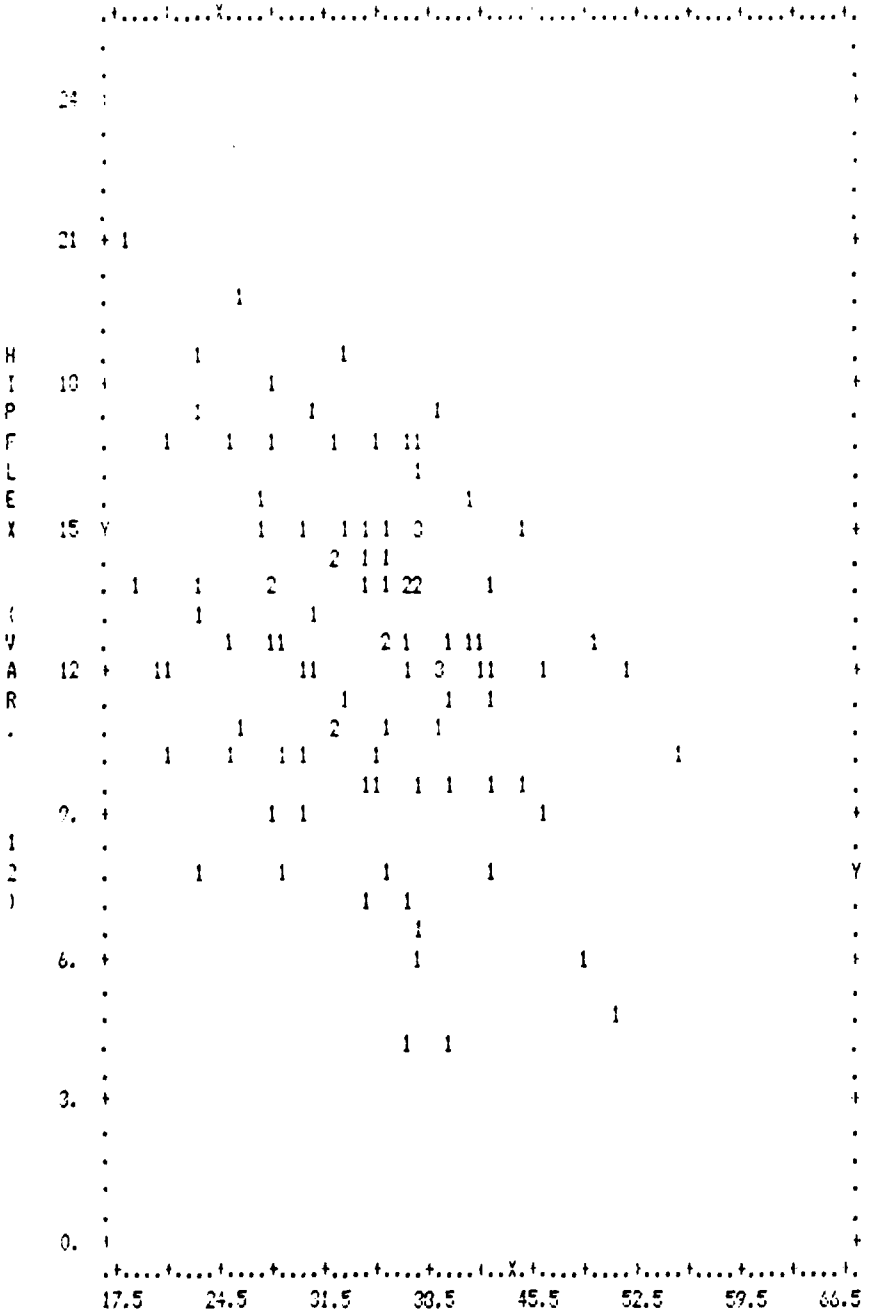


N= 100

COR=-.435 AGE (VAR. 2)

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.320	7.4050	X= .23970*Y+ 42.554	45.913
Y	34.350	13.575	Y=-.78020*X+ 61.404	150.99

PLOT OF VARIABLE 2 AGE AND VARIABLE 12 HUFFLEX

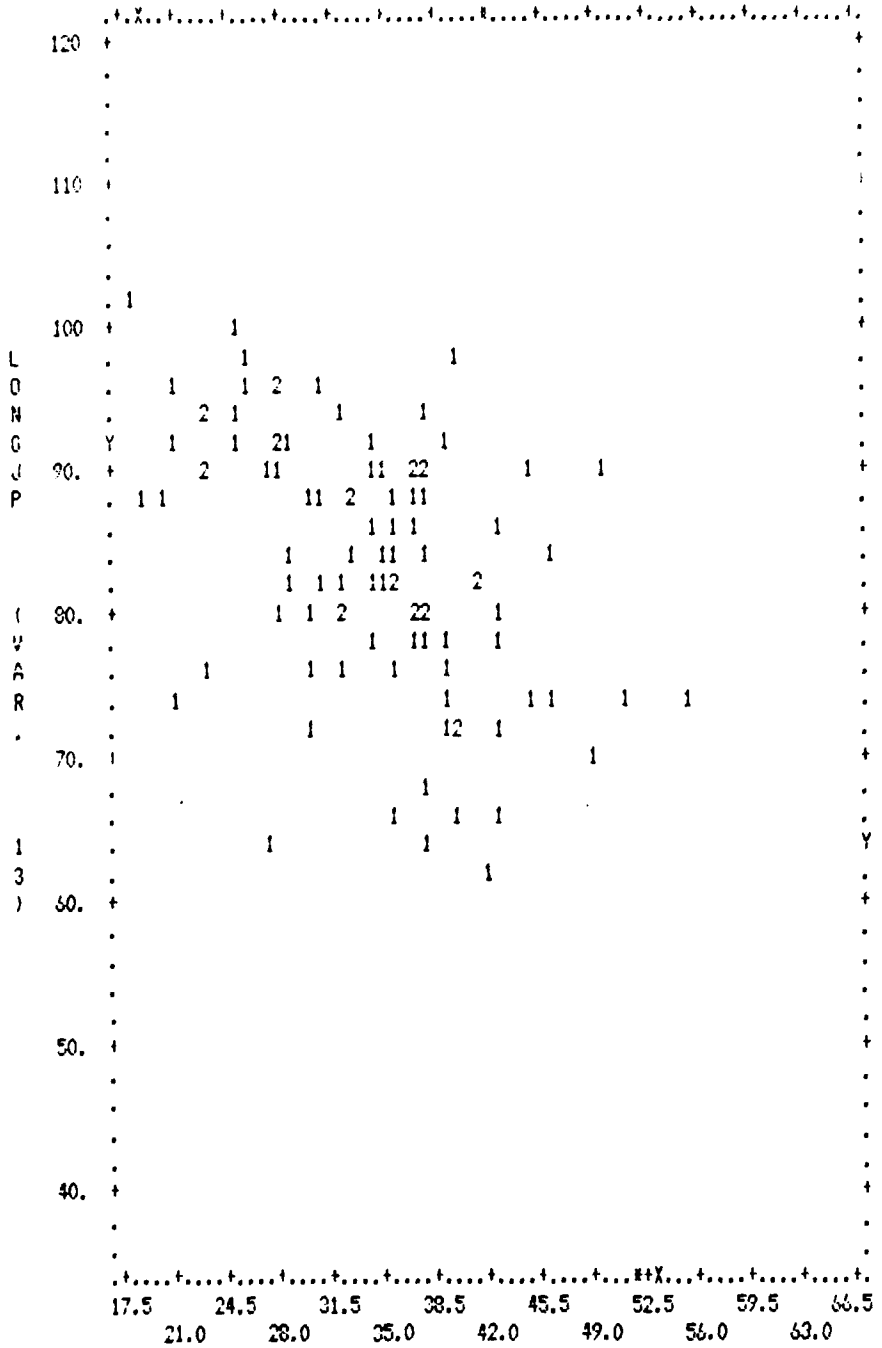


N= 101

COR=.328

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.495	7.6533	X= .74037*Y(	40.720 52.785
Y	12.472	3.3043	Y=.1450C*X+	17.496 10.333

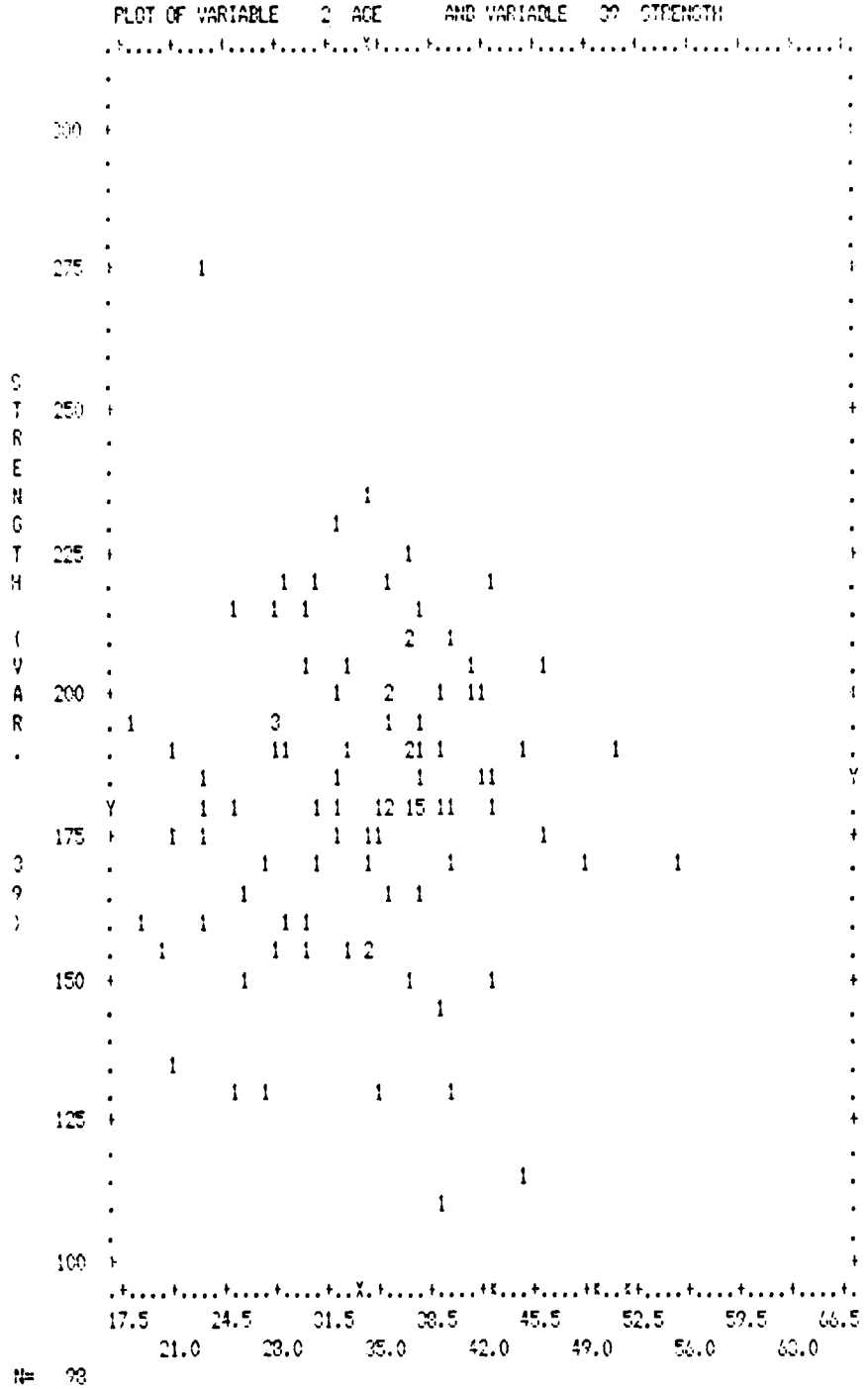
PLOT OF VARIABLE 2 AGE AND VARIABLE 13 LONGJP



N= 99
COR=-.467

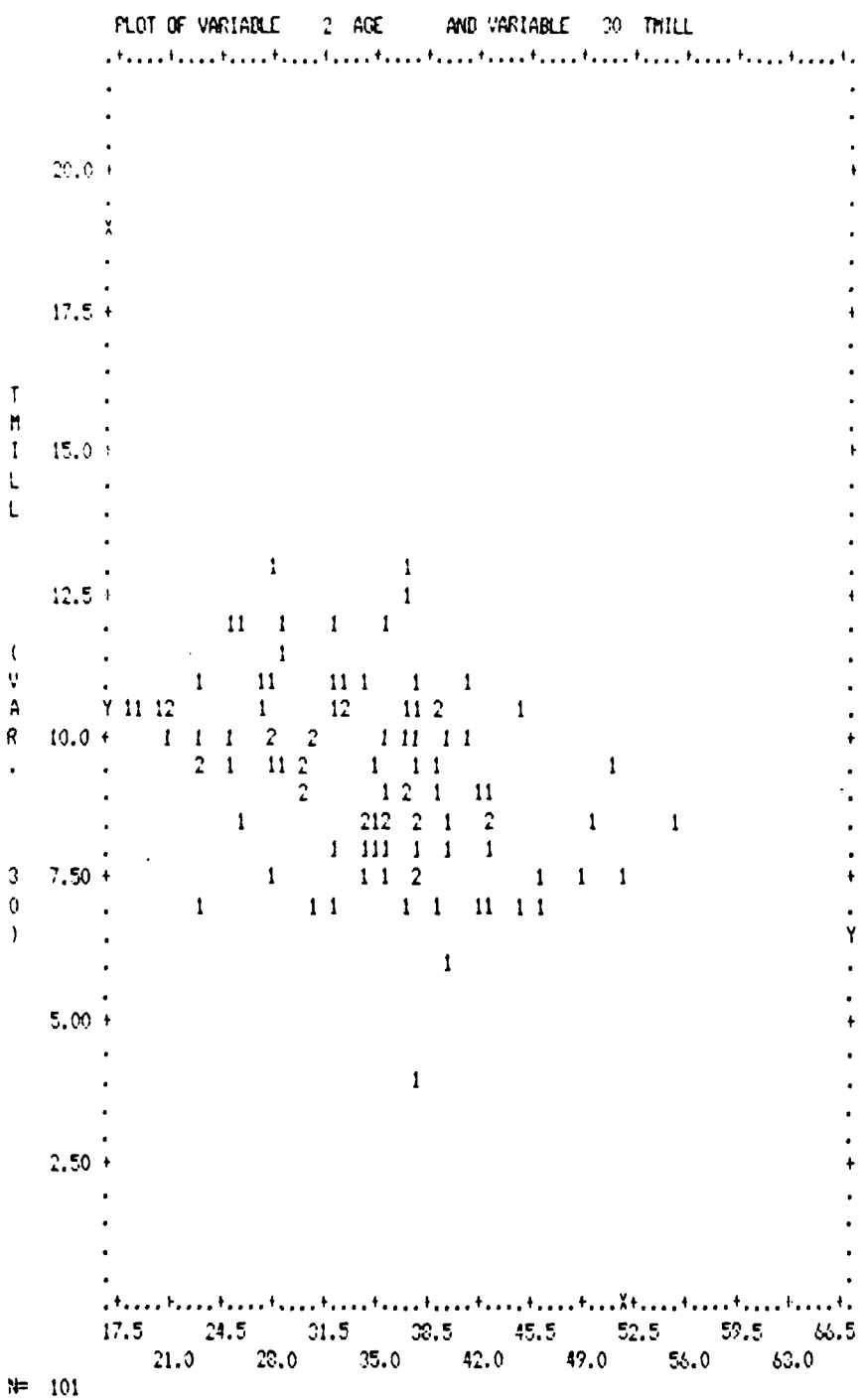
	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.242	7.4834	X=-.38941*Y+ 66.642	44.251
Y	83.202	8.9705	Y=-.55954*X+ 102.36	63.585

PLOT OF VARIABLE 2 AGE AND VARIABLE 39 STRENGTH



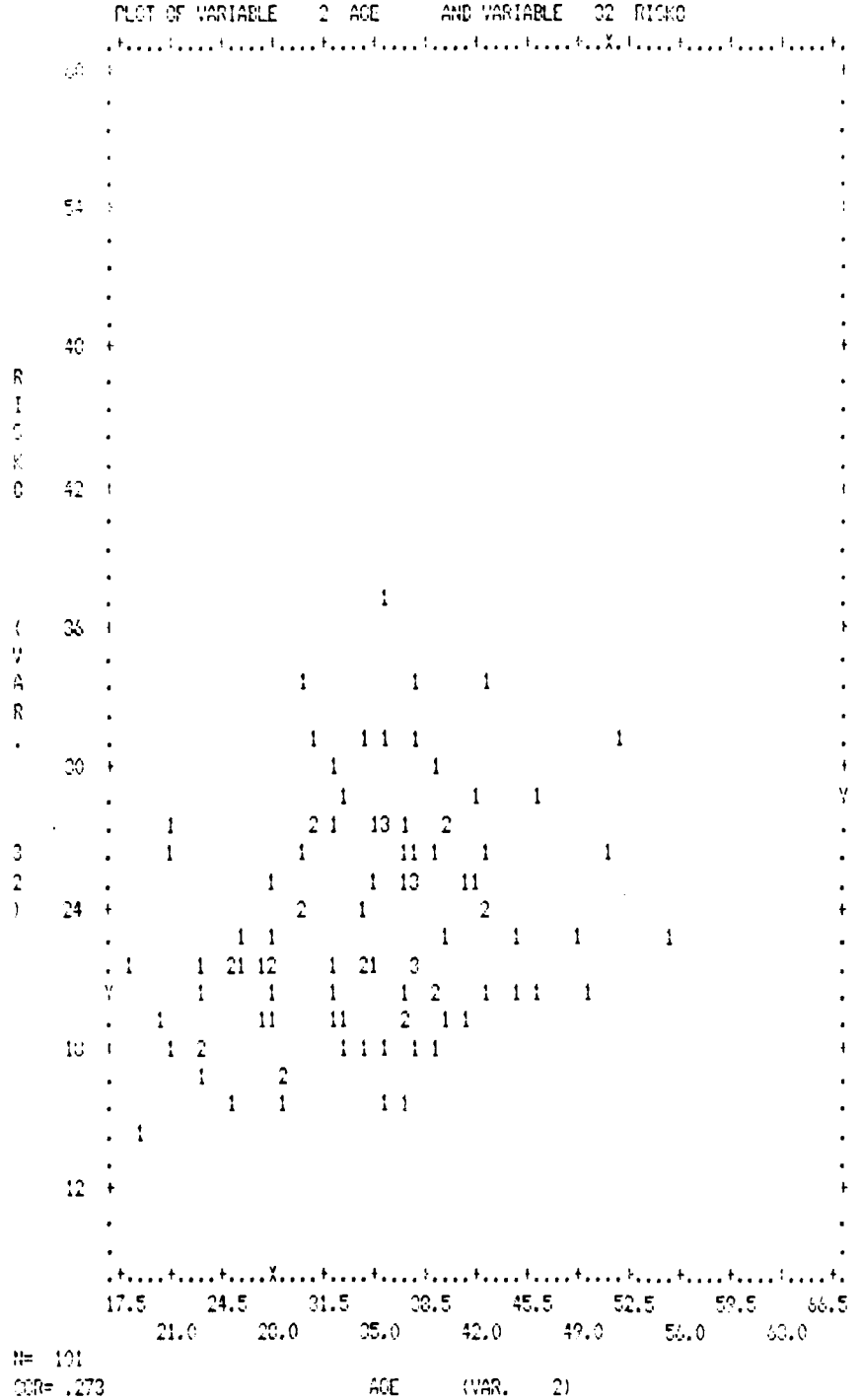
N= 98
COR= .013 AGE (VAR. 2)

	MEAN	ST.DEV.	REGRESSION LINE	REG.MS.
X	34.071	7.3362	X= .00368*Y+ 33.401	54.370
Y	182.04	26.827	Y= .04922*X+ 180.36	727.04



N= 101
COR=-.395

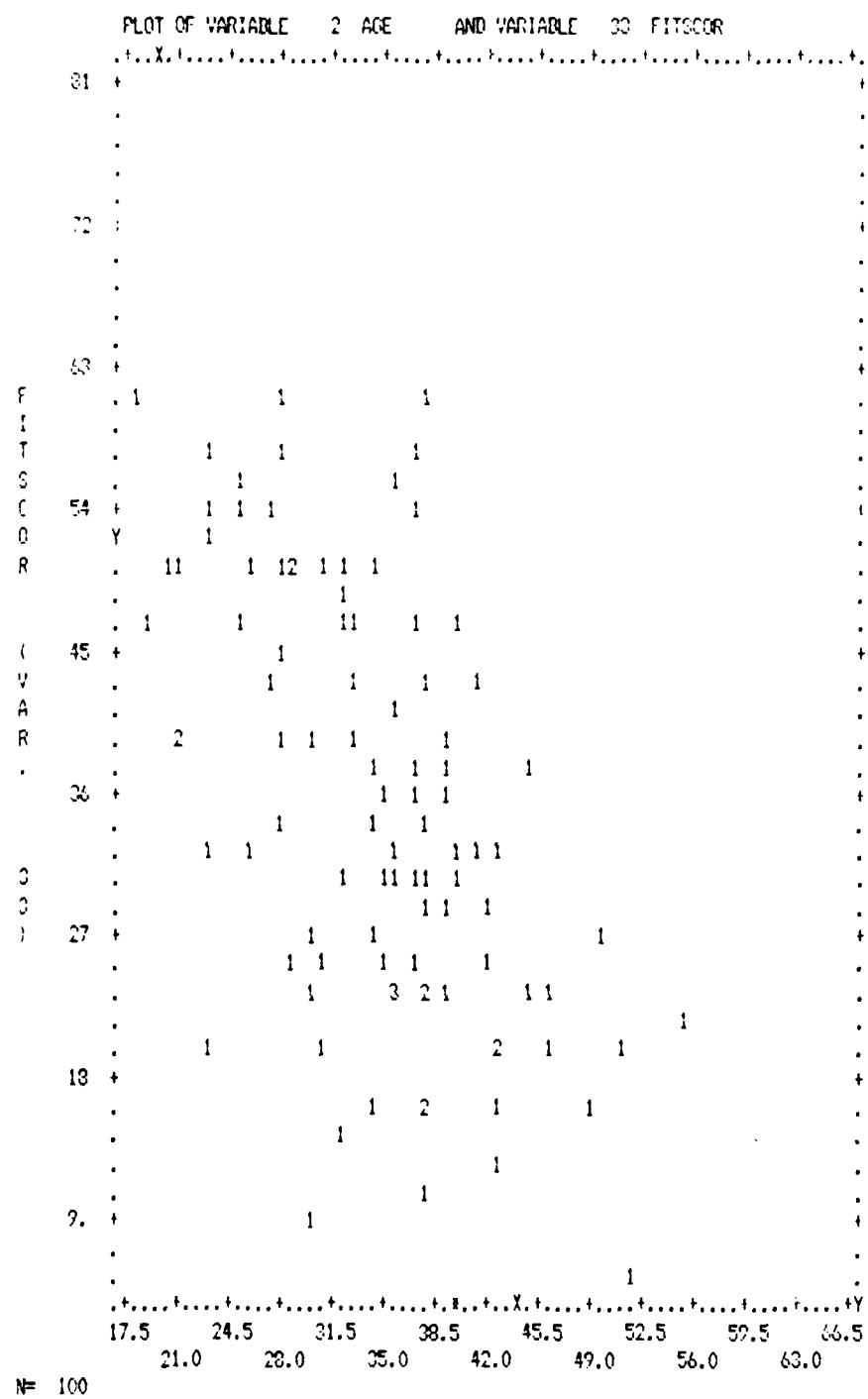
	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.495	7.6533	X=-1.8376*Y+ 51.600	50.403
Y	9.3087	1.6027	Y=-.08058*X+ 12.088	2.2103



N= 101

SSR= .273 AGE (VAR. 2)

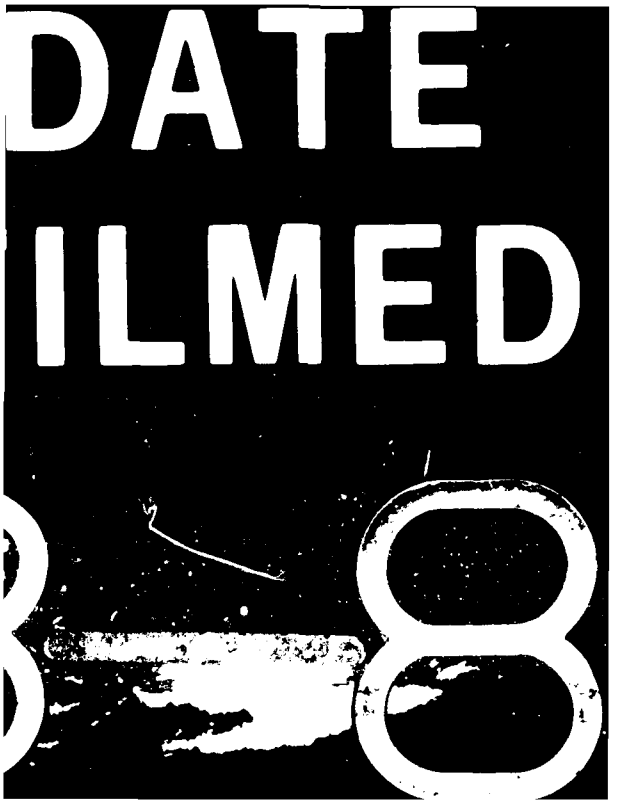
	MEAN	ST.DEV.	REGRESSION LINE	REG.MS.
X	34.495	7.0533	X= .44566*Y+ 24.108	54.760
Y	23.307	4.3813	Y= .16674*X+ 17.555	20.491



N= 100

COR=-.543 AGE (VAR. 2)

	MEAN	ST.DEV.	REGRESSION LINE	RES.MS.
X	34.440	7.6717	X=-.30503*Y+ 45.236	41.900
Y	35.290	13.627	Y=-.96518*X+ 68.531	132.19


DATE
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