Report to the Defence and
Civil Institute of Environment
Medicine, Downsview on
contract OISE 97711-2-6886

"Development of Protocols for Accurate Measurement of Body Composition"

M.J. Plyley
R.J. Shephard
R.D. Forsyth

Table of Contents

List of Tables
List of Figures
Executive Summary

1.0 Introduction

1.1 Statement of contract
1.2 Objectives of the study
1.3 Problems and subproblems
1.4 Model selection
1.5 Assumptions
1.6 Justification
1.7 Selection of measurements

2.0 Review of selected relevant areas of the literature

2.1 Overview
2.2 Determination of body composition by hydrodensitometry and its limitations as a reference ('gold') standard
2.3 Theory of lung volume assessment in body density procedures

3.0 Methodology

3.1 Subjects and data collected
3.2 Procedures for residual volume
3.3 Hydrodensitometry at maximum expiration and at vital capacity
3.4 Procedures of anthropometry in body composition assessment
3.5 Models of body fatness prediction
3.6 BF estimation using skinfolds
3.7 BF estimation using all variables
3.8 Musculo-skeletal proportions and the reference man and woman
3.9 Musculo-skeletal proportions and somatotype
3.10 Other procedures of BF estimation tested

4.0 Results

- 4.1 Sample
- 4.2 Residual volume
- 4.3 Hydrodensitometry
- 4.4 Musculo-skeletal proportions
- 4.4.1 Reference data
- 4.4.2 Somatotype
- 4.5 Estimations of body composition
- 4.6 Relationships among musculo-skeletal proportions and body composition

5.0 Conclusions and recommendations

6.0 References

7.0 Appendices

- 7.1 Anthropometric procedures
- 7.2 Body composition estimation equations
- 7.3 Pre-studies on residual gas volume measurement
- 7.4 Intra-observer and inter-observer reliability of anthropometric measurements
- 7.5 Raw data

List of Tables:

Chapter 3 Methods

3.1 Requested random sample for Group 1 of CF.

3.2 Actual sample obtained for Group 1 of CF.

3.3 Actual sample completing all tests for Group 1 of CF.

3.4 Distribution characteristics of 5 yr. age ranges in Group 1 of CF.

3.5 Distribution characteristics of 3 age groups (<30, 30-39, >40 yrs.) for Group 1 of CF.

3.6 Variable list, with indication of source, recommendations and procedures made in other studies.

3.7 Evaluation instruments for body length and diameter measurements.

3.8 An example of K_{SF} calculations for reference young males (Katch and Katch 1983).

3.9 Sample description of 'reference' Canadian Forces personnel.

3.10 Anthropometric variables collected for determination of Heath-Carter somatotype.

3.11 Reference Canadian somatotype characteristics by age and by sex. Scores for Heath-Carter computer calculations based on 2525 YMCA volunteers studied by Bailey et al. (1982).

3.12 Reference athlete somatotype characteristics by sex and by activity. Heath-Carter somatotype based on data of Carter 1984.

Chapter 4 Results

4.1 Reference study data for female (N=125) and male (N=155) Canadian Forces personnel by age group.

4.2 Residual volumes for the study sample of the Canadian Forces (Group 1) as measured by helium dilution and predicted by two RV equations from the literature.

4.3 Body density and % body fat of Canadian Forces personnel with residual volumes measured by helium dilution and by two predictions equations.

4.4 Adjusted lung volumes (LV) and relative body fat for 3 trials on 109 females and 145 males in the CF.

Tables con't

4.5 Measurement of body fatness (%BF) by hydrostatic weighing at maximum expiration (HW_{ME}) and at any lung volume (HW_{LV}), adjusted and unadjusted for hydrostatic pressure.

4.6 Body density and % body fat for the CF, by gender and by age.

4.7 (a) Descriptive statistics of mass, stature, and body circumference measurements on 155 males in the CF.
(b) Descriptive statistics of mass, stature, and body circumference measurements on 125 females in the CF.

4.8 Descriptive statistics of the body diameter measurements for 155 males and 125 females in the CF.

4.9 Descriptive statistics of the skinfold thickness measurements on 155 males and 125 females in the CF.

4.10 Pearson product correlation matrix of skinfold thickness measurements on 155 males and 125 females in the CF.

4.11 Descriptive statistics of body composition variables on 155 males and 125 females in the CF.

4.12 Description of the somatotype and the musculo-skeletal proportions of the CF sample.

4.13 Pearson product correlation coefficients of the body composition and somatotype components on 155 males and 125 females of the CF.

4.14 (a) Maximum R^2 regressions for body fat (%BF) for 147 males in the CF.
(b) Maximum R^2 regressions for body fat (%BF) for 106 females in the CF.

4.15 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on CF sample, by total group and by sex.

4.16 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on CF sample by age group and by sex.

4.17 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on CF sample of females (N=106) by age and by fat level (based on median fat level from densitometry).

4.18 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on a CF sample of males (N=147) by age and by fat level (based on median fat level from densitometry).

Tables con't

4.19 Cross-validation of applied Behnke-Wilmore (AB) scaling method of body fat estimation on an independent sample of 109 male and 66 female CF personnel.

4.20 Mean predicted body fat (%BF) from hydrostatic weighing (HW), applied Behnke-Wilmore (AB) and generated %BF estimations by circumference, skinfold and diameter measurements (CSD).

4.21 (a) Cross-validation and comparison of % body fat values estimated from anthropometric measurements for CF males.
(b) Cross-validation and comparison of % body fat values estimated from anthropometric measurements for CF females.

Appendices

7.3a The mean values of the residual volumes (in ml.) measured by oxygen dilution, helium dilution, and nitrogen washout for pre-study Group A.

7.3b Mean and standard deviation of FVC, RV, and body composition for each method in the pre-study Group A.

7.3c Significance (F values and probability) for the RV and body composition in the pre-study Group A.

7.3d Residual volume measurements for the pre-study Group B by helium and oxygen dilutions.

7.3e Cross-validation of three (3) residual volume prediction equations for the pre-study Group B (19 males and 18 females).

7.4a Intra-observer reliability of the principal investigator (RDF) on pre-study Group C (N=13, 7 females and 6 males).

7.4b Test-retest reliability of five skinfold measurements by observer (N=5) and by trial (N=2) for pre-study Group C.

7.4c Test-retest reliability of 7 circumference measurements by observer (N=5) and by trial (N=2) for pre-study Group C.

7.4d (i) Significance of skinfold measurements.
(ii) Significance of the sums of skinfold measurements.

7.4e Significance of the circumference measurements.

List of Figures

3.0 Methods

3.1 Helium dilution single breath apparatus for measuring residual volume (Ogilvie et al. 1957).

3.2 Hydrostatic weighing apparatus with chair.

3.3 Plexiglass frame and scale support.

3.4 Typical tracing of an underwater weight recording showing oscillations of the measurement.

4.0 Results

4.1 Body density vs. total skinfold (4) in Canadian Forces Personnel (variables from Durnin and Womersley 1974).

4.2 Graph of applied Behnke-Wilmore (AB) and regression (CSD) procedures compared to % body fat from densitometry (HW) for CF males by age and by fat level.

Executive summary

The purpose of this research was to evaluate various procedures and models for estimating body fatness (BF) of the Canadian Forces (CF). After a thorough review of the literature on the measurement of total body density and models of the estimation and description of adiposity. A series of experiments were conducted for: (a) residual gas volume measurement; (b) hydrostatic weighing at maximum expiration and with lung volumes; and (c) these measures of body density by underwater weighing with and without corrections for hydrostatic pressure; and finally (d) test-retest reliability of anthropometric measurements by both experienced and inexperienced technicians. It was concluded that the following tests would be used in the CF field trials: (i) the helium dilution procedure for residual gas volume (RV_{HE}) (Ogilvie et. al. 1957); (ii) hydrostatic weighing at both maximum expiration (HW @ ME) and at lung volume as measured with an SLR automated spirometer (HW @ LV); (iii) an anthropometric variable battery with stature, body mass and independent variables including 10 skinfold thicknesses, 15 circumferences and 9 diameters. The extent of the anthropometric variable list was necessary to ensure of a number of BF estimations known from the literature.

Procedures for the measurement of body fatness of the Canadian Forces were evaluated on a total variable-complete random sample of 155 males and 125 females in 3 age categories (<30 yrs, 30-39.9 years., ≥ 40 yrs).

Multivariate comparison of BF by 4 densitometric methods (HW @ ME and HW @ LV, adjusted and unadjusted) showed a significant overall MANOVA ($p<.05$). Adjustment for hydrostatic pressure on HW @ ME made no significant difference ($p < 0.05$, $t = 0.31$) on BF for the total group (21.6 ± 7.29 % BF). However, BF from unadjusted HW @ LV was significantly lower ($p. < 0.05$, $t = 2.26$) than BF calculated from adjusted HW @ LV (20.2 ± 7.35 and 22.0 ± 7.23 respectively). No significant difference ($p<.05$, $t = 0.62$) in BF from adjusted HW @ LV and HW @ ME was found. We concluded that (i) BF determined by densitometry was appropriate for this mature, healthy active adult population; (ii) BF determination by densitometry at LV with adjustment for hydrostatic pressure is an appropriate procedure, especially fo subjects who do not expire to residual volume.

In the second part of this research we have evaluated 3 models of estimating adiposity. the first is a regression model based on best regressors as selected by maximum R^2 stepwise improvement for all variables, circumference, skinfold thickness and body diameter measurements (CSD). The second is a 'scaling' model were the sum of 5 skinfold (triceps, subscapular, suprailiac, abdomen and thigh) are scaled by stature and body

Executive Summary Cont'd.

mass on the basis of reference CF males and females. This procedure was developed by Behnke and Wilmore (1974) for radiographic fat thicknesses. However Katch and Katch (1983) have applied this procedure to skinfold thicknesses as measured by skinfold caliper. We refer to this procedure as the applied Behnke - Wilmore method - AB. The third model evaluated was the Heath-Carter Somatotype procedure. This procedure does not estimate body fatness but does give a relative measure of adiposity.

Multivariate factoral analysis by sex, age and high/low % fat (HF/LF) levels (based on group median hydrostatic weighing (HW @ ME) showed a significant overall ANOVA ($p<.05$). Overall BF from the AB and CSD methods did not differ from BF by HW @ ME, at any age in either gender. Moreover, the BF results by AB were not significantly different for either HF or LF groups for either gender. The CSD method on the other hand, did significantly underestimate the BF of the HF while overestimating the BF of the LF males and females.

The AB and CSD methods have been cross-validated on an independent CF sample of 109 males, 66 females) and revealed no significant differences from the percent body fat calculated by hydrostatic weighing.

The CF sample of males and females were also evaluated according to the Heath-Carter Somatotype procedure. This method of assessment of adiposity is a linear model with an independent variable of a relative 9 point scale of endomorphy based on Sheldon's somatotype procedure (Sheldon et. al, 1940). The Heath-Carter somatotype demonstrated that the CF sample males and females were more robust and muscular (mesomorphy) than the average Canadian population. However this Gestalt scale, although closely associated to total body fat as measured by hydrostatic weighing, were not as accurate as % body fat predicted by the AB or CSD methods. Also endomorphy scores were considered less useful for the CF purposes and therefore were not pursued further.

We conclude that (i) the applied Behnke-Wilmore method (AB) is the optimal predictive method for this CF population, (ii) the underwater weighing procedure should be used when predicted values are disputed and (iii) residual gas volumes should be measured not just predicted from available RV regressions.

1.2 Objectives of the study

The objectives of this research were:

(1) to ascertain the optimal equation for the assessment of body composition for an active population (Canadian forces personnel, ages 20 to 55 years)

(2) to evaluate the importance of musculo-skeletal robustness as an improvement in BF prediction

(3) to test the generality and practicality of the improved procedures on a CF specific population (cross validation of procedures).

1.3 Problems and Subproblems

In setting the hydrostatic "gold standard", several specific problems of methodology had to be resolved, including:

(1) difficulties in applying hydrostatic weighing to subjects who are fearful of submersion, or who are unable to exhale completely to residual lung volume while underwater; and

(2) choosing between alternative methods of assessing residual lung volume.

The question of the practicability of underwater weighing has recently been explored by various authors, with total body density measurement being made at lung volumes ranging from residual volume (RV) to total lung volume (FVC + RV) (Brozek et al, 1949; Girandola et al, 1977; Shephard, Lavallee et al, 1969; Thomas and Etheridge, 1980; Welch and Crisp, 1958; Weltman and Katch, 1981). Although young adults do not normally object to the protocol of hydrostatic weighing, children and older adults very often do. Even with young adults, it is not uncommon to have 15% of volunteers from a random sample refuse cooperation, exhibit an inability to expire maximally, or fail to submerge completely during volumetric measurement. Submersion may change pulmonary blood volume and thus residual volume. However, if gas volumes are retained during submersion as proposed by some authors, the added gas volume is subject to hydrostatic compression (Agostini et al, 1966; Brozek et al, 1949; Carey et al, 1956; Craig and Ware, 1967; Girandola et al, 1977; Jarrett, 1965; Prefaut et al, 1976; Welch and Crisp, 1958). Thus volumes must be measured underwater or appropriate adjustments must be made for lung compression while submerged. Any hydrostatic effect is greater when sitting than when supine, and the larger the lung volume (FVC + RV), the greater the impact on the corresponding total body volume, underwater weight, density and subsequent body fat calculation. In a large subject, (>90 kg) holding the breath at a vital capacity inspiration of 7.0 l (and residual volume of 1.7 l), the compression would amount to 2%, with a 0.7% error change in the estimation of body fat.

For the determination of residual volume (RV), helium dilution techniques are commonly used (Meneely et al, 1949; Mitchell and Renzetti, 1968; Ogilvie et al, 1957). Another simple approach is an oxygen dilution procedure (Wilmore, 1969; Wilmore et al, 1980). Both the helium and oxygen dilution procedures have been validated by comparision with the nitrogen washout procedure (Ogilvie et al, 1957; Wilmore, 1969).

In meeting the first objective, ie. the choice of an optimum equation for predicting body fatness, there are 2 subproblems:
1) a possible "specificity" in the reference population used to develop predictive equations, including the possibility of musculo-skeletal proportions that differ from the general population; and
2) a rationale for the selection of a particular predictive anthropometric model.

In the past, many large sample surveys purporting to determine body composition have used body fat prediction equations developed from populations which are unlikely to have been representative of the sample in question, for example, regressions developed on a Scottish urban population of the 1960's have been applied to Canadian Forces personnel (C. Allen and D. Bell, personal communication; Durnin and Womersley, 1974). Generalized prediction equations may give rise to erroneous estimates of body fat if the test sample does not entirely correspong to the original population with respect to such factors as age, sex, ethnicity, nutritional status and habitual activity. Errors are particularly common when the body fatness of athletes is predicted from general population BF equations (Jackson and Pollock, 1977; Katch and Katch, 1983; Sinning, 1978).

In seeking to improve the prediction of body fatness, we have compared anthropometric and hydrostatic data in a relatively large sample (N=280) of men and women, aged 20 to 55 years, a cross-section of the Canadian Forces (CF) population. Examination of the new equations to other samples of the Canadian population (swimmers, aged 13-25 years and older subjects, aged 45-75 years) will help clarify the appropriateness of the proposed approach in muscular and non-muscular groups.

1.4 Model Selection

Three different anthropometric models have been compared:
(i) a Linear Regression Model (LRM), based on traditional skinfold and circumference measures;
(ii) a Reference 'Scaling' Model (RSM) of the type proposed by Behnke (1959); and
(iii) a Somatotype Model (SM), which addresses the issue of incorporating a "Gestalt" of robustness. It is compared directly to non-Gestalt measures of robustness such as independent skeletal diameters (Katch and Freedson, 1982).

The Linear Regression Model proceeds through the following steps to predict body density (and thus body fat):

1. Stepwise maximum R2 improvement for skinfolds, including both log and quadratic transformation of the sum of skinfolds;
2. Stepwise maximum R2 improvement for circumferences (on the basis that circumference measurements may be more easily undertaken by field survey personnel);
3. Stepwise maximum R2 improvement for all variables.

The Reference 'Scaling' Model-applied Behnke-Wilmore (Katch and Katch, 1983) proceeded through three steps:

1. Body fat estimation from the sum of skinfolds scaled for height and body mass;
2. Assessment of musculo-skeletal proportions relative to a reference group;
3. Assessment of the potential contribution of musculo-skeletal proportions (reference frame size) to the description of body composition.

The Somatotype Model proceeded through 4 steps:

1. Assessment of musculo-skeletal and fat proportions (body form) as described in the Heath-Carter (1967) procedure;
2. Assessment of the relationship between each somatotype component (endomorphy, mesomorphy, and ectomorphy) and fat and fat-free fractions of the body as determined by underwater weighing;
3. Assessment of the relationship between the mesomorphic component of the Heath-Carter (H-C) somatotype, and the frame component as estimated from the reference 'scaled' population;

4. Determination of the specific contribution of each index of robustness (mesomorphy and reference frame) to simple prediction procedures.

1.5 Assumptions

The critical assumption in this project is that the underwater weighing/volumetric procedure of densitometry provides a reliable and valid fatness criteria for the population under study. Limitations inherent in this assumption are:
(i) the density of the fat-free mass (FFM) is constant for all subjects (since the tissues comprising the FFM have different densities, then the components must have mutually compensating densities and proportions);
(ii) the density of the fatmass (FM) must be constant for all subjects.

1.6 Justification

A simple, reliable and valid method of determining body fatness is important, given the probable impact of excessive amounts of body fat upon health. Obesity is associated with ischaemic heart disease (IHD), hypertension and maturity - onset diabetes mellitus (Lamb, 1984). However, there is some debate as to whether obesity exerts a significant independent impact on (IHD) after allowance for its association with hypertension and an adverse lipid profile. Excess adipose tissue can also limit the performance of physical tasks, especially those that involve displacement of body mass (Astrand and Rodahl, 1977; Shephard, 1977). Moreover, adiposity can be corrected through a combination of proper dietary management and increased exercise (Pollock, Wilmore and Fox, 1984). The need for appropriate BF equations becomes particularly necessary with groups such as the Canadian Forces (CF), where the job demands both strength and endurance, and muscularity is above the average for the general population. Having an appropriate BF equation reduces the likelihood that personnel in such heavy occupations will be advised to undergo unnecessary, unfair and possibly unhealthy "weight loss" requirements. Moreover, an accurate knowledge of body fatness and definition of a realistic "ideal weight" are often initial steps in stimulating an individual to lose fat and adopt a healty lifestyle.

1.7 Selection of Measurements

The variables chosen for study were representative of current technology. The 47 anthropometric variables selected are comprehensive enough to allow comparisons with 4 major surveys:
i) The Montreal Olympic Games Anthropometry Project (M.O.G.A.P.), a standard test battery which has been recommended by its originators as part of the Canadian Association for Sport Sciences (C.A.S.S.) Elite Athlete testing protocol (MacDougall et al, 1982). The MOGAP list includes factors necessary for somatotyping by the Heath-Carter procedure.
ii) The International Biological Program (I.B.P.) offers an anthropometric battery that has been accepted and followed throughout the world, particularly in studies of ethnic populations. The procedures, outlined in Weiner and Lourie (1969), have been used extensively in Canada and throughout the world (Shephard, 1978).
iii) Guide for Anthropometric Measurements of Canadian Adults (Jette, 1980). Although more limited in scope, these anthropometric procedures have been well documented and have interest in the context of this research because they also have been applied to a sample of Canadian men and women drawn from the Canadian Forces (Jette, personal communication).
iv) Behnke and Wilmore (1974). The anthropometric methods described by Behnke and Wilmore in "Evaluation of Body Composition" (1974) are widely used in the United States of America.

Despite the various international standards already proposed, discussions on standardization continue. Proponents of many anthropometric procedures were present in an open committee (chaired by Drs. A. Roche and J. Wilmore) for the re-assessment and standardization of human body measurements held in conjunction with the American College of Sports Medicine, annual meeting in Montreal (1981). Canadian representative were R. Montpetit and R. Forsyth.

2.0 Review of selected relevant areas of the literature

2.1 Overview

The assessment of body fatness is one of the most difficult and controversial problems in the health science field. No practical procedure is presently available to measure body fat directly. Ideally, body composition is determined from 'fresh' cadavers (less than one day post-mortem), this providing a standard to validate anthropometric measurements collected shortly before death. The usual problems with cadaver studies are: (i) only a very small sample of subjects is available, and (ii) the individuals examined have dehydrated bodies or are of unknown health and background. Most of the assumptions applied to studies of body composition are thus based on results from 4-6 cadavers, or are derived from research on domesticated animals.

Researchers will continue to be limited in their evaluation of the chemical composition of the body until a large data base has been collected from non-dehydrated, non-embalmed cadavers, including young disease-free normals, obese and athletic groups. This will surely take considerable time, given current restrictions on this type of scientific investigation. At present, the total of the world body fat data is derived from 42 cadaver dissections, and of these only 25 are very recent (Clarys et. al. 1984; Martin, 1984; Martin et. al. 1985).

Technical limitations on the direct measurement of body composition have led to various methods of approximating the amount of adipose tissue in humans. The main methods for indirect assessment of stored lipid can be classified as: (i) anthropometric fractionation of body mass; (ii) hydrodensitometry; (iii) indirect chemical analysis; and (iv) the relatively recent methods of echo- and soft tissue (Beta) radiography. This research involves only the first two of these procedures (anthropometry and hydrodensitometry), although we may note that, to date, methods (iii) and (iv) are more complicated, more expensive, and do not appear to offer better accuracy than (i) and (ii).

All indirect methods for evaluating the total fat mass have _a priori_ assumptions which must be met. First, the water component of the body cell mass, particularly the fat-free mass, must be constant: a figure of 73.2% water is usually assumed for healthy subjects. Secondly, the various components of the fat-free mass must each have the anticipated density. Finally, the relative proportions of muscle, bone and residual lean mass must be constant. Many of the assumed values in fact show considerable variation from one subject to another and within a given subject at different ages (Martin, 1984). The present research will focus particularly on the third of these difficulties (variations in the relative proportions of lean tissue), considering how far an anthropometric assessment of musculoskeletal proportions can help in the indirect assessment of body composition.

The various models used to fractionate body mass on the basis of measurements of subcutaneous fat thicknesses, body circumferences and widths are simple. However, the researcher must accept the inherent assumptions of prediction and statistical manipulation. First, a "gold standard" of body composition must be chosen. Estimations of body composition using dependent anthropometric variables must be checked against a suitable independent variable, such as the indirect densitometric procedure - currently referred to as hydrodensitometry. Secondly, the assumption of homogeneity between a given sample and the population used for the initial development of a prediction equation for any body component such as body fatness, is often contravened. Partly for this reason, a multitude of regression equations (>100) have been proposed to predict body density, and thus the fatness of various populations from anthropometric data (a selection of body fat and body density equations are shown in Appendix 7.2). The most precise equations have varied markedly with the gender, age, ethnicity, state of nutrition and fitness level of the population under study. The influence of musculo-skeletal proportions and differences in such proportions with age, gender, and physical training (fitness), is only partially understood.

Prediction of body density using a 'generalized' equation derived from a large sample with average anthropometric values comparable to the test population has to date been thought to yield the fairest estimates of relative adiposity. Many generalized BF equations are based on quadratic or logarithmic models to allow for the non-linear relationship between skinfold thicknesses and body density. Since the individuals to be evaluated in most populations include not only the young and the average, but also those who are old, very obese or thin and highly athletic, the likelihood of deriving a good "generalized" body fat equation from a small number of anthropometric variables is limited. However, such BF equations are more satisfactory for health screening than one of the many 'sample-specific' BF equations, since comparison can then be made with other national and international standards.

Although more complex and less convenient, a more satisfactory approach when evaluating the fatness of individuals, is to determine total body density from body mass and volume. There are still some problems in converting observations to percent fat, but nevertheless many people regard this procedure as the "gold standard" to be used in evaluating anthropometric procedures. There are various methods available for assessing body volume including gas and water displacement techniques, but the most common is the principle of buoyancy, developed by Archimedes and applied to human body composition by Behnke (Behnke, Feen, & Welham 1942; Welham & Behnke 1942). Body fat content is generally calculated from total body density on the assumption that the body tissue can be viewed as a simple two - component system of fixed density: fat tissue mass (FM) and fat-free mass (FFM) (Behnke et. al., 1942).

Variations of human morphology reflect differences in the amount and distribution of fat, and in the size and shape of the body's lean mass (muscular and skeletal components). Historically, anthropometric techniques have been used to evaluate body form and composition, relating such findings to both the mechanics of movement and the risk of disease (Borelli 1679; Broca 1864; Flower 1907; Galton 1884-85; Kretschmar 1930; Quetelet 1871; Sheldon et al. 1940; Viola 1932, cited in Harrison et al., 1977). Although there have been extensive descriptions of such body builds as the "habitus phthisicus", early investigators failed to consider the possibility that body form might be a consequence rather than a cause of disease. The use of anthropometry to describe an optimal body form for elite athletes has a long tradition in this century (Sheldon et. al. 1940; Shephard 1978; Tanner 1964; Welham and Behnke 1942). This tradition has inspired an attempt to found a new discipline of kinanthropometry, which would apply the methods of physical anthropology to human movement studies, including sport, elite athletic performance and growth (Ross 1976). Modern forms of somatotype evaluation form one part of this proposed discipline. A great deal of scientific investigation has been stimulated, applying to sports groups all manner of anthropometric procedures and models (Carter 1972, 1975, 1980; Katch and Katch 1983; Ross et. al. 1978; Sinning 1978, 1984; Wilmore 1983).

The simplest methods of assessing body composition remain anthropometric models that employ body stature and mass, thickness of subcutaneous fat or body circumferences and diameters. Ratios of stature to body mass and determinations of "excess" mass have some attraction as very simple tools for the epidemiologist, but they have limited usefulness for the prediction of body composition in the individual, since changes in body mass do not always reflect increases or decreases in body fatness.

An athletic person can be 'overweight' but not 'overfat'. Nevertheless, indices relating stature and body mass have often been used to provide a preliminary indication of obesity (Benn, 1971; Garn, 1984; Lee et al., 1981; Society of Actuaries 1959; Metropolitan Life, 1959, 1982). A stature/mass ratio is also the sole determinant of the ectomorphic component of body form as described by the Heath-Carter Somatotype Model (Heath and Carter, 1967).

Individual anthropometric variables can be highly correlated with a more general measure of body composition, eg. body density is often quite closely related to abdominal circumference or to summed individual skinfolds. However, allowance must be made for several factors in any anthropometric fractionation of body mass:

i) inter-individual and ethnic differences in the fat patterning of subcutaneous adipose tissue;

ii) sex-specific essential fat and gender related differences in the distribution of subcutaneous fat;
iii) the non-linear association between subcutaneous fat thickness and body density;
iv) the effects of age upon the density of lean tissues;
v) possible ethnic differences in the composition of lean tissues;
vi) possible differences in fat distribution and body composition induced by training (Hovak, Hyatt and Alexander 1968; Katch, Michael, and Jones, 1980; Kireilis and Cureton 1947; Malina 1979; Womersley, Durnin, Boddy, and Mahaffy 1976), poor nutrition, bed rest (Cohn et. al., 1980; Shephard 1978; Sidney, Shephard and Harrison, 1977), or a non-gravitational environment.

The most common procedure for estimating body composition is a regression model which assumes a strong linear association between a specified independent variable (body density, as an indicator of relative body fatness) and the dependent anthropometric measures. The first such BF regression was developed almost 40 years ago (Keys and Brozek, 1949). There has subsequently been occasional refinements of the statistical methodology used in the estimation of body composition which include (i) logarithmic transformations (Durnin and Womersley 1974), (ii) power functions (Jackson and Pollock, 1977, 1978; Jackson, Pollock and Ward, 1980), and (iii) use of principal component analysis (Shephard et al. 1969). Various 'group-specific' and population 'generalized' body fat equations are now available (Appendix 7.2). However, it seems probable that in any linear model and for any given list of anthropometric variables, samples of different age, sex, ethnicity, and physical activity patterns will be best described by differently weighted combinations of skinfolds, circumferences, and diameters. 'Generalized' BF equations are more dependable for describing a sample with substantial variation in body fatness, but are still invalid for extreme cases such as very thin or obese individuals and very muscular athletes.

An alternative tactic for the description of body composition was developed by Behnke and co-workers (Behnke 1959; Behnke 1961a, b; Behnke and Wilmore 1974; Taylor and Behnke 1961) from the anthropometric model of Matiegka (1921). Matiegka's model, in essence, was the first attempt to fractionate body mass into four components - adipose tissue, muscle, bone and residual masses - using anthropometric measurements. The residual component was derived from the differences between total body mass and the other 3 component masses. Although not very widely used in the early part of this century mainly because his 4-component model could only be accurately determined by cadaver dissection, such innovative ideas have given rise to alternatives to the linear regression model. The Behnke 'Reference group' model is a similar approach to that of Matiegka (1921), presenting fat level as a relative figure, scaled by stature and mass and compared to a "reference" population. In the most complete treatise describing this procedure, Behnke scaled the body circumferences and diameters of Naval and athletic subjects to reference data obtained from a sample of male and female U.S. adults using stature and mass as scaling variables (Behnke 1959, 1961; Taylor and Behnke 1961). More recently the data used for comparison has been described as the "Reference Man" and the "Reference Woman", terms original ascribed to Brozek and Keys (1953). Katch and Katch (1983) extended the Behnke concept of 'scaling' anthropometric variables to include a scaled sum of skinfolds. The Behnke method has two advantages: (i) musculoskeletal "robustness" is linked to the body fatness of subjects, based on the characteristics of large reference samples and (ii) Behnke and co-workers have always insisted on the need for a densitometric validation of their technique. The results of this analytic method are often illustrated by somatographs, which show percentage differences from the reference group means in an easy form for visual comparison.

A final possibility is to describe the body form and composition indirectly, using a somatotype model of the type developed by Sheldon et. al. (1940), and more recently elaborated by Heath-Carter (1967). Sheldon's original somatotype model assumed three body characteristics: linearity (ectomorphy), muscularity (mesomorphy), and obesity (endomorphy), determining these as a subjective "Gestalt". Heath and Carter elaborated the concept, substituting objective for subjective data. The revised methodology has been used extensively by some physical education and anthropology researchers to describe the musculo-skeletal proportions of an individual including the athletic and the non-athletic (Carter 1970, 1978, 1980a, b, 1981, 1982, 1983; Carter and Heath 1971; Carter et. al. 1983; Heath 1977; Heath and Carther 1966, 1967).

The associations among body composition factors (fat and fat-free masses), musculo-skeletal proportions, and somatotype are neither clear nor extensively reviewed in the literature (Lohman et. al. 1978; Orvanova et al., 1984; Ross and Ward 1982; Slaughter and Lohman 1976; Stepnicka 1980; Szmodis 1977; Tucker 1983; Walker 1978; Walker and Tanner 1980; Wilmore 1970).

2.2 The Determination of Body Composition by Hydrodensitometry and its Limitations as a Reference Standard.

Although many methods are currently available for estimating body density and percent body fat, hydrodensitometry will be employed as the 'gold' standard for body composition assessment. This widely used technique is based on the Archimedian principle of buoyancy, which may be stated as:

> "if a solid object is placed in a fluid and its mass is heavier than the equivalent volume of the fluid, its mass underwater will be lighter than its true mass by an amount equal to the volume of fluid displaced."

Thus, the less dense an object, the more buoyant it will be, and the less it will weight underwater.

Archimedes has been immortalized for his hydromechanical investigations of the adulteration of the golden crown (actually composed of gold and silver) of Emperor Hiero in the 2nd century B.C. Archimedes thus developed two-component hydrodensitometry.

Measurement of Body Density by Volumetric procedures

The fatness of humans is commonly assessed by densitometry, with a 2-component model being used to transform total body density into fat and fat-free masses. The underwater weighing technique developed by Behnke and collegues, for U.S. Navy personnel (Behnke, Feen, and Welham, 1942) and applied to robust football players (Welham and Behnke, 1942), is the most widely used procedure for calculating total body density (BD). This densitometric procedure has not changed drastically in over 40 years. Subjects have been weighed underwater in both horizontal (Katch, 1968) and seated positions, at maximum expiration (Akers and Buskirk, 1969; Behnke and Welham, 1942; Brozek and Keys, 1949; Welham and Behnke, 1942), at functional residual capacity (FRC), and total lung volume (TLV) (Girandola et. al., 1977; Ostrove and Vaccaro, 1982; Timson and Coffman, 1984; Thomas and Etheridge, 1980; Welch and Crisp, 1958; Weltman and Katch, 1981).

In the standard densitometric procedure, body volume is determined from weight loss due to fluid displacement during total body submersion in water; the basic Archimedian equation for determining total body density is:

$$BD = \frac{M}{V} \qquad (1)$$

Body mass (M) has always been easily determined by weighing the individual on some 'balance-beam' scale, but body volume (V) is a more difficult variable to measure. In Behnke's original hydrodensitometric procedure, the body volume was calculated by the weight loss due to submersion, obtained by subtracting the mass in water (Mw) from the mass in air (Ma). In estimating the displaced volume, the mass of water was corrected for both its density (Dw) from the observed water temperature, and for residual gas volumes (V_{rg}) within the body; thus:

$$V = \frac{(M_a - M_w)}{D_w} - V_{rg} \qquad (2)$$

An alternative Archimedian volumetric procedure to underwater weighing has applied the measure of the actual volume of water displaced (V_{dw}) by the submerged body (Allen et al., 1959 a,b; Allen et al., 1956). Simple elevation of the water on a graduated scale as the body is submerged gives an accurate measure of total body volume (V). The volume of the water displaced must be corrected for water temperature (T_w) and any residual gas volume (V_{rg}). Although both hydrostatic procedures provide results which are similar, the measurement of weight loss in underwater weighing is generally considered more accurate than collection of displaced water (Ward et al., 1978). The equation for body volume by the measurement of volume displacement is:

$$V = \frac{(M_a - M_{dw})}{D_w} - V_{rg} \qquad (3)$$

In either of these hydrostatic weighing procedures, adjustments must be made for two internal gas volumes for these will increase the buoyancy, and therefore decrease the density of the body. The two internal gases are: (i) visceral gas (V_g), and (ii) residual (lung) volume (RV). The volume of air which is trapped in the lungs at the end of a maximal expiration is called the residual volume (RV). This residual gas is relatively large, with values for young adult males ranging from 1200 to 1600 ml (Wilmore 1969) and females 600 to 2000 ml (Sloan, 1967; Sloan et al., 1962). Since residual volume is large and varies with age, it should be measured rather than predicted, at least in older adults. In children free of lung disease, it has been argued that calculations of residual volume based on a fixed percentage (28%) of vital capacity (VC) are as accurate as actual measurements of RV (Shephard et. al., 1973; Shephard, 1982).

On the other hand, visceral gas (gastro-intestinal gas, or flatus) (V_g), ie. gas trapped in the stomach and intestines, is usually small in magnitude, depending on previous food or carbonated drink consumption (Durnin and Satwanti, 1982). Therefore, V_g is rarely measured; rather, it is the usual practice to assume a constant value of 100 ml (BTPS) (Buskirk, 1961).

Thus the final body density equation for hydrostatic weighing then becomes:

$$BD = \frac{M_a}{\dfrac{(M_a - M_w)}{D_w} - (RV + 0.100)} \qquad (4)$$

Assumptions and Limitations in Calculating % Body Fat.

Unfortunately, unlike Emperor Hiero's crown, the density of the human body is the accumulative effects of many components which show some variation in both their proportions and their densities. In the 2 - component model, overall body density (BD) is assumed to reflect the proportions of the fat (FM) and fat-free masses (FFM), and their respective densities (d_f and d_{ffm}).

Thus, total body density is given by:

$$BD = \frac{(F + FFM)}{\dfrac{F}{d_f} + \dfrac{FFM}{d_{ffm}}} \qquad (5)$$

Since FM plus FFM equals unity, the proportion of fat can be derived by substitution:

$$F = \frac{1}{(BD)\dfrac{(d_f)(d_{ffm})}{(d_f - d_{ffm})} - \dfrac{(d_f)}{(d_f - d_{ffm})}} \qquad (6)$$

The density of ether extractable fat (d_{fm}) is generally assumed to be 0.900 g/cm^3 (Brozek, 1956; Brozek et. al., 1963; Fidanya et al., 1953; Siri, 1961). The density of adipose tissue can vary slightly from 0.900 to 0.940 g/cm^3 (Martin, 1984).

The density of the non-fat portion (d_{ffm}) has been vigorously debated with substantial differences suggested between athletes, the young, and the elderly (Martin, 1984). A figure of 1.100 g/cm^3 is typical of young healthy individuals (Brozek et. al.,1963; Siri, 1961). Lohman and his co-workers have recently shown that the density of the FFM is lower in children (1.080 g/cm^3) based on measurements of total body water, body density, and bone mineral content (Lohman et al., 1985). Also, an estimate of 1.063 g/cm^3 has been made for 80 year old men (Norris et. al., 1963).

Estimations of the overall variation in body composition will be influenced slightly by the standard deviation of the density of the fat (S'D.$_{fm}$), and more considerably by the variation in the densities of the fat-free mass (S.D.$_{ffm}$) and the whole body (S.D.$_{BD}$) (Bakker and Struikenkamp, 1977). Thus, the variance in the estimates of body composition, assuming $d_f = 0.900$ g/cm^3, $d_{ffm} = 1.095$ g/cm^3, and a population average body density for males of 1.060 g/cm^3, is:

$$(S.D._{fm})^2 = 13(S.D._{ffm})^2 + 20(S.D._{BD})^2 \qquad (7)$$

Depending on the subject's age, disease state, or sex, inter-individual variability in the density of the fat-free mass can vary from 1.057 g/cm^3 (osteoporotic) to 1.19 g/cm^3 (osteosclerotic) (Werdein and Kyle, 1960) due to changes in bone mineral content. Although a mean density for the FFM ranging from 1.095 g/cm^3 (Brozek and Keys, 1953) to 1.100 g/cm^3 (Siri, 1961) has been generally acknowledged for the average population, some authors have recorded total body density values for young athletic males as high as 1.102 g/cm^3 (Behnke, 1963) and 1.104 g/cm^3 (Michel and Katch, 1968).

A recent study of professional Canadian football players, found values ranging from 1.057 g/cm^3 to 1.130 g/cm^3 (ie. +18 to -12% BF). In this athletic sample, 8 of 29 had a total body density greater than 1.100 g/cm^3, and 18 of 29 subjects had less than 3% BF, ie. less than minimal essential fat. Twelve of the athletes with questionable body fat estimates in this study (18/29) were Caucasions and six were from African ancestory (Black Americans) (Adams et. al., 1982).

Although ethnic differences in bone mineral content and bone mass are known (Broman et. als., 1958; Mazees and Christiansen, 1982; Trotter et. al., 1958, 1960), the bone density in response to strenuous athletic training and participation would appear to be a more significant factor in the body composition of athletes (Nilsson and Westlin, 1971). This is due to increased bone density and 'breaking' strength as a result of increased mineral deposition (Atkinson and Weatherall, 1967; Burr, 1980). Mineral salts account for approximately 90% of bone density (Burr, 1980). Similarly, there is a loss of bone mineral content of approximately 1% per year after 50 years (Sorenson et. al., 1968).

However, for normal healthy individuals, the d_{ffm} of 1.100 g/cm^3, serves as a valid estimate for the calculation of FFM (Pollock, Wilmore and Fox, 1984). Substitution of these density values for F and FFM in equation (6) allows conversion of the measured body density (BD) to body fat (BF) as a percentage of the total body mass (%BF):

$$\%BF = 100\left(\frac{4.95}{BD} - 4.50\right) \quad (8)$$

$$\%BF = 100\left(\frac{4.57}{BD} - 4.142\right) \quad (9)$$

Equation (8) was developed by Siri (1961) and equation (9) was produced by Brozek et. al. (1963).

2.2 Theory of Lung Volumes in Body Density Assessment Residual Volume.

The measurement of RV has been recognized as a major source of error in body density calculations since the earliest usage of volumetric methods (Behnke et. al., 1942; Rahn et. al., 1949). This volume of gas constitutes between 25 and 30 percent of the total lung capacity (TLC) in normal young subjects. RV estimation rather than actual measurement of residual gas can lead to significant errors in body volume determinations. This is especially true in the elderly or those suffering from respiratory diseases. The volume of air remaining in the lungs increases with age (Kaltreider et. al., 1938), particularly with chronic obstructive lung diseases (Mitchell and Renzetti, 1968; Stubbing et. al., 1980b), and smoking (Shephard, 1982). Residual volume also increases during exercise (Stubbing et. al., 1980a).

The physiological closing pressure and elastic properties of the lung and chest wall affect the rate and the degree of increase in residual volume and functional residual capacity (Agostini et. al., 1966; Dahlback, 1978; Hong et. al., 1969, and Robertson et. al., 1978).

The most common procedures for determining residual volume are: (i) body plethysmography, (ii) open-circuit nitrogen washout, and (iii) closed-circuit gas dilution procedures, either oxygen dilution (Wilmore, 1969: Wilmore et. al., 1980) or helium dilution (Meneely et al., 1949; Mitchell and Renzetti, 1968; Ogilvie et al., 1957). Both gas dilution procedures have been shown to be both reliable and valid techniques for the measurement of RV, and are both technically simple and relatively inexpensive for either field studies or laboratory applications.

Residual Volume and Densitometry

Although hydrostatic weighing is simple in principle, technical problems can arise in practice, particularly if subjects are not accustomed to being in a submerged state without air. One requirement of traditional hydrodensitometry is a 'complete' expiration of air from the lungs (ie. to residual volume) while submerged. However, subjects who are older, or who have a 'fear of the water', may not adquately expel all their air (Weltman and Katch, 1981; Shephard, 1978).

Recently, research has focused on the procedure of underwater weighing with the subject retaining a volume of air during submersion (Girandola et. al., 1977; Ostrove and Vaccar, 1982; Sawka et. al., 1978; Thomas and Etheridge, 1980; Welch and Crisp, 1958; Weltman and Katch, 1981). Underwater weighing has taken place at TLC (Timson and Coffman, 1984; Weltman and Katch, 1981), at functional residual capacity (FRC) (Thomas and Etheridge, 1980) and at approximately 50% of vital capacity (VC) (Welch and Crisp, 1958).

Although hydrostatic pressure has little significant effect on the residual gas volume, it has been shown that pressure on the lungs during submersion can have a significant effect on larger lung volumes such as total lung capacity (TLC), inspiratory capacity (IC) and vital capacity (VC) (Agostini et. al., 1966). However, the fundamental problem is how to assess body volume at this increased lung volume during submersion. This increased volume can range from less than one liter at RV to 6 or 7 liters at total lung capacity (TLC). No author, as yet, has proposed a theoretical adjustment for hydrostatic pressure on lung volume during submersion.

Hydrostatic Pressure and Residual Volume

Hydrostatic pressure, ie. the force of compression due to the weight of water, has important effects on the chest and lung volumes during submersion. Agostini and colleagues (1966) estimated that the magnitude of the hydrostatic pressure on the chest was 20 cm H_2O when seated in a vertical position, submerged up to the neck. A similar value of 20 cm H_2O was found by Flynn (1975) with subjects seated in water up to the level of the 7th cervical vertebrae. Interestingly, they found that a value of 25 cm H_2O was required to bring the subject's reduced lung volumes back to the dry land values.

The effect of hydrostatic pressure on the RV at shallow depths was considered insignificant by Craig and Ware (1967); however, other lung volumes have been shown to be reduced 1-13% when subjects were submerged to the neck (Bondi et al., 1976; Etheridge and Thomas, 1980; Girandola et. al., 1977; Robertson et. al., 1978; Timson and Coffman, 1984). On the other hand, Girandola et. al., (1977) reported an increase in the RV while submerged. The increased RV may have been due to pulmonary vascular engorgement (central blood volume) or some unanticipated effect of submersion on the stomach or diaphragm (Lanphier and Camporesi, 1982). Several other authors have also found increases in RV with submersion. Carey et. al., (1956) showed a non-significant increase in RV (5%), and Lawther (1969) demonstrated a significant increase in the RV of young children who were submerged up to the neck, but a decrease in the RV of older subjects.

Much of the research has shown a decrease in RV with submersion. (Agostini et. al., 1966; Bondi et. al., 1976; Brozek et. al., 1949; Jarrett, 1965).

The effect of hydrostatic pressure at relatively shallow depths has been found to be inconsistant with regards to total or partial lung volume. While some authors consider the effects of submersion on larger lung volumes as inconsequential (Craig and Ware, 1967; Welch and Crisp, 1958; Weltman and Katch, 1981), others have cited significant changes due to hydrostatic pressure.

Prefaut et. al., (1976) showed total lung capacity (TLC) to be reduced when the subject was submerged to the neck. These authors ascribed the difference in lung volume to a decrease in the maximum static pressure on the chest. However, the loss of thoracic recoil may have diminished this proposed effect.

Girandola et. al., (1977) reported significant decreases in the forced vital capacity (FVC), inspiratory reserve volume (IRV), total lung capacity (TLC) and functional reserve capacity (FRC), during submersion. As the lungs become completely filled with air, the effects of hydrostatic pressure become more significant, eg. (forced vital capacity (FVC) decreases by 8.9%. The in-water and out-of-water lung volumes do exhibit a close linear relationship and a high correlation ($r=0.95$) (Girandola et. al. 1977).

Theoretical Adjustment for Hydrostatic Pressure

A theoretical adjustment of lung volume for hydrostatic pressure during submersion has not been discussed in the literature, but can be derived knowing the actual lung volume and the depth below the water. The depth of the central locus of pressure, or "centre of pressure" of the lungs as described by Jarrett (1965), of a subject submerged to the neck is 19 cm. below and 7 cm. behind the sternal angle. The distance from the sternal angle to the level of the chin is approximately 9-10 cm. on the average reference unisex person (Ross and Wilson, 1973). However, in the downward tucked position necessary for hydrostatic weighing, an additional 12 cm. may be added to account for the increased submersion. Therefore, the hydrostatic pressure on the lungs in the tucked position would be calculated for a total depth of 40 cm, or a pressure of 40 cm H_2O. It would of course be necessary to guaranty that the body does not float toward the surface when the subject has filled the lungs with air.

Since gas volume is reduced by 50% at 975.[illegible] cm H_2O, a depth of 40 cm represents a theoretical gas volume adjustment of 2% for hydrostatic pressure.

Vital Capacity

To measure body density at any lung volume (LV), it is also necessary to accurately measure vital capacity while the subject is seated in the water. Shephard and Cox (1980) have shown that SRL automated spirometers are an accurate method of measuring expired lung volumes. The hot-wire anemometer flow measuring devices have an error of measurement of FVC of 2%, ie. a volume of 30 ml. These electronic spirometers have the additional advantage of providing both a printed output as well as a digital one.

3.0 Methods

3.1 Subjects and Data Collection

A group of subjects were tested by the methodology described in 3.1 to 3.4 (Group 1), and cross-validated on a second similar group (Group 2) as described below:

Group 1: a large sample of Canadian Forces personnel (125 females and 155 males) as a basis for the development of the body fat regression equations;

Group 2: a large sample of Canadian Forces personnel (66 females and 109 males) were measured by D.C.I.E.M. personnel, and served as a sample for cross-validation of the derived body fat regression equations.

Military personnel for Group 1 were drawn as a stratified random sample of 320 subjects from four CF bases:

Airforce - CFB Trenton, Ontario
Army - CFB Petawawa, Ontario
Navy - CFB Halifax, Nova Scotia
Support - CFB Downsview, Ontario

The requested sample for Group 1 is shown in Table 3.1 below:

Table 3.1 Requested random sample for Group 1

Age (years) and Numbers of Subjects

Discipline	<30		30-39		40-49		>50	
	M	F	M	F	M	F	M	F
Airforce	10	10	10	10	10	10	10	10
Army	10	10	10	10	10	10	10	10
Navy	10	10	10	10	10	10	10	10
Support	10	10	10	10	10	10	10	10
	80		80		80		80	

160 males, 160 females

Individual personnel were selected from the base files by the officers in charge of Physical Education and Recreation.

The sample included officers and enlisted personnel from across Canada. Entry into the study was part of the daily routine. Selection was thus independent of any factors known to be associated with body composition.

A total of 280 subjects (155 males, 125 females) arrived for the scheduled testing. The majority of the incomplete data sets occurred in the 40-49 and >50 years age categories, particularly for females. Other age categories were somewhat over-represented in the final sample as shown in Table 3.2.

Table 3.2 Actual sample obtained for Group 1.

	Males			Females			Total		
Age (yrs)	Exp.	Obs.	Diff.	Exp.	Obs.	Diff.	Exp.	Obs.	Diff.
<30	40	57	+17	40	60	+20	80	117	+37
30-39	40	37	- 3	40	43	+ 3	80	80	0
40-49	40	39	- 1	40	16	-24	80	55	-25
>50	40	22	-18	40	10	-30	80	32	-48
Total	160	155	- 5	160	125	-34	320	280	-40

A certain number of subjects could not undergo, or did not wish to complete, part of the testing, usually the under water weighing. Of the 280 initial subjects, only 253 completed the entire test battery (147 males and 106 females: Table 3.3).

Table 3.3 Actual sample completing all tests for Group 1.

	Males			Females			Total		
Age (yrs)	Exp.	Obs.	Diff.	Exp.	Obs.	Diff.	Exp.	Obs.	Diff.
<30	40	56	+16	40	53	+13	80	109	+29
30-39	40	36	- 4	40	35	- 5	80	71	- 9
40-49	40	36	- 4	40	15	-25	80	51	-29
>50	40	19	-21	40	3	-37	80	22	-58
Total	160	147	-13	160	106	-54	320	25	-67

Due to the small sample size in the older categories (40-49 and >50 yrs), these two age groups were subsequently pooled into a >40 yrs. category.

The pooling of subjects from two age categories into one representing middle-aged subjects might affect the distribution of the data. Table 3.4 shows the age distribution of the subjects divided into 5 year intervals. The g1 (skewness) and g2 (kurtosis) values for each age interval distribution indicated that:

(i) only males in the >50 yrs. interval had significantly skewness of ages,

(ii) female in both the 35-39.9 and 50-54.9 yrs. intervals were significantly skewed, and

(iii) neither of the complete age distributions were significantly skewed.

After pooling the subjects, the distribution of ages were more evenly representative of all ages.

Table 3.5 Distribution characteristics of 3 age groups (<30, 30-39, >40) in Group 1 of CF.

Age (yrs.)	Sex	N	X	SD	g_1	g_2
<30	M	56	24.1	2.63	0.24	-1.05 **
	F	53	24.7	2.86	-0.09	-0.94 *
30-39	M	36	35.9	2.40	-0.29 *	-0.55
	F	35	33.8	2.44	0.22	-1.28 **
>40	M	55	47.4	5.53	0.93 **	0.68
	F	18	45.7	4.84	0.63 *	-1.24 **
Total	M	147	35.7	10.88	0.29 *	-0.90 *
	F	106	31.3	8.36	0.86 **	0.23

* $p<0.05$
** $p<0.01$

Group 2 - Canadian Forces Subgroup

This random sample of Canadian Forces personnel (66 females and 109 males) was measured by D.C.I.E.M. staff in an independent study (1980-1981). The subjects were recruited from CFB Toronto and CFB London (Ontario). The ages ranged from 17-49 years for males (mean age = 27.5 ± 8.54 years) and 19 - 56 years for females (mean age = 32.7 ± 9.14 years).

Measurements taken on these subjects included stature, mass, 7 skinfold thicknesses (triceps, biceps, abdomen, subscapular, suprailiac, anterior thigh, medial calf), four body and limb circumferences (neck, flexed biceps, abdomen 2 and calf), and two bone diameters (bicondylar humerus and femur). Hydrodensitometry was used as the criterion measure for body density and relative body fat was determined by the equation of Brozek et al. (1963).

Table 3.4 Distribution characteristics of the age ranges in Group 1

	Age (y)	n	$\bar{X}_{age}$ ± S.D.	$g1^+$	$g2^+$
Males:	<25	38	22.5 ± 1.48	-0.16	-1.27
	25-29.9	19	27.2 ± 1.12	+0.01	-1.06
	30-34.9	13	33.3 ± 1.38	-0.64	-1.00
	35-39.9	24	37.4 ± 1.40	+0.26	-1.19
	40-44.9	26	42.7 ± 1.60	-0.25	-1.08
	45-49.9	13	47.8 ± 1.20	+0.25	-0.48
	50-54.9	18	51.7 ± 1.46	+0.94*	-0.50
	>55	4	60.5 ± 2.75	-0.01	-5.26*
	Group	155	36.2 ±11.01	+0.22	-1.01
Females:	<25	30	22.3 ± 1.58	-0.61	-0.24
	25-29.9	30	27.3 ± 1.31	+0.22	-0.96*
	30-34.9	26	32.2 ± 1.38	+0.30	-0.84
	35-39.9	17	36.8 ± 1.19	+0.90*	+0.98
	40-44.9	12	42.1 ± 0.95	-0.65	+0.04
	45-49.9	4	47.2 ± 1.06	-0.41	+1.40*
	50-54.9	6	52.7 ± 1.48	-0.88*	-1.73*
	>55	4	60.5 ± 2.74	-0.05	-5.26*
	Group	125	31.7 ± 8.44	+0.79	+0.10

+ g_1 = skewness; g_2 = kurtosis

* sig. g_1 ($p < .05$)

** sig. g_2 ($p < .05$)

3.2 Measurement of Residual Volume

The closed-circuit helium dilution technique was used to measure residual lung volume. The RV methods described here have been taken from the literature (Ogilvie et al., 1957). Although other procedures are available including oxygen dilution (Wilmore, 1969, Wilmore et al., 1980) and nitrogen washout (Cournard et al., 1941), we have found the helium dilution procedure to be very reliable (test/retest coefficient of r = 0.98, with a difference of 44.6 ± 47.4 ml between duplicate readings). It is also quick and inexpensive.

The key components of the RV procedure are:

(i) a hyperoxygenated gas with helium and nitrogen components serves as the dilution gas;

(ii) the gas is distributed throughut the alveolar gas volume by dilution from a single breath of fixed volume (Ogilvie et al., 1957) as compared to distribution of gas molecules over 6 breaths (Mitchell and Renzetti, 1968).

(iii) the volume of gas to be inhaled was fixed at 2.0, 3.0, or 4.0 liters with the intent of approximating 75% of FVC for each individual.

A five litre ansesthesia bag was flushed and filled to 2, 3, or 4 litres with a mixed gas containing: helium 10.65%, oxygen 25.1% and nitrogen 64.3%.

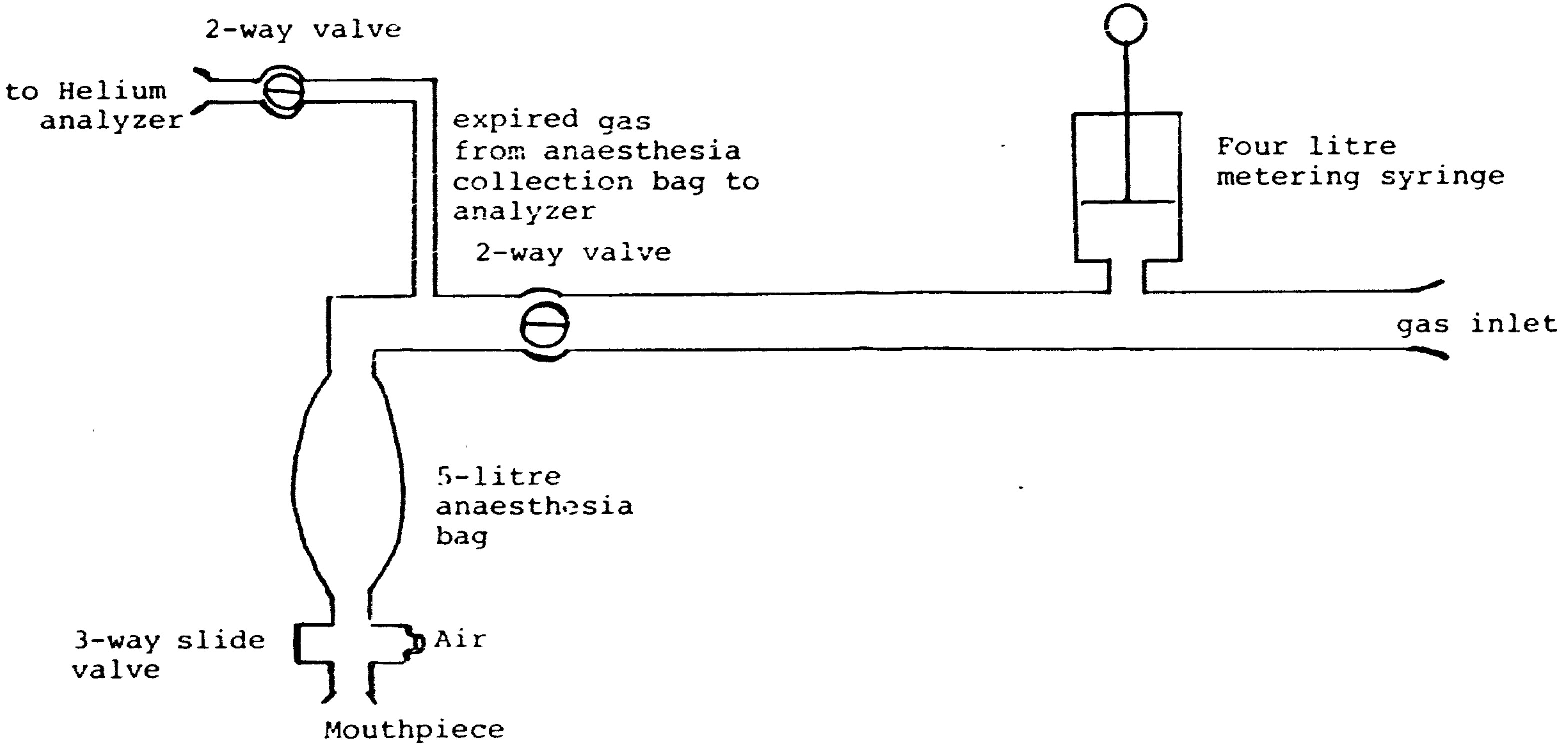
The apparatus is shown in Figure 3.1. One end of an anaesthesia bag was fitted to a three-way sliding valve with a clean mouthpiece attached at the input port. The three-way valve connected the subject to either room air or the rebreathe bag. The other end of the bag was attached to the tank of mixed gas by a 2-way valve and rubber tubing.

A calibrated syringe, placed between the tank and the 2-way valve, was used to fill the anaesthesia bag accurately. A second 2-way valve connected the rebreathing bag to the helium analyzer for analysis.

The Cambridge Gas Analyser system consisted of a Katharometer (model C742787), a galvanometer (model L433919), a six volt battery power source (Cambridge Gas Analysis Instruments), and a microcatheter sample pump (Beckman Instruments, series 551, Palo Alto, Calfornia).

The pump was used to move the gas sample through the system to the analyser. The percent helium values were read from an analog scale on the galvanometer. All values and fittings in the system were checked carefully for leakage.

Figure 3-1 Helium Dilution Single Breath Apparatus for Measuring Residual Volume (Ogilvie et al.,1957).



At the beginning of each trial, the helium gas was passed through the analyser to establish the initial helium concentration.

Test Administration

The subject sat comfortably in front of the analyser, wearing a noseclip and a tightly fitting mouthpiece. After expiring to residual volume, the sliding valve was opened to the rebreathe bag. The subject inhaled the entire contents of the bag and held this gas in the lungs for ten seconds counted out as "one thousand-and-one, one thousand-and-one...". At the end of the time as checked from a clock, the subject expired maximally into the bag and the sliding valve was closed. The contents were then mixed and analyzed. After approximately 2 minutes, trial 2 was conducted in a similar fashion. If the first two trials were not identical, a third trial was included, and the two closed values were then used for that subject.

Calculation of RV by helim dilution was done as follows:

$$RV = \frac{V_{bag_{he2}} (FI_{he_2} - FE_{he_2})}{F_{E_{he_2}}} - DS_{BTPS}$$

where:

RV = residual volume (ml)

$V_{bag_{he_2}}$ = volume of helium gas mixture in the holding bag at the beginning of the proceudre

$F_{I_{he_2}}$ = the inspired fraction of helium at the beginning of the procedure

$F_{E_{he_2}}$ = the expired fraction of helim at the point of equilibrium

DS_{BTPS} = external dead space of the mouth piece and valve corrected to BTPS (=65 ml)

3.3 Measurement of Total Body Density

The density of the body was determined by the Archimedian principle of buoyancy, ie. D=M/V. The body volume was assessed by measuring the difference between the mass-in-air (Ma) and the mass-in-water (M_w), since the weight loss is equal to the weight of the water displaced. This volume must be corrected for both the density of the water (which is temperature dependent), and for any residual gas volumes, eg. residual volume (RV), vital capacity (VC), gastrointestinal gas (GI) and air trapped in hair and clothing.

The gas content of the gastrointentinal tract, hair and clothing is not usually measured; rather a volume of 100 ml (BTPS) is substituted for what is assumed to be a relatively constant volume (Buskirk, 1961). Neglecting this correction leads to a potential error of 0.14% and 0.17% in predicted body volume based on average body volumes of 73.63 l. and 59.40 l. for males and females, respectively.

The measurements required for the proper determination of body density are:

(i) body mass in air - Ma (in kg),
(ii) body mass submerged in the water - M_w (in kg),
(iii) water temperature (in °C),
(iv) data for RV calculation from the helium dilution procedure:
  (a) initial gas (helium) concentration - $F_{I_{he_2}}$
  (b) final gas (helium) concentration - $F_{E_{he_2}}$
  (c) gas volume in the bag - $V_{bag_{he_2}}$ (in l),
  (d) gas temperature (in °C),
  (e) barometric pressure (in mmHg),
(v) lung volume seated in water (in l),
(vi) mass of equipment (weight belt, chair, nose clips) in water (in kg).

The pool water temperature was recorded from a mercury-probe thermometer at the beginning of each test. In the laboratory, the pool is electrically heated, and averages 31°C. However, during field testing, the swimming pool water temperature was only heated to 25-28°C. The temperatures were recorded to the nearest full degree centrigrade.

Body mass in the air was measured by a balance-beam scale (Health-O-Meter) calibrated with known weights prior to the study, and balanced prior to each day's testing. The subject was weighed without footwear, in light clothing (swimsuit, shorts and light shirt, approximate mass 0.2 kg), and measurements were made to the nearest 0.1 kg. It is important that the scale be situated on a flat surface while all measurements are being made.

The underwater weighing system constructed at the University of Toronto, School of Physical and Health Education consists of a square-section tank measuring 205 cm x 122 cm x 122 cm, with a weighing apparatus suspended from an overhead beam of structural aluminum. A 15 kg Chatillon autopsy scale, accurate to 0.2% of full scale, is used to measure underwater weight. A chair used by the subject is attached to the scale via an adjustable pulley. This adjusting mechanism allows the subject to be oriented vertically at the proper depth in the water, ie. seated in the chair submerged to the neck.

The hydrostatic weighing chair was designed to offer a stable support for the subject. As shown in Figure 3.2, the square tubular structure was constructed of inexpensive 3 cm ABS plastic plumbing pipe. Chair segments were drilled with small (0.4 cm) holes so that the chair would not float. Although the size of the chair (60 x 60 x 90 cm) was sufficient to provide comfortable seating for both tall and broad subjects, experience has shown that a further modification for head clearance would be desirable for very tall subjects, such as certain classes of athletes.

Measurement of body density at various field locations was accomplished by employment of a suitable platform and scale support. This structure was made adjustable for use in swimming pools. A triangular plexiglass and aluminum support (Figure 3.3) provided: (i) a solid platform for the vertical scale support, (ii) a clear visual field and accessibility of the subject, and (iii) unobstructed space for manipulation of spirometry hoses and equipment. A frontal plexiglass plate was added to reduce any wave motion effects on the suspended hydrostatic chair and subject. In addition, the pool supervisor in most cases, agreed to restrict usage of the aquatic centre to research personnel and subjects; this also minimized any wave effects.

While the portable apparatus could not be faulted from the viewpoint of safety, the position of the primary technician, from an ergonomic standpoint, was less than desirable. Depending on the water level, the main support surface was normally set approximately 20-30 cm above the water. The operator responsible for interacting with the subject sat on the pool edge, another 15-20 cm above the water. While the manipulation of the spirometry hose for the subject was not difficult, the operator was obliged to hunch over, reaching down some 30-40 cm. This position was tiresome, and would only be acceptable for short term field studies. While performing the same tasks in the laboratory, the operator may sit or squat at the side of the tank, slightly below the water line. With this arrangement, the management of the subject, data collection, and general safety are all optimal.

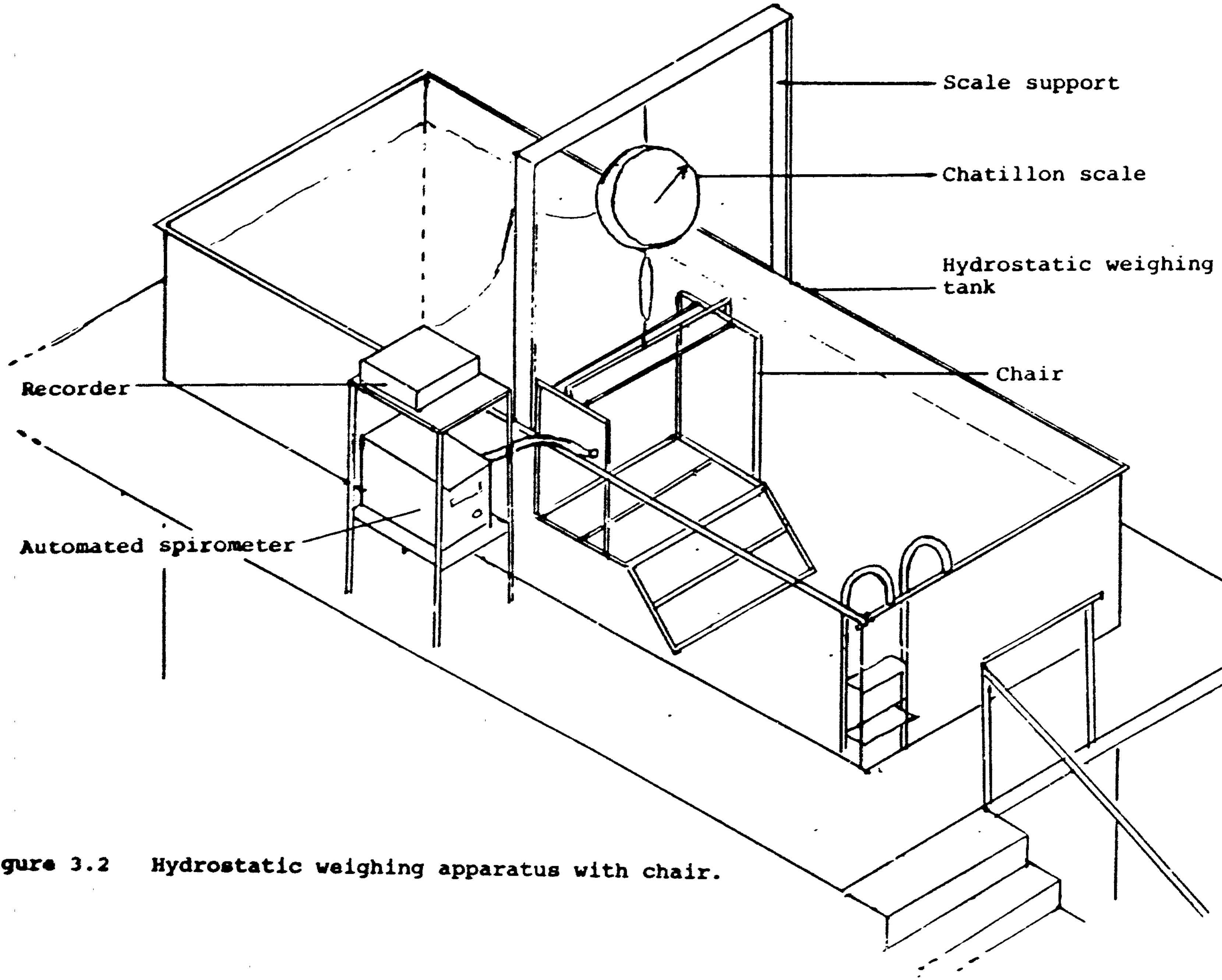
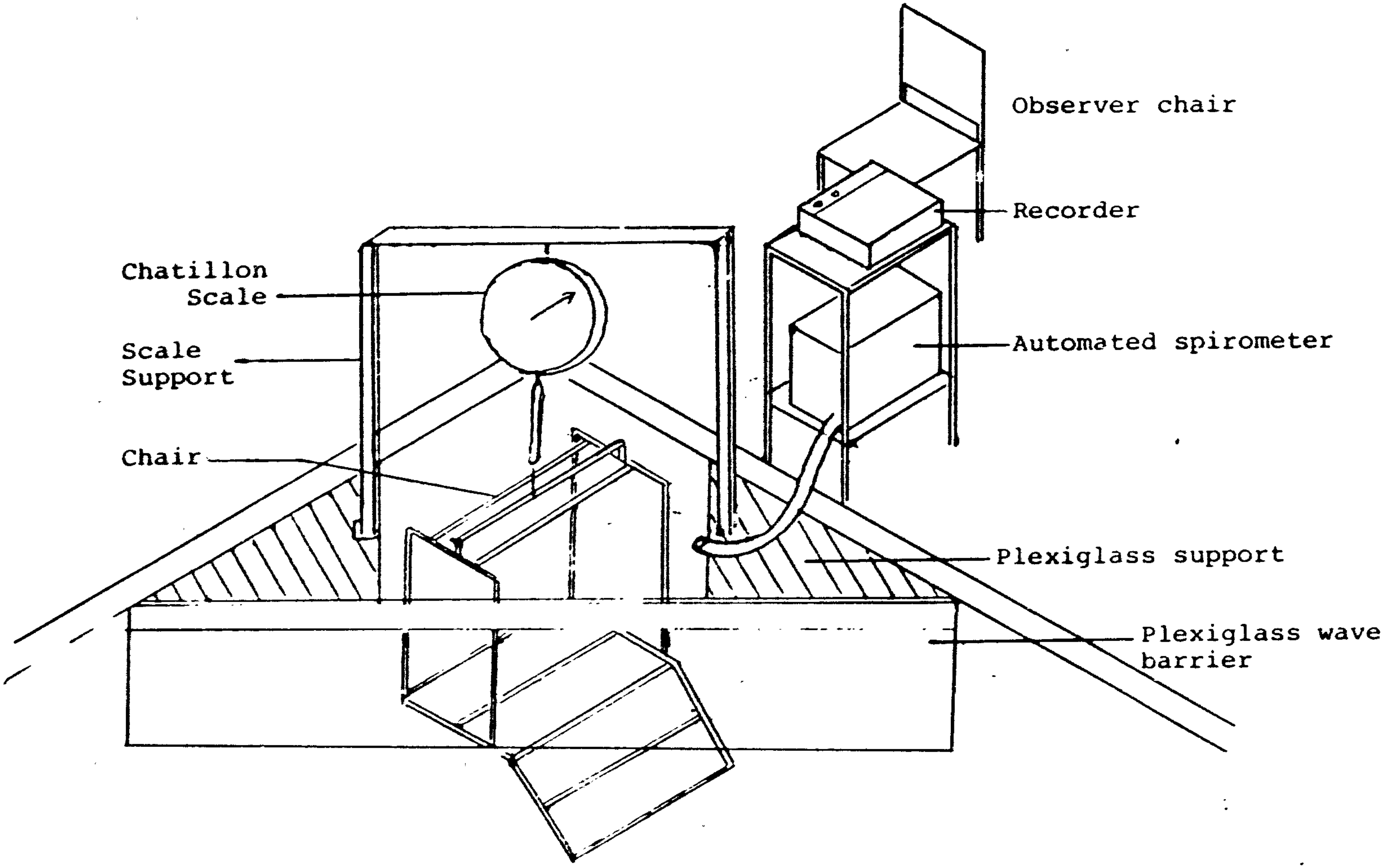


Figure 3.2 Hydrostatic weighing apparatus with chair.

Figure 3.3 Plexiglass frame and scale support.



Accuracy of reading the Chatillon Scale is not a serious problem from the seated position on the platform. If a technician were observing the scale arm from an extreme angle, parallax can cause the apparent reading to be slightly above or below the actual reading.

The problem of parallax was avoided by having a second technician responsible for reading and recording the scale values as well as the spirometric data. This operator sat comfortably, directly in front of the scale face at the same height as the dial.

The principal operator was responsible for: (i) providing information to the subject, (ii) assuring that the subject follows the necessary procedures while in the water, (iii) maintaining technical accuracy, e.g. seeing that lung volume is collected properly with the automatic spirometer, (iv) assuring the subject's safety, and (v) acting as a co-recorder of scale readings. When this principal operator was seated normally on the platform, he was 30 cm below and 60-80 cm away from the scale.

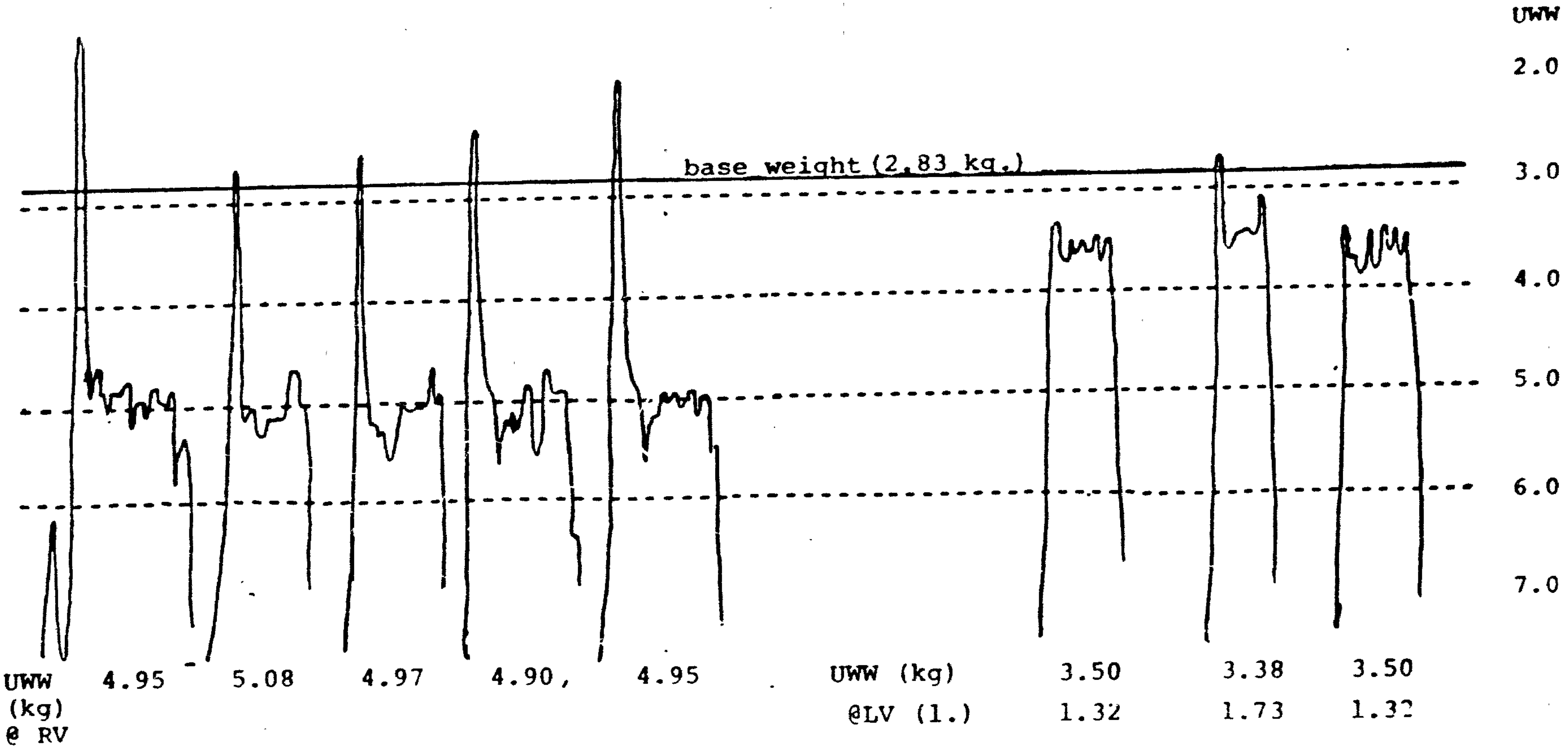
The underwater weight was determined in two ways: (i) read directly from the Chatillon Scale by each of the operators, and (ii) recorded on a 2 channel strip recorder (Can Lab Linear 1200) as the fine movement of the Chatillon Scale arm sensed by a potentiometer on the spindle of the arm. The accuracy of the electronic recording system was 0.10 Kg. of under waterweight. Figure 3.4 shows a typical tracing of the underwater weight in which the oscillations of the scale can be seen; the central locus is the accepted value for the underwater weight (including chair weight).

An automated spirometer (SRL M-10) was positioned near the support so that the intake tube could easily be extended to the subject in the water. The spirometer was calibrated for volumes of 1, 2, 3, and 4 litres with a metered calibrating syringe. The accuracy of measurement of forced vital capacity (FVC) has been shown to be 30 ml, or ± 2% (Shephard and Cox, 1980). This accuracy level falls within the standards of the American Thoracic Society (±3% or 50ml).

Procedure 1: Hydrostatic weighing at maximal expiration

The method for hydrodensitometry at maximal expiration to residual volume (HW_{me}) is as follows:

Figure 3.4 Typical tracing of the underwater weight showing oscillations of the scale. (ID. #254, male, 40 yrs., 175.4 cm., 72.7 kg., FVC= 5.67 l., RV_{He}=1.78 l., $RV_{pred.}$=1.94 l.)



UWW selected= 4.95 kg.

D_B@ME= 1.058 g/cc.
BF= 17.6%

D_B@LV = 1.0563 g/cc.
BF= 18.5%

i) The subject was instructed in advance both by written and verbal communication to fast for 5 to 6 hours prior to testing while avoiding all carbonated drinks.

ii) The subject was asked to wear a light-weight nylon bathing suit.

iii) Upon arrival in the test area, the subject was asked to void both the bladder and the GI tract if possible.

iv) The subject carefully read and signed the consent forms.

v) At the hydrostatic weighing station, seated out of the water, the subject was asked to perform the pulmonary function test (forced vital capacity (FVC); forced expiratory volume in 1 second (FEV 1.0) and peak flow rate (PF)) 3 times on the automated spirometry. The average of the two highest scores was recorded for each variable.

vi) Measurement of residual volume (RV) by helium dilution.

vii) Measurement of body mass in air.

viii) The subject was re-instructed as to the purpose of the underwater testing and procedures. (At this time some subjects chose to withdraw from any further involvement in the testing. In accordance with the consent form and conditions agreed with the University of Toronto Office of Research Administration (ORA), such subjects could continue with other sections of the body composition evaluation, or retire from the study as they wished).

ix) The subject, fitted with a 2.8, 4.0, or 5.2 kg. scuba weight belt, was asked to lower himself carefully into the water using the steps, and to sit in the submerged hydrostatic chair. The weight belt mass underwater was recorded for later underwater weight adjustment; this belt had corresponding volumes of 0.56, 0.58, and 0.60 l for the 3 masses in air. These volumes were used to correct for the chair/equipment weight.

xi) The subject was given further preliminary instructions, and was fitted with a standard noseclip, if desired.

xii) The subject practiced the breathing procedure by performing 2-3 maximal expiration trials to residual volume.

xiii) The subject completed 5-7 trials in which maximal expiration to RV was done underwater.

xiv) The underwater weight was taken to be the average of the 3 highest but consistant values recorded within ± 10 gm. If the subject was not completely submerged on a given trial, that trial was disregarded.

xv) The subject was then prepared for the second procedure, ie. hydrostatic weighing at any lung volume (HW_{lv}). During the field testing, the hydrostatic weighing at maximal expiration HW_{me} preceded the HW_{lv}. The ordering of the testing procedure was necessary because the time to learn the HW_{me} procedure is more prolonged, and in theory, the HW_{lv} does not require much learning (Weltman and Katch, 1981).

Procedure 2: Hydrostatic weighing at any lung volume

This second procedure (HW_{lv}) was not very different in the preparation, pre-test, or habituation phases from HW_{me}. The procedure was as follows:

i) The subject was informed about the purpose and technique to be used in the second procedure and the nose clip was positioned.

ii) The subject took a breath, not necessarily maximal, and submerged the head approximately 10 to 15 seconds. While a tight seal around the mouth piece was requested, any air leakage was clearly visible.

iii) When the subject re-surfaced, the air still held in the lungs was expired into the SRL M-10 spirometer; this expired volume of air was recorded both from the digital display (visual) and from the strip rcorder (hard copy) in much the same way as the simultaneous underwater weight.

iv) The practice sequence was repeated 1-2 times to familiarize the subject with the new procedure.

v) The test sequence involved 3 repeats of the procedure, or until 2 trials were completed correctly.

Calculations of total body density (BD) and percent body fat (%BF)

The general formula for calculating body density (BD) is mass/volume, where density is expressed as g/cm^3, and body mass and volume are in kilograms and liters, respectively.

The formula for calculating body density using underwater weighting at maximal expiration is:

$$BD_{me} = \frac{M_a}{\frac{(M_a - M_w)}{d_w} - (RV + 0.1)} \tag{8}$$

The formula for calculating body density using underwater weighing at vital capacity is:

$$BD_{vc} = \frac{M_a}{\frac{(M_a - M_w)}{d_w} - (LV + RV + 0.1)} \tag{9}$$

The percentage of body fat was determined from the simple algebraic equation of Brozek et al. (1963) that incorporates the average densities of the fat(d_{fm}) and fat-free(d_{ffm}) tissues (0.900 g/cm^3 and 1.10 g/cm^3, respectively):

$$BD = \frac{(FM + FFM)}{\frac{FM}{d_{fm}} + \frac{FFM}{d_{ffm}}} \tag{10}$$

Since the density of the whole system equals the FM plus the FFM (ie. FM+FFM=1), then:

$$BD = \frac{1}{\frac{FM}{d_{fm}} + \frac{FFM}{d_{ffm}}} \tag{11}$$

The proportional contribution of the fat is derived by rearrangement of equation (11):

$$\%BF = \frac{1}{\dfrac{(d_{fm})(d_{ffm})}{(d_{fm}-d_{ffm})} - \dfrac{d_{fm}}{(d_{fm}-d_{ffm})}} \qquad (12)$$

This equation is then reduced by substitution of the average densities of the FM and the FFM (Brozek et. al., 1963):

$$\%BF = 100\left(\frac{4.57}{BD} - 4.142\right) \qquad (13)$$

3.4 Procedures for anthropometric body composition assessment.

Anthropometric variables can be grouped into 3 categories:

i) Linear measurements, including:

  - stature
  - lengths
  - diameters (widths)
  - circumferences (girths, casings)

ii) Mass

iii) Skinfold thickness

All measurements must be made accurately by a skilled and experienced anthropometrist. The reliability and validity of any measurement can decrease considerably when performed by inexperienced personnel. Anthropometric measurements must be learned by the anthropometrist through both proper teaching of protocols and hours of practice. The author was trained in the anthropometric protocols of the International Biological programme. The reliability of each measurement by this anthropometrist lies between 0.90 and 0.99. The validity and reliability of these measurements are discussed elsewhere.

Anthropometric Protocols

The 47 anthropometric measures used in this study come from 4 sources:

i) International Biological Programme (IBP) (Weiner and Lourie, 1969; Weiner and Lourie, 1981);

ii) Montreal Olympic Games Anthropometric Program (MOGAP) protocols (Borms et al., 1979; Ross et al., 1982);

iii) Behnke and Wilmore (1974);

iv) Heath-Carter Somatotyping (Heath and Carter, 1967; Carter et al., 1983).

Table 3.6 compares and contrasts the 4 sources. The primary protocol used in this study was the IBP handbook "Practical Human Biology", (Weiner and Lourie, 1981) which is a reprint of the original IBP handbook "Human Biology: A Guide to Field Methods", (Weiner and Lourie, 1969). The anthropometric procedures described by Weiner and Lourie have been followed with only 4 exceptions: (i) flexed upper arm (bicep) circumference, and (ii) chest depth (antero-posterior chest width), plus a clarification of (iii) suprailiac/iliac, and (iv) subscapular skinfolds. The description of upper arm circumference contracted in the IBP protocol requires measurement of the tensed arm with elbow bent at 90 and the humerus in the same longitudinal axis as the trunk. Thus the tape around the arm is held in the horizontal plane. By contrast, the Somatotype, MOGAP and Behnke and Wilmore protocols require the maximally flexed arm to be held perpendicular to the axis of the body with the tape around the arm in a 90 cross-sectional plane to the axis of the upper arm. To meet the requirements of the Heath-Carter Somatotype protocol, contracted biceps circumference was defined by the MOGAP/H-C protocols.

The chest depth is defined by IBP and MOGAP as the maximal anterio-posterior distance from the sternum to the tip of the spinous process at the union of the 3rd and 4th sternebrae, in a plane perpendicular to the body axis. Ross and Marfell-Jones (1982) use the term mesosternale level for the application point of the spreading caliper olive tip. The timing of the measurement is "end of normal expiration (end tidal)" (Ross and Marfell-Jones, 1982, p.89). However, the fundamental difference in the

Table 3.6. Variable List, with indication of source, recommendations and procedures made in other studies

No.	Variable	Source				Comment
		IBP	MOGAP	B&W	OTHER	
1	Stature cm.	x	x	x	HC	
2	Sitting Height cm.	x	x	x		
	Skinfolds					
3	Biceps	x	x	x		
4	Triceps	x	x	x	HC	
5	Subscapular	1.	x	x	HC	1. IP= Left Scapula
6	Suprailiac		x	x		
7	Iliac (supra-spinale)	x	x		HC	
8	Chest	x	x	x		
9	Mid-axillary	x	x	x		
10	Abdomen	x	x	x		
11	Anterior Thigh	x	x	x		
12	Calf (medical)	x	x	x	HC	
	Circumferences					
13	Head	x	x	x		
14	Neck	x	2	x		2 MOGAP above larynx
15	Shoulder			x		
16	Chest	x	x	3		3 not for women -below breast
17	Abdomen 1		x	x		
18	Abdomen 2	x		x		
19	Gluteal	x	x	x		
20	Thigh	x	x	x		
21	Knee			x		
22	Calf	x	x	x	HC	
23	Ankle	x	x	x		
24	Upper Arm Flexed	4	x	x	HC	4. IBP Protocol arm not elevated

25	Upper Arm	x	x	x		
26	Forearm	x	x	x		
27	Wrist	x	x	x		
	Diameters					
28	Shoulder			x		
29	Biacromial	x	x	x		
30	Chest (Transverse)	x	x	x		
31	Chest (Ant.-Post.)	5	x			5. IBP= standing subject
32	Billiac (biilio-cristal)	x	x	x		
33	Bitrochanteric			x		
34	Bicondylar Femur	x	x	x	HC	
35	Ankle	x		x		
36	Bicondylar Humerus	x	x	x	HC	
37	Wrist	x		x		
38	Hand	x				
	Lengths					
39	Total Arm L.	x				
40	Total Arm Segment	x				
41	Forearm Segment	x				
42	Ht. of Acromion		x			
43	Ht. of A.S.I.S.	x	x			
44	Ht. of Tibiale	x	x			
45	Tibiale Length	x				
46	Foot Length	x	x			
47	Body Mass	x	x	x	HC	

Calculated lengths

Upper Arm Segment	x	
Hand Segment	x	
Trunk Length		x
Leg length		x
Head Ht.		x

two protocols is the body position during measurement, ie. standing verses seated (IBP and MOGAP protocols, respectively). Past experience with both protocols, particularly with respect to very tall subjects, which is common in athletic populations, has led to acceptance of the MOGAP procedure for A-P chest depth. It is easier to be consistant with the subjects seated and the calipers placed over the right shoulder and into the mesosternal position.

Two skinfolds on the right lateral side of the trunk at the level of the ilium were taken: (i) suprailiac SF in the mid-axillary line (Behnke and Wilmore, 1974; Ross and Marfell-Jones, 1982), and (ii) iliac or supraspinale SF as defined by Heath-Carter, IBP and MOGAP protocols. This was done to allow description by Heath-Carter endomorphic components, and calculation of BF using prediction equations which require iliac SF in the anterior axillary line such as Durnin and Womersley (1974) and Drinkwater and Ross (1980).

The MOGAP protocol has been extensively used in the assessment of elite athletes (Borms et al., 1979; Carter et al., 1982). This protocol includes the variables necessary to estimate body shape and musculo-skeletal proportions using the Heath-Carter protocol, but it does not include all the measurements necessary to test various body composition prediction equations or methods for the fractionation of mass (Behnke and Wilmore, 1974).

The subscapular skinfold in the IBP protocol states "... the skinfold is picked up under the inferior angle of the left scapula ..." (Weiner and Lourie, 1981, p. 41). Most protocols today, including that of Durnin and Womersley (1974), have the subscapular skinfold raised inferior to the right scapula. The skinfolds in the Nutrition Canada surveys have also been taken on the left side of the body. However, there is general agreement that no statistical difference in skinfold readings exist between measurements on the right vs the left side of the body (Jette, 1982).

The current anthropometric standards for Nutrition Canada Surveys (Demirjion, 1980), the Canada Fitness Survey (Bouchard, 1984), and past and present research on the Canadian Forces (Jette, 1984 personal communications; Bell and Cox, 1983) have been based on the IBP protocols.

Finally, the Behnke-Wilmore procedures as described in "Evaluation and Regulation of Body Build and Composition" (1974), are very widely used in the United States. The development of the "reference man" and 'reference woman' by Behnke required a more extensive list of circumferences and diameters. Behnke used many more circumferences than most protocols incorporate; specifically, the additional girth measures include: shoulder, 2 abdominal, knee and ankle. Similarly, eight measures of body diameter were taken including: left and right wrists, ankles, knees and elbows. While both right and left extremity widths were not measured the following Behnke and Wilmore diameters were included:

- bideltoid (shoulder)
- biacromial
- chest
- biiliac (biiliocristal)
- bitrochanteric
- knee (bicondylar femur; right)
- ankle (right)
- elbow (bicondylar humerus; right)

The Behnke and Wilmore (1974) procedures do not include any body segment lengths. For a complete description of linear proportionality, limb and trunk lengths were included. The majority of these measurements were done according to the IBP protocol as shown in Table 3.6, with the only exception being the height of the acromion from the floor which was taken from Ross and Marfell-Jones (1982); this protocol allows the addition of measurements of trunk length, head and neck height.

Anthropometric Conventions

Anthropometric descriptions are given with reference to 3 primary planes with the subject standing erect:

- the Sagittal plane (antero-posterior axis)
- the Transverse plane
- the Frontal plane

Landmarks sites

There are various landmarks which can be marked as reference points for the accurate placement of instruments such as anthropometers, sliding calipers and skinfold calipers. The following points were marked on the standing subject with a red dermographic pencil:

i) mid-upper arm: a dot was placed on the lateral aspect of the arm, midway between the superior and laterial border of the acromion and the tip of the olecranon process of the ulna. A point horizontal to this dot was placed on the anterior mid-line for the biceps skinfold and on the posterior mid-line for the triceps skinfold.

ii) mid-axillary line: a dot was placed on the mid-axillary line, 3 cm above the ilium for the placement of the suprailiac skinfold.

iii) anterior axillary line: a dot was placed on the line of the anterior axillary border (armpit), at the level of the iliac crest (7 cm above the anterior superior iliac spine).

iv) mid-thigh: a dot was placed halfway between the mid-inguinal point and the upper anterior point of the patella, with the knee flexed at 90 .

Measurement techniques

i) Linear measurements

Body stature was measured in a free standing position with the feet closed and head in the Frankfurt (horizontal) plane. The instrument used was a Siber - Hegner GPM anthropometer of the Martin type. The foot of the anthropometer was fixed to the floor and the top attached to a wall support. Subjects were assisted into a stretched posture by the application of gentle pressure on the mastoid process (Weiner and Lourie, 1969, Ross and Marfell-Jones, 1982).

Body diameters are useful measures of both body and skeletal size. Measurements of linearity (limb length, trunk length, head and neck height) and non-linearity (limb thickness, trunk thickness) can be incorporated into both 'Gestalt' and 'non-Gestalt' models of body physique.

Like all anthropometric measurements, lengths and diameters require detailed knowledge of body landmarks and standardized procedures. Body lengths and some larger widths (shoulder, chest, biacromial, biiliac, bitrochanteric) are made in a standing anatomical position. Following identification and marking of landmarks, the subject stands facing away from the anthropometrist. Measurements proceed in a systematic order so that speed and accuracy of measurement are maintained, but not at the expense of the subject's convenience. Once the standing measurements have been completed, the seated measurements are taken (knee and ankle widths, foot and shank length, and sitting height). The calipers are positioned as described in Ross and Marfell-Jones (1982); Weiner and Lourie (1981), and Behnke and Wilmore (1974). Behnke and Wilmore (1974) provide the most extensive list of body diameters.

The anthropometric equipment used in this research was the Siber - Hegner anthropometer which includes a large sliding caliper (A) and small sliding bone caliper (B). All body lengths and some larger widths (shoulder, chest, biacromial, biiliac, bitrochanteric) were made with the large anthropometer. Other small diameters (elbow, wrist, hand, knee, ankle) were measured with the small sliding caliper (Table 3.7).

Table 3.7 Instruments used in measuring body length and diameters measurements

(Widths)		(Lengths)	
Standing			
Shoulder	A		
Biacromial	A	Acromial Height	A
Chest	A	Spinale Height	A
Biiliac	A	Tibial Height	A
Bitrochanteric	A		
		Total Arm Length	A
Elbow	B	Total Arm, Segment	A
Wrist	B	Forearm Segment	A
Hand	B		
Sitting			
Knee	B	Shank	A
Ankle	B	Foot length	A
		Sitting Height	A

(A = Anthropometer; B = Sliding Caliper)

The scale on the large anthropometer can be read to 0.1 cm., eg. biacromial width 39.1 cm; the vernier scale of the small sliding calipers is accurate to 0.01 cm., eg. elbow diameter 6.12 cm. However, the data read from the sliding caliper was recorded to only 1 decimal place, eg. 6.1 cm., since the best estimates of tolerance are 1-2 mm (Borms et al., 1979; Weiner and Lourie, 1969).

A flexible Lufkin metal tape was used to measure all body girths. The tape was checked against a one meter steel measuring ruler.

The major source of error when taking body circumferences is the compression of soft tissues with the tape. Unless care is taken to exert only a constant light pressure of the tape on the body segment being measured, considerable error can arise. The test-retest reliability of girth measurements by a trained anthropometrist is similar to skinfolds, ie. 0.90 - 0.96.

A second important source of error is the dispacement of the tape from the horizontal plane around the body segment (with the exception of flexed bicep girth as previously mentioned).

The following 15 body circumferences were measured in this study:

- head
- neck
- shoulder
- chest
- abdomen 1
- abdomen 2
- gluteal
- thigh
- knee
- calf
- ankle
- flexed upper arm
- relaxed upper arm
- forearm
- wrist

All measurements were made according to the Behnke and Wilmore (1974) protocol except the chest circumference for females; chest girth in females was taken at the same position, mesosternal, as the males. This decision was based on the desire for primary compliance, as required by the IBP protocol.

(ii) Body mass

Body mass was measured on an accurately calibrated balance-beam scale (Health-O-Meter, Continental Scale Corp., Bridgeview, Illinois), and recorded at a precision of 0.10 kg. (Borms et al, 1979). The subject was lightly clad in a bathing suit only, adding approximately 100 gms. It was not possible to measure all subjects in the early morning as testing was scheduled from 8:30 a.m. to 5:00 p.m. Thus, the subjects were asked to void bladders and GI tracts before weighing. They were instructed prior to the testing not to avail themselves of food or drink 6 hours prior to the scheduled body composition test appointment.

(iii) Skinfold thickness

Skinfold thicknesses were measured with a Harpenden skinfold caliper (Bull Instruments Ltd., England). These calipers are designed to exert a constant pressure of 10 g/mm^2 of caliper face over a face area of 35 mm^2. While measurements are usually recorded to 0.2 mm (Canadian Standardized Test of Fitness, 3rd ed., 1985), some researchers read to the nearest 0.1 mm (Ross and Marfell-Jones, 1982).

A double fold of skin and subcutaneous fat is picked up with the thumb and index finger such that: (i) the fold includes a double layer of skin and subcutaneous fat, and (ii) the caliper is placed one centimeter from the anthropometrist's fingers, but on the exactly pre-determined site as defined by the protocol. The caliper jaws are closed on the fat fold for 2 seconds of full pressure, the reading taken, and the caliper removed.

While the movement of the caliper needle should slow after 2 seconds, this is not always the case; however, the protocol requires caliper reading after 2 seconds of tissue compression.

The 10 skinfold measurements which were taken include:

- biceps
- triceps
- subscapular
- suprailiac
- iliac (supraspinale)
- chest
- mid-axillary
- abdomen
- anterior thigh
- medial calf

3.5 Prediction of body fatness

Two methods of estimating body fatness were evaluated:

(i) multiple regression analysis of independent anthropometric variables against the dependent variable, ie. percent body fat (as determined by hydrodensitometry), and

(ii) a model in which the sum of skinfolds, adjusted for stature and mass, is transformed to an index of relative body fatness (Behnke and Wilmore, 1974; Katch and Katch, 1983) as presented in section 3.6.

Multiple regression models using (i) skinfolds, (ii) circumferences, and (iii) all variables are outlined in sections 3.6 and 3.7.

Prediction of Estimation of Body Fatness

When determining an appropriate body fat prediction equation, the following statistical and biological considerations must be satisfied:

(i) the characteristics of the primary group of subjects being used for the determination of the estimations must be clearly defined,
(ii) the ratio of the number of variables entered into the regression equation to the number of subjects tested must be considered and should be >1:20,
(iii) the variables selected must not be highly correlated amongst themselves (multi-collinearity),
(iv) account must be taken of the non-linear association of body density with the independent variables,
(v) allowance must be made for the effects of age and gender on the observed relationships.

Regression Procedure

The Maximum R^2 Improvement procedure (MAXR) as described in the SAS Users Guide (1979) was employed. The R^2 of each variable, or combination of variables, was examined for each new variable entry by using a switching algorithm searching for the greatest R^2. Variables are included in the model only if they attain <0.10 probability levels from the partial F test.

The difference between the MAXR and normal stepwise techniques is that any exchanges of variables in the MAXR model are made after the examination. However, in the stepwise procedure, removal of variables with small partial F ratios precludes any consideration of the effects of the addition of the 'best of the remaining' variables.

Group Homogeneity: Normality and Outliers

Samples were tested for group homogeneity, and where necessary, the effect of eliminating outlying values tested. While Dixon's test (Dixon, 1950) is suitable for samples of <25, suspected outliers in samples >25 can be identified by the technique of Grubbs (1969):

$$C = \frac{(X_i - \overline{X})}{S.D.}$$

where X_i = outlier value

$\overline{X}$ = mean value of the sample

S.D. = standard deviation of the sample

C = critical value (a critical value for elimination of a suspected outlier is $C>0.10$)

To reduce the set of anthropometric variables to a more manageable and appropriate regressor set, a preliminary factor analysis was carried out by gender. This procedure identified variables which were closely related to the fat and fat-free components (Jackson and Pollock, 1976; Meleski, 1980; and Thorlund et al, 1984 a,b). The percentage of variance accounted for by each factor in both the rotated and unrotated positions served as a criterion for the optimal grouping of variables. Mukherjee and Roche (1984) suggested that a preliminary non-statistical selection was also useful in reducing the number of variables.

To reduce the effects due to a high correlation among the independent variables, the correlation matrix was scrutinized. Selected variables were: (i) highly correlated with the dependent variable, and (ii) not highly correlated with each other. For example, since the subcutaneous skinfold thicknesses were highly correlated with each other, the sum of skinfolds was used to reduce the potentially confounding effects of multi-colinearity.

Since the relationship between body density and skinfold thickness is curvilinear, a better fit should be obtained with a log or quadratic transformation. Therefore, the following derivations of skinfold thicknesses were examined in relationship to body density and relative body fatness from hydrodensitometry:

(i) one or more skinfolds (chosen from the 10 measured),
(ii) sum of skinfolds (sum of 10, 5, 4, 3, 2),
(iii) log sum of 4, 3 and 2 skinfolds,
(iv) quadratic transformations of sum of skinfolds.

The relationship of circumferences to body fatness is also thought to be curvilinear (Hogdson et al, 1984). The need for log transformed relationships were evaluated by linear regression analysis.

3.6 Body fat estimation from skinfold thickness

Relative body fat prediction equations were developed using a reduced set of anthropometric variables as discussed in section 3.5.

Determination of the best model is based on:

(i) maximum R^2 improvement (MAXR)
(ii) the smallest standard error of the estimate (S.E.E.)
(iii) Mallow's c(p) criterion (Mallow, 1973).

The subsets of variables with c(p) less than or equal to the number of variables is the least restrictive condition for the optimal model (Mallow, 1973; Mukherjee and Roche, 1984).

The generality of the 'best' model is then cross-validated against a second group of males and females having a similar background, occupation and age as the main sample.

Behnke Scaling Model of (AB) body fat prediction from skinfold thicknesses

The procedure of Behnke and Wilmore (1974) has recently been adapted (Katch and Katch, 1983) for use with 5 skinfolds (triceps, subscapular, suprailiac, abdomen and thigh) rather than radiographic measurement of fat thickness. The sum of skinfolds (SF) is scaled by the 3F factor, ie. $3(\text{mass/stature})^{1/2}$, where stature is measured in decimeters (dm). Body fat is then calculated from:

$$\% \, BF = \frac{SF}{(3F)(K_{sf})} \qquad (14)$$

where K_{sf} is a constant derived from reference data, and is determined as:

$$K_{sf} = \frac{SF_{ref}}{3 \left(\dfrac{M_{ref}}{Stat_{ref}} \right)^{1/2} BF_{ref}} \qquad (15)$$

where BF_{ref} is a reference body fat based on a suitable standard such as hydrodensitometry, M_{ref} and $Stat_{ref}$ are reference body mass (kg) and stature (dm).

In the present research, the reference values are sex and age-specific group mean values for stature, mass, % body fat from hydrodensitometry, and sum of 5 skinfolds. Table 3.8 gives an example of a K_{sf} calculation, and Table 3.9 gives the reference values used for the CF sample.

Table 3.8 An example of K_{sf} calculations for reference young males (Katch and Katch, 1983)

Stature = 18.42 dm. (or 184.2 cm.),
Mass = 72.16 kg.
Sum 5 SF = 67.3 mm. (triceps, subscapular, suprailiac, abdomen, thigh)
Mean %BF = 15.3%

$$K_{sf} = \frac{67.3}{3\left(\frac{72.16}{18.42}\right)^{1/2}(15.3)}$$

$$= 0.741$$

Table 3.9 Sample description of 'reference' Canadian Forces (CF) personnel

Age (yrs)	< 30	30-39	> 40
Males:			
5 SF (mm)	73.6	89.2	88.6
Ht (cm)	173.8	173.9	174.9
Ht (dm)	17.38	17.39	17.49
M (kg)	75.1	78.9	79.5
% BF	16.3	19.5	21.7
AGE (yrs)	24.1	35.9	47.6
K_{sf}	0.724	0.716	0.634
N =	57	37	61
Females:			
5 SF (mm)	87.8	99.4	101.5
Ht (cm)	164.1	164.0	165.3
Ht (dm)	16.41	16.40	16.53
M (kg)	60.4	62.3	64.0
% BF	23.2	26.8	27.1
AGE (yrs)	24.8	34.0	45.9
K_{sf}	0.658	0.634	0.635
N =	60	43	22

3.7 Body fat estimation using all variables

3.8 Body fat estimation using circumferences only

Relative body fat prediction equations were developed using all variables from the reduced list. The best regression model for all variables for each sex was derived from the following list of variables:

(i) all skinfolds
(ii) sum of skinfolds
(iii) log of sum of skinfolds
(iv) circumferences from the reduced variable set
(v) bony diameters from the reduced variables set
(vi) stature
(vii) age.

The best models of circumferences only and all variables were derived by:

(i) maximum R^2 improvement
(ii) minimum standard error of estimate (S.E.E.)
(iii) Mallow's c(p) criterion.

The models chosen were then cross-validated on the other Canadian Forces group.

3.9 Musculo-skeletal proportions and somatotype (Heath-Carter procedures)

The technique of somatotyping most commonly used today was developed by Heath and Carter (1967). This procedure employs anthropometric measures to give a more reliable estimate of Sheldon's conceptual 'whole' somatotypes (Sheldon et al, 1940) which, in the past, were judged subjectively. The 3 primary components of somatotype are:

- endomorphy (component 1)
- mesomorphy (component 2)
- ectomorphy (component 3)

Each of the 3 components of somatotype are defined by a normalized scale, originally 1 to 7 (Sheldon et al, 1940), but later redefined as 1 to 9 (Heath, 1963; Sheldon et al, 1969). More recently, with the development of computer programmes and regressions for the calculations of somatotype (Carter, 1980; Heath and Carter, 1967), each component of somatotype has been considered as a continuous variable from a minimal rating of 0.1 (Ross and Marfell-Jones, 1982) to a maximum in the general range of 9. The anthropometric variables required for the Heath-Carter Somatotype (H-C) calculation are outlined in Table 3.10.

3.10 Anthropometric variables collected for the determination of Heath-Carter somatotype

(i) Stature (cm)
(ii) Mass (kg)
(iii) Skinfolds (mm)
  - triceps
  - subscapular
  - iliac (supraspinale)
  - medial calf
(iv) Circumferences (cm)
  - flexed upper arm
  - calf
(v) Diameters (cm)
  - bicondylar humerus (elbow)
  - bicondylar femur (knee)

Endomorphy

The sum of 3 skinfolds (3SF), triceps, subscapular and iliac, are entered into a cubic equation to predict an endomorphy score (I):

$$I = -\ 0.7182 + 0.1451\ (3SF) - 0.00068\ (3SF)^2 + 0.0000014\ (3SF)^3 \qquad (16)$$

Ross and co-workers (Ross and Marfell-Jones, 1982) refer to an adjustment of the endomorphy score for stature by scaling data to the stature described by the unisex phantom (170.18 cm, Ross and Wilson, 1973). This adjustment was made for comparison, and will be referred to as endomorphy -2 (I-2). It is calculated as:

$$I\text{-}2 = \frac{170.18\ (I)}{(\text{Stature})} \qquad (17)$$

Mesomorphy

The assessment of musculo-skeletal robustness by the Heath-Carter 2nd component, mesomorphy, used corrected circumferences and body diameters in combination with stature.

The maximal girths of the biceps (flexed) and calf are adjusted by reducing circumference for the overlying skinfold thickness (triceps and medial calf skinfold thicknesses, respectively).

The bony diameters used in H-C somatotyping are the bicondylar humerus (elbow) and bicondylar femur (knee). These variables are standard 'non-Gestalt' measures of musculo-skeletal robustness (Behnke and Wilmore, 1974; Metropolitan Life, 1980).

The regression equation for calculation of the H-C second component (II, Mesomorphy) is:

$$\begin{aligned} II = {} & 0.858\ (E) + 0.601\ (K) + (0.188\ (B-TSF)) \\ & + (0.161\ (C-CSF)) - (0.131(S) + 4.50 \end{aligned}$$

where:

E = elbow or bicondylar humerus diameter (cm)
K = knee or bicondylar femur diameter (cm)
B = flexed upper arm circumference (cm)
C = calf circumference (cm)
TSF = tricep skinfold (cm)
CSF = medial calf skinfold (cm)
S = stature (cm)

Ectomorphy

The third H-C somatotype component, ectomorphy, is assessed from stature and mass, using a ponderal index, ie. [stature/(mass)$^{1/3}$]. The regression equation for ectomorphy (III) is:

$$III = \frac{0.732\ (\text{Stature})}{(M)^{1/3}} - 28.58 \tag{18}$$

The scores for ectomorphy have qualifiers; where the index is less than 40.75, but greater than 38.28, the regression equation is modified to:

$$III = \frac{0.463\ (\text{Stature})}{(M)^{1/3}} - 17.63 \tag{19}$$

If the index is less than or equal to 38.25, a minimal rating of 0.1 is assigned (Ross and Marfell-Jones, 1982) since negative values are unrealistic. For average males (170 cm) and females (160 cm), the minimal body mass to achieve a score of 0.1 would be 87.8 kg and 73.2 kg, respectively.

Analysis of Somatotype

While a somatotype is a conceptual whole, it is most often viewed as 3 separate components whose scores are each derived from specific anthropometric variables. Thus the description of somatotype must include both the component parts and the entire somatotype in order to completely assess the variation of body build.

Means, variance and standard deviations can be calculated for each somatotype component, ie. endomorphy (endomorphy -2), mesomorphy, and ectomorphy. Also traditionally included in a descriptive analysis of somatotype is the ponderal index score, ie. $[\text{stature}/(\text{mass})^{1/3}]$.

However, to describe the true 'Gestalt' nature of somatotype, single scores have been used to describe each individual in a 3-dimensional (3-D) space. Traditionally such displays of somatotype, called somatoplots, were 2-dimensional (2-D) representations of the 3-D space. The 2-D displays were used to represent the subjects visually by sex, age, or activity group. However, it should be stressed that such 2-D somatocharts do not always provide a satisfactory measure of the true distance between somatoplots because of the 3-D nature of the endo-, meso-, ectomorphy components (Carter et al, 1983; Duquet and Hebbelinck, 1977). Therefore, 2-D and 3-D analysis of somatotype dispersion should include: (i) somatotype dispersion distance (SDD), and (ii) somatotype attitudinal distance (SAD), respectively.

Two-dimensional somatotype analysis

The bidimensional analysis of somatotypes considers the distance between somatopoints in a 2-D somatoplot. The somatotype dispersion distance (S.D.D.) is the distance between any two somatotypes on a somatoplot. The mean somatoplot is calculated from an X-Y grid as:

$$X = III - I$$

$$Y = 2(II) - (III + I)$$

where: I = endomorphy score
II = mesomorphy score
III = ectomorphy score

The somatotype dispersion distance (SDD) is then calculated as:

$$SDD_{1,2} = (3(X_1 - X_2)^2 + (Y_1 - Y_2)^2)^{1/2} \qquad (20)$$

where (X_1,Y_1) and (X_2,Y_2) are the coordinates of somatoplots 1 and 2.

The somatoptype dispersion mean (SDM), or the somatotype dispersion index_(Ross and Wilson, 1973), is the scatter about the mean (S) in 2 dimensions and is calculated as:

$$SDM = \sum_{i=1}^{n} (SDD_i /n) \qquad (21)$$

where SDD_1 is the distance from somatotype (S_1) to the mean of the somatoplot (S). The variance of this dispersion is $S_D{}^2$.

Three-dimensional somatotype analysis

Although graphical representation of 3-D space is more complicated, it is the best method of analysis of somatotype. Carter and co-workers (Carter et al, 1983) have presented a sophisticated, analytic procedure called the somatotype attitudinal distance (SAD), which describes the distance between somatopoints in a true three-dimensional way. The SAD has a scatter about the mean (S) called the somatotype attitudinal mean (SAM) with a variance, $S_A{}^2$.

$$SAD_{1,2} = ((I_1-I_2)^2 + (II_1-II_2)^2 + (III_1-III_2)^2)^{1/2} \qquad (22)$$

where I, II and III represent endo-, meso-, and ectomorphy respectively, and the subscripts are between 2 groups. The somatotypes attitudinal mean (SAM) is calculated as:

$$SAM = \sum_{i=1}^{n} (SAD_i \,/\, n) \qquad (23)$$

The distance between any two somatoplots in the 3-D comparison is an actual distance, while the distance between the 2 somatopoints when pictured in 2-D is only a projection since the X and Y coordinates must first be derived. The 3-D somatotype was used in this analysis as its attitudinal distance is preferred because of the reduced variance of the distribution about the mean somatoplot (S).

Calculation of variance

It is common nowadays to use tests of significance not just a simple mean of components in the analysis of somatotypes. The measure of variability of somatotypes within a population, about a group mean (S), for both two- and three- dimensional somatoplots, are calculated as:

$$S_D{}^2 = \quad SDD_i{}^2 \; / \; (n-1) \tag{24}$$

$$S_A{}^2 = \quad SAD_i{}^2 \; / \; (n-1) \tag{25}$$

Prior to testing the significance between group somatotype means, a test of homogeneity (equality of variance) is necessary for either SDM or SAM. Carter et al, (1983) recommend a Hartley's F_{max} test as described by Winer (1971):

3-D:

$$F_{max} = \frac{S_1{}^2}{S_2{}^2} = \frac{\left(\dfrac{SAD_1{}^2}{(n_1 - 1)}\right)}{\left(\dfrac{SAD_2{}^2}{(n_2 - 1)}\right)} \tag{26}$$

Tests of significance between independent group somatotype means are derived from the sum of squared deviations of the somatotype attitudinal distance, ie. $SAD_{1,2}$, and compared by either a t-test or analysis of variance.

$$\text{t value} = \frac{(\bar{S}_1 - \bar{S}_2)}{\left[\left(\dfrac{(SAD_1{}^2) + (SAD_2{}^2)}{(n_1 + n_2 - 2)}\right)\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)\right]^{1/2}} \tag{27}$$

$$\text{F value} = \frac{\left(\dfrac{SS_{treatment}}{df_{treatment}}\right)}{\left(\dfrac{SS_{error}}{df_{error}}\right)} = \frac{\sum^{k} n_j \, (\bar{S}_j - \bar{U})^2/(n-1)}{\sum \sum \; (SAD_j)^2} \tag{28}$$

Reference data for Canadian somatotype characteristics are shown in Table 3.11, from Bailey et al., (1982). This data is a subsample (N=2520) of the 13,599 participants in the YMCA-LIFE program, categorized by sex and age (15-69 years). Although it is a relatively large sample, it is probably biased towards the more physically active members of the community. This reference group data is employed in the analysis because SDM and SAM are provided for each sex and age-specific group.

Table 3.11. Reference Canadian somatotypes characteristics by age and sex. The scores for the Heath-Carter computer calculations are based on 2520 YMCA volunteers studied by Bailey et al. (1982); (Mean ± S.D.).

Sex	Age (yrs)	N	Endo	Meso	Ecto	SDM	SAM
Male	15-19	161	3.02 (±1.43)	4.65 (±1.51)	2.75 (±1.38)	4.91	2.16
	20-29	205	3.66 (1.52)	5.04 (1.23)	2.13 (1.19)	4.70	2.07
	30-39	213	4.07 (1.49)	5.38 (1.32)	1.80 (1.04)	4.42	2.00
	40-49	203	4.11 (1.25)	5.23 (1.23)	1.65 (0.97)	3.84	1.76
	50-59	231	4.14 (1.15)	5.49 (1.16)	1.59 (0.87)	3.63	1.64
	60+	187	3.94 (1.16)	5.11 (1.14	1.71 (0.96)	3.77	1.69
Female	15-19	235	4.33 (1.21)	3.69 (1.08)	2.41 (1.04)	3.78	1.69
	20-29	219	4.42 (1.19)	3.75 (1.18)	2.39 (1.08)	3.85	1.74
	30-39	200	4.47 (1.33)	3.87 (1.03)	2.34 (1.08)	3.88	1.76
	40-49	262	5.24 (1.41)	4.35 (1.34)	1.85 (1.01)	4.25	1.93
	50-59	248	5.37 (1.29)	4.43 (1.27)	1.74 (1.01)	4.02	1.81
	60+	156	5.35 (1.34)	4.69 (1.35)	1.62 (1.08)	4.36	1.97

Reference data for the athlete groups are drawn from the most recent Olympic profiles of somatotype available (Carter, 1984). The mean and standard deviations of each somatotype component are given by sex and by sport. The values are given in Table 3.12, below.

Table 3.12 Reference athlete somatotype characteristics by sex and by activity. Heath-Carter somatotype based on the data of Carter (1984); (Mean ± S.D.)

Activity	Sex	N	Endo	Meso	Ecto	SDM	SAM
Swimming	M	98	2.1 ±0.6	5.0 ±0.8	2.9 ±0.7	4.57	1.79
	F	59	3.2 ±0.8	3.9 ±0.7	3.0 ±0.9	3.22	2.86
Rowing	M	150	2.2 ±0.6	5.2 ±0.9	2.5 ±0.8	3.46	1.28
	F	51	3.1 ±0.8	3.9 ±0.9	2.8 ±0.8	3.05	1.36

Comparisons of the 'Gestalt' somatotype score and components were made for selected anthropometric variables which are measures of musculo-skeletal robustness. Anthropometric variables can be compared to somatotype component scores, e.g. sum of skinfolds versus endomorphy, but such analyses must be approached with caution since the interpretation of results can be misleading. Independent anthropometric variables and somatotype may, or may not, be related.

If a variable is not a somatotype calculating component, it is treated independently. Regression analyses of SDD or SAD and independent variables, eg. abdominal circumference provide proper measures of association (partial r and even multiple correlations, r^2). Methods of regression analysis were evaluated by tetrachoric correlation, and tested for significance by chi-square.

4.0 Results

4.1 Sample

The mean ages of the <30, 30 to 39, and >40 yrs. groups were 24.1 and 24.8 yrs., 35.9 and 34.0 yrs., and 47.6 and 45.9 yrs. for males and females, respectively.

The male and female Canadian Forces sample characteristics are described by age groups in Tables 4.1. There is a significant increase in body mass for each age group (<30 yrs. = 60.4 and 75.1 kg.; 30-39 yrs. = 62.3 and 78.9 kg.; and >40 yrs. = 64.0 and 79.5 kg., for females and males, respectively).

There was a significant increase in the stature of both males and females in the older age category (>40 yrs.), with 1.2 and 1.3 cm. differences in height for the females and 1.1 and 1.0 cm. differential for the males of the <30 and 30-39 yrs. age groups respectively.

Table 4.1 Reference study data for female (N=125) and male (N=155) Canadian Forces personnel by age group.

	Groups by Age		
	<30	30-39	>40
Females:			
N	60	43	22
Age (yrs)	24.8	34.0	45.9
Stature (cm)	164.1	164.0	165.3
Mass (kg.)	60.4	62.3	64.0
Males:			
N	57	37	61
Age (yrs)	24.1	35.9	47.6
Stature (cm)	173.8	173.9	174.9
Mass (kg.)	75.1	78.9	79.5

4.2 Residual Volumes

Two pre-study evaluations of the procedures of residual volume measurements were carried out, the results of which are presented in Appendix 7.3. These pre-study results suggested that the Helium dilution (RV_{he}) procedure of Ogilvie et al., 1957 was appropriate for the CF field tests to be carried out at the various Canadian Forces bases.

Results of the CF study are shown in Table 4.2. The prediction equations of Bass (1964), ie. 25% of FVC, and Goldman and Becklake (1959), ie., regression of stature and age, and Wilmore (1969) have been selected as the procedures for use in this research when residual volume by helium dilution is not measured. The Goldman-Becklake RV equation which does not require the measurement of forced vital capacity was used as the standard RV prediction equation for cross-validating the various body fat prediction equations on other groups.

Table 4.2 shows the residual volumes of the female and male subjects as measured by helium dilution and predicted by the procedures of Bass (1964), Goldman and Becklake (1959), and Wilmore (1969). The results of all RV prediction equations were significantly different from the helium dilution measured RV for females and males.

However, for the CF females, the density and relative fatness of the body were not significantly different for calculations using residual volumes of helium dilution and Wilmore's RV prediction. For the CF males, although the Goldman-Becklake RV prediction was significantly different from the RV measured by helium dilution, the body density and relative body fat were not significantly different. Thus the prediction procedure for residual volume for the males and females differs and neither FVC nor height and age have reliably predicted the RV as measured by helium dilution.

Table 4.2 Residual volumes of the study sample of the Canadian forces as measured by helium dilution and predicted by equations from the literature (Bass 1964, Goldman and Becklake 1959, and Wilmore 1969).

RV Method	N	Mean (ml)	S.D. (ml)	S.E. (ml)	C.V. (%)
Females:					
Helium dil.	121	1305.2	289.9	26.4	22.2
Bass (1964)	123	960.8	170.7	15.4	17.8
Goldman-Becklake (1959)	125	1642.9	224.4	20.1	13.7
Wilmore (1969)	123	1076.1	191.2	17.2	17.8
Males:					
Helium dil.	150	1676.1	403.0	32.9	24.1
Bass (1964)	152	1269.8	242.8	19.7	19.1
Goldman-Becklake (1959)	155	1864.6	258.7	20.8	13.9
Wilmore (1969)	152	1219.0	233.1	18.9	19.1

4.3 Hydrodensitometry

The results of the body density measurements and body fat calculations using measured and predicted RV for the CF sample are presented in Table 4.3.

Table 4.3 Body density and % body fat of Canadian Forces personnel with residual volume measured by helium dilution and by three prediction equations (RV_B - Bass, 1964; RV_{GB} - Goldman and Becklake, 1959 and RV_W - Wilmore, 1969) for 106 females and 147 males.

Method		N	Mean	S.D.	S.E.	C.V.(%)
Females:						
D_B-RV_{HE}	(g/cm^3)	106	1.0405	0.0152	0.00148	1.5
D_B-RV_B	(g/cm^3)	106	1.0350	0.0154	0.00150	1.5
D_B-RV_{GB}	(g/cm^3)	106	1.0469	0.0158	0.00154	1.5
D_B-RV_W	(g/cm^3)	106	1.0370	0.0157	0.00152	1.5
BF-RV_{HE}	(%)	106	25.1	6.45	0.63	25.7
BF-RV_B	(%)	106	27.4	6.56	0.64	23.9
BF-RV_{GB}	(%)	106	22.3	6.62	0.64	29.5
BF-RV_W	(%)	106	26.6	6.66	0.65	25.1
Males:						
D_B-RV_{HE}	(g/cm^3)	147	1.0549	0.0167	0.00137	1.58
D_B-RV_B	(g/cm^3)	148	1.0498	0.0177	0.00146	1.69
D_B-RV_{GB}	(g/cm^3)	148	1.0583	0.0156	0.00136	1.57
D_B-RV_W	(g/cm^3)	148	1.049	0.0176	0.0015	1.7
BF-RV_{HE}	(%)	147	19.1	6.82	0.56	36.1
BF-RV_B	(%)	148	21.2	7.35	0.60	34.6
BF-RV_{GB}	(%)	148	17.7	6.76	0.56	38.2
BF-RV_W	(%)	148	21.5	7.32	0.60	34.0

One question being addressed in this research was the effect of submersion on lung volume (LV) as it pertains to hydrostatic weighing, and the calculation of relative body fat (%BF). Table 4.4 shows the difference that a 2.05% adjustment (40 cm H_2O) makes to LV and the %BF when measured by hydrostatic weighing at maximal expiration (HW_{me}). The mean differences of 0.42 and 0.50 %BF for females and males, respectively, are due to the effects of a potential hydrostatic pressure of 40 cm H^2O. Table 4.5 shows the differences among relative body fatness as calculated from unadjusted and adjusted hydrostatic weighing at any lung volume (HW_{lv}) as assessed by three trials and unadjusted and adjusted hydrostatic weighing at any lung volume (HW_{lv}adj). There are no significant differences among the results since the variance of the underwater weighing procedures are greater than that between corrected and uncorrected calculations of body fatness. Table 4.6 gives the body density and percent body fat for the CF sample by age group and gender.

Table 4.4 Adjusted* lung volume (LV) and relative body fat (%BF) for three trials on 109 females and 145 males in the C.F.

		N	LV** (l)	LV_{adj} (l)	%BF	$\%BF_{adj}$
Females:						
Trial	A	111	3.26	3.33	22.2	22.7
	B	109	3.05	3.11	22.8	23.2
	C	109	3.03	3.09	23.0	23.4
Mean		---	3.11	2.18	22.7	23.1
Males:						
Trial	A	146	3.87	3.95	17.8	18.3
	B	147	3.72	3.80	18.4	18.9
	C	145	3.70	3.78	18.6	19.1
Mean		---	3.76	3.84	18.3	18.8

* Adjusted for a hydrostatic pressure of 40cm H_2O, ie. 2.05%

** LV measured at the time of hydrostatic weighing

Table 4.5 Measurement of body fatness by hydrostatic weighing at maximal expiration (HW_{me}) and at any lung volume (HW_{lv}), and the effect of adjusting (HW_{lv}adj) for the effect of 40 cm H_2O hydrostatic pressure. (Values are means ± S.D.).

Sex	N	BF-HW_{me}	BF-HW_{lv}	BF-HW_{lv}adj.
Males	147	19.1 ±6.8	18.4 ±7.5	18.9 ±7.4
Females	106	25.1 ±6.5	22.8 ±6.8	23.2 ±6.7

Table 4.6 Body density and % BF for the CF, by gender and by age. (Mean ± S.D.).

	N	Age (yrs.)	Stature (cm.)	Mass (kg.)	BMI (kg/m^2)	5SF (mm.)	Density (g/cc)	%BF
Females:								
<30	60 53*	24.8 ± 2.92	164.1 ± 6.30	60.4 ± 8.51	22.4 ± 2.90	87.8 ± 30.85	1.045 ± .0149	23.2 ± 6.27
30-39	43 35*	34.0 ± 2.60	164.0 ± 7.38	62.7 ± 9.89	23.3 ± 3.13	99.4 ± 36.28	1.037 ± .0157	26.8 ± 6.63
>40	22 18*	45.9 ± 4.82	165.3 ± 4.79	64.0 ±10.47	23.4 ± 3.46	101.5 ± 30.30	1.036 ± .0120	27.1 ± 5.26
Total	125 106*	31.7 ± 8.44	164.3 ± 6.44	61.8 ± 9.40	22.9 ± 3.09	94.1 ± 33.03	1.041 ± .0153	25.1 ± 6.45
Males:								
<30	57 56*	24.1 ± 2.62	173.8 ± 7.08	75.1 ±10.24	24.8 ± 2.89	73.6 ± 32.18	1.062 ± .0171	16.4 ± 6.94
30-39	37 36*	36.0 ± 2.41	173.9 ± 5.88	78.9 ± 9.25	26.1 ± 2.89	89.2 ± 37.04	1.054 ± .0166	19.5 ± 6.81
>40	61 55*	47.6 ± 5.39	174.1 ± 6.94	79.5 ±11.85	26.2 ± 3.09	88.6 ± 30.23	1.049 ± .0136	21.7 ± 5.64
Total	155 147*	36.2 ±11.01	174.0 ± 6.72	77.8 ±10.82	25.7 ± 3.02	83.2 ± 33.3	1.055 ± .0167	19.1 ± 6.82

* number completing both hydrostatic weighing and anthropometry.

4.4 Musculo-skeletal Proportions and Fatness.

An additional question to be considered in this research on fat measurement concerned the reliability and validity of anthropometry as conducted by an experienced anthropometrist and examples of the P.E.R.I. staff as currently trained. The results are found in Appendix 7.4. It would be concluded that the test-retest reliability of a skinfold or circumference is greatly dependent upon experience and training. However, the inter-observer measurement error is considerable even with well-trained personnel. The reliability of skinfold and circumference measurements are about the same. However, skinfold measures are more directly related to body fatness and not just body size.

Generally there are significant gender and observer differences in skinfold thickness measurement, with the triceps and thigh skinfolds being the most divergent between the sexes. There was significant inter-observer difference in skinfold measurement of all skinfolds except the triceps SF. There were no trial differences and no significant interactions between gender-observer-trial for the skinfolds.

For circumference measurements the neck, abdomen, flexed and unflexed upper arm girths and the wrist showed significant observer differences. However, there were not significant trial differences although the knee girth had an error probability of 0.07. The knee and gluteal girths did show significant or near significant interactions between observer and trial measurements.

Musculo-skeletal proportions: descriptive statistics of the anthropometric variables.

The anthropometric measurements of the CF sample are described in more detail in Tables 4.17a, b and 4.18 where the mean, standard deviation, skewness (g_1) and kurtosis (G_2) statistics of the body mass, stature and various circumferences are shown for both males and females.

Table 4.7a Descriptive statistics for mass, stature and body circumference measurements on 155 CF males

Measurement	Mean	S.D.	g_1+	g_2+
Mass (kg)	77.8	10.8	0.88*	0.07
Stature (cm)	174.0	6.7	0.24	0.07
Head (cm)	57.0	1.7	0.71*	0.72**
Neck (cm)	38.9	2.0	0.40*	0.69**
Shoulder (cm)	114.8	5.6	0.42*	0.43
Chest Sn (cm)	104.2	6.0	0.13	0.00
Chest (cm)	101.0	6.1	0.10	0.21
Bust (cm)	---	---	---	---
Abd 1 (cm)	87.3	8.3	0.31	-0.32
Abd 2 (cm)	89.9	9.1	0.23	-0.55**
Gluteal (cm)	98.4	6.5	0.81*	1.68
Thigh (cm)	57.7	4.4	0.32*	-0.02
Knee (cm)	38.6	2.2	0.20	-0.55**
Calf (cm)	37.8	2.6	0.19	-0.51
Ankle (cm)	22.5	1.3	0.31	-0.09
Flexed Upper Arm (cm)	34.5	2.5	0.11	0.79**
Upper Arm (cm)	32.5	2.5	-0.26	1.49**
Forearm (cm)	28.5	1.5	0.61*	1.49**
Wrist (cm)	17.5	0.9	0.27	0.26

+ g_1 = skewness; g_2 = kurtosis
* sig. g_1 ($g<.05$)
** sig. g_2 ($g<.05$)

Table 4.7b Descriptive statistics for mass, stature and body circumference measurements on 125 CF females.

Measurement	Mean	S.D.	g_1+	g_2+
Mass (kg)	61.8	9.4	0.79*	0.86**
Stature (cm)	164.3	6.4	0.26	0.20
Head (cm)	54.4	1.6	0.41*	-0.27
Neck (cm)	32.6	2.1	0.63*	0.37
Shoulder (cm)	99.4	5.4	0.24	0.66
Chest Sn (cm)	90.5	6.2	0.34	-0.02
Chest (cm)	86.9	6.3	0.45*	0.45
Bust (cm)	92.1	7.6	0.72*	0.93**
Abd 1 (cm)	72.7	7.5	1.06	1.86**
Abd 2 (cm)	79.3	8.8	0.97*	1.47**
Gluteal (cm)	96.4	6.9	0.17*	0.57
Thigh (cm)	57.3	4.7	0.55	0.72
Knee (cm)	36.7	2.8	0.50*	0.95**
Calf (cm)	35.4	2.9	0.37*	-0.05
Ankle (cm)	21.3	1.4	0.18	-0.40
Flexed Upper Arm (cm)	29.4	3.0	0.84*	1.72**
Upper Arm (cm)	28.4	3.0	0.74*	1.19**
Forearm (cm)	24.3	1.7	0.37*	-0.04
Wrist (cm)	15.3	1.0	0.41*	0.35

+ g_1 = skewness; g_2 = kurtosis
* sig. g_1 ($g<.05$)
** sig. g_2 ($<.05$)

Table 4.18 presents the body diameter measurements of the CF sample again divided into males and females.

Table 4.8 Descriptive statistics for body diametor measurements in 155 males and 125 females in the CF.

Measurement	Mean	S.D.	g_1^+	g_2^+
Males:				
Shoulder	46.5	2.2	0.64*	1.05**
Biacromial	40.1	2.0	0.35*	0.56
Biiliac	28.7	2.0	-0.20	0.90
Bitrochanteric	34.5	2.0	0.57*	0.56
Humerus	7.2	0.4	0.41*	-0.05
Wrist	5.9	0.3	-0.25	-0.01
Femur	9.6	0.5	0.07	-0.18
Ankle	7.2	0.4	0.09	0.06
Chest (trans)	29.8	1.8	0.19	0.04
Chest (A-P)	21.6	2.0	-0.03	-0.42
Females:				
Shoulder	40.1	2.1	0.18*	0.12
Biacromial	36.4	1.7	0.35*	0.52
Biiliac	28.7	2.0	0.68*	0.08
Bitrochanteric	35.3	2.7	0.68*	1.41*
Humerus	6.2	0.4	0.43*	0.01
Wrist	5.2	0.3	0.24	0.52
Femur	8.8	0.5	0.40*	1.05*
Ankle	6.4	0.4	0.19	2.74*
Chest (trans)	26.2	1.7	-0.04	-0.29
Chest (A-P)	18.4	1.7	0.20	0.53

+ g_1 = skewness; g_2 = Kurtosis
* sig. g_1 ($g<.05$)
**sig. g_2 ($<.05$)

Table 4.9 shows the descriptive statistics of the 10 skinfold thicknesses measured in this study (biceps, triceps, subscapular, suprailiac, chest, abdomen, iliac, mid-axillary, anterior thigh, and medial calf). All skinfolds exhibit a positive skewness (g_1) for males ranging from 0.33 to 1.90, while females show skewness statistics from 0.47 to 1.59. Thigh skinfold is interesting since not only is the mean difference between males and females 12.2 mm. (13.3 ± 6.8 mm. and 25.5 ± 9.8 mm., for males and females, respectively), but the variance of the females is twice a large (46.3 and 96.8, males and females, respectively). Similarly, females had more medial calf subcutaneous fat than males (18.7 ± 6.2 mm. and 10.3 ± 5.1 mm., for males and females, respectively). However, the males had significantly more fat at the suprailiac (22.8 ± 9.3 mm. vs 17.8 ± 7.9mm.) and abdominal (21.2 ± 9.8 mm. vs 18.5 ± 9.8 mm.) sites than did the females.

Table 4.9 Descriptive statistics for skinfold thickness measurements on 155 males and 125 females in the CF.

Measurement	Mean	S.D.	g_1+	g_2+
Males:				
Biceps	5.2	2.7	1.51*	3.39**
Triceps	12.0	5.0	0.94*	1.38**
Subscapular	14.0	6.3	1.76*	4.00**
Suprailiac	22.8	9.3	0.38*	-0.60**
Ant. iliac	10.7	5.1	1.13*	1.67**
Chest	11.3	4.8	0.33*	-0.69*
Abdomen	21.2	9.8	0.40*	-0.41
Axillary	12.6	5.8	0.84*	0.40
Thigh	13.3	6.8	1.90*	4.76**
Calf	10.3	5.1	1.00*	1.28**
Females:				
Biceps	7.7	3.4	0.91*	0.34
Triceps	19.0	6.0	0.61*	-0.05
Subscapular	14.0	7.0	1.59*	2.98**
Suprailiac	17.8	7.9	0.94*	0.59
Ant. iliac	11.9	5.9	1.03*	0.89**
Chest	9.1	4.8	1.04*	0.89**
Abdomen	18.5	9.8	0.78*	-0.14
Axillary	11.9	5.5	1.04*	0.63
Thigh	25.5	9.8	0.87*	1.12**
Calf	18.7	6.2	0.47*	0.03

+ g_1 = skewness; g_2 = kurtosis
*sig. g_1 (g<.05)
**sig. g_2 (<.05)

Table 4.10 shows the correlation coefficients among the skinfold sites. Generally higher correlations are found among independent skinfold variables (0.35 to 0.86) than between independent (% body fat from hydrodensitometry) and dependent variables (individual or sum of skinfolds). The highest correlation (0.86) is between suprailiac and either the abdominal or anterior iliac for the males; however, the highest correlation (r) for the females was found between the subscapular and mid-axillary skinfolds. The correlations between the triceps and abdomen skinfolds were 0.68 and 0.80 for females and males, respectively.

Table 4.10 Pearson product correlation (r) matrix of skinfold thickness measurements on 155 males and 125 females in the CF.

Males

	Bi.	Tri.	Sub.	Sup.	Che.	Abd.	Ilia.	Axil.	Thi.	Calf
Bi.	--	81	73	73	78	74	73	83	69	70
Tri.	70	--	75	82	74	80	81	79	82	82
Sub.	73	68	--	72	74	78	74	78	62	64
Sup.	71	74	83	--	74	86	86	80	85	72
Che.	56	63	73	73	--	77	73	85	58	62
Abd.	71	68	76	74	63	--	83	81	66	67
Ilia.	75	69	82	78	67	85	--	80	67	73
Axil.	69	64	87	83	77	78	84	--	62	64
Thi.	53	67	37	46	35	43	50	39	--	82
Calf	55	74	51	56	50	56	56	48	72	--

Legend:

Bi. = biceps, Tri. = triceps, Sub. = subscapular,
Sup. = suprailiac, Che. = chest, Abd = abdomen,
Ilia = anterior iliac, Axil. = axillary, Thi. = thigh,
Calf = calf

Figure 4.1 illustrates the general relationship between skinfolds (in this case, the sum of 4 skinfolds (biceps, triceps, subscapular and suprailiac) from Durnin and Womersley, 1974) and body density for the Canadian Forces (N=253).

Table 4.11 gives the descriptive statistics for the body composition parameters of the CF males and females. The sum of skinfolds are skewed and show some kurtosis similar to the individual skinfolds; however, logarithmic transformation of these sums of skinfolds reduces the skewness. Note that neither body density nor body fatness are distributed in this skewed manner.

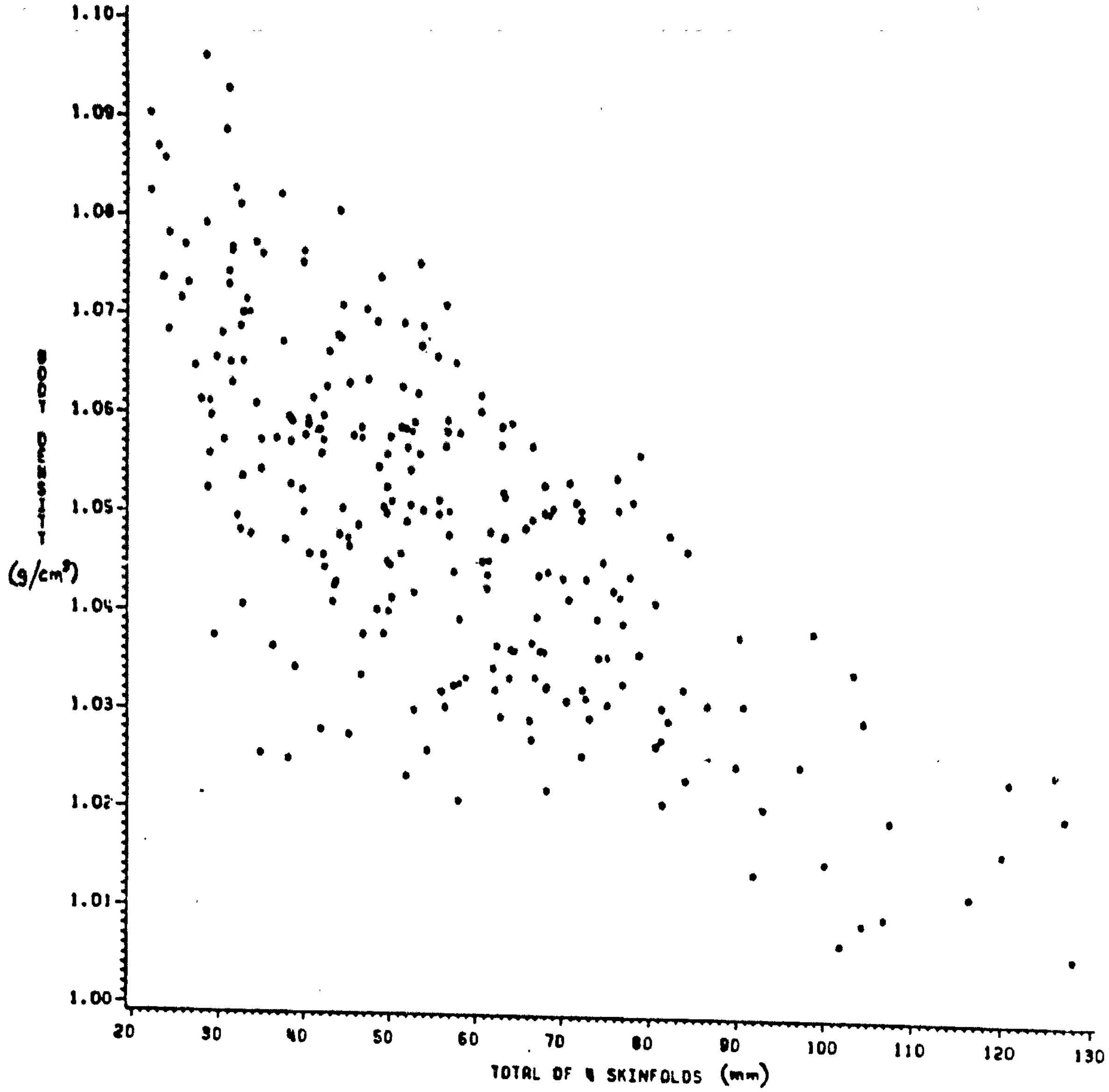
Table 4.11 Descriptive statistics for the body composition variables of 155 males and 125 females in the C.F.

Variable	Mean	S.D.	g_1+	g_2+
Males:				
BD (g/cm^3)	1.055	0.016	+0.03	-0.35
BF (%) (N=147)	19.1	6.82	+0.05	-0.40
Sum 5 SF (mm)	83.2	33.4	+0.85*	+1.12
Log sum 5 SF (mm)	1.89	0.18	-0.18	-0.49
Sum 10 SF	133.2	53.7	+0.82*	+1.00**
Log sum 10 SF(mm)	2.09	0.18	-0.18	-0.54
Females:				
BD (g/cm^3)	1.040	0.015	-0.02	-0.33
BF(%) (N>106)	25.1	6.45	+0.21	-0.47
Sum of 5 SF(mm)	94.1	32.9	+0.80*	+0.34
Log sum of 5 SF(mm)	1.95	0.15	+0.04	-0.57
Sum of 10 SF(mm)	152.9	53.4	+0.69*	-0.05
Log sum of 10 SF(mm)	2.16	0.15	-0.01	-0.65**

+g_1 = skewness; g_2 = kurtosis
*sig. g_1 ($p < .05$)
** sig. g_2 ($p < .05$)

5 SF = (triceps, subscapular, suprailiac, abdomen, and thigh)
10 SF = (triceps, subscapular, suprailiac, abdomen, thigh, midaxillary, chest, iliac, calf, and biceps).

BODY DENSITY VS TOTAL SKINFOLD
CANADIAN MILITARY PERSONNEL



4.4.1 Somatotype

Table 4.12 presents the physical characteristics of the CF sample grouped by gender including the anthropometric variables which pertain to the Heath-Carter somatotype and the endo-, meso-, and ectomorphic components of the somatotype. The range of endomorphy are 1.41 to 8.40 and 2.04 to 8.58, for males and females, respectively. The minimum and maximum endomorphy-2 scores are 1.37 to 8.10 and 2.13 to 9.01, males and females respectively. Scaling for body stature did not significantly affect the calculation of the endomorphy scores, which were 4.42 ± 1.46 and 4.58 ± 1.53 for females and 3.64 ± 1.41 and 3.56 ± 1.37 for males for the normal and stature-adjusted endomorphic scores, respectively.

Both the males and females of the CF sample were more robust and less fat than the reference Canadian data (Bailey et al., 1982). The males have endomorphic scores equivalent to the reference 20-29 yrs. age group, a mesomorphic score significantly greater than the most robust reference group (ie. 5.38 ± 1.32 for the 30-39 yrs. group), and an ectomorphic component significantly less than any of the reference Canadians except the 50-59 yrs. group.

Similarly the females had an endomorphic score equal to the 20-29 yrs. reference age group, but the mesomorphic component was within the range of the 30-39 yrs. reference age group for muscularity.

The correlation coefficients for the body composition and the somatotype components are shown in Table 4.13. All variables are significantly correlated, except fat mass and relative body fat (%BF), to lean body mass (LBM) or LBM/stature.

Table 4.12 Physical characteristics of Canadian Forces Sample (N= 125 females and 155 males)

	Female	Male
Stature (cm)	164.3 (±6.44)	173.9 (±6.72)
Mass (kg)	61.8 (±9.40)	77.8 (±10.82)
% Body fat	25.1 (±6.45)	19.1 (±6.82)
Lean Body Mass (kg)	46.1 (±5.07)	62.7 (±7.23)
Fat mass (kg)	15.8 (±5.90)	15.2 (±6.78)
Ponderal Index	41.7 (±1.85)	40.9 (±1.73)
Flexed Bicep circ.	29.4 (±2.95)	34.5 (±2.46)
Calf circ.	35.4 (±2.89)	37.8 (±2.58)
Elbow w.	6.2 (±0.36)	7.2 (±0.43)
Knee w.	8.8 (±0.53)	9.6 (±0.46)

First Component +	4.42 (±1.462)	3.64 (±1.413)
Endomorphy 2	4.58 (±1.528)	3.56 (±1.374)
Second Component	4.16 (±1.203)	5.88 (±1.082)
Third Component	2.09 (±1.089)	1.53 (±1.044)

Table 4.13 Pearson product correlation coefficients for body composition and somatotype components on 155 males and 125 females in the CF.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Endomorphy	--	.99	.42	-.63	-.68	.25	.24	.86	.78
2. Endomorphy 2	.99	--	.46	-.67	-.72	.18*	.21	.84	.78
3. Mesomorphy	.50	.54	--	-.81	-.83	.29	.49	.35	.29
4. Ectomorphy	-.68	-.71	-.85	--	.98	-.31	-.50	-.57	-.50
5. Ponderal Index	-.11	-.75	-.87	.97	--	-.29	-.49	-.61	.54
6. Lean Body Mass	.30	.23	.28	-.36	-.32	--	.95	.17*	.12*
7. LBM/stature	.35	.32	.49	-.58	.55	.94	--	.12*	-.16*
8. Fat mass	.79	.77	.55	-.63	-.70	.30	.28	--	.95
9. % Body Fat	.73	.72	.45	-.55	-.61	.00*	.01*	.94	--

*All values are significant ($p < .05$) unless indicated.

4.5 Estimations of Body Composition

Selection of body fat regression equations

Tables 4.14 a and b present an example of regression equations generated from circumferences and skinfolds, for males and females. The best prediction equation is indicated as determined by the maximum R^2, the root of the mean square error, and Mallow's c(p).

Table 4.14(a) Maximum R^2 regressions for percent body fat (%BF) of 147 males in the CF.

Variable	Intercept	Coeff.	Std error	R^2	MSE	C(P)
Sum2SF*	6.9	0.37	0.026	0.58	19.48	53.80
Abdom2 +	-13.3	0.28	0.073			
Sum2SF		0.22	0.047	0.62	17.77	37.28
Wrist +	4.5	-1.54	0.405			
Abdom2 +		0.39	0.076			
Sum2SF		0.18	0.046	0.66	16.26	22.98
Age +	10.2	0.11	0.033			
Wrist +		-1.75	0.397			
Abdom2 +		0.33	0.077			
Sum2SF		0.21	0.045	0.68	15.21	13.47

*(triceps and abdomen)

Table 4.14 (b) Maximum R^2 regressions for percent body fat (%BF) of 106 females in the CF.

Variable	Intercept	Coeff.	Std error	R^2	MSE	C(P)
Sum2SF*	18.6	0.004	0.0004	0.58	17.54	17.93
Knee c.+	- 5.1	0.675	0.1701			
Sum2SF		0.003	0.0004	0.64	15.36	3.96

Table 4.15 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on CF sample by total group and by sex, (using sum of 5SF/3 x (mass/stature) 1/2 x KSF where the constants (KSF) have been calculated for each sex and age group).

Total Sample	N	$\bar{x}$	SD	SE	R^2	E
% BF (densitometry)	253	21.6	7.28	.46		
% BF (prediction by AB)	279	21.6	7.74	.46	0.65	4.53
Sample by Sex						
Females:						
% BF (densitometry)	106	25.1	6.45	.63		
% BF (prediction by AB)	124	24.9	7.56	.68	0.58	4.19
Males:						
% BF (densitometry)	147	19.1	6.82	.56		
% BF (prediction by AB)	155	19.0	6.84	.55	0.62	4.24

Table 4.15 shows the body fat results from both hydrodensitometry and the new %BF prediction method referred to as the applied Behnke-Wilmore (AB). There are no significant differences between the procedures for either the total sample with males and females combined (21.6 ± 7.28 and 21.6 ± 7.78 %BF, respectively) or sorted by gender (femles: 25.1 ± 6.45 and 24.9 ± 7.56 %BF; males 19.1 ± 6.82 and 19.0 ± 6.84 %BF for densitometry and prediction respectively).

Table 4.16 Validation of the applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on 155 males and 125 females in the CF.

By Age Groups

	Method	N	x	SD	SE	R^2	E
Females:							
<30	D	53	23.2	6.27	0.86	0.57	4.16
	AB	60	23.0	6.84	0.88		
30-39	D	35	28.6	6.63	1.12	0.52	4.68
	AB	42	26.6	8.52	1.31		
>40	D	18	27.1	5.26	1.24	0.72	2.90
	AB	22	26.8	6.40	1.36		
Males:							
<30	D	56	16.4	6.94	0.93	0.60	4.45
	AB	57	16.1	6.31	0.84		
30-39	D	36	19.5	6.81	1.14	0.73	3.59
	AB	37	19.3	7.08	1.16		
>40	D	55	21.7	5.63	0.76	0.43	4.30
	AB	61	21.5	6.20	0.79		

The validation of the applied Behnke-Wilmore body fat prediction procedure on the sample stratified by age and gender (Table 4.16) shows no significant difference between body fat measured by underwater weighing and skinfold prediction (AB) procedures. The largest differences between procedures was 2% for the 30-39 year old females.

Finally, the applied Behnke-Wilmore procedure was validated on the CF sample as sorted not only by age and gender but also by fat level. This fat level was determined as the median percent body fat of the gender-age group as measured by hydrodensitometry. For the females (Table 4.17), the prediction of body fat for the high fat group which is the group to be most closely scrutinized by the Canadian Forces over the next few years, was not significantly different from the percent body fat as measured by underwater weighing. The greatest difference between procedures in the high fat group was 1.6 %BF, in both the under 30 yrs and 30-40 yrs groups.

The applied Behnke-Wilmore procedure did over-predict the thinner segment of the female sample by up to 3.9 %BF. However, these differences were not significant.

Similarly the prediction of body fat of the male CF personnel (Table 4.18) showed no significant differences for the high fat or low fat groups. In the high fat group, the AB procedure underestimated the percent body fat by 1.8, 1.2 and 1.3 %BF for the less than 30 yrs, 30-39 yrs and greater than 40 yrs groups, respectively.

The low fat segments of the male personnel were overestimated by 0.8, 1.0 and 2.3 %BF for the three age groups (<30, 30-39, >40 yrs, respectively).

Table 4.17 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on a CF sample of females (N=106) by age and by fat level (based on median fat level from densitometry)

Females

	N	$\bar{x}$	SD	SE	E
<30					
HF % BF (D)	19	29.9	4.18	0.96	5.36
% BF (AB)	19	28.3	6.99	1.60	
LF % BF (D)	34	19.5	3.52	0.60	3.96
% BF (AB)	41	23.4	7.53	1.68	
30-39					
HF % BF (D)	22	31.1	3.71	0.79	6.59
% BF (AB)	22	29.5	8.46	1.80	
LF % BF (D)	13	19.7	3.36	0.93	3.54
% BF (AB)	20	23.4	7.53	1.68	
≥40					
HF % BF (D)	12	29.9	3.66	1.06	3.30
% BF (AB)	12	29.9	4.98	1.44	
LF % BF (D)	6	21.5	2.87	1.17	5.47
% BF (Ab)	10	23.2	6.17	1.95	

HF = high fat
LF = low fat
Overall mean = 25.7% BF

Table 4.18 Validation of applied Behnke-Wilmore (AB) body fat prediction method compared to % body fat from densitometry (D) on a CF sample of males (N=147) by age and by fat level (based on median fat level from densitometry)

Males

	N	$\bar{x}$	SD	SE	E
<30					
HF % BF (D)	21	23.5	3.90	0.85	5.61
% BF (AB)	21	21.7	5.82	1.27	
LF % BF (D)	35	12.0	4.25	0.72	2.82
% BF (AB)	36	12.8	3.75	0.62	
30-39					
HF % BF (D)	18	25.1	4.14	0.98	3.98
% BF (AB)	18	23.9	5.96	1.41	
LF % BF (D)	18	13.9	3.46	0.82	3.44
% BF (AB)	19	14.9	4.97	1.14	
≥40					
HF % BF (D)	34	25.2	4.15	0.71	4.98
% BF (AB)	34	23.9	6.03	1.03	
LF % BF (D)	21	16.1	1.85	0.40	4.38
% BF (AB)	27	18.4	5.00	0.96	

HF = high fat
LF = low fat
Overall mean = 18.9 %BF

Analysis on the CF cross-validation sample (109 males and 66 females) was determined with % body fat from hydrodensitometry as the criterion variable. Residual gas volume was measured by oxygen dilution for the sample of CF personnel used for cross-validation (Bell and Cox, 1984). Table 4.19 shows the characteristics and overall male and female percent body fat results on the CF cross-validation sample. There was a 0.5 %BF difference for the CF males and 1.1 %BF difference for the CF females, neither results was significantly different from the percent body fat calculated from total body density. The correlation coefficients were high 0.83 for both males and females.

Table 4.19 Cross-validation of applied Behnke-Wilmore scaling method of body fat estimation (%BF) on an independent sample of 109 males and 66 females in the CF.

	Males	Females
N	109	66
Age (y)	27.3 ± 8.5	32.7 ± 9.1
Height (cm)	174.2 ± 5.9	163.2 ± 5.4
Body mass (kg)	75.6 ± 10.9	63.9 ± 10.9
%BF by D	16.1 ± 6.9	28.2 ± 6.7
%BF by AB	15.6 ± 6.4*	27.1 ± 8.5**

* $r = 0.83$; $p = .23$
** $r = 0.83$; $p = .06$
D = hydrodensitometry
AB = applied Behnke-Wilmore

The applied Behnke-Wilmore (AB) procedure and the circumference-skinfold-diameter (CSD) procedure as compared to the hydrodensitometric method of calculating relative body fat are illustrated in Figure 4.2. The % body fat predictions for the CF males tested, and given in three age categories, less than 30, 30-39 and greater than 40 years of age. The CSD method gave significantly different results from the underwater weighing procedure in both high and low fat groups at all ages.

However, when both estimations of body fatness (by the CSD and AB procedures) for the total groups of males and females were compared to the densitometric calculation of relative fat across three age-groups (Table 4.20), there were no significant differences among the comparisons. The CSD results did underestimate the females slightly by 3.2%, 2.2% and 1.3% in the age categories <30, 30-39 and >40 yrs, respectively. These differences are somewhat greater than 0.2, 2.0 and 0.3 %BF respectively by the AB prediction method.

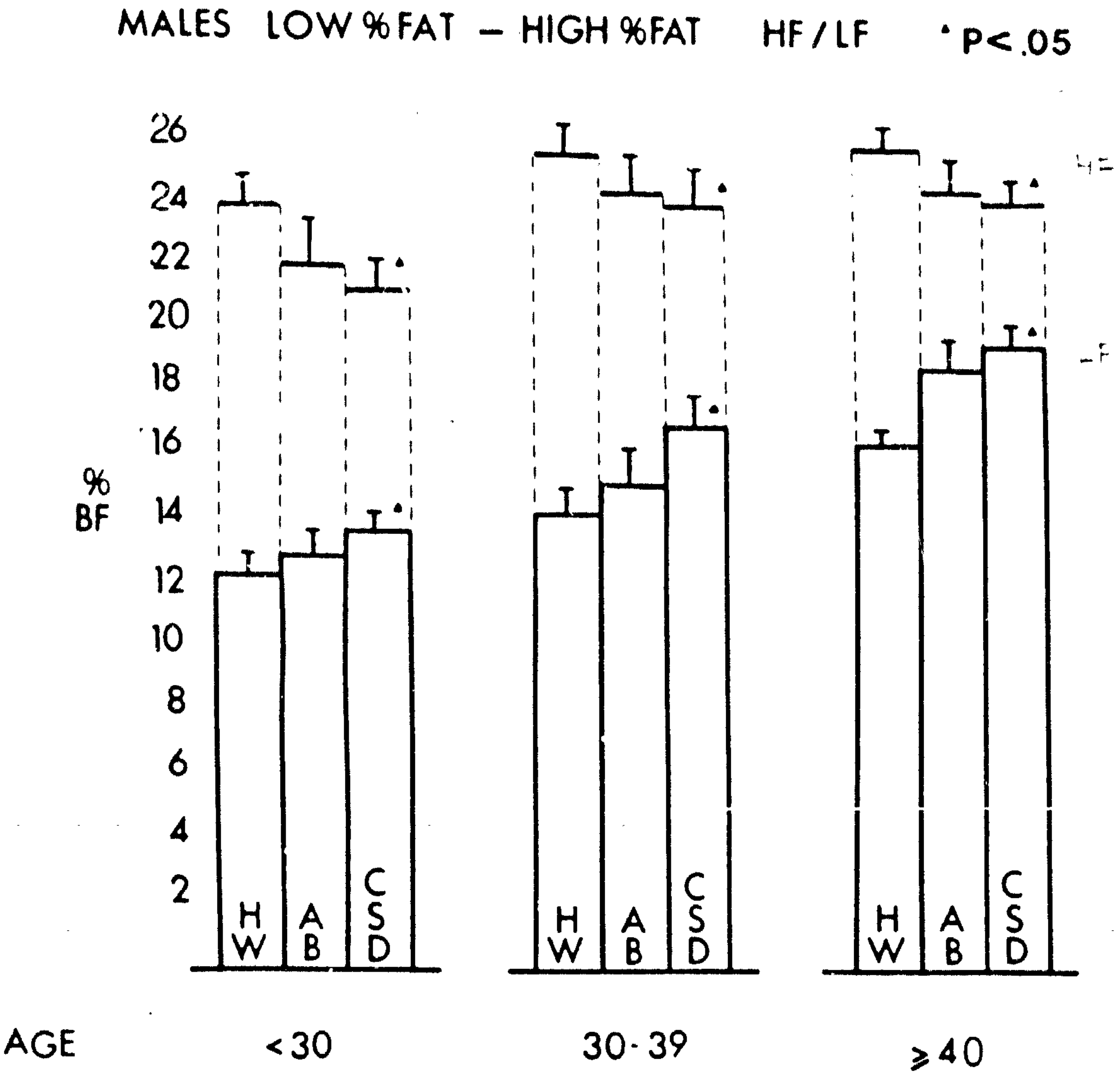
For the males, CSD slightly overestimated the relative fat in the 2 younger age categories by 0.5 and 0.8 %BF (not significant).

Table 4.20 Mean predicted body fat (%) by sex and by age: HW= hydrostatic weighing; AB applied Behnke; CSD= generated estimation by circumferences, skinfold and diameters regression procedure.

	HW	AB	CSD
Females			
<30	23.2	23.0	20.0
30-39	28.6	26.6	26.4
≥40	27.1	26.8	25.8
All	25.1	24.9	--
Males			
<30	16.4	16.1	16.9
30-39	19.5	19.3	20.3
≥40	21.7	21.5	21.4
All	19.1	19.0	--

No significant differences

Figure 4.2 Graph of applied Behnke-Wilmore (AB) and regression (CSD) %BF prediction procedures compared to %BF from densitometry (HW) for males by age and by fat level



Finally the comparisons with other procedures are shown in Tables 4.21a and b. For CF males, all procedures had strong linear relationships with relative fat calculated from hydrodensitometry. Moreover, two procedures Jackson and Pollock (1977) and Lohman (1981) significantly underestimated the fatness of the CF male personnel by 4.6% and 2.8% respectively.

The Wright-Dotson-Davis (1981) procedure using log of circumferences and log stature developed for a U.S. Navy sample, was not significantly different from either hydrodensitometrically calculated body fat or AB (skinfold) predicted body fat. Similarly Durnin and Womersley (1974) equation provided a good estimate of relative body density and body fat. The correlation coefficient between these BF predictions and the BF calculated from underwater weighing was 0.78 (Wright-Dotson-Davis, 1981 and Durnin and Womersley, 1974) compared to 0.79 for the AB procedure. The highest value was provided by the second Wright-Dotson-Davis (1981) procedure at = .81. This latter procedure (W-D-D #2), however, did provide a slight (1.36%) but significant overestimation of the fat level of these male CF personnel.

For the female personnel, Durnin and Womersley (1974) significantly overestimated the body fatness (2.71 ± 4.99) while the estimates of Jackson, Pollock and Ward (1978) (22.8 ± 5.84) were significantly less than the female CF personnel average (25.1 ± 6.45).

Table 4.21a: Comparison of % body fat values estimated from anthropometric measures in CF males (19.1 ± 6.82 %BF)

Equation	Difference Analysis				Correlation Analysis				
	Mean	S.D.	Difference	t-value	Intercept	Slope	r	SEE	E
Wright-Dotson-Davis #1	18.5	5.03	-0.59	1.86	0.801	1.05	0.78	3.15	4.29
Wright-Dotson-Davis #2	20.4	5.60	1.36	-3.76	-0.87	0.98	0.81	3.28	4.00
Durnin & Womersley (1974)	18.7	5.63	-0.45	1.43	1.53	0.95	0.78	3.52	4.29
Jackson & Pollock (1977)	14.5	5.42	-4.63	13.69	4.58	1.01	0.79	3.32	4.16
Lohman (1981)	16.3	5.78	-2.74	7.66	10.99	0.81	0.78	3.62	4.32
Present Study: ht (Sum 5 SF*)	19.0	6.84	-0.15	-0.56	4.30	0.78	0.79	4.24	4.24

* (Tri+Scap+Iliac+Abdomen+Thigh)

$SEE = SD_y(1-r^2)^{1/2}$

$E = (SS_{res}/N)^{1/2}$

Table 4.21b: Comparison of % body fat values estimated from anthropometric measures in CF females (25.1 ± 6.45 %BF)

	Difference Analysis				Correlation Analysis				
Equation	Mean	S.D.	Difference	t-value	Intercept	Slope	r	SEE	E
Wright-Dotson-Davis	24.6	4.85	-0.49	0.86	2.75	0.91	0.65	3.69	4.94
Durnin & Womersley (1974)	27.1	4.99	1.98	-4.50	-0.28	0.94	0.73	3.41	4.42
Jackson, Pollock & Ward (1978)	22.8	5.84	-2.28	6.23	5.28	0.88	0.79	3.59	3.99
Present Study:									
Sum 5 SF*	24.9	7.56	-0.20	-0.93	8.91	0.66	0.76	4.89	4.19
CSD	25.3	5.53	0.20	- .05	-0.03	1.00	0.81	3.23	3.78

* (Tri+Scap+Iliac+Abdomen+Thigh)

$SEE = SD_y(1-r^2)^{1/2}$

$E = (SS_{res}/N)^{1/2}$

Conclusions

Due to the loss of body fatness predictive accuracy at the high and low ends of the 'fat spectrum' with the CSD method, the AB procedure is considered a better method of estimating the fatness of these Canadian Forces personnel.

This AB procedure incorporates the most sensitive anthropometric measures of changes in fatness total skinfold thickness. Also AB method makes adjustments for overall body size by a specific stature-mass index, $[\text{mass (kg)/stature (dm)}]^{1/2}$.

Recommendations

(1) Recommended Field Method

The most reliable methods of predicting % body fat are by skinfold thickness measurement and should take into account the general body size of the subject. Body fat estimation procedures have been validated on 147 male and 106 female CF personnel (Group 1), and cross-validated on 109 male and 66 female CF personnel (Group 2). The technique of choice is the applied Behnke and Wilmore method applied (Behnke and Wilmore 1974) as modified by Katch and Katch (1983). This procedure scales the sum of 5 skinfolds by mass and stature, and is both age and gender specific.

(2) Laboratory Procedures

For evaluation of individuals who have "failed" to meet the fatness standards (to be decided on by the Surgeon-General), these subjects should be re-evaluated by a qualified anthropometric specialist and by hydrodensitometry (see recommendations 1 and 2).

(3) Hydrostatic weighing should be done at both maximum expiration (to residual volume) (HW_{me}) and at a comfortable lung volume (HW_{lv}). Many subjects are unable or unwilling to expire to residual volume while underwater.

(4) Residual volume of gas in the lungs must be measured (either by helium or oxygen dilution) by a trained technician since greater measurement error can occur from the prediction of residual volume. Both the helium and the oxygen dilution procedures are reliable, accurate and cost effective methods of determining residual gas volumes as compared to the nitrogen washout procedures.

(5) For CF adults (18-60 yrs), the conversion of body density to percent body fat (%BF) by the methods of both Brozek et al. (1963) and Siri (1961) are accurate.

(6) Training P.E.R.I. Staff

With minimal training, P.E.R.I. personnel were not reliable in making anthropometric measurements of either skinfolds or circumferences. Therefore, the testing personnel must be much more rigorously trained in anthropometruc procedures. A system of standardization of P.E.R.I. personnel similar to that recommended and used for certification of C.A.S.S. laboratories should follow an intense training program.

The Applied Behnke-Wilmore
AB Procedure

Collect the following data for the calculation of percent body fat:

			EXAMPLE
1.	Gender	M ___ F ___	Female
2.	Age (yrs)	______	35 years
3.	Stature	________ . __ (cm) - 10	160.0 (cm) -
		_____ . _____ (dm)	16.00 (dm)
4.	Body mass	________ . __ (kg)	60.00 (kg)
5.	Skinfold thickness		
	triceps SF	_____ . __	25.0 (mm)
	subscapular SF	_____ . __	15.0 (mm)
	suprailiac SF	_____ . __	18.0 (mm)
	abdomen SF	_____ . __	20.0 (mm)
	thigh SF	_____ . __	25.0 (mm)
	Total SF	________ . __	103.0 (mm)

Formula:

$$\% \text{ BF} = \frac{\text{Total SF}}{3 * \left(\frac{\text{Body mass}}{\text{Stature (dm)}}\right)^{1/2} * K_{SF}}$$

Calculation - for females, 35 yrs, 160 cm, 60 kg, and sum 5 SF of 103.0 mm.

$$\% \text{ BF} = \frac{103}{3(60/16)^{1/2} * 0.634}$$

$$= \frac{103}{5.810 * 0.634}$$

$$= 27.965$$

= 28.0 % body fat

Alternative K_{SF}

for females:
ages <30 yrs = 0.658
30-39 yrs = 0.634
≥40 yrs = 0.635

for males:
ages <30 yrs = 0.724
30-39 yrs = 0.716
≥40 yrs = 0.634

REFERENCES

Adams, J., Bagnall, K.M., M^cFadden, K.D.& Mottola, M. (1981). Body density differences between negro and caucasion professional football players. British Journal of Sports Medicine, 15(4), 257-260.

Agostoni, E., Gurtner, G., Gorri, G., & Rahn, H. (1966). Respiratory mechanics during submersion and negative-pressure breathing. Journal of Applied Physiology, 23, 251-258.

Akers, R., & Buskirk, E.R. (1969). An underwater weighing system utilizing transducers. Journal of Applied Physiology, 26(5): 649-652.

Allen, T.H., Peng, M.T., Chen, K.P., Huang, T.F., Chang, C., & Fang, F.S. (1956). Prediction of total adiposity from skinfolds and the curvilinear relationship between external and internal adiposity. Metabolism, 5, 346-352.

Allen, T.H., Krzywicki, H.J., & Roberts, J.E. (1959). Density, fat, water and solids in freshly isolated tissues. Journal of Applied Physiology, 14, 1005-1008.

Allen, T.H., Welch, B.E., Trujillo, T.T., & Roberts, J.E. (1959). Fat, water and tissue solids of the whole body less its bone mineral. Journal of Applied Physiology, 14, 1009-1012.

Astrand, P.O., & Rodahl, K. (1977). Textbook of Work Physiology. New York: McGraw-Hill.

Atkinson, R.J. Weatherall, J.A., and Weidmann, S.M.(1962). Changes in density of the human femoral cortex with age. J. Bone Joint Surg. 44: 496-502.

Bailey, D.A., Carter, J.E.L., & Mirwald, R.L. (1982). Somatotypes of Canadian men and women. Human Biology, 54, 813-828.

Bakker, H.K., & Struikenkamp, R.S. (1977). Biological variability and lean body mass estimates. Human Biology, 49(2), 187-202.

Bassett, C.A. (1965). Electrical effects in bone. Scientific American, 10, 108-116.

Behnke, A.R. (1942). Physiologic studies pertaining to deep sea diving and aviation, especially in relation to the fat content and composition of the body. Harvey Lectures, 37, 198-226.

Behnke, A.R. (1959). The estimation of lean body weight from skeletal measurements. *Human Biology*, *31*, 295-315.

Behnke, A.R. (1961a). Quantitative assessment of body build. *Journal of Applied Physiology*, *16*, 960-968.

Behnke, A.R. (1961b). Anthropometric fractionation of body weight. *Journal of Applied Physiology*, *16*, 949-954.

Behnke, A.R. (1963). Anthropometric evaluation of body composition throughout life. *Annals of the New York Academy of Science*, *110*, 450-464.

Behnke, A.R., Feen, B.G., & Welham, W.C. (1942). The specific gravity of healthy men. Body weight-volume as an index of obesity. *The Journal of the American Medical Association*, *118*, 495-501.

Behnke, A.R., & Royce, J. (1966). Body size, shape, and composition of several types of athletes. *Journal of Sports Medicine and Physical Fitness*, *6*, 75-88.

Behnke, A.R., & Wilmore, J.H. (1974). *Evaluation and Regulation of Body Build and Composition*. Englewood, NJ: Prentice Hall.

Bell, D.G., & Cox, K. (1984). *Measurement of the body composition of Canadian Forces male personnel* (DCIEM No. 84-C-05). Downsview, Ontario: Defence and Civil Institute of Environmental Medicine.

Benn, R.T. (1971). Some mathematical properties of weight-for-height indices used as measures of adiposity. *British Journal of Preventative and Social Medicine*, *25*, 42-50.

Boileau, R.A., Lohman, T.G., Slaughter, M.H., Bell, T.E., Going, S.B., & Hendrix, M.K. (1984). Hydration of the fat-free body in children during maturation. *Human Biology*, *56*(4), 651-666.

Bondi, J., Henschel, A., & Keys, A. (1949). Effect of submersion in water on the volume of residual air in man. *Journal of Applied Physiology*, *2*, 240-246.

Borms, J., Hebbelinck. M., Carter, J.E.L., Ross, W.D., & Lariviere, G. (1979). Methods of basic anthropometry in Olympic athletes - The MOGAP procedure. In U. Novotny & S. Titlbachova (Eds.), *Methods of Functional Anthropology* (pp. 31-39). Prague, Czechoslovakia: Charles University.

Bouchard, C., & Lortie, G. (1984). Heredity and endurance performance. *Sports Medicine*, *1*(1), 38-64.

Broman, G.E., Trotter, M., & Peterson, R.R. (1958). The density of selected bones of the human skeleton. American Journal of Physical Anthropology, 16, 197-212.

Brozek, J. (1960). Age differences in residual lung volume and vital capacity of normal subjects. Journal of Gerontology, 15, 155-160.

Brozek, J., Henschel, A., & Keys, A. (1949). Effect of submersion in water on the volume of residual air in man. Journal of Applied Physiology, 2, 240-246.

Brozek, J., & Keys, A. (1951). The evaluation of leanness-fatness in man: Norms and intercorrelations. British Journal of Nutrition, 5, 194-206.

Brozek, J., & Keys, A. (1953). Relative body weight, age, and fatness. Geriatrics, 8, 70.

Brozek, J., Grande, F., Anderson, J.T., & Keys, A. (1963). Densitometric analysis of body composition: Revision of some quantitative assumptions. Annals of the New York Academy of Science, 110, 113-140.

Brozek, J., Kihlberg, J.K., Taylor, H.L., & Keys, A. (1963). Skinfold distributions in middle-aged American men: A contribution to norms of leanness-fatness. Annals of the New York Academy of Science, 110, 492-502.

Burkinshaw, L., Jones, L. and Krupowicz, D.W. (1973). Observer error in skinfold thickness measurements. Human Biology, 45(2), 273-279.

Burr, D.B. (1980). The relationship among physical, geometrical and mechanical properties of bone, with a note on the properties of nonhuman bone. Yearbook of Physical Anthropology, 23, 109-146.

Buskirk, E. (1961). Underwater weighing and body density: A review of procedures. In J. Brozek & A. Henschel (Eds.), Techniques for Measuring Body Composition. Washington, DC: National Academy of Sciences, National Research Council.

Carey, C.R., Schaeffer, K.E., & Alvis, H.J. (1956). Effect of skin diving on lung volumes. Journal of Applied Physiology, 8, 519-523.

Carter, J.E.L. (1970). The somatotypes of athletes - a review. Human Biology, 42, 535.

Carter, J.E.L. (1972). The Heath-Carter Somatotype Method. San Diego, CA: San Diego State University Syllabus Service.

Carter, J.E.L. (1976, May). *Proportionality characteristics of male Olympic black and white runners and jumpers*. Paper presented at the meeting of the American College of Sports Medicine, Annaheim, CA.

Carter, J.E.L. (1980). The contributions of somatotyping to kinanthropometry. In M. Ostyn, G. Beunen, & J. Simons (Eds.), *Kinanthropometry II. International Series on Sport Sciences* (pp. 409-422). Baltimore, MD: University Park Press.

Carter, J.E.L. (1980a). *The Heath-Carter Somatotype Method* (3rd ed.). San Diego, CA: San Diego State University Syllabus Service.

Carter, J.E.L. (1981, May). *Size and somatotype of Olympic female athletes at Montreal*. Paper presented at the meeting of the American College of Sports Medicine, Miami, FL.

Carter, J.E.L. (1982). Body composition of Montreal Olympic athletes. In J.E.L. Carter (Ed.), *The Physical Structure of Olympic Athletes. Part I. MOGAP* (pp. 107-116).Basel, Karger

Carter, J.E.L., & Rendle, M.L. (1965). *The Physiques of Royal New Zealand Air Force Men*. Wellington, New Zealand: Royal New Zealand Air Force, Air Department.

Carter, J.E.L., & Heath, B.H. (1971). Somatotype methodology and kinesiology research. In *Kinesiology Review* (pp. 10-19). Washington, DC: American Association for Health, Physical Education and Recreation.

Carter, J.E.L., Hebbelinck, M., & de Garay, A. (1978). Anthropometric profiles of Olympic athletes at Mexico City. In F. Landry & W.A.R. Orban (Eds.), *Biomechanics of sport and kinanthropometry* (pp. 305-312). Miami, FL: Symposia Specialists.

Carter, J.E.L., Ross, W.D., Duquet, W., & Aubry, S.P. (1983). Advances in somatotype methodology and analysis. *Yearbook of Physical Anthropology*, *26*, 193-213.

Chumlea, W.C., Roche, A.F., and Webb, P. (1984). Body size, subcutaneous fatness, and total body fat in older adults. *International Journal of Obesity, 8,311-317.*

Churchill, E., Churchill, T., M^{c}Conville, J.T., & White, R.M. (1977). *Anthropometry of women of the U.S. Army - 1977. Report No. 2 - The basic univariate statistics* (Technical Report No. TR 77/024). Natick, MA: United States Army Research and Development Command.

Clarys, J.P., Martin, A.D., & Drinkwater, D.T. (1984). Gross tissue masses in adult humans: Data from 25 dissections. Human Biology, 56, 459-473.

Cohn, S.H., Ellis, K.J., Wallach, S., Zanzi, I., Atkins, H.L., & Aloia, J.F. (1974). Absolute and relative deficit in total skeletal calcium and radial bone mineral in osteoporosis. Journal of Nuclear Medicine, 15, 428-435.

Cohn, S.H., Gartenhaus, W., Sawitsky, A., et al. (1980) Compartmental body composition of cancer patients by measurement of total body nitrogen, potassium and water. Metabolism 30, 222-229.

Cox, K., & Bell, D.B. (1983). Body composition of Canadian Forces Personnel; Part 1: Females [Draft report]. Downsview, Ontario: Defence and Civil Institute of Environmental Medicine.

Craig, A.B., & Ware, D.E. (1967). Effects of immersion in water on vital capacity and residual volume of the lungs. Journal of Applied Physiology, 23, 423-425.

Dahlback, G.O., & Lundgren, C.E.G. (1972). Pulmonary air trapping induced by water immersion. Aerospace Medicine, 43, 768-774.

Darling, R.C., Cournand, A., & Richards, D.W. (1940). Studies on the intrapulmonary mixture of gases. III. An open-circuit method for measuring residual air. Journal of Clinical Investigations, 19, 609-618.

Demijean, A. (1980). Anthropometric report: Height, weight and body composition. Nutrition Canada, National Health and Welfare.

Dixon, W.J. (1950). Analysis of extreme values.Annals of Mathematics and Statistics, 21, 488-506

Drinkwater, D.T., & Ross, W.D. (1980). Anthropometric fractionation of body mass. In M. Ostyn, G. Beunen, & J. Simons (Eds.). Kinanthropometry II, International Series on Sport Sciences (pp. 178-189). Baltimore, MD: University Park Press.

Duquet, W., & Hebbelink, M. (1977). Application of the somatotype attitudinal distance to the study of group and individual somatotype status and relations (pp. 377-384). In O. Eiben (Ed.), Growth and Development: Physique. Budapest, Hungary: Akademiai Kiado.

Durnin, J.V.G.A., & Taylor, A. (1960). Replicability of measurements of density of the human body as determined by underwater weighing. Journal of Applied Physiology, 15, 142-144.

Durnin, J.V.G.A., & Rahaman, M.M. (1967). The assessment of the amount of fat in the human body from measurements of skinfold thickness. British Journal of Nutrition, 21, 681-689.

Durnin, J.V.G.A., and Satwanti, K.M. (1982). Variations in the assessment of the fat content of the human body due to experimental technique in measuring body density. Annals of Human Biology, 9, 221-225.

Durnin, J.V.G.A., & Womersley, J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness measurements on 481 men and women aged 16 to 72 years. British Journal of Nutrition, 32, 77-97.

Etheridge, G.L., and Thomas, T.R. (1980) The effect of body position and water immersion on lung volumes of women (Abstract). Medicine and Science in Sports, 10, 61.

Fidanza, F., Keys, A., & Anderson, J.T. (1953). Density of body fat in man and other mammals. Journal of Applied Physiology, 6, 252-256.

Flynn, M.A., Clark, J., Reid, J., & Chase, G. (1975). A longitudinal study of total body potassium in normal children. Pediatric Research, 9, 834-836.

Galton, F. (1884-5). Anthropometric laboratory. Journal of Anthropology, 14, 205-221.

Garn, S.M. (1970), The Earlier Gain and Later Loss of Cortical Bone. Springfield, IL: C.C. Thomas.

Garn, S.M., & Harper, R.V. (1955). Fat accumulation and weight gain in the adult male. Human Biology, 27, 39.

Garn, S.M., & Hawthorne, V.M. (1984). The 'new' metropolitan weight table. American Journal of Clinical Nutrition, 39(3), 490.

Gibson, J.C., & Hugh-Jones, P. (1949). The measurement of the total lung volume and breathing capacity. Clinical Science, 7, 185-216.

Girandola, R.N., Wisnell, R.A., Mohler, J.G., Romero, G.T., & Barnes, W.S. (1977). Effects of water immersion on lung volumes: Implications for body composition analysis. Journal of Applied Physiology, 43, 276-279.

Goldman, H.I., & Becklake, M.R. (1959). Respiratory function tests: Normal values of medium altitudes and the prediction of normal results. American Review of Tuberculosis and Respiratory Diseases, 79, 457-467.

Grubbs, F.E. (1969). Procedures for detecting outlying observations in samples. Technometrics, 11, 1-21.

Hajnis, K., Petrasek, R., & Cerovska, J. (1983). Differences of body characteristics in the individual somatotypes. Anthropologie, 21/22, 139-145.

Hancox, N.M. (1972). Biology of Bone. London: Cambridge University Press.

Harrison, G.A., Weiner, J.S., Tanner, J.M., and Barnicot, N.A. (1977). Human biology. Oxford: Oxford University Press.

Hathirat, S., Renzetti, A.D., & Mitchell, M. (1970). Measurement of total lung capacity by helium dilution in a constant volume system. American Review of Respiratory Diseases, 102, 760-770.

Heath, B.H. (1963). Need for modification of somatotyping methodology. American Journal of Physical Anthropology, 21, 227-233.

Heath, B.H. (1977). Applying the Heath-Carter somatotype method. In O. Eiben (Ed.), Growth and development: Physique (pp. 335-347). Budapest, Hungary: Akademiai Kiado.

Heath, B.H., & Carter, J.E.L. (1966). A comparison of somatotype methods. American Journal of Physical Anthropology, 24, 87-99.

Heath, B.H., & Carter, J.E.L. (1967). A modified somatotype method. American Journal of Physical Anthropology, 27, 57-74.

Hebbelinck, M., Duquet, W., & Ross, W.D. (1972). A practical outline for the Heath-Carter somatotyping method applied to children. In O. Bar-Or (Ed.), Pediatric Work Physiology. Israel: Wingate Institute.

Hodgson J.A. and Beckett, M.B. (1984). Prediction of body fat content in military personnel from body circumferences and height. Paper presented at the meeting of the American College of Sports Medicine, San Diego, CA.

Herrald, F.J.C., & M^c^Michael, J. (1939). Determination of lung volume: A simple constant volume modification of Christie's method. Proceedings of the Royal Society of London. Series B: Biological Sciences , 126, 491-501.

Hong, S.K., Cerretelli, P., Cuez, J.C., & Rahn, H. (1969). Mechanics of respiration during submersion in water. Journal of Applied Physiology, 27, 535-538.

Hovak, L.P., Hyatt, R.E., & Alexander, J.F. (1968). Body composition and physiologic function of athletes. The Journal of the American Medical Association, 205, 764-770.

Jackson, A.S., & Pollock, M.L. (1976). Factor analysis and multivariate scaling of anthropometric variables for the assessment of body composition. Medicine and Science in Sports, 8(3), 196-203.

Jackson, A.S., & Pollock, M.L. (1977). Prediction accuracy of body density, lean body weight, and total body volume equations. Medicine and Science in Sports, 9(4), 197-201.

Jackson, A.S., & Pollock, M.L. (1978). Generalized equations for predicting body density of men. British Journal of Nutrition, 40, 497-504.

Jackson, A.S., & Pollock, M.L. (1982). Steps toward the development of generalized equations for predicting body composition of adults. Canadian Journal of Applied Sport Sciences, 7(3), 189-197.

Jackson, A.S., Pollock, M.L., & Morrow, J.R.,Jr(1980).The function of age, sex and skinfold fat on body density [Abstract]. Medicine and Science in Sports and Exercise, 12, 103.

Jackson, A.S., Pollock, M.L., & Morrow, J.R., Jr. (1981). Generalized body density equations. The function of gender [Abstract]. Medicine and Science in Sports and Exercise, 13, 122.

Jackson, A.S., Pollock, M.L., & Ward, A. (1980). Generalized equations for predicting body density of women. Medicine and Science in Sports and Exercise, 12(3), 175-182.

Jackson, A.S., and Pollock, M.L. (1985). Practical assessment of body composition. The Physician & Sportsmedicine, 13(5), 76-90.

Jarrett, A.S. (1965). Effect of immersion on intrapulmonary pressure. Journal of Applied Physiology, 20, 1261-1266.

Jette, M. (1984). Guide for Anthropometric Measurements of Canadian Adults. Montreal, Quebec: Ross Lab, Division of Abbott Laboratories Limited.

Kaltreider, N.L., Fray, W.W., & van Z Hyde, H. (1938). The effect of age on the total pulmonary capacity and its subdivisions. American Review of Tuberculosis, 37, 662-689.

Katch, F.I. (1968). Apparent body density and variability during underwater weighing. Research Quarterly, 39(4), 993-999.

Katch, F.I., & Katch, V.L. (1980). Measurement and prediction errors in body composition assessment and the search for the perfect prediction equations. Research Quarterly for Exercise and Sport, 51(1), 249-260.

Katch, F.I., & Katch, V.L. (1984). The body composition profile. Techniques of measurement and applications. Clinics in Sports Medicine, 3(1), 31-63.

Katch, F.I., Katch, V.L., & Behnke, A.R. (1980). The underweight female. The Physician and Sportsmedicine, 8(12), 55-64.

Katch, V.L., & Freedson, P.S. (1982). Body size and shape: Derivation of the 'HAT' frame size model. American Journal of Clinical Nutrition, 36(4), 669-675.

Katch, K.L., Freedson, P.S., Katch, F.I., & Smith, L. (1982). Body frame size: Validity of self-appraisal. American Journal of Clinical Nutrition, 36(4), 676-679.

Keys, A., & Brozek, J. (1953). Body fat in adult man. Physiological Review, 33, 245-325.

Keys, A., Fidanza, F., Karvonin, M.J., Kinuira, N., & Taylor, H.L. (1972). Indices of relative weight and obesity. Journal of Chronic Diseases, 25, 329-342.

King, H.A., & Carter, J.E.L. (1982). Exploratory factor analysis of anthropometric measurements of Montreal Olympic athletes. In J.E.L. Carter (Ed.), Physical Structure of Olympic Athletes, Part I. MOGAP (pp. 128-137).Basel, Karger.

Kireilis, R.W., & Cureton, T.R. (1947). The relationships of external fat to physical education activities and fitness tests. Research Quarterly, 18, 123.

Knapik, J.J., Burse, R.L., & Vogel, J.A. (1983). Height, weight, percent body fat, and indices of adiposity for young men and women entering the U.S. Army. Aviation, Space and Environmental Medicine, 54(3), 223-231.

Krzywicki, J.J., & Chinn, K.S.K. (1967). Body composition of a military population, Fort Carson, 1963. I. Body density, fat and potassium 40. *American Journal of Clinical Nutrition*, *20*, 708-715.

Lamb, D. (1984). *Physiology of Exercise. Responses and Adaptations.* New York, MacMillan.

Lamb, D. (1985) Weight loss, exercise and bone loss. *The Health Letter*, *25*(4), 1-2.

Lanphier, E.H., & Camporesi, E.M. (1982). Chapter 6. Respiration and exercise. In P.B. Bennett, & D.H. Elliott (Eds.), *The Physiology and Medicine of Diving*. London: Bailliere-Tindall.

Lawther, G. (1969). *Estimation of Underwater Residual Volume from Related Measures*. Unpublished doctoral dissertation, Pennsylvania State University, PA.

Lee, J., Kolonel, L.N., & Hinds, M.W. (1981). Relative merits of weight-corrected-for-height indices. *American Journal of Clinical Nutrition*, *34*, 2521-2529.

Lohman, T.G. (1971). Biological variation on body composition. *Journal of Animal Science*, *32*, 647-653.

Lohman, T.G. (1981). Skinfolds and body density and their relation to body fatness: A review. *Human Biology*, *53*, 181-225.

Lohman, T.G. (1982). Body composition methodology in sports medicine. *The Physician and Sportsmedicine*, *10*(12), 46-58.

Lohman, T.G., Slaughter, M.H., Boileau, R.A., Bunt, J., & Lessier, L. (1984). Bone mineral measurements and their relationship to body density in children, youth and adults. *Human Biology*, *56*(4), 667-679.

Lohman, T.G., Slaughter, M.H., Selinger, A., & Boileau, R.A. (1978). Relationship of body composition to somatotype in college-age men. *Human Biology*, *5*(2), 147-157.

Lohman, T.G., Pollock, M.L., Slaughter, M.H., Brandon, L.J., & Boileau, R.A. (1984). Methodological factors and the prediction of body fat in female athletes. *Medicine and Science in Sports and Exercise*, *6*(1), 92-96.

Lohman, T.G., Slaughter, M.H., Going, S., & Boileau, R.A. (1985, May). *Validity of skinfold equations for predicting body fatness in children and youth in athletic and non-athletic populations*. Paper presented at the meeting of the American College of Sports Medicine, Nashville, TN.

Lundsgaard, C., & Van Slyke, D.D. (1918). Studies of lung volume. I. Relation between thorax size and lung volume in normal adults. *Journal of Experimental Medicine*, *27*, 65-85.

Malina, R.M. (1969). The quantification of fat, muscle and bone in man. *Clinical Orthopaedics and Related Research*, *65*, 9-72.

Malina, R.M. (1979). The effects of exercise on specific tissues, dimensions, and functions during growth. *Studies in Physical Anthropology*, *5*, 21-52.

Malina, R.M. (1980). The measurement of body composition. In F.E. Johnston, A.F. Roche, & C. Suzanne (Eds.), *Human Physical Growth and Maturation: Methodologies and factors* (pp. 35-59). New York: Plenum Press.

Mallows, C.L. (1973). Some comments of C(P). *Technometrics*, *15*, 661-675.

Martin, A.D. (1984). *An Anatomical Basis for Assessing Human Body Composition: Evidence from 25 Dissections*. Unpublished doctoral dissertation, Simon Fraser University, British Columbia.

Martin, A.D., Ross, W.D., Drinkwater, D.T., & Clarys, J.P. (1985) Prediction of body fat by skinfold caliper: Assumptions and cadaver evidence. *International Journal of Obesity*, *9*(Suppl. 1), 31-39.

Matiegka, J. (1921). The testing of physical efficiency. *American Journal of Physical Anthropology*, *4*(3), 223-230.

Mayer, J. (1959). Obesity: Diagnosis. *Postgraduate Medicine*, *25*, 469.

Mazess, R.B., & Christiansen C. (1982). A comparison of bone mineral results from Denmark and the United States. *Human Biology*, *54*(2), 343-354.

M^{C}Dougall, J.D., Wenger, H.A. & Green, H.J.(Eds.) (1982). *Physiological Testing of the Elite Athlete*. Canadian Association of Sport Sciences and Canadian Sportsmedicine Association, Ottawa.

Meleski, B.W. (1980). *Growth, Maturity, Body Composition and Familial Characteristics of Competitive Swimmers, 8 to 18 Years of Age*. Unpublished doctoral dissertation, University of Texas, Austin, TX.

Meneely, G.R., & Kaltreider, N.L. (1941). Use of helium for determination of pulmonary capacity. *Proceedings of the Society for Experimental Biology and Medicine*, *46*, 266.

Meneely, G.R., & Kaltreider, N.L. (1949). The volume of the lung determined by helium dilution. Description of the method and comparison with other procedures. *Journal of Clinical Investigation*, *28*, 129-139.

Meszaros, J., & Szmodis, I. (1980). A comparison of body dimensions between athletic and non-athletic young and adult subjects. In M. Ostyn, O. Beuner, & J. Simons (Eds.), *Kinanthropometry II, International Series on Sport Sciences* (pp. 223-230). Baltimore, MD: University Park Press.

Metropolitan Life Insurance Company. (1959). New weight standards for men and women. *Statistical Bulletin*, *40*, 1-4.

Metropolitan Life Insurance Company. (1983). New Metropolitan weight table. *Statistical Bulletin*, *64*, 3.

Michael, E.D., & Katch, F.I. (1968). Predictions of body density from skinfold and girth measurements of 17-year old boys. *Journal of Applied Physiology*, *25*, 747-750.

Motley, H.L. (1957). Comparison of a simple helium closed with the oxygen open-circuit method for measuring residual air. *American Review of Tuberculosis and Pulmonary Diseases*, *76*, 601-615.

Mukherjee, D., & Roche, A.F. (1984). The estimation of percent body fat, body density and total body fat by maximum R^2 regression equations. *Human Biology*, *56*(1), 79-109.+

Nilsson, B.E., & Westlin, N.E. (1971). Bone density in athletes. *Clinical Orthopaedics and Related Research*, *77*, 179-182.

Norris, A.H., Lundy, T., & Shock, N.W. (1963). Trends in selected indices of body composition in men between the ages 30 and 80 years. *Annals of the New York Academy of Science*, *110*, 623-639.

Novak, L.P. (1963). Age and sex differences in body density and creatinine excretion of high school children. *Annals of the New York Academy of Science*, *110*, 545-577.

Novak, L.P., Hyatt, R.E., & Alexander, J.F. (1968). Body composition and physiological function of athletes. *The Journal of the American Medical Association*, *205*, 764-770.

Orvanova. E., Uher, L., Slamka, M., pataki, L., and Ramacsay,L. (1984). Body size, shape and composition analysis of weightlifters and variables discriminating them according to performance and age. In J. Borms, et al., (Eds.) Human Growth and Development (pp. 511-524). New York, Plenum Publ.

Ostrove, S.M., & Vaccaro, P. (1982). Effect of immersion on residual volume in young women: Implications for measurement of body density. International Journal of Sports Medicine, 3, 220-223.

Pascale, L.R., Grossman, M.I., Sloane, H.S., & Frankel, T. (1956). Correlations between thickness of skinfolds and body density in 88 soldiers. Human Biology, 28, 165-176.

Pollock, M.L., Wilmore, J.H., & Fox, S.M. (1984). Exercise in Health and Disease: Evaluation and Prescription for Prevention and Rehabilitation. Philadelphia, PA: W.B. Saunders Company.

Prefaut, C.E., Lupi-H.,E., & Anthonisen, N.R. (1976). Human lung mechanics during water immersion. Journal of Applied Physiology, 40, 320-323.

Quetelet, L.A.J. (1869). Anthropometrie; ou, mesure des differentes facultes de l'homme. Referenced In H. Hrdlicka (Ed.) (1939), Practical Anthropometry (pp.11). Philadelphia, PA: The Westar Institute of Anatomy and Biology.

Rahn, H., Fenn, W.O., & Otis, A.B. (1949). Daily variations of vital capacity, residual air, and expiratory reserve volume including a study of the residual air method. Journal of Applied Physiology, 1, 725-736.

Robertson, E.H., Jr., Engle, C.M., & Bradley, M.E. (1978). Lung volumes in man immersed to the neck: Dilution and plethysmographic techniques. Journal of Applied Physiology, 44, 679-682.

Ross, W.D. (1976). Metaphorical models for the study of human shape and proportionality. In J.Broekoff (Ed.), Physical Education, Sports and the Sciences (pp. 284-304). Eugene, OR: University of Oregon Microform Publications.

Ross, W.D. (1976). Kinanthropometry. An emerging scientific technology. In F. Landry, & W.A.R. Orban (Eds.), Biomechanics of sports and kinanthropometry (pp. 269-282). Miami: Symposia Specialists.

Ross, W.D., Hebbelinck, M., Brown S.R., & Faulkner, R.A. (1978). Kinanthropometric landmarks and terminology. In R.J. Shephard, & H. Laveliee (Eds.), Physical Fitness Assessment - Principles, Practice and Application (pp.44-50). Springfield, IL: Charles C. Thomas.

Ross, W.D., & Marfell-Jones, M.J. (1982). Kinanthropometry. In J.D. M^{c}Dougall, H.A. Wenger, & H.J. Green (Eds.) Physiological Testing of the Elite Athlete. Canadian Association of Sport Sciences.

Ross, W.D., Marfell-Jones, M.J., & Stirling, D.R. (1982). Prospects in kinanthropometry. In J.J. Jackson, & H.A. Wenger (Eds.), The Sport Sciences (pp. 134-150). Victoria, British Columbia: University of Victoria Press.

Ross, W.D., & Ward, R. (1982). Human proportionality and sexual dimorphism. In R. Hall (Ed.) Sexual dimorphism in homo sapiens: A question of size (pp. 317-359). New York: Praeger.

Ross, W.D., Ward, R., Leahy, R.M., & Day, J.A.P. (1982) Proportionality of Montreal athletes. In J.E.L. Carter (Ed.) Physical structure of Olympic athletes, Part 1, MOGAP (pp. 81-106). Basel, Karger

Ross, W.D., & Wilson, B.D. (1973). A somatotype dispersion index. Research Quarterly, 44, 372.

Ross, W.D., & Wilson, N.C. (1974). A stratagem for proportional growth assessment. Acta Paediatrica Belgica, 28(Suppl.), 169-182.

Sawka, M.N., Weber, H.R., & Knowlton, R.G. (1978). The effect of total body submersion on residual lung volume and body density measurements in man. Ergonomics, 21, 89-94.

Sheldon, W.H., Stevens, S.S., & Tucker, W.B. (1940). The Varieties of Human Physique. New York: Harper & Brothers.

Sheldon, W.H., Lewis, N.D.C., & Tenney, A.S. (1969). Psychotic patterns and physical constitution. In D.V. Siva Sankar (Ed.), Schizophrenia, Current Concepts and Research (pp. 839-911). Hicksville, NY: PJD Publications.

Shephard, R.J. (1977). Endurance Fitness,(2nd ed.). Toronto, Ontario: University of Toronto Press.

Shephard, R.J. (1978a). Human Physiological Work Capacity: International Biological Programme 15. Cambridge, England: Cambridge University Press.

Shephard, R.J. (1978b). Fitness, obesity and health. In C. Allen (Ed.), Proceedings of the First RSG4 Physical Fitness Symposium with Special Reference to Military Forces (pp. 238-261). Downsview, Ontario: Defence and Civil Institute of Environmental Medicine.

Shephard, R.J. (1982a). *Physical Activity and Growth*. Chicago, IL: Yearbook Medical Publications Incorporated.

Shephard, R.J. (1982b). *Physiology and Biochemistry of Exercise*. New York: Praeger Publications.

Shephard, R.J., Jones, J., Ishii, K., Kaneko, M., & Albrecht, A.P. (1969). Factors affecting body density and thickness of subcutaneous fat. Data on 518 Canadian city dwellers. *American Journal of Clinical Nutrition*, *22*, 1175-1189.

Shephard, R.J., Kaneko, M., & Ishii, K. (1971). Simple indices of obesity. *Journal of Sports Medicine and Physical Fitness*, *11*, 154-161.

Shephard, R.J., Hatcher, J., & Rode, A. (1973). On the body composition of the Eskimo. *European Journal of Applied Physiology*, *30*, 1-13.

Shephard, R.J., & Cox, M.H. (1980). Use of the SRL (M-10 Pulmonary Screener) automated spirometer. *Respiratory Technology*, 7-17.

Sidney, K.H., Shephard, R.J., & Harrison, J. (1977). Endurance training and body composition of the elderly. *American Journal of Clinical Nutrition*, *30*, 326-333.

Sinning, W.E. (1990). Use and misuse of anthropometric estimates of body composition. *Journal of Physical Education and Recreation*, *51*, 43-45.

Sinning, W.E. (1984). Body composition and athletic performance. *American Academy of Physical Education*, 45-56.

Sinning, W.E., & Wilson, J.R. (1984). Validity of generalized equations for body composition analysis in women athletes. *Research Quarterly for Exercise and Sport*, *55*(2), 153-160.

Siri, W.E. (1961). Body composition from fluid spaces and density. In J. Brozek & A. Henschel (Eds.), *Techniques for Measuring Body Composition* (pp. 223-244). Washington, DC: National Academy of Science.

Slaughter, M.H., & Lohman, T.G. (1976). Relationship of body composition to somatotype. *American Journal of Physical Anthropology*, *44*, 237-244.

Slaughter, M.H., & Lohman, T.G., & Misner, J.E. (1977). Relationship of somatotype and body composition to physical performance. *Research Quarterly*, *48*, 159-168.

Slaughter, M.H., & Lohman, T.G., & Boileau, R.A. (1978a). Relationship of Heath and Carter's second component to lean body mass and height in college women. *Research Quarterly*, *48*(4), 759-765.

Slaughter, M.H., Lohman, T.G., & Boileau, R.A. (1978). Relationship of anthropometric dimensions to lean body mass in children. *Annals of Human Biology*, *5*(5), 469-482.

Slaughter, M.H., Lohman, T.G., Boileau, R.A., Stillman, R.J., Van Loan, M., Horswill, C.A., & Wilmore, J.H. (1984). Influence of maturation on relationship of skinfolds to body density: A cross-sectional study. *Human Biology*, *56*(4), 681-689.

Sloan, A.W. (1967). Estimation of body fat in young men. *Journal of Applied Physiology*, *23*, 311-315.

Sloan, A.W., Burt, J.J., & Blyth, C.S. (1962). Estimation of body fat in young women. *Journal of Applied Physiology*, *17*, 967-970.

Sloan, A.W., & Bredell, G.A.G. (1973). A comparison of two simple methods of determining pulmonary residual volume. *Human Biology*, *45*, 23-29.

Sorenson, J.A., Mazess, R.B., Smith, E.L., Clark, J.A., & Cameron, J.R. (1968). *Bone Mineral and Body Composition* [Progress report]. Madison, WI: University of Wisconsin.

Sport Canada (1985). *Canadian Standardized Test of Fitness (CSTF) Operations Manual* 3rd edition. Ottawa, Ontario: Fitness and Amateur Sport.

Stepnicka, J. (1977). Somatotypes of Czechoslovak athletes. In O. Eiben (Ed.), *Growth and Development: Physique* (pp. 351-364). Budapest, Hungary: Akademiai Kiado.

Stepnicka, J. (1980). Comparison of the Blazek and Heath-Carter methods of somatotyping children. *Anthropologiai Kozlemenyek*, *24*, 241-246.

Stubbing, D.G., Pengelly, L.D., Morse, J.L.C., & Jones, N.L. (1980a). Pulmonary mechanics during exercise in normal males. *Journal of Applied Physiology R.E.E.P.*, *49*(3), 506-510.

Stubbing, D.G., Pengelly, L.D., Morse, J.L.C., & Jones, N.L. (1980b). Pulmonary mechanics during exercise in subjects with chronic airflow obstruction. *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, *49*(3), 511-515.

Szmodis, I. (1977). Physique and growth estimated by Conrad's and Heath-Carter's somatocharts in athletic children. In O. Eiben (Ed.), *Growth and Development: Physique* (pp. 407-415). Budapest, Hungary: Academiai Kiado.

Tanner, J.M. (1959). The measurement of body fat in man. *Proc. Nutrition Soc.*, *13*, 148

Tanner, J.M. (1964). *The Physique of Olympic Athletes. A Study of 137 Track and Field Athletes at the XVIIth Olympic Games, Rome 1960*. London: George Allen Unwin Publishers.

Taylor, W.E., & Behnke, A.R. (1961). Anthropometric comparison of muscular and obese men. *Journal of Applied Physiology*, *16*(6), 955-959.

Thomas, T.R., & Etheridge, G.L. (1980). Hydrostatic weighing at functional residual capacity and residual volume. *Journal of Applied Physiology*, *49*, 157-159.

Thorland, W.G., Johnson, G.O., Fagot, T.G., Tharp, G.D., & Hammer, R.W. (1981). Body composition and somatotype characteristics of junior Olympic athletes. *Medicine and Science in Sports and Exercise*, *13*(5), 332-338.

Thorland, W.G., Johnson, G.O., Fagot, T.G., Tharp, G.D., & Hammer, R.W. (1984). Body composition and somatotype characteristics of junior Olympic athletes. *Medicine and Science in Sports and Exercise*, *16*(1), 332-338.

Thorland, W.G., Johnson, G.O., Tharp, G.D., Fagot, T.G., & Hammer, R.W. (1984). Validity of anthropometric equations for the estimation of body density in adolescent athletes. *Medicine and Science in Sports and Exercise*, *16*(1), 77-81.

Timson, B.F., & Coffman, J.L. (1984). Body composition by hydrostatic weighing at total lung capacity and residual volume. *Medicine and Science in Sports and Exercise*, *16*(4), 411-414.

Trotter, M., Broman, G.E., & Peterson, R.R. (1958). The density of the humeri of American whites and negroes. *Leech*, *28*, 139-143.

Trotter, M., Broman, G.E., & Peterson, R.R. (1960). Densities of bones of white and negro skeletons. *Journal of Bone and Joint Surgery*, *42A*, 50-58.

Tucker, L.A. (1983). Obesity, exercise, somatotype and psychological well-being: A factor analytic study. *Journal of Human Movement Studies*, *9*(3), 128-134.

Viola, G. (1932). *La Costituzione Individuale*. Bologna, Italy: L. Cappelli.

Vogel, J.A., & Crowdy, J.P. (1979). Aerobic fitness and body fat of young British males entering the army. *European Journal of Applied Physiology*, *40*, 73-83.

Ward, A., Pollock, M.L., Jackson, A.S., Ayres, J.J., & Pape, G. (1978). A comparison of body fat determined by underwater weighing and volume displacement. *Journal of Applied Physiology*, *45*, E94-E96.

Walker, R.N. (1962). *Body Build and Behaviour in Young Children. I. Body Build and Nursery School Teacher's ratings. Monographs of the Society for Research in Child Development*, *27*, 1-94.

Walker, R.N. (1978). Pre-school physique and late adolescent somatotype. *Annals of Human Biology*, *5*(2), 113-130.

Walker, R.N., & Tanner, J.M. (1980). Prediction of adult Sheldon somatotypes I and II from ratings and measurements at childhood ages. *Annals of Human Biology*, *7*, 231-224.

Warner, J.G., Jr., Yeates, R.A., & Sherwood, L. (1984). A hydrostatic weighing method using total lung capacity and a small tank [Abstract]. *Medicine and Science in Sports and Exercise*, *16*(2), 199.

Welch, B.E., & Crisp, C.E. (1958). Effect of the level of expiration on body density measurement. *Journal of Applied Physiology*, *12*, 399-402.

Welham, W.C., & Behnke, A.R. (1942). The specific gravity of healthy men. *The Journal of the American Medical Association*, *118*, 498.

Weltman, A., & Katch, V.L. (1975). Preferential use of casing (girth) measures for estimating body volume and density. *Journal of Applied Physiology*, *38*(3), 560-563.

Weltman, A., & Katch, V.L. (1981). Comparison of hydrostatic weighing at residual volume and total lung capacity. *Medicine and Science in Sports and Exercise*, *13*(3), 210-212.

Weiner, J.S., & Lourie, J.A. (1969). *Human Biology: A Guide to Field Methods*. Oxford, Blackwell Scientific Publ.

Weiner, J.S., & Lourie, J.A. (1981). *Practical Human Biology*. London: Academic Press.

Werdein, E.J., & Kyle, L.H. (1960). Estimation of the constancy of density of the fat-free body. *Journal of Clinical Investigation*, *39*, 626-629.

White, R.M. (1978). *United States Army Anthropometry: 1946-1977* (Technical Report No. TR-79/007). Natick, MA: United States Army Research and Development Command.

Wilmore, J.H. (1969). A simplified method for determination of residual lung volumes. *Journal of Applied Physiology*, *27*, 96-100.

Wilmore, J.H. (1970). Validation of the first and second components of the Heath-Carter somatotype method. *American Journal of Physical Anthropology*, *32*, 369-372.

Wilmore, J.H. (1983). Body composition in sports and exercise: Directions for future research. *Medicine and Science in Sports and Exercise*, *15*, 21-31.

Wilmore, J.H., Vodak, P.A., Parr, R.B., Girandola, R.N., & Billing, J.E. (1980). Further simplification of a method for determination of residual lung volume. *Medicine and Science in Sports and Exercise*, *12*(3), 216-218.

Winer, B.J. (1971). *Statistical Principles in Experimental Design*. New York: McGraw-Hill.

Womersley, J., Durnin, J.V.G.A., Boddy, K., & Mahaffy, M. (1976). Influence of muscular development, obesity and age on the fat-free mass of adults. *Journal of Applied Physiology*, *41*, 223-229.

Wright, H.F., Dotson, C.O., & Davis, P.O. (1981). A simple technique for measurement of percent body fat in man. *United States Navy Medical Newsletter*, *72*, 23-27.

Wright, J.F., & Wilmore, J.H. (1974). Estimation of relative body fat and lean body weight in a United States Marine Corps population. *Aerospace Medicine*, *45*, 301-306.

Appendix 7.1: Anthropometric Techniques

(a) Stature:

Equipment: Stature is measured by a wall-mounted stadiometer. The subject, without shoes, stands with his back square against the wall with heels together. The subject is gently stretched upward to his fullest height with the shoulders and the arms relaxed downward. The examiner aligns the horizontal bar of the measuring rod to the maximum point of height. To be accurate, measurement should be completed at eye level. Measure and record height to the nearest 0.1 cm.

(b) Body Mass:

Equipment: Health-O-Meter balance-beam scale. Ensure that the scale is on a flat surface. The subject is weighed without shoes and in light clothing (shorts and socks). Measurement of mass is to the nearest 0.1 kilogram.

(c) Girth Measurements:

Equipment: Steel measuring tape. Ensure that the tape is properly located in the horizontal plane and measure to the nearest mm. All measurements are made on the right side of the body.

(i)	head:	maximum girth of the head with the tape superior to the glabella (midpoint of supra-orbital tori).
(ii)	neck:	girth measurement just superior to the larnyx.
(iii)	shoulder:	maximum girth at the protrusion of the deltoid muscles.
(iv)	chest inspired:	the maximum girth after complete inspiration of the mesosternale or the level of the nipples.
(v)	chest:	as above (iv), at mid-tidal volume.
(vi)	abdomen 1:	at the natural waist, midway between the lowest lateral portion of the rib cage and the iliac crest.
(vii)	abdomen 2:	at the level of the umbilicus and the iliac crests.

(viii) gluteal: anteriorly, at the level of the symphysis pubis, and posteriorly, at the level of the gluteus musculature.

(ix) thigh: maximum thigh girth, 1 cm. below the gluteal line (fold).

(x) knee: mid-patellar level with the leg relaxed and the weight shifted to the left leg.

(xi) calf: maximum girth of the calf.

(xii) ankle: minimum girth of the leg above the malleolis (syhyion tibiale).

(xiii) flexed upper arm: maximum circumference of the biceps when the arm is maximally flexed in a bent elevated position.

(xiv) upper arm: maximum circumference of the biceps (midpoint between elbow and shoulder) with the arm hanging relaxed.

(xv) forearm: maximum circumference immediately distal to the elbow joint with the arm hanging relaxed.

(xvi) wrist: minimal girth distal to the styloid processes of the radius and the ulna.

(d) Limb Length Measurements:

Equipment: Anthropometer. Each measurement is delineated by anatomical reference sites. Measurements are taken on the right of the body and recorded to the nearest 0.5 cm.

(i) total arm: the arm and hand are fully extended at the side. Measure the full length from the proximal lateral edge of the acromion of the scapula to the tip of the middle finger with hand and arm fully extended.

(ii) total arm segment: the arm and hand are fully extended at the side. Measure the length from the proximal edge of the acromion to the ulnar styloid process.

(iii) hand: total arm length minus total arm segment length.

(iv)	forearem:	measure the length from the olecranon process of the ulna to the ulnar styloid process with the arm bent at 90°.
(v)	total leg:	with the subject in a standing position, weight evenly distributed, and legs and feet together, measure the length from the anterior superior iliac spine of the pelvis to the ground (vertical distance).
(vi)	shank:	with the subject in a standing position and weight evenly distributed, measure the length from the lateral fibial condyle to the level of the floor.
(vii)	elbow:	measure the maximum epicondylar width of the humerous with the arm held in a horizontal position and the elbow bent at 90°.
(viii)	wrist:	measure the maximum breadth of the distal forearm across the ulnar styloid process with the arm hanging in a relaxed position.
(ix)	knee:	measure the maximum bicondylar breadth of the femur (maximum knee width) with the subject seated and the knee bent at 90°.
(x)	ankle:	measure the maximum width of the distal lower leg across the malleoli with the subject standing.

(e) Skinfold Measurements:

Equipment: Harpenden skinfold calipers. Grasp each skinfold between the thumb and the index finger with firm, but painless pressure. The skinfold is lifted with the crest of the fold following the alignment specified. The caliper jaws are applied at the prescribed site. Measurements are read two seconds after the full pressure of the caliper jaws have been applied. Measurements are recorded to the nearest 0.2 mm. and are repeated 2-3 times depending if the difference is >4 mm. The accuracy of the measurement depends on: precise identification of the site of the skinfold, forming the skinfold prior to the application of the caliper jaws, and the standardization of the alignment of the skinfold crest. The measurement is completed by the release of the spring handles of the caliper.

(i) triceps skinfold: the skinfold is taken on the back of the unclothed pendulous right arm at a level midway between the tip of the acromion (most lateral margin of the acromion process of the scapula and the tip of the elbow) with the forearm flexed at an angle of 90°. The skinfold is lifted parallel to the long axis of the arm.

(ii) biceps skinfold: the measurement is made on the ventral side of the hanging right upper arm (over the biceps) at a point midway between the acromion and the olecranon process of the ulna as described for the triceps. The skinfold is lifted parallel to the long axis of the upper arm.

(iii) subscapular skinfold: the measurement is made approximately 1 cm. below the lower (inferior) angle of the right scapula with the subject standing, shoulders relaxed. The crease of the skinfold lifted should run at an angle of about 45° downwards and laterally.

(iv) suprailiac skinfold: the measurement is made in the midline just above (3 cm.) the iliac crest with the fold running obliquely downward and forward.

(v) abdomen skinfold: a vertical skinfold is measured 2 cm. to the right of the umbilicus.

(vi) chest skinfold: the measurement is made over the lateral border of the pectoralis major, medial to the anterior axillary border. The skinfold runs diagonally downward and medial.

(vii) iliac skinfold: the measurement is made 6-7 cm. above the anterior superior iliac spine, at the level and in the same plane as the umbilicus and in the anterior axillary line.

(viii) midaxillary skinfold: a vertical skinfold is raised on the midaxillary line, approximately at the level of the 5th intercostal.

(ix) thigh skinfold: a vertical fold is measured midpoint between the inguinal fold and the knee in the midline of the thigh.

(x) medial calf skinfold: a vertical skinfold is raised on the medial border of the right calf at the level of the estimated maximal circumference.

Appendix 7.2:Body Composition Estimation Equations

Variable list:
var 1 = age; var 2 = stature; var 3 = body mass; var 4 = biceps skinfold; var 5 = triceps skinfold; var 6 = subscapular skinfold; var 7 = suprailiac skinfold, var 7s = suprailiac skinfold with vertical fold; var 8 = abdomen skinfold; var 9 = iliac skinfold; var 10 = mid-axillary skinfold; var 11 = chest skinfold; var 12 = anterior thigh skinfold; var 13 = medial calf skinfold; var 13 = medial calf skinfold; var 14 = neck circumference; var 16 = abdomen 1 circumference; var 17 = abdomen 2 circumference; var 18 = gluteal circumference; var 19 = thigh circumference; var 20 = calf circumference; var 21 = flexed upper arm circumference; var 22 = upper arm circumference; var 23 = forearm circumference; var 24 = wrist circumference; var 25 = epicondylar humerus diameter; var 26 = epicondylar femur diameter; var 27 = wrist diameter; var 28 = biiliac diameter; var 29 = bitrochanteric diameter; var 30 = ankle diameter.

1. Durnin and Womersley (1974).

Females:

16-19 yrs.	D_B= 1.1549 - 0.0678 x log (sum var 4,5,6,7)
20-29 yrs.	D_B= 1.1599 - 0.0717 x log (sum var 4,5,6,7)
30-39 yrs.	D_B= 1.1423 - 0.0632 x log (sum var 4,5,6,7)
40-49 yrs.	D_B= 1.1333 - 0.0612 x log (sum var 4,5,6,7)
50+ yrs.	D_B= 1.1339 - 0.0645 x log (sum var 4,5,6,7)

Males:

17-19 yrs.	D_B= 1.1620 - 0.0630 x log (sum var 4,5,6,7)
20-29 yrs.	D_B= 1.1631 - 0.0632 x log (sum var 4,5,6,7)
30-39 yrs.	D_B= 1.1422 - 0.0544 x log (sum var 4,5,6,7)
40-49 yrs.	D_B= 1.1620 - 0.0700 x log (sum var 4,5,6,7)
50+ yrs.	D_B= 1.1715 - 0.0779 x log (sum var 4,5,6,7)

2. Forsyth and Sinning (1973).

Males:

young a) D_B= 1.103 - 0.00168 (var 6) - 0.00127 (var 8)

b) D_B= 1.02415 - 0.00169 (var 6) + 0.00444 (var 2) - 0.0013 (var 8)

3. Hodgson et al (1982).

Females:
young Navy $\% \ BF = 161.27 \times \log (var\ 16 + var\ 17 - var\ 14) - 100.81\ (var\ 2) - 69.55$

Males:
young Navy $\% \ BF = 85.20 \times \log (var\ 17 - var\ 14) - 0.43 \times \log (var\ 2) - 61.00$

4. Jackson, Pollock, and Ward (1980).

Females:
a) $D_B = 1.096095 - 0.0006952\ (sum\ var\ 5,8,9,12) + 0.0000011\ (sum\ var\ 5,8,9,12)^2 - 0.0000714\ (var\ 1)$

b) $D_B = 1.0994921 - 0.0009929\ (sum\ var\ 5,9,12) + 0.0000023\ (sum\ var\ 5,9,12)^2 - 0.0001392$

5. Jackson and Pollock (1978).

Males:
a) $D_B = 1.1886 - 0.03049 \times \ln (sum\ var\ 8,11,12) - 0.00027\ (var\ 1)$
b) $D_B = 1.10938 - 0.0008267 \times (sum\ var\ 8,11,12) + 0.0000016\ (sum\ var\ 8,11,12)^2 - 0.0002574\ (var\ 1)$

6. Katch and McArdle (1973).

Females:
$D_B = 1.08347 + 0.0006\ (var\ 5) - 0.00151\ (var\ 6) - 0.00097\ (var\ 12)$

Males:
$D_B = 1.09665 - 0.00103\ (var\ 5) - 0.00056\ (var\ 6) - 0.00054\ (var\ 8)$

7. Lohman (1981).

Males:
$D_B = 1.0982 - 0.000815\ (sum\ var\ 5,6,8) + 0.00000084\ (sum\ var\ 5,6,8)^2$

8. Sloan, Burt, and Blyth (1962).

Females:
$D_B = 1.0764 - 0.00081\ (var\ 7s) - 0.00088\ (var\ 5)$

9. Sloan (1967).

Males:
D_B= 1.1043 - 0.001327 (var 12) - 0.00131 (var 6).

10. Wilmore and Behnke (1969).

Females:
D_B= 1.06234 - 0.00068 (var 6) - 0.00039 (var 5) - 0.00025 (var 12)

Males:
D_B= 1.1511 + 0.0007 (var 3) + 0.0015 (var 30) + 0.0006 (var 15) - 0.0019 (var 17) - 0.0012 (var 18)

11. Wright, Dotson, and Davis (1980).

Females:
a) % BF= 14.866 + 0.167 (var 8) + 0.162 (var 12) + 0.217 (var 17) + 3.380 (var 27) + 0.274 (var 5)
b) % BF= 0.707 + 1.051 (var 22) - 1.522 (var 23) - 0.879 (var 13) + 0.326 (var 17) + 0.597 (var 19)

Appendix 7.3 Residual Volumes

Prior to this research project, a study of residual volume (Pollock, personal communication) compared the helium and oxygen dilutions with the nitrogen washout method of determining residual volume. The characteristics of the subjects in this study were: five males and five females, average age of 22 ± 1.4 yrs, mean body mass 67.5 ± 9.8 kg, and mean stature 171.1 ± 7.3 cm.

The mean residual volume measurements are presented in Table 7.3a. The helium dilution method tended to yield higher RV values than the nitrogen washout method, while the oxygen dilution technique produced lower RV measurements. However all three methods demonstrated similar values of RV overall.

Table 7.3a Residual volume measurements* by oxygen dilution, helium dilution and nitrogen washout techniques in pre-study Group A.

Subject	Sex	RV_{O2}	RV_{he}	RV_{N2}
1	F	990	1242	801
2	F	974	1022	861
3	F	1087	1084	1201
4	F	1421	1772	1211
5	F	1745	2089	1575
6	M	1192	1469	1221
7	M	1309	1745	1538
8	M	1366	2134	1792
9	M	1204	1892	1495
10	M	1107	1568	1540
Mean		1239.5	1601.7	1323.5
±SD		232.5	395.4	321.5

* all values are in ml.

The mean, standard deviation and standard error of the forced vital capacity (FVC), residual volume (RV), body density (D_B), and body composition (%BF) of the various methods are given in Table 7.3b. The female RV measurements varied from 890 to 1625 ml., with a mean of 1252.5 ± 240.6 ml. The F value (Table 7.3c) for the females was quite large, indicating that there was a significant difference among the various measurements. The mean residual volume for the males was 1440.6 ± 180.9 ml., with a range of 1180 to 1810 ml. Again the large F value (Table 7.3c) indicated a significant difference among the various RV measurements.

Table 7.3b Forced vital capacity (FVC), residual volume (RV), body density (BD) and percent body fat (%BF) in pre-study Group A. Residual volume was measured by oxygen dilution (O_2), helium dilution (H_e), nitrogen washout (N_2) and predicted from Bass (1964), Goldman and Becklake (1959) and Wilmore (1969). (Values are means ± S.D.; n= 10).

Method	Sex	RV (ml)	BD* (g/cm^3)	BF** (%)
Helium	M$^+$	1759±290.1	1.078±0.013	9.4±5.3
	F$^+$	1437±459.1	1.055±0.011	19.5±5.1
Oxygen	M	1236±102.3	1.069±0.013	12.9±5.6
	F	1243±333.2	1.051±0.012	21.2±5.5
Nitrogen	M	1517±202.9	1.074±0.014	11.1±6.3
	F	1130±312.6	1.049±0.012	22.2±5.3
Bass[a]	M	1231±293.3	1.069±0.012	13.2±5.1
	F	891±67.5	1.044±0.009	24.2±4.2
Goldman[b] & Becklake	M	1672±181.7	1.076±0.012	10.2±5.1
	F	1625±143.1	1.058±0.11	18.1±5.1
Wilmore[c]	M	1182±281.5	1.068±0.012	13.5±5.1
	F	998±75.7	1.046±0.009	23.3±4.2

[a] Bass(1964).
M: RV(l)= 0.25 (FVC,l)
F: RV(l)= 0.25 (FVC,l)

[b] Goldman and Becklake (1959).
M: RV(l)= 0.027(ht,cm) + 0.017(age,yr) - 3.447
F: RV(l)= 0.032(ht,cm) + 0.009(age,yr) - 3.900

[c] Wilmore (1969)
M: RV(l)= 0.24(FVC,l)
F: RV(l)= 0.28(FVC,l)

+ forced vital capacity (l)
M: 4.93 ± 1.17
F: 3.57 ± 0.27

* body density from hydrodensitometry

** % body fat predicted from Siri (1961)

These residual volumes were used to calculate body density. The females had a mean body density of 1.0507 ± 0.0114 g/cm^3 with a range from 1.0440 to 1.0575 g/cm^3. The mean body density for the male subjects was 1.0723 ± 0.0130 g/cm^3 with a range of 1.0680 - 1.0783 g/cm^3. Body composition from the calculations of Siri (1961) gave a mean relative body fat of 21.2 ± 5.1% (range 18.1 to 24.2%) for the females and 11.7 ± 5.6% (range 9.1 - 13.5%) for the males (Table 7.3b).

The F values of the body density and relative body fat were not significant for either females or males, as shown in Table 7.3c. The probability of the F values for females for D_B and %BF were 61 and 62% respectively. For the males, the corresponding probabilities were 95% and 96% for D_B and %BF, respectively.

Table 7.3c Significance (F ratio) and probability values for RV, BD and %BF in pre-study Group A.

Variable	Sex	F ratio	P
RV(l)	M	8.37	$<.0001$
	F	5.22	$<.0001$
BD(g/cm^2)	M	0.41	$>.95$
	F	0.81	$>.50$
BF(%)	M	0.40	$>.95$
	F	0.80	$>.50$

These results show that even though significant differences were found among the 3 methods of RV calculation, neither body density nor relative body fatness were significantly affected by variation in residual gas volume. A residual volume difference of 200 ml. creates a discrepency in body density of 0.0032 g/cm^3 or 1.5 %BF. The variation among the methods was greater than this on two occassions (632 and 734 ml.), but the effects of these deviations were not significant when analyzed by ANOVA and Duncan's multiple range tests.

Due to the relatively small sample size used in the above study, an extended study of the two dilution methods was carried out. The results of the oxygen and helium dilution procedures for the determination of residual volume are shown in Table 7.3d. There is a slight but non-significant difference between the two procedures ($p<0.05$); residual volumes for the total group ($N=36$) by the helium (RV_{he}) and oxygen (RV_{O2}) dilutions were 1577 ± 465.2 ml. and 1483 ± 442.5 ml., respectively. The range of measurements were 900 - 2090 ml. and 930 - 2300 ml. for the RV_{he} and RV_{O2}, respectively. The correlation coefficient between the two procedures was 0.85, and there was no significant difference between the volumes. The females ($N=18$) showed a slightly lower RV_{he} (1283.4 ± 232.5 ml.) than RV_{O2} (1349.5 ± 347.8 ml.), a difference of 66 ml., ($r=0.89$), while the males ($N=18$) had a significantly larger RV_{he} (1724.8 ± 255.6 ml.) than with the oxygen dilution procedure (1559.9 ± 269.0 ml.), a difference of 165 ml., ($r=0.63$). Given that there was: (i) a non-significant difference between the results of the two methods, and (ii) the standardized methods of both procedures, the helium dilution method of Ogilvie et al. (1957) was chosen as the preferred method for the field study on the CF sample as was suggested by the American Thoracic Society (1979) and by Hackney and Deutsch (1985).

Table 7.3d Residual volume measurements for pre-study Group B, by helium and oxygen dilution techniques.

Females:	Age (yrs)	Stature (cm.)	Mass (kg.)	FVC (l.)	Oxygen (ml.)	Helium (ml.)
1	20	159.5	57.5	4.22	1030	1181
2	22	166.4	63.4	4.26	974	1022
3	23	170.3	67.5	5.07	1087	1084
4	23	168.2	54.6	4.94	1491	1772
5	24	167.4	58.1	4.72	1745	2089
6	16	168.7	59.7	4.62	1270	1231
7	14	167.0	59.3	4.27	1120	898
8	16	166.6	61.7	5.18	1660	1530
9	17	172.5	59.2	4.84	1560	2024
10	19	171.0	56.9	5.28	1580	1839
11	20	168.2	61.5	4.43	1269	1228
12	21	170.7	57.5	4.61	1373	1205
13	21	171.3	62.2	4.59	1295	1284
14	26	161.6	51.7	3.30	935	912
15	21	168.7	61.0	4.43	1242	1243
16	20	167.9	62.1	4.60	1190	1389
17	21	163.4	58.0	4.14	1099	1195
18	20	172.0	55.6	4.18	1181	1165
Mean	20.2	167.9	59.3	4.54	1283.4	1349.4
± S.D.	±2.9	± 3.4	±3.5	±0.45	±232.5	±347.8

Males:						
19	20	182.7	80.9	6.58	1192	1469
20	21	173.1	68.0	6.25	1309	1745
21	22	168.8	69.0	5.63	1459	1648
22	23	171.1	71.9	6.08	1204	1892
23	23	183.7	84.5	6.61	1145	1550
24	24	186.4	78.3	--	2070	2177
25	18	188.7	82.0	7.21	1830	2064
26	16	179.4	70.5	5.80	1430	1889
27	21	184.3	79.4	7.22	1684	1495
28	22	180.3	82.4	6.30	1450	1682
29	16	177.4	76.7	5.90	1482	1316
30	24	180.6	81.4	7.32	1760	1779
31	38	185.0	101.4	7.75	1809	1980
32	17	181.5	68.2	6.14	1448	1438
33	19	174.2	81.0	6.00	1397	1303
34	35	175.8	82.5	6.82	1903	2045
35	20	177.8	83.4	5.75	1551	1648
36	20	180.7	73.7	6.89	1950	1927
Mean	22.2	179.5	78.6	6.49	1559.6	1724.8
± S.D.	±5.6	± 5.3	±7.8	±0.61	±269.0	±255.6

Predicted Residual Volumes

In the first pre-study on residual volume procedures, various RV prediction methods from the literature were evaluated; results from three of these methods (Bass, 1964; Goldman and Becklake, 1959; and Wilmore, 1969) compared to the two dilution methods are shown in Table 7.3e.

Table 7.3e Cross-validation of three residual volume prediction equations on a sample on normal subjects (18 males and 18 females) in pre-study Group B.

RV Method	Mean (ml)	S.D. (ml)	S.E. (ml)
Females:			
Helium dilution	1349.5	347.8	82.0
Oxygen dilution	1283.4	232.5	54.8
Bass (1964)	1148.5	146.9	36.4
Goldman & Becklake (1959)	1653.4	109.4	25.8
Wilmore (1969)	1286.1	164.5	38.8
Males:			
Helium dilution	1724.8	255.6	60.4
Oxygen dilution	1559.9	269.0	63.4
Bass (1964)	1621.5	157.6	38.2
Goldman & Becklake (1959)	1764.5	177.5	41.8
Wilmore (1969)	1556.5	151.3	35.7

Appendix 7.4 Observer error and the reliability of anthropometric measurements.

Two reliability studies were carried in this research project: (i) an intra-observer reliability of the principal investigator, and (ii) an inter-observer reliability study which included three P.E.R.I. personnel from CFB Downsview, an experienced researcher from D.C.I.E.M., and the anthropometrist conducting the study, ie. a total of five observers.

Intra-observer reliability.

Table 7.4a shows the intra-observer reliability of the principal investigator for various anthropometric measurements. There are no significant differences between test and retest for any of the variables; the probabilities range from 0.72 for the upper arm circumference to 0.97 for the gluteal circumference and triceps skinfold.

Table 7.4a Intra-observer reliability of the principal investigator (RDF) (7 females and 6 males) (Values are means on pre-study Group C).

	Females		Males		
Variable	Test	Retest	Test	Retest	P
Circumferences:					
Knee	36.33	36.03			.82
Gluteal	95.93	96.03			.97
Abdomen	73.34	72.74	89.37	88.87	.90
Wrist	14.86	14.84	17.60	17.55	.96
Flexed Up. Arm			34.67	34.42	.83
Upper Arm			32.00	32.35	.72
Neck			38.80	38.77	.96
Skinfolds:					
Triceps	17.11	17.24	10.02	10.05	.97
Subscap	11.77	11.92	11.27	11.37	.94
Suprailiac	13.46	13.84	21.28	21.87	.92
Abdomen	11.74	11.81	17.45	16.63	.91
Ant. Thigh	25.33	25.51	15.00	15.48	.93
Sum of 3*	42.34	43.01	42.57	43.28	.92
Sum of 5**	79.41	80.34	75.02	75.40	.96

*Sum of 3 skinfolds equals triceps + subscapular + suprailiac

**Sum of 5 skinfolds equals triceps + subscapular + suprailiac + abdomen + anterior thigh.

Inter-observer reliability

A sample of thirteen individuals (7 females and 6 males) between the ages of 24 and 58 yrs. (13.0 ± 11.3 yrs.), averaging 69.1 ± 15.2 kg. of body mass (smallest female 47.3 kg., largest male 105.7 kg.) and 171.2 ± 9.9 cm. in stature (158.3 to 185.1 cm.) served as subjects. Each subject was measured at 5 skinfold sites (triceps, subscapular, suprailiac, abdomen and anterior thigh), and for either 4 circumferences (males: gluteal, knee, abdomen and wrist) or 5 circumferences (female: neck, abdomen, gluteal, flexed and relaxed upper arm girths).

Two sums of skinfolds were also evaluated: (i) sum of 3 skinfolds (triceps, subscapular, suprailiac), and (ii) sum of 5 skinfolds (triceps subscapular, suprailiac, abdomen, anterior thigh).

Each subject was measured at each of the five skinfold sites by each of the five investigators using Harpenden skinfold calipers. Each skinfold site was measured three times, and the mean of the closest two measures was recorded and used for the analysis of data. A repeated-measures design was employed with a 2x2x5 factorial design (2 sexes, 2 trials, 5 observers). Thus, each subject was measured 10 times at each site. The 3 novice observers had previously been instructed by the principal anthropometrist (RDF) on two separate occassions plus a refresher immediately prior to the commencement of the testing. One of the observers had past experience in anthropometry and body composition assessment. All data were recorded individually by the observers, but all data forms were collected after each trial. The time between trials was not less than half an hour and usually about 45 minutes. The observers did not have access to the data for comparison purposes until after the total reliability study was completed. A repeated-measures analysis of variance was computed to determine the influence of the observer and the gender of the subject on the reliability of each skinfold measurement.

Each subject was also measured at each of 4 (males) or 5 (females) circumferences by each of the 5 observers using a steel Lufkin tape. A repeated-measures design was employed with a 2x5 factorial design. Thus, each subject was measured 10 times at each site. A repeated - measures analysis of variance was calculated to establish the differences between the 5 observers.

Table 7.4b summarizes the test-retest results for the 5 observers for each of the skinfold measurements and, Table 7.4c provides the reliability information on circumferences for the same 5 investigators.

Table 7.4b Test-retest reliability for five skinfold thickness measurements by observer (n=5) and by trial (n=2) on pre-study Group C (n=13).

Observer	Site/trial	Males	Females
	Triceps		
1	1	9.75	16.21
	2	9.28	16.67
2	1	10.25	16.79
	2	10.50	16.44
3	1	9.25	16.39
	2	9.53	15.73
4	1	9.95	16.36
	2	9.83	16.31
5	1	10.02	17.11
	2	10.05	17.24
	Subscapular		
1	1	11.53	12.63
	2	11.15	12.81
2	1	12.67	14.01
	2	12.78	13.29
3	1	12.98	11.94
	2	12.38	12.51
4	1	11.78	13.13
	2	11.80	13.10
5	1	11.27	11.77
	2	11.37	11.93
	Suprailiac		
1	1	18.78	11.49
	2	18.15	12.07
2	1	19.60	13.89
	2	20.88	13.26
3	1	18.18	13.03
	2	19.03	12.21
4	1	17.57	08.71
	2	17.27	09.50
5	1	21.28	13.46
	2	21.87	13.84

	Abdomen		
1	1	14.10	10.83
	2	14.75	11.24
2	1	18.03	13.67
	2	17.57	13.84
3	1	15.80	12.44
	2	14.73	12.19
4	1	17.08	11.66
	2	16.60	11.93
5	1	17.45	11.74
	2	16.63	11.81
	Anterior thigh		
1	1	14.07	22.73
	2	14.42	23.03
2	1	17.27	25.42
	2	18.12	26.34
3	1	13.77	25.57
	2	14.38	24.30
4	1	16.25	25.29
	2	16.77	25.26
5	1	15.00	25.33
	2	15.48	25.51
	Sum 3 SF		
1	1	40.07	40.33
	2	38.58	41.56
2	1	42.52	44.69
	2	44.17	42.99
3	1	40.52	41.36
	2	40.95	40.46
4	1	39.30	38.20
	2	38.90	38.91
5	1	42.57	42.34
	2	43.28	43.01
	Sum 5 SF		
1	1	68.23	73.89
	2	67.75	75.83
2	1	77.82	83.79
	2	79.85	83.17
3	1	70.08	79.37
	2	70.07	76.94
4	1	72.63	75.14
	2	72.27	76.10
5	1	75.02	79.41
	2	75.40	80.34

Table 7:4c Test-retest reliability of 7 circumference measurements by observer (N=5) and by trial (N=2). (Values are means).

Observer	Trial	Sites			
Females:		Knee	Hip	Abdomen	Wrist
1	1	35.6	94.3	73.6	15.3
	2	36.1	95.8	72.8	15.2
2	1	35.2	95.2	73.4	15.1
	2	36.0	94.9	73.6	15.1
3	1	36.0	94.9	71.2	15.3
	2	37.1	95.1	72.9	15.4
4	1	35.6	95.1	71.8	14.5
	2	35.3	94.9	72.0	14.4
5	1	36.3	95.9	73.3	14.9
	2	36.0	96.0	72.7	14.8
	Total	35.93	95.21	72.73	15.00

Males:		Abdomen	Wrist	Fl.Up.Arm	Up.Arm	Neck
1	1	89.0	17.9	34.6	32.6	39.0
	2	89.2	17.8	34.2	32.0	38.7
2	1	88.4	17.3	34.4	31.9	39.0
	2	88.8	17.5	34.4	32.7	38.6
3	1	89.6	17.8	34.6	31.8	40.4
	2	89.8	17.9	34.5	31.9	39.8
4	1	87.0	16.8	33.3	31.4	38.6
	2	86.7	16.8	33.7	30.5	38.0
5	1	89.4	17.6	34.7	32.0	38.8
	2	88.9	17.6	34.4	32.4	38.8
	Total	88.67	17.48	34.28	31.91	38.95

Tables 7.4d (i,ii) and 7.4e show the significance (F ratio) and the probability values from the ANOVA tables for the skinfold and circumference reliability data.

Table 7.4d (i) Significance (F ratio) and probability from ANOVA for skinfold measurements (triceps, subscapular, suprailiac, abdomen, anterior thigh).

Sources of Variation	Triceps		Subscap.		Suprail.		Abdomen		Thigh	
	F	P	F	P	F	P	F	P	F	P
Sex	6.27	.03	0.10	.76	2.12	.17	1.41	.26	4.59	.06
Observer	2.11	.10	3.62	.01	5.47	.00	5.38	.00	5.62	.00
Trial	0.41	.53	0.16	.69	0.79	.39	0.34	.57	0.45	.52
(Sex)(Obs)	0.54	.71	1.43	.24	0.44	.78	1.15	.35	1.19	.33
(Sex)(Tri)	0.13	.72	0.49	.50	0.43	.52	1.67	.22	0.45	.52
(Obs)(Tri)	0.24	.92	0.15	.96	0.13	.97	0.80	.53	1.77	.16
(Sex)(Obs)(Tri)	1.54	.21	0.69	.60	1.62	.19	0.23	.92	1.31	.29

Table 7.4d (ii) Significance (F ratio) and probability from ANOVA for the sums of three and five skinfolds, ie. triceps, subscapular, and suprailiac plus abdomen and anterior thigh.

Sources of Variation	Sum of 3		Sum of 5	
	F	P	F	P
Sex	0.00	.97	0.12	.74
Observer	6.24	.00	9.01	.00
Trial	0.11	.75	0.21	.66
(Sex)(Obs)	0.29	.89	0.65	.65
(Sex)(Tri)	0.26	.74	0.02	.88
(Obs)(Tri)	0.16	.96	0.45	.77
(Sex)(Obs)(Tri)	1.43	.25	0.75	.57

Table 7.4e Significance (F ratio) and probability from ANOVA for seven circumferences (knee, gluteal, abdomen, wrist, flexed upper arm, upper arm, and neck).

Sources of Variation	Knee		Gluteal		Abdomen		Wrist	
	F	P	F	P	F	P	F	P
Observer	1.78	.17	1.44	.25	2.95	.03	19.53	.00
Trial	4.83	.07	1.75	.23	0.08	.79	0.08	.78
(Obs)(Tri)	4.46	.01	2.64	.07	2.16	.10	0.42	.95

	Fl.Up.Arm		Upper Arm		Neck	
	F	P	F	P	F	P
Observer	3.42	.03	5.21	.01	4.86	.01
Trial	0.04	.85	0.02	.89	3.21	.13
(Obs)(Tri)	1.00	.44	1.37	.29	0.54	.71

```
                                                  SAS                        12:13 TUESDAY, FEBRUARY 25, 1986   1
                                                 SEX=F

                                               UNIVARIATE

VARIABLE=AGE
                     MOMENTS                                      QUANTILES(DEF=4)                                  EXTREMES

N                   125     SUM WGTS          125     100% MAX     54.0274        99%      53.9569          LOWEST      HIGHEST
MEAN            31.6745     SUM           3959.31      75% Q3       36.626        95%      49.9904         18.4274      51.0411
STD DEV         8.44138     VARIANCE      71.2569      50% MED     30.3972        90%      42.8504         19.4931      53.2575
SKEWNESS       0.789616     KURTOSIS     0.100633      25% Q1      25.1534        10%      22.1627         19.5096      53.6712
USS              134245     CSS           8835.85       0% MIN     18.4274         5%      21.1162         20.1425      53.7561
CV              26.6504     STD MEAN      0.75502                                  1%      18.7045         20.5507      54.0274
T:MEAN=0        41.9518     PROB>|T|       0.0001     RANGE           35.6
SGN RANK         3937.5     PROB>|S|       0.0001     Q3-Q1        11.4726
NUM ¬= 0            125                               MODE         24.3726
```

```
                                                  SAS                        12:13 TUESDAY, FEBRUARY 25, 1986   2
                                                 SEX=F

                                               UNIVARIATE

VARIABLE=HEIGHT
                     MOMENTS                                      QUANTILES(DEF=4)                                  EXTREMES

N                   125     SUM WGTS          125     100% MAX       184.3        99%       183.39          LOWEST      HIGHEST
MEAN            164.306     SUM           20538.3      75% Q3        168.9        95%       175.05           151.3        177.4
STD DEV         6.43793     VARIANCE      41.4469      50% MED         164        90%       172.28           151.3        177.7
SKEWNESS       0.260385     KURTOSIS     0.201984      25% Q1          160        10%       156.16           151.5        178.9
USS             3379714     CSS           5139.41       0% MIN       151.3         5%       152.62             152        180.8
CV              3.91824     STD MEAN     0.575826                                  1%        151.3           152.4        184.3
T:MEAN=0        285.341     PROB>|T|       0.0001     RANGE             33
SGN RANK         3937.5     PROB>|S|       0.0001     Q3-Q1        8.89999
NUM ¬= 0            125                               MODE           160.5
```

```
                                          SAS                  12:13 TUESDAY, FEBRUARY 25, 1986
                                         SEX=F
                                       UNIVARIATE

VARIABLE=HEIGHT
                     MOMENTS                                       QUANTILES(DEF=4)                                  EXTREMES

N                  125  SUM WGTS           125      100% MAX      96.6        99%     93.8179            LOWEST      HIGHEST
MEAN           61.7928  SUM             7724.1       75% Q3      67.75        95%       78.54              42.8         80.5
STD DEV        9.39551  VARIANCE       88.2757       50% MED      60.5        90%       75.54              46.4         83.8
SKEWNESS      0.792661  KURTOSIS      0.856211       25% Q1       55.8        10%       50.72              47.5         84.9
USS             488240  CSS            10946.2        0% MIN      42.8         5%       48.73              47.8         85.9
CV             15.2049  STD MEAN       0.84036                                 1%      43.736              48.6         96.6
T:MEAN=0       73.5313  PROB>|T|        0.0001      RANGE         53.8
SGN RANK        3937.5  PROB>|S|        0.0001      Q3-Q1        11.95
NUM ^= 0           125                              MODE            58
```

```
                                          SAS                  12:13 TUESDAY, FEBRUARY 25, 1986     4
                                         SEX=F
                                       UNIVARIATE

VARIABLE=BMI
                     MOMENTS                                       QUANTILES(DEF=4)                                  EXTREMES

N                  125  SUM WGTS           125      100% MAX   33.3301        99%     33.1054            LOWEST      HIGHEST
MEAN           22.8656  SUM             2858.2       75% Q3    24.6339        95%     28.9741           17.8015      31.6513
STD DEV        3.08921  VARIANCE       9.54324       50% MED   22.1484        90%     26.5006           17.9568      31.9682
SKEWNESS       1.16872  KURTOSIS       1.81586       25% Q1    20.8948        10%     19.4612           18.2105      32.3103
USS            66537.6  CSS            1183.36        0% MIN   17.8016         5%     18.5305           18.3087      32.4661
CV             13.5103  STD MEAN      0.276308                                 1%     17.8419           18.3721      33.3301
T:MEAN=0        82.754  PROB>|T|        0.0001      RANGE      15.5285
SGN RANK        3937.5  PROB>|S|        0.0001      Q3-Q1      3.73914
NUM ^= 0           125                              MODE       17.8015
```

```
                                                       SAS                                11:27 WEDNESDAY, JUNE 11, 1986     2
                                                      SEX=F

                                                   UNIVARIATE
VARIABLE=DENSITY1

                    MOMENTS                                         QUANTILES(DEF=4)                                  EXTREMES

N                 106   SUM WGTS          106      100% MAX   1.07252       99%     1.07235             LOWEST       HIGHEST
MEAN          1.04054   SUM           110.297       75% Q3    1.05266       95%      1.0634             1.0057       1.06368
STD DEV     0.0152418   VARIANCE  .000232311        50% MED   1.03891       90%     1.06095            1.00718       1.06402
SKEWNESS    -0.144798   KURTOSIS    -0.527917       25% Q1    1.03108       10%     1.02223            1.00763       1.06583
USS           114.793   CSS         0.0243927        0% MIN    1.0057        5%     1.01045            1.00771       1.07003
CV            1.46479   STD MEAN  0.00148041                                1%      1.0058            1.00909       1.07252
T:MEAN=0      702.572   PROB>|T|       0.0001      RANGE    0.0666209
SGN RANK       2835.5   PROB>|S|       0.0001      Q3-Q1    0.0215847
NUM ^= 0          106                              MODE        1.0057

                                                   MISSING VALUE
                                                           COUNT      19
                                                    % COUNT/NOBS   15.20
```

```
                                                       SAS                                12:[illegible] TUESDAY, FEBRUARY 25, 1986     6
                                                      SEX=F

                                                   UNIVARIATE
VARIABLE=PERFAT1

                    MOMENTS                                         QUANTILES(DEF=4)                                  EXTREMES

N                 106   SUM WGTS          106      100% MAX     40.21       99%     40.1632             LOWEST       HIGHEST
MEAN          25.0885   SUM           2659.38       75% Q3    29.0243       95%     38.0752            11.8991       38.6848
STD DEV       6.45103   VARIANCE      41.6158       50% MED    25.685       90%     32.8604            12.8891       39.3039
SKEWNESS     0.208532   KURTOSIS    -0.469278       25% Q1    19.9363       10%     16.5463            14.5753       39.3394
USS           71089.6   CSS           4369.66        0% MIN   11.8991        5%     15.5544             15.305       39.5613
CV            25.7131   STD MEAN      0.62658                                1%     11.9684              15.44         40.21
T:MEAN=0      40.0404   PROB>|T|       0.0001      RANGE      28.3109
SGN RANK       2835.5   PROB>|S|       0.0001      Q3-Q1      9.08791
NUM ^= 0          106                              MODE       11.8991

                                                   MISSING VALUE
                                                           COUNT      19
                                                    % COUNT/NOBS   15.20
```

```
                                                 SAS                    12:13 TUESDAY, FEBRUARY 25, 1986    7
                                                SEX=F

                                              UNIVARIATE

VARIABLE=FATMASS

                    MOMENTS                                     QUANTILES(DEF=4)                               EXTREMES

N                  106  SUM WGTS          106      100% MAX    34.1383        99%    34.0178          LOWEST      HIGHEST
MEAN           15.9179  SUM            1687.3       75% Q3     18.9562        95%    29.3086         5.87814      30.0514
STD DEV        5.89998  VARIANCE      34.8098       50% MED    15.7171        90%    23.9078         7.16634      30.0667
SKEWNESS      0.805481  KURTOSIS     0.541177       25% Q1     11.1933        10%    8.86031         7.53476      30.4093
USS            30513.3  CSS           3655.03        0% MIN    5.87814         5%     8.0696         7.97139      32.4178
CV             37.0651  STD MEAN     0.573057                                  1%    5.96831         8.06798      34.1383
T:MEAN=0       27.7772  PROB>|T|       0.0001      RANGE       28.2602
SGN RANK        2835.5  PROB>|S|       0.0001      Q3-Q1       7.76299
NUM ^= 0           106                             MODE        5.87814

                                                   MISSING VALUE         .
                                                           COUNT        19
                                                    % COUNT/NOBS     15.20
```

```
                                                 SAS                    12:13 TUESDAY, FEBRUARY 25, 1986    8
                                                SEX=F

                                              UNIVARIATE

VARIABLE=SUM2SF

                    MOMENTS                                     QUANTILES(DEF=4)                               EXTREMES

N                  125  SUM WGTS          125      100% MAX       75.8        99%      75.28          LOWEST      HIGHEST
MEAN           37.4528  SUM            4681.6       75% Q3        46.4        95%      65.76            15.2         67.4
STD DEV         14.521  VARIANCE       210.86       50% MED       35.4        90%       59.8            16.2         67.8
SKEWNESS      0.647549  KURTOSIS    -0.323807       25% Q1        26.1        10%      21.16            16.4         72.4
USS             201486  CSS           26146.6        0% MIN       15.2         5%      18.04            16.4         73.8
CV             38.7715  STD MEAN       1.2988                                  1%      15.44              17         75.8
T:MEAN=0       28.8365  PROB>|T|       0.0001      RANGE          60.6
SGN RANK        3937.5  PROB>|S|       0.0001      Q3-Q1          20.3
NUM ^= 0           125                             MODE           27.2
```

```
                                                                           SAS                   12:13 TUESDAY, FEBRUARY 25, 1986     9
                                                                          SEX=F

                                                                        UNIVARIATE

VARIABLE=SUM3SF

                    MOMENTS                                         QUANTILES(DEF=4)                                 EXTREMES

N                   125      SUM WGTS          125        100% MAX      103.8        99%      101.044          LOWEST      HIGHEST
MEAN            44.9224      SUM            5615.3         75% Q3          53        95%         81.8              21         88.2
STD DEV         17.0559      VARIANCE      290.903         50% MED       41.6        90%        67.08            21.4         90.2
SKEWNESS        1.09322      KURTOSIS      1.14934         25% Q1        33.2        10%        25.32            21.8         92.6
USS              288325      CSS           36071.9          0% MIN         21         5%        23.86            22.2         93.2
CV              37.9674      STD MEAN      1.52552                                    1%       21.104            22.6        103.8
T:MEAN=0        29.4472      PROB>|T|       0.0001         RANGE         82.8
SGN RANK         3937.5      PROB>|S|       0.0001         Q3-Q1         19.8
NUM ^= 0            125                                    MODE          34.8
```

```
                                                                           SAS                   12:13 TUESDAY, FEBRUARY 25, 1986    10
                                                                          SEX=F

                                                                        UNIVARIATE

VARIABLE=SUM4SF

                    MOMENTS                                         QUANTILES(DEF=4)                                 EXTREMES

N                   125      SUM WGTS          125        100% MAX      127.8        99%      125.772          LOWEST      HIGHEST
MEAN             58.432      SUM              7304         75% Q3          68        95%       106.02            26.4        107.4
STD DEV         21.8216      VARIANCE      476.181         50% MED       52.6        90%        90.72            27.8        116.8
SKEWNESS        1.02868      KURTOSIS     0.836783         25% Q1          42        10%         33.2            28.6        117.2
USS              485834      CSS           59046.5          0% MIN       26.4         5%        30.26            28.8          120
CV              37.3453      STD MEAN      1.95178                                    1%       26.764            29.4        127.8
T:MEAN=0        29.9378      PROB>|T|       0.0001         RANGE        101.4
SGN RANK         3937.5      PROB>|S|       0.0001         Q3-Q1           26
NUM ^= 0            125                                    MODE          34.8
```

```
                                        SAS                            12:13 TUESDAY, FEBRUARY 25, 1986    1
                                       SEX=F

                                     UNIVARIATE

VARIABLE=SUM5SF

               MOMENTS                                    QUANTILES(DEF=4)                           EXTREMES

N               124   SUM WGTS        124     100% MAX     192.3       99%    190.325        LOWEST     HIGHEST
MEAN        94.1363   SUM         11672.9      75% Q3     112.55       95%     162.15          41.8       171.8
STD DEV     33.0341   VARIANCE    1091.25      50% MED      92.4       90%      140.4          44.6       172.8
SKEWNESS   0.801215   KURTOSIS    0.33714      25% Q1      67.65       10%       54.9          46.2       175.4
USS         1233068   CSS          134224       0% MIN      41.8        5%      50.55            48       184.4
CV          35.0918   STD MEAN    2.96655                               1%       42.5          48.2       192.3
T:MEAN=0    31.7326   PROB>|T|     0.0001     RANGE        150.5
SGN RANK       3875   PROB>|S|     0.0001     Q3-Q1         44.9
NUM ^= 0        124                           MODE          92.8

                                              MISSING VALUE          .
                                                      COUNT          1
                                               % COUNT/NOBS       0.80
```

```
                                        SAS                            12:13 TUESDAY, FEBRUARY 25, 1986    12
                                       SEX=M

                                     UNIVARIATE

VARIABLE=AGE

               MOMENTS                                    QUANTILES(DEF=4)                           EXTREMES

N               155   SUM WGTS        155     100% MAX    63.263       99%    62.8457        LOWEST     HIGHEST
MEAN          36.18   SUM          5607.9      75% Q3     44.674       95%    53.4751       19.9123     54.6329
STD DEV     11.0072   VARIANCE    121.159      50% MED   36.2274       90%    50.8137        19.989     57.7945
SKEWNESS   0.214642   KURTOSIS   -1.00662      25% Q1    25.5041       10%    22.0373       20.3918     58.5671
USS          221552   CSS         18658.5       0% MIN   19.9123        5%     20.777       20.4603     62.5178
CV          30.4235   STD MEAN   0.884122                               1%    19.9553       20.6192      63.263
T:MEAN=0    40.9219   PROB>|T|     0.0001     RANGE      43.3507
SGN RANK       6045   PROB>|S|     0.0001     Q3-Q1      19.1699
NUM ^= 0        155                           MODE       50.8137
```

```
                                                     SAS                              12:13 TUESDAY, FEBRUARY 25, 1986
                                                    SEX=M

                                                  UNIVARIATE

VARIABLE=HEIGHT

                        MOMENTS                                        QUANTILES(DEF=4)                             EXTREMES

N                155   SUM WGTS          155          100% MAX    194.5        99%      192.148          LOWEST       HIGHEST
MEAN         173.945   SUM           26961.5           75% Q3     178.3        95%        186.5           157.9         188.4
STD DEV      6.71568   VARIANCE      45.1004           50% MED    173.7        90%       182.26           160.1         188.8
SKEWNESS    0.236876   KURTOSIS    0.0664461           25% Q1     169.6        10%       164.84             161         189.3
USS          4696768   CSS           6945.46            0% MIN    157.9         5%       162.72             162         190.3
CV           3.86081   STD MEAN     0.539417                                    1%      159.132           162.1         194.5
T:MEAN=0     322.469   PROB>|T|       0.0001          RANGE        34.6
SGN RANK        6045   PROB>|S|       0.0001          Q3-Q1         8.7
NUM ^= 0         155                                  MODE        170.8
```

```
                                                     SAS                              12:13 TUESDAY, FEBRUARY 25, 1986   14
                                                    SEX=M

                                                  UNIVARIATE

VARIABLE=WEIGHT

                        MOMENTS                                        QUANTILES(DEF=4)                             EXTREMES

N                155   SUM WGTS          155          100% MAX    125.4        99%      112.968          LOWEST       HIGHEST
MEAN         77.7452   SUM           12050.5           75% Q3      83.8        95%         98.7            58.4          99.9
STD DEV        10.82   VARIANCE      117.073           50% MED     76.1        90%        92.82            59.8         101.1
SKEWNESS    0.876646   KURTOSIS      1.51969           25% Q1      69.8        10%        65.36            60.6         101.4
USS           954897   CSS           18029.2            0% MIN     58.4         5%         62.7            60.9         103.2
CV           13.9173   STD MEAN     0.869086                                    1%       59.184              61         125.4
T:MEAN=0     89.4563   PROB>|T|       0.0001          RANGE          67
SGN RANK        6045   PROB>|S|       0.0001          Q3-Q1          14
NUM ^= 0         155                                  MODE         82.5
```

```
                                                                  SAS                                      12:13 TUESDAY, FEBRUARY 25, 1986   15
                                                                 SEX=M
                                                              UNIVARIATE

VARIABLE=BMI

                        MOMENTS                                                QUANTILES(DEF=4)                                 EXTREMES

N                   155    SUM WGTS          155          100% MAX   35.3669         99%       34.833           LOWEST       HIGHEST
MEAN            25.6724    SUM           3979.22           75% Q3    27.6343         95%      30.5381          18.0166       32.3242
STD DEV         3.01624    VARIANCE      9.09773           50% MED   25.5508         90%      29.2436          19.7487       32.7128
SKEWNESS       0.342661    KURTOSIS     0.290851           25% Q1    23.2261         10%      21.9895          20.0803       32.7285
USS              103557    CSS           1401.05            0% MIN   18.0166          5%       21.042          20.2501       34.4135
CV               11.749    STD MEAN     0.242271                                      1%      18.9866          20.4314       35.3669
T:MEAN=0        105.966    PROB>|T|       0.0001          RANGE      17.3502
SGN RANK           6045    PROB>|S|       0.0001          Q3-Q1      4.40823
NUM ^= 0            155                                   MODE       21.8237
```

```
                                                                  SAS                                      11:27 WEDNESDAY, JUNE 11, 1986     6
                                                                 SEX=M
                                                              UNIVARIATE

VARIABLE=DENSITY1

                        MOMENTS                                                QUANTILES(DEF=4)                                 EXTREMES

N                   147    SUM WGTS          147          100% MAX   1.09416         99%      1.09318           LOWEST       HIGHEST
MEAN            1.05489    SUM           155.069           75% Q3    1.06624         95%      1.08136          1.01448       1.08957
STD DEV       0.0166008    VARIANCE  .000275587            50% MED   1.05516         90%      1.07667          1.01968       1.09032
SKEWNESS      0.0268422    KURTOSIS    -0.390742           25% Q1    1.04334         10%      1.03082          1.02338        1.0915
USS             163.621    CSS         0.0402356            0% MIN   1.01448          5%      1.02725          1.02348       1.09212
CV               1.5737    STD MEAN     0.001369                                      1%      1.01698          1.02385       1.09416
T:MEAN=0        770.436    PROB>|T|       0.0001          RANGE    0.0796805
SGN RANK           5439    PROB>|S|       0.0001          Q3-Q1    0.0229053
NUM ^= 0            147                                   MODE       1.01448

                                                          MISSING VALUE          .
                                                                  COUNT          8
                                                           % COUNT/NOBS       5.16
```

```
                                                                      SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   17
                                                                     SEX=M

                                                                   UNIVARIATE

VARIABLE=PERFAT1

                       MOMENTS                                          QUANTILES(DEF=4)                                      EXTREMES

N                   147     SUM WGTS          147          100% MAX    36.2777        99%      35.1735            LOWEST       HIGHEST
MEAN            19.1273     SUM           2811.71           75% Q3     23.8173        95%      30.6758           3.47231       32.1563
STD DEV         6.82039     VARIANCE      46.5178           50% MED    18.9093        90%       29.135           4.25384       32.3167
SKEWNESS      0.0480168     KURTOSIS    -0.397995           25% Q1      14.408        10%      10.2578           4.49091       32.3609
USS               60572     CSS           6791.59            0% MIN    3.47231         5%      8.41433           4.94456       33.9774
CV              35.6579     STD MEAN     0.562537                                      1%      3.84744           5.23061       36.2777
T:MEAN=0        34.0019     PROB>|T|       0.0001          RANGE       32.8056
SGN RANK           5439     PROB>|S|       0.0001          Q3-Q1       9.40936
NUM ^= 0            147                                    MODE        3.47231

                                                           MISSING VALUE        .
                                                                   COUNT        8
                                                            % COUNT/NOBS     5.16
```

```
                                                                      SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   18
                                                                     SEX=M

                                                                   UNIVARIATE

VARIABLE=FATMASS

                       MOMENTS                                          QUANTILES(DEF=4)                                      EXTREMES

N                   147     SUM WGTS          147          100% MAX     40.324        99%      37.4569            LOWEST       HIGHEST
MEAN            15.2834     SUM           2246.66           75% Q3     19.5738        95%       27.045            2.4202       27.8239
STD DEV         6.78129     VARIANCE      45.9859           50% MED     14.562        90%      24.5423            3.0134       29.6026
SKEWNESS       0.609267     KURTOSIS       0.5743           25% Q1     10.0594        10%      7.12131           3.33717       31.8966
USS             41050.4     CSS           6713.94            0% MIN     2.4202         5%      5.20411           3.37375       34.3511
CV              44.3704     STD MEAN     0.559312                                      1%      2.70494           3.52052        40.324
T:MEAN=0        27.3253     PROB>|T|       0.0001          RANGE       37.9038
SGN RANK           5439     PROB>|S|       0.0001          Q3-Q1       9.51438
NUM ^= 0            147                                    MODE         2.4202

                                                           MISSING VALUE        .
                                                                   COUNT        8
                                                            % COUNT/NOBS     5.16
```

```
                                                           SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   19
                                                          SEX=M

                                                        UNIVARIATE

VARIABLE=SUM2SF

                    MOMENTS                                           QUANTILES(DEF=4)                                  EXTREMES

N                  155    SUM WGTS         155        100% MAX      81.2         99%     77.3919              LOWEST      HIGHEST
MEAN           33.2052    SUM           5146.8         75% Q3       43.6         95%          55                10.4         61.4
STD DEV        14.0681    VARIANCE     197.913         50% MED      32.6         90%        51.8                  11         67.2
SKEWNESS      0.540427    KURTOSIS    0.154484         25% Q1       22.6         10%       14.52                11.2         67.4
USS             201379    CSS          30478.5          0% MIN      10.4          5%       12.72                11.4         74.4
CV             42.3673    STD MEAN     1.12998                                    1%      10.736                  12         81.2
T:MEAN=0       29.3856    PROB>|T|      0.0001         RANGE        70.8
SGN RANK          6045    PROB>|S|      0.0001         Q3-Q1          21
NUM ¬= 0           155                                 MODE         23.8
```

```
                                                           SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   20
                                                          SEX=M

                                                        UNIVARIATE

VARIABLE=SUM3SF

                    MOMENTS                                           QUANTILES(DEF=4)                                  EXTREMES

N                  155    SUM WGTS         155        100% MAX       100         99%     97.6479              LOWEST      HIGHEST
MEAN           36.6148    SUM           5675.3         75% Q3       45.8         95%       62.28                15.8         67.4
STD DEV        15.0971    VARIANCE     227.922         50% MED      34.2         90%       55.28                15.8         77.4
SKEWNESS       1.25701    KURTOSIS      2.7023         25% Q1       23.8         10%       19.92                  16         84.8
USS             242900    CSS            35100          0% MIN      15.8          5%       17.88                16.2         95.8
CV             41.2321    STD MEAN     1.21263                                    1%        15.8                16.6          100
T:MEAN=0       30.1947    PROB>|T|      0.0001         RANGE        84.2
SGN RANK          6045    PROB>|S|      0.0001         Q3-Q1          22
NUM ¬= 0           155                                 MODE           22
```

```
                                                        SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   21
                                                       SEX=M

                                                     UNIVARIATE

VARIABLE=SUM4SF

                    MOMENTS                                          QUANTILES(DEF=4)                                 EXTREMES

N                155     SUM WGTS          155         100% MAX     126.8        99%    126.128          LOWEST      HIGHEST
MEAN         54.0013     SUM            8370.2          75% Q3       67.6        95%      91.72            22.2          100
STD DEV      21.2416     VARIANCE      451.204          50% MED      51.8        90%      79.12            22.2          103
SKEWNESS    0.853327     KURTOSIS     0.897896          25% Q1       36.6        10%      29.96              23        120.6
USS           521487     CSS           69485.3           0% MIN      22.2         5%      25.32            23.6        125.6
CV           39.3353     STD MEAN      1.70616                                    1%       22.2            23.8        126.8
T:MEAN=0     31.6507     PROB>|T|       0.0001         RANGE        104.6
SGN RANK        6045     PROB>|S|       0.0001         Q3-Q1           31
NUM ¬= 0         155                                   MODE            31
```

```
                                                        SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   22
                                                       SEX=M

                                                     UNIVARIATE

VARIABLE=SUM5SF

                    MOMENTS                                          QUANTILES(DEF=4)                                 EXTREMES

N                155     SUM WGTS          155         100% MAX     202.8        99%    201.456          LOWEST      HIGHEST
MEAN         83.2342     SUM           12901.3          75% Q3      105.2        95%     137.08            29.8        162.6
STD DEV       33.286     VARIANCE      1107.96          50% MED      81.4        90%     122.32            32.6        166.2
SKEWNESS    0.841313     KURTOSIS      1.13135          25% Q1       56.4        10%      44.52              33        176.2
USS          1244455     CSS            170625           0% MIN      29.8         5%      35.84            33.8        200.4
CV           39.9905     STD MEAN      2.67359                                    1%     31.368            34.4        202.8
T:MEAN=0     31.1319     PROB>|T|       0.0001         RANGE          173
SGN RANK        6045     PROB>|S|       0.0001         Q3-Q1         48.8
NUM ¬= 0         155                                   MODE          50.4
```

```
                                                  SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   23
                                        SEX=F   CHECKAGE=GT40

                                              UNIVARIATE

VARIABLE=AGE

                  MOMENTS                                          QUANTILES(DEF=4)                          EXTREMES

N                 22   SUM WGTS           22      100% MAX   54.0274        99%      54.0274         LOWEST      HIGHEST
MEAN         45.9127   SUM           1010.08       75% Q3    50.7616        95%      53.9867         40.3288     51.0411
STD DEV      4.81672   VARIANCE      23.2008       50% MED   43.2959        90%      53.7307         40.4794     53.2575
SKEWNESS    0.629984   KURTOSIS     -1.18532       25% Q1    42.0842        10%      40.8082         41.5733     53.6712
USS          46862.7   CSS           487.216        0% MIN   40.3288         5%      40.3514         41.6603     53.7361
CV            10.491   STD MEAN      1.07693                                 1%      40.3288         42.0329     54.0274
T:MEAN=0     44.7388   PROB>|T|       0.0001      RANGE      13.6986
SGN RANK       126.5   PROB>|S|       0.0001      Q3-Q1       8.6774
NUM ^= 0          22                              MODE       40.3288
```

```
                                                  SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   24
                                        SEX=F   CHECKAGE=GT40

                                              UNIVARIATE

VARIABLE=HEIGHT

                  MOMENTS                                          QUANTILES(DEF=4)                          EXTREMES

N                 22   SUM WGTS           22      100% MAX     172.6        99%        172.6         LOWEST      HIGHEST
MEAN         165.327   SUM            3637.2       75% Q3    169.625        95%      172.435          157.2        169.7
STD DEV      4.79257   VARIANCE      22.9687       50% MED     166.2        90%       171.41          157.9        170.1
SKEWNESS   -0.236851   KURTOSIS     -1.23875       25% Q1     161.25        10%       158.11          158.6        171.2
USS           601811   CSS           482.344        0% MIN     157.2         5%      157.305          159.4        171.5
CV           2.89884   STD MEAN      1.02179                                 1%        157.2          160.5        172.6
T:MEAN=0     161.803   PROB>|T|       0.0001      RANGE         15.4
SGN RANK       126.5   PROB>|S|       0.0001      Q3-Q1      8.37499
NUM ^= 0          22                              MODE         166.5
```

```
                                                   SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   25
                                          SEX=F    CHECKAGE=GT40

                                                   UNIVARIATE

VARIABLE=WEIGHT

                   MOMENTS                                          QUANTILES(DEF=4)                             EXTREMES

N                   22     SUM WGTS          22          100% MAX      84.9         99%        84.9          LOWEST      HIGHEST
MEAN           63.9636     SUM           1407.2           75% Q3     72.425         95%       84.24            48.7         75.5
STD DEV        10.4734     VARIANCE     109.693           50% MED     60.85         90%       79.87            51.7           76
SKEWNESS      0.446774     KURTOSIS   -0.915968           25% Q1       55.5         10%       51.73            51.8         78.4
USS            92313.2     CSS          2303.55            0% MIN      48.7          5%       49.15            53.4         80.5
CV             16.3741     STD MEAN     2.23294                                      1%        48.7            53.7         84.9
T:MEAN=0       28.6454     PROB>|T|      0.0001          RANGE         36.2
SGN RANK         126.5     PROB>|S|      0.0001          Q3-Q1       16.925
NUM ^= 0            22                                   MODE          48.7
```

```
                                                   SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   26
                                          SEX=F    CHECKAGE=GT40

                                                   UNIVARIATE

VARIABLE=BMI

                   MOMENTS                                          QUANTILES(DEF=4)                             EXTREMES

N                   22     SUM WGTS          22          100% MAX   32.3103         99%     32.3103          LOWEST      HIGHEST
MEAN           23.3665     SUM          514.064           75% Q3    25.9894         95%     31.5836         17.8015      26.2667
STD DEV        3.46327     VARIANCE     11.9942           50% MED   23.1399         90%     27.2225         18.6493      26.3972
SKEWNESS      0.585457     KURTOSIS    0.473998           25% Q1    20.7005         10%     18.9332         19.5957      26.6555
USS            12263.8     CSS          251.879            0% MIN   17.8016          5%     17.9287          20.162      27.4655
CV             14.8215     STD MEAN    0.738371                                      1%     17.8015         20.4737      32.3103
T:MEAN=0       31.6461     PROB>|T|      0.0001          RANGE      14.5088
SGN RANK         126.5     PROB>|S|      0.0001          Q3-Q1      5.28886
NUM ^= 0            22                                   MODE       17.8015
```

```
                                                               SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   27
                                                     SEX=F   CHECKAGE=GT40
                                                            UNIVARIATE

VARIABLE=DENSITY

                        MOMENTS                                          QUANTILES(DEF=4)                                EXTREMES

N                   18    SUM WGTS           18          100% MAX    1.06194       99%      1.06194         LOWEST      HIGHEST
MEAN           1.03618    SUM           18.6513           75% Q3      1.0479       95%      1.06194        1.00598      1.04777
STD DEV      0.0123702    VARIANCE  .000153021            50% MED    1.03423       90%      1.05055        1.02421      1.04827
SKEWNESS     -0.217133    KURTOSIS      1.40424           25% Q1     1.02885       10%      1.02239        1.02736      1.04884
USS            19.3287    CSS        0.00260136            0% MIN    1.00598        5%      1.00598        1.02839      1.04928
CV             1.19382    STD MEAN   0.00291568                                     1%      1.00598        1.02901      1.06194
T:MEAN=0       355.383    PROB>|T|       0.0001           RANGE    0.0559647
SGN RANK          85.5    PROB>|S|   .000214092           Q3-Q1    0.0190449
NUM ¬= 0            18                                    MODE       1.00598

                                                          MISSING VALUE       .
                                                                  COUNT       4
                                                           % COUNT/NOBS   18.18
```

```
                                                               SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   28
                                                     SEX=F   CHECKAGE=GT40
                                                            UNIVARIATE

VARIABLE=PERFAT1

                        MOMENTS                                          QUANTILES(DEF=4)                                EXTREMES

N                   18    SUM WGTS           18          100% MAX      40.21       99%        40.21         LOWEST      HIGHEST
MEAN           27.1168    SUM           488.102           75% Q3     30.2254       95%        40.21        16.3683      30.1662
STD DEV        5.25714    VARIANCE      27.6375           50% MED     27.875       90%      32.9552        21.6201      30.4029
SKEWNESS       0.30729    KURTOSIS      1.52691           25% Q1     22.1379       10%      21.0949        21.7408      30.8164
USS            13705.6    CSS           469.837            0% MIN    16.3684        5%      16.3683        21.9997      32.1492
CV              19.387    STD MEAN      1.23912                                     1%      16.3683         22.184        40.21
T:MEAN=0       21.8839    PROB>|T|       0.0001           RANGE      23.8417
SGN RANK          85.5    PROB>|S|   .000214092           Q3-Q1      8.08742
NUM ¬= 0            18                                    MODE       16.3683

                                                          MISSING VALUE       .
                                                                  COUNT       4
                                                           % COUNT/NOBS   18.18
```

```
                                                       SAS                                    12:13 TUESDAY, FEBRUARY 25, 1986   29
                                                SEX=F   CHECKAGE=GT40

                                                      UNIVARIATE

VARIABLE=FATMASS

                     MOMENTS                                         QUANTILES(DEF=4)                                 EXTREMES

N                  18     SUM WGTS           18       100% MAX    34.1383        99%      34.1383          LOWEST     HIGHEST
MEAN          18.0755     SUM           325.359        75% Q3     22.2535        95%      34.1383         7.97139     22.1774
STD DEV       6.10025     VARIANCE      37.2131        50% MED    17.6167        90%      24.4922           11.24      22.482
SKEWNESS     0.773953     KURTOSIS      1.53975        25% Q1     12.9684        10%      10.9131         11.5451     22.9546
USS           6513.64     CSS           632.622         0% MIN    7.97139         5%      7.97139         12.3418     23.4205
CV            33.7487     STD MEAN      1.43784                                   1%      7.97139         13.1773     34.1383
T:MEAN=0      12.5713     PROB>|T|       0.0001        RANGE      26.1669
SGN RANK         85.5     PROB>|S|  .000214092         Q3-Q1       9.2851
NUM ¬= 0           18                                  MODE       7.97139

                                                       MISSING VALUE        .
                                                               COUNT        4
                                                        % COUNT/NOBS    18.18
```

```
                                                       SAS                                    12:13 TUESDAY, FEBRUARY 25, 1986   30
                                                SEX=F   CHECKAGE=GT40

                                                      UNIVARIATE

VARIABLE=SUM2SF

                     MOMENTS                                         QUANTILES(DEF=4)                                 EXTREMES

N                  22     SUM WGTS           22       100% MAX       73.8        99%         73.8          LOWEST     HIGHEST
MEAN             42.7     SUM             939.4        75% Q3          51        95%      72.0599            18.6        51.6
STD DEV        13.573     VARIANCE      184.228        50% MED       43.5        90%        60.64            21.8        56.2
SKEWNESS     0.159919     KURTOSIS     0.121293        25% Q1        34.9        10%         22.4            23.8          57
USS           43981.2     CSS           3868.78         0% MIN       18.6         5%        19.08            27.4        62.2
CV             31.787     STD MEAN      2.89378                                   1%         18.6              28        73.8
T:MEAN=0      14.7558     PROB>|T|       0.0001        RANGE         55.2
SGN RANK        126.5     PROB>|S|       0.0001        Q3-Q1         16.1
NUM ¬= 0           22                                  MODE          18.6
```

```
                                                            SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   31
                                                    SEX=F   CHECKAGE=GT40

                                                          UNIVARIATE

VARIABLE=SUM3SF

                     MOMENTS                                           QUANTILES(DEF=4)                               EXTREMES

N                  22     SUM WGTS          22          100% MAX      103.8        99%      103.8            LOWEST       HIGHEST
MEAN          48.2818     SUM           1062.2           75% Q3       63.25        95%    98.9397              24.2          65.2
STD DEV       18.6201     VARIANCE     346.707           50% MED       43.9        90%      70.08                26            66
SKEWNESS      1.24621     KURTOSIS     2.42426           25% Q1        38.6        10%      26.24              26.8            67
USS           58565.8     CSS          7280.85            0% MIN       24.2         5%      24.47                27          71.4
CV            38.5654     STD MEAN     3.96981                                      1%       24.2              33.2         103.8
T:MEAN=0      12.1622     PROB>|T|      0.0001          RANGE          79.6
SGN RANK        126.5     PROB>|S|      0.0001          Q3-Q1         24.65
NUM ¬= 0           22                                   MODE           42.2
```

```
                                                            SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   32
                                                    SEX=F   CHECKAGE=GT40

                                                          UNIVARIATE

VARIABLE=SUM4SF

                     MOMENTS                                           QUANTILES(DEF=4)                               EXTREMES

N                  22     SUM WGTS          22          100% MAX      127.8        99%      127.8            LOWEST       HIGHEST
MEAN          62.4636     SUM           1374.2           75% Q3        74.1        95%     122.13              31.4          80.4
STD DEV       22.5098     VARIANCE     506.691           50% MED       60.4        90%      88.86              32.4            81
SKEWNESS     0.969959     KURTOSIS      2.1236           25% Q1       50.25        10%      32.46              32.6          86.2
USS             96478     CSS          10640.5            0% MIN       31.4         5%      31.55              33.6            90
CV            36.0366     STD MEAN     4.79911                                      1%       31.4              45.6         127.8
T:MEAN=0      13.0157     PROB>|T|      0.0001          RANGE          96.4
SGN RANK        126.5     PROB>|S|      0.0001          Q3-Q1         23.85
NUM ¬= 0           22                                   MODE           31.4
```

```
                                                   SAS                       12:13 TUESDAY, FEBRUARY 25, 1986    43
                                              SEX=F   CHECKAGE=GT40

                                                     UNIVARIATE

VARIABLE=SUM5SF

                        MOMENTS                                          QUANTILES(DEF=4)                                   EXTREMES

N                   22      SUM WGTS            22            100% MAX       184.4          99%       184.4               LOWEST      HIGHEST
MEAN           101.445      SUM             2231.8             75% Q3       117.45          95%      177.44                 52.8        124.2
STD DEV        30.3386      VARIANCE        920.43             50% MED       101.6          90%       134.4                   55        125.2
SKEWNESS      0.526694      KURTOSIS       1.58369             25% Q1         88.9          10%       55.12                 55.4          126
USS             245735      CSS              19329              0% MIN        52.8           5%       53.13                   61          138
CV             29.9063      STD MEAN       6.46821                                           1%        52.8                 87.4        184.4
T:MEAN=0       15.6837      PROB>|T|        0.0001            RANGE          131.6
SGN RANK         126.5      PROB>|S|        0.0001            Q3-Q1          28.55
NUM ^= 0            22                                        MODE            92.6
```

```
                                                   SAS                       12:13 TUESDAY, FEBRUARY 25, 1986    46
                                              SEX=F   CHECKAGE=LE30

                                                     UNIVARIATE

VARIABLE=AGE

                        MOMENTS                                          QUANTILES(DEF=4)                                   EXTREMES

N                   60      SUM WGTS            60            100% MAX     29.6137          99%     29.6137               LOWEST      HIGHEST
MEAN           24.7667      SUM               1486             75% Q3      27.0589          95%     29.1997              18.4274      29.1452
STD DEV        2.92259      VARIANCE       8.54153             50% MED     24.7205          90%     28.8983              19.4931      29.1945
SKEWNESS     -0.155721      KURTOSIS     -0.969865             25% Q1       22.337          10%     21.1008              19.5096         29.2
USS            37307.4      CSS             503.95              0% MIN     18.4274           5%     19.5412              20.1425      29.2877
CV             11.8005      STD MEAN      0.377305                                           1%     18.4274              20.5507      29.6137
T:MEAN=0       65.6411      PROB>|T|        0.0001            RANGE        11.1863
SGN RANK           915      PROB>|S|        0.0001            Q3-Q1        4.72192
NUM ^= 0            60                                        MODE         24.3726
```

```
                                                                SAS                               12:13 TUESDAY, FEBRUARY 25, 1936    5
                                                      SEX=F    CHECKAGE=LE30
                                                                UNIVARIATE
VARIABLE=HEIGHT

                    MOMENTS                                                  QUANTILES(DEF=4)                                     EXTREMES

N                     60      SUM WGTS            60        100% MAX     184.3        99%        184.3                  LOWEST        HIGHEST
MEAN             164.123      SUM             9847.4         75% Q3      167.5        95%      178.575                   151.3          172.4
STD DEV          6.29992      VARIANCE       39.6889         50% MED     164.1        90%        170.1                   152.5          172.4
SKEWNESS         0.67853      KURTOSIS       1.53996         25% Q1      160.1        10%       156.27                     153          178.9
USS              1618530      CSS            2341.65          0% MIN     151.3         5%      153.125                   155.5          180.8
CV               3.83853      STD MEAN      0.813316                                   1%        151.3                   155.7          184.3
T:MEAN=0         201.795      PROB>|T|        0.0001        RANGE           33
SGN RANK             915      PROB>|S|        0.0001        Q3-Q1          7.4
NUM ^= 0              60                                    MODE         167.5
```

```
                                                                SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   36
                                                      SEX=F    CHECKAGE=LE30
                                                                UNIVARIATE
VARIABLE=WEIGHT

                    MOMENTS                                                  QUANTILES(DEF=4)                                     EXTREMES

N                     60      SUM WGTS            60        100% MAX      85.9        99%         85.9                  LOWEST        HIGHEST
MEAN             60.3533      SUM             3621.2         75% Q3       66.1        95%        75.92                    42.8           73.3
STD DEV           8.5119      VARIANCE       72.4524         50% MED      59.5        90%        73.28                    47.5           74.4
SKEWNESS        0.531401      KURTOSIS      0.303345         25% Q1     54.275        10%        49.45                    47.8             76
USS               222826      CSS            4274.69          0% MIN      42.8         5%        47.85                    48.8           77.3
CV               14.1034      STD MEAN       1.09888                                   1%         42.8                    48.8           85.9
T:MEAN=0         54.9225      PROB>|T|        0.0001        RANGE         43.1
SGN RANK             915      PROB>|S|        0.0001        Q3-Q1       11.825
NUM ^= 0              60                                    MODE          48.8
```

```
                                                  SAS                                   12:13 TUESDAY, FEBRUARY 25, 1986   37
                                          SEX=F   CHECKAGE=LE30

                                                 UNIVARIATE

VARIABLE=BMI

                    MOMENTS                                         QUANTILES(DEF=4)                              EXTREMES

N                  60    SUM WGTS          60          100% MAX    32.4661        99%     32.4661          LOWEST        HIGHEST
MEAN          22.3945    SUM          1343.67           75% Q3     23.6463        95%     27.4393         17.9568         26.093
STD DEV       2.89722    VARIANCE     8.39387           50% MED    22.0663        90%     25.5659         18.2105        27.3942
SKEWNESS      1.28477    KURTOSIS     2.88358           25% Q1     20.4681        10%     18.7487         18.3087        27.4417
USS           30585.9    CSS          495.239            0% MIN    17.9568         5%     18.3119         18.3721        31.9682
CV            12.9372    STD MEAN    0.374029                                      1%     17.9568         18.4795        32.4661
T:MEAN=0      59.8735    PROB>|T|      0.0001           RANGE      14.5093
SGN RANK          915    PROB>|S|      0.0001           Q3-Q1      3.17819
NUM ¬= 0           60                                   MODE       17.9568
```

```
                                                  SAS                                   12:13 TUESDAY, FEBRUARY 25, 1986   38
                                          SEX=F   CHECKAGE=LE30

                                                 UNIVARIATE

VARIABLE=DENSITY

                    MOMENTS                                         QUANTILES(DEF=4)                              EXTREMES

N                  53    SUM WGTS          53          100% MAX    1.07314        99%     1.07314          LOWEST        HIGHEST
MEAN          1.04538    SUM          55.4053           75% Q3     1.05775        95%     1.06753         1.00741         1.0633
STD DEV     0.0149251    VARIANCE   .000222758          50% MED    1.04612        90%     1.06244         1.00794        1.06431
SKEWNESS    -0.510372    KURTOSIS    0.0155674          25% Q1     1.03473        10%     1.02445         1.01727        1.06627
USS           57.9313    CSS         0.0115834           0% MIN    1.00741         5%     1.01447         1.02302        1.07049
CV            1.42771    STD MEAN   0.00205012                                     1%     1.00741         1.02439        1.07314
T:MEAN=0      509.914    PROB>|T|      0.0001           RANGE    0.0657326
SGN RANK        715.5    PROB>|S|      0.0001           Q3-Q1    0.0230203
NUM ¬= 0           53                                   MODE       1.00741

                                                        MISSING VALUE         .
                                                                COUNT         7
                                                         % COUNT/NOBS     11.67
```

```
                                                           SAS                              12:13 TUESDAY, FEBRUARY 25, 1986   39
                                                   SEX=F   CHECKAGE=LE30
                                                        UNIVARIATE

VARIABLE=PERFAT1
                     MOMENTS                                 QUANTILES(DEF=4)                                  EXTREMES

N                   53    SUM WGTS        53       100% MAX   39.5413       99%    39.5413         LOWEST     HIGHEST
MEAN           23.2415    SUM         1231.8        75% Q3    27.6474       95%    36.4166        11.8991     32.1307
STD DEV        6.26789    VARIANCE   39.2864        50% MED   22.8788       90%    32.0723        12.8891     32.6292
SKEWNESS      0.580129    KURTOSIS  0.138797        25% Q1    18.0971       10%    16.1091        14.5753     35.1641
USS            30671.9    CSS        2042.89         0% MIN   11.8991        5%    14.0695          15.44     39.3394
CV             26.9685    STD MEAN   0.86096                                 1%    11.8991        15.7668     39.5413
T:MEAN=0       26.9949    PROB>|T|    0.0001        RANGE     27.6422
SGN RANK         715.5    PROB>|S|    0.0001        Q3-Q1     9.55029
NUM ^= 0            53                              MODE      11.8991

                                                    MISSING VALUE         .
                                                            COUNT         7
                                                     % COUNT/NOBS     11.67
```

```
                                                           SAS                              12:13 TUESDAY, FEBRUARY 25, 1986   40
                                                   SEX=F   CHECKAGE=LE30
                                                        UNIVARIATE

VARIABLE=FATMASS
                     MOMENTS                                 QUANTILES(DEF=4)                                  EXTREMES

N                   53    SUM WGTS        53       100% MAX   30.4094       99%    30.4093         LOWEST     HIGHEST
MEAN           14.4702    SUM        766.919        75% Q3    17.1977       95%    26.2211        5.87814     23.7965
STD DEV        5.45819    VARIANCE   29.7918        50% MED   13.0483       90%    22.8659        7.16636     24.3412
SKEWNESS         1.027    KURTOSIS   1.09763        25% Q1    10.4711       10%    8.38548        7.53474     24.5797
USS            12646.6    CSS        1549.17         0% MIN   5.87814        5%    7.42422        8.07261     30.0514
CV             37.7202    STD MEAN  0.749739                                 1%    5.87814        8.19674     30.4093
T:MEAN=0       19.3003    PROB>|T|    0.0001        RANGE     24.5312
SGN RANK         715.5    PROB>|S|    0.0001        Q3-Q1     6.72663
NUM ^= 0            53                              MODE      5.87814

                                                    MISSING VALUE         .
                                                            COUNT         7
                                                     % COUNT/NOBS     11.67
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   41
                                          SEX=F    CHECKAGE=LE30

                                                 UNIVARIATE

VARIABLE=SUM2SF

                    MOMENTS                                             QUANTILES(DEF=4)                              EXTREMES

N                  60     SUM WGTS          60          100% MAX     72.4        99%       72.4           LOWEST         HIGHEST
MEAN          34.0067     SUM           2040.4           75% Q3     42.45        95%      64.76             15.2            52.8
STD DEV       13.1567     VARIANCE       173.1           50% MED     30.4        90%      51.72             16.2              64
SKEWNESS       1.0742     KURTOSIS    0.808205           25% Q1      24.8        10%      20.14             16.4            64.8
USS           79600.1     CSS          10212.9            0% MIN     15.2         5%      16.55             19.4            67.8
CV            38.6887     STD MEAN     1.69853                                    1%       15.2             19.8            72.4
T:MEAN=0      20.0213     PROB>|T|      0.0001          RANGE        57.2
SGN RANK          915     PROB>|S|      0.0001          Q3-Q1       17.65
NUM ¬= 0           60                                   MODE         27.2
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   42
                                          SEX=F    CHECKAGE=LE30

                                                 UNIVARIATE

VARIABLE=SUM3SF

                    MOMENTS                                             QUANTILES(DEF=4)                              EXTREMES

N                  60     SUM WGTS          60          100% MAX     90.2        99%       90.2           LOWEST         HIGHEST
MEAN            41.77     SUM           2506.2           75% Q3      50.1        95%    74.3899               21            61.2
STD DEV       14.5505     VARIANCE     211.718           50% MED     38.4        90%      59.84             21.4            62.8
SKEWNESS      1.09938     KURTOSIS     1.66931           25% Q1      32.2        10%       24.1             22.2              75
USS            117175     CSS          12491.3            0% MIN       21         5%      22.22             22.6              83
CV            34.8349     STD MEAN     1.87846                                    1%         21             23.8            90.2
T:MEAN=0      22.2362     PROB>|T|      0.0001          RANGE        69.2
SGN RANK          915     PROB>|S|      0.0001          Q3-Q1        17.9
NUM ¬= 0           60                                   MODE         34.8
```

```
                                                 SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   43
                                          SEX=F   CHECKAGE=LE30

                                               UNIVARIATE

VARIABLE=SUM4SF
                    MOMENTS                                            QUANTILES(DEF=4)                                 EXTREMES

N                    60   SUM WGTS         60        100% MAX       120        99%          120              LOWEST      HIGHEST
MEAN            54.4567   SUM          3267.4         75% Q3       65.6        95%        100.9                26.4           81
STD DEV         19.0696   VARIANCE     363.65         50% MED      51.5        90%        74.16                27.8         83.8
SKEWNESS        1.14329   KURTOSIS    2.04111         25% Q1       41.2        10%        30.36                28.6        101.8
USS              199387   CSS         21455.4          0% MIN      26.4         5%        28.61                28.8        106.8
CV               35.018   STD MEAN    2.46188                                   1%         26.4                30.2          120
T:MEAN=0          22.12   PROB>|T|     0.0001        RANGE         93.6
SGN RANK            915   PROB>|S|     0.0001        Q3-Q1         24.4
NUM ¬= 0             60                              MODE            42
```

```
                                                 SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   44
                                          SEX=F   CHECKAGE=LE30

                                               UNIVARIATE

VARIABLE=SUM5SF
                    MOMENTS                                            QUANTILES(DEF=4)                                 EXTREMES

N                    60   SUM WGTS         60        100% MAX     175.4        99%        175.4              LOWEST      HIGHEST
MEAN            87.7633   SUM          5265.8         75% Q3     106.15        95%       162.26                41.8        142.8
STD DEV         30.8483   VARIANCE    951.618         50% MED      81.6        90%       126.88                44.6        155.8
SKEWNESS        1.02234   KURTOSIS    1.06713         25% Q1       64.7        10%        52.26                46.2        162.6
USS              518290   CSS         56145.5          0% MIN      41.8         5%        46.29                  48        172.8
CV              35.1494   STD MEAN     3.9825                                   1%         41.8                48.2        175.4
T:MEAN=0        22.0372   PROB>|T|     0.0001        RANGE        133.6
SGN RANK            915   PROB>|S|     0.0001        Q3-Q1        41.45
NUM ¬= 0             60                              MODE          54.6
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   45
                                         SEX=F    CHECKAGE=30TO
                                                 UNIVARIATE

VARIABLE=AGE
                         MOMENTS                                      QUANTILES(DEF=4)                               EXTREMES

N                     43    SUM WGTS           43     100% MAX    39.7589       99%     39.7589           LOWEST      HIGHEST
MEAN             34.0285    SUM           1463.22      75% Q3     36.3178       95%     38.1803          30.2575      37.6986
STD DEV          2.59752    VARIANCE      6.74713      50% MED    33.4959       90%     37.7397          30.3644      37.7671
SKEWNESS        0.248907    KURTOSIS     -1.05394      25% Q1     31.7808       10%     30.5353          30.3972      38.0027
USS              50074.7    CSS            283.38       0% MIN    30.2575        5%      30.371           30.452      38.2247
CV               7.63338    STD MEAN     0.396119                                1%     30.2575          30.6603      39.7589
T:MEAN=0         85.9048    PROB>|T|       0.0001      RANGE      9.50137
SGN RANK             473    PROB>|S|       0.0001      Q3-Q1      4.53699
NUM ¬= 0              43                               MODE       30.2575
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   46
                                         SEX=F    CHECKAGE=30TO
                                                 UNIVARIATE

VARIABLE=HEIGHT
                         MOMENTS                                      QUANTILES(DEF=4)                               EXTREMES

N                     43    SUM WGTS           43     100% MAX      177.7       99%       177.7           LOWEST      HIGHEST
MEAN              164.04    SUM            7053.7      75% Q3         170       95%      176.96            151.3        174.6
STD DEV          7.37987    VARIANCE      54.4624      50% MED      163.3       90%      174.66            151.5        174.7
SKEWNESS       0.0569752    KURTOSIS    -0.843638      25% Q1       158.9       10%       152.6              152        175.2
USS              1159373    CSS           2287.42       0% MIN      151.3        5%       151.6            152.4        177.4
CV               4.49883    STD MEAN      1.12542                                1%       151.3            152.9        177.7
T:MEAN=0         145.759    PROB>|T|       0.0001      RANGE         26.4
SGN RANK             473    PROB>|S|       0.0001      Q3-Q1         11.1
NUM ¬= 0              43                               MODE           158
```

```
                                        SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   47
                               SEX=F   CHECKAGE=3CTO

                                      UNIVARIATE

VARIABLE=HEIGHT

               MOMENTS                                   QUANTILES(DEF=4)                           EXTREMES

N                   43  SUM WGTS         43      100% MAX      96.6        99%       96.6          LOWEST      HIGHEST
MEAN           62.6907  SUM          2695.7       75% Q3       68.8        95%    82.7399            46.4         75.6
STD DEV        9.88659  VARIANCE    97.7447       50% MED      61.1        90%      76.14            48.6         76.5
SKEWNESS       1.13824  KURTOSIS      2.202       25% Q1       56.3        10%      51.02            49.9         78.6
USS             173101  CSS         4105.28        0% MIN      46.4         5%      48.86            50.3         83.8
CV             15.7704  STD MEAN    1.50769                                 1%       46.4            52.1         96.6
T:MEAN=0       41.5806  PROB>|T|     0.0001      RANGE         50.2
SGN RANK           473  PROB>|S|     0.0001      Q3-Q1         12.5
NUM ^= 0            43                           MODE          56.3
```

```
                                        SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   48
                               SEX=F   CHECKAGE=30TO

                                      UNIVARIATE

VARIABLE=BMI

               MOMENTS                                   QUANTILES(DEF=4)                           EXTREMES

N                   43  SUM WGTS         43      100% MAX   33.3301        99%    33.3301          LOWEST      HIGHEST
MEAN           23.2666  SUM         1000.47       75% Q3    24.8913        95%    31.1753         18.6561      26.1584
STD DEV        3.12627  VARIANCE    9.77357       50% MED   22.3902        90%    28.2316         19.7405      28.2804
SKEWNESS       1.45966  KURTOSIS    2.25739       25% Q1    21.2393        10%    20.1975         19.7565      29.2714
USS              23688  CSS          410.49        0% MIN   18.6561         5%    19.7437         20.0831      31.6513
CV             13.4367  STD MEAN   0.476752                                 1%    18.6561          20.369      33.3301
T:MEAN=0       48.8024  PROB>|T|     0.0001      RANGE      14.6739
SGN RANK           473  PROB>|S|     0.0001      Q3-Q1      3.65199
NUM ^= 0            43                           MODE       18.6561
```

```
                                                   SAS                                   12:13 TUESDAY, FEBRUARY 25, 1986   49
                                          SEX=F   CHECKAGE=30TO

                                                  UNIVARIATE

VARIABLE=DENSITY

                        MOMENTS                                       QUANTILES(DEF=4)                                  EXTREMES

N                  35     SUM WGTS            35      100% MAX    1.06463        99%        1.06463          LOWEST       HIGHEST
MEAN          1.03689     SUM            36.2911       75% Q3     1.04947        95%        1.06347         1.00805       1.05933
STD DEV     0.0156927     VARIANCE    .000246261       50% MED    1.03337        90%        1.06264         1.00944       1.06254
SKEWNESS     0.207513     KURTOSIS     -0.740139       25% Q1     1.02565        10%        1.01754         1.01329       1.06281
USS           37.6382     CSS         0.00837287        0% MIN    1.00805         5%        1.00917         1.02037       1.06318
CV            1.51344     STD MEAN    0.00265255                                  1%        1.00805         1.02051       1.06463
T:MEAN=0      390.902     PROB>|T|        0.0001       RANGE    0.0565819
SGN RANK          315     PROB>|S|        0.0001       Q3-Q1    0.0236158
NUM ¬= 0           35                                  MODE       1.00805

                                                       MISSING VALUE           .
                                                               COUNT           8
                                                        % COUNT/NOBS       18.60
```

```
                                                   SAS                                   12:13 TUESDAY, FEBRUARY 25, 1986   50
                                          SEX=F   CHECKAGE=30TO

                                                  UNIVARIATE

VARIABLE=PERFAT1

                        MOMENTS                                       QUANTILES(DEF=4)                                  EXTREMES

N                  35     SUM WGTS            35      100% MAX    39.3029        99%        39.3029          LOWEST       HIGHEST
MEAN          26.8423     SUM            939.479       75% Q3     31.5015        95%        38.8084          15.305       33.8008
STD DEV       6.62978     VARIANCE        43.954       50% MED    28.2693        90%        35.0699         15.8459        33.821
SKEWNESS    -0.156532     KURTOSIS     -0.726303       25% Q1     21.4213        10%        16.1102         16.0208       36.9433
USS           26712.2     CSS            1494.44        0% MIN     15.305         5%        15.7377         16.1703       38.6848
CV             24.699     STD MEAN       1.12064                                  1%         15.305         17.3879       39.3029
T:MEAN=0      23.9527     PROB>|T|        0.0001       RANGE      23.9979
SGN RANK          315     PROB>|S|        0.0001       Q3-Q1      10.0801
NUM ¬= 0           35                                  MODE        15.305

                                                       MISSING VALUE           .
                                                               COUNT           8
                                                        % COUNT/NOBS       18.60
```

```
                                                         SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   51
                                                 SEX=F    CHECKAGE=30TO

                                                       UNIVARIATE

VARIABLE=FATMASS

                    MOMENTS                                          QUANTILES(DEF=4)                          EXTREMES

N                      35     SUM WGTS          35        100% MAX     32.4178      99%      32.4178        LOWEST       HIGHEST
MEAN              17.0006     SUM           595.02         75% Q3      20.0349      95%      30.5369       8.06798       24.1675
STD DEV           6.03259     VARIANCE     36.3922         50% MED     17.1911      90%      25.6965       8.73917        24.208
SKEWNESS         0.650956     KURTOSIS    0.269275         25% Q1      12.0602      10%      9.26557       8.87369       27.9292
USS                 11353     CSS          1237.33          0% MIN     8.06798       5%      8.60493       9.52683       30.0667
CV                35.4846     STD MEAN     1.01969                                   1%      8.06798       9.76685       32.4178
T:MEAN=0          16.6722     PROB>|T|      0.0001        RANGE        24.3499
SGN RANK              315     PROB>|S|      0.0001        Q3-Q1        7.97472
NUM ¬= 0               35                                 MODE         8.06798

                                                          MISSING VALUE      .
                                                                  COUNT      8
                                                           % COUNT/NOBS  18.60
```

```
                                                         SAS                          12:13 TUESDAY, FEBRUARY 25, 1986   52
                                                 SEX=F    CHECKAGE=30TO

                                                       UNIVARIATE

VARIABLE=SUM2SF

                    MOMENTS                                          QUANTILES(DEF=4)                          EXTREMES

N                      43     SUM WGTS          43        100% MAX        75.8      99%         75.8        LOWEST       HIGHEST
MEAN              39.5767     SUM           1701.8         75% Q3         49.6      95%        67.12          16.4          62.4
STD DEV            15.851     VARIANCE     251.255         50% MED        35.8      90%        64.08            17          65.2
SKEWNESS         0.445623     KURTOSIS   -0.762482         25% Q1         27.2      10%        19.48          17.8            66
USS               77904.4     CSS          10552.7          0% MIN        16.4       5%        17.16          18.6          67.4
CV                40.0514     STD MEAN     2.41726                                   1%         16.4          20.8          75.8
T:MEAN=0          16.3726     PROB>|T|      0.0001        RANGE           59.4
SGN RANK              473     PROB>|S|      0.0001        Q3-Q1           22.4
NUM ¬= 0               43                                 MODE            27.2
```

```
                                                     SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   53
                                           SEX=F   CHECKAGE=30TO

                                                  UNIVARIATE

VARIABLE=SUM3SF

                    MOMENTS                                        QUANTILES(DEF=4)                              EXTREMES

N                  43    SUM WGTS           43        100% MAX       93.2        99%       93.2             LOWEST      HIGHEST
MEAN          47.6023    SUM            2046.9         75% Q3        62.2        95%    91.7199               21.8         72.4
STD DEV       18.9902    VARIANCE      360.628         50% MED       43.2        90%    76.3599                 24           79
SKEWNESS     0.868826    KURTOSIS     0.027886         25% Q1        33.6        10%      25.88               25.2         88.2
USS            112584    CSS           15146.4          0% MIN       21.8         5%      24.24               25.4         92.6
CV            39.8934    STD MEAN      2.89598                                    1%       21.8               26.6         93.2
T:MEAN=0      16.4374    PROB>|T|       0.0001        RANGE          71.4
SGN RANK          473    PROB>|S|       0.0001        Q3-Q1          28.6
NUM ¬= 0           43                                 MODE           38.6
```

```
                                                     SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   54
                                           SEX=F   CHECKAGE=30TO

                                                  UNIVARIATE

VARIABLE=SUM4SF

                    MOMENTS                                        QUANTILES(DEF=4)                              EXTREMES

N                  43    SUM WGTS           43        100% MAX      117.2        99%      117.2             LOWEST      HIGHEST
MEAN          61.9163    SUM            2662.4         75% Q3        81.2        95%     114.52               29.4        104.2
STD DEV       24.4573    VARIANCE      598.162         50% MED       54.2        90%      104.2               34.2        104.2
SKEWNESS     0.863592    KURTOSIS    -0.369016         25% Q1          43        10%      36.08               34.8        107.4
USS            189969    CSS           25122.8          0% MIN       29.4         5%      34.32               34.8        116.3
CV            39.5007    STD MEAN      3.72971                                    1%       29.4                 38        117.2
T:MEAN=0      16.6008    PROB>|T|       0.0001        RANGE          87.8
SGN RANK          473    PROB>|S|       0.0001        Q3-Q1          38.2
NUM ¬= 0           43                                 MODE           34.8
```

```
                                                          SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   55
                                              SEX=F    CHECKAGE=30TO

                                                        UNIVARIATE

VARIABLE=SUM5SF

                    MOMENTS                                          QUANTILES(DEF=4)                              EXTREMES

N                   42        SUM WGTS          42     100% MAX     192.3       99%        192.3            LOWEST      HIGHEST
MEAN           99.4119        SUM           4175.3      75% Q3      121.1       95%       170.15              50.2          155
STD DEV        36.2809        VARIANCE      1316.7      50% MED      93.1       90%        158.5              51.6          160
SKEWNESS      0.696617        KURTOSIS   -0.246634      25% Q1       67.3       10%         58.8                58        160.8
USS             469043        CSS          53968.5       0% MIN      50.2        5%        52.56              58.8        171.8
CV             36.4955        STD MEAN     5.59827                                1%         50.2              58.8        192.3
T:MEAN=0       17.7576        PROB>|T|      0.0001     RANGE        142.1
SGN RANK         451.5        PROB>|S|      0.0001     Q3-Q1         53.8
NUM ¬= 0            42                                 MODE          58.8

                                                       MISSING VALUE           .
                                                                COUNT          1
                                                        % COUNT/NOBS        2.33
```

```
                                                          SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   56
                                              SEX=M    CHECKAGE=GT40

                                                        UNIVARIATE

VARIABLE=AGE

                    MOMENTS                                          QUANTILES(DEF=4)                              EXTREMES

N                   61        SUM WGTS          61     100% MAX    63.263       99%       63.263            LOWEST      HIGHEST
MEAN           47.6224        SUM          2904.96      75% Q3    50.8137       95%      58.4898           40.0849      54.6329
STD DEV        5.38498        VARIANCE      28.998      50% MED    47.189       90%      54.3101           40.1589      57.7945
SKEWNESS      0.795304        KURTOSIS    0.547699      25% Q1    42.9699       10%      41.4225           40.2082      58.5671
USS             140081        CSS          1739.88       0% MIN   40.0849        5%      40.2301           40.4274      62.5178
CV             11.3077        STD MEAN    0.689476                                1%      40.0849           40.4329       63.263
T:MEAN=0       69.0704        PROB>|T|      0.0001     RANGE      23.1781
SGN RANK         945.5        PROB>|S|      0.0001     Q3-Q1      7.34383
NUM ¬= 0            61                                 MODE       50.8137
```

```
                                                   SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   57
                                             SEX=M   CHECKAGE=GT40
                                                   UNIVARIATE

VARIABLE=HEIGHT

                 MOMENTS                                              QUANTILES(DEF=4)                               EXTREMES

N                    61   SUM WGTS          61           100% MAX     189.3       99%       189.3          LOWEST     HIGHEST
MEAN            174.108   SUM          10620.6            75% Q3      178.5       95%      188.23           157.9       186.5
STD DEV         6.94032   VARIANCE     48 1681            50% MED     174.4       90%      182.96             161       187.6
SKEWNESS       0.101412   KURTOSIS  0.00104111            25% Q1     169.55       10%      164.36             162       188.3
USS             1852024   CSS          2890.09             0% MIN     157.9        5%      162.08           162.8       188.8
CV              3.98621   STD MEAN    0.888617                                     1%       157.9           163.5       189.3
T:MEAN=0        195.932   PROB>|T|      0.0001            RANGE        31.4
SGN RANK          945.5   PROB>|S|      0.0001            Q3-Q1        8.95
NUM ¬= 0             61                                   MODE        167.5
```

```
                                                   SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   58
                                             SEX=M   CHECKAGE=GT40
                                                   UNIVARIATE

VARIABLE=HEIGHT

                 MOMENTS                                              QUANTILES(DEF=4)                               EXTREMES

N                    61   SUM WGTS          61           100% MAX     125.4       99%       125.4          LOWEST     HIGHEST
MEAN             79.518   SUM           4850.6            75% Q3       85.1       95%       98.57            59.8        97.2
STD DEV          11.852   VARIANCE     140.469            50% MED      80.2       90%       95.92            60.6        97.4
SKEWNESS       0.965446   KURTOSIS     2.35898            25% Q1      70.75       10%       65.28            62.7        98.7
USS              394138   CSS          8428.13             0% MIN      59.8        5%        62.7            62.7        99.9
CV              14.9047   STD MEAN     1.51749                                     1%        59.8            64.2       125.4
T:MEAN=0        52.4011   PROB>|T|      0.0001            RANGE        65.6
SGN RANK          945.5   PROB>|S|      0.0001            Q3-Q1       14.35
NUM ¬= 0             61                                   MODE         82.5
```

```
                                             SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   59
                                      SEX=M    CHECKAGE=GT40

                                          UNIVARIATE

VARIABLE=BMI

                 MOMENTS                                         QUANTILES(DEF=4)                              EXTREMES

N                     61    SUM WGTS            61     100% MAX    35.3669        99%     35.3669        LOWEST      HIGHEST
MEAN             26.1821    SUM            1597.11      75% Q3     27.6573        95%     32.1356        18.0166     30.3186
STD DEV          3.08501    VARIANCE       9.51731      50% MED    26.7249        90%     29.8755        20.2801     30.4381
SKEWNESS        0.144999    KURTOSIS      0.829509      25% Q1     24.1661        10%     22.3471        21.8237     32.3242
USS              42386.8    CSS            571.039       0% MIN    18.0166         5%     21.8237        21.8237     32.7285
CV               11.7829    STD MEAN      0.394996                                 1%     18.0166        22.2669     35.3669
T:MEAN=0         66.2846    PROB>|T|        0.0001      RANGE      17.3502
SGN RANK           945.5    PROB>|S|        0.0001      Q3-Q1       3.4912
NUM ^= 0              61                                MODE       21.8237
```

```
                                             SAS                                 12:13 TUESDAY, FEBRUARY 25, 1986   60
                                      SEX=M    CHECKAGE=GT40

                                          UNIVARIATE

VARIABLE=DENSITY

                 MOMENTS                                         QUANTILES(DEF=4)                              EXTREMES

N                     55    SUM WGTS            55     100% MAX    1.07047        99%     1.07047        LOWEST      HIGHEST
MEAN             1.04911    SUM            57.7008      75% Q3     1.05957        95%     1.07007        1.01483      1.0669
STD DEV        0.0135664    VARIANCE   .000184046      50% MED    1.05152        90%     1.06658        1.02418     1.06833
SKEWNESS       -0.343202    KURTOSIS     -0.658816      25% Q1     1.03908        10%     1.03009        1.02732     1.07004
USS              60.5442    CSS          0.0099385       0% MIN    1.01483         5%     1.02669        1.02762     1.07018
CV               1.29314    STD MEAN    0.00182929                                 1%     1.01483        1.02985     1.07047
T:MEAN=0         573.505    PROB>|T|        0.0001      RANGE     0.055643
SGN RANK             770    PROB>|S|        0.0001      Q3-Q1    0.0204954
NUM ^= 0              55                                MODE       1.01483

                                                        MISSING VALUE          .
                                                                COUNT          6
                                                         % COUNT/NOBS       9.84
```

```
                                                  SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   61
                                         SEX=M   CHECKAGE=GT40

                                               UNIVARIATE

VARIABLE=PERFAT1

                      MOMENTS                                          QUANTILES(DEF=4)                               EXTREMES

N                    55    SUM WGTS          55     100% MAX    36.2777        99%      36.2777             LOWEST       HIGHEST
MEAN            21.7031    SUM          1193.67      75% Q3     25.8482        95%      31.1261            13.0305       29.7475
STD DEV         5.63454    VARIANCE      31.748      50% MED    20.6197        90%      29.6383             13.102       30.7138
SKEWNESS       0.392225    KURTOSIS   -0.591222      25% Q1     17.3531        10%      14.5085            13.1025       30.8686
USS             27620.7    CSS          1714.39       0% MIN    13.0305         5%      13.1024            13.8329       32.1563
CV              25.9619    STD MEAN    0.759761                                 1%      13.0305             14.408       36.2777
T:MEAN=0        28.5657    PROB>|T|      0.0001     RANGE       23.2472
SGN RANK            770    PROB>|S|      0.0001     Q3-Q1        8.4951
NUM ¬= 0             55                             MODE        13.0305

                                                    MISSING VALUE          .
                                                              COUNT        6
                                                     % COUNT/NOBS       9.84
```

```
                                                  SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   62
                                         SEX=M   CHECKAGE=GT40

                                               UNIVARIATE

VARIABLE=FATMASS

                      MOMENTS                                          QUANTILES(DEF=4)                               EXTREMES

N                    55    SUM WGTS          55     100% MAX     40.324        99%       40.324             LOWEST       HIGHEST
MEAN            17.7349    SUM          975.418      75% Q3     22.7509        95%      27.8625            8.60011       25.6309
STD DEV         6.36116    VARIANCE     40.4644      50% MED    16.2905        90%      25.5437            9.66926       27.1032
SKEWNESS       0.947946    KURTOSIS     1.30328      25% Q1     12.9762        10%       10.369            9.70894       27.4274
USS               19484    CSS          2185.08       0% MIN    8.60011         5%      9.70101            10.0047       29.6026
CV              35.8681    STD MEAN    0.857739                                 1%      8.60011            10.0594        40.324
T:MEAN=0        20.6763    PROB>|T|      0.0001     RANGE       31.7239
SGN RANK            770    PROB>|S|      0.0001     Q3-Q1       9.77472
NUM ¬= 0             55                             MODE        8.60011

                                                    MISSING VALUE          .
                                                              COUNT        6
                                                     % COUNT/NOBS       9.84
```

```
                                                    SAS                        12:13 TUESDAY, FEBRUARY 25, 1986   63
                                           SEX=M   CHECKAGE=GT40
                                                 UNIVARIATE

VARIABLE=SUM2SF
                    MOMENTS                                       QUANTILES(DEF=4)                               EXTREMES

N                      61    SUM WGTS          61      100% MAX      74.4         99%         74.4           LOWEST      HIGHEST
MEAN              35.9557    SUM             2193.3     75% Q3       45.3         95%        56.93             12.4         52.6
STD DEV           12.5603    VARIANCE       157.762     50% MED      35.6         90%        51.76             13.2         52.7
SKEWNESS         0.377425    KURTOSIS      0.260747     25% Q1       25.1         10%         19.8             14.6         57.4
USS               88327.4    CSS            9465.69      0% MIN      12.4          5%        14.86             17.2         61.4
CV                34.9327    STD MEAN       1.60818                                1%         12.4               19         74.4
T:MEAN=0           22.358    PROB>|T|        0.0001    RANGE           62
SGN RANK            945.5    PROB>|S|        0.0001    Q3-Q1         20.2
NUM ^= 0               61                              MODE          38.2
```

```
                                                    SAS                        12:13 TUESDAY, FEBRUARY 25, 1986   64
                                           SEX=M   CHECKAGE=GT40
                                                 UNIVARIATE

VARIABLE=SUM3SF
                    MOMENTS                                       QUANTILES(DEF=4)                               EXTREMES

N                      61    SUM WGTS          61      100% MAX       100         99%          100           LOWEST      HIGHEST
MEAN              39.1049    SUM             2385.4     75% Q3       45.5         95%        63.14             16.6           57
STD DEV            14.096    VARIANCE       198.697     50% MED      36.8         90%        55.88             17.8         62.6
SKEWNESS           1.4886    KURTOSIS       4.59814     25% Q1       30.6         10%        23.16             18.6         63.2
USS                105203    CSS            11921.8      0% MIN      16.6          5%        18.94               22         67.4
CV                36.0466    STD MEAN       1.80481                                1%         16.6             22.8          100
T:MEAN=0          21.6671    PROB>|T|        0.0001    RANGE         83.4
SGN RANK            945.5    PROB>|S|        0.0001    Q3-Q1         14.9
NUM ^= 0               61                              MODE          23.8
```

```
                                                                 SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   65
                                                        SEX=M   CHECKAGE=GT40
                                                                UNIVARIATE
VARIABLE=SUM4SF
                         MOMENTS                                                  QUANTILES(DEF=4)                                  EXTREMES

N                    61     SUM WGTS         61          100% MAX      125.6        99%        125.6                 LOWEST       HIGHEST
MEAN            57.8754     SUM          3530.4           75% Q3        71.8        95%      97.5999                   24.2          85.8
STD DEV         19.4366     VARIANCE    377.782           50% MED       56.2        90%        79.84                   27.2          90.4
SKEWNESS       0.858939     KURTOSIS     1.3891           25% Q1        44.5        10%        34.32                   28.8          98.4
USS              226990     CSS         22666.9            0% MIN       24.2         5%        28.88                   29.6           100
CV              33.5835     STD MEAN     2.4886                                      1%         24.2                     34         125.6
T:MEAN=0        23.2562     PROB>|T|     0.0001          RANGE         101.4
SGN RANK          945.5     PROB>|S|     0.0001          Q3-Q1          27.3
NUM ¬= 0             61                                  MODE             34
```

```
                                                                 SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   66
                                                        SEX=M   CHECKAGE=GT40
                                                                UNIVARIATE
VARIABLE=SUM5SF
                         MOMENTS                                                  QUANTILES(DEF=4)                                  EXTREMES

N                    61     SUM WGTS         61          100% MAX      200.4        99%        200.4                 LOWEST       HIGHEST
MEAN            88.6213     SUM          5405.9           75% Q3       105.8        95%       138.64                   35.2         134.3
STD DEV         30.2329     VARIANCE    914.028           50% MED       84.4        90%       124.32                     40         135.4
SKEWNESS       0.942828     KURTOSIS    2.13173           25% Q1        64.7        10%         54.4                   41.8           139
USS              533920     CSS         54841.7            0% MIN       35.2         5%        42.08                   44.6         162.6
CV              34.1147     STD MEAN    3.87093                                      1%         35.2                   53.2         200.4
T:MEAN=0        22.8941     PROB>|T|     0.0001          RANGE         165.2
SGN RANK          945.5     PROB>|S|     0.0001          Q3-Q1          41.1
NUM ¬= 0             61                                  MODE           54.4
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   67
                                          SEX=M   CHECKAGE=LE30

                                                UNIVARIATE

VARIABLE=AGE

                     MOMENTS                                          QUANTILES(DEF=4)                             EXTREMES

N                 57     SUM WGTS          57         100% MAX   29.1863        99%      29.1863        LOWEST     HIGHEST
MEAN         24.0852     SUM          1372.85          75% Q3    26.3548        95%      28.4345       19.9123      28.189
STD DEV      2.61596     VARIANCE     6.86325          50% MED   24.0383        90%      28.0005        19.989     28.3233
SKEWNESS    0.264715     KURTOSIS    -1.02778          25% Q1     21.874        10%      20.7156       20.3918      28.389
USS          33448.7     CSS          383.222           0% MIN   19.9123         5%      20.3515       20.4603     28.8438
CV           10.8613     STD MEAN    0.346492                                    1%      19.9123       20.6192     29.1863
T:MEAN=0     69.5114     PROB>|T|      0.0001        RANGE       9.27397
SGN RANK       826.5     PROB>|S|      0.0001        Q3-Q1       4.48081
NUM ¬= 0          57                                 MODE        19.9123
```

```
                                                    SAS                               12:13 TUESDAY, FEBRUARY 25, 1986   68
                                          SEX=M   CHECKAGE=LE30

                                                UNIVARIATE

VARIABLE=HEIGHT

                     MOMENTS                                          QUANTILES(DEF=4)                             EXTREMES

N                 57     SUM WGTS          57         100% MAX     190.3        99%        190.3        LOWEST     HIGHEST
MEAN         173.807     SUM             9907          75% Q3      179.1        95%       185.78         160.1       184.2
STD DEV      7.08123     VARIANCE     50.1439          50% MED     173.6        90%       183.08         162.1       184.7
SKEWNESS   0.0901799     KURTOSIS   -0.612963          25% Q1      168.7        10%        163.5         162.3       185.7
USS          1724714     CSS          2808.06           0% MIN     160.1         5%       162.28         162.4       186.5
CV           4.07419     STD MEAN    0.937932                                    1%        160.1         163.5       190.3
T:MEAN=0     185.309     PROB>|T|      0.0001        RANGE          30.2
SGN RANK       826.5     PROB>|S|      0.0001        Q3-Q1          10.4
NUM ¬= 0          57                                 MODE          163.5
```

```
                                                  SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   69
                                             SEX=M   CHECKAGE=LE30
                                                    UNIVARIATE

VARIABLE=HEIGHT
                       MOMENTS                                       QUANTILES(DEF=4)                            EXTREMES

N                57        SUM WGTS           57         100% MAX      101.4         99%        101.4        LOWEST      HIGHEST
MEAN        75.0842        SUM            4279.8          75% Q3        82.4         95%        97.44          58.4           91
STD DEV     10.2404        VARIANCE      104.866          50% MED       72.8         90%        89.56          60.9         95.3
SKEWNESS    0.75841        KURTOSIS -0.0498217          25% Q1       66.85         10%         64.2            61         97.3
USS          327218        CSS           5872.48           0% MIN       58.4          5%        60.99          62.3         98.7
CV          13.6385        STD MEAN      1.35637                                    1%         58.4            63        101.4
T:MEAN=0    55.3566        PROB>|T|       0.0001          RANGE           43
SGN RANK      826.5        PROB>|S|       0.0001          Q3-Q1        15.55
NUM ¬= 0         57                                       MODE          64.5
```

```
                                                  SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   70
                                             SEX=M   CHECKAGE=LE30
                                                    UNIVARIATE

VARIABLE=BMI
                       MOMENTS                                       QUANTILES(DEF=4)                            EXTREMES

N                57        SUM WGTS           57         100% MAX    31.9522         99%      31.9522        LOWEST      HIGHEST
MEAN        24.8407        SUM           1415.92          75% Q3     27.6398         95%      30.1149       19.7487      29.3012
STD DEV      2.8874        VARIANCE      8.33708          50% MED     24.284         90%      28.7697       20.0803      29.3426
SKEWNESS   0.409099        KURTOSIS    -0.638306          25% Q1     22.6761         10%       21.384       20.4314      30.0783
USS         35639.2        CSS           466.876           0% MIN    19.7487          5%      20.3963       21.1077      30.4447
CV          11.6237        STD MEAN     0.382445                                    1%      19.7487       21.2204      31.9522
T:MEAN=0    64.9522        PROB>|T|       0.0001          RANGE      12.2036
SGN RANK      826.5        PROB>|S|       0.0001          Q3-Q1      4.96372
NUM ¬= 0         57                                       MODE       19.7487
```

```
                                                                SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   21
                                                     SEX=M   CHECKAGE=LE30
                                                             UNIVARIATE

VARIABLE=DENSITY

                        MOMENTS                                         QUANTILES(DEF=4)                             EXTREMES

N                   56     SUM WGTS           56     100% MAX     1.0948        99%       1.0948            LOWEST      HIGHEST
MEAN           1.06216     SUM           59.4812      75% Q3     1.07566        95%      1.09212            1.0236      1.09013
STD DEV      0.0171312     VARIANCE  .000293477      50% MED    1.06371        90%      1.08568           1.02775      1.09078
SKEWNESS     -0.129166     KURTOSIS     -0.40353     25% Q1     1.05035        10%      1.03685           1.03113      1.09202
USS            63.1949     CSS         0.0161413      0% MIN     1.0236         5%      1.03062           1.03241      1.09267
CV             1.61286     STD MEAN   0.00228925                                1%       1.0236           1.03259       1.0948
T:MEAN=0       463.979     PROB>|T|       0.0001      RANGE     0.071194
SGN RANK           798     PROB>|S|       0.0001      Q3-Q1    0.0253077
NUM ¬= 0            56                               MODE        1.0236

                                                     MISSING VALUE       .
                                                             COUNT       1
                                                      % COUNT/NOBS    1.75
```

```
                                                                SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   22
                                                     SEX=M   CHECKAGE=LE30
                                                             UNIVARIATE

VARIABLE=PERFAT1

                        MOMENTS                                         QUANTILES(DEF=4)                             EXTREMES

N                   56     SUM WGTS           56     100% MAX    32.3609        99%      32.3609            LOWEST      HIGHEST
MEAN           16.3467     SUM           915.416      75% Q3    21.0704        95%      29.3657           3.47231      28.5261
STD DEV        6.93956     VARIANCE      48.1575      50% MED   15.5847        90%       25.957           4.25384       28.596
SKEWNESS      0.202582     KURTOSIS    -0.358133      25% Q1     10.861        10%      6.82163           4.49091      29.1445
USS            17612.7     CSS           2648.66       0% MIN   3.47231         5%      4.45535           4.94456      30.6187
CV             42.4523     STD MEAN     0.927338                                1%      3.47231           5.23061      32.3609
T:MEAN=0       17.6276     PROB>|T|       0.0001      RANGE      28.8886
SGN RANK           798     PROB>|S|       0.0001      Q3-Q1      10.2095
NUM ¬= 0            56                               MODE       3.47231

                                                     MISSING VALUE       .
                                                             COUNT       1
                                                      % COUNT/NOBS    1.75
```

```
                                                   SAS                            12:13 TUESDAY, FEBRUARY 25, 1986   73
                                            SEX=M   CHECKAGE=LE30

                                                  UNIVARIATE

VARIABLE=FATMASS

                    MOMENTS                                        QUANTILES(DEF=4)                             EXTREMES

N                  56   SUM WGTS          56        100% MAX   27.8239        99%      27.8239          LOWEST      HIGHEST
MEAN          12.6056   SUM          705.912         75% Q3    17.2006        95%      24.8386          2.4202        21.28
STD DEV       6.23522   VARIANCE      38.878         50% MED    11.757        90%      21.2272          3.0134      21.8584
SKEWNESS     0.393597   KURTOSIS   -0.476196         25% Q1    7.77475        10%      4.49651         3.23717      24.5448
USS           11036.7   CSS          2138.29          0% MIN    2.4202         5%      3.20361         3.37375      26.5036
CV             49.464   STD MEAN    0.833216                                   1%       2.4202         3.52052      27.8239
T:MEAN=0      15.1288   PROB>|T|      0.0001         RANGE     25.4037
SGN RANK          798   PROB>|S|      0.0001         Q3-Q1     9.42581
NUM ^= 0           56                                MODE       2.4202

                                                     MISSING VALUE       .
                                                               COUNT     1
                                                      % COUNT/NOBS    1.75
```

```
                                                   SAS                            12:13 TUESDAY, FEBRUARY 25, 1986   74
                                            SEX=M   CHECKAGE=LE30

                                                  UNIVARIATE

VARIABLE=SUM2SF

                    MOMENTS                                        QUANTILES(DEF=4)                             EXTREMES

N                  57   SUM WGTS          57        100% MAX      67.2        99%         67.2          LOWEST      HIGHEST
MEAN          28.6298   SUM           1631.9         75% Q3       37.2        95%        52.06            10.4         51.2
STD DEV       13.5224   VARIANCE     182.856         50% MED      36.6        90%        48.64              11         51.8
SKEWNESS      0.63005   KURTOSIS    -0.18264         25% Q1         16        10%        12.64            11.4         51.8
USS             56961   CSS            10240          0% MIN      10.4         5%        11.36              12         54.4
CV             47.232   STD MEAN     1.79109                                   1%         10.4              12         67.2
T:MEAN=0      15.9846   PROB>|T|      0.0001         RANGE        56.8
SGN RANK        826.5   PROB>|S|      0.0001         Q3-Q1        21.2
NUM ^= 0           57                                MODE         12.8
```

```
                                                      SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   75
                                              SEX=M   CHECKAGE=LE30
                                                   UNIVARIATE

VARIABLE=SUM3SF

                    MOMENTS                                        QUANTILES(DEF=4)                               EXTREMES

N                      57   SUM WGTS          57     100% MAX      77.4       99%      77.4           LOWEST      HIGHEST
MEAN              32.6158   SUM           1859.1      75% Q3         42       95%     58.78             15.8           53
STD DEV             13.73   VARIANCE     188.512      50% MED      31.6       90%     52.84             15.8         53.4
SKEWNESS         0.917969   KURTOSIS    0.633271      25% Q1      20.65       10%     17.88               16         58.4
USS               71192.7   CSS          10556.7       0% MIN      15.8        5%     15.98             16.2         62.2
CV                 42.096   STD MEAN     1.81858                               1%      15.8             17.8         77.4
T:MEAN=0          17.9348   PROB>|T|      0.0001     RANGE         61.6
SGN RANK            826.5   PROB>|S|      0.0001     Q3-Q1        21.35
NUM ¬= 0               57                            MODE          15.8
```

```
                                                      SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   76
                                              SEX=M   CHECKAGE=LE30
                                                   UNIVARIATE

VARIABLE=SUM4SF

                    MOMENTS                                        QUANTILES(DEF=4)                               EXTREMES

N                      57   SUM WGTS          57     100% MAX       103       99%       103           LOWEST      HIGHEST
MEAN              47.6982   SUM           2718.8      75% Q3       62.7       95%   85.1199             22.2         81.8
STD DEV           19.8188   VARIANCE     392.785      50% MED      44.2       90%     77.16             22.2         81.8
SKEWNESS         0.822528   KURTOSIS   0.0891588      25% Q1       31.1       10%     25.24               23         83.8
USS                151678   CSS          21995.9       0% MIN      22.2        5%     22.92             23.6           97
CV                41.5504   STD MEAN     2.62506                               1%      22.2             23.8          103
T:MEAN=0          18.1703   PROB>|T|      0.0001     RANGE         80.8
SGN RANK            826.5   PROB>|S|      0.0001     Q3-Q1         31.6
NUM ¬= 0               57                            MODE          22.2
```

```
                                                          SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   77
                                                SEX=M   CHECKAGE=LE30

                                                        UNIVARIATE

VARIABLE=SUM5SF

                       MOMENTS                                            QUANTILES(DEF=4)                                  EXTREMES

N                    57     SUM WGTS            57      100% MAX      166.2         99%         166.2           LOWEST      HIGHEST
MEAN            73.5895     SUM             4194.6       75% Q3        93.7         95%         131.8             29.8          121
STD DEV         32.1827     VARIANCE       1035.72       50% MED       70.4         90%        118.92             32.6        123.4
SKEWNESS       0.821455     KURTOSIS      0.316728       25% Q1       46.55         10%         35.68               33        128.8
USS              366679     CSS            58000.5        0% MIN       29.8          5%         32.96             33.8        158.8
CV              43.7327     STD MEAN        4.2627                                   1%          29.8             34.4        166.2
T:MEAN=0        17.2636     PROB>|T|        0.0001      RANGE         136.4
SGN RANK          826.5     PROB>|S|        0.0001      Q3-Q1         47.15
NUM ^= 0             57                                 MODE           50.4
```

```
                                                          SAS                         12:13 TUESDAY, FEBRUARY 25, 1986   78
                                                SEX=M   CHECKAGE=30TO

                                                        UNIVARIATE

VARIABLE=AGE

                       MOMENTS                                            QUANTILES(DEF=4)                                  EXTREMES

N                    37     SUM WGTS            37      100% MAX    39.9123         99%       39.9123           LOWEST      HIGHEST
MEAN             35.948     SUM            1330.08       75% Q3     37.8507         95%        39.466           31.063      38.9945
STD DEV         2.40696     VARIANCE       5.79347       50% MED    36.1479         90%       39.2833             31.2      39.2603
SKEWNESS      -0.337034     KURTOSIS     -0.568781       25% Q1     34.2822         10%       32.2641          31.3041      39.3753
USS             48022.2     CSS            208.565        0% MIN     31.063          5%       31.1863          32.5041      39.4164
CV              6.69568     STD MEAN      0.395702                                   1%        31.063          33.1178      39.9123
T:MEAN=0        90.8461     PROB>|T|        0.0001      RANGE       8.84932
SGN RANK          351.5     PROB>|S|        0.0001      Q3-Q1        3.5685
NUM ^= 0             37                                 MODE         31.063
```

```
                                           SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   79
                                  SEX=M    CHECKAGE=30TO

                                        UNIVARIATE

VARIABLE=HEIGHT

                     MOMENTS                                     QUANTILES(DEF=4)                              EXTREMES

N                37     SUM WGTS        37     100% MAX     194.5      99%      194.5          LOWEST      HIGHEST
MEAN        173.889     SUM         6433.9      75% Q3      177.4      95%     183.25           164.5        179.8
STD DEV     5.87957     VARIANCE   34.5693      50% MED     173.7      90%      180.8           164.5        180.7
SKEWNESS    1.03553     KURTOSIS   2.81213      25% Q1     170.65      10%     166.52           165.8        181.2
USS         1120030     CSS         1244.5       0% MIN     164.5       5%      164.5           166.7          182
CV          3.38122     STD MEAN  0.966595                              1%      164.5           167.1        194.5
T:MEAN=0    179.899     PROB>|T|    0.0001     RANGE           30
SGN RANK      351.5     PROB>|S|    0.0001     Q3-Q1         6.75
NUM ^= 0         37                            MODE         171.6
```

```
                                           SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   80
                                  SEX=M    CHECKAGE=30TO

                                        UNIVARIATE

VARIABLE-HEIGHT

                     MOMENTS                                     QUANTILES(DEF=4)                              EXTREMES

N                37     SUM WGTS        37     100% MAX     103.2      99%      103.2          LOWEST      HIGHEST
MEAN        78.9216     SUM         2920.1      75% Q3       83.3      95%     101.31            63.2         87.2
STD DEV     9.25278     VARIANCE    85.614      50% MED      76.8      90%      92.22            67.2         90.6
SKEWNESS   0.866371     KURTOSIS  0.863831      25% Q1       73.1      10%       68.2            68.2         98.7
USS          233541     CSS         3082.1       0% MIN      63.2       5%       66.8            68.2        101.1
CV           11.724     STD MEAN   1.52115                              1%       63.2            68.5        103.2
T:MEAN=0    51.8825     PROB>|T|    0.0001     RANGE           40
SGN RANK      351.5     PROB>|S|    0.0001     Q3-Q1         10.2
NUM ^= 0         37                            MODE          68.2
```

```
                                                       SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   81
                                             SEX=M   CHECKAGE=30TO

                                                    UNIVARIATE

VARIABLE=BMI                                                                                      EXTREMES
                        MOMENTS                                        QUANTILES(DEF=4)
                                                                                                 LOWEST      HIGHEST
N                  37     SUM WGTS          37       100% MAX   34.4136      99%    34.4135     20.7715     28.3564
MEAN          26.1134     SUM          966.197        75% Q3    27.6081      95%    32.8828      20.779      29.891
STD DEV       2.88992     VARIANCE     8.35162        50% MED   26.2929      90%    30.0951     21.8077     30.9115
SKEWNESS     0.688292     KURTOSIS     1.28975        25% Q1    24.2348      10%    22.9077     23.1827     32.7128
USS           25531.4     CSS          300.658         0% MIN   20.7715       5%    20.7782     23.2625     34.4135
CV            11.0666     STD MEAN    0.475099                                1%    20.7715
T:MEAN=0      54.9641     PROB>|T|      0.0001       RANGE       13.642
SGN RANK        351.5     PROB>|S|      0.0001       Q3-Q1      3.37326
NUM ¬= 0           37                                MODE       20.7715
```

```
                                                       SAS                    12:13 TUESDAY, FEBRUARY 25, 1986   82
                                             SEX=M   CHECKAGE=30TO

                                                    UNIVARIATE

VARIABLE=DENSITY                                                                                  EXTREMES
                        MOMENTS                                        QUANTILES(DEF=4)
                                                                                                 LOWEST      HIGHEST
N                  36     SUM WGTS          36       100% MAX   1.08134      99%    1.08134     1.02001     1.07646
MEAN          1.05442     SUM          37.9591        75% Q3    1.06865      95%    1.08075     1.02393     1.07698
STD DEV      0.016561     VARIANCE .000274266        50% MED   1.05529      90%     1.0776     1.03065     1.07907
SKEWNESS    -0.148281     KURTOSIS    -0.78459        25% Q1    1.04164      10%    1.03107     1.03124     1.08065
USS           40.0345     CSS        0.0095993         0% MIN   1.02002       5%    1.02335     1.03453     1.08134
CV            1.57062     STD MEAN  0.00276016                                1%    1.02001
T:MEAN=0      382.014     PROB>|T|      0.0001       RANGE    0.0613249
SGN RANK          333     PROB>|S|      0.0001       Q3-Q1    0.0270078
NUM ¬= 0           36                                MODE       1.02001

                                                     MISSING VALUE        .
                                                             COUNT        1
                                                      % COUNT/NOBS     2.70
```

```
                                          SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   83
                                   SEX=M   CHECKAGE=30TO
                                         UNIVARIATE

VARIABLE=PERFAT1
                  MOMENTS                                        QUANTILES(DEF=4)                          EXTREMES

N                   36   SUM WGTS          36    100% MAX   33.9774        99%     33.9774       LOWEST      HIGHEST
MEAN           19.5174   SUM          702.625     75% Q3    24.7149        95%     32.5658      8.67181      27.6871
STD DEV        6.81424   VARIANCE     46.4338     50% MED   19.0797        90%     29.2332      8.94554      29.1527
SKEWNESS      0.206411   KURTOSIS   -0.741856     25% Q1    13.6439        10%     10.0704      9.58147       29.421
USS            15338.6   CSS          1625.18      0% MIN   8.67181         5%     8.90448        10.28      32.3167
CV             34.9137   STD MEAN     1.13571                               1%     8.67181      10.5298      33.9774
T:MEAN=0       17.1852   PROB>|T|      0.0001    RANGE      25.3056
SGN RANK           333   PROB>|S|      0.0001    Q3-Q1       11.071
NUM ¬= 0            36                           MODE       8.67181

                                                 MISSING VALUE       .
                                                         COUNT       1
                                                  % COUNT/NOBS    2.70
```

```
                                          SAS                       12:13 TUESDAY, FEBRUARY 25, 1986   84
                                   SEX=M   CHECKAGE=30TO
                                         UNIVARIATE

VARIABLE=FATMASS
                  MOMENTS                                        QUANTILES(DEF=4)                          EXTREMES

N                   36   SUM WGTS          36    100% MAX   34.3511        99%     34.3511       LOWEST      HIGHEST
MEAN           15.7035   SUM          565.326     75% Q3    18.8129        95%     32.2648      5.48058      24.0601
STD DEV         6.8705   VARIANCE     47.2038     50% MED   15.2815        90%     25.0367      6.10086      24.2135
SKEWNESS      0.829484   KURTOSIS    0.681481     25% Q1    9.95447        10%     7.07551      6.75493      26.9577
USS            10529.7   CSS          1652.13      0% MIN   5.48058         5%     6.00782       7.2129      31.8966
CV             43.7514   STD MEAN     1.14508                               1%     5.48058      8.95807      34.3511
T:MEAN=0       13.7138   PROB>|T|      0.0001    RANGE      28.8706
SGN RANK           333   PROB>|S|      0.0001    Q3-Q1      8.85838
NUM ¬= 0            36                           MODE       5.48058

                                                 MISSING VALUE       .
                                                         COUNT       1
                                                  % COUNT/NOBS    2.70
```

```
                                                                     SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   85
                                                            SEX=M   CHECKAGE=30TO

                                                                  UNIVARIATE

VARIABLE=SUM2SF

                      MOMENTS                                                   QUANTILES(DEF=4)                                   EXTREMES

N                37       SUM WGTS         37          100% MAX      81.2         99%       81.2               LOWEST      HIGHEST
MEAN        35.7189       SUM          1321.6           75% Q3       44.1         95%    68.7799                 11.2         53.6
STD DEV     15.7095       VARIANCE    246.788           50% MED      33.2         90%         55                 15.6           55
SKEWNESS   0.758934       KURTOSIS   0.494289           25% Q1       22.8         10%      17.76                 17.6           55
USS         56090.5       CSS         8884.36            0% MIN      11.2          5%      15.16                 17.8         67.4
CV          43.9808       STD MEAN    2.58262                                      1%       11.2                 18.4         81.2
T:MEAN=0    13.8305       PROB>|T|     0.0001          RANGE           70
SGN RANK      351.5       PROB>|S|     0.0001          Q3-Q1         21.3
NUM ¬= 0         37                                    MODE          23.8
```

```
                                                                     SAS                           12:13 TUESDAY, FEBRUARY 25, 1986   86
                                                            SEX=M   CHECKAGE=30TO

                                                                  UNIVARIATE

VARIABLE=SUM3SF

                      MOMENTS                                                   QUANTILES(DEF=4)                                   EXTREMES

N                37       SUM WGTS         37          100% MAX      95.8         99%       95.8               LOWEST      HIGHEST
MEAN        38.6703       SUM          1430.6           75% Q3       49.2         95%    85.8999                 18.2           56
STD DEV     17.6189       VARIANCE    310.427           50% MED      34.2         90%      57.92                 20.4         57.4
SKEWNESS    1.38641       KURTOSIS    2.41364           25% Q1       23.5         10%      21.72                 20.6           60
USS         66504.8       CSS         11175.4            0% MIN      18.2          5%      20.18                   22         84.8
CV           45.562       STD MEAN    2.89654                                      1%       18.2                 22.4         95.8
T:MEAN=0    13.3505       PROB>|T|     0.0001          RANGE         77.6
SGN RANK      351.5       PROB>|S|     0.0001          Q3-Q1         25.7
NUM ¬= 0         37                                    MODE          22.6
```

```
                                                  SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   87
                                          SEX=M    CHECKAGE=30T0
                                                UNIVARIATE

VARIABLE=SUM4SF
                      MOMENTS                                              QUANTILES(DEF=4)                               EXTREMES

N                   37   SUM WGTS          37       100% MAX      126.8       99%      126.8           LOWEST      HIGHEST
MEAN           57.3243   SUM             2121        75% Q3        71.2       95%     121.22             24.2         78.4
STD DEV        24.2864   VARIANCE      589.83        50% MED       56.4       90%      84.52               29         83.4
SKEWNESS      0.986858   KURTOSIS     1.13689        25% Q1        34.6       10%      31.64               31           89
USS             142819   CSS          21233.9         0% MIN       24.2        5%      28.52             31.8        120.6
CV             42.3667   STD MEAN     3.99266                                  1%       24.2             32.4        126.8
T:MEAN=0       14.3574   PROB>|T|      0.0001       RANGE         102.6
SGN RANK         351.5   PROB>|S|      0.0001       Q3-Q1          36.6
NUM ^= 0            37                              MODE           32.6
```

```
                                                  SAS                                12:13 TUESDAY, FEBRUARY 25, 1986   88
                                          SEX=M    CHECKAGE=30T0
                                                UNIVARIATE

VARIABLE=SUM5SF
                      MOMENTS                                              QUANTILES(DEF=4)                               EXTREMES

N                   37   SUM WGTS          37       100% MAX      202.8       99%      202.8           LOWEST      HIGHEST
MEAN           89.2108   SUM           3300.8        75% Q3       111.9       95%     178.86             34.4        123.6
STD DEV        37.0394   VARIANCE     1371.92        50% MED       87.2       90%     126.52             44.6          124
SKEWNESS      0.962205   KURTOSIS     1.36551        25% Q1          57       10%      48.88             47.6        136.6
USS             343856   CSS          49389.1         0% MIN       34.4        5%      43.58             49.2        176.2
CV              41.519   STD MEAN     6.08925                                  1%       34.4             49.4        202.8
T:MEAN=0       14.6506   PROB>|T|      0.0001       RANGE         168.4
SGN RANK         351.5   PROB>|S|      0.0001       Q3-Q1          54.9
NUM ^= 0            37                              MODE           34.4
```

```
                                          SAS                               13:59 TUESDAY, APRIL 1, 1986    1
------------------------------------------ SEX=F ------------------------------------------------------------

OBS NAME      BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

 1  SAWKINS     1     1     28    10    61   56.0              .     1    147.5              .      1     DOWNSVIEW 000 165.8  66.6  53.0 31.0   94.2    82.8  75.5  88.7  70.4
 2  GOULET      2     2     22     5    62     .      1        .     1       .       1      57.0           DOWNSVIEW 003 168.1  57.0  52.7 32.0   95.7    78.1  76.2  90.4  73.1
 3  BRUNET      1     2     24     9    61     .      1        .          137.0              .             DOWNSVIEW 004 155.7  59.4  54.9 34.2  102.2    89.5  84.0  92.3  73.7
 4  HILLIER     1     1     10     1    57   68.0              .          140.0              .             DOWNSVIEW 007 172.4  63.4  57.9 33.3  102.2    86.8  80.2  89.0  68.4
 5  DYCK        9     4     28     1    52   63.0              .     1    134.0              .      1     DOWNSVIEW 009 155.7  60.7  54.3 32.8   96.4    87.4  83.2  92.2  71.9
 6  TASCO       3     1     16     7    53   60.0            149          105.0              .      1     DOWNSVIEW 012 152.0  46.4  57.3 30.9   93.0    78.8  75.4  83.9  68.1
 7  GIBBSON     1     2     13     9    62     .      1        .     1       .       1        .      1     DOWNSVIEW 013 163.2  58.5  54.6 32.2   99.3    85.9  83.2  92.4  67.6
 8  TRUMAN      1     4     14     3    60   66.5              .     1    160.0              .      1     DOWNSVIEW 014 166.2  70.2  56.6 35.3  104.9    99.8  91.7  93.4  77.4
 9  CLAYTON     1     1     12    11    58     .      1        .     1    135.0              .      1     DOWNSVIEW 015 165.3  61.6  53.8 30 .   98.4    95.2  91.6  95.3  78.0

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUFARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

 1    73.5    107.2  62.8  39.4 39.7  23.0   29.2   28.0   24.0   15.4    4.8    17.0    12.2    17.8      9.4    13.4     9.2     11.2    29.4   18.8   91.8   134.8
 2    80.5     93.0  50.7  34.9 35.7  21.6   27.2   27.3   23.1   15.2    9.6    14.8    18.2    18.6     10.8    17.8    14.4     15.2    18.0   19.4   85.9   138.2
 3    78.8     97.3  58.5  35.8 36.3  20.6   31.3   29.5   25.0   15.8    7.2    19.4    16.8    16.8     10.8    15.4    11.2     10.8    38.6   23.6   79.1   126.7
 4    74.4    100.1  59.3  38.2 36.1  23.7   29.1   29.0   26.3   16.9    7.8    19.4     9.0    16.4     10.2    12.4    12.4      9.4    17.0   19.0   91.2   140.9
 5    73.7    101.2  59.6  37.7 35.2  21.4   30.5   30.3   24.8   15.7    6.2    19.4    12.4    14.2      4.4    16.0     6.8      8.0    24.0   18.6   78.9   128.3
 6    68.4     86.5  49.0  33.8 31.7  19.7   25.1   24.0   22.5   14.4    3.0    12.0     8.4    10.8      4.4     5.0     3.6      6.4    22.6   16.4   77.8   123.0
 7    74.5     92.4  54.0  36.1 35.9  21.3   29.2   29.0   25.7   16.2    6.6    15.6    10.2     9.6      6.4     9.8     7.0      9.0    14.0   14.4   85.2   135.2
 8    80.0     98.2  58.8  37.8 39.0  25.0   32.5   31.4   27.7   17.1    6.8    18.8    13.4    12.4     17.0     9.0     9.0     10.6    19.2   21.6   87.5   136.4
 9    80.4     98.0  54.2  36.0 35.4  21.7   28.3   28.4   23.5   16.1    5.2    14.4    12.4    14.4      8.6    12.2     8.0     14.8    20.8   14.8   88.0   132.7

OBS EPIFEWTH ANKLEWTH EPIHUNTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

 1     8.7     6.3      5.7      4.7      7.2   70.5 52.3 25.2  37.9  22.3   37.5     33.4    26.2     29.4     39.3   94.0  42.5   18.1     745    27.2   11.20   5.90    2   11.20
 2     8.5     6.2      5.6      5.0      7.4   74.1 55.8 26.8  39.0  23.4   39.0     36.1    25.8     28.0     34.0   92.6  44.0   16.9     745    27.2   10.60   6.80    2   10.60
 3     8.5     6.4      6.0      5.2      7.6   69.4 51.5 25.1  34.0  23.1   41.5     36.2    27.3     29.2     35.4   86.4  38.8   17.7     745    27.2   11.40   5.60    2   11.40
 4     8.5     6.8      6.3      5.2      8.0   76.8 57.9 27.8  39.2  23.9   42.9     38.4    27.5     28.1     36.8   93.0  45.1   15.6     745    27.2   11.40   6.88    2   11.40
 5     9.0     6.3      6.1      5.1      7.5   71.3 54.2 26.0  38.6  22.2   39.6     35.0    27.1     27.6     41.1   86.8  43.7   20.0     745    27.2   11.40   5.63    2   11.40
 6     7.6     5.9      5.4      5.0      7.4   67.7 50.5 23.8  35.3  22.8   37.3     35.1    25.1     24.8     30.4   83.3  39.7   17.1     745    27.2   11.40   7.60    2   11.40
 7     8.9     6.4      6.4      5.3      7.3   72.7 55.0 24.8  37.8  22.7   39.8     35.7    27.8     28.3     33.9   92.0  46.8   18.1     745    27.2   11.57   7.60    2   11.57
 8     9.0     7.0      6.5      5.4      8.3   71.0 53.8 25.6  37.4  24.6   43.0     36.1    27.7     28.1     34.5   89.7  43.3   20.0     745    27.2   11.57   6.94    2   11.57
 9     8.2     6.0      6.0      5.2      7.7   75.5 56.8 26.7  37.7  23.3   38.4     35.4    27.0     27.8     35.1   90.0  41.5   18.5     745    27.2   11.57   7.27    2   11.57
```

```
                                          SAS                               13:59 TUESDAY, APRIL 1, 1986    2
------------------------------------------ SEX=F ------------------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC  HRV2    H2OVAP  HRV1    HRV3

 1   6.60    2    11.20   7.00    2   4.15 3.15 440  31.2    2.18    2.700    1.45    1.72     1.50     1.70       .        .    1.41101  27.32 1.83855 1.20510
 2   6.40    2    10.60   6.34    2   3.61 3.26 442  32.3    2.18    3.410    1.20    2.84     0.85     2.96     1.77     2.50   1.32455  27.32 1.11766 1.35783
 3   5.70    2    11.40   6.40    2   3.55 2.96 358  32.6    2.18    3.290    1.88    1.85     1.65     2.18     1.20     2.17   2.05451  27.32 2.13035 1.58999
 4   6.72    2    11.40   5.95    2   4.08 3.05 243  33.5    2.18    3.285    1.46    2.49     1.19     2.42     2.08     1.22   1.40987  27.32 1.32609 1.87606
 5   5.63    2      .       .     .   3.95 3.40 318  33.9    2.18    3.190    2.39    1.55     2.07     1.39     2.47     1.55   2.10731  27.32 2.10731    .
 6   7.86    2    11.40   7.80    2   3.42 3.01 239  34.6    2.18    3.770    2.32    1.66     1.40     1.69     1.45     2.69   0.88738  27.32 0.99275 0.91107
 7   7.60    2      .       .     .   4.10 3.01 236  34.6    2.18    4.330    2.98    1.14     2.98     1.46     2.70     1.31   1.04025  27.32 1.04025    .
 8   7.04    2    11.57   7.60    2   5.04 4.16 423  34.6    2.18    5.103    3.47    1.56     2.57     2.60     2.68     2.65   1.29740  27.32 1.34769 1.04025
 9   7.40    2    11.57   7.30    2   4.62 3.47 395  34.5    2.18    3.250    1.16    2.48     1.91     1.44     1.80     1.41   1.12762  27.32 1.18699 1.17310

OBS    A          B          C        MINRVDIF    HRV     H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

 1  0.427540   0.633457   0.205917   0.205917   1.30806  0.995326  1.02985  1.03730  1.03779     .     1.02942  1.03308  1.03357
 2  0.206887   0.240172   0.033285   0.033285   1.34119  0.994948  1.04929  1.06138  1.05682  1.06600  1.04876  1.05576  1.05120
 3  0.075840   0.540360   0.464520   0.075840   2.09243  0.994845  1.05898  1.06721  1.06911  1.06029  1.05817  1.06185  1.06360
 4  0.083777   0.549970   0.466193   0.083777   1.36798  0.994536  1.04240  1.05375  1.04780  1.04255  1.04192  1.04889  1.04302
 5  0.000000       .          .      0.000000   2.10731  0.994398  1.05607  1.06995  1.06094  1.07147  1.05528  1.06479  1.05593
 6  0.105366   0.081674   0.023692   0.023692   0.89923  0.994158  1.05933  1.06422  1.04281  1.06802  1.05888  1.05809  1.03691
 7  0.000000       .          .      0.000000   1.04025  0.994158  1.05984  1.05567  1.06180  1.05355  1.05943  1.05103  1.05698
 8  0.050287   0.307440   0.257153   0.050287   1.32254  0.994158  1.06627  1.06493  1.06711  1.06972  1.06583  1.06076  1.06258
 9  0.059370   0.013888   0.045482   0.013888   1.18004  0.994192  1.03977  1.04645  1.04139  1.03892  1.03935  1.04158  1.03695

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC     X         Y        Z       MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

 1      .     29.5532  26.3684  26.1609     .     0.20747      .        .      0.20747  26.2647  29.7372  28.1667  27.9564     .
 2   1.06047  21.3336  16.3725  18.2308  14.5052  1.85828   1.86724   3.7255  1.85828  17.3016  21.5540  18.6632  20.5412  16.7401
 3   1.05457  17.3482  14.0192  13.2590  16.8160  0.76019   2.79681   3.5570  0.76019  13.6391  17.6782  16.1797  15.4716  19.0270
 4   1.03823  24.2097  19.4885  21.9500  24.1493  2.46148   4.66078   2.1993  2.19930  23.0496  24.4118  21.5002  23.9514  25.9734
 5   1.06630  18.5346  12.9219  16.5493  12.3162  3.62741   0.60570   4.2331  0.60570  12.6190  18.8598  14.9921  18.5948  14.3864
 6   1.06133  17.2063  15.2219  24.0409  13.6964  8.81898   1.52551  10.3445  1.52551  14.4592  17.3879  17.7085  26.5335  16.3909
 7   1.04886  16.9980  18.7005  16.2007  19.5727  2.49983   0.87217   3.3720  0.87217  19.1366  17.1646  20.6121  18.1635  21.5114
 8   1.06515  14.3988  14.9365  14.0596  13.0138  0.87697   1.92277   1.0458  0.87697  14.4980  14.5753  16.6232  15.8850  14.8459
 9   1.03451  25.3191  22.5163  24.6352  25.6786  2.11896   3.16236   1.0434  1.04340  25.1569  25.4985  24.5567  26.5175  27.5563
```

```
------------------------------------------------- SEX=F ---------------------------------------------------

OBS  M        N        O        MINFAT1  EAPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR   AGE

 1   0.21028  .        .        0.21028  28.0616  31.0    60 8   74.0     18.2  27.1   51.5    31.5    4.6     51.8  143.2   89.8   666  22 106
 2   1.87801  1.92312  3.8011   1.87801  19.6022  29.9    56.0   82.2     18.3  29.0   48.6    38.2    5.0     61.2  156.8   87.4   903  21.4575
 3   0.70814  2.84728  3.5556   0.70814  15.8257  29.0    50.1   76.6     17.9  26.4   47.6    37.8    4.8     60.2  170.6  107.0   632  22.200
 4   2.45114  4.47311  2.0220   2.02197  24.9626  31.5    59.7   81.2     18.9  30.1   47.9    36.1    5.9     52.6  133.0   74.2 -1086  26.906
 5   3.60272  0.60570  4.2084   0.60570  14.6893  27.4    51.5   76.8     17.1  28.2   43.1    33.1    5.1     52.2  130.0   86.0 -2895  31.863
 6   8.82504  1.31754  10.1426  1.31754  17.0497  29.0    48.8   74.2     17.2  26.7   43.6    34.5    4.4     34.2   92.6   58.8 -2360  30.3973
 7   2.44858  0.89939  3.3480   0.89939  21.0617  28.0    57.2   78.0     17.7  30.2   45.2    31.2    9.0     42.0  102 6   59.2   986  21.230
 8   0.73817  1.77730  1.0391   0.73817  16.2541  29.8    57.7   78.7     17.2  28.2   46.4    35.4    5.9     51.4  137.8   72.8    73  23.7315
 9   1.96079  2.99963  1.0388   1.03884  27.0369  32.6    55.4   77.3     18.7  30.1   48.5    35.8    3.8     46.4  135.6   74.2  -415  25.0685
```

```
------------------------------------------------- SEX=F ---------------------------------------------------

OBS NAME      BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST  ABDOMEN1

10  MCDONALD  1     1      29   11     41    58.0          .     1       176             .      1        DOWNSVIEW 019 171.2  80.5   57.8 35.7 103.7    100.5   96.1  103 6 86.7
11  BECKER    1     1      24    7     60    65.0          162           135             59.0            DOWNSVIEW 020 164.7  58.0   56.0 34.8  96.2     91.8   86.9   90.9 72.2
12  KIRBY     6     1       8    7     51    60.0          .     1       114             52.0            DOWNSVIEW 022 152.9  52.1   52.5 31.0  87.6     77.5   73.0   81.8 69.1
13  PARENT    4     1      24    7     61    65.0          .             130             .               DOWNSVIEW 028 163.8  60.5   57.0 31.5  96.5     89.6   86.2  9[illegible].0 73.5
14  RIMMER    3     1       2   12     48    69.0          .     1       180             .      1        DOWNSVIEW 030 169.2  83.8   54.5 34.6 106.0    101.5   97.7  102.5 87.1
15  SIMMONS   3     1       8    3     47    61.5          .     1       135             .      1        DOWNSVIEW 035 156.3  61.1   53.3 30.5 100.6     95.7   92.4  101.0 74.2
16  HALL      1     1       2    6     64    65.0          .     1       142             .      1        DOWNSVIEW 036 164.8  65.7   57.1 33.1 102.3     92.8   87.6   90.4 75.9
17  LAFRANCE  1     2      11   10     56    .     1       .     1       .      1        .      1        DOWNSVIEW 040 160.7  58.5   55.5 34.2 100.5     87.6   85.4   89.3 72.4
18  REMUS     7     1      11    6     40    64.0          .             115             .               DOWNSVIEW 042 163.2  53.7   54.3 32.4  98.9     85.7   81.9   85.3 66.3

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

10  91.1     105.1   61.3  38.8 40.6 23.6  35.0    34.8  26.8    17.0  7.4     17.8     22.2   22.8     10.4    19.4    11.0     12.6    21.6    26.8   89.0   141.1
11  81.0      95.5   53.9  35.7 31.8 20.5  28.0    27.7  24.2    15.6  4.8     13.2     14.2   19.4     11.0    16.4    11.0     14.6    12.0    12.6   87.2   135.8
12  76.9     104.0   56.3  37.5 35.0 19.4  27.4    27.3  22.3    13.5  7.6     24.2     14.4   21.8     12.2    21.2    21.2     18.4    33.0    32.2   78.2   126.9
13  80.3      98.7   58.4  35.9 34.3 21.5  30.2    28.0  23.4    15.4  5.2     17.4     14.4   20.8     13.6    14.2     8.0     13.6    15.8    17.2   89.0   135.4
14  96.7     113.2   68.3  42.0 43.3 24.4  35.0    33.5  27.3    16.3  7.0     32.0     22.4   30.4     13.4    30.4    18.0     14.2    37.0    39.2   88.2   137.1
15  76.3     104.7   58.5  38.6 37.1 22.3  28.5    28.5  25.0    15.4  6.0     13.8     10.8   16.0      6.6    15.4     9.2     10.2    19.6    14.2   81.6   128.8
16  80.6      97.7   61.3  40.8 38.3 23.6  30.8    30.4  25.3    16.4  7.8     28.0     16.6   20.0     14.0     9.2     8.4     12.0    28.8    20.2   89.8   135.3
17  78.7      98.1   52.2  35.1 34.2 20.3  28.2    28.5  24.0    16.0  9.6     24.0     20.0   20.2     16.6    20.0    16.0     15.2    27.0    18.6   85.3   130.2
18  66.3      96.9   50.0  35.9 34.3 21.8  26.4    25.0  23.0    15.8  5.6     19.0      8.2   19.0      7.4     9.0     6.0      9.2    37.4    17.0   86.9   134.2

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTK LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

10  9.8      6.7      6.8      5.2      7.6     74.3 55.5 26.0 38.1   23.2  42.9     37.8    29.2     30.5     37.7     98.9 45.7  21.0     745     27.2    11.40  7.10    2     11.40
11  8.8      6.6      5.7      5.2      7.5     72.5 55.3 25.6 37.7   22.2  38.9     35.8    26.9     27.4     35.0     90.5 43.1  18.6     745     27.2    11.40  6.04    2     11.40
12  8.3      5.7      5.7      4.6      6.9     66.2 49.6 24.3 37.0   21.5  35.0     32.4    22.7     28.1     37.7     88.7 41.5  17.0     745     26.7    11.40  8.18    2     11.40
13  8.4      6.5      6.3      5.1      8.0     71.7 53.9 25.3 37.4   23.0  39.1     34.9    25.2     29.6     36.4     89.6 42.9  18.5     745     26.7    11.25  6.45    2     11.25
14  9.6      6.6      6.4      5.4      7.7     72.5 54.5 26.3 39.3   24.2  40.2     38.3    28.0     29.7     44.0     93.1 45.1  21.0     745     26.7      .      .      .     11.20
15  9.3      6.2      5.6      4.8      7.6     69.2 52.6 25.3 35.5   22.5  39.3     35.2    27.0     27.6     36.9     89.0 42.6  19.2     744     27.2    11.40  6.78    2     11.40
16  9.2      6.7      6.4      5.3      8.8     73.4 56.2 27.1 38.6   21.8  39.6     36.2    24.2     28.3     37.7     93.0 43.6  17.6     744     27.2    11.30  7.48    2     11.30
17  8.6      6.3      6.0      5.1      7.4     69.5 51.6 24.1 35.1   22.0  38.0     35.1    24.1     29.9     36.2     86.1 40.1  19.1     744     27.2    11.40  7.18    2     11.40
18  9.0      6.7      6.2      5.3      7.9     73.1 54.9 25.3 38.0   24.3  39.3     35.8    23.8     29.8     36.1     91.4 42.5  19.7       .       .       .      .      .       .
```

```
---------------------------------------- SEX=F ----------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC  FEV1  PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC    HRV2  H2OVAP    HRV1    HRV3

10    7.10    2      .       .     .   4.13  3.41  481  34.2    2.18    3.500   1.24    2.25     1.49    1.94     2.44    0.98    1.21706  27.32  1.21706        .
11    5.54    2    11.40    5.42   2   4.15  3.62  408  34.4    2.18    3.080   1.37    2.24     2.68    1.50     2.80    1.02    2.09969  27.32  1.81543  2.27391
12    8.13    2      .       .     .   3.96  2.77  501  32.4    2.18    2.443   1.23    2.05     1.34    2.05     1.90    0.84    0.76908  26.47  0.76908        .
13    7.18    2    11.25    7.40   2   3.79  3.67  597  33.6    2.18    4.250   3.05    1.78     2.26    2.98     2.38    2.84    1.13795  26.47  1.51559  1.03875
14    6.60    2    11.20    6.52   2   5.31  4.02  585  33.6    2.18    1.431   0.80    0.89     0.90    1.81       .       .     1.41504  26.47        .  1.45936
15    7.40    2    11.40    6.90   2   4.42  3.36  412  33.0    2.18    2.950   1.68    1.24     1.55    1.78     1.32    2.08    1.07888  27.32  1.37804  1.31594
16    7.62    2    11.30    7.66   2   4.86  3.96  428  33.0    2.18    3.320   1.72    2.03     1.79    1.94     1.91    1.32    0.95656  27.32  1.01550  0.94011
17    7.20    2      .       .     .   4.07  3.31  389  32.8    2.18    2.910   1.86    1.45     2.22    1.08     2.16    1.14    1.16975  27.32  1.17912        .
18      .     .      .       .     .   4.39  3.34  320    .     2.18      .       .       .        .       .        .       .          .       .        .        .

OBS     A          B          C       MINRVDIF    HRV     H2ODENS    DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

10  0.000000       .          .       0.000000  1.21706  0.994295   1.03397   1.03366   1.03289   1.03283   1.03364   1.03008   1.02939
11  0.284253   0.458476   0.174223    0.174223  2.18680  0.994227   1.05824   1.06838   1.07987   1.07269   1.05738   1.06269   1.07436
12  0.000000       .          .       0.000000  0.76908  0.994913   1.02224   1.03918   1.04147   1.02817   1.02192   1.03386   1.03614
13  0.377647   0.476847   0.099200    0.099200  1.08835  0.994501   1.05713   1.06783   1.07553   1.07516   1.05672   1.06298   1.07014
14      .          .      0.044342    0.044342  1.43721  0.994501   1.00944   1.01256   1.02520       .     1.00909   1.00954   1.02187
15  0.299164   0.062098   0.237065    0.062098  1.34699  0.994707   1.03772   1.03708   1.04433   1.04556   1.03724   1.03645   1.03964
16  0.058942   0.075387   0.014445    0.014445  0.94833  0.994707   1.03455   1.04147   1.04114   1.03297   1.03424   1.03717   1.03688
17  0.009366       .          .       0.009366  1.17443  0.994776   1.03555   1.04283   1.04268   1.04266   1.03511   1.03814   1.03813
18      .          .          .           .        .         .          .         .         .         .         .         .         .

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC    X        Y         Z       MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

10  1.02959  27.7864  27.9167  28.2492  28.2750  0.3325  0.35831  0.02583  0.02583  28.2621  27.9280  29.4566  29.7520  29.6661
11  1.06745  17.6490  13.5513   9.0001  11.8312  4.5511  1.72008  2.83106  1.72008  12.6912  18.0023  15.8422  11.1715  13.925
12  1.02347  32.8580  25.5706  24.6008  30.2772  0.9698  4.70661  5.67642  0.96981  25.0857  32.9963  27.8318  26.8620  32.320
13  1.06983  18.1009  13.7699  10.7058  10.8519  3.0640  2.91797  0.14606  0.14406  10.7789  18.2694  15.7248  12.8466  12.971
14     .     38.5241  37.1307  31.5651     .     5.5655     .        .     5.56555  34.3479  38.6848  38.4815  33.0188     .
15  1.04075  26.1873  26.4622  23.4008  22.8864  3.0614  3.57585  0.51441  0.51441  23.1436  26.3938  28.3548  25.3761  24.9077
16  1.02898  27.5361  24.6043  24.7408  28.2143  0.1365  3.61002  3.47349  0.13653  24.6725  27.6713  26.4201  26.5438  29.928
17  1.03810  27.1115  24.0298  24.0931  24.0956  0.0634  0.04581  0.00246  0.00246  24.0943  27.2996  26.0124  26.0165  26.02
18     .        .        .        .        .       .        .        .        .        .        .        .        .        .
```

```
---------------------------------------- SEX=F ----------------------------------------

OBS    M        N        O      MINFAT1  EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF   TSF    BIR    AGE

10  0.2964  0.21050  0.08590  0.08590  29.7091   30.1   58.9    82.2    18.8   29.5   53.2    36.5    7.6    70.2   172.0  103.8  -6607  42.032
11  4.6707  1.91715  2.75353  1.91715  14.8836   28.9   58.3    77.5    17.2   29.7   47.4    34.4    5.4    51.6   129.2   75.2    205  23.3
12  0.9698  4.48903  5.45884  0.96981  27.3469   26.0   52.2    74.7    16.6   25.3   47.2    33.2    4.5    68.0   206.2  114.6  -3099  32.47
13  2.8782  2.75383  0.12438  0.12438  12.9088   26.4   60.6    74.8    17.8   28.6   46.7    31.9    5.5    57.8   140.2   82.6    570  22.3
14  5.4627     .        .     5.46269  35.7502   32.1   56.1    81.0    18.0   28.2   48.0    35.9    5.8    91.8   244.0  152.2  -4047  35.0
15  2.9786  3.44706  0.46842  0.46842  25.1419   27.5   54.1    74.7    16.6   27.3   46.4    32.1    7.1    46.6   121.8   75.6  -4682  36.75
16  0.1237  3.50877  3.38508  0.12369  26.4820   29.5   60.3    75.0    17.2   29.1   49.4    31.4    5.2    72.4   165.0  102.6   1614  19.5
17  0.0041  0.01617  0.01207  0.00410  26.0145   30.5   54.8    75.4    17.9   27.5   46.0    35.3    5.0    73.8   187.2  111.2  -1177  27.15
18     .       .        .        .        .      29.0   57.9    76.3    18.2   29.6   46.9    33.8    4.5    51.8   137.8   92.6  -7143  43.5
```

```
---------------------------------------------------------- SEX=F ----------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST

19 KETTLEWELL   1 1  7  3 48 70.0     .     1 214     96.5    DOWNSVIEW 043 174.7 96.6 56.8 38.7 118.0 108.7 107.4 112.9
20 HOOPER       1 1 28  7 36 63.0     .     1   .   1   .   1 DOWNSVIEW 046 159.4 65.8 54.0 35.4 105.0  97.4  92.0  98.4
21 BEATON       3 1 27 12 54 66.0     .       140       .     DOWNSVIEW 047 167.5 62.1 55.7 31.6 100.2  91.8  84.3  98.2
22 GOULDEN      4 4 10  5 60 63.0     .         .   1   .   1 DOWNSVIEW 048 160.7 51.7 53.7 31.3  93.9  87.4  84.1  86.2
23 PALMER       1 1  6  1 51 62.0     .         .      56.0   DOWNSVIEW 049 159.1 56.0 55.2 33.1  99.2  91.0  85.8  90.6
24 RUTTER       9 4 28  4 62    .  1 165        .   1  70.5   DOWNSVIEW 052 164.7 68.2 56.7 35.1 101.8  96.3  91.5 102.7
25 SEPP         9 4  8 11 40 62.0     .       135     61.0    DOWNSVIEW 053 169.7 60.5 55.2 31.7 101.3  92.9  89.3  94.7
26 FINN         1 1 12  2 57 63.0     .     1   .   1   .   1 DOWNSVIEW 056 159.1 61.6 55.7 34.0 104.3  92.2  88.7  96.2
27 PARRISH      3 1 26  9 54    .  1 159       149     67.5    TRENTON   100 158.8 65.8 52.5 34.8 105.0  99.0  95.6 103.7

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

19 94.0 101.8 120.9 74.5 46.7 42.6 25.2 39.7 38.9 28.3 17.7 15.2 34.6 34.8 32.6 18.8 41.2 23.8 22.2    .  31.6 92.7
20 80.6  93.5 100.4 58.8 36.7 36.9 21.7 32.2 31.7 26.3 16.2 10.4 23.6 20.0 27.0 17.2 32.6 21.6 18.4 22.8 19.8 86.3
21 68.4  70.9  98.1 57.0 37.4 36.2 22.9 28.8 27.9 23.3 14.6  4.2 12.4  9.4  8.8  8.4  9.0  5.8  7.0 15.2 18.0 91.3
22 64.0  67.5  87.0 55.5 35.4 34.3 20.8 29.0 27.1 24.4 14.9  4.6 11.6  8.6 15.4  8.0 10.0  7.2  6.0 17.4  9.2 83.4
23 67.7  75.7  92.8 56.2 36.6 33.8 21.4 27.0 26.7 23.9 15.5  5.6 16.6  9.6  9.6  7.8  7.4  6.2  8.2 19.2 11.6 87.2
24 80.5  86.8 102.2 60.4 37.6 36.9 22.4 30.7 30.2 25.5 16.6  8.6 20.2 16.4 18.6 18.2 25.6 13.8 17.2 22.8 15.4 84.5
25 72.3  83.5  92.4 55.3 36.9 34.5 20.3 28.9 28.8 24.7 15.5  9.2 19.2 16.2 17.6  6.2 24.0 14.4 13.2 19.0 19.8 88.1
26 74.6  76.4  96.3 58.6 37.7 36.9 23.2 30.4 28.5 25.4 16.3  3.4  9.0  7.2  8.2  4.4  6.2  5.2  4.8 17.4 10.4 87.2
27 78.8  86.3 100.2 59.4 34.0 34.4 19.1 30.3 28.9 24.4 14.9  8.4 22.0 24.2 26.4 13.4 29.8 16.6 20.2 25.6 23.2 84.1

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

19 143.6 10.7 7.3 7.0 5.7 8.1 74.5 55.7 27.4 41.3 24.0 46.8 42.3 30.4 35.1 45.5 100.7 47.9 21.1   .     .      .     .   .
20 131.0  8.6 6.3 6.1 5.2 8.0 70.2 53.5 26.1 35.4 22.6 40.3 36.8 26.4 30.4 36.2  88.2 40.2 19.0 746  26.7  11.10  5.77  2
21 134.3  8.5 6.2 6.3 5.2 7.8 72.7 56.2 26.2 35.9 21.2 40.3 37.0 26.8 26.5 35.5  92.2 40.5 18.2 746  26.7  11.20  6.67  2
22 133.3  8.3 6.4 6.5 5.0 7.4 68.9 51.3 24.3 35.1 21.8 37.3 33.8 26.0 26.0 32.7  87.0 39.5 19.3 746  26.7  11.20  6.53  2
23 127.7  8.8 6.5 6.2 5.2 7.8 71.6 53.4 25.4 35.0 23.5 40.7 37.5 26.7 25.9 34.3  87.6 40.1 16.8 746  26.7  11.20  7.00  2
24 135.4  8.5 6.5 6.0 5.5 8.0 74.5 55.5 25.8 37.7 24.5 43.5 37.5 28.6 30.4 37.3  90.2 42.2 19.2 746  26.7  11.20  7.22  2
25 147.9  9.1 6.4 6.0 5.2 7.5 75.6 57.1 26.7 40.1 23.8 40.0 37.6 25.3 31.5 34.0  96.6 45.0 20.3 745  27.1  11.00  6.46  2
26 128.1  8.9 6.9 6.4 5.3 8.0 70.2 53.0 25.5 35.4 23.6 42.7 37.8 26.8 27.8 35.1  87.0 39.1 18.7 745  27.1  11.16  7.38  2
27 128.4  8.4 6.3 6.0 4.7 7.3 71.2 53.5 25.0 36.3 21.5 41.4 36.8 27.9 28.9 37.3  83.2 39.1 19.3 763  25.5  11.40  8.15  2
```

```
---------------------------------------------------------- SEX=F ----------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

19     .    .  .     .    .  . 5.22 4.02 430    .  2.18     .    .    .    .    .    .    .        .      .        .        .
20 11.10 5.99  2 11.10 5.40  2 3.66 3.18 472 31.3  2.18 2.450 1.14 1.51 1.32 1.43 0.84 2.13 1.74744 26.47 1.89790 2.17859
21 11.20 6.82  2 11.20 7.17  3 5.27 3.86 406 31.1  2.18 4.030 2.74 2.75 2.12 1.86 1.86 3.09 1.29841 26.47 1.37706 1.72616
22 11.20 6.55  2     .    .  . 4.65 3.62 257 31.1  2.18 3.600 0.83 3.02 1.62 2.32 1.60 1.91 1.44257 26.47 1.45372       .
23 11.20 6.98  2     .    .  . 5.13 4.42 519 31.2  2.18 4.185 2.91 1.58 2.80 1.73 2.09 2.63 1.21825 26.47 1.20849       .
24 11.20 7.48  2 11.20 7.42  2 4.96 4.32 526 31.0  2.18 3.540 2.14 1.61 2.55 1.41 2.05 1.74 0.98985 26.47 1.10467 1.01563
25 11.00 6.78  2 11.00 6.70  2 4.92 3.88 429 30.9  2.18 2.850 1.20 2.85 1.53 1.49 2.33 0.81 1.25342 27.15 1.42418 1.29458
26 11.16 7.20  2 11.16 6.98  2 4.59 3.98 594 30.8  2.18 4.560 3.05 3.00 3.20 1.04 2.87 2.61 1.09955 27.15 1.01922 1.20335
27 11.40 8.10  2 11.40 8.00  2 3.26 2.93 422 26.0  2.68 3.265 1.62 1.42 1.21 1.63 1.79 1.20 0.80325 24.43 0.78475 0.84094

OBS     A         B         C      MINRVDIF    HRV     H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

19        .         .         .         .         .         .         .        .        .        .        .        .        .
20 0.150460  0.280693  0.431153  0.150460  1.82267  0.995291  1.03449  1.03765  1.03931  1.04289  1.03389  1.03328  1.03495
21 0.078646  0.349101  0.427746  0.078646  1.33774  0.995360  1.05606  1.08283  1.05500  1.07265  1.05556  1.07750  1.05026
22 0.011152         .         .  0.011152  1.44815  0.995360  1.06105  1.06624  1.06030  1.05889  1.06041  1.05987  1.06222
23 0.009763         .         .  0.009763  1.21337  0.995326  1.06318  1.06925  1.07006  1.07389  1.06268  1.06402  1.06476
24 0.114823  0.089040  0.025783  0.025783  1.00274  0.995394  1.03756  1.04079  1.04416  1.04141  1.03724  1.03677  1.04019
25 0.170759  0.129599  0.041161  0.041161  1.27400  0.995429  1.03502  1.05657  1.03793  1.04014  1.03456  1.05135  1.03338
26 0.080325  0.184127  0.103801  0.080325  1.05939  0.995463  1.06116  1.08898  1.05523  1.07810  1.06076  1.08356  1.05085
27 0.018499  0.056192  0.037693  0.018499  0.79400  0.997111  1.02302  1.01938  1.01621  1.01860  1.02276  1.01552  1.01231

OBS DENSITYZ  PERFAT  PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

19        .       .        .        .        .        .        .        .        .        .        .        .        .        .
20  1.03827 27.5624  26.2164  25.5160  24.0038   0.7004  2.21263  1.51219  0.70044  25.8662  27.8219  28.0800  27.3681  25.9556
21  1.06729 18.5418   7.8417  18.9752  11.8458  11.1335  4.00410  7.12941  4.00410   9.8438  18.7436   9.9302  20.9295  13.9856
22  1.05309 16.5047  14.4090  13.5809  17.3826   0.8281  2.97369  3.80179  0.82810  13.9949  16.7671  16.9865  16.0316  19.7591
23  1.06818 15.6429  13.2027  12.8805  11.3572   0.3222  1.84554  1.52332  0.32221  13.0416  15.8459  15.3022  15.0051  13.6323
24  1.03736 26.2553  24.8916  23.4717  24.6263   1.4199  0.26524  1.15465  0.26524  24.7589  26.3931  26.5906  25.1433  26.3432
25  1.03582 27.3370  18.3297  26.0986  25.1644   7.7689  6.83468  0.93420  0.93420  25.6315  27.5342  20.4791  28.0374  26.9979
26  1.07293 16.4614   5.4584  18.8814   9.6932  13.4230  4.23482  9.18819  4.23482   7.5758  16.6225   7.5596  20.6845  11.7351
27  1.01481 32.5162  34.1119  35.5093  34.4558   1.3973  0.34384  1.05346  0.34384  34.2839  32.6292  35.8162  37.2434  36.1287
```

```
------------------------------------------------------------ SEX=F -------------------------------------------------------------------

OBS        M         N         O   MINFAT1   EXPFAT1  HEADHGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  TSFDW  TOTALSF    TSF    BIR      AGE

 19        .         .         .         .         .     31.1    61.6      82.0   18.8    28.3     52.8     34.1      6.6  117.2        .      .  -4317  35 7589
 20   0.7118   2.12436   1.41253   0.71183   27.7240     28.4    57.9      73.1   16.7    27.4     48.0     32.9      4.8   81.0    213.4  126.0  -8557  47.3753
 21  10.9992   4.05540   6.94385   4.05540   11.9579     33.2    58.1      76.2   16.5    30.0     51.7     35.7      4.6   34.8     98.2   54.8  -1831  28.9479
 22   0.9550   2.77254   3.72750   0.95495   16.5090     27.4    56.0      77.3   17.6    27.3     47.5     37.8      4.4   40.2     98.0   63.0     30  23.5753
 23   0.2971   1.66988   1.37276   0.29712   15.1536     31.4    55.8      71.9   18.2    28.0     47.5     31.8      5.1   41.4    101.8   62.4  -3282  32.9233
 24   1.4474   0.24739   1.19998   0.24739   26.4469     29.3    55.2      80.2   19.0    29.7     48.0     38.0      4.5   63.8    176.8  103.6    848  21.6087
 25   7.5583   6.51879   1.03950   1.03950   27.5176     21.8    66.3      81.6   18.5    30.4     51.6     36.6      4.9   62.2    158.8   96.0  -4993  45.0904
 26  13.1149   4.17551   8.94942   4.17551    9.6473     31.0    56.2      71.9   17.2    27.5     47.9     32.8      3.7   27.8     76.2   48.0  -1053  26 8164
 27   1.4272   0.31252   1.11469   0.31252   35.9725     30.4    53.7      74.1   17.7    28.5     44.1     35.6      2.8   81.0    209.8  128.0  -1923  29.2000
```

```
-------------------------------------------------------------------- SEX=F -------------------------------------------------------------------------

OBS NAME         BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST

 28 ROCHON           1      1   24      7    57  63.0             .           120.0             58.0          TRENTON  101  158.6  58.0  54.0 31.9     99.3    89.3  84.1 88.8
 29 FUTTER           2      1   12      1    61  62.0             .           132.0                .          TRENTON  102  157.1  56.0  55.0 33.3     97.9    93.1  89.6 91.5
 30 WILLIAMS         1      1   23      8    60  65.0             .       1   145.0                .        1 TRENTON  103  162.8  59.0  55.3 31.7    102.4    90.3  87.2 90.1
 31 ROWAT            5      1   30      3    57  65.0       1     .       1   138.0                .        1 TRENTON  104  164.2  63.8  53.3 34.4    101.5    95.8  92.6 99.4
 32 GAUDREAULT       3      1   25      8    54  65.5                         116.0             63.0          TRENTON  105  165.6  64.5  54.3 31.6    100.3    95.4  87.9 94.5
 33 WILSON           9      1    5      3    57  63.5           161           135.0             53.0          TRENTON  106  161.2  53.0  53.2 30.0     93.2    87.6  83.0 88.3
 34 MACDONALD        1      1   23      5    49  67.0             .       1   109.0                .        1 TRENTON  107  169.0  61.4  55.8 32.3    100.8    92.0  88.7 92.0
 35 LANGEVIN         2      2   30      3    46  60.0           152           125.0             49.0          TRENTON  108  151.3  48.6  51.4 30.6     91.2    83.7  81.9 84.5
 36 ENGLISH          2      1    9      8    61  64.0           162           125.0             56.9          TRENTON  109  160.4  56.9  53.4 30.4     95.8    84.1  82.3 90.0

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSSF TRICEPSSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

 28     71.5     82.4    93.1  57.2 38.3 35.8  21.5    29.9  28.8    23.8  14.7     10.6      25.0   13.8     18.6     9.6    17.6     13.8    12.2    36.8   22.6   81.5
 29     69.4     73.4    90.8  53.8 32.7 33.2  20.2    30.8  30.2    23.8  14.7      4.0      15.4   12.8     12.8     6.6     9.6      6.6    11.2    14.0   10.6   81.0
 30     66.7     73.0    95.4  56.5 34.4 34.1  20.2    28.9  27.8    24.8  14.9      4.4      11.4   10.4     13.6     4.0    13.2      7.6     7.2    16.4    9.6   86.5
 31     74.4     78.3    99.1  59.4 35.7 36.4  21.4    30.1  28.4    24.6  15.2      7.4      22.8   23.4     20.6    16.2    17.0     15.0    18.4    25.4   20.8   84.5
 32     68.5     83.7    99.5  61.7 38.2 38.4  22.4    29.3  28.4    24.5  15.3      5.8      18.0    9.8     16.0     6.4    14.2      9.2    11.4    20.4   16.4   86.0
 33     66.3     75.7    88.5  54.2 35.3 33.7  20.2    28.7  28.5    22.5  14.4      6.4      20.2    9.2     14.2     4.0    12.4      6.0     6.8    17.8   15.4   83.7
 34     74.0     78.0    79.9  56.1 35.8 34.0  21.8    29.7  28.6    24.4  15.9      9.0      18.8   15.4     21.0     6.6    20.0     12.0    16.6    28.8   17.4   91.5
 35     67.8     71.6    89.6  53.4 32.0 31.0  18.6    27.3  25.7    21.2  13.6      8.8      18.2   10.4     13.6     7.0    17.6     16.6    12.4    33.0   16.4   82.5
 36     65.0     70.6    94.0  58.8 32.8 33.5  20.7    28.7  28.0    22.2  14.7      6.0      20.8   12.2     16.4     4.4    17.0     13.0    12.0    26.4   11.2   82.7

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH  TAL  TAS  LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP W1INIT W1FINAL W1VOL

 28    132.4      9.2      6.7      5.8      5.0     7.7 70.0 53.0 23.7   36.0  23.6     39.3    34.5     26.9     29.2     34.8 87.0  40.1     18.9     763    25.5  11.30    6.38     2
 29    129.5      7.9      6.1      5.9      4.7     7.4 72.0 53.6 25.2   35.4  21.5     40.1    34.8     26.2     25.5     32.1 86.8  40.6     17.7     763    25.5  11.30    7.48     2
 30    129.4      7.8      6.1      6.0      5.1     7.7 74.2 56.8 27.5   37.9  22.0     42.3    38.3     25.5     27.3     35.2 86.9  42.2     19.4     763    25.5  11.30    7.00     2
 31    136.3      9.0      6.7      6.4      5.1     7.4 72.5 54.2 26.0   38.8  23.4     41.3    36.9     26.2     29.1     35.3 91.7  42.0     20.2     763    25.5  11.40    7.24     2
 32    134.8      9.3      6.5      6.8      5.1     7.9 71.8 54.7 25.3   37.6  24.3     41.1    36.9     29.0     30.1     37.9 90.1  40.8     20.3     763    25.5  11.50    6.90     2
 33    131.7      8.3      6.3      6.1      4.9     7.3 69.8 53.3 25.4   37.0  22.5     38.8    35.0     25.4     25.8     33.1 87.5  41.1     15.2     763    25.5  11.40    7.08     2
 34    138.2      8.6      6.6      6.2      5.2     7.5 71.1 53.8 25.3   36.0  23.1     40.2    36.1     27.5     28.7     36.0 92.2  42.0     16.5     763    25.5  11.40    6.70     2
 35    123.7      8.5      6.3      5.7      5.0     7.0 67.4 51.2 24.0   34.3  21.8     36.7    33.8     23.4     27.3     32.1 84.7  39.7     18.3     763    26.8  11.40    7.66     2
 36    132.7      7.8      6.3      5.8      5.1     6.8 70.0 53.3 24.9   36.6  22.6     40.5    36.2     24.7     26.0     35.1 88.0  41.7     15.0     763    25.5  11.50    7.40     2
```

```
                                                   SAS                                   13:59 TUESDAY, APRIL 1, 198

--------------------------------------------------- SEX=F ---------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

28  11.30  6.27    2     11.30  6.36    2     3.31 3.06 413 26      2.68    2.930   2.20    1.24     1.79    1.38     1.35    1.82     1.64917 24.43  1.58260 1.59453
29  11.30  7.60    2     11.30  7.98    2     3.29 2.52 332 26      2.68    4.180   2.59    1.21     2.95    0.76     3.07    0.64     0.97344 24.43  1.02455 0.82174
30  11.30  7.20    2     11.30  7.40    2     3.76 3.14 350 26      2.68    4.430   2.68    1.74     2.39    1.98     2.33    2.30     1.15042 24.43  1.24649 1.05954
31  11.40  6.88    2     11.40  8.00    3     3.92 3.30 431 26      2.48    3.766   1.80    3.00     1.27    3.06     1.25    3.21     1.33796 24.43  1.16143 1.29623
32  11.50  7.00    2     11.40  6.60    2     4.21 2.92 193 26      2.68    3.870   3.28    1.44     2.54    2.26     2.47    1.84     1.30771 24.43  1.35872 1.48857
33  11.40  7.66    2     11.40  7.60    2     2.82 2.40 430 26      2.68    4.170   2.09    1.78     2.10    2.04     1.53    2.09     0.97646 24.43  1.23767 1.00163
34  11.40  6.60    2     11.40  6.92    2     3.48 2.83 314 26      2.68    3.073   1.75    1.34     1.69    1.82     1.63    1.57     1.48857 24.43  1.43333 1.31744
35  11.40  7.80    2     11.40  7.78    2     2.76 2.33 301 26      2.68    4.145   3.28    1.56     2.99    0.92     3.54    0.96     0.91250 26.64  0.96931 0.92049
36  11.50  7.68    2     11.50  7.48    2     2.89 2.56 330 26      2.68    4.230    .       .       2.22    2.11     1.95    2.32     0.99605 24.43  1.11744 1.08183

OBS A        B        C        MINRVDIF  HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

28  0.066575 0.011933 0.054641 0.0119332 1.58856 0.997111 1.03459 1.04405  1.03898  1.03896  1.03399  1.03923  1.03415
29  0.051106 0.202801 0.151695 0.0511056 0.99899 0.997111 1.04875 1.04125  1.03954  1.03954  1.04835  1.03653  1.03500
30  0.096074 0.186954 0.090880 0.0908804 1.10498 0.997111 1.05282 1.05254  1.05158  1.05648  1.05239  1.04771  1.04667
31  0.176525 0.134796 0.041729 0.0417294 1.31709 0.997111 1.04089 1.05865  1.05043  1.05268  1.04043  1.05361  1.04544
32  0.051013 0.129850 0.180863 0.0510125 1.33321 0.997111 1.04245 1.05694  1.05829  1.04985  1.04199  1.05251  1.05356
33  0.261214 0.236041 0.025173 0.0251733 0.98904 0.997111 1.05124 1.04490  1.05049  1.03974  1.05082  1.03963  1.04506
34  0.055235 0.115897 0.171132 0.0552347 1.46095 0.997111 1.03289 1.03312  1.04047  1.03503  1.03237  1.02866  1.03578
35  0.056813 0.048822 0.007991 0.0079909 0.91650 0.997111 1.05390 1.06997  1.04848  1.06204  1.05347  1.06410  1.04314
36  0.121392 0.035611 0.085781 0.0356107 1.09964 0.997111 1.05086  .       1.05270  1.05151  1.05043   .       1.04754

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

28  1.03396  27.5197 23.5180 25.6547 25.6648 2.13677 2.14682 0.01004 0.01004 25.6598 27.7763 25.5507 27.7101 27.7912
29  1.03505  21.5549 24.6936 25.4195 25.4167 0.72595 0.72312 0.00284 0.00284 25.4181 21.7220 26.6953 27.3459 27.323
30  1.05140  19.8722 19.9889 20.3827 18.3702 0.39380 1.61876 2.01255 0.39380 20.1858 20.0476 21.9898 22.4217 20.460
31  1.04762  24.8478 17.4820 20.8596 19.9289 3.37761 2.44684 0.93078 0.93078 20.3943 25.0412 19.5486 22.9350 22.026
32  1.04534  24.1894 18.1790 17.6274 21.1006 0.55163 2.92159 3.47322 0.55163 17.9032 24.3831 19.9989 19.5664 22.978
33  1.03440  20.5246 23.1634 20.8350 25.3330 2.32836 2.16965 4.49801 2.16965 24.2482 20.6994 25.3774 23.0950 27.601
34  1.03047  28.2483 28.1503 25.0255 27.3341 3.12476 0.81614 2.30862 0.81614 27.7422 28.4712 30.0662 27.0147 29.285
35  1.05653  19.4259 12.9141 21.6671 16.1042 8.75296 3.19004 5.56293 3.19004 14.5091 19.6025 15.2722 23.9018 18.346
36  1.04629  20.6799  .      19.9235 20.4116  .       .      0.48818 0.48818 20.1675 20.8609  .      22.0582 22.581

                                                   SAS                      .            13:59 TUESDAY, APRIL 1, 1986   12

--------------------------------------------------- SEX=F ---------------------------------------------------

OBS M       N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDH TOTALSF TSF    BIR    AGE

28  2.15939 2.24050 0.08112 0.08112 27.7507 26.2    55.3   77.1     17.0  29.3   46.9    37.0    4.1     68.0  180.6   111.6   -891  26.3726
29  0.65067 0.62776 0.02291 0.02291 27.3345 27.6    53.4   76.1     18.4  28.4   46.2    35.5    5.2     45.0  103.6    64.6    377  22.896
30  0.43190 1.52983 1.96174 0.43190 22.2058 33.4    53.1   76.3     17.4  29.3   44.7    34.1    4.3     39.6   97.8    65.0    235  23.287
31  3.38642 2.47767 0.90875 0.90875 22.4806 27.9    56.6   79.7     18.3  28.2   49.7    37.7    3.2     74.2  187.0   109.2  -1007  26.69
32  0.43253 2.97969 3.41222 0.43253 19.7826 30.8    55.2   79.6     17.1  29.4   49.3    38.8    3.2     49.6  127.6    78.4  -1955  29.28
33  2.28240 2.22445 4.50685 2.22445 26.4898 29.5    54.2   77.5     16.5  27.9   46.4    36.4    4.1     50.0  112.4    73.8  -1032  26.75
34  3.05153 0.78105 2.27048 0.78105 29.6757 30.8    60.7   77.5     17.3  28.5   50.2    35.5    6.0     64.2  165.6   104.0  -3875  34.547
35  8.62959 3.07438 5.55521 3.07438 16.8094 27.6    54.9   68.8     16.2  27.2   45.0    29.1    5.4     51.0  154.0    92.8  -5025  37.698
36   .       .      0.52276 0.52276 22.3196 27.7    55.0   77.7     16.7  28.4   46.3    36.0    5.1     55.4  139.4    92.8    586  22.326
```

```
------------------------------------------------------ SEX=F ------------------------------------------------------

OBS NAME             BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST  BUST

37  ANDERSON           7     1     6     5    47      .      1       .     1     128.0            .       1     TRENTON  110  170.6  57.5  52.5 30.5   89.9     88.1  86.8   91.2
38  BOWNESS NICOLE     2     1     9    12    45    63.0            .     1     119.0            .       1     TRENTON  111  158.0  52.5  53.2 32.3   92.3     84.5  81.0   84.6
39  SABOURIN           1     1     9    10    52      .      1       .             0.1            .       1     TRENTON  112  156.1  49.9  53.7 29.5   94.3     81.0  78.6   81.6
40  MANN               3     1    24    10    47    67.5            .     1     133.0            .       1     TRENTON  113  166.4  61.5  53.9 34.6  100.0     93.1  89.4   96.4
41  HOLLINGSHEAD       1     1    28     7    48    69.0            .     1     143.0            .       1     TRENTON  114  170.0  62.2  51.9 31.3  100.7     92.9  91.0   92.3
42  BOUCHER            3     1    16     8    47    64.0            .     1     130.0            .       1     TRENTON  115  161.2  57.1  53.8 32.4   97.3     87.0  85.0   88.3
43  CREAMER            1     1    22     1    51    62.5            .           122.0            .             TRENTON  116  160.8  56.3  55.3 32.6   99.0     87.7  82.6   89.1
44  LIVINGSTONE        1     1    19     6    43    67.0            .           152.0            .             TRENTON  117  168.4  70.3  57.0 34.9  105.5    100.3  96.2  106.5
45  TKACZ              1     4    28     7    53    64.0            .     1     127.0          57.0            TRENTON  118  161.2  56.3  56.1 31.2   98.0     91.2  86.2   87.0

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

37  74.6  79.2   92.0  54.1  36.5  31.5  18.1  26.3  25.6  22.0  13.6   7.2  17.2  10.8  19.0   8.6  14.4  10.6  11.4  17.2  11.0  87.5
38  67.5  71.9   94.6  58.9  35.5  33.2  19.4  28.1  26.9  22.5  13.9   4.2  19.6  13.4  19.6   8.0  16.0  12.6  10.0  32.0  20.8  81.5
39  61.5  69.1   91.7  55.6  35.9  34.1  20.3  26.2  24.8  23.6  14.3   3.6  17.2   7.0   7.0   3.4   5.4   5.4   4.6  30.4  13.8  82.4
40  72.0  76.8   94.0  55.0  35.9  34.3  21.3  29.1  28.4  24.0  15.1   5.4  16.6  11.2  16.2   5.2  13.2   7.0   8.4  15.2  10.6  88.2
41  65.6  70.9   96.9  58.8  38.7  38.5  21.3  28.2  26.8  24.0  15.4   4.4  14.0   9.4  15.2   4.2  13.2   8.8   8.6  24.4  16.0  86.6
42  68.0  74.2   96.5  56.0  35.8  35.3  20.5  28.5  27.1  24.1  15.4   4.8  16.0  10.4   9.0   5.0  11.6   6.2   8.2  11.0  14.0  86.4
43  67.1  71.7   93.6  55.7  36.2  33.0  21.2  28.5  28.1  23.1  14.3   7.6  18.4  11.2  15.0   7.0  18.2  12.0   8.6  29.4  22.2  84.8
44  83.5  85.1   93.8  53.9  38.8  39.0  24.0  29.5  28.8  25.8  16.3  10.4  17.2  30.2  32.2  15.2  33.6  24.0  24.0  11.0  21.0  89.5
45  65.9  71.6   91.7  54.0  35.6  34.5  20.4  27.0  25.7  23.4  15.0   2.0  13.2   7.2   7.0   2.6   4.6   4.8   5.6  18.2  11.6  90.2

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

37  139.0   7.8  6.1  5.8  4.9  6.8  77.1  59.1  27.2  40.0  23.4  39.7  37.0  25.8  26.0  34.8  96.9  46.5  18.5  763  25.5  11.50  6.40  2
38  128.9   8.7  6.0  6.1  4.5  7.2  67.3  50.4  23.8  37.4  22.2  37.9  35.5  24.6  27.3  34.4  86.9  41.4  14.1  763  26.8  11.40  7.33  2
39  127.5   8.6  6.4  6.0  5.0  7.0  67.4  51.0  23.2  35.3  21.4  37.2  33.4  25.4  26.4  35.5  84.9  41.3  14.5  763  26.8  11.40  7.30  2
40  136.2   8.9  6.9  6.6  5.2  7.8  74.7  55.2  26.3  38.6  24.5  40.3  37.8  28.0  26.1  33.6  96.1  43.2  18.5  763  27.0  11.37  6.60  2
41  141.0   9.4  6.8  6.4  5.6  8.2  76.3  56.8  27.2  40.9  24.9  41.7  38.0  26.6  27.8  37.9  95.6  45.0  17.7  763  27.0  11.38  5.80  2
42  131.1   8.7  6.7  6.3  5.4  7.6  71.2  53.3  25.1  35.6  22.7  39.3  36.6  26.3  25.9  35.7  87.1  39.2  17.6  763  27.0  11.38  6.44  2
43  130.3   8.8  6.2  6.1  4.5  7.0  69.8  52.8  25.6  37.0  21.3  37.9  35.7  24.7  27.2  34.4  88.3  43.3  19.2  763  27.0  11.38  7.53  2
44  136.8   9.5  6.9  6.6  5.6  8.3  73.2  54.7  26.8  38.4  23.6  39.8  36.0  27.8  30.0  32.3  93.0  42.5  21.5  763  27.0  11.35  6.50  2
45  130.9   9.0  6.8  6.3  5.3  7.7  70.0  52.7  25.4  35.5  23.8  40.3  37.6  27.1  29.3  34.5  85.7  41.5  16.6  763  27.0  11.35  6.70  2
```

```
------------------------------------------------------ SEX=F ------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

37  11.50  6.78  2  11.50  6.77  2  3.29  2.50  307  26  2.68  2.650  1.40  1.62  1.49  1.73  1.10  1.98  1.42192  24.43  1.63769  1.42729
38  11.40  7.40  2  11.40  7.40  2  2.65  2.23  416   .  2.68    .      .     .     .     .     .     .    1.08053  26.64  1.11182  1.08053
39  11.40  7.23  2  11.40  7.23  2  3.07  2.68  389  26  2.68  3.055  1.48  1.90  2.39  1.06  2.09  1.12  1.15757  26.64  1.12541  1.15757
40  11.37  6.50  2  11.37  6.04  2  3.87  3.10  318  26  2.68  4.714  1.45  2.72  2.19  2.49  1.72  2.67  1.52266  26.98  1.46636  1.80568
41  11.36  6.50  2  11.36  6.62  2  3.30  1.78  301  26  2.68  3.275  2.25  2.13  2.14  1.38  1.90  2.50  1.52593  26.98  1.97483  1.45851
42  11.36  6.60  2  11.36  6.81  2  3.67  3.20  402  26  2.68  4.526  3.29  0.96  3.41  0.84  3.34  0.74  1.46957  26.98  1.56058  1.35662
43  11.38  7.60  2  11.38  7.64  2  3.16  2.62  408  26  2.68  4.250  2.59  1.02  2.69  1.02  2.75  0.80  0.98759  26.98  1.01716  0.97094
44  11.35  6.70  2  11.35  6.52  2  4.24  3.15  352  26  2.68  3.800  2.34  1.18  2.65  1.28  2.18  1.30  1.40539  26.98  1.51612  1.50474
45  11.35  6.71  2    .      .    .  3.49  2.09  293  26  2.68  2.990  2.24  1.21  1.53  2.24  1.50  1.87  1.40003  26.98  1.40539   .

OBS     A         B         C      HINRVDIF     HRV    H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

37  0.215773  0.210405  0.005368  0.005368  1.42460  0.997111  1.02669  1.03345  1.03718  1.03455  1.02615  1.02859  1.03225
38  0.031290  0.031290  0.000000  0.000000  1.08053      .         .        .        .        .        .        .        .
39  0.032157  0.032157  0.000000  0.000000  1.15757  0.997111  1.03385  1.04076  1.04234  1.03712  1.03334  1.03509  1.03702
40  0.056305  0.339324  0.283019  0.056305  1.49451  0.997111  1.06281  1.05274  1.06205  1.05673  1.06225  1.04760  1.05691
41  0.448896  0.516318  0.067422  0.067422  1.49222  0.997111  1.03648  1.05587  1.04067  1.05621  1.03595  1.05097  1.03618
42  0.091008  0.203966  0.112958  0.091008  1.51508  0.997111  1.06463  1.05911  1.05912  1.05578  1.06402  1.05421  1.05426
43  0.029572  0.046227  0.016655  0.016655  0.97926  0.997111  1.04947  1.03700  1.03892  1.03587  1.04908  1.03242  1.03432
44  0.110735  0.011379  0.099356  0.011379  1.51043  0.997111  1.04046  1.03610  1.04241  1.03548  1.03998  1.03222  1.03845
45  0.005363      .         .     0.005363  1.40271  0.997111  1.03329  1.04204  1.04821  1.04046  1.03274  1.03717  1.04288

OBS DENSITYZ  PERFAT  PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

37  1.02955  30.9218  28.0099  26.4183  27.5400  1.59164  0.46996  1.12168  0.46996  27.7749  31.1540  30.0956  28.5218  29.6842
38     .        .        .        .        .        .        .        .        .        .        .        .        .        .
39  1.03183  27.8385  24.9038  24.2386  26.4445  0.66523  1.54073  2.20596  0.66523  24.5712  28.0558  27.3095  26.4866  28.7038
40  1.05158  15.7932  19.9058  16.1001  15.2652  3.80569  1.64061  2.16508  1.64061  19.0855  16.0208  22.0340  18.1933  20.3858
41  1.05117  26.7173  18.6203  24.9413  18.4809  6.32099  0.13950  6.46049  0.13950  18.5506  26.9420  20.6354  26.8434  20.5516
42  1.05100  15.0565  17.2941  17.2913  18.6535  0.00278  1.35944  1.36222  0.00278  17.2927  15.3050  19.3009  19.2784  20.6242
43  1.03138  21.2584  26.4925  25.6784  26.9757  0.81407  0.48327  1.29735  0.48327  26.7341  21.4214  28.4486  27.6345  28.8953
44  1.03157  25.0291  26.8768  24.2057  27.1399  2.67113  0.26304  2.93417  0.26304  27.0084  25.2304  28.5355  25.8777  28.8146
45  1.03535  28.0786  24.3623  21.7814  25.0290  2.58082  0.66678  3.24760  0.66678  24.6957  28.3120  26.4205  24.0111  27.1971
```

SEX=F

OBS	M	N	O	MINFAT1	EXPFAT1	HEADHGT	TRUNKL	TOTALLEG	HANDL	UPARML	THIGHL1	THIGHL2	FOOTHGT	TSFDW	TOTALSF	TSF	BIR	AGE
37	1.57372	0.41131	1.16241	0.41131	29.8899	31.6	55.9	83.1	18.0	31.9	50.4	36.6	6.5	54.2	127.4	78.6	-4623	36.5973
38	.	.	.	.	.	29.1	52.4	76.5	16.9	26.6	45.5	35.1	4.0	56.8	156.2	100.6	-5136	38.0027
39	0.82293	1.39429	2.21722	0.82293	26.8981	28.6	53.8	73.7	16.4	27.8	45.6	37.4	6.0	34.8	97.8	67.0	-2640	31.1644
40	3.84072	1.64823	2.19250	1.64823	21.2099	30.2	58.0	80.2	19.5	28.9	52.9	37.0	4.6	49.4	109.0	72.4	-4452	36.1288
41	6.20803	0.08377	6.29179	0.08377	20.5935	29.0	57.6	83.4	17.5	31.6	50.6	38.4	4.1	43.0	118.2	76.2	-4174	35.3471
42	0.02247	1.32334	1.34581	0.02247	19.2896	30.1	56.3	74.8	17.9	22.2	47.9	35.6	3.6	40.2	96.2	58.0	-4521	36.3178
43	0.81407	0.44666	1.26074	0.44666	28.6719	30.5	54.3	76.0	17.0	27.2	45.0	32.7	6.3	52.2	149.6	92.2	-3266	32.8795
44	2.65780	0.27903	2.93684	0.27903	28.6750	29.6	59.9	78.9	18.5	27.9	50.5	36.4	4.1	90.0	218.8	124.2	-6040	40.4795
45	2.40942	0.77661	3.18603	0.77661	26.8088	30.3	59.9	71.0	17.3	27.3	44.2	29.5	6.0	29.4	76.8	50.2	-2348	30.3644

SEX=F

OBS	NAME	BIRTH	ORIGIN	BDAY	BMONTH	BYEAR	HGTIN	NOHGTIN	HGTCM	NOHGTCM	WGTLBS	NOWGTLBS	WGTKGS	NOWGTKGS	LOCATION	ID	HEIGHT	WEIGHT	HEAD	NECK	SHOULDER	CHESTIN	CHEST	BUST	ABDOMEN1
46	DELMAGE	7	1	15	5	42	65.5		.		127		.		TRENTON	119	165.9	59.4	55.5	32.5	97.0	89.6	85.7	87.6	70.2
47	GORDON	6	1	14	4	42	63.0		.	1	125		.	1	TRENTON	120	162.4	58.0	53.0	32.4	93.5	84.7	82.2	86.6	71.8
48	HALL	1	1	26	[illegible]	[illegible]	[illegible]		.	1	[illegible]		.	1	TRENTON	121	172.6	75.5	56.2	34.5	104.9	99.1	97.2	97.0	78.2
49	MCNAMARA	7	1	4	11	41	62.0		.	1	112		.	1	TRENTON	122	157.9	51.8	53.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	HILLS	1	1	17	7	35	63.0		.	1	.	1	.	1	TRENTON	123	158.6	56.2	53.4	30.3	97.6	85.8	81.4	86.3	68.7
51	HAFFEL	9	4	14	10	36	.	1	.	1	.	1	.	1	TRENTON	124	160.5	68.0	56.1	35.7	102.2	93.9	91.6	93.4	78.7
52	REFAUSSE	1	1	12	2	36	64.0		.		118		.		TRENTON	125	161.5	53.4	54.6	32.0	94.6	86.2	83.6	84.0	71.8
53	BOUDREAU	1	1	3	4	41	67.0		.		125		.		TRENTON	126	169.2	56.1	54.7	30.9	93.6	84.7	82.2	86.2	65.7
54	COOPER	1	1	11	8	41	66.0		.	1	130		58.3		TRENTON	129	166.5	56.3	53.3	33.3	97.8	94.5	92.2	95.8	76.5

OBS	ABDOMEN2	GLUTEAL	THIGH	KNEE	CALF	ANKLE	FLUPARM	UPARM	FOREARM	WRIST	BICEPSF	TRICEPSF	SCAPSF	SILIACSF	CHESTSF	ABDOMSF	AILIACSF	AXILLSF	THIGHSF	CALFSF	SITHGT	TRUNKHGT
46	76.8	95.2	56.1	35.3	34.8	20.2	31.5	30.1	25.0	15.0	8.8	24.2	10.2	13.4	7.4	14.0	7.8	8.6	31.8	22.0	88.9	139.6
47	76.3	95.4	59.0	38.3	36.5	22.0	28.8	28.0	23.4	15.4	11.4	23.0	9.6	12.2	7.2	15.4	9.2	8.2	32.4	24.0	86.6	131.0
48	86.3	106.9	64.2	40.5	38.1	22.1	33.2	32.0	26.0	15.7	15.0	27.2	19.2	24.8	15.0	24.4	19.6	15.2	42.4	27.2	91.8	140.3
49	75.9	92.9	53.3	33.1	32.1	19.7	26.4	25.2	22.3	14.0	5.2	18.8	7.0	14.6	8.0	26.8	15.4	14.0	36.4	21.0	85.6	128.8
50	81.4	96.5	57.4	34.6	34.0	20.1	28.4	27.6	23.3	14.5	8.4	21.0	9.0	19.4	4.6	23.2	10.4	7.0	27.0	14.8	82.4	128.8
51	86.3	103.6	63.3	40.4	37.0	23.7	31.7	30.8	26.0	16.0	6.8	25.6	10.4	23.0	8.2	13.8	8.8	10.4	35.6	[illegible]	85.5	133.1
52	75.1	90.2	54.3	35.4	35.3	20.5	27.4	26.0	24.0	15.1	3.8	14.0	5.8	9.0	5.0	7.8	7.2	6.4	18.4	17.2	82.2	132.2
53	69.1	95.0	52.7	35.7	33.8	20.9	27.2	25.2	24.5	14.8	4.4	14.6	6.0	8.6	3.2	9.2	6.2	5.2	22.6	14.8	88.0	140.2
54	83.9	89.7	51.1	34.4	33.3	18.8	28.2	27.1	23.1	15.2	7.4	16.0	16.8	18.4	7.6	27.8	10.2	16.2	10.4	15.8	88.5	137.0

OBS	EPIFEWTH	ANKLEWTH	EPIHUWTH	WRISTWTH	HANDWTH	TAL	TAS	LAS	SHANKL	FOOTL	SHOLDWTH	BIACWTH	CHESTWTH	ILIACWTH	TROCHWTH	LEGL	LLEGL	CHESTDEP	BARPRES	AMBTEMP	H1INIT	H1FINAL	H1VOL	H2INIT
46	9.0	6.3	6.6	5.3	7.5	73.8	56.2	26.5	36.4	23.5	39.7	36.4	25.8	28.1	36.0	90.7	41.8	18.6	763	27.0	11.35	5.57	2	11.35
47	8.9	6.2	6.0	5.3	7.3	70.7	54.2	25.7	36.6	22.4	37.4	34.5	23.1	29.0	35.0	89.7	43.5	20.6	763	27.0	11.35	6.60	2	11.35
48	9.8	6.7	6.7	5.3	7.1	76.8	58.1	27.6	38.9	25.0	42.5	38.9	27.3	30.3	39.0	95.3	44.0	21.0	763	27.0	11.36	6.09	2	11.36
49	8.4	6.2	5.9	5.0	7.5	69.8	52.6	24.6	34.9	23.5	37.6	35.0	24.7	28.4	35.3	87.8	39.4	15.4	763	27.0	11.36	6.46	2	11.36
50	8.4	6.2	6.1	5.0	7.4	72.0	54.1	25.1	36.6	22.7	39.8	36.8	24.7	29.1	36.3	89.1	40.4	16.4	763	27.0	11.36	6.62	2	11.36
51	10.2	7.0	6.8	5.7	8.4	74.7	56.7	26.5	36.7	25.3	41.2	37.5	29.0	32.0	36.8	89.6	41.5	18.7	763	27.0	11.36	6.40	2	11.36
52	8.4	6.3	6.1	5.0	7.7	71.3	54.3	26.0	38.4	22.3	37.2	35.7	26.0	28.3	33.8	93.5	44.5	16.3	763	27.0	11.20	6.28	2	11.20
53	8.8	6.7	6.4	5.2	7.8	73.4	55.8	25.6	38.8	23.0	38.6	35.0	26.3	27.9	35.2	95.1	43.7	17.6	763	27.0	11.36	6.18	2	11.36
54	8.2	6.4	5.8	5.2	7.4	72.0	54.5	25.1	38.3	23.2	40.8	37.6	27.7	28.0	31.2	90.9	42.3	18.6	743	27.5	11.35	6.51	2	11.35

```
------------------------------------------------ SEX=F ------------------------------------------------

OBS  H2FINAL  H2VOL  H3INIT  H3FINAL  H3VOL  FVC   FEV1  PFR  H2OTEMP  BASEWGT  H2OWGT1  H2OWGTA  LUNGVOLA  H2OWGTB  LUNGVOLB  H2OWGTC  LUNGVOLC  HRV2     H2OVAP  HRV1     HRV3

 46  6.70     2      11.35   6.74     2      4.43  3.53  494  26       2.68     3.890    1.25     2.06      1.78     2.68      1.45     2.49      1.40539  26.98   2.13550  1.38403
 47  7.53     3      11.35   7.57     3      3.51  2.87  371  26       2.68     2.680    1.35     1.23      .        .         1.19     0.66      1.54757  26.98   1.45992  1.52219
 48  6.60     3      11.36   6.92     3      4.32  3.53  341  26       2.68     3.013    1.20     1.84      2.20     0.60      2.43     0.45      2.22923  26.98   1.76936  1.97559
 49  6.58     2      11.36   6.60     2      2.88  2.45  320  .        2.68     .        .        .         .        .         .        .         1.47425  26.98   1.54238  1.46314
 50  6.71     2      11.36   6.70     2      3.36  2.60  222  26       2.68     3.283    1.40     1.68      1.60     1.61      1.48     1.68      1.40319  26.98   1.45209  1.40856
 51  6.36     2      11.36   6.20     2      2.98  2.04  196  .        2.68     .        .        .         .        .         .        .         1.60112  26.98   1.57741  1.69905
 52  5.60     2      11.20   6.20     2      3.36  2.59  284  26       2.68     3.466    1.80     1.33      2.67     0.46      2.25     0.68      2.05541  26.98   1.59534  1.64422
 53  6.60     2      11.36   6.61     2      3.29  2.57  301  26       2.68     3.700    2.46     1.35      2.24     1.44      2.20     1.46      1.46314  26.98   1.71165  1.45760
 54  6.70     2      11.35   6.62     2      3.01  2.56  249  26       2.68     2.983    2.25     0.67      1.52     1.43      2.08     0.91      1.40248  27.83   1.50730  1.44588

OBS  A         B         C         MINRVDIF  HRV      H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

 46  0.730115  0.751473  0.021358  0.021358  1.39471  0.997111  1.04777  1.03684   1.05830   1.04856   1.04724   1.03197   1.05298
 47  0.087653  0.062273  0.025381  0.025381  1.53488  0.997111  1.02901  1.02711   .         1.01400   1.02843   1.02247   .
 48  0.459870  0.206231  0.253639  0.206231  1.87247  0.997111  1.03151  1.03182   1.02849   1.02962   1.03097   1.02794   1.02499
 49  0.068132  0.079246  0.011114  0.011114  1.46869  .         .        .         .         .         .         .         .
 50  0.048898  0.043529  0.005368  0.005368  1.40588  0.997111  1.03902  1.03503   1.03753   1.03656   1.03847   1.03004   1.03254
 51  0.023716  0.121642  0.097926  0.023716  1.58926  .         .        .         .         .         .         .         .
 52  0.460073  0.048886  0.411184  0.048888  1.61978  0.997111  1.04928  1.04230   1.04235   1.03827   1.04860   1.03703   1.03744
 53  0.248509  0.254041  0.005532  0.005532  1.46037  0.997111  1.04827  1.05036   1.04780   1.04740   1.04769   1.04532   1.04274
 54  0.104819  0.061416  0.043401  0.043401  1.42418  0.997111  1.03237  1.03116   1.03169   1.03245   1.03184   1.02677   1.02699

OBS  DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC  X        Y        Z        MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

 46  1.04361   21.9641  26.5621  17.6257  21.6338  8.93639  4.92836  4.00803  4.00803  19.6298  22.1840  28.6442  19.8071  23.7852
 47  1.00967   29.9183  30.7366  .        36.4921  .        5.75555  .        5.75555  33.6143  30.1662  32.7590  .        38.4225
 48  1.02615   28.8392  28.7075  30.1427  29.6545  1.43518  0.94691  0.48827  0.48827  29.8986  29.0715  30.3788  31.6601  31.1537
 49  .         .        .        .        .        .        .        .        .        .        .        .        .        .
 50  1.03155   25.6371  27.3322  26.2704  26.6798  1.06183  0.65242  0.40941  0.40941  26.4751  25.8715  29.4729  28.3994  28.8205
 51  .         .        .        .        .        .        .        .        .        .        .        .        .        .
 52  1.03331   21.3359  24.2527  24.2312  25.9532  0.02157  1.70045  1.72202  0.02157  24.2419  21.6201  26.4819  26.3076  28.0683
 53  1.04235   21.7558  20.8890  21.9532  22.1170  1.06419  1.22806  0.16387  0.16387  22.0351  21.9997  22.9875  24.0668  24.2340
 54  1.02794   28.4703  28.9805  28.7622  28.4359  0.21859  0.54485  0.32627  0.21859  28.8715  28.6991  30.8850  30.7886  30.3788
```

```
------------------------------------------------ SEX=F ------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  TSFDW  TOTALSF  TSF    BIR    AGE

 46  8.83703  4.85897  3.97806  3.97806  21.7962  26.3     62.6    77.0      17.6   29.7    48.9     35.2     5.4      56.6   148.2    93.6   -6440  41.5753
 47  .        5.66348  .        5.66348  35.5908  31.4     55.2    75.8      16.5   28.5    46.2     32.3     6.9      56.2   152.6    92.6   -6471  41.6603
 48  1.28131  0.77443  0.50688  0.50688  31.4067  32.3     59.5    80.8      18.7   30.5    51.3     36.8     5.1      86.2   230.0    138.0  -6822  42.6219
 49  .        .        .        .        .        29.1     56.5    72.3      17.2   28.0    48.4     32.9     4.5      45.6   167.2    103.6  -6632  42.1014
 50  1.07350  0.65242  0.42108  0.42108  28.6100  29.8     52.6    76.2      17.9   29.0    48.7     35.8     3.8      57.8   144.8    99.6   -8934  48.4082
 51  .        .        .        .        .        27.4     58.1    75.0      18.0   30.2    48.1     33.5     4.8      65.8   167.8    108.4  -8479  47.1616
 52  0.17420  1.58642  1.76062  0.17420  26.3948  29.3     52.9    79.3      17.0   28.3    49.0     34.8     6.1      32.6    94.6    55.0  -7993  45.8301
 53  1.07922  1.24643  0.16721  0.16721  24.1504  29.0     59.0    81.2      17.6   30.2    51.4     37.5     4.9      33.6    94.8    61.0  -6847  42.6904
 54  0.09646  0.50629  0.40983  0.09646  30.8366  29.5     59.0    78.0      17.5   29.4    48.6     35.7     4.0      58.6   146.6    89.4  -6717  42.3342
```

```
------------------------------------------------- SEX=F -------------------------------------------------

OBS NAME        BIRTHM ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST  BUST

55  KENNELL       9     4    11    9     30   65.5           160           115                .           TRENTON   130 166.5  51.7  53.3 31.2   92.2    83.4   80.9   85.7
56  RANKIN        9     4    24    6     41   68.0            .            160                .           TRENTON   131 169.6  71.4  53.0 35.4   97.0    96.4   93.5  100.8
57  BERTHIAUME    1     1    13    4     30   67.0            .            150                .           TRENTON   132 167.8  67.4  54.5 34.1  101.2    96.2   93.2  106.9
58  ABDO          9     5    19    5     63   68.0           172           122              55.6          TRENTON   133 170.1  55.6  54.0 30.6  101.6    91.2   88.4   90.1
59  BEATH         7     4     4   12     29   62.0            .            136                .           TRENTON   134 157.2  61.2  56.7 35.3  102.0    89.3   86.3   95.4
60  DESCHENES     2     1    26    6     55   65.5            .            112                .           TRENTON   135 163.5  49.4  51.0 30.6   98.1    85.0   82.3   85.5
61  BRENNAN       1     1    24    7     59   67.5            .            165                .           TRENTON   136 169.5  73.5  56.1 34.2  106.1    96.4   93.7  100.1
62  MURPHY        3     1    28   11     32   64.0            .            185                .           TRENTON   137 162.1  84.9  55.7 39.1  109.5   107.8  105.9  120.4
63  ROBINSON      3     1    11    9     58   61.0            .     1     165                .      1    PETAMANA  200 153.0  76.0  53.3 34.7  104.2    98.4   93.3  102.3

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF ILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

55    62.6    72.0     91.2   52.2  33.8 31.4 20.7  26.7   24.8  22.3   15.2    3.6    14.8     5.0    9.0     3.2    12.6     6.2     5.6    14.0     9.8   87.6
56    77.9    82.2    105.6   60.0  38.8 37.1 21.4  31.8   31.4  25.2   15.4   11.2    27.0    21.4   20.8    12.6    30.0    14.2    16.0    26.0    16.8   89.0
57    79.9    88.5     98.2   53.9  36.8 32.5 20.7  31.8   31.5  24.8   16.3   12.0    22.0    20.0   18.0    12.8    40.2    25.0    18.0    15.0    14.2   90.6
58    66.2    70.2     86.2   52.2  33.2 32.6 20.1  28.4   26.5  23.0   14.1    4.8    11.4     5.0   11.2     3.2     8.0     6.2     6.0    12.6     9.0   87.7
59    75.6    84.0     93.5   55.5  35.0 35.2 21.4  30.9   29.4  25.7   16.9    7.8    16.0    15.8   12.6     7.0    25.6    13.0    12.4    17.4    10.6   83.0
60    64.3    67.4     82.0   48.8  31.9 31.6 19.3  25.7   24.8  21.8   14.7    3.0     9.2     6.2    8.0     3.8     7.2     5.6     6.0    14.0     8.8   88.5
61    81.0    86.6    102.8   63.2  39.1 37.3 22.0  32.5   31.2  24.9   15.7    7.4    17.6    16.2   25.0     9.0     4.0    17.0    15.2    30.6    18.2   88.0
62   102.6   112.6    105.0   55.7  39.8 35.2 20.4  40.2   38.3  28.3   18.3   15.8    28.8    43.0   40.2    14.0    45.0    32.0    25.2    27.4    19.4   86.1
63    88.8    94.8    110.2   68.4  42.5 40.0 21.6  35.8   35.3  26.7   16.0   12.2    31.2    21.6   36.8    12.2    32.8    22.2    21.8    40.2    29.2   83.1

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

55   136.7     8.3      7.9      6.3      5.4     7.9   74.6 55.2 25.5  38.7   23.8    38.8     35.8    25.7     30.4     35.5   93.5  44.4   16.3     743    27.5   11.35   6.82   2
56   142.5     9.7      6.7      6.4      5.3     8.1   78.7 59.0 27.1  40.1   24.4    39.7     35.5    28.0     32.0     39.1   96.2  44.7   18.7     743    27.5   11.40   7.30   2
57   134.1     9.4      6.7      7.2      5.5     8.0   74.5 56.0 26.8  38.0   23.1    40.1     38.0    28.8     33.3     35.5   92.0  42.9   19.2     743    27.5   11.40   6.74   2
58   141.5     8.4      6.6      6.1      4.9     7.4   77.5 58.3 27.3  40.7   24.4    41.3     38.7    26.3     26.7     31.4   98.4  45.7   17.9     743    27.5   11.40   7.38   2
59   128.8     9.0      6.3      6.4      5.4     7.9   69.8 52.4 25.1  35.2   22.2    39.8     37.9    26.9     30.0     33.8   85.1  39.7   18.2     743    27.5   11.35   7.08   2
60   133.2     8.0      6.0      6.1      5.0     7.0   73.0 55.4 26.8  37.2   22.1    38.9     36.8    26.1     25.0     30.6   88.5  41.1   15.3     743    27.5   11.35   6.81   2
61   140.7     8.9      6.4      5.9      5.3     7.8   74.2 56.6 26.4  39.7   23.8    41.3     36.3    29.0     31.1     37.2   95.6  45.1   18.1     743    27.5   11.35   7.28   2
62   135.8     9.6      6.3      7.0      5.5     8.2   70.2 52.7 24.8  37.0   23.4    40.7     37.8    30.4     32.2     34.5   86.7  41.8   24.0     743    27.5   11.35   7.00   2
63   124.1     8.9      6.0      5.9      5.1     7.7   68.9 51.2 24.0  33.9   21.3    41.8     36.9    26.3     28.5     40.4   80.0  37.1   20.5     749    27.7   11.00   7.78   2
```

```
------------------------------------------------- SEX=F -------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWCT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC   HRV2   H2OVAP   HRV1     HRV3

55   11.35   7.07    2    11.35   7.00    2   2.86 2.24 342   26     2.68    3.753    2.50    1.22     2.10    1.68     2.27    1.27   1.21453  27.83  1.33929  1.24856
56   11.40   7.12    2    11.40   6.63    2   3.72 3.10 426   26     2.68    3.103    1.34    2.52     1.82    1.82     1.50    1.43   1.20551  27.83  1.12181  1.45639
57   11.40   6.48    2    11.40   6.38    2   3.12 2.35 319   26     2.68    2.870    2.05    0.61     1.05    1.26     1.15    1.26   1.54077  27.83  1.39689  1.59923
58   11.40   7.54    2    11.40   8.37    3   4.04 3.12 418   26     2.68    5.150    3.15    1.86     3.23    1.79     3.51    1.54   1.01643  27.83  1.08593  1.08231
59   11.35   7.08    2      .       .     .   2.33 1.73 155    .     2.68      .        .       .        .       .        .       .     1.20972  27.83  1.20972   .
60   11.35   7.30    2    11.35   6.96    2   3.65 2.98 416   26     2.68    4.635    2.54    1.99     1.89    2.59     2.40    2.05   1.10729  27.83  1.34447  1.26832
61   11.35   6.90    2    11.35   6.93    2   3.67 2.74 226   26     2.68    4.006    1.07    2.75     2.10    1.76     1.93    1.68   1.29838  27.83  1.11635  1.28328
62   11.35   7.17    2    11.35   7.33    2   2.94 2.41 276   26     5.88    5.156     .       .       4.72    0.19     4.12    0.43   1.16706  27.83  1.24856  1.09380
63   11.00   7.68    2    11.00   7.71    2   3.50 3.15 347   26     2.83    2.450    1.42    1.46     0.85    2.40     1.19    1.75   0.84642  26.17  0.80745  0.83462

OBS    A          B          C         MINRVDIF     HRV     H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

55  0.124761   0.090726   0.034035   0.0340348   1.23154   0.997111   1.04884   1.04807   1.04932   1.04424   1.04831   1.04278   1.04382
56  0.083699   0.334573   0.250873   0.0836993   1.16366   0.997111   1.02421   1.03538   1.03211   1.02161   1.02386   1.03126   1.02823
57  0.143877   0.202336   0.058460   0.0584597   1.57000   0.997111   1.02839   1.02554   1.01959   1.02269   1.02788   1.02173   1.01563
58  0.069494   0.003614   0.065879   0.0036140   1.08412   0.997111   1.07049   1.06750   1.06771   1.06834   1.07003   1.06219   1.06242
59  0.000000       .          .      0.0000000   1.20972       .          .         .         .         .         .         .         .
60  0.237175   0.076151   0.161024   0.0761514   1.30639   0.997111   1.07314   1.07056   1.06936   1.06870   1.07252   1.06439   1.06292
61  0.182031   0.166935   0.015097   0.0150967   1.29083   0.997111   1.03844   1.03559   1.03622   1.03257   1.03805   1.03148   1.03240
62  0.081503   0.154759   0.073255   0.0732555   1.13043   0.997111   1.00598       .       1.00304   0.99877   1.00570       .       1.00035
63  0.038977   0.027178   0.011799   0.0117992   0.84052   0.996424   1.00741   1.01314   1.01813   1.01394   1.00718   1.00981   1.01451

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC     X         Y         Z       MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

55  1.03897  21.5177  21.8414  21.3213  23.4384  0.52012   1.59699   2.11712   0.52012  21.5814  21.7408  24.0536  23.6168  25.6596
56  1.01792  31.9966  27.1840  28.5833  33.1336  1.39922   5.94955   4.55033   1.39922  27.8836  32.1492  28.9475  30.2549  34.7540
57  1.01867  30.1847  31.4207  34.0175  32.6594  2.59679   1.23874   1.35805   1.23874  32.0401  30.4029  33.0798  35.7669  34.4228
58  1.06315  12.7064  13.9048  13.8207  13.5674  0.08410   0.33735   0.25325   0.08410  13.8627  12.8891  16.0447  15.9488  15.6535
59     .         .        .        .        .        .         .         .         .        .        .        .        .        .
60  1.06252  11.6513  12.6788  13.1588  13.4227  0.47997   0.74383   0.26386   0.26386  13.2907  11.8991  15.1542  15.7479  15.9094
61  1.02880  25.8837  27.0931  26.8258  28.3833  0.26726   1.29022   1.55748   0.26726  26.9594  26.0482  28.8517  28.4582  30.0055
62  0.99605  40.0853     .     41.4162  43.3634     .         .       1.94717   1.94717  42.3898  40.2100     .      42.6385  44.6122
63  1.01052  39.4377  36.8742  34.6617  36.5184  2.21257   0.35583   1.85674   0.35583  36.6963  39.5413  38.3605  36.2638  38.0404
```

```
------------------------------------------ SEX=F ------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF    BIR     AGE

55   0.43677  1.60605  2.04282  0.43677  23.8352  29.8    57.8   78.9     19.4  29.7   49.1    34.5    5.7     32.4   83.8   55.4  -10704  53.2575
56   1.30737  5.80653  4.49916  1.30737  29.6012  27.1    61.9   80.6     19.7  31.9   51.5    35.9    4.6     80.4  196.0  125.2   -6765  42.4658
57   2.68714  1.34299  1.34415  1.34299  33.7513  33.7    56.9   77.2     18.5  29.2   49.1    34.3    4.9     72.0  197.2  115.2  -10855  53.6712
58   0.09589  0.39127  0.29537  0.09589  15.9968  28.6    59.1   82.4     19.2  31.0   52.7    34.7    5.0     32.4   77.4   48.2    1234  20.5507
59   .        .        .        .        .        28.4    54.6   74.2     17.4  27.3   45.4    34.5    4.5     52.2  138.2   87.4  -10985  54.0274
60   0.59376  0.75521  0.16145  0.16145  15.8287  30.3    58.2   75.0     17.6  28.6   47.4    33.9    3.9     26.4   71.8   44.6   -1650  28.4521
61   0.39345  1.15384  1.54729  0.39345  25.6549  28.8    59.2   81.5     17.6  30.2   50.5    36.4    5.4     66.2  160.2   93.4    -161  24.3726
62   .        .        1.97365  1.97365  43.6253  26.3    59.8   76.0     17.5  27.9   44.9    34.2    4.8    127.8  290.8  184.4   -9895  51.0411
63   2.09670  0.32008  1.77662  0.32008  38.2004  28.9    54.2   69.9     17.7  27.2   42.9    32.8    3.2    101.8  260.2  162.6    -477  25.2384
```

```
------------------------------------------ SEX=F ------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST  ABDOMEN1

64  GOODMAN     3     1      20    5     57    64.0            .     1       125             .      1        PETAHAHA 201 164.0  56.9   53.0 32.0  98.2     86.3   84.2   87.5 64.0
65  DOHERTY     5     9      16   10     54     .    1         .     1       135             .      1        PETAHAHA 202 167.9  60.8   53.8 32.0 105.0     90.0   86.2   87.1 73.2
66  FOSTER      1     1      12    9     56    61.0            .             172             .               PETAHAHA 203 155.5  77.3   53.8 36.5 108.1    100.8   98.6  110.4 91.6
67  KNIE        1     1      29    6     56    65.5            .     1       135             .      1        PETAHAHA 204 166.8  60.7   52.5 31.1  99.1     86.6   82.3   86.8 66.6
68  GOODBRAND   1     1      24    2     48    71.0            .     1       156             .      1        PETAHAHA 205 177.4  71.5   52.7 32.9 103.9     96.7   93.3  102.9 80.4
69  BULLEN      9             5    2     58    66.5            .     1       144             .      1        PETAHAHA 206 167.5  66.2   53.4 33.4 100.9     91.8   88.4   93.0 73.4
70  CHRISTENSEN 3     1       5    3     46    66.0            .              .             66               PETAHAHA 207 167.0  65.6   55.1 35.3 104.0     91.3   86.7   91.8 74.6
71  HUDSON      1             5   10     62     .            160.0           112             .               PETAHAHA 208 160.5  54.1   54.2 32.4  98.0     85.7   82.8   85.8 69.8
72  MCNEIL      4     1      27    2     52     .    1         .     1       120             .      1        PETAHAHA 210 163.1  56.5   55.5 32.4 100.3     92.6   89.8  100.0 69.8

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

64  73.3      95.2   57.0  32.8 36.0 21.2  28.5    27.4  24.3    14.8   5.2     16.0      8.0   12.8      8.6     8.8     7.2      6.2    35.0    19.6   86.8   132.3
65  80.2      96.5   53.2  36.7 34.7 22.6  29.7    28.5  24.9    16.9   5.2     15.0      8.4   10.2      4.6     9.0     7.2      8.2    20.0    13.8   88.2   137.6
66  95.0     108.8   65.0  39.2 38.4 23.0  34.9    34.5  27.5    17.5  15.8     26.6     31.6   30.8     12.4    43.8    22.8     28.6    40.6    28.4   85.0   126.1
67  74.8     100.1   56.1  34.6 38.0 21.7  26.1    26.1  23.3    14.8   5.0     16.4     10.6   14.4      6.4     9.6     7.0      9.8    24.2    12.4   87.9   137.4
68  83.8      98.6   59.2  39.0 35.9 20.3  30.8    30.2  26.2    16.4  18.0     23.4     23.2   28.2     19.0    22.0    18.6     23.6    31.2    17.8   90.4   146.2
69  83.7     100.2   61.4  40.0 38.2 22.3  30.5    30.0  25.0    15.3  10.0     20.6     10.8   21.6      6.0    15.2    10.2     12.2    26.0    23.0   88.5   138.2
70  88.8      99.7   59.1  39.2 35.7 20.1  33.6    33.0  26.0    14.9   8.6     19.0     12.8   16.2      9.2    15.0     8.2      8.6    30.4    20.6   88.0   138.1
71  75.8      93.9   56.5  37.4 34.1 20.8  26.5    25.7  23.8    15.0   7.6     16.4      9.8   16.0      8.0    12.0     8.4      9.2    25.0    18.6   85.0   130.6
72  75.5      91.1   54.2  33.9 33.3 21.0  30.2    28.8  24.7    15.7   6.0     11.4     13.6    9.4      4.0    11.4     9.0      5.8    13.0    11.2   84.6   134.3

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEG  LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

64  8.6      5.8      5.8      5.0      7.3     69.2 52.4 24.7 36.3   23.4  40.6     37.0    25.1     27.3     34.9     86.0 41.1  18.0     749     27.7     .      .      .     11.00
65  8.7      6.8      6.3      6.0      8.7     74.8 56.5 27.1 38.2   24.3  43.0     39.4    28.3     30.3     35.3     92.6 41.8  16.8     749     28.0    11.00   6.82   2     11.00
66  9.2      6.3      6.6      5.2      7.5     77.7 60.7 23.5 34.6   22.4  43.5     36.8    27.0     30.3     37.9     76.6 39.1  22.5     749     27.7    11.00   7.00   2     11.00
67  8.8      6.6      6.3      5.3      7.7     71.7 54.5 25.0 37.3   23.5  41.1     36.6    26.4     29.9     37.9     89.0 42.8  15.8     749     28.3    11.00   6.68   2     11.00
68  9.4      6.6      6.4      5.4      8.0     79.0 59.2 28.4 39.8   24.9  42.9     39.5    27.7     28.9     35.7     98.7 44.3  19.9     749     28.3    11.00   6.40   2     11.00
69  9.2      6.1      6.3      5.3      7.8     74.0 56.1 26.8 37.5   22.9  40.7     35.7    25.8     28.5     36.1     91.7 42.7  17.1     749     28.3    11.00   6.88   2     11.00
70  8.3      6.0      6.2      4.8      7.5     73.2 54.8 24.7 37.9   27.0  41.2     36.6    23.5     30.6     35.5     91.0 42.8  19.2     749     28.3    11.00   6.72   2     11.00
71  8.6      6.4      6.1      5.0      7.2     72.9 55.1 25.5 36.3   23.1  41.2     38.2    24.6     29.4     34.7     87.4 40.2  16.6     749     28.3    11.00   7.10   2     11.00
72  8.4      6.4      6.3      5.3      7.7     70.6 53.5 24.7 37.0   22.8  40.7     37.2    27.2     29.0     32.5     89.5 41.6  19.0     749     28.8    11.00   6.11   2     11.00
```

```
------------------------------------------------------- SEX=F -------------------------------------------------------

OBS  H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC  FEV1  PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC    HRV2   H2OVAP    HRV1     HRV3

 64    6.31    2    11.00   6.24    2    3.52  3.09  317    28     2.83   3.300    2.10    2.15     2.60     1.65     2.75     0.61   1.50480  28.17      .      1.54621
 65    6.96    2    11.00   6.83    2    3.97  2.94  346    28     2.83   3.450    2.20    2.04     2.40     1.86     1.50     2.11   1.15814  28.68   1.22671  1.22172
 66    7.00    2      .      .      .    3.44  2.87  342    28     2.83   2.200    0.95    2.61     1.62     0.93     1.80     0.45   1.14100  28.17   1.14100     .
 67    7.00    2    11.00   6.97    2    3.97  3.26  367    28     2.83   4.900    2.68    2.50     2.50     2.52     2.60     2.37   1.13712  29.19   1.29595  1.15139
 68    6.51    2    11.00   6.66    2    3.68  2.82  246    28     2.83   2.750    0.90    1.94     1.33     1.44     1.35     1.06   1.38668  29.19   1.44796  1.30638
 69    7.26    2    11.00   7.10    2    3.49  3.26  408    28     2.83   4.570    2.60    1.15     2.55     2.04     2.35     2.20   1.01837  29.19   1.19495  1.09042
 70    6.49    2    11.00   6.56    2    3.60  2.93  432    28     2.83   3.375    2.36    1.80     2.15     1.74     2.29     1.50   1.39767  29.19   1.27527  1.35951
 71    6.62    2    11.00   6.68    2    3.29  2.70  373    26     2.83   3.800    1.83    2.24     2.75     1.11     3.12     0.74   1.32744  29.19   1.09042  1.29595
 72    6.36    2    11.00   7.12    3    3.64  3.15  440    28     2.83   3.700    1.70    2.82     3.44     0.95     3.60     0.75   1.44659  30.04   1.61549  1.65144

OBS     A          B          C       MINRVDIF    HRV      H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

 64      .          .       0.041403  0.041403  1.52551  0.996424  1.03827  1.05650  1.05653  1.03937  1.03768  1.05113  1.05136
 65  0.068571   0.004991   0.063580  0.004991  1.22422  0.996424  1.03307  1.04705  1.04742  1.03577  1.03263  1.04226  1.04269
 66  0.000000       .          .      0.000000  1.14100  0.996424  1.00794  1.02607  1.01253  1.00858  1.00763  1.02232  1.00933
 67  0.158833   0.144562   0.014271  0.014271  1.14425  0.996424  1.05789  1.06293  1.05995  1.05903  1.05746  1.05784  1.05488
 68  0.061277   0.141575   0.080298  0.061277  1.41732  0.996424  1.02051  1.02173  1.01927  1.01551  1.02009  1.01782  1.01552
 69  0.176573   0.104530   0.072043  0.072043  1.05439  0.996424  1.04582  1.03236  1.04603  1.04536  1.04547  1.02840  1.04170
 70  0.122400   0.084239   0.038161  0.038161  1.37859  0.996424  1.03186  1.04470  1.04022  1.03858  1.03140  1.04031  1.03588
 71  0.237023   0.205532   0.031491  0.031491  1.31169  0.996424  1.04612  1.05147  1.04726  1.04729  1.04558  1.04592  1.04222
 72  0.148893   0.035954   0.184847  0.035954  1.63346  0.996424  1.04837  1.06442  1.06194  1.06116  1.04771  1.05861  1.05692

OBS DENSITYZ  PERFAT  PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

 64  1.03476  25.9561  18.3607  18.3462  25.4901  0.01441  7.12942  7.14383  0.01441  18.3535  26.2073  20.5721  20.4754  27.4480
 65  1.03105  28.1697  22.2654  22.1097  27.0196  0.15572  4.75424  4.90997  0.15572  22.1875  28.3583  24.2716  24.0882  29.0367
 66  1.00552  39.2011  31.1873  37.1442  38.9140  5.95694  7.72673  1.76979  1.76979  38.0291  39.3394  32.8243  38.5776  40.2892
 67  1.05403  17.7916  15.7435  16.9530  17.3268  1.20948  1.58322  0.37374  0.37374  17.1399  17.9682  17.8118  19.0243  19.3749
 68  1.01191  33.6151  33.0822  34.1612  35.8203  1.07900  2.73807  1.65907  1.07900  33.6217  33.8008  34.8005  35.8140  37.4232
 69  1.04098  22.7760  28.4855  22.6879  22.9690  5.79755  5.51647  0.28109  0.28109  22.8285  22.9252  30.'781  24.5065  24.8102
 70  1.03434  28.6891  23.2458  25.1320  25.8252  1.88619  2.57934  0.69315  0.69315  25.4786  28.8860  25.0931  26.9707  27.6296
 71  1.04240  22.6517  20.4306  22.1767  22.1654  1.74605  1.73483  0.01122  0.01122  22.1710  22.8788  22.7351  24.2855  24.2102
 72  1.05622  21.7166  15.1421  16.1431  16.4620  1.00100  1.31990  0.31890  0.31890  16.3026  21.9875  17.4983  18.1892  18.4749
```

```
------------------------------------------------------- SEX=F -------------------------------------------------------

OBS     M        N        O      MINFAT1  EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDH TOTALSF  TSF    BIR     AGE

 64  0.09673  6.87586  6.97260  0.09673  20.5238  31.7   55.1   77.2   16.8   27.7   44.9   36.1   4.8    42.0  127.4   80.6   -956  26.5507
 65  0.18346  4.76503  4.94849  0.18346  24.1799  30.3   57.9   79.7   18.3   29.4   50.8   37.9   3.6    38.8  101.6   62.6  -1903  29.1452
 66  5.75333  7.46494  1 71162  1.71162  39.4334  27.4   57.6   70.5   17.0   37.2   37.5   31.4   4.5   106.8  283.4  175.4  -1206  27.2356
 67  1.21256  1.56315  0.35059  0.35059  19.1996  29.4   58.5   78.9   17.2   29.5   46.2   36.1   5.5    46.4  115.6   75.2  -1281  27.4411
 68  1.01349  2.62277  1.60926  1.01349  35.3072  31.2   59.2   87.0   19.8   30.8   54.4   42.7   4.5    92.8  225.0  128.0  -4329  35.7918
 69  5.67160  5.36787  0.30373  0.30373  24.6584  29.3   59.2   79.0   17.9   29.3   49.0   36.3   5.2    63.0  155.6   94.2   -695  25.8356
 70  1.87763  2.53650  0.65867  0.65867  27.3001  28.9   59.1   79.0   18.4   30.1   48.2   36.2   4.9    56.6  148.6   93.4  -5050  37.7671
 71  1.55037  1.47508  0.07529  0.07529  24.2478  29.9   55.1   75.5   17.8   29.6   47.2   35.3   3.9    49.8  131.0   79.2   1008  21.1699
 72  0.69093  0.97666  0.28573  0.28573  18.3321  26.8   55.8   78.5   17.1   28.8   47.9   36.9   4.6    40.4   94.8   58.8  -2865  31.7808
```

```
------------------------------------------------------------ SEX=F ------------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST  BUST ABDOMEN1

 73 RATTRAY         3      1   28      3    47  63.1             .       1      .        1      .        1 PETAWAWA 211  161.8   54.3 52.4 30.5     99.0    91.3  88.1  91.0     67.4
 74 GONDEK          1      1   26      6    53  63.0             .       1    140               .        1 PETAWAWA 212  163.4   61.1 53.8 31.1     99.1    88.7  86.8  91.5     70.2
 75 ROBITAILLE      1      3   11      4    53  69.0             .       1    147               .        1 PETAWAWA 213  174.6   63.6 53.9 35.3    106.7    95.2  91.6  96.4     73.4
 76 BOUFFARD        1      1   11      6    50  64.5           0.1              .        1      .        1 PETAWAWA 214  163.7   52.9 51.2 30.9     97.0    85.6  80.1  82.0     66.5
 77 MICHAUD                     2     10    50     .       1     .       1      .        1      .        1 PETAWAWA 215  151.5   76.5 54.1 32.5     99.0    89.1  87.8  91.3     75.9
 78 PEARSON         2      2    8      3    44  70.0             .       1    165               .        1 PETAWAWA 216  177.7   78.6 56.9 34.9    109.4   100.9  96.6 104.2     81.1
 79 DE JONG         9      3   13      3    30  67.0         170.0            155            72.0          PETAWAWA 217  170.1   76.0 55.8 35.0    106.0    92.6  88.6  88.8     75.2
 80 MOON            1      1   13      8    43  65.0             .       1    108               .        1 PETAWAWA 218  165.4   48.7 54.3 29.9     90.0    81.6  77.7  78.3     60.0
 81 LACHARITE       6      9   23      2    47  62.0             .       1    140               .        1 PETAWAWA 259  158.0   63.8 52.0 34.1    103.5    98.8  92.5  99.1     80.4

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

 73     76.4    93.6  53.3 34.9 31.0  20.3    28.3  27.1    23.7  15.5     7.4     18.4    9.8      8.6     6.4    22.3     13.4     8.4    24.2   14.8   86.8        .
 74     83.5   102.7  60.5 40.5 35.5  20.4    31.5  29.9    24.0  15.5     8.2     24.8   13.0     16.6     8.8    21.6     12.6    13.2    34.6   24.4   87.1    135.6
 75     76.9    95.8  54.7 37.7 38.2  23.3    28.3  27.1    24.9  15.1     6.0     12.8    8.4     14.6     4.2    10.4      6.0     7.2    14.2   11.0   87.0    142.3
 76     71.1    91.7  51.6 35.6 34.3  20.7    26.6  25.4    23.4  15.4     3.8     11.8    7.4     11.8     3.8     9.0      6.2     5.6    19.8   11.8   84.5    132.2
 77     84.8   104.5  64.0 41.0 38.5  22.1    32.9  31.7    25.5  15.0    15.2     32.2   18.8     38.0    14.0    28.8     16.2    16.4    42.2   31.2   84.1    123.8
 78     86.3   104.3  58.3 38.0 35.2  22.4    34.1  33.4    26.2  16.1    11.2     26.8   12.0     21.2     7.6    32.2     14.2    13.4    26.6   17.2   88.9    146.0
 79     80.1   104.5  64.5 40.8 37.7  22.1    33.2  32.0    27.4  16.8     9.4     22.2   12.4     22.2    10.2    24.0     13.2    12.0    33.4   24.0   89.9    172.5
 80     66.2    89.0  51.3 34.8 33.0  19.6    26.2  24.2    22.4  15.1     5.6     11.2    7.2      7.4     5.2     7.4      5.8     6.0    19.6   14.8   87.0    135.3
 81     82.5    98.7  61.6 36.4 36.2  21.7    30.9  30.0    26.2  16.0    12.4     22.0   15.4     23.0     6.4    24.0      8.2    15.6    31.2   22.8   83.1    130.7

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH  TAL  TAS  LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH  LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

 73      8.6      6.5      5.8      5.5     7.8 70.6 53.1 24.0   35.4  23.1     39.4    35.0     27.2     29.2     33.5  88.0  40.2     17.2       .       .      .       .     .      .
 74      8.9      6.1      6.3      5.3     7.4 71.6 54.8 25.9   37.1  22.6     40.4    36.6     24.2     29.1     38.2  89.1  40.9     18.0     749    28.8  11.00    6.07     2  11.00
 75      9.1      6.8      6.7      5.1     8.6 79.5 60.7 28.8   41.1  25.2     41.9    39.8     29.0     28.3     35.1  94.3  46.2     20.2     749    28.8  11.04    6.34     2  11.04
 76      8.8      6.7      6.2      5.4     7.7 72.5 54.5 25.9   36.9  22.8     40.4    37.6     24.0     26.4     34.2  88.1  41.3     17.1     749    28.8  11.04    6.56     2  11.04
 77      9.1      6.0      6.0      4.9     7.2 65.9 50.0 23.8   31.8  22.3     40.2    36.7     25.8     29.6     40.0  78.2  35.9     16.4     749    28.8  11.04    6.80     2  11.04
 78      9.2      6.9      6.7      5.5     8.2 79.6 60.4 28.2   41.1  24.0     43.9    39.7     28.0     32.7     37.3  98.5  45.6     20.0     749    28.8  11.04    6.00     2  11.04
 79      9.2      6.6      7.0      5.5     8.3 77.4 57.7 26.5   37.9  25.0     43.3    39.1     27.6     31.5     39.5  94.3  42.6     20.2     749    28.8      .       .     .  11.00
 80      8.5      6.1      6.0      5.0     7.2 71.0 53.3 25.1   37.7  23.1     37.2    34.7     22.5     26.0     33.2  86.2  42.1     15.7     749    28.8  11.00    6.73     2  11.00
 81      9.4      6.3      6.0      5.2     8.0 72.1 54.5 26.2   36.6  22.4     42.6    37.2     26.2     29.1     35.7  90.3  41.8     18.9     765    28.7  11.09    7.10     2  11.09
```

```
------------------------------------------------------------ SEX=F ------------------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC FEV1  PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC    HRV2 H2OVAP    HRV1    HRV3

 73       .     .      .       .     . 3.57 3.16  464       .    2.83       .       .        .       .        .       .        .       .      .       .       .
 74    6.13     2  11.00    6.12     2 3.07 2.96  338      28    2.83   3.000    1.78     2.68    1.79     1.72    2.40     1.73 1.60313  30.04 1.64045 1.60433
 75    6.42     2  11.04    6.37     2 4.94 3.69  324      28    2.83   2.850    1.82     2.92    2.14     2.41    1.81     2.96 1.44569  30.04 1.49135 1.47406
 76    6.58     2  11.04    6.60     2 4.20 3.31  378      28    2.83   3.980    1.47     2.64    2.05     2.10    1.45     2.80 1.35772  30.04 1.36848 1.34702
 77    6.80     2      .       .     . 3.06 2.56  250      28    2.83   2.100    0.70     2.74    1.12     1.85    0.76     2.60 1.24351  30.04 1.24351       .
 78    6.01     2      .       .     . 4.10 3.37  321      28    2.83       .    0.80     2.77    1.25     1.34    0.85     2.77 1.69252  30.04 1.69896       .
 79    6.20     2  11.00    6.40     2 3.58 1.81  145      28    2.83   3.250    1.00     2.39    1.75     1.39    1.38     2.38 1.56050  30.04       . 1.44355
 80    6.91     2  11.00    6.96     2 3.69 3.17  457      26    2.83   4.400    2.96     1.38    2.74     1.56    2.58     1.78 1.17695  30.04 1.26653 1.15266
 81    7.21     2  11.09    7.21     2 3.86 3.07  407      26    2.83   3.550    2.70     1.07    2.35     1.60    2.30     1.58 1.06389  29.87 1.11404 1.06359

OBS        A        B        C MINRVDIF     HRV  H2ODENS DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

 73        .        .        .        .       .        .       .        .        .        .        .        .        .
 74 0.037319 0.031150 0.006169 0.006169 1.60621 0.996424 1.03169  1.05769  1.04058  1.05172  1.03112  1.05244  1.03584
 75 0.045654 0.017254 0.028399 0.017254 1.48272 0.996424 1.02585  1.05804  1.05473  1.05857  1.02535  1.05296  1.04986
 76 0.010762 0.021460 0.010697 0.010697 1.35237 0.996424 1.05183  1.05436  1.05525  1.05731  1.05125  1.04847  1.04958
 77 0.000000        .        . 0.000000 1.24351 0.996424 1.00805  1.02610  1.01969  1.02500  1.00771  1.02224  1.01612
 78 0.006441        .        . 0.006441 1.69574 0.996424       .  1.03324  1.02012  1.03392        .  1.02929  1.01666
 79        .        . 0.116652 0.116652 1.50218 0.996424 1.02736  1.02919  1.02576  1.03439  1.02693  1.02531  1.02218
 80 0.089580 0.113641 0.024061 0.024061 1.16492 0.996424 1.06194  1.06043  1.05949  1.06086  1.06139  1.05464  1.05363
 81 0.050140 0.050140 0.000000 0.000000 1.06389 0.996424 1.03047  1.03409  1.03710  1.03592  1.03011  1.03002  1.03282

OBS DENSITYZ  PERFAT PERFATA PERFATB PERFATC       X       Y       Z  MINFAT  EXPFAT PERFAT1 PERFATX PERFATY PERFATZ

 73        .       .       .       .       .       .       .       .       .       .       .       .       .       .
 74  1.04688 28.7622 17.8748 24.9801 20.3264 7.10530 2.45161 4.65369 2.45161 19.1006 29.0085 20.0279 26.9860 22.3339
 75  1.05347 31.2831 17.7290 19.0860 17.5137 1.35700 0.21531 1.57231 0.21531 17.6213 31.5015 19.8146 21.0965 19.6052
 76  1.05132 20.2826 19.2374 18.8738 18.0286 0.36354 1.20883 0.84529 0.36354  9.0556 20.5221 21.6722 21.2130 20.4917
 77  1.02119 39.1506 31.1757 33.9744 31.6523 2.79871 0.47662 2.32209 0.47662 31.4140 39.3029 32.8583 35.5480 33.3178
 78  1.02997       . 28.0989 33.7875 27.8072 5.68858 0.29176 5.98033 0.29176 27.9531       . 29.7941 35.3122 29.5023
 79  1.03047 30.6313 29.8380 31.3251 27.6049 1.48711 2.23307 3.72017 1.48711 30.5815 30.8164 31.5204 32.8842 29.2861
 80  1.05488 16.1443 16.7558 17.1386 16.5809 0.38277 0.17488 0.55765 0.17488 16.6683 16.3684 19.1222 19.5396 19.0242
 81  1.03166 29.2871 27.7331 26.4528 26.9555 1.28035 0.77765 0.50270 0.50270 26.7041 29.4434 29.4791 28.2765 28.7763
```

SEX=F

OBS	M	N	D	WINFAT1	EXPFAT1	HEADHGT	TRUNKL	TOTALLEG	HANDL	UPARML	THIGHL1	THIGHL2	FOOTHGT	TSFDW	TOTALSF	TSF	BIR	AGE
73								75.0	17.5	29.1	47.8	34.8	4.8	44.2	133.7	83.3	-4662	36.704
74	6.95810	2.30594	4.65715	2.30594	21.1809	27.8	59.3	76.3	16.8	28.9	48.2	35.4	3.8	62.6	177.8	110.6	-2380	30.45
75	1.28188	0.20942	1.45125	0.20942	19.7099	32.3	54.7	87.6	18.8	31.9	48.1	41.4	5.1	41.8	94.8	60.4	-2456	30.6453
76	0.45917	1.18050	0.72153	0.45917	21.4426	31.5	53.0	79.2	18.0	28.6	44.8	37.9	4.4	34.8	91.0	59.8	-3491	33.4949
77	2.68972	0.45948	2.23074	0.45948	33.0880	27.7	56.4	67.4	15.9	26.2	42.3	31.5	4.1	104.2	253.0	160.0	-3378	33.1863
78	5.51813	0.29176	5.80989	0.29176	29.6482	31.7	57.2	88.8	19.2	32.2	52.9	43.2	4.5	71.2	182.4	118.8	-5777	39.7529
79	1.36384	2.23430	3.39814	1.36384	32.2023	37.6	52.3	80.2	19.7	31.2	51.7	37.6	4.7	66.2	183.0	114.2	-10886	53.7547
80	0.41739	0.09794	0.51533	0.09794	19.0732	30.1	56.9	78.4	17.7	28.2	44.1	36.3	4.4	31.4	90.2	52.8	-5985	40.3788
81	1.20252	0.70276	0.49976	0.49976	28.5264	27.3	55.8	74.9	17.6	28.3	48.5	33.1	5.2	72.8	181.0	115.6	-4695	36.7945

SEX=F

OBS	NAME	BIRTH	ORIGIN	BDAY	BMONTH	BYEAR	HGTIN	NOHGTIN	HGTCM	NOHGTCM	WGTLBS	NOWGTLBS	WGTKGS	NOWGTKGS	LOCATION	ID	HEIGHT	WEIGHT	HEAD	NECK	SHOULDER	CHES IN	CHEST	BUST
82	[illegible]	5	4	18	5	57	64.0		.	1	120.0		.	1	PETAHAWA	260	162.8	55.3	54.3	32.0	96.8	86.9	82.8	90.4
83	[illegible]	9	1	11	6	51	68.0		.	1	153.0		70.0		PETAHAWA	261	171.3	68.9	53.8	33.5	107.8	95.3	90.6	94.5
84	[illegible]	1	1	21	4	52	68.0		.	1	135.0		.	1	PETAHAWA	262	172.2	60.4	55.8	32.8	100.7	90.8	86.3	89.2
85	[illegible]	1	1	5	9	55	.	1	.	1	.	1	.	1	PETAHAWA	263	156.9	54.5	53.8	30.6	95.0	86.8	79.8	86.2
86	[illegible]	3	1	3	8	51	62.8		.		124.0		.		PETAHAWA	264	160.5	57.9	56.0	32.7	98.3	86.1	83.4	89.4
87	[illegible]	1	1	2	7	65	65.0		.	1	150.0		.	1	PETAHAWA	265	159.6	69.9	55.5	37.8	113.6	100.0	96.4	105.4
88	[illegible]	3	1	15	4	47	67.0		.	1	140.0		.	1	PETAHAWA	267	169.2	64.1	54.5	33.4	104.2	95.6	91.7	100.7
89	[illegible]	1		13	7	55	63.0		.	1	110.0		.	1	PETAHAWA	268	159.3	48.8	52.5	31.8	98.5	91.0	87.0	91.4
90	[illegible]	2	1	18	8	60	63.0		.		127.0		.		HALIFAX	300	160.0	57.1	53.9	33.2	93.9	86.2	81.8	33.0

OBS	[illegible]	[illegible]	[illegible]	[illegible]	GLUTEAL	THIGH	KNEE	CALF	ANKLE	FLUPARM	UPARM	FOREARM	WRIST	BICEPSF	TRICEPSF	SCAPSF	SILIACSF	CHESTSF	ABDOMSF	AILIACSF	AXILLSF	THIGHSF	CALFSF	SITHGT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.6	36.0	34.1	19.2	27.8	27.0	22.4	14.0	8.0	21.6	14.2	19.4	4.4	29.4	19.2	14.0	28.4	23.4	84.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	64.0	39.2	36.4	22.3	31.8	31.4	26.5	16.2	14.1	28.5	20.8	26.2	21.2	20.6	15.0	13.8	33.0	27.4	90.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.0	34.0	20.3	33.0	27.7	26.8	23.2	15.9	5.8	6.6	11.8	13.8	7.0	12.0	8.2	10.0	20.4	12.0	90.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57.1	35.9	36.0	21.0	29.6	29.0	24.3	14.0	5.0	16.2	14.8	8.6	4.6	8.0	5.2	5.4	20.8	18.0	86.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.2	37.4	35.8	23.0	29.7	28.0	25.7	16.0	6.4	18.0	9.4	9.4	7.6	8.2	6.2	7.2	28.4	20.0	86.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60.2	38.3	36.0	22.4	31.6	31.5	25.8	16.1	13.8	30.0	35.6	40.6	19.0	37.8	24.6	26.0	28.8	18.4	85.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	55.6	35.6	33.6	21.4	27.0	26.2	23.2	15.7	7.0	16.0	8.2	12.6	6.0	13.4	10.0	11.2	17.2	18.0	85.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	48.2	32.0	31.7	19.1	25.6	24.6	22.5	14.9	5.4	10.8	9.8	12.0	10.0	14.0	8.6	11.4	13.4	9.2	86.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	88.3	56.2	35.3	35.5	21.1	26.6	26.2	23.0	14.7	11.0	16.4	16.0	24.8	11.0	13.2	9.0	11.4	26.4	15.8	84.0

OBS	[illegible]	[illegible]	[illegible]	EPIHUWTH	WRISTWTH	HANDWTH	TAL	TAS	LAS	SHANKL	FOOTL	SHOLDWTH	BIACWTH	CHESTWTH	ILIACWTH	TROCHWTH	LEGL	LLEGL	CHESTDEP	BARPRES	AMBTEMP	H1INIT	H1FINAL	H1VOL
[illegible]	[illegible]	[illegible]	[illegible]	5.5	4.8	7.2	70.4	53.7	25.4	37.1	22.7	39.3	35.6	24.5	27.9	33.4	91.6	42.3	16.2	765	28.4	11.09	7.64	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.4	8.0	74.3	55.9	26.1	38.9	23.4	44.4	37.7	25.8	30.3	37.0	93.7	47.0	18.4	765	28.4	11.09	6.93	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.6	7.6	77.0	58.3	27.6	39.7	23.0	41.3	38.0	26.0	31.3	36.0	97.6	46.4	17.2	765	28.3	11.09	6.05	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.9	7.8	66.7	51.4	23.9	35.7	21.1	39.1	34.4	26.8	24.7	33.1	85.6	40.0	17.6	765	27.9	10.90	7.17	2
[illegible]	[illegible]	[illegible]	[illegible]	6.1	5.6	7.8	71.5	54.9	25.8	35.7	22.4	40.2	35.7	23.2	28.2	34.3	86.5	40.8	19.6	765	27.9	11.06	6.92	2
[illegible]	[illegible]	[illegible]	[illegible]	6.4	5.1	8.1	69.5	52.6	25.1	36.7	23.0	42.4	36.0	28.1	29.4	35.2	87.9	42.4	18.5	765	27.9	.	.	.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.2	7.6	75.8	57.8	26.9	39.6	24.2	40.5	37.5	27.2	31.0	35.1	98.2	45.4	20.0	765	27.9	11.06	6.50	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.9	7.2	66.6	50.3	24.5	35.5	22.5	40.8	36.2	27.6	27.2	31.8	85.8	40.8	17.7	765	27.9	11.06	7.18	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.8	7.7	71.1	52.3	24.8	36.3	24.8	39.0	36.6	27.2	26.4	31.6	.	42.7	17.6	761	22.6	11.41	7.18	2

```
------------------------------------------------ SEX=F ------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

82  11.09  7.63    2     .      .       .     3.30 2.77 239 28.0    2.83      .     2.80    1.85     2.05    2.26     1.15    2.44     0.88725 29.36  0.88324  .
83  11.09  6.94    2     .      .       .     4.20 3.26 478 28.0    2.83    3.350   1.12    2.78     0.79    2.71     1.19    2.22     1.19181 29.36  1.19667  .
84  11.09  5.98    2   11.09   6.01     2     4.16 2.87 360 28.0    2.83    4.555   2.39    1.98     2.65    2.04     2.35    2.20     1.73346 29.19  1.68821 1.71394
85  10.90  7.20    2   10.90   7.20     2     3.52 2.71 320 28.0    2.83      .     1.40    2.65     2.05    2.74     1.47    2.66     1.01744 28.51  1.03083 1.01744
86  11.06  6.81    2   11.06   6.88     2     3.80 2.23 173 28.0    2.83    3.800   2.55    1.86     2.75    1.52     2.95    1.40     1.25034 28.51  1.19577 1.21541
87  11.06  7.49    2   11.06   7.60     2     3.81 3.12 352 28.0    2.83    3.000   1.40    2.08     1.20    2.44     1.48    2.82     0.93870 28.51   .      0.89353
88  11.06  7.18    2   11.06   6.81     2     4.40 3.86 523 28.0    2.83    4.200   1.39    2.95     2.25    1.62     2.35    1.50     1.07345 28.51  1.41404 1.25034
89  11.06  7.29    2   11.06   7.10     2     4.07 3.14 305 28.0    2.83    2.800   2.00    2.99     1.90     .       1.50    3.26     1.02432 28.51  1.07345 1.11013
90  11.41  6.86    2   11.41   7.26     2     3.68 2.03 306 25.0    2.72    4.250   1.80    2.43     3.01    1.36     2.89    1.31     1.37394 19.50  1.21247 1.17433

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

82  0.004010  .        .       0.004010 0.88524 0.996424  .      1.05344  1.04660  1.03247   .       1.04632  1.04139
83  0.004860  .        .       0.004860 1.19424 0.996424 1.02707 1.03544  1.02923  1.02787  1.02670  1.03108  1.02495
84  0.045249 0.025727 0.019521 0.019521 1.72370 0.996424 1.06254 1.05895  1.06494  1.06230  1.06188  1.05385  1.05976
85  0.013388 0.013388 0.000000 0.000000 1.01744 0.996424  .      1.04471  1.05979  1.04632   .       1.03923  1.05411
86  0.054564 0.019640 0.034924 0.019640 1.20559 0.996424 1.04098 1.05243  1.04977  1.05131  1.04051  1.04 43   1.04493
87   .        .       0.045171 0.045171 0.91612 0.996424 1.01727 1.02434  1.02674  1.03680  1.01699  1.02043  1.02270
88  0.340595 0.163707 0.176888 0.163707 1.33219 0.996424 1.04580 1.04802  1.04008  1.03975  1.04533  1.04311  1.03570
89  0.049126 0.036684 0.085809 0.036684 1.09179 0.996424 1.02439 1.07368   .       1.06823  1.02390  1.06702   .
90  0.161468 0.038143 0.199611 0.038143 1.19340 0.997455 1.05209 1.05159  1.05436  1.05106  1.05162  1.04630  1.04947

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

82  1.02733   .      19.6183 22.4503 28.4271 2.83201 8.80878 5.97678 2.83201 21.0343  .      21.7345 24.6360 30.6433
83  1.02375  30.7541 27.1591 29.8201 30.4075 2.66097 3.24841 0.58743 0.58743 30.1138 30.9165 29.0261 31.6775 32.1983
84  1.05708  15.9029 17.3614 14.9332 16.0006 2.42825 1.36083 1.06742 1.06742 15.4669 16.1703 19.4492 17.0302 18.1225
85  1.04081   .      23.2429 17.0182 22.5699 6.22470 0.67293 5.55176 0.67293 22.9064  .      25.5504 19.3411 24.8791
86  1.04650  24.8115 20.0322 21.1315 20.4944 1.09934 0.46225 0.63710 0.46225 20.2633 25.0065 22.1068 23.1511 22.49
87  1.03257  35.0413 31.9406 30.8993 26.5777 1.04137 5.36296 4.32159 1.04137 31.4199 35.1641 33.6496 32.6567 28.36
88  1.03541  22.7868 21.8605 25.1894 25.3294 3.32886 3.46889 0.14003 0.14003 25.2594 22.9815 23.9123 27.0468 27.1693
89  1.06151  31.9211 11.4392  .      13.6099  .      2.17070  .      2.17070 12.5245 32.1307 14.0958  .      16.3133
90  1.04622  20.1717 20.3818 19.2366 20.5996 1.14520 0.21784 1.36305 0.21784 20.4907 20.3675 22.5770 21.2562 22.6110
```

```
------------------------------------------------ SEX=F ------------------------------------------------

OBS M       N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDM TOTALSF TSF   BIF   AGE

82  2.90146 8.90874 6.00727 2.90146 23.1853 27.5    57.3   78.0     16.7  28.3   49.3    35.7    5.2      63.2 182.0   113.0  -958 26.5562
83  2.65146 3.17226 0.52081 0.52081 31.9375 29.8    61.1   80.4     16.4  29.8   46.7    33.4    8.1      89.6 220.6   129.1 -3126 32.4959
84  2.41894 1.32671 1.09223 1.09223 17.5763 28.2    62.3   81.7     16.7  30.7   51.2    35.3    6.7      38.0 107.6    64.6 -2811 31.6329
85  6.20922 0.67121 5.53801 0.67121 25.2147 29.0    57.0   70.9     15.3  27.5   45.6    30.9    4.3      44.6 106.6    68.4 -1579 28.2575
86  1.04433 0.38782 0.65651 0.38782 22.3007 30.4    56.1   74.0     16.6  29.1   45.7    33.2    5.1      43.2 120.8    73.4 -3073 32.3507
87  0.99312 5.26378 4.27066 0.99312 33.1532 28.8    56.8   74.0     17.1  27.5   45.5    31.6    5.7     120.0 274.6   172.8  2009 18.4274
88  3.13447 3.25696 0.12249 0.12249 27.1080 30.4    54.6   84.2     18.0  30.9   52.8    38.8    5.8      43.8 119.6    67.4 -4644 36.6548
89   .      2.22253  .      2.22253 15.2070 29.6    56.9   72.8     16.3  25.8   45.0    32.0    5.3      38.0 104.6    60.0 -1633 28.4055
90  1.32076 0.03408 1.35484 0.03408 22.5940 40.0    44.0   76.0     18.8  27.5    .      33.3    6.4      68.2 155.0    96.8   230 23.3014
```

```
                                              SAS                                13:59 TUESDAY, APRIL 1, 1986   31
------------------------------------------------ SEX=F ------------------------------------------------

OBS NAME          BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST

 91 ROWE            1     4     18     9     61   66.0            .            126.0            .              HALIFAX  301  164.0   51.8  53.3 30.3   95.0    80.5   81.5  85.5
 92 ASHFORD         8     1     11    10     57   65.5           163           108.0          48.8             HALIFAX  302  163.7   48.8  51.8 28.0   87.6    81.4   76.5  80.0
 93 CASLAKE         3     1     28    10     56   64.0            .      1     109.0          49.0             HALIFAX  303  160.8   52.5  52.7 30.8   89.6    79.3   76.7  75.3
 94 KELLY           3     1     24     9     60   65.0            .            110.0            .              HALIFAX  304  166.7   49.5  52.0 30.5   88.4    82.2   76.0  79.8
 95 D'ENTREMONT     3     1     11     6     57   68.0            .      1     147.0          67.0             HALIFAX  305  172.4   67.7  52.6 32.3   96.5    89.5   86.2  87.0
 96 FERRIS          3     1     15    10     63     .             .               .             .              HALIFAX  306  164.8   74.4  54.9 33.1  103.0    93.8   90.4  96.4
 97 NIXON           9     4      8     6     64   67.0            .               .             .              HALIFAX  307  168.8   71.3  53.0 29.8   95.8    89.3   84.1  91.6
 98 MESSIER         2     1     28     9     54   66.0            .      1     112.5            .      1       HALIFAX  308  166.9   51.0  55.1 29.0   88.8    82.3   78.8  80.7
 99 BIGGAR          3     4     19     9     57   67.0            .      1     133.0            .      1       HALIFAX  309  169.4   61.7  55.0 30.7   95.5    89.5   81.9  87.1

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

 91   67.2     74.1     83.6   48.2  33.9 33.5  19.5   26.7    24.9   21.8   14.2    6.2    13.8    10.4     7.8     4.8    13.2    11.4     10.2    14.6   17.8   81.8
 92   59.9     68.0     86.4   49.5  31.8 30.5  19.0   23.2    22.5   21.9   14.2    4.8    10.2     7.0     6.8     6.2    11.2     6.8      7.4    19.4    9.8   82.9
 93   65.0     77.0     85.6   52.9  33.3 33.8  20.4   23.9    23.2   22.5   14.5    5.0    15.4    11.2    10.2     5.6    15.4    10.2      8.4    34.2   16.8   86.0
 94   65.4     67.5     82.3   49.1  34.1 33.4  19.8   22.2    21.3   20.7   13.5    4.2     9.8     8.0     8.2     7.0    10.2     7.4      8.4    18.4   11.2   86.0
 95   73.9     85.0     94.7   56.6  38.0 36.4  22.5   28.3    27.3   24.7   15.6    6.8    17.8    11.2    16.8    11.8    19.8    18.0     11.8    19.8   12.2   87.7
 96   79.9     92.1    107.9   68.5  40.0 39.2  22.3   34.5    33.0   27.8   16.0   13.8    21.2    20.4    28.4    13.4    26.4    16.8     18.8    59.4   23.8   86.2
 97   74.2     92.0    100.2   65.9  35.8 39.7  23.0   29.5    29.0   34.1   15.0   11.8    21.4    11.8    13.8     7.2    43.4    15.8      9.8    52.4   26.7   90.5
 98   65.8     75.9     84.5   52.1  30.3 31.5  19.9   24.0    23.4   21.2   13.8    6.8    16.0     8.8     9.4     7.2    13.0     9.4      8.2    28.2   17.6   86.3
 99   74.8     85.5     95.5   58.1  33.0 31.6  19.4   28.0    27.6   23.4   14.3   10.8    19.4    20.0    20.0    15.4    33.4    18.4     13.2    24.0   19.8   83.7

OBS TRUNKHGT EPIFEMTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH  TAL  TAS  LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

 91  134.4     8.6      4.9      6.5      4.8      7.5   73.1 56.6 28.8  41.1  23.4    39.1     37.4     26.9     26.4     30.3     .   47.1   19.5     761    22.2    11.41   6.52    2
 92  136.4     8.0      5.9      6.2      5.2      7.0   71.2 55.2 28.2  38.6  21.7    35.5     34.0     24.6     26.6     31.6     .   47.2   17.6     761    22.6    11.41   6.88    2
 93  133.6     8.4      6.0      6.2      5.1      7.5   71.0 54.5 27.7  36.4  22.8    37.8     35.5     24.7     27.1     31.3     .   40.8   17.7     761    22.6      .       .     .
 94  136.1     8.3      6.1      6.0      5.0      6.8   70.1 54.5 27.4  36.5  21.0    36.5     34.3     27.1     25.9     30.5     .   42.2   17.6     761    22.2    11.41   7.23    2
 95  142.1     9.3      7.3      6.9      5.4      7.9   75.6 57.2 28.2  40.0  24.7    38.8     36.7     29.0     30.4     33.7     .   46.1   18.9     761    22.2    11.41   7.42    2
 96  135.8     8.9      6.9      7.1      5.1      7.5   71.8 54.6 25.3  40.4  23.0    38.1     34.8     27.0     30.0     35.9     .   43.7   19.1     760    22.3    11.41   7.37    2
 97  136.9     8.7      6.7      6.2      5.0      7.5   72.9 56.3 26.2  38.8  22.4    37.4     33.4     27.2     28.5     34.2     .   43.2   19.6     761    22.3    11.41   6.99    2
 98  136.1     7.7      6.0      6.1      5.0      7.1   72.1 55.0 25.8  37.8  22.7    36.6     36.0     24.9     26.8     32.6     .   44.2   19.1     760    22.3      .       .     .
 99  141.7     8.2      6.4      6.2      5.0      7.5   72.0 56.3 26.0  40.0  23.1    38.1     34.2     26.8     26.6     33.5     .   46.4   17.9     760    22.3    11.50   7.47    2


                                              SAS                                13:59 TUESDAY, APRIL 1, 1986   32
------------------------------------------------ SEX=F ------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC   HRV2   H2OVAP   HRV1     HRV3

 91  11.41   6.41    2   11.41   6.80    2   4.24 3.80  423   25.0    2.72    3.840    2.09     2.26     2.61     1.43     2.56     1.52   1.63198  18.82  1.56642  1.40910
 92  11.41   7.03    2   11.41   7.20    2   3.34 3.05  460   25.0    2.72    4.240    2.37     2.46     2.74     1.81     3.29     1.32   1.28633  19.50  1.36341  1.20266
 93  11.41   6.91    2   11.41   6.81    2   3.07 2.80  354   25.0    2.72    4.255    2.43     1.34     2.43     1.36     2.35     1.72   1.34773  19.50     .     1.40054
 94  11.41   7.24    2     .       .      .     .    .     .     .      2.72      .        .        .        .        .        .        .    1.18648  18.82  1.19124     .
 95  11.41   7.56    2   11.41   7.42    2   4.35 3.70  436   25.0    2.72    5.310    3.65     1.53     3.85     1.49     4.23     1.23   1.04084  18.82  1.10301  1.10301
 96  11.41   7.42    2   11.41   7.40    2   4.30 3.82  437   25.0    2.72    3.295    2.37     2.38     1.90     2.40     2.15     1.54   1.10245  18.99  1.12521  1.11151
 97  11.41   6.88    2   11.41   7.10    2   4.83 3.08  230     .     2.72      .        .        .        .        .        .        .    1.36573  18.99  1.30879  1.25361
 98  11.41   5.78    2   11.41   5.56    2   4.20 3.32  344     .     2.72      .        .        .        .        .        .        .    2.05450  18.99     .     2.22494
 99  11.50   7.42    2   11.50   7.41    2   3.61 3.10  345   24.5    2.72    3.535    2.51     1.37     2.44     1.97     2.13     1.67   1.12891  18.99  1.10628  1.13348

OBS     A          B          C       MINRVDIF    HRV     H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

 91 0.0455630  0.157316   0.222879   0.065563   1.59920  0.997455   1.05762  1.06865  1.06189  1.06276  1.05691  1.06253  1.05621
 92 0.0770785  0.160552   0.083473   0.077079   1.32487  0.997455   1.06431  1.07807  1.07147  1.07291  1.06368  1.07150  1.06528
 93     .          .      0.052815   0.052815   1.37413  0.997455   1.06089  1.05049  1.05091  1.05683  1.06028  1.04515  1.04555
 94 0.0047588      .          .      0.004759   1.18886      .          .        .        .        .        .        .        .
 95 0.0621691  0.000000   0.062169   0.000000   1.10301  0.997455   1.05946  1.05724  1.05990  1.06191  1.05909  1.05306  1.05571
 96 0.0227639  0.013695   0.009069   0.009069   1.10698  0.997455   1.02456  1.04547  1.03889  1.03012  1.02424  1.04150  1.03496
 97 0.0569446  0.055180   0.112125   0.055180   1.28120      .          .        .        .        .        .        .        .
 98     .          .      0.170439   0.170439   2.13972      .          .        .        .        .        .        .        .
 99 0.0226363  0.027200   0.004564   0.004564   1.13119  0.997626   1.03433  1.04031  1.04969  1.03889  1.03393  1.03592  1.04500

OBS DENSITYZ  PERFAT  PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

 91  1.05703 17.9027  13.4427  16.1659  15.8141  2.72324  2.37147  0.35177  0.35177  15.9900  18.1919  15.9051  18.4782  18.1427
 92  1.06695 15.1857   9.7052  12.3185  11.7434  2.61329  2.03826  0.57503  0.57503  12.0310  15.4400  12.3047  14.7932  14.1241
 93  1.05126 16.5721  20.8345  20.6604  18.2248  0.17410  2.60965  2.43556  0.17410  20.7474  16.8173  23.0597  22.8892  20.5179
 94     .       .        .        .        .        .        .        .        .        .        .        .        .        .
 95  1.05780 17.1511  18.0573  16.9738  16.1572  1.08350  1.90009  0.81659  0.81659  16.5655  17.3038  19.7717  18.6827  17.8301
 96  1.02651 31.8452  22.9224  25.6939  29.4369  2.77148  6.51447  3.74299  2.77148  24.3082  31.9846  24.5900  27.3640  30.9987
 97     .       .        .        .        .        .        .        .        .        .        .        .        .        .
 98     .       .        .        .        .        .        .        .        .        .        .        .        .        .
 99  1.03441 27.6299  25.0926  21.1682  25.6918  3.92437  0.59924  4.52362  0.59924  25.3922  27.8016  26.9537  23.1205  27.5985
```

```
                                                   SAS                                        13:59 TUESDAY, APRIL 1, 1986   33
------------------------------------------------- SEX=F ------------------------------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF    BIR   AGE

 91  2.57312  2.23763  0.33549  0.33549  18.3105  29.6    52.2   82.2     16.5  27.8   .       35.1    6.0     38.2  110.2    59.8    626  22.2164
 92  2.48850  1.81941  0.66910  0.66910  14.4587  27.3    55.6   80.8     16.0  27.0   .       33.6    8.6     28.8   89.6    54.6   -812  26.1562
 93  0.17053  2.54184  2.37132  0.17053  22.9745  27.2    58.8   74.8     16.5  26.8   .       34.0    4.4     41.8  132.4    86.4  -1160  27.1096
 94   .        .        .        .         .      30.6    55.4   80.7     15.6  27.1   .       38.5    5.7     30.2   92.8    54.6    267  23.2000
 95  1.08904  1.94161  0.85257  0.85257  18.2564  30.3    57.4   84.7     18.4  29.0   .       36.6    8.1     52.6  146.0    85.4   -934  26.4904
 96  2.77400  6.40870  3.63470  2.77400  25.9770  29.0    57.2   78.6     17.2  29.3   .       34.9    3.3     83.5  242.4   155.8   1383  20.1425
 97   .        .        .        .         .      31.9    58.6   78.3     16.6  30.1   .       35.1    4.4     58.8  214.1   142.8   1620  19.4932
 98   .        .        .        .         .      30.8    55.5   80.6     17.1  29.2   .       36.4    6.4     41.0  124.6    75.4  -1921  29.1945
 99  3.83327  0.64479  4.47806  0.64479  27.2761  27.7    56.0   85.7     15.7  30.3   .       39.3    6.4     70.2  194.4   116.8   -834  26.2164
```

```
                                                   SAS                                        13:59 TUESDAY, APRIL 1, 1986   34
------------------------------------------------- SEX=F ------------------------------------------------------------------------

OBS NAME                BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST

100 BERNARD  ESTELLE L  3     1      30   12     47    62.5           .     1       130.0             .      1        HALIFAX  310 158.9  60.6   54.8 33.0   90.5   86.5    86.5   90.9
101 ALLEN               3     4      20    9     51    68.0           .     1       150.0             .      1        HALIFAX  311 170.3  69.9   53.6 32.9  100.5   89.8    86.8   96.7
102 KOSS                9     1       5    9     53    65.5           .              .                .               HALIFAX  312 163.0  62.4   54.6 30.5   97.0   87.1    83.4   85.8
103 KING                4     1      19    9     45    64.5           .     1        .      1         .      1        HALIFAX  313 163.5  75.6   52.4 35.1  103.8   95.6    93.9  101.2
104 HAUGH               1     1      11   10     49    69.0           .     1       155.0             .      1        HALIFAX  314 174.6  70.7   57.2 32.0  103.2   93.4    88.0   95.8
105 TAYLOR              3     5       3    9     59    60.5         154             107.0           48.0             HALIFAX  315 152.5  47.5   55.7 30.5   95.1   81.3    79.0   83.5
106 CLARKE              1     1       2   10     49    66.0           .     1       157.0           73.0             HALIFAX  316 167.6  73.8   53.6 32.9  107.7   97.2    94.8  101.0
107 PETERS              3     1      13   10     52    64.0           .     1        .      1       68.0             HALIFAX  317 162.8  68.8   53.7 35.3  101.0   97.0    92.8   96.2
108 FOWLER              2     2      21    3     60     .     1     183              .      1       69.0             HALIFAX  318 180.8  68.4   53.6 31.3  104.6   92.6    89.1   94.8

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

100 69.2      83.2    101.5   60.7  37.8 37.0 22.7  29.1    28.5  23.6    14.8   7.8    21.0     14.2   14.8     12.8    24.0    12.2     11.8    34.2    27.8   86.8
101 73.5      91.0     98.6   60.9  36.6 36.6 21.5  29.5    28.4  24.6    14.7   8.7    17.8     17.4   12.4     10.4    17.4    19.6     18.8    47.8    30.0   90.0
102 69.7      82.9    101.5   62.8  38.0 38.9 21.2  30.3    26.1  23.6    15.0  13.0    25.2     21.8   22.8     14.8    26.8    15.2     17.2    40.0    28.0   87.8
103 87.8     107.2    106.9   61.9  38.2 38.0 23.4  35.2    33.0  36.7    15.2  16.2    32.4     28.8   38.9     13.8    32.8    31.4     18.8    59.4    25.4   88.6
104 71.0      76.2    102.2   63.0  40.2 37.9 23.1  30.1    28.7  25.2    15.9   6.2    18.0      9.2   15.6      5.8    29.0    16.0      9.0    32.8    25.6   93.6
105 62.0      64.7     85.7   54.4  31.3 32.1 20.1  27.1    25.6  23.5    14.6   2.8    10.8      7.8    9.0      3.4     9.0     5.2      5.2     9.6     7.8   74.8
106 74.8      85.0    101.5   60.6  42.0 37.2 23.1  32.1    31.2  27.0    16.3  11.4    25.6     20.0   24.2     12.2    31.0    18.4     14.0    28.8    33.4   89.6
107 83.8      86.2    101.2   61.4  36.8 37.3 21.4  32.8    32.1  26.1    15.8  14.6    24.0     33.8   31.8     15.2    35.0    21.2     23.2    30.4    25.4   82.9
108 71.0      76.6    100.2   59.4  36.2 38.3 22.1  27.6    25.5  24.8    15.4   5.4    15.4      9.0   16.4      4.2    11.8    10.6      7.4    29.0    21.4   93.2

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL  LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

100 130.8    8.1      6.7      6.4      4.9      7.2     70.2 52.8 26.1 39.7   23.1  35.7     34.5    25.5     28.3     33.8       .   43.7  16.2     760     22.3    11.50  7.20    2
101 144.4    8.4      6.7      6.3      4.9      7.6     76.2 57.1 25.8 41.0   22.3  39.2     35.0    26.7     31.0     32.9       .   48.7  20.4     760     22.3    11.50  7.18    2
102 133.0    7.4      6.2      6.7      5.0      6.9     70.2 52.7 25.9 38.2   38.0  37.1     34.0    24.7     28.7     33.6       .   45.1  18.1       .       .        .     .      .
103 135.0    9.1      6.9      6.0      4.9      7.1     70.2 53.3 25.8 36.8   23.0  36.8     33.0    28.5     32.3     34.0       .     .   20.2     759     22.2    11.41  7.39    2
104 139.2    9.2      6.6      6.2      5.4      7.9     75.6 56.9 27.4 40.7   24.7  41.0     37.7    25.2     29.1     39.5     94.7  45.6  21.7     756     23.1    11.16  6.42    2
105 123.5    7.9      6.2      5.9      5.0      7.8     70.0 52.8 26.1 36.5   22.6  39.2     34.6    23.8     23.2     30.7     90.2  40.3  15.6     756     23.0    11.40  8.29    2
106 140.0    9.0      6.7      6.9      5.4      8.2     73.8 55.4 26.4 39.6   24.5  43.4     37.3    27.6     28.8     38.5     95.1  44.3  20.3     755     23.1    11.40  6.99    2
107 132.3    9.5      6.0      6.4      5.2      7.8     70.0 53.1 25.3 37.4   22.8  43.1     37.4    26.9     30.8     38.1     90.1  43.1  19.5     756     23.1    11.33  7.62    2
108 147.5    8.9      6.7      6.2      5.3      7.6     81.7 64.1 28.1 43.0   24.9  43.2     40.3    26.0     29.1     36.7    102.3  48.3  17.9     754     23.3    11.40  6.72    2
```

```
------------------------------------------------- SEX=F -------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

100 11.50 7.29 2 11.50 7.20 2 3.43 2.90 338 24.5 2.72 2.815 1.20 2.49 2.12 1.11 2.03 1.28 1.18922 18.99 1.23225 1.23225
101 11.50 7.23 2 11.50 7.17 2 4.18 3.36 532 25.0 2.72   .   1.37 0.97 1.32   .    .    .   1.21779 18.99 1.24195 1.24683
102   .    .   2   .     .  .   .    .    .    .  2.72   .     .    .    .    .    .    .      .      .      .       .
103 11.41 7.41 2 11.41 7.47 2 3.42 2.93 419 25.0 2.72 2.500 1.74 0.54 1.88 0.60 1.15 1.53 1.10766 18.82 1.11676 1.08066
104 11.16 6.37 2 11.16 6.51 2 4.99 3.93 437 25.0 2.72 3.640 2.20 2.52 2.87 1.23 3.57 0.59 1.56310 20.35 1.53345 1.48124
105 11.40 8.28 2   .     .  .  2.71 2.43 337 25.0 2.72   .     .    .    .    .    .    .   0.74847 20.18 0.74686    .
106 11.40 7.07 2 11.40 7.80 3 4.11 3.33 482 25.0 2.72 2.980 1.16 1.75 1.49 1.93 2.36 0.90 1.26005 20.35 1.30015 1.43357
107 11.33 7.80 2 11.33 7.68 2 3.83 3.27 412 25.0 2.72 3.635 2.90 0.55 2.26 1.27 1.85 1.45 0.91263 20.35 0.98718 0.96194
108 11.40 6.80 2 11.40 6.63 2 4.24 3.91 445 25.0 2.72 4.120 1.49 3.16 3.59 0.89 3.10 1.31 1.39764 20.69 1.44095 1.49093

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

100 0.043027 0.000000 0.043027 0.000000 1.23225 0.997626 1.02412 1.03943  1.03133  1.03273  1.02369  1.03452  1.02699
101 0.024170 0.004874 0.029044 0.004874 1.24439 0.997455    .    1.01394     .        .        .     1.01034     .
102    .        .        .        .        .        .        .       .        .        .        .        .        .
103 0.009099 0.036103 0.027004 0.009099 1.11221 0.997455 1.01329 1.01029  1.01300  1.01569  1.01298  1.00714  1.00982
104 0.029644 0.052212 0.081856 0.029644 1.54828 0.997455 1.03773 1.05439  1.04476  1.04571  1.03725  1.04995  1.04080
105 0.003610    .        .     0.003610 0.74667 0.997455    .       .        .        .        .        .        .
106 0.040096 0.133418 0.173514 0.040096 1.28010 0.997455 1.02274 1.02168  1.02896  1.02670  1.02237  1.01799  1.02516
107 0.074547 0.025237 0.049310 0.025237 0.97456 0.997455 1.02982 1.02694  1.02815  1.02461  1.02951  1.02341  1.02438
108 0.043316 0.049980 0.093295 0.043316 1.41929 0.997455 1.04464 1.05306  1.05039  1.04924  1.04418  1.04831  1.04642

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X      Y      Z      MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

100 1.02832  32.0351 25.4654 28.9179 28.3162 3.4525 2.8508 0.6017 0.60169 28.6171 32.2256 27.5491 30.7883 30.2129
101    .        .    36.5174    .       .      .      .      .       .       .       .    38.1218    .       .
102    .        .       .       .       .      .      .      .       .       .       .       .       .       .
103 1.01224  36.8055 38.1471 36.9360 35.7382 1.2112 2.4089 1.1977 1.19773 36.3371 36.9433 39.5609 38.3571 37.2747
104 1.04195  26.1837 19.2264 23.2230 22.8236 3.9966 3.5972 0.3994 0.39938 23.0233 26.3886 21.0582 24.8839 24.3997
105    .        .       .       .       .      .      .      .       .       .       .       .       .       .
106 1.02322  32.6397 33.1019 29.9386 30.9156 3.1633 2.1863 0.9770 0.97704 30.4271 32.8022 34.7251 31.5846 32.4309
107 1.02081  29.5690 30.8103 30.2897 31.8245 0.5205 1.0142 1.5347 0.52055 30.5500 29.7017 32.3464 31.9239 33.4831
108 1.04514  23.2715 19.7752 20.8753 21.3513 1.1000 1.5761 0.4760 0.47604 21.1133 23.4659 21.7387 22.5278 23.0614
```

```
                                              SAS                                   13:59 TUESDAY, APRIL 1, 1986   3
------------------------------------------------- SEX=F -------------------------------------------------

OBS M      N      O      MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALST TSF   BIR   AGE

100 3.2391 2.6637 0.5754 0.57540 30.5006 28.1 58.7 72.1 17.4 26.7   .  28.4 4.0  57.8 160.6 108.2 -4385 35.9452
101   .      .      .       .       .    25.9 64.1 80.3 19.1 31.3   .  31.6 7.7  56.3 200.3 112.8 -3025 32.2192
102   .      .      .       .       .    30.0 57.8 75.2 17.5 26.8   .  30.1 6.9  82.8 224.8 136.6 -2309 30.2575
103 1.2037 2.2862 1.0825 1.08249 37.8159 28.5 60.1 74.9 16.9 27.5   .    .   .  116.3 297.9 192.3 -5217 38.2245
104 3.8256 3.3415 0.4842 0.48419 24.6418 35.4 58.2 81.0 18.7 29.5 49.1 35.4 4.9  49.0 167.2 104.6 -3734 34.1616
105   .      .      .       .       .    29.0 45.8 77.7 17.2 26.7 49.9 37.4 3.8  30.4  70.6  46.2  -120 24.2603
106 3.1405 2.2942 0.8463 0.84629 32.0077 27.6 62.0 78.0 18.4 29.0 50.8 33.7 4.7  81.2 219.0 129.6 -3743 34.1863
107 0.4225 1.1367 1.5592 0.42250 32.1351 30.5 52.4 79.9 16.9 27.8 47.0 36.6 5.7 104.2 254.6 155.0 -2636 31.1534
108 0.7891 1.3227 0.5336 0.53357 22.7946 33.3 59.9 87.6 17.6 36.0 54.0 39.3 5.3  48.2 132.6  83.6    80 23.7123
```

```
                                                     SAS                              13:59 TUESDAY, APRIL 1, 1986   3
------------------------------------------------------ SEX=F ------------------------------------------------------------

OBS NAME              BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST

109 ROUSSEAU            2 2 24  7 59 62.0   155      .  1 52.0    HALIFAX 319 156.2 51.2 52.9 31.5  99.5  88.6 85.4  90.3
110 CONNERS             3 1 19  7 60 71.0     . 1 162.0      .  1 HALIFAX 320 178.9 73.8 54.4 33.7 101.3  97.0 93.3  95.5
111 TEDLEY              1 1 15  7 50 70.5     . 1 145.0   67.0    HALIFAX 321 175.2 66.0 53.1 33.5  97.8  89.8 87.3  91.3
112 NORMAN              1 1 28  4 54 72.0   183   191.0   87.0    HALIFAX 322 184.3 85.9 58.9 34.8 104.4 100.0 96.5 105.7
113 GILLESPIE           3 1 13  4 33 68.0     . 1 170.0   80.0    HALIFAX 359 171.5 78.4 56.8 37.5 113.1 103.4 99.7    .
114 CHRISTOPHERSON      1 1 27  7 57 64.0   160   109.0   48.5    HALIFAX 364 161.3 47.8 51.8 29.6  94.4  83.6 79.0  81.6
115 REARDON             3 4  9  9 58 60.0     .    95.0   42.0    HALIFAX 365 151.3 42.8 53.0 29.8  90.0  81.0 76.1  79.2
116 LEMIRE              4 1 15  5 56 65.0     . 1 127.5   57.5    HALIFAX 366 167.5 57.3 56.8 31.0  95.8  84.8 82.1  85.7
117 GIBBONS             3 1 21  6 61 68.0     . 1 152.0      .  1 HALIFAX 367 169.4 [illegible] 55.0 33.5 102.4  91.3 88.3  93.7

OBS ABDOMEN1 ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT

109 68.4  72.2  86.2 51.4 33.3 32.2 19.5 28.1 27.1 22.7 13.3  7.0 16.0 14.2 14.0  6.8 11.2  7.6  8.0 21.0 15.4 79.2
110 80.3  87.6 100.3 59.0 38.5 36.8 22.2 29.2 27.7 25.6 16.1  7.0 18.0 15.4 26.4 11.2 20.2 13.0 13.0 18.6 17.8 88.0
111 71.9  76.0 101.5 63.4 37.3 36.0 22.0 29.2 28.1 24.0 15.4  8.0 29.6 11.2 17.2 11.2 20.0 11.0  9.4 30.4 26.0 86.0
112 76.8  81.5 105.2 66.1 45.0 41.4 24.4 31.5 30.7 26.3 16.8  6.4 28.0 15.4 18.0  5.8 21.6 10.0  7.0 33.6 25.8 96.1
113 93.4 100.5 101.5 57.5 38.0 39.0 23.4 35.1 34.0 28.8 17.8  5.2 12.2 16.0 30.2 21.8 38.2 14.0 22.8 16.8 18.6 89.4
114 65.4  69.0  84.4 51.7 32.8 34.3 19.8 26.5 24.5 22.4 14.3  3.4 11.0  6.6  7.6  4.8  5.2  4.6  6.4 11.4  7.8 80.8
115 56.5  63.0  83.0 50.3 33.6 32.0 21.0 25.7 24.6 21.0 14.4  4.6 13.2  6.6  7.6  4.4  8.8  5.2  5.4 15.8 12.6 81.4
116 66.4  73.8  97.4 57.0 37.4 35.0 20.8 28.6 27.0 23.0 15.2  6.4 22.0  9.4 12.2 10.4 20.0 10.6  6.4 33.0 24.2 88.8
117 77.4  85.3 101.3 61.1 40.8 38.9 23.1 28.4 28.1 24.7 15.8 10.2 18.4 13.0 20.2 11.2 26.0 17.8 15.6 31.0 24.2 91.9

OBS TRUNKHGT EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

109 128.3 8.1 6.0 5.9 4.6 7.0 69.7 52.9 25.2 36.8 22.0 39.4 34.8 24.7 26.0 31.9  89.2 41.9 17.3 755 23.2 11.40 7.80 2
110 151.8 9.2 6.8 6.7 5.7 7.9 85.4 64.9 28.8 43.3 26.3 42.6 38.5 26.8 29.6 35.9 107.8 49.3 19.0 755 23.1 11.40 7.20 2
111 147.1 9.1 6.9 6.6 5.4 8.0 82.9 63.9 29.5 42.8 24.5 39.6 36.6 24.2 31.6 39.7 103.7 49.1 17.2 753 23.1 11.40 6.39 2
112 153.1 9.8 7.3 6.9 5.6 8.4 83.3 64.3 30.1 43.0 25.5 44.5 37.6 29.3 31.7 42.4 102.7 48.1 19.7 752 23.1 11.40 6.50 2
113 139.5 9.6 7.2 7.1 6.0 8.6 76.8 57.6 27.0 38.8 25.2 43.4 38.1 27.6 32.3 34.6  97.7 47.2 23.2 751 23.3     .    . 2
114 131.3 8.1 6.2 6.2 4.9 7.3 72.9 54.5 26.3 38.5 22.8 38.8 34.9 22.3 26.6 30.9  94.5 44.3 16.8 752 24.0 11.40 7.83 2
115 123.6 8.3 6.3 5.9 5.0 7.0 64.5 47.8 22.8 34.0 20.0 37.0 34.1 22.8 25.9 30.4  80.9 39.7 15.7 752 23.9 11.40 7.47 2
116 135.8 8.9 6.4 6.2 5.2 7.6 71.5 53.4 26.0 37.3 23.3 39.0 34.4 24.3 29.7 36.8  90.8 44.1 19.5 752 24.0 11.40 6.65 2
117 138.5 9.1 6.6 6.0 5.5 7.5 75.0 57.7 26.2 36.7 22.7 40.3 35.3 26.2 31.8 39.2  92.7 43.4 17.6 752 24.0 11.40 7.07 2
```

```
                                                     SAS                              13:59 TUESDAY, APRIL 1, 1986   38
------------------------------------------------------- SEX F ------------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEHGT H2OHGT1 H2OHGTA LUNGVOLA H2OHGTB LUNGVOLB H2OHGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

109 11.40 7.61 2 11.40 7.77 2 3.93 3.12 249 25.0 2.72 4.725 2.10 2.96 2.65 2.22 3.65 1.26 1.01088 20.52 0.93164 0.94390
110 11.40 8.06 3 11.40 7.86 3 4.75 3.99 368 25.0 2.72 4.230 2.52 2.74 1.61 4.19 2.44 3.90 1.27991 20.35 1.19680 1.39721
111 11.40 6.50 2 11.40 6.66 2 4.41 3.65 329 25.0 2.72 3.150 2.05 2.79 2.26 0.86 2.20 0.67 1.56743 20.35 1.63304 1.47588
112 11.40 7.40 3 11.40 7.20 3 6.24 5.00 539 25.0 2.72 3.740 1.72 2.09 1.99 1.64 1.25 2.29 1.69130 20.35 1.56751 1.83079
113 11.36 6.91 3 11.36 6.72 3 6.11 3.96 534 24.5 2.72 3.050 0.90 2.74 1.80 1.40 1.73 1.51 2.02631 20.69       .  2.17765
114 11.40 7.88 2 11.40 8.06 2 3.53 3.22 403 24.8 2.72 4.250 2.44 2.25 3.43 1.57 3.38 0.92 0.89547 21.88 0.91544 0.82562
115 11.40 7.80 2 11.40 7.94 2 3.57 3.08 343 24.8 2.72 3.950 1.90 2.08 1.90 2.22 1.23 1.73 0.92806 21.71 1.06774 0.87233
116 11.40 6.77 2 11.40 6.79 2 4.03 3.62 331 24.8 2.72 3.300 2.01 2.26 2.16 1.92 2.42 1.73 1.40828 21.88 1.47397 1.39755
117 11.40 6.92 2     .    . . 3.48 2.84 430 24.8 2.72 3.550 2.40 1.15 2.25 1.21 2.45 1.97 1.32936 21.88 1.25380       .

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

109 0.079238 0.012254 0.066984 0.012254 0.93777 0.997455 1.06330 1.07060 1.06639 1.06734 1.06287 1.06437 1.06054
110 0.083116 0.200408 0.117292 0.083116 1.23836 0.997455 1.04020 1.05546 1.06364 1.07201 1.03983 1.05123 1.05889
111 0.065604 0.157159 0.091555 0.065604 1.60023 0.997455 1.03337 1.06141 1.03285 1.02882 1.03284 1.05648 1.02887
112 0.123786 0.263272 0.139486 0.123786 1.62941 0.997455 1.03310 1.03390 1.03168 1.03054 1.03268 1.03048 1.02838
113        .        . 0.151346 0.151346 2.10198 0.997626 1.03338 1.04141 1.03539 1.03594 1.03280 1.03729 1.03169
114 0.019972 0.089821 0.069648 0.019972 0.90546 0.997523 1.05610 1.06636 1.07385 1.05722 1.05567 1.06010 1.06783
115 0.139666 0.195411 0.055745 0.055745 0.90020 0.997523 1.05505 1.05570 1.05936 1.02975 1.05457 1.04894 1.05248
116 0.065693 0.076416 0.010723 0.010723 1.40291 0.997523 1.03775 1.05624 1.05256 1.05393 1.03721 1.05091 1.04741
117 0.075563        .        . 0.075563 1.29158 0.997523 1.03391 1.03386 1.03244 1.04777 1.03349 1.02994 1.02851

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

109 1.06191 15.5952 12.6649 14.3483 13.9684  1.6834  1.3036  0.3798 0.37981 14.1584 15.7668 15.1633 16.7112 16.1558
110 1.06728 25.1379 18.7868 15.4573 12.1002  3.3295  6.6865  3.3570 3.32952 17.1220 25.2951 20.5303 17.3846 13.9910
111 1.02488 28.0421 16.3596 28.2656 29.9977 11.9060 13.6381  1.7321 1.73212 29.1317 28.2693 18.3676 29.9997 31.7048
112 1.02709 28.1589 27.8139 28.7679 29.2568  0.9540  1.4428  0.4889 0.48886 29.0123 28.3366 29.2836 30.1885 30.7482
113 1.03220 28.0363 24.6270 27.1793 26.9471  2.5523  2.3201  0.2322 0.23219 27.0632 28.2875 26.3714 28.7636 28.5445
114 1.05170 18.5230 14.3593 11.3720 18.065   2.9373  3.7063  6.6937 2.98731 12.8656 18.7005 16.8899 13.7693 20.3356
115 1.02350 18.9542 18.6882 17.1934 29.5971  1.4949 10.9089 12.4037 1.49486 17.9408 19.1513 21.4761 20.0119 32.3084
116 1.04883 26.1761 12.4653 19.9777 19.4143  1.5124  0.9489  0.5634 0.56344 19.6960 26.4055 20.6593 22.1161 21.5216
117 1.04346 27.8117 27.8310 28.4401 21.9660  0.6091  5.8650  6.4741 0.60915 28.1355 27.9902 29.5164 30.1339 23.7647
```

```
                                                    SAS                              13:59 TUESDAY, APRIL 1, 1986   39
------------------------------------------------- SEX=F --------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF    BIR    AGE

109   1.5480   0.9925   0.5555  0.55547  16.4335  27.9    51.3   77.0     16.8  27.7   47.3    35.1    5.1     51.2  121.2    76.4   -161  24.3726
110   3.1455   6.5393   3.3938  3.14545  18.9576  27.1    60.9   90.9     20.5  34.1   58.5    41.6    6.0     66.8  160.6    98.6    200  23.3836
111  11.6320  13.3372   1.7052  1.70515  30.8522  28.1    57.9   89.2     19.0  34.4   54.6    40.1    6.3     66.0  174.0   108.4  -3457  33.4027
112   0.9049   1.4446   0.5597  0.55975  30.4684  31.2    64.9   88.2     19.0  34.2   54.6    40.1    5.1     67.8  171.6   116.6  -2074  29.6137
113   2.3922   2.1731   0.2190  0.21905  28.6541  32.0    57.4   82.1     19.2  30.6   50.5    34.9    8.4     63.6  195.8   113.4  -9759  50.6685
114   3.1206   3.4457   6.5663  3.12058  15.3296  30.0    50.8   80.5     18.4  28.2   50.2    36.2    5.8     28.6   68.8    41.8   -888  26.3644
115   1.4642  10.8323  12.2965  1.46422  20.7440  27.7    53.7   69.9     16.7  25.0   41.2    30.2    5.7     32.0   84.2    52.0   -479  25.2438
116   1.4568   0.8623   0.5945  0.59450  21.8189  31.7    57.1   78.7     18.1  27.4   46.7    34.6    6.8     50.0  154.6    96.6  -1326  27.5644
117   0.6174   5.7517   6.3491  0.61744  29.8251  31.4    60.5   78.0     17.3  31.5   49.3    34.6    6.7     61.8  189.6   110.6    537  22.4603
```

```
                                                    SAS                              13:59 TUESDAY, APRIL 1, 1986   40
------------------------------------------------- SEX=F --------------------------------------------------

OBS NAME       BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOWGTIN HGTCM NOWGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST  ABDOMEN1 ABDOMEN2

118 MCCARTHY   3     1       3   10     62    65.0  .               136.0            62              HALIFAX  368 165.9  59.7   54.6 32.5 102.8    88.5    84.9   93.6 68.3     76.9
119 CONNOLLY   3     1      29    7     59    63.5  .               120.0             .              HALIFAX  369 156.9  54.2   53.6 32.9  97.8    87.2    82.5   86.4 68.5     73.6
120 KELEHER    3     1       2   11     62    68.0  .               135.0             .              HALIFAX  370 170.1  59.6   53.6 33.8  97.2    88.3    85.3   88.5 72.3     77.3
121 WALSH      3     1      27    3     51     .    .                  .              .              HALIFAX  371 164.2  50.3   54.1 30.0  97.1    87.1    83.6   87.7 68.1     67.8
122 SAMARODEN  1     1       2   12     52    65.0  .           1   125.0             .      1       HALIFAX  374 160.0  56.7   52.2 31.1  96.6    85.6    84.2   90.1 71.5     74.4
123 LAIDMAN    1     1      14    9     52    60.5  .           1   146.5             .      1       HALIFAX  375 152.4  65.4   53.8 32.0 105.4    97.3    93.9  104.1 81.5     95.4
124 HARRIS     3     1      28    7     55    66.0  .           1   131.0            59              HALIFAX  376 166.0  60.0   55.3 30.9 102.6    91.4    88.6   92.3 68.4     74.0
125 BRYDEN     3            15   12     48    64.0  .           1   130.0             .      1       HALIFAX  377 163.3  59.8   53.6 32.6  99.8    88.1    84.5   85.7 79.9     83.4

OBS GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT EPIFEMTH

118   94.9  55.4  36.9 35.1 22.3  29.7    28.9  24.4    15.6  11.2    20.8     11.8   18.2      7.0    22.0    14.2     12.0    20.0    18.4   87.3   136.2     8.8
119   94.2  55.8  34.7 35.2 21.2  27.5    26.0  24.2    15.2   7.0    13.2     10.8   20.8      5.8    17.2     8.0      7.6    14.0    14.4   86.2   127.5     8.6
120   94.8  54.3  35.8 33.2 21.4  26.8    25.8  23.3    15.3   7.8    20.8     18.4   21.0     16.2    27.2    15.8     10.2    19.8    21.0   87.0   142.1     8.8
121   86.5  51.4  33.3 32.4 19.0  26.4    25.0  22.5    14.6   8.4    12.0      5.6   15.6      4.2     4.4     4.2      5.2    14.0    11.4   80.8   134.2     8.2
122   97.5  57.9  36.9 35.3 22.6  27.0    26.1  24.5    14.2   4.2    13.0     10.6   15.6      6.0    14.2    12.0      8.8    25.4    20.8   87.9   130.7     8.7
123  104.2  61.5  35.7 36.0 20.5  34.0    33.0  24.1    15.0  11.0    34.4     30.0   32.0     17.0    33.0    23.8     28.4    42.4    23.0   80.3   123.4     8.3
124   91.7  55.0  38.9 38.7 21.8  27.1    25.7  23.5    14.5   4.2    17.4     11.2   12.2      4.0     9.8     4.6      6.8    29.0    23.6   79.5   137.9     8.9
125   95.0  54.3  36.8 33.4 20.8  29.5    26.1  24.0    14.3   2.8    33.2     21.8   36.0     27.0    32.8    17.2     23.2    37.0    24.8   86.1   133.5     8.6

OBS ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

118 6.3      6.6      5.1      7.9     73.5 55.8 26.3 38.0   22.6  39.2     35.3    24.6     29.8     35.7     91.5 43.1  17.6     752     24.0    11.40  6.63    2     11.40
119 6.2      6.0      5.4      8.2     67.7 50.7 23.9 34.3   22.2  40.2     36.9    24.3     27.1     35.5     82.8 38.5  18.1     752     24.0    11.40  6.78    2     11.40
120 6.4      6.5      5.3      7.6     76.0 57.4 26.3 40.8   24.1  40.9     37.6    24.9     29.7     35.6     95.1 44.0  17.6     752     24.2    11.40  7.20    2     11.40
121 5.9      6.2      5.0      7.3     69.0 52.1 25.4 38.2   22.5  40.5     35.8    25.8     25.5     31.8     95.0 46.8  19.7     752     24.2    11.40  6.03    2       .
122 6.1      6.3      5.1      7.7     68.5 52.1 24.5 34.9   24.5  39.6     35.5    24.1     28.6     37.3     86.3 40.8  18.2     751     24.0    11.38  6.42    2       .
123 5.9      5.9      4.8      7.3     66.6 50.3 23.8 33.5   20.7  41.9     35.3    25.2     30.2     36.8     87.0 40.3  19.6     751     24.0    11.38  7.57    2     11.38
124 6.5      6.3      4.9      7.4     74.9 57.4 27.2 39.7   23.5  42.0     38.2    26.3     26.5     35.1     96.3 44.7  18.5     751     24.0    11.31  7.08    2     11.31
125 6.1      6.5      5.1      7.8     73.1 54.5 25.8 38.2   22.8  38.0     35.0    24.7     27.8     33.7     92.8 45.0  19.4     751     24.0    11.31  7.37    2     11.31
```

```
----------------------------------------------------------------- SEX=F -----------------------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

118 6.83 2 11.40 7.01 3 4.08 3.85 479 24.8 2.72 3.200 2.54 1.35 2.30 1.45 1.85 1.77 1.37630 21.88 1.48515 1.96059
119 7.03 2 11.40 7.20 2 3.68 3.43 422 24.8 2.72 4.070 1.50 2.98 2.21 2.95 2.65 2.93 1.27364 21.88 1.40291 1.19086
120 7.40 2   .    .   . 3.95 3.07 320 24.8 2.72 4.223 2.90 1.74 3.04 1.49 2.37 2.31 1.09709 22.22 1.18950  .
121  .   . 11.40 6.20 2 4.13 3.42 455 24.8 2.72   .   1.70 2.31 2.38 1.79 2.35 1.54    .    22.22 1.85292 1.74098
122  .   . 11.38 6.63 2 3.36 2.90 353 24.8 2.72 3.400 1.55 2.29 1.25 2.27 1.45 2.31    .    21.88 1.60009 1.47870
123 7.60 2 11.38 7.60 2 3.18 2.79 407 24.8 2.72 2.920 2.17 0.56 1.00 2.96 1.20 1.64 1.00506 21.88 1.01789 1.00506
124 7.07 2   .    .   . 3.83 3.07 346 24.8 2.72   .   1.88 2.30 2.47 1.70 3.15 2.39 1.22634 21.88 1.22145  .
125 7.52 2 11.31 7.60 2 3.57 2.82 240 24.8 2.72   .   1.35 2.36  .    .    .    .   1.01937 21.88 1.08555 0.98515

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

118 0.108853 0.475440 0.584293 0.108853 1.43072 0.997523 1.03488 1.04737 1.04480 1.04240 1.03435 1.04267 1.04008
119 0.129271 0.212047 0.082776 0.082776 1.23225 0.997523 1.05213 1.06044 1.07478 1.08383 1.05162 1.05453 1.06872
120 0.092409    .        .     0.092409 1.14330 0.997523 1.04837 1.05606 1.05401 1.05678 1.04794 1.05123 1.04930
121    .     0.111941    .     0.111941 1.79695 0.997523    .    1.06759 1.07126 1.06491    .    1.06119 1.06506
122    .     0.121388    .     0.121388 1.53939 0.997523 1.04268 1.05110 1.04489 1.04954 1.04208 1.04570 1.03956
123 0.012830 0.012830 0.000000 0.000000 1.00506 0.997523 1.02037 1.01732 1.03712 1.01903 1.02004 1.01366 1.03251
124 0.004885    .        .     0.004885 1.22390 0.997523    .    1.04862 1.04846 1.07421    .    1.04365 1.04372
125 0.066181 0.100409 0.034228 0.034228 1.00226 0.997523    .    1.03620    .        .        .    1.03139    .

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

118 1.03759 27.3989 22.1296 23.2058 24.2095 1.07625  2.0799  1.0037 1.00369 23.7077 27.6234 24.0969 25.1889 26.2428
119 1.07768 20.1557 16.7525 11.0041  7.4535 5.74844  9.2990  3.5505 3.55054  9.2288 20.3687 19.1670 13.4133  9.8593
120 1.05173 21.7134 18.5411 19.3819 18.2445 0.84079  0.2966  1.1374 0.29662 18.3928 21.8931 20.5279 21.3293 20.3208
121 1.05889    .    13.8680 12.3990 14.9436 1.46902  1.0756  2.5446 1.07560 14.4058    .    16.4500 14.8842 17.3822
122 1.04415 24.0922 20.5826 23.1680 21.2296 2.58519  0.6468  1.9384 0.64680 20.9062 24.3465 22.8275 25.4094 23.4776
123 1.01501 33.6771 35.0178 26.4431 34.2659 8.57466  0.7518  7.8228 0.75183 34.6419 33.8211 36.6395 28.4087 36.0424
124 1.06892    .    21.6119 21.6769 11.2292 0.06501 10.3827 10.4477 0.06501 21.6444    .    23.6854 23.6568 13.3168
125    .       .    26.8367    .       .       .       .       .       .       .       .    28.8918    .       .
```

```
----------------------------------------------------------------- SEX=F -----------------------------------------------------------------

OBS M       N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR   ACE

118 1.09195  2.1459  1.0539 1.05391 25.7158 29.7 57.6 78.6 17.7 29.5 48.4 35.5 5.1  67.0 155.6  92.8  1006 21.1753
119 5.75363  9.3076  3.5540 3.55400 11.6363 29.4 56.8 70.7 17.0 26.8 44.3 32.2 4.2  51.8 118.8  76.0  -156 24.3589
120 0.80149  0.2070  1.0085 0.20702 20.4243 28.0 59.0 83.1 18.6 31.1 49.1 37.1 5.2  68.0 178.2 107.2  1036 21.0932
121 1.56587  0.9322  2.4980 0.93218 16.9161 30.0 50.8 83.4 16.9 26.7 48.2 36.6 8.6  41.6  85.0  51.6 -3202 32.7641
122 2.58189  0.6531  1.9318 0.65010 23.1526 29.3 56.6 72.1 16.4 27.6 45.5 31.3 5.9  43.4 130.6  78.8 -2586 31.0164
123 8.23086  0.5971  7.6337 0.59712 36.3410 29.0 51.3 72.1 16.3 26.5 46.7 31.8 6.8 107.4 275.0 171.8 -2665 31.2329
124 0.02868 10.3686 10.3400 0.02868 23.6711 28.1 51.7 86.2 17.5 30.2 51.6 41.5 5.0  45.0 122.8  79.6 -1618 28.3644
125    .        .       .       .       .    29.6 56.3 77.2 16.6 28.7 47.8 32.2 6.8  93.8 255.8 160.8 -4034 34.9836
```

```
                                                  SAS                              13:59 TUESDAY, APRIL 1, 1986   43

----------------------------------------------------------- SEX=M -----------------------------------------------------------

OBS NAME      BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION   ID HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

126 JONES         2      4   27      4    29  71.5             .            187               .          DOWNSVIEW 001  180.1   83.8 59.7 38.8    115.9   106.7 104.7    .     95.5
127 SCHUSTER      1      1    2      7    62     .       1     .       1    175               .        1 DOWNSVIEW 002  186.5   77.3 55.9 36.7    119.3   102.4  97.7    .     80.5
128 SOBEY         7      1    6      5    37  73.0             .            160               .          DOWNSVIEW 005  183.4   60.6 59.9 36.5    102.3    99.4  93.8    .     82.1
129 DEARING       1      1   25      6    61  72.0           180            160               .          DOWNSVIEW 006  184.2   72.0 57.2 36.4    106.9    98.8  95.6    .     77.3
130 OBRIEN        9      6   20     10    60     .       1     .       1      .        1      .        1 DOWNSVIEW 008  182.8   67.1 57.0 34.9    108.3    93.0  89.6    .     73.6
131 BOMBAY        1      1    3     10    61  74.0             .       1      .        1     70          DOWNSVIEW 010  184.7   69.7 56.2 36.2    107.9    89.8  84.8    .     73.6
132 MAXWELL       1      1   25      9    47  70.0             .       1    168               .        1 DOWNSVIEW 011  176.3   76.8 58.4 37.4    116.9   103.1  99.8    .     82.2
133 ELF           9      1   17     10    47  71.0           176            180              82          DOWNSVIEW 016  180.7   83.2 59.7 38.6    118.2   110.7 106.0    .     92.1
134 STOKER        9      1   15      7    29  71.3             .       1    172               .        1 DOWNSVIEW 017  175.8   79.0 59.2 40.3    112.0   105.4 103.5    .     93.1

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

126     92.9   101.8  55.6 39.8 39.7  24.5    33.9  32.8    29.5  19.7     6.0     15.4   22.6     34.4    14.0    19.8      7.8    16.2    11.8   11.4   88.0    145.7
127     80.7    95.6  54.0 36.3 36.8  23.0    35.0  32.3    29.5  17.9     2.8      8.2    7.8     12.6     5.2     7.2      5.2     5.2     9.4    7.6   93.1    154.3
128     89.6    98.2  52.6 37.8 33.6  20.8    30.2  29.6    27.0  17.4     4.2     10.8   12.2     20.0     8.4    24.2     11.8    11.0     9.4   12.6   91.7    152.3
129     84.2    95.9  55.4 38.8 39.5  22.7    30.5  29.3    26.8  16.9     3.0      8.4    7.6     13.0     6.0    10.6      4.6     5.4     7.4    8.8   92.8    152.8
130     74.7    92.8  53.8 38.4 36.1  22.0    30.6  29.1    27.5  17.0     3.8      6.6    9.4     11.2     4.2     6.2      6.0     6.4    11.0    8.6   94.2    150.5
131     75.5    94.6  54.5 38.5 35.4  21.2    31.3  29.0    27.1  17.4     3.2      6.2    8.6     10.4     4.2     5.2      5.0     5.4     5.6    4.2   99.0    147.7
132     83.2    99.1  57.2 36.3 39.5  23.0    34.5  32.9    28.9  18.0     7.8     11.0   16.8     24.6    14.2    21.8      6.4    10.8    13.0    6.2   90.6    144.1
133     96.6   100.3  58.3 36.2 37.9  22.8    33.0  22.6    29.0  17.7     5.4     17.4   14.4     33.2    12.0    24.2     12.6    19.2    12.2   16.0   91.4    150.2
134     94.9   100.7  53.7 40.2 34.4  21.9    31.1  30.1    26.7  17.8     3.8      8.8   12.2     17.4    11.0    16.0     10.0    11.2     8.0    6.2   90.5    146.3

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH  TAL  TAS  LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH  LEGL LLEGL CHESTDEP BARPRES AHBTEMP H1INIT H1FINAL H1VOL

126     10.2      7.6      7.6      6.3     9.6 82.1 61.7 29.9   42.7  26.8     45.7    39.0     32.6     30.3     36.0 106.2  47.4     22.0     745    27.2  11.20    5.00     2
127     10.0      7.7      7.4      6.1     8.8 81.6 61.6 30.3   43.9  28.0     48.6    41.8     29.8     28.3     33.4 108.3  49.4     17.7     745    27.2  10.60    7.38     3
128      9.6      7.0      7.6      6.0     8.4 83.1 63.1 29.0   44.3  26.3     43.2    39.6     29.8     29.0     34.0 105.4  51.2     19.6     745    27.2  11.40    5.37     3
129      9.6      7.4      6.8      5.6     8.6 64.2 57.8 30.1   44.8  28.6     44.8    40.0     30.3     29.3     35.1 107.4  50.8     19.6     745    27.2  11.40    5.22     3
130      9.7      7.2      7.0      5.8     8.8 83.2 62.9 29.9   42.8  27.2     44.1    40.0     27.9     30.2     33.9 101.8  48.0     16.7     745    27.2  11.40    7.18     3
131      9.8      7.2      7.0      6.0     8.7 76.0 57.1 27.3   41.0  25.7     43.7    40.3     27.9     30.4     34.8  99.6  49.1     17.6     745    27.2  11.42    7.16     3
132      9.6      7.2      7.5      6.0     9.0 79.4 59.8 29.1   41.4  25.4     47.8    42.3     29.9     27.9     34.9  97.9  47.4     23.6     745    27.2  11.40    5.58     3
133      9.1      7.1      7.4      5.9     8.8 83.1 63.9 30.6   42.4  27.2     46.5    42.0     32.3     29.0     35.2 103.0  48.5     21.6     745    27.2  11.55    7.80     3
134     10.0      7.0      6.7      6.0     8.5 78.1 59.2 27.6   39.9  25.7     46.2    41.3     32.8     29.5     36.1 101.3  45.5     22.2     745    27.2  11.55    6.38     2
```

```
                                                  SAS                              13:59 TUESDAY, APRIL 1, 1986   44

----------------------------------------------------------- SEX=M -----------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC    HRV2 H2OVAP    HRV1

126  11.20    6.20     3  11.20    6.10     3 5.64 4.19 619    31.4    2.18   3.880    2.43     1.40    0.99     2.96    1.58     2.40 2.49976  27.32 2.56[illegible]5
127  10.60    7.10     3  10.60    7.22     3 6.72 5.41 588    32.0    2.18   6.000    4.19     2.13    3.91     2.21    4.23     2.22 1.50119  27.32 1.32[illegible]
128  11.40    6.82     3  11.40    6.79     3 5.98 4.60 579    32.9    2.18   3.520    2.30     1.67    2.93     1.65    2.33     1.58 2.07007  27.32 3.50[illegible]
129  11.40    5.22     3  11.40    6.80     3 7.23 5.13 586    33.3    2.18       .    1.25     3.28    2.08     2.95    2.22     2.65 3.70206  27.32 3.7020[illegible]
130  11.40    7.70     3  11.40    7.80     3 4.39 3.82 395    33.7    2.18   6.280    4.40     2.04    4.49     1.93    4.32     2.05 1.46157  27.32 1.803[illegible]
131  11.42    7.10     3  11.42    7.20     3 4.64 3.99 572    34.0    2.18   6.280    4.38     1.27    3.89     1.28    3.76     1.62 1.86907  27.32 1.826[illegible]
132  11.40    6.50     3  11.40    6.67     3 6.16 4.73 648    34.4    2.18   4.600    1.79     2.87    1.05     3.85    2.17     2.51 2.33220  27.32 3.2532[illegible]
133  11.55    7.88     3  11.55    7.82     3 4.95 4.32 602    34.6    2.18   5.100    3.00     2.04    3.28     1.54    2.82     2.23 1.41449  27.32 1.4623[illegible]
134  11.55    6.08     2  11.55    6.40     2 3.25 2.09 507    34.5    2.18   3.940    2.98     0.76    3.15     1.00    2.89     0.99 1.84146  27.32 1.65[illegible]77

OBS    HRV3       A       B       C MINRVDIF     HRV  H2ODENS DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

126 2.59409 0.06439 0.02994 0.09433 0.029938 2.57912 0.995257 1.05525  1.05449  1.05599  1.05643  1.05454  1.05077  1.05184
127 1.42216 0.18043 0.10139 0.07904 0.079039 1.46167 0.995051 1.07511  1.07978  1.07676  1.08175  1.07467  1.07567  1.07264
128 2.09360 1.43768 1.41415 0.02352 0.023524 2.08184 0.994742 1.06183  1.07015  1.08187  1.06902  1.06104  1.06494  1.07655
129 2.08573 0.00000 1.61633 1.61633 0.000000 3.70206 0.994604       .  1.09334  1.10179  1.09911        .  1.08768  1.09614
130 1.40112 0.34154 0.40200 0.06046 0.060460 1.43134 0.994467 1.09202  1.09504  1.09433  1.09343  1.09150  1.09021  1.08956
131 1.79791 0.04293 0.02822 0.07116 0.028225 1.81203 0.994364 1.09480  1.09410  1.07581  1.07930  1.09416  1.08939  1.07146
132 2.18981 0.92107 1.06345 0.14238 0.142364 2.26100 0.994227 1.06659  1.06724  1.07075  1.06757  1.06591  1.06273  1.0659
133 1.45031 0.04788 0.01206 0.03582 0.012063 1.45634 0.994158 1.05709  1.05612  1.05320  1.05624  1.05669  1.05249  1.04973
134 1.63976 0.18969 0.01201 0.20170 0.012013 1.64576 0.994192 1.04658  1.04374  1.04944  1.04566  1.04611  1.04031  1.0459

OBS DENSITYZ  PERFAT PERFATA PERFATB PERFATC       X       Y       Z  MINFAT  EXPFAT PERFAT1 PERFATX PERFATY PERFATZ

126  1.05242 18.8745 19.1848 18.5678 18.3889 0.61699 0.79593 0.17894 0.17894 18.4784 19.1628 20.7204 20.2778 20.0362
127  1.07760 10.8710  9.0324 10.2231  8.2627 1.19064 0.76974 1.96038 0.76974  8.6475 11.0482 10.6501 11.8505  9.8913
128  1.06386 16.1875 12.8426  8.2173 13.2939 4.62528 0.45128 5.07656 0.45128 13.0482 16.5094 14.9309 10.3025 15.3682
129  1.09359       .  3.7835  0.5813  1.5920 3.20219 2.19146 1.01073 1.01073  1.0867       .  5.9614  2.7163  3.6880
130  1.08861  4.2911  3.1364  3.4054  3.7524 0.26902 0.61600 0.34698 0.26902  3.4709  4.4909  4.9860  5.2369  5.6006
131  1.07480  3.2288  3.4761 10.5955  9.2234 7.09941 5.72735 1.37207 1.37207  9.9094  3.4723  5.3023 12.3224 10.9960
132  1.06317 14.2669 14.0070 12.6044 13.8748 1.40256 0.13214 1.27041 0.13214 13.9409 14.5427 15.8230 14.5400 15.6449
133  1.05256 18.1182 18.5155 19.7149 18.4664 1.19938 0.04912 1.24849 0.04912 18.4910 18.2822 20.0078 21.1508 19.9800
134  1.04216 22.4604 23.6498 21.2722 22.8429 2.37752 0.80683 1.57068 0.80683 23.2463 22.6555 25.0920 22.7430 24.3125
```

```
                                                   SAS                                  13:59 TUESDAY, APR: 1, 1986   45
------------------------------------------------ SEX=M ---------------------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UP-ARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR    AGE

126  0.44259  0.68413  0.24154  0.24154  20.1570  34.4  53.6  92.1  20.4  31.8  58.8  44.7  4.7   78.4  159.4  104.0  -11206  54.6329
127  1.20034  0.75883  1.95917  0.75883  10.2707  32.2  60.9  93.4  20.0  31.3  58.9  44.0  5.5   31.4   71.2   45.2     913  21.4301
128  4.62837  0.43737  5.06574  0.43737  15.1495  31.1  60.6  91.7  20.0  34.1  54.2  40.5  6.9   47.2  124.6   76.6   -8275  46.6027
129  3.24513  2.27343  0.97170  0.97170   3.2022  31.4  61.4  91.4   6.4  27.7  56.6  40.6  6.0   32.0   74.8   47.0     541  22.4493
130  0.25087  0.61460  0.36373  0.25087   5.1116  32.3  61.9  88.6  20.3  33.0  53.8  40.6  5.2   31.0   73.4   44.4     293  23.1278
131  7.02011  5.69374  1.32637  1.32637  11.6592  37.0  62.0  85.7  18.9  29.8  50.5  36.6  8.1   28.4   58.0   36.0     641  22.1753
132  1.28301  0.17606  1.10695  0.17606  15.7350  32.2  58.4  85.7  19.6  30.7  50.5  38.3  6.0   60.2  132.6   87.2   -4481  36.2082
133  1.14307  0.02772  1.17080  0.02772  19.9939  30.5  60.9  89.3  19.2  33.3  54.5  40.8  6.1   70.4  166.6  101.4   -4459  36.1479
134  2.34906  0.77956  1.56950  0.77956  24.7052  29.5  61.0  85.3  18.9  31.6  55.8  39.8  5.6   42.2  104.6   62.4  -11127  54.4164
```

```
                                                   SAS                                  13:59 TUESDAY, APRIL 1, 1986   44
------------------------------------------------ SEX=M ---------------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION   ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

135 WOOD        1 1 19  8 52 71.0     .  1  190       .     1  DOWNSVIEW  018  177.5   86.9  58.5  40.9  119.0  108.0  107.9  .   98.1
136 ALLAN       3 1 19  1 61   .   1  .  1    .   1   .     1  DOWNSVIEW  021  162.1   72.8  55.2  39.2  111.0  100.4   97.6  .   83.1
137 LEGAULT     4 2 24  6 39 65.0     .  1  135       .     1  DOWNSVIEW  024  163.5   59.8  55.5  37.1  105.4   95.3   92.2  .   83.0
138 ROBERTSON   1 1 14  5 39 75.0     .     275       .        DOWNSVIEW  025  188.3  125.4  61.2  46.5  131.7  122.4  120.4  .  112.7
139 RUTTER      2 1 23 11 59   .   1  .  1    .   1   .     1  DOWNSVIEW  026  174.5   87.2  58.3  40.4  113.9  111.0  107.7  .   92.0
140 HUBLEY      3 4 30  1 42 69.0     .  1  163      74.0      DOWNSVIEW  027  171.6   73.8  54.3  39.4  110.7  103.5   99.9  .   88.5
141 LEVTE       3 1 18  9 47 69.0     .     164       .        DOWNSVIEW  029  175.6   75.6  57.4  39.3  117.8  106.6  104.8  .   85.8
142 LUFFMAN     3 1 25  1 46 69.0     .  1  190       .     1  DOWNSVIEW  031  170.8   87.2  56.3  41.1  120.9  109.3  107.2  .   92.8
143 MULVIHILL   1 4 26  5 42 74.0     .     220     100.0      DOWNSVIEW  032  188.8   98.7  58.5  41.9  122.0  107.3  103.5  .   96.6

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

135  100.9  104.5  60.8  39.5  37.3  21.5  35.1  32.2  28.0  17.0   8.0  17.6  17.6  40.2  16.4  24.6  20.8  24.6  15.8  15.6   92.8  146.1
136   88.8  100.1  63.2  38.1  39.5  22.3  35.5  33.3  28.9  17.2   5.4  13.4  12.0  11.6  13.4  22.2  11.6  11.4  22.6  16.0   89.1  130.0
137   83.4   89.1  49.0  35.5  32.8  20.4  30.1  27.9  26.6  17.1   3.8   9.4  11.4  16.2  12.4  14.6   7.0  10.6  12.6   5.8   84.9  136.0
138  114.4  125.1  66.7  43.5  44.1  23.7  44.2  41.5  35.1  20.4  12.2  29.4  40.6  43.4  20.2  45.0  30.0  25.8  42.0  26.4  101.8  157.0
139   95.0  105.6  65.5  39.4  41.7  23.7  35.5  33.6  29.6  17.4   5.0  12.6  17.2  31.4  17.2  26.6  16.0  13.8  14.8  16.2   93.0  144.2
140   88.0   95.8  56.6  36.9  37.7  21.5  33.4  31.8  28.7  17.9   4.2  11.2  15.2  25.6  11.4  24.0   9.4  12.0   9.8   4.2   89.9  140.0
141   87.0   97.4  56.2  37.2  38.0  22.9  36.4  33.2  29.8  18.4   4.8   9.6  12.4  22.6   8.8  17.6  11.2  11.6  10.8   7.0   86.9  143.6
142   92.3  104.6  61.9  37.8  40.7  22.5  39.3  35.0  31.2  17.5   3.8   7.6  11.4  17.0   9.2  14.2   7.0  10.4  10.0   6.8   89.0  139.6
143  102.8  10[illegible].3  63.8  43.7  42.4  22.2  38.2  35.8  31.5  19.5   6.6  16.0  1[illegible].8  28.2  12.2  24.0  11.8  16.0  17.0  13.2   95.3  153.8

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT HIFINAL HIVOL H2INIT

135   9.4  6.7  4.9  5.4  8.1  78.3  60.7  28.2  40.2  24.2  48.7  41.2  30.4  30.2  34.1   99.5  47.2  23.6  745  27.2  11.46  8.00  3  11.46
136   9.2  6.9  6.8  5.7  8.7  70.6  53.1  25.2  35.5  23.7  45.7  41.1  29.5  26.1  35.5   86.9  41.6  21.1  745  27.2  11.40  8.05  3  11.40
137   9.0  6.8  7.0  5.9  8.4  76.3  57.1  26.6  37.7  25.4  44.4  39.3  29.7  26.8  32.3   92.2  42.5  19.2  745  26.7  11.25  7.10  3  11.25
138  10.2  7.0  7.9  6.3  9.3  80.0  60.8  30.0  43.8  26.4  53.6  44.1  34.0  32.3  40.4  103.8  52.6  25.6  745  26.7  11.25  7.00  3  11.25
139   9.6  7.3  7.3  5.5  8.6  80.7  61.6  28.8  40.1  25.3  46.7  42.1  29.9  28.5  35.7   96.5  44.7  27.9  745  26.7  11.25  7.95  3  11.25
140   9.1  6.8  7.2  5.7  8.9  79.3  59.4  28.1  39.2  25.3  44.6  39.8  30.6  26.8  34.0   95.5  45.7  21.4  745  26.7  11.35  6.70  3  11.35
141   9.7  7.3  7.7  6.2  8.8  75.9  57.2  27.9  40.1  24.2  47.7  41.3  29.6  27.1  33.0   95.4  45.5  26.3  745  26.7  11.20  6.70  3  11.20
142   9.5  7.2  7.2  5.7  9.1  77.0  58.3  27.8  39.1  26.0  47.9  40.6  30.4  27.8  35.9   95.1  44.8  23.3  745  26.7  11.40  7.50  3  11.40
143  10.4  8.1  8.0  6.6  9.3  85.9  65.3  30.4  44.8  26.7  46.8  41.3  30.3  33.4  38.0  106.9  5[illegible].8  23.0  745  26.7  11.40  6.40  3  11.40
```

```
------------------------------------------ SEX=M ------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEHGT H2OHGT1 H2OHGTA LUNGVOLA H2OHGTB LUNGVOLB H2OHGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

135 8.06    3     11.46  8.20    3     4.45 3.89 615 34.2    2.18    3.680   3.28    1.32     2.52    0.93     1.49    2.91     1.27465 27.32  1.30862 1.19733
136 8.20    3     11.40  8.44    3     4.77 3.82 546 34.1    2.18    5.176   2.94    3.26     4.02    2.32     4.47    2.16     1.17402 27.32  1.25654 1.04810
137 7.40    3     11.25  7.40    3     4.70 3.85 472 33.1    2.18    3.910   3.15    1.02     2.50    1.91     1.37    2.05     1.59273 26.47  1.79792 1.59273
138 6.80    3      .      .      .     6.39 4.66 581 32.8    2.18    3.090   0.68    3.43     1.22    2.03     0.53    2.27     2.02122 26.47  1.87023  .
139 7.95    3      .      .      .     6.38 5.22 659 33.4    2.18    4.860   2.22    3.12     2.30    2.90     3.28    1.97     1.25675 26.47  1.25675  .
140 6.88    3     11.25  6.60    3     6.25 4.75 647 33.3    2.18    4.765   2.10    1.59     3.48    1.04     3.74    1.29     1.95977 26.47  2.10010 2.18137
141 6.80    3     11.20  6.63    3     7.66 5.94 628 33.6    2.18    3.040   2.12    1.83     1.24    3.24     2.38    1.25     1.99774 26.47  2.07626 2.13264
142 7.80    3     11.40  8.00    3     5.90 4.91 755 33.4    2.18    6.940   2.11    1.90     5.05    2.27     6.91    1.00     1.40511 26.47  1.59186 1.28840
143 6.88    3     11.40  7.17    3     5.97 4.77 757 33.4    2.18    5.490   2.70    3.30     3.55    1.88     3.90    1.56     2.02942 26.47  2.42639 1.81534

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

135 0.033967 0.111291 0.077323 0.033967 1.29164 0.994295 1.03453 1.04595  1.03162  1.04331  1.03420  1.04277  1.02862
136 0.082515 0.208439 0.125924 0.082515 1.21528 0.994330 1.06321 1.07915  1.08149  1.08622  1.06283  1.07450  1.07713
137 0.205196 0.205196 0.000000 0.000000 1.59273 0.994673 1.06089 1.06572  1.07024  1.05149  1.06027  1.06093  1.06505
138 0.150995  .        .       0.150995 1.94573 0.994776 1.02418 1.03268  1.02544  1.02165  1.02385  1.03004  1.02308
139 0.000000  .        .       0.000000 1.25675 0.994570 1.04872 1.05463  1.05285  1.05356  1.04840  1.05095  1.04924
140 0.140329 0.081268 0.221597 0.081268 2.14074 0.994604 1.07018 1.05354  1.06629  1.07422  1.06950  1.04940  1.06222
141 0.078527 0.056378 0.134906 0.056378 2.10445 0.994501 1.04232 1.05548  1.06328  1.05081  1.04170  1.05136  1.05867
142 0.186748 0.303465 0.116717 0.116717 1.34676 0.994570 1.07698 1.07778  1.08192  1.09004  1.07661  1.07424  1.07825
143 0.396975 0.611058 0.214082 0.214082 1.92238 0.994570 1.05732 1.06295  1.05652  1.05688  1.05687  1.05945  1.05338

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X      Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

135 1.03974  27.5479 22.7217 28.7924 23.8275 6.0707 1.10579 4.96489 1.10579 23.2746 27.6871 24.0551 30.0837 25.3323
136 1.08187  15.6288  9.2807  8.3632  6.5266 0.9175 2.75408 1.83658 0.91751  8.8220 15.7852 11.1121 10.0737  8.216
137 1.04644  16.5722 14.6164 12.8089 20.4208 1.8075 5.80446 7.61197 1.80751 13.7126 16.8218 16.5541 14.8861 22.520
138 1.01927  32.0109 28.3396 31.4636 33.1168 3.1238 4.77695 1.65316 1.65316 32.2902 32.1563 29.4703 32.4895 34.160
139 1.05018  21.5674 19.1273 19.8588 19.5687 0.7314 0.44134 0.29008 0.29008 19.7137 21.7024 20.6457 21.3535 20.963
140 1.07001  12.8302 19.5766 14.3905 11.2237 5.1861 8.35292 3.16686 3.16686 12.8071 13.1020 21.2887 16.0328 12.8977
141 1.04690  24.2467 18.7765 15.6021 20.7022 3.1744 1.92570 5.10013 1.92570 19.7394 24.5075 20.4731 17.4734 22.326
142 1.08666  10.1353  9.8208  8.1978  5.0525 1.6229 4.76825 3.14531 1.62294  9.0093 10.2800 11.2178  9.6346  6.352
143 1.05382  18.0264 15.7355 18.3533 18.2055 2.6177 2.46997 0.14775 0.14775 18.2794 18.2089 17.1573 19.6402 19.462
```

```
------------------------------------------ SEX=M ------------------------------------------

OBS M      N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLFG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDK TOTALSF TSF   BIR   ACE

135 6.0286 1.27721 4.75164 1.27721 24.6937 31.4    61.4   84.7     17.6  32.5   52.3    37.5    7.0      83.4 201.2   115.8 -2691 31.3
136 1.0385 3.89564 1.85717 1.03848 10.5929 32.1    57.0   73.0     17.5  27.9   45.3    31.4    6.1      42.4 139.6    81.8   334 22.8
137 1.6681 5.96582 7.63790 1.66808 15.7201 27.5    57.4   78.6     19.2  30.5   49.7    36.1    4.8      40.8 103.8    64.2 -7496 44.46
138 3.0192 4.69029 1.67109 1.67109 33.3250 31.3    70.5   86.5     19.2  30.8   51.2    33.9    8.8     125.6 315.0   200.4 -7537 44.51
139 0.7078 0.31779 0.39000 0.31779 20.8046 30.3    62.7   81.5     19.1  32.8   52.5    37.3    4.1      66.2 170.8   102.6   -39 24.03
140 5.2559 8.39101 3.13513 3.13513 14.4652 31.6    58.3   81.7     19.9  31.3   49.8    36.0    6.5      56.2 127.0    85.8 -6545 41.863
141 2.9997 1.85383 4.85352 1.85383 21.4000 32.0    54.9   88.7     18.7  29.3   49.9    43.2    5.4      49.4 116.4    73.0 -4488 36.
142 1.5832 4.86494 3.28175 1.58319 10.4262 31.2    57.8   81.8     18.7  30.5   50.3    37.0    5.7      39.8  97.4    60.2 -5089 37.
143 2.4829 2.30481 0.17813 0.17813 19.5511 35.0    60.3   93.5     20.6  34.9   56.1    42.7    6.0      62.6 156.8    97.0 -6429 41.545
```

```
--------------------------------------------------- SEX=M ---------------------------------------------------

OBS NAME       BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NONGTIN HGTCM NONGTCM WGTLBS NONGTLBS WGTKGS NONGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

144 ROBERTSON   1 1 24  4 48 70.0          .         190          .       DOWNSVIEW 033 176.4 83.7 58.0 38.2 117.0 105.1 101.7 .  91.0
145 MACDIARMID  1 4 11  6 34 76.0          .       1 210        95.0       DOWNSVIEW 034 187.6 97.4 58.5 42.7 118.5 111.0 108.1 .  99.6
146 KING        3 1 29 11 40 66.0      165.0           .   1      .    1   DOWNSVIEW 037 162.0 72.4 57.2 36.6 112.5 102.0  96.6 .  84.6
147 BOUDREAU    3 1  4  7 50 67.0          .         154          .       DOWNSVIEW 038 168.3 68.2 60.1 37.6 113.3 100.6  97.9 .  79.8
148 PERCIVAL    6 1 12  8 55 69.0          .       1 187          .    1   DOWNSVIEW 039 173.6 83.1 57.6 39.4 115.5 109.8 106.4 .  95.5
149 HETU        1 2 13  7 57 69.5          .       1              .    1   DOWNSVIEW 041 174.8 86.1 58.5 39.3 122.8 110.0 102.1 .  89.6
150 TATEM       9 4 18  6 45 70.0          .         197          .       DOWNSVIEW 044 171.2 90.6 58.5 39.9 120.8 115.1 109.6 . 100.0
151 STODDART    1 4  3 10 32 73.5          .       1 210        95.5       DOWNSVIEW 045 186.5 96.1 58.2 41.1 119.7 114.9 110.8 .  98.1
152 TETREAULT   2 2 21  6 63 72.0          .       1 145          .       DOWNSVIEW 050 181.7 65.2 57.3 37.2 111.5  94.9  92.6 .  72.2

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

144  94.9 103.7 59.5 39.4 40.1 24.0 36.0 34.6 30.3 18.6 4.8  9.4 10.4 29.0 13.2 24.2 11.2 14.8 12.0 13.0 96.3 143.8
145 104.2 109.4 62.6 41.7 40.4 23.8 36.4 33.3 30.7 19.4 5.8 17.0 18.2 36.4 11.3 33.2 20.2 16.6 16.8 11.4 94.9 156.1
146  86.6  97.7 58.9 36.2 39.4 23.6 35.1 33.9 28.6 18.8 6.6 13.6 11.0 18.2 13.2 20.8 13.2 12.4 14.6 11.2 87.8 135.2
147  81.5  93.4 54.6 36.5 37.1 21.7 33.7 30.8 27.8 17.9 3.2  7.6 10.8 13.4  7.0 17.2  7.8  7.0  8.6  8.4 86.4 137.5
148  97.4 100.6 61.1 42.5 39.6 23.2 35.0 33.1 28.0 17.9 5.8 16.6 14.8 25.6 16.0 25.2 16.8 16.4 13.0 17.2 90.2 143.1
149  91.6 102.9 62.0 40.7 41.5 24.8 39.1 36.2 31.4 19.6 3.6 11.0 11.6 27.0 11.2 18.6 11.2 11.0 14.2 12.4 91.1 144.0
150 102.9 107.2 59.2 40.4 40.7 23.5 38.4 37.1 30.6 18.0 8.4 18.0 26.0 36.6 16.6 37.0 16.0 19.0 19.0 14.4 90.3 145.1
151 103.6 108.9 59.2 41.5 39.4 23.3 36.0 35.0 31.1 19.3 9.4 17.0 17.8 36.0 20.0 26.0 21.2 24.2 12.2  9.8 95.7 154.7
152  73.3  92.4 51.1 36.7 34.6 21.2 31.1 26.0 26.2 16.9 3.2  6.4  8.4 10.4  6.2  6.4  4.6  5.8  9.2 11.2 94.5 149.7

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

144  9.7 7.6 8.1 6.2 8.7 77.8 58.3 28.0 39.2 26.4 46.0 39.2 28.9 29.5 36.3  96.9 45.4 23.1 744 33.1 11.30 7.88 3 11.30
145 10.8 8.0 8.4 6.4 9.4 85.8 64.5 30.4 44.8 28.5 46.9 40.1 32.7 32.9 39.0 105.8 49.4 24.1 744 27.2 11.40 6.57 3 11.40
146  9.3 6.9 6.8 6.2 8.9 71.5 54.0 25.5 35.1 24.2 42.3 35.7 29.6 28.0 33.1  87.8 40.1 21.2 744 27.2 11.30 7.00 3 11.30
147  9.0 7.0 6.8 6.0 8.6 74.9 56.1 28.1 36.3 25.1 46.6 41.0 30.6 26.3 31.9  92.5 43.9 20.0 744 27.2 11.30 7.08 3 11.30
148  9.8 7.2 6.7 6.1 8.3 77.4 59.3 26.0 41.3 25.6 47.5 40.4 31.2 30.2 35.7  97.2 46.1 22.7 744 27.2 11.40 7.77 3 11.40
149 10.2 7.9 7.9 6.3 9.2 80.4 60.0 28.7 42.2 26.0 48.5 39.9 32.1 28.9 36.3  98.1 46.1 22.0 744 27.2 11.40 7.20 3 11.40
150 10.1 7.7 7.5 6.3 8.9 78.8 59.7 28.0 42.0 27.0 46.3 39.7 30.0 30.4 36.7  97.3 46.2 22.8   .    .     .    . .     .
151 10.0 7.5 7.9 6.2 9.2 86.1 66.5 31.0 45.2 28.1 47.3 39.4 30.4 31.8 36.0 107.3 50.4 25.3 746 26.7 11.10 6.90 3 11.10
152  9.4 7.2 6.8 6.1 8.6 80.5 61.6 29.6 43.5 25.0 46.5 41.7 28.9 28.2 32.5 100.9 49.3 19.9 746 26.7 11.20 7.00 3 11.20
```

```
--------------------------------------------------- SEX=M ---------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

144 7.56 3 11.30 7.50 3 6.23 4.89 631 33.0 2.18 4.550 3.12 2.88 3.19 1.84 3.18 3.33 1.45711 37.35 1.27014 1.49394
145 6.39 3 11.40 6.60 3 6.29 4.86 659 33.1 2.18 4.000 1.45 2.84 1.31 2.70 2.15 1.81 2.42646 27.32 2.27277 2.24764
146 7.48 3 11.30 7.43 3 5.52 4.66 550 33.0 2.18 4.130 1.51 4.01 2.36 2.11 2.20 2.36 1.55775 27.32 1.88773 1.59014
147 7.30 3 11.30 7.07 3 5.45 4.61 651 32.9 2.18 5.320 3.23 3.72 3.89 1.41 3.39 2.12 1.67641 27.32 1.82963 1.83682
148 7.82 3 11.40 7.85 3 6.49 5.19 576 32.9 2.18 4.750 2.40 2.55 3.14 1.68 1.97 3.27 1.38926 27.32 1.41915 1.37152
149 7.22 3     .    . . 6.17 5.44 757 32.8 2.18 6.440 4.92 1.66 4.36 2.66 4.78 2.08 1.77517 27.32 1.78914       .
150    . .     .    . . 6.13 4.91 696    . 2.18     .    .    .    .    .    .    .       .     .       .       .
151 6.30 3 11.10 6.18 3 6.85 4.41 631 31.3 2.18 3.270 1.78 1.87 1.42 2.32 1.58 1.57 2.36450 26.47 1.87511 2.47378
152 6.98 3     .    . . 6.17 5.81 649 31.1 2.18 5.075 3.32 2.52 2.10 3.88 2.85 4.29 1.86198 26.47 1.84734       .

OBS A        B       C       MINRVOF  HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY DENSITYZ

144 0.186970 0.22380 0.03683 0.036833 1.47552 0.994707 1.04964 1.06897 1.05590 1.07599 1.04924 1.06504 1.05234 1.07187
145 0.155695 0.02512 0.18082 0.025124 2.26020 0.994673 1.04495 1.04804 1.04490 1.04439 1.04443 1.04464 1.04153 1.04123
146 0.329978 0.29759 0.03238 0.032383 1.57395 0.994707 1.05285 1.07435 1.05794 1.05932 1.05236 1.06936 1.05369 1.05498
147 0.153218 0.00719 0.16041 0.007191 1.83322 0.994742 1.08065 1.10910 1.08018 1.08374 1.08001 1.10347 1.07564 1.07894
148 0.029882 0.04763 0.01775 0.017747 1.38035 0.994742 1.05142 1.05392 1.05224 1.05778 1.05104 1.05018 1.04875 1.05384
149 0.013971       .       . 0.013971 1.78215 0.994776 1.07712 1.07890 1.08484 1.08269 1.07663 1.07526 1.08088 1.07890
150        .       .       .        .       .        .       .       .       .       .       .       .       .       .
151 0.489387 0.59867 0.10928 0.109281 2.41914 0.995291 1.03908 1.04329 1.04429 1.03764 1.03852 1.04004 1.04093 1.03459
152 0.014644       .       . 0.014644 1.85466 0.995360 1.08060 1.09433 1.09680 1.11869 1.07992 1.08903 1.09097 1.11247

OBS PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ M

144 21.1887 13.3133 18.6074 10.5269  5.2941 2.78633 0.08047 2.78633 11.9201 21.3538 14.8928 20.0705 12.1568  5.1777
145 23.1408 21.8442 23.1615 23.3750  1.3173 1.53077 0.21349 0.21349 23.2682 23.3582 23.2732 24.5770 24.7048  1.3038
146 19.8096 11.1737 17.7729 17.2102  6.5992 6.03649 0.56272 0.56272 17.4916 20.0633 13.1587 19.5120 18.9817  6.7534
147  8.6937 -2.1547  8.8784  7.4889 11.0331 9.64360 1.38947 1.38947  8.1836  8.9455 -0.0517 10.6641  9.3721 10.7158
148 20.4506 19.4190 20.1124 17.8367  0.6934 1.58233 2.27574 0.69341 19.7657 20.6062 20.9620 21.9573 19.4608  0.9953
149 10.0801  9.3793  7.0595  7.8971  2.3198 1.48228 0.83754 0.83754  7.4783 10.2740 10.8154  8.6044  9.3789  2.2110
150       .       .       .       .       .       .       .       .       .       .       .       .       .       .
151 25.6123 23.8388 23.4189 26.2210  0.4199 2.38223 2.80212 0.41989 23.6288 25.8487 25.2080 24.8320 27.5610  0.3760
152  8.7132  3.4085  2.4670 -5.6881  0.9414 9.09661 8.15518 0.94142  2.9378  8.9797  5.4389  4.6929 -3.4034  0.7460
```

```
                                              SAS                              13:59 TUESDAY, APRIL 1, 1986   5
------------------------------------------------------ SEX=M -------------------------------------------------------

OBS  N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDN TOTALSF   TSF    BIR    AGE

146  2.73596  7.91370  2.73596  13.5248  32.6    63.7   80.1     19.5  30.3   51.5    34.7    6.2     53.6  142.0     85.0  -4269  35.6274
145  1.43170  0.12789  0.12789  24.6409  31.5    63.4   92.7     21.5  34.1   56.4    43.3    4.6     77.4  187.2    121.6  -9335  49.5068
146  5.82299  0.53037  0.53037  19.2469  26.8    61.0   74.2     17.5  28.5   47.7    34.1    5.0     49.4  134.8     78.2  -4972  43.0329
147  9.42381  1.29194  1.29194  10.0181  30.8    55.6   81.7     18.8  28.0   48.6    38.0    5.6     35.0   91.0     57.6  -3468  33.4329
148  1.50115  2.09648  0.59533  21.2597  30.5    59.7   83.4     18.1  31.3   51.1    37.3    4.8     62.8  167.4     95.2  -1603  28.3233
149  1.43658  0.77443  0.77443   8.9916  30.8    60.3   83.7     20.4  31.3   52.0    37.6    3.9     53.2  131.8     82.4   -902  26.4027
150   .        .        .         .      26.1    64.2   80.9     19.1  31.7   51.1    34.7    4.2     89.0  211.0    136.6  -5310  38.4795
151  2.35299  2.72901  0.37602  25.0200  31.8    63.9   90.8     19.6  35.5   56.9    40.4    5.2     80.2  193.6    109.0  -9951  51.1945
152  8.84228  8.09627  0.74601   5.0459  32.0    62.5   87.2     18.9  32.0   51.6    37.9    5.8     28.4   71.8     40.8   1267  20.4603
```

```
                                              SAS                              13:59 TUESDAY, APRIL 1, 1986   52
------------------------------------------------------ SEX=M -------------------------------------------------------

OBS NAME      BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

153 DONNELLY    2     1     16    11    57   71.0           .      1     206               .       1     DOWNSVIEW 051 178.8  89.2  59.4  39.3  124.3   109.2  104.7  .   92.2
154 DONOVAN     3     1     22     1    50   58.0           .            180               .             DOWNSVIEW 055 172.0  82.1  58.3  40.5  117.2   106.8  103.7  .   91.4
155 ROSE        1     1     27     6    39   71.0           .            190               .             TRENTON   137 179.4  87.8  58.2  38.8  113.3   108.1  105.5  .   97.3
156 BARRY       1     1      3     2    55   72.0         180.0          207             94.0            TRENTON   138 178.0  95.3  62.7  41.4  126.6   117.0  113.7  .   96.3
157 SEWELL      9     1      1    10    54   69.5           .      1     175               .       1     TRENTON   139 175.6  76.7  56.5  37.2  113.5   103.4   99.6  .   84.0
158 MACGREGOR   5     1     29     6    56   71.0           .      1     181             81.4            TRENTON   140 180.6  81.4  57.4  41.5  117.3   107.9  102.2  .   89.4
159 PURCELL     1     1     23     2    56   65.0           .      1     147             65.5            TRENTON   141 163.5  65.5  55.9  38.1  113.0    97.3   94.7  .   80.6
160 FUGARD      1     1     16     7    59   72.0         180.0          165             72.0            TRENTON   142 179.4  71.5  56.0  36.7  110.1   105.2  101.0  .   78.0
161 DOUGLAS     1     1      8     4    60     .     1      .      1     146               .             TRENTON   143 169.4  66.0  58.4  35.1  114.0    95.7   93.1  .   75.1

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUFARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

153   97.3   103.6   63.5  42.3 40.0  24.8   36.6   34.3   30.0   19.7   6.4    16.0    15.6    28.2    13.6    20.0    14.4    15.0    14.0    8.8   98.4   149.6
154   93.0   103.5   60.8  39.3 38.2  23.3   34.6   30.9   29.2   18.7   4.2    11.2    15.6    25.4    15.6    22.0    10.0    12.4    14.0   12.0   90.6   140.9
155   99.0   101.7   59.1  37.4 38.6  23.0   37.1   34.4   29.5   18.0   3.4    12.0    12.4    25.8    10.4    23.4     8.4    11.4    16.6   10.0   92.1   149.6
156   98.0   104.5   63.7  41.8 42.3  25.2   36.6   35.2   29.4   18.3   3.0    14.0    12.2    15.0     9.0    11.2     7.6    10.0     8.0   10.2   90.1   147.2
157   84.8    96.0   61.9  38.1 37.2  21.7   35.3   32.9   27.4   17.2   7.6    11.4    17.6    26.4    11.8    20.0    10.0    18.0    15.4   15.8   92.4   145.8
158   94.7    95.0   59.5  39.1 38.3  23.0   35.3   33.3   28.8   17.5   5.0    16.6    13.4    20.4     8.2    18.0    11.8     9.8    16.6   13.8   93.7   148.5
159   76.7    90.1   53.4  34.7 36.6  21.8   33.5   31.0   28.6   17.2   5.2     6.2     9.4     8.5     5.6     7.6     4.4     5.0     5.6    4.2   83.7   133.8
160   80.4    93.4   57.1  37.8 36.3  21.6   32.5   30.4   27.0   17.1   3.2    11.5     8.0    10.2     7.6    11.4     6.0     6.0     9.6   11.8   93.4   148.3
161   78.5    91.1   53.2  35.8 35.3  22.2   32.5   30.6   27.0   16.6   3.4     8.5     7.8    20.0     8.2    21.4     7.4     8.2     8.0    8.6   88.9   139.1

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL  LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

153   10.8     7.4      9.9      6.4     8.7  79.1 59.8 28.8  41.6  26.3    48.4    41.9     33.6     21.3     37.5    96.8  46.6   21.3     746     26.7   11.20   6.75    3   11.20
154    9.7     7.4      7.0      6.3     9.0  76.5 57.7 27.6  39.4  25.0    48.2    39.5     32.3     26.6     33.3    96.5  44.9   23.2     745     27.1   11.00   7.67    3   11.00
155   10.1     7.6      7.4      6.2     8.8  78.4 58.7 27.5  39.1  25.0    45.6    37.7     29.1     29.4     35.1    97.9  45.1   21.1     763     27.0   11.36   7.83    3   11.36
156   10.4     7.2      7.6      6.3     9.4  81.4 61.6 30.0  40.6  26.8    49.2    44.2     34.0     32.2     36.2    97.9  45.9   21.6     743     27.5   11.35   6.88    3   11.35
157    9.9     7.3      7.1      6.1     8.6  78.0 59.3 27.8  41.1  26.5    47.2    42.0     31.3     28.3     35.6    97.8  46.5   20.3     743     27.5   11.35   6.44    3   11.35
158    9.8     7.0      7.1      5.4     8.9  80.5 60.7 28.4  41.8  24.1    48.8    41.2     30.7     30.7     33.5   100.1  48.1   19.4     743     27.5   11.35   7.30    3   11.35
159    8.8     7.0      6.7      5.9     8.7  73.1 55.3 26.6  38.5  23.9    45.5    40.3     27.1     25.0     31.4    90.0  43.3   19.2     743     27.5   11.35   7.75    3   11.35
160    9.7     7.1      7.1      5.1     9.3  80.0 60.5 28.4  41.7  25.7    46.8    42.5     30.7     28.2     33.1   100.2  48.2   17.4     743     27.8   11.30   7.76    3   11.30
161    8.9     6.9      7.2      5.7     8.8  75.3 56.5 27.9  39.1  24.5    47.5    41.1     29.3     28.5     32.5    92.7  44.1   19.1     743     27.8   11.30   6.62    3   11.30
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

153 7.09 3 11.20 7.36 3 6.55 5.32 652 31.1 2.18 5.420 2.85 2.58 2.70 2.74 1.91 4.13 1.78246 26.47 2.03663 1.99735
154 7.90 3 11.00 7.95 3 5.60 4.95 751 30.8 2.18 5.440 3.45 1.85 3.05 2.31 3.60 1.82 1.18158 27.15 1.31465 1.15367
155 5.90 3 11.36 7.31 3 4.74 4.24 598 26.0 2.68 5.050 3.28 1.14 4.14 0.47 4.10 0.59 2.87998 26.98 2.95365 1.69649
156 6.98 3 11.35 6.90 3 6.55 5.18 509 26.0 2.68 4.910 3.21 1.31 3.45 0.95 1.25 3.62 1.92207 27.83 1.99723 1.98202
157 7.30 3 11.35 7.47 3 5.27 3.38 392 26.0 2.68 4.720 2.38 1.67 1.49 2.57 2.09 1.76 1.69539 27.83 2.35546 1.58287
158 7.52 3 11.35 7.40 3 6.24 4.86 622 26.0 2.68 4.800  .    .   1.95 2.40 2.05 2.46 1.55074 27.83 1.69539 1.62858
159 7.70 3 11.35 7.60 3 4.04 3.56 253 26.0 2.68 5.850 4.46 1.84 4.20 1.42 4.36 1.49 1.43854 27.83 1.40830 1.50022
160 8.00 3 11.30 7.82 3 5.16 4.03 486 26.0 2.68 5.575 3.58 1.66 3.18 1.78 4.10 1.09 1.24076 28.34 1.37944 1.34397
161 7.10 3 11.30 7.12 3 4.22 3.73 586 26.0 2.68 5.380 2.80 2.03 2.70 2.48 3.78 1.46 1.80918 28.34 2.17553 1.79498

OBS    A         B        C        MINRVDIF   HFV      H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY DENSITYZ

153 0.254164 0.43927 0.18511 0.185108 1.62991 0.995360 1.05995 1.05992 1.06004 1.06761 1.05951 1.05632 1.05639 1.06354
154 0.133074 0.16098 0.02791 0.027910 1.16762 0.995463 1.05857 1.05654 1.05733 1.05818 1.05824 1.05299 1.05365 1.05443
155 0.073671 1.25717 1.18349 0.073671 2.91682 0.997111 1.06545 1.05730 1.05976 1.06078 1.06468 1.05371 1.05632 1.05731
156 0.075161 0.01521 0.05995 0.015206 1.98962 0.997111 1.04755 1.04303 1.04167 1.04697 1.04708 1.03998 1.03871 1.04336
157 0.660274 0.77280 0.11252 0.112523 1.63913 0.997111 1.05191 1.04224 1.04234 1.03940 1.05143 1.03846 1.03830 1.03562
158 0.144649 0.06682 0.07783 0.066816 1.66198 0.997111 1.05016    .    1.04399 1.04614 1.04970    .    1.04021 1.04233
159 0.030242 0.09192 0.06166 0.030242 1.42342 0.997111 1.07735 1.08531 1.07320 1.07763 1.07683 1.08053 1.06868 1.07334
160 0.138686 0.03547 0.10322 0.035470 1.36171 0.997111 1.06531 1.05991 1.05549 1.05914 1.06487 1.05579 1.05137 1.06521
161 0.366352 0.38054 0.01419 0.014193 1.80208 0.997111 1.07509 1.06542 1.07147 1.07256 1.07445 1.06065 1.06648 1.06793

OBS PERFAT   PERFATA  PERFATB  PERFATC    X        Y        Z       MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ     M

153 16.9528 16.9629 16.9153 13.8602 0.04765 3.10277 3.05512 0.04765 16.9391 17.1303 18.4361 18.4052 15.4961 0.03085
154 17.5148 18.3446 18.0208 17.6728 0.32383 0.67177 0.34794 0.32383 18.1827 17.6480 19.8022 19.5309 19.1270 0.27134
155 14.7258 18.0317 17.0297 16.6139 1.00192 1.41772 0.41580 0.41580 16.8218 15.0370 19.5055 18.4321 18.0291 1.07341
156 22.0546 23.9486 24.5207 22.2974 0.57211 1.65115 2.22327 0.57211 24.2346 22.2504 25.2320 25.7688 23.8080 0.53672
157 20.2477 24.2801 24.2359 25.4768 0.04422 1.19666 1.24088 0.04422 24.2580 20.4479 25.8760 25.9417 27.0836 0.06571
158 20.9711    .    23.5439 22.6440    .        .    0.89991 0.89991 23.0939 21.1624    .    25.1343 24.2412    .
159  9.7895  6.8779 11.6276  9.8796 4.74968 3.00177 1.74791 1.74791 10.7536 10.1931  8.7401 13.4297 11.6918 4.68961
160 14.7825 16.9698 18.7744 17.2810 1.80463 0.31126 1.49337 0.31126 17.1254 14.9616 18.6511 20.4715 18.8873 1.82042
161 10.8799 14.7400 12.3185 11.8814 2.42148 2.85860 0.43712 0.43712 12.1000 11.1357 16.6688 14.3112 13.7293 2.35760
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS    N        O      MINFAT1  EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDH TOTALSF  TSF    BIR     AGE

153 2.97998 2.90913 0.03085 18.4207 29.2 69.2 80.4 19.3 31.0 50.2 33.8 5.0 66.2 152.0 93.8  -776 26.0575
154 0.67519 0.40385 0.27134 19.6665 31.1 59.5 81.4 18.8 30.1 51.6 36.5 5.5 56.4 142.4 88.2 -3631 33.8795
155 1.47640 0.40299 0.40299 18.2306 29.8 62.3 87.3 19.7 31.2 52.8 42.2 6.0 53.6 133.8 90.2 -7493 44.4603
156 1.42407 1.96079 0.53672 25.5004 30.8 59.3 87.9 19.8 31.6 52.0 42.0 5.3 44.2 100.2 60.4 -1793 28.8438
157 1.20765 1.14194 0.06571 25.9088 29.8 62.6 83.2 18.7 31.5 51.3 36.7 5.4 63.0 154.0 90.8 -1918 29.1863
158    .    0.89300 0.89300 24.6877 31.9 61.8 86.7 19.8 32.3 52.0 38.6 6.3 55.4 133.6 85.0 -1281 27.4411
159 2.95171 1.73790 1.73790 12.5607 29.7 54.0 79.8 17.8 26.7 46.7 36.5 4.8 26.0  56.4 37.0 -1408 27.7890
160 0.23626 1.58416 0.23626 18.7692 31.1 62.3 86.0 19.5 32.1 52.0 37.6 6.5 32.6  85.0 50.4  -169 24.3945
161 2.93951 0.58191 0.58191 14.0203 30.3 58.6 80.5 18.8 28.6 48.6 36.4 5.0 39.7 101.5 65.7    38 23.8274
```

```
------------------------------------------------------------------- SEX=M ---------------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

162 GEDDES          2      1    3      5    58     .       1 179.8       1    165            74.0           TRENTON 144  179.8   73.4 58.9 38.0    110.2    93.3  90.1    .     80.4
163 MCGINLAY        9      1    3      1    61  68.5         173.0            166            75.0           TRENTON 145  169.8   74.3 57.5 40.5    117.0   101.1  97.0    .     81.4
164 LOWRY           1      1    5      5    56  69.5         178.0            168            77.1           TRENTON 146  174.8   74.2 55.1 40.5    118.4   107.6 104.0    .     86.3
165 BOUCHER         3      1   21      7    42  68.0             .            157               .           TRENTON 147  168.7   70.0 55.4 38.7    113.2    98.6  96.0    .     83.3
166 PRENDERGAST     2      1    3      6    44     .       1     .       1      .        1      .        1  TRENTON 148  167.1   67.2 58.0 36.7    103.1    99.4  96.3    .     84.5
167 BRAKE           1      1   17      8    57  66.0             .            165           174.0           TRENTON 149  166.1   76.6 56.4 37.8    111.3   103.6 101.4    .     88.3
168 FILONIK         9      4    4     10    41  69.0         179.0            155            71.0           TRENTON 150  176.4   69.5 56.2 37.2    109.1    99.7  95.3    .     82.7
169 RICE            4      1   22      4    47  67.8             .       1    180               .        1  TRENTON 151  171.6   81.7 55.8 40.0    120.6   107.0 103.8    .     92.8
170 COLTON          1      1   12     12    44  72.0         182.0            152            71.0           TRENTON 152  181.2   68.2 56.2 38.4    111.0   100.5  96.0    .     80.1

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

162     82.2    93.4  57.7 36.0 34.8  19.3    32.6  31.1    28.3  16.8     2.6     10.2    9.2     20.0     8.0    20.0     11.4    10.0    10.0    9.6   91.2    148.0
163     82.2    97.2  59.5 37.4 38.5  22.2    34.7  31.5    28.1  17.7     3.0     11.0   14.0     19.0     6.4    14.4      9.8     9.4    12.0    7.2   89.9    135.7
164     86.9    95.3  55.8 37.6 38.2  22.0    32.9  30.7    27.2  16.6     3.6      7.0   11.2     23.2     7.8    18.0      8.2     9.6     6.6    4.6   93.2    143.0
165     85.5    92.6  54.0 36.7 34.1  21.6    35.3  33.2    28.6  17.9     5.6      9.0   12.2     25.0     8.2    28.8      9.0    14.0     8.4    7.4   88.8    138.5
166     87.0    91.2  52.7 36.7 34.7  21.2    32.7  30.8    27.5  16.2     3.4      7.4    7.4     11.2     5.6    14.0      5.6     6.8     8.0    7.0   89.0    137.5
167     91.3   100.5  63.4 37.3 36.1  21.7    35.1  32.9    28.0  16.0     3.0     12.4   11.4     24.2     6.4    18.2      8.8    13.2    12.0    5.2   86.4    134.9
168     81.1    90.0  51.2 36.8 35.9  22.5    31.0  30.0    28.8  17.6     3.0      5.2    8.2     12.4     6.2     9.4      5.2     6.4     6.6    3.8   92.2    147.0
169     94.5    99.5  61.6 39.3 40.2  22.7    35.4  32.9    29.4  17.4     5.8     16.2   12.2     33.4    10.8    30.8     11.6    11.6    17.8   16.4   91.6    139.8
170     82.5    93.4  50.6 35.8 34.0  20.8    29.1  27.8    25.4  16.5     4.0      6.2    7.8     14.6     9.2    17.6      8.4     8.4    10.2    4.8   96.2    146.2

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH  TAL  TAS  LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH  LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

162      9.3      6.9      7.3      5.9     8.3 78.1 59.5 28.6   41.9  24.8     45.4    38.8     27.2     26.7     35.1 103.5  49.4     18.3     743    27.8  11.30    7.48     3
163      9.3      6.7      6.7      5.9     9.0 73.2 54.9 27.5   38.0  25.2     47.4    42.5     30.3     27.3     33.7  92.1  42.8     18.3     743    27.8  11.30    7.57     3
164      9.6      7.3      7.5      5.9     8.4 80.3 60.6 28.6   40.3  25.9     47.7    41.8     31.3     28.7     34.0  94.4  47.3     23.8     743    27.5  11.30    6.58     3
165      9.4      6.9      7.1      5.9     9.4 77.5 58.1 28.4   39.4  26.0     45.7    38.4     30.2     25.7     32.9  93.6  45.7     22.5     743    27.5  11.30    8.00     3
166      9.2      6.6      6.6      5.7     8.8 76.7 58.5 27.8   39.9  25.0     41.8    35.5     27.7     29.4     33.4  94.1  45.3     20.1     743    27.5  11.40    7.41     3
167      9.6      7.0      6.9      5.4     8.3 72.9 56.0 26.3   37.5  24.0     46.1    39.3     30.1     28.4     36.1  91.0  42.6     21.6     743    27.5  11.40    8.20     3
168      9.5      7.6      7.6      6.1     9.2 81.5 60.7 28.8   40.9  27.8     44.3    39.1     30.6     27.9     31.6  97.4  48.2     20.4     743    27.5  11.40    6.97     3
169      9.4      7.2      7.1      5.8     8.7 78.5 59.7 27.9   40.2  25.1     48.7    42.7     33.3     30.3     35.3  93.4  45.2     21.4     743    27.5  11.40    8.10     3
170      9.5      7.2      7.2      5.9     8.6 80.9 61.5 28.3   40.9  26.2     45.8    40.7     30.4     29.2     32.9  99.5  46.8     19.7     743    27.5  11.40    7.20     3
```

```
------------------------------------------------------------------- SEX=M ---------------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL  FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC    HRV2 H2OVAP    HRV1    HRV3

162  11.30    7.96     3  11.30    8.00     3 3.92 3.36 461      26    2.68   5.450    4.12     1.32    4.15     1.30    4.00     1.34 1.26329  28.34 1.55249 1.24076
163  11.30    7.65     3  11.30    7.76     3 4.56 3.90 482      26    2.68   5.885    3.60     2.44    4.42     1.38       .        . 1.44592  28.34 1.49547 1.37944
164  11.30    6.79     3  11.30    6.70     3 5.46 4.94 674      26    2.68   4.850    1.68     3.61    2.65     2.38    2.55     2.56 2.04335  27.83 2.21225 2.11444
165  11.30    8.20     3  11.30    8.40     3 3.86 3.43 468      26    2.68   5.230    3.70     1.60    2.83     2.17    3.88     1.98 1.13332  27.83 1.24288 1.02898
166  11.40    7.56     3  11.40    7.40     3 4.70 3.02 246      26    2.68   4.750    1.80     2.21    1.39     2.70    2.40     1.64 1.54636  27.83 1.64345 1.65006
167  11.40    7.89     3  11.40    8.14     3 3.91 3.24 458      26    2.68   6.250    5.30     1.03    3.39     2.02    2.63     2.87 1.34581  27.83 1.17211 1.20469
168  11.40    6.94     3  11.40    6.91     3 4.92 3.49 718      26    2.68   4.530    2.50     2.84    2.30     2.10    2.60     2.28 1.97478  27.83 1.95230 1.99746
169  11.40    8.02     3  11.40    8.00     3 4.42 3.74 598      26    2.68   5.350    4.09     0.65    2.80     1.98    3.74     0.90 1.27133  27.83 1.22669 1.28263
170  11.40    7.26     3  11.40    7.37     3 5.57 4.55 640      26    2.68   4.300    3.20     0.70    4.15     0.18    4.15     0.19 1.74453  27.83 1.76615 1.67000

OBS        A        B        C MINRVDIF     HRV  H2ODENS DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

162 0.289201 0.311735 0.022534 0.022534 1.25202 0.997111 1.05962  1.05941  1.05956  1.05788  1.05923  1.05556  1.05572
163 0.049557 0.116030 0.066473 0.049557 1.47070 0.997111 1.06883  1.07112  1.06764        .  1.06837  1.06681  1.06351
164 0.168904 0.097813 0.071091 0.071091 2.07889 0.997111 1.06236  1.06895  1.06500  1.06622  1.06171  1.06409  1.06057
165 0.109558 0.213898 0.104341 0.104341 1.08115 0.997111 1.05642  1.05747  1.05218  1.06650  1.05607  1.05341  1.04798
166 0.097072 0.006611 0.103684 0.006611 1.64676 0.997111 1.06032  1.04794  1.04923  1.04846  1.05975  1.04340  1.04451
167 0.173706 0.032588 0.141118 0.032588 1.18840 0.997111 1.06787  1.06903  1.05539  1.05667  1.06751  1.06538  1.05154
168 0.022484 0.045163 0.022679 0.022484 1.96354 0.997111 1.05976  1.07291  1.05756  1.04535  1.05911  1.06799  1.05302
169 0.044645 0.055966 0.011301 0.011301 1.27698 0.997111 1.05222  1.04397  1.04445  1.04262  1.05187  1.04079  1.04090
170 0.041613 0.116143 0.074530 0.041613 1.76534 0.997111 1.05393  1.04741  1.05442  1.05458  1.05334  1.04339  1.05052

OBS DENSITYZ  PERFAT PERFATA PERFATB PERFATC       X       Y       Z  MINFAT  EXPFAT PERFAT1 PERFATX PERFATY PERFATZ

162  1.05403 17.0857 17.1719 17.1091 17.7967 0.06280 0.62478 0.68758 0.06280 17.1405 17.2455 18.7454 18.6801 19.3728
163        . 13.3688 12.4562 13.9177       . 1.46157       .       . 1.46157 13.1870 13.5543 14.1794 15.5073       .
164  1.06172 15.9763 13.3229 14.9069 14.4160 1.58404 1.09310 0.49094 0.49094 14.6615 16.2388 15.2730 16.7017 16.2335
165  1.06225 18.3927 17.9644 20.1361 14.3052 2.17145 3.65940 5.83086 2.17145 19.0503 18.5374 19.6291 21.8769 16.0206
166  1.04410 16.8030 21.8936 21.3576 21.6777 0.53597 0.21584 0.32013 0.21584 21.7856 17.0326 23.7914 23.3237 23.4961
167  1.05256 13.7528 13.2919 18.8137 18.2099 5.52179 4.99798 0.52381 0.52381 18.5518 13.8981 14.7565 20.3993 19.9795
168  1.06069 17.0311 11.7436 17.9284 14.7664 6.18482 3.02284 3.16197 3.02284 13.2550 17.2956 13.7062 19.7913 16.6534
169  1.03938 20.1194 23.5519 23.3491 24.1170 0.20284 0.56504 0.76788 0.20284 23.4505 20.2658 24.8916 24.8413 25.4853
170  1.05068 19.4137 22.1154 19.2156 19.1486 2.89982 2.96683 0.06701 0.06701 19.1821 19.6562 23.7942 20.8230 20.7574
```

```
                                                            SAS                          13:59 TUESDAY, APRIL 1, 1986   57
------------------------------------------------------- SEX=M -----------------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNK1 TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR    AGE

162  0.06536  0.62733  0.69269  0.06536  18.7127  31.8    49.4   88.6     18.6  30.9   54.1    39.2    7.5     42.0  111.0   69.4  -608   25.5973
163  1.32791  .        .        1.32791  14.8434  34.1    55.8   79.9     18.3  27.4   49.4    37.1    4.8     47.0  106.2   70.4   368   22.9233
164  1.42874  0.96053  0.46821  0.46821  16.4676  31.8    61.4   81.6     19.7  32.0   47.1    34.3    7.0     45.0   98.8   65.0  -1336  27.5918
165  2.24774  3.60855  5.85628  2.24774  20.7530  30.2    58.6   79.9     19.4  29.7   47.9    34.2    6.3     51.8  127.6   83.4  -6373  41.3918
166  0.46766  0.29530  0.17235  0.17235  23.4099  29.8    59.2   78.1     18.2  30.7   [illegible] 32.8 5.4     29.0   76.0   47.6  -4960  37.5255
167  5.64287  5.22302  0.41985  0.41985  20.1894  31.2    55.5   79.7     16.9  29.7   48.4    37.1    7.1     51.0  114.8   78.2  -867   26.3068
168  6.08507  2.94736  3.13771  2.94736  15.1799  29.4    62.8   84.2     [illegible] 31.9 49.2  36.0    7.3     28.8   66.4   41.8  -6663  42.1863
169  0.05033  0.59370  0.64403  0.05033  24.8664  31.8    59.8   80.0     16.8  31.8   48.2    34.8    5.0     67.6  166.6  110.4  -4637  36.6354
170  2.97125  3.03689  0.06564  0.06564  20.7902  35.0    61.2   85.0     19.4  33.2   52.7    34.2    5.9     32.6   91.2   56.4  -5498  38.9965
```

```
                                                            SAS                          13:59 TUESDAY, APRIL 1, 1986   58
------------------------------------------------------- SEX=M -----------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY EMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

171 NEWELL      9     1      18   8      45    71.0          .     1       .      1        .      1        TRENTON  153 176.4  82.5   58.6 39.0 109.0    107.1   103.4 .    96.1
172 NICHOLS     1     1       6   9      44    69.0          170           185             83.0           TRENTON  154 171.6  83.5   55.3 37.0 110.0    105.7   102.2 .    90.0
173 THOMPSON    1     1       1   2      48    65.5          .     1       165    1        .      1        TRENTON  155 164.5  74.1   55.8 39.1 114.9    103.1   102.4 .    90.9
174 SWEET       1     1      20   9      46    76.0          190           225             102.0          TRENTON  156 194.5 103.2   60.0 41.3 130.2    114.8   110.2 .    94.6
175 OLIVER      1     1      27   4      40    70.0          .     1       177             80.0           TRENTON  157 174.9  81.0   56.2 40.3 120.9    106.3   102.4 .    87.1
176 FITZPATRICK 6     1       8   9      49    68.0          171           154             68.5           TRENTON  158 170.8  68.5   54.0 38.3 115.2    102.5    96.6 .    79.5
177 AUBIN       1     2      25  12      33    72.0          .     1       222             .      1        TRENTON  159 178.7  97.2   57.7 42.3 116.0    108.8   105.1 .   103.9
178 CAHILL      9     1      11   5      37    67.0          .     1       145             .      1        TRENTON  160 169.6  66.1   58.4 40.0 106.7     97.4    94.2 .    83.5
179 WHITE       1     1       1   8      35    65.0          .     1       .      1        .      1        TRENTON  161 166.2  74.1   54.4 38.5 112.2    100.4    97.7 .    85.6

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

171  98.0    100.9   59.0  40.0 39.3 22.5  37.0    34.1  29.2    18.3   7.2    20.8     16.0   34.4     14.2    32.8    14.2     13.8    19.6    16.6   93.1   144.5
172  93.1    100.0   63.6  39.9 39.7 23.3  36.9    35.9  28.8    17.3   5.2    17.4     13.0   28.2      9.2    25.0    18.4     10.6    17.0    12.4   89.2   143.7
173  94.2     99.2   61.2  38.7 37.7 22.4  32.8    31.5  27.0    16.8   7.0    18.0     21.4   31.2     12.0    35.4    18.0     21.4    18.0     8.6   87.6   135.7
174 100.3    109.2   66.1  42.4 41.2 25.2  37.1    35.4  30.2    18.3   7.2    15.2     13.2   31.4     12.0    28.6    11.6     11.6    16.8    13.4   99.0   156.6
175  90.0    100.2   61.1  39.7 37.7 23.2  36.4    36.0  30.0    18.6   3.8    12.0     11.4   17.0      8.2    12.8     7.6      8.8    18.4    11.6   87.5   142.3
176  80.9     92.7   55.0  35.1 35.5 21.1  33.6    30.8  26.0    16.7   2.6     6.4      8.6   14.8      8.0    12.0     5.6      7.8     8.4     4.6   90.7   139.1
177 110.0    108.3   58.8  42.1 42.3 23.3  36.7    35.4  30.5    18.3   5.4    13.6     22.0   33.8     19.0    38.0    19.6     24.0    17.6    12.0   86.9   148.7
178  83.8     92.8   52.3  36.1 35.0 20.7  30.2    29.3  26.8    17.0   4.0    11.0      9.8   14.8     10.4    12.0     7.2     10.4    10.2     5.0   86.4   138.5
179  88.0     95.8   56.6  37.2 37.8 22.0  34.6    32.2  27.7    17.6   3.2    11.2     11.6   27.4      7.2    34.4     9.8      9.2    12.0     8.4   86.3   138.1

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL  LLEGL CHESTDEP BARPRES AMBTEMP HIINIT HIFINAL HIVOL

171  9.8     7.4      7.2      6.2      9.4     81.1 60.7 28.0 42.5   27.1  46.8     41.8    31.5     28.5     34.8      99.8 49.0  22.2     743     27.5    11.40  7.06    3
172  9.7     7.3      7.3      5.7      8.8     79.3 60.5 28.5 40.7   24.9  46.0     38.5    30.1     29.5     34.8      95.5 47.1  22.4     743     27.5    11.40  7.28    3
173  9.5     7.2      7.0      5.5      8.9     76.7 58.2 27.2 37.8   24.8  46.0     39.7    29.5     28.1     34.5      92.0 43.7  23.5     743     27.5    11.25  8.40    3
174 10.9     8.2      8.1      6.4      9.0     85.3 65.3 31.2 44.9   26.2  52.6     45.4    34.9     33.5     40.1     107.6 52.0  23.1     743     27.5    11.25  6.10    3
175 10.0     7.7      7.4      6.5      9.6     76.8 57.1 28.4 41.1   27.3  49.4     42.4    31.9     29.8     34.3      94.7 48.5  22.0     743     27.5    11.25  7.00    3
176  9.2     7.2      7.4      5.7      8.3     75.7 58.2 27.4 39.6   24.0  47.2     40.2    29.4     26.6     33.8      92.3 44.5  21.6     743     27.5    11.35  7.24    3
177 10.6     7.4      7.4      6.2      9.3     82.7 62.3 29.2 42.2   26.1  47.1     40.7    32.9     31.2     35.7      99.8 49.8  24.3     743     27.5    11.35  7.00    3
178  9.8     7.3      7.1      6.2      9.0     74.5 55.8 26.5 37.1   25.0  43.4     38.2    29.0     28.5     32.8      91.4 42.7  20.6     743     27.5    11.35  7.67    3
179  9.1     7.3      6.9      5.8      8.8     75.4 56.9 27.4 39.2   24.0  45.8     40.5    28.8     27.2     32.4      91.0 43.7  21.7     743     27.2    11.40  7.04    3
```

```
---------------------------------------------------- SEX=M ----------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

171  11.40  7.07   3      .     .      .    5.14 3.85 458  26      2.68    3.776   2.05    1.54     1.48    2.02     1.20    2.14     1.87873 27.83  1.88599  .
172  11.40  7.32   3    11.40  7.23    3    4.27 3.64 517  26      2.68    5.350   3.80    1.13     4.27    0.38     4.37    0.52     1.70360 27.83  1.73082 1.76525
173  11.25  7.67   3    11.25  7.61    3    4.32 3.38 523  26      2.68    4.750   3.45    0.42     3.35    0.47     2.98    0.94     1.41541 27.83  1.01006 1.45219
174  11.25  6.27   3    11.25  7.08    4    5.52 3.89 356  26      2.68    3.950   3.00    1.09     1.90    1.58     2.60    1.24     2.45691 27.83  2.61592 2.42845
175  11.25  7.00   3      .     .      .    4.78 3.91 628  26      2.68    5.750   2.65    2.27     1.79    3.26     1.75    3.24     1.86186 27.83  1.86186  .
176  11.35  7.31   3    11.35  6.76    3    5.11 4.01 581  26      2.68    5.350   2.02    2.80     2.24    2.41     3.09    1.34     1.68863 27.83  1.73637 2.09036
177  11.35  7.36   3    11.35  7.51    3    3.80 3.24 376  26      2.68    4.175   2.75    1.03     1.30    2.52     1.17    2.52     1.65508 27.83  1.90729 1.55713
178  11.35  7.55   3    11.35  7.23    3    3.94 3.41 570  26      2.68    4.320   3.05    0.95     3.08    0.91     2.14    2.03     1.53167 27.83  1.45687 1.74326
179  11.40  7.32   3    11.40  7.32    3    3.74 3.43 563  25      2.68    5.716   2.30    2.55     2.38    1.98     2.72    2.00     1.70652 27.32  1.90384 1.70652

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

171 0.007263  .        .       0.007263 1.88236 0.997111 1.03880 1.03631  1.03512  1.03303  1.03830  1.03280  1.03149
172 0.027212 0.034438 0.061650 0.027212 1.71721 0.997111 1.05689 1.05125  1.04757  1.05074  1.05642  1.04784  1.04439
173 0.405358 0.442134 0.036776 0.036776 1.43380 0.997111 1.05121 1.03819  1.03746  1.03890  1.05077  1.03474  1.03400
174 0.159017 0.187471 0.028454 0.028454 2.44268 0.997111 1.03840 1.03984  1.03345  1.03721  1.03788  1.03699  1.03054
175 0.000000  .        .       0.000000 1.86186 0.997111 1.06636 1.05471  1.05647  1.05564  1.06583  1.05082  1.05228
176 0.047739 0.353989 0.401729 0.047739 1.71250 0.997111 1.07015 1.06120  1.05843  1.05488  1.06956  1.05642  1.05379
177 0.252209 0.350160 0.097951 0.097951 1.60611 0.997111 1.03410 1.02973  1.03012  1.02870  1.03374  1.02697  1.02702
178 0.074795 0.286387 0.211592 0.074795 1.49427 0.997111 1.05153 1.04614  1.04598  1.04892  1.05101  1.04202  1.04187
179 0.197315 0.197315 0.000000 0.000000 1.70652 0.997455 1.07004 1.05669  1.04936  1.05475  1.06950  1.05238  1.04528

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

171 1.02939  25.7302 26.7882 27.2959 28.1867 0.50769 1.39849 0.89080 0.50769 27.0420 25.9439 28.2847 28.8469 29.7513
172 1.04750  18.1989 20.5222 22.0472 20.7321 1.52500 0.20988 1.31512 0.20988 20.6271 18.3916 21.9362 23.3771 22.0777
173 1.03529  20.5371 25.9876 26.2978 25.6877 0.31015 0.29997 0.61012 0.29997 25.8376 20.7184 27.4555 27.7719 27.2212
174 1.03435  25.9000 25.2923 28.0076 26.4045 2.71537 1.11221 1.60317 1.11221 25.8484 26.1218 26.4986 29.2585 27.6244
175 1.05146  14.3602 19.0937 18.3743 18.7135 0.71940 0.38023 0.33917 0.33917 18.5439 14.5755 20.7000 20.0951 20.4319
176 1.05063  12.8433 16.4435 17.5735 19.0248 1.12991 2.58122 1.45131 1.12991 17.0085 13.0775 18.3950 19.4716 20.7765
177 1.02561  27.7292 29.6057 29.4374 30.0504 0.16832 0.44467 0.61298 0.16832 29.5216 27.8840 30.8001 30.7754 31.3864
178 1.04441  20.4061 22.6440 22.7125 21.4869 0.06854 1.15711 1.22565 0.06854 22.6763 20.6179 24.3732 24.4360 23.3891
179 1.05063  12.8867 18.2814 21.3021 19.0766 3.02074 0.79514 2.22559 0.79514 18.6790 13.1025 20.0530 23.0017 20.7786


                                                         SAS                            13:59 TUESDAY, APRIL 1, 1986  60
---------------------------------------------------- SEX=M ----------------------------------------------------

OBS M       N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR   AGE

171 0.56220 1.46662 0.90442 0.56220 28.5658 31.9    61.2   83.3     20.4  32.7   50.8    34.3    6.5     78.4  189.6   123.6 -5249 38.3123
172 1.44085 0.14144 1.29941 0.14144 22.0070 27.9    61.3   82.4     18.8  32.0   48.4    35.3    6.4     63.8  156.4   100.6 -5595 39.2603
173 0.31648 0.23423 0.55070 0.23423 27.3364 28.8    58.8   76.9     18.5  31.0   48.3    33.2    5.9     77.6  191.0   124.0 -4352 35.8548
174 2.75985 1.12582 1.63403 1.12582 27.0615 37.7    61.3   95.5     20.0  34.1   55.6    43.8    7.1     67.0  161.0   105.2 -4851 37.2219
175 0.60490 0.26804 0.33686 0.26804 20.5660 32.6    54.9   87.4     19.7  26.7   46.2    38.9    7.4     44.2  111.6    71.6 -7188 43.6247
176 1.07657 2.38154 1.30497 1.07657 18.9333 31.7    59.0   80.1     17.5  30.8   48.1    35.9    4.6     32.4   78.8    50.2 -3767 34.2521
177 0.02470 0.56628 0.61298 0.02470 30.7878 30.0    56.9   91.8     20.4  33.1   50.0    42.0    7.6     74.8  205.0   125.0 -9503 49.9671
178 0.06287 1.00404 1.06691 0.06287 24.4046 31.1    55.3   83.2     18.7  29.3   48.7    40.8    5.6     39.6   94.8    57.8 -8270 46.5893
179 2.94867 0.72561 2.22307 0.72561 20.4156 28.1    56.2   79.9     18.5  29.5   47.3    36.2    4.5     53.4  134.4    96.6 -8919 48.3671
```

```
                                                    SAS                                13:59 TUESDAY, APRIL 1, 1986   61
------------------------------------------------- SEX=M ----------------------------------------------------------------

OBS NAME         BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

180 LEIGHTON         3  1  12  11  40  68.5        .  1            1  85.5     TRENTON  162  171.4   85.8  55.1  43.6  115.3  105.6  103.5  .   93.1
181 GORDON           1  4  10   4  39  67.0        .  1  200.0        91.0     TRENTON  163  180.4   92.3  59.4  42.1  115.4  106.7  104.8  .   93.8
182 WILSON           1  1  11   2  46  69.0        .  1     .     1     .   1  TRENTON  164  171.4  101.1  59.7  42.9  124.8  115.4  114.1  .  100.1
183 EVANS            4  1  11   9  20  66.0        .  1  162.0          .   1  TRENTON  165  164.2   73.8  57.8  38.8  102.3  101.0  100.0  .   89.7
184 WATSON           1  1  31   7  33  71.5        .  1  180.0          .   1  TRENTON  166  178.5   82.5  58.7  39.7  114.5  108.7  107.7  .   99.0
185 DUDENHOFFER      1  1   7   4  33  71.0        .  1  192.0          .   1  TRENTON  167  180.1   87.2  56.3  41.6  118.4  108.6  105.8  .  100.4
186 WREGGET          5  1  31   7  30  70.0        .  1  180.0          .   1  TRENTON  168  176.5   82.5  57.8  38.7  113.4  104.2  102.2  .   88.4
187 PARKINSON        1  1  10   6  21  68.0        .  1  150.0         68.5     TRENTON  169  172.9   67.0  57.6  35.3  104.3   96.5   93.4  .   87.6
188 COOK             1  1  25   1  30  69.0        .  1     .     1   74.5     TRENTON  170  173.8   74.5  55.3  36.4  108.6  100.0   96.8  .   84.5

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

180   98.7  103.5  58.3  39.9  41.1  24.2  37.0  34.8  30.9  18.8   7.4  15.8  21.6  26.4  15.4  29.2  11.4  15.2  16.4   9.4  92.8  142.5
181   97.3  106.3  61.9  42.3  39.4  22.2  33.6  32.8  28.2  16.8   8.0  18.2  12.8  27.6  15.0  26.4  11.6  16.8  29.0  19.0  95.4  150.5
182  108.6  118.8  70.2  41.5  42.6  24.3  38.6  37.0  29.9  17.1  13.2  32.0  39.8  41.8  20.0  49.2  24.0  29.4  40.0  31.2  89.1  142.2
183   89.5   95.0  52.4  37.8  35.5  21.6  34.2  32.0  27.4  17.8   6.0  10.4  16.8  19.2  15.6  20.4   9.6  16.0   6.4   6.4  87.2  133.9
184  100.3  100.0  54.4  39.6  35.4  21.4  33.2  31.9  27.0  17.9   6.2  15.0  13.0  23.0  20.4  35.0  11.2  19.2  22.0   8.2  90.7  145.1
185  104.4  102.5  57.0  39.5  37.7  22.2  36.6  35.3  29.5  18.1   7.2  15.2  20.0  31.2  18.2  36.0  19.0  16.8  12.2  10.8  92.4  148.2
186   95.0  102.1  60.6  40.0  36.8  23.1  36.7  35.3  28.8  18.4   7.8  20.4  12.6  26.4  10.8  28.4  10.6  15.4  15.6  11.2  93.4  145.4
187   87.0   91.1  51.2  35.4  35.1  21.9  31.5  29.9  26.3  16.8   4.8  10.6  11.4  22.2  11.8  18.6   7.4  12.0   7.8   3.0  87.3  142.0
188   86.8   97.9  55.2  39.2  40.0  22.7  35.0  33.0  28.2  17.9   5.2  11.4  13.4  15.0  12.8  14.2   9.4   9.2  11.2  10.2  88.5  143.4

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

180   9.9  8.1  7.7  6.0  9.4  76.0  57.3  26.3  37.4  24.9  46.5  40.0  29.6  29.8  33.8   92.9  44.3  23.8  743  27.2  11.40  6.60  3
181  10.3  7.9  7.4  5.7  9.3  80.5  59.7  27.7  41.3  28.0  47.0  40.5  31.7  30.8  36.6   99.8  48.3  22.4  743  27.2  11.40  7.38  3
182  10.0  6.8  7.2  5.6  8.6  77.1  58.5  27.1  37.8  24.5  51.9  41.3  33.1  31.8  36.6   93.1  44.2  24.2  743  27.2  11.35  7.44  3
183  10.0  7.2  7.4  5.8  8.8  74.7  56.9  27.5  38.5  25.2  43.9  40.5  29.2  29.7  33.5   90.5  42.3  24.5  743  27.2  11.35  6.88  3
184  10.1  7.4  7.2  6.2  9.2  79.2  58.6  28.4  40.4  26.8  46.1  42.5  33.1  33.6  34.6   96.0  46.3  25.0  743  27.2  11.35  5.65  3
185  10.0  7.3  7.8  6.5  9.2  78.7  60.2  29.5  43.2  27.5  46.1  40.8  30.9  32.1  35.3  102.6  47.5  23.0  743  27.2  11.35  7.01  3
186  10.1  7.9  8.0  6.5  9.1  81.3  61.6  29.4  40.6  26.1  44.0  37.9  29.7  29.9  35.8   98.7  46.8  21.3  743  27.5  11.35  7.37  3
187   9.2  7.2  7.3  5.8  8.7  76.1  56.7  27.2  40.0  24.7  42.3  37.9  29.6  28.8  33.0   97.2  44.6  20.4  743  27.5  11.35  6.80  3
188  10.2  7.3  7.3  6.2  8.9  76.4  57.3  28.0  37.9  25.9  43.0  37.3  30.2  29.3  35.3   92.8  43.7  20.5  743  27.5  11.35  7.17  3


                                                    SAS                                13:59 TUESDAY, APRIL 1, 1986   62
------------------------------------------------- SEX=M ----------------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

180  11.40  7.00  3  11.40  7.00  3  3.36  2.96  467  25  2.68  4.750  1.80  2.11  3.47  0.51  2.10  1.79  1.93331  27.32  2.24773  1.93331
181  11.40  7.24  3  11.40  7.47  3  4.55  3.93  625  25  2.68  4.450  2.40  1.70  3.15  0.94  2.50  1.39  1.76134  27.32  1.66619  1.6049
182  11.35  7.50  3  11.35  7.51  3  3.67  2.96  462  25  2.66  3.000  1.65  1.11  1.68  1.03  1.75  0.99  1.56622  27.32  1.60510  1.5598
183  11.35  7.00  3  11.35  6.92  3  2.90  2.37  399  25  2.66  4.660  3.80  0.99  2.09  1.92  2.80  1.11  1.91056  27.32  2.00065  1.9702
184  11.35  5.78  3  11.35  6.42  3  3.76  2.70  403  25  2.66  3.010  1.20  1.47  1.64  0.83  0.92  1.37  3.00077  27.32  3.14470  2.37719
185  11.35  7.28  3  11.35  7.30  3  4.25  3.60  472  25  2.68  4.200  1.90  1.50  2.42  0.94  1.90  1.50  1.71190  27.32  1.90319  1.6983
186  11.35  7.30  3  11.35  7.70  3  3.77  3.28  441  25  2.68  3.920   .     .    2.89  0.61  2.67  0.62  1.69539  27.83  1.64843  1.4355
187  11.35  6.40  3  11.35  6.50  3  3.56  2.93  345  25  2.68  3.600  1.80  1.20  0.94  1.99  2.30  0.95  2.39069  27.83  2.05895  2.30393
188  11.35  7.21  3  11.35  7.28  3  3.26  2.67  524  25  2.68  2.790  2.70  0.90  2.71  0.65  2.56  0.90  1.75711  27.83  1.78504  1.70297

OBS      A         B         C     MINRVDIF     HRV     H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

180  0.314416  0.314416  0.000000  0.000000  1.93331  0.997455  1.05029  1.03951  1.04171  1.03927  1.04978  1.03596  1.03853
181  0.095152  0.059286  0.154438  0.059286  1.63655  0.997455  1.03954  1.03540  1.03531  1.03297  1.03915  1.03229  1.03236
182  0.038877  0.045296  0.006419  0.006419  1.56301  0.997455  1.02002  1.01752  1.01700  1.01731  1.01969  1.01491  1.01442
183  0.090089  0.030377  0.059712  0.030377  1.98546  0.997455  1.05838  1.06032  1.04850  1.04704  1.05776  1.05636  1.04435
184  0.143928  0.767512  0.623584  0.143928  3.07274  0.997455  1.04435  1.03981  1.03722  1.03485  1.04352  1.03599  1.03358
185  0.191290  0.204897  0.013607  0.013607  1.70510  0.997455  1.03969  1.02980  1.02933  1.02980  1.03926  1.02658  1.02625
186  0.046962  0.209889  0.256851  0.046962  1.67191  0.997455  1.03793   .       1.03244  1.03231  1.03749   .       1.02926
187  0.331746  0.244982  0.086764  0.086764  2.34731  0.997455  1.05296  1.04305  1.04186  1.04714  1.05216  1.03864  1.03722
188  0.027928  0.076064  0.048136  0.027928  1.77107  0.997455  1.02732  1.03892  1.03546  1.03718  1.02681  1.03525  1.03186

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

180  1.03580  20.9162  25.4304  24.5023  25.5329  0.92818  0.10245  1.0306  0.10245  25.4817  21.1273  26.9372  25.8452  27.0047
181  1.02995  25.4159  27.1747  27.2147  28.2132  0.04004  1.03850  0.9985  0.04004  27.1947  25.5820  28.5036  28.4465  29.5106
182  1.01474  33.8326  34.9330  35.1587  35.0222  0.22567  0.08925  0.1344  0.08925  34.9776  33.9774  36.0847  36.3030  36.1629
183  1.04314  17.5937  16.8023  21.6594  22.2674  4.85710  5.46512  0.6080  0.60802  21.9634  17.8457  18.4185  23.3936  23.8988
184  1.03108  23.3923  25.3013  26.4029  27.41    1.10166  2.10893  1.0073  1.00727  26.9066  23.7412  26.9250  27.9540  29.0226
185  1.02658  25.3534  29.5768  29.7795  29.5768  0.20268  0.00000  0.2027  0.00000  29.5768  25.5366  30.9693  31.1119  30.9693
186  1.02907  26.0983   .       28.4394  28.4979   .        .       0.0585  0.05850  28.4687  26.2882   .       29.8064  29.8886
187  1.04278  19.8159  23.9398  24.4322  22.2258  0.49243  1.71393  2.2064  0.49243  24.1860  20.1441  25.8000  26.4029  24.0511
188  1.03352  30.6459  25.6786  27.1507  26.4166  1.47206  0.73799  0.7341  0.73407  26.7836  30.8686  27.2419  28.6820  27.9793
```

```
                                                  SAS                                13:59 TUESDAY, APRIL 1, 1986   63
------------------------------------------------- SEX=M ---------------------------------------------------------------

OBS  M        N            O       MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT  TSFDM TOTALSF  TSF     BIR    AGE

180  1.09196  0.06751     1.1595  0.06751  26.9710  28.9  63.9  78.6  18.7  31.0  48.6  34.3  6.9   71.2  168.2  109.4   -4989  43.0795
181  0.03710  1.00703     1.0441  0.03710  28.4851  29.9  65.5  85.0  20.8  32.0  51.5  36.7  7.0   67.6  185.4  115.0   -7571  44.6740
182  0.21825  0.07813     0.1401  0.07813  36.1238  29.2  59.9  82.3  18.6  31.4  48.9  36.1  6.4  126.8  320.6  202.8   -5072  37.8274
183  4.97516  5.48036     0.5052  0.50520  23.6462  30.3  56.9  77.0  17.8  29.4  48.2  34.7  3.8   52.4  126.8   73.2  -14356  63.2630
184  1.02898  2.09757     1.0686  1.02898  27.4395  33.2  57.5  87.6  20.6  30.2  49.7  41.3  5.9   57.2  173.2  108.0   -9650  50.3699
185  0.14251  0.00000     0.1425  0.00000  30.9693  31.9  60.5  87.7  18.5  30.7  55.1  40.2  4.3   73.6  187.2  115.2   -9765  50.6849
186   .        .          0.0824  0.08235  29.8476  31.1  62.3  83.1  19.7  32.2  51.9  36.3  6.2   67.2  159.4  103.6  -10746  53.3726
187  0.60290  1.74888     2.3518  0.60290  26.1014  30.9  56.4  85.6  19.4  29.5  52.6  41.0  4.6   49.0  109.6   70.6  -14084  62.5178
18b  1.44062  0.73799     0.7026  0.70263  28.3306  30.4  58.1  85.3  19.1  29.3  49.1  41.6  5.8   45.0  112.0   65.2  -10933  53.8849




                                                  SAS                                13:59 TUESDAY, APRIL 1, 1986   64
------------------------------------------------- SEX=M ---------------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

189 CLANCY        9  1  10  12  32  64.5       .  1  174.0  1  79.0     TRENTON  171  165.0  78.7  57.2  41.4  113.5  110.0  106.1  .   95.1
190 BOUDREAU      3  2  22  10  35  66.0       .  1  145.0     66.0     TRENTON  172  170.5  67.0  55.3  36.7  106.0   96.8   93.1  .   78.5
191 LAROSE        1  2  20  11  33  63.0       .  1  150.0       .   1  TRENTON  173  161.0  67.5  57.8  37.8  111.5  101.0   99.8  .   85.0
192 AUDSON        1  1  28   5  33  62.0     155     178.2     81.0     TRENTON  174  157.9  81.6  58.6  40.8  113.4  111.0  109.6  .  106.1
193 APPERLEY      1  1  22   5  25  68.0     167     180.0     81.5     TRENTON  175  173.3  82.5  58.1  42.6  115.2  110.3  107.0  .   97.8
194 MAC DONALD    3  1   7   4  35  71.0       .  1  158.0     72.0     TRENTON  176  178.5  71.5  57.7  38.7  116.0  102.4   99.4  .   91.1
195 LAGOOD        1  1   2   8  46    .    1 180     170.0     74.0     TRENTON  177  178.3  73.7  55.3  39.2  112.5  103.1   98.9  .   80.0
196 MERFAH        1  1  32  11  47  70.0       .  1  183.0       .   1  TRENTON  178  178.1  83.4  57.9  38.3  113.5  105.0  101.6  .   [illegible]
197 SPILCHEN      1  4   7   4  59  66.0     167     157.5     71.5     TRENTON  179  167.4  71.2  56.2  38.1  115.6  104.4  100.8  .   75.2

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

189   96.8   96.6  57.2  37.3  37.7  22.7  35.1  32.4  29.8  17.6   4.4  17.0  11.6  20.4  11.6  20.2  11.4  13.4   8.2   5.2  82.4  135.1
190   80.8   94.7  54.1  38.5  36.3  21.6  34.9  32.7  27.4  17.2   2.8   8.4   7.6  19.6   6.0  10.6   7.0   6.6  13.2   4.8  87.7  142.2
191   87.0   95.2  55.3  36.3  35.5  21.7  30.4  31.5  28.0  16.7   2.8   7.6  11.2  16.0   7.4  11.8   6.0  11.6   6.6   5.6  84.8  130.9
192  107.1  108.9  59.7  41.4  39.1  23.7  36.3  35.0  28.8  17.1  13.8  25.6  25.6  35.0  21.8  35.8  16.2  31.2  40.6  22.4  78.9  129.4
193   96.0   99.1  57.5  37.5  38.5  21.6  36.4  34.9  29.0  17.6   8.0  13.8  19.0  16.4  13.8  24.4  10.0  13.8  11.8   6.4  90.0  141.8
194   91.5   95.9  51.6  35.5  33.6  19.8  30.9  29.7  26.0  16.0   8.0  10.8  11.6  27.4  16.2  36.2  11.0  26.2  15.2   4.2  94.2  145.4
195   82.4   95.3  57.9  36.5  35.5  22.0  31.9  30.0  28.0  17.4   3.2   7.4   9.6  10.8   5.6  10.4   5.0   6.4   6.4    .2  92.7  147.0
196   88.2  100.0  56.8  38.6  40.1  23.1  35.8  33.2  28.6  18.7   3.2   6.2   8.6  16.2   8.0  16.0   7.8   8.2   5.2    .2  93.2  143.3
197   76.4   94.3  55.2  39.6  37.4  22.5  38.0  33.4  29.1  18.2   2.4   4.6   6.8  10.0   4.4   6.4   4.6   4.4   4.6   3.4  89.6  134.5

OBS EPIFEMWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP HIINIT HIFINAL HIVOL

189   9.8  7.6  7.4  6.2  9.1  77.6  57.6  28.0  39.0  25.9  44.4  38.7  31.4  29.6  34.2   94.3  45.1  23.4  743  27.5  11.35  7.50  3
190   9.3  7.1  7.7  6.0  8.7  78.8  60.2  28.4  40.4  25.5  43.8  36.5  28.9  28.8  34.6   94.9  45.7  17.8  743  27.5  11.40  7.35  3
191   9.6  7.0  7.2  5.6  8.5  68.7  51.8  24.2  35.5  22.2  45.5  38.3  26.8  27.3  33.2   85.5  40.3  22.7  743  27.2  11.40  7.23  3
192  10.3  6.9  7.1  5.9  8.1  70.1  53.0  25.5  35.5  23.2  44.1  37.4  30.1  31.3  35.8   83.9  41.2  23.7  743  27.2  11.40  7.63  3
193   9.2  6.9  7.3  5.8  9.0  75.7  57.8  27.9  39.4  25.3  44.8  38.7  31.5  28.6  32.0   95.1  45.7  25.8  743  27.2  11.40  7.30  3
194   8.7  6.7  6.6  5.5  8.2  76.5  57.8  27.4  39.8  25.3  46.1  41.9  30.2  27.0  31.7   99.1  46.1  23.3  743  27.2  11.40  7.02  3
195  10.0  7.5  7.3  6.0  9.4  79.0  59.3  28.7  42.6  26.9  45.5  41.4  31.5  28.4  35.0   98.4  48.0  19.1  743  27.5  11.25  7.40  3
196  10.2  7.6  7.6  6.7  9.2  81.8  62.1  29.1  40.0  26.5  45.9  39.2  29.6  28.8  34.8   98.3  47.1  24.8  743  27.5  11.25  7.42  3
197   9.5  7.3  6.8  6.4  9.1  73.5  55.7  27.6  38.8  24.3  47.4  41.1  30.5  26.1  33.4   91.8  43.1  20.3  743  27.5  11.25  7.71  3
```

```
---------------------------------------------------- SEX=M ----------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

189 11.35  7.26    3     11.35  7.32    3     3.52 2.72 203 25      2.68    5.250   2.40    2.37     2.65    2.03     2.75    1.82     1.72263 27.83  1.56354 1.68188
190 11.40  7.24    3     11.40  7.20    3     3.55 3.17 532 25      2.68    4.570   2.33    2.20     2.44    2.07     2.52    1.86     1.75833 27.83  1.68339 1.78615
191 11.40  7.56    3     11.40  7.61    3     3.29 2.85 306 25      2.68    4.350   1.47    2.16     1.65    1.99     1.78    1.89     1.54903 27.32  1.76828 1.51747
192 11.40  7.98    3     11.40  7.82    3     3.07 2.70 458 25      2.68    2.430   1.02    2.16     1.53    1.30     1.12    1.89     1.29621 27.32  1.50496 1.38932
193 11.40  7.30    3       .     .      .     3.72 3.09 503 25      2.68    3.250   1.40    2.12     1.59    1.74     1.80    1.00     1.72011 27.32  1.72011  .
194 11.40  7.26    3     11.40  7.00    3     3.73 2.96 495 25      2.68    3.135   1.05    1.60     1.20    1.39     1.24    0.98     1.74752 27.32  1.91853 1.93331
195 11.25  7.40    3       .     .      .     4.36 3.93 404 25      2.68    5.750   4.65    0.98     4.20    1.20     3.34    1.86     1.58560 27.83  1.58560  .
196 11.25  7.40    3     11.25  7.40    3     4.85 3.69 624 25      2.68    6.700   3.05    2.55     3.90    1.85     3.85    1.72     1.58560 27.83  1.57257 1.58560
197 11.25  7.80    3     11.25  8.00    3     4.29 3.73 497 25      2.68    7.130   5.65    0.92     5.61    1.04     5.36    1.21     1.33767 27.63  1.39121 1.22301

OBS A        B        C        MINRVDIF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

189 0.159092 0.118341 0.040751 0.040751 1.70226 0.997455 1.05892 1.05202  1.05376  1.04923  1.05842  1.04805  1.04690
190 0.074939 0.102758 0.027818 0.027818 1.77224 0.997455 1.05957 1.05881  1.05848  1.05631  1.05897  1.05412  1.05384
191 0.219251 0.250811 0.031561 0.031561 1.53325 0.997455 1.05152 1.03974  1.03991  1.04040  1.05101  1.03535  1.03557
192 0.208750 0.115640 0.093110 0.093110 1.34276 0.997455 1.01483 1.02433  1.01987  1.02216  1.01448  1.02085  1.01664
193 0.000000  .        .       0.000000 1.72011 0.997455 1.02985 1.03326  1.03083  1.02405  1.02940  1.02968  1.02735
194 0.171011 0.014780 0.185791 0.014780 1.92592 0.997455 1.03596 1.02866  1.02777  1.02234  1.03537  1.02464  1.02383
195 0.000000  .        .       0.000000 1.58560 0.997455 1.06910 1.06704  1.06364  1.06054  1.06859  1.06315  1.05971
196 0.013031 0.013031 0.000000 0.000000 1.58560 0.997455 1.07358 1.05846  1.06051  1.05809  1.07313  1.05465  1.05688
197 0.053541 0.166207 0.114666 0.053541 1.36444 0.997455 1.09078 1.08144  1.08276  1.08143  1.09032  1.07740  1.07867

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y      Z      MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

189 1.04543  17.3728 20.2023 20.7213 21.3585 0.51891 1.1562 0.6373 0.51891 20.4618 17.5755 21.8485 22.3269 22.9392
190 1.05176  17.1053 17.4171 17.5516 18.4369 0.13450 1.0198 0.8853 0.13450 17.4843 17.3531 19.3367 19.4530 20.3090
191 1.03608  20.4069 25.3314 25.2605 25.0552 0.07081 0.2762 0.2054 0.07081 25.2960 20.6197 27.1980 27.1036 2[illegible].8844
192 1.01876  36.1235 31.9433 33.8962 32.8940 1.95288 0.9507 1.0022 0.95065 32.4186 36.2777 33.4655 35.3197 34.3857
193 1.02081  29.5522 28.0827 29.1325 32.0654 1.04980 3.9827 2.9329 1.04980 28.6076 29.7475 29.6266 30.6333 33.4872
194 1.01856  26.9355 30.0694 30.4505 32.8147 0.38105 2.7453 2.3642 0.38105 30.2599 27.1878 31.8097 32.1633 34.4738
195 1.05643  13.2628 14.0865 15.4576 16.7114 1.37114 2.6249 1.2538 1.25377 16.0845 13.4644 15.6528 17.0519 18.3896
196 1.05451  11.4793 17.5579 16.7241 17.7111 0.83383 0.1532 0.9870 0.15320 17.6345 11.6574 19.1184 18.2059 19.1764
197 1.07729   4.7650  8.3836  7.8708  8.3884 0.51283 0.0047 0.5176 0.00475  8.3860  4.9446  9.9679  9.4709 10.0108
```

```
---------------------------------------------------- SEX=M ----------------------------------------------------

OBS M       N      O      MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UFARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF       TSF   BIR    AGE

189 0.47844 1.0957 0.6123 0.47844 22.0877 29.9    52.5   82.6     20.0  29.6   49.2    37.5    6.1     48.4  118.4          72.4 -9853  51.0082
190 0.11633 0.9723 0.8560 0.11633 19.3949 28.3    59.4   82.8     18.6  31.8   49.2    37.1    5.3     38.4   86.6          59.4 -8837  48.1425
191 0.09441 0.3136 0.2192 0.09441 27.1508 30.1    54.7   76.2     16.9  27.6   45.3    36.0    4.7     37.6   86.6          53.2 -9538  50.0630
192 1.85415 0.9197 0.9345 0.91966 33.9254 28.5    50.4   79.0     17.1  27.5   42.4    37.5    6.0    100.0  268.0         162.6 -9714  50.5452
193 1.00665 3.8555 2.8489 1.00665 30.1299 31.5    58.5   83.3     17.9  29.9   49.4    37.6    6.3     57.2  137.4          85.4 -12642 58.5671
194 0.35353 2.6641 2.3105 0.35353 31.9865 33.1    61.1   84.3     18.7  30.4   53.0    38.2    6.3     57.8  17[illegible].8 101.2 -9035  48.6849
195 1.39911 2.7368 1.3377 1.33767 17.7207 31.3    61.4   85.6     19.8  30.5   50.4    37.6    5.4     31.0   7[illegible].0  44.6 -4900  37.3562
196 0.91246 0.0600 0.9724 0.05997 19.1484 34.8    58.4   84.9     19.7  33.0   51.2    37.8    7.1     34.2   8[illegible].6  52.2 -4415  36.0274
197 0.49704 0.0429 0.5399 0.04291  9.9894 32.9    56.7   77.8     17.8  26.1   48.7    34.7    4.3     23.8   51.8          32.6  -269  24.6685
```

```
                                                   SAS                                   13:59 TUESDAY, APRIL 1, 1986   67
------------------------------------------------------------ SEX=M ------------------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

198 HEATH         1     1     2    12    39    70 5            .      1     186               .        1    TRENTON  180  177.5  84.7  58.8 40.3  115.5   106.4  103.2  .    92.0
199 BUTLER        1     1     6     1    63     .       1      .      1     190               .        1    PETAHAWA 219  170.8  85.6  57.2 40.1  120.2   105.2  102.1  .    90.2
200 BATSON        3          27     5    62    64.0            .      1      .       1        .        1    PETAHAWA 220  160.1  81.9  55.6 38.6  118.4   106.0  103.2  .    94.3
201 MACHEY        3     1     6     7    61    70.0          177.0          165               .        1    PETAHAWA 221  176.5  71.1  56.0 38.0  114.0   102.7   99.6  .    83.1
202 CARTER        2     1    24     4    63    65.0            .      1     137             61.5            PETAHAWA 222  163.5  61.0  54.8 34.0  113.5   100.6  100.6  .    71.3
203 LINDHOLM      9     4    17     2    57    69.5            .      1     165               .        1    PETAHAWA 223  173.0  76.2  56.0 39.3  115.6   104.6  101.9  .    82.3
204 BRINTON       4     1     6     6    58    68.0            .      1     140               .        1    PETAHAWA 224  172.7  64.5  57.0 37.0  109.8    96.8   92.8  .    73.5
205 KILPATRICK    1     1     8    11    59    68.0            .      1     150               .        1    PETAHAWA 225  169.6  66.7  57.4 38.7  114.0    99.2   96.8  .    77.6
206 BOLDUC        2     2    30     9    55    68.0            .      1     155               .        1    PETAHAWA 226  170.8  69.8  56.3 38.7  111.8    99.5   95.7  .    79.0

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

198    95.7   101.1  59.6  39.1 40.0 23.5   35.5   33.7   28.2   17.7    7.2    16.8    13.4    35.0    17.2    19.2    15.0    20.4    12.4    18.2   93.9   148.2
199    94.7   103.7  63.5  40.2 39.9 23.7   39.8   37.9   30.5   17.9    8.0    20.6    16.2    29.2     9.4    23.0    14.6    13.8    30.0    22.4   89.4   140.2
200   103.6   106.4  67.1  38.2 40.3 22.3   36.8   35.1   28.5   16.2   10.4    18.6    21.6    46.4    18.0    35.8    42.0    22.4    34.4    20.2   82.7   130.1
201    85.7    94.3  54.0  36.2 33.5 20.7   35.4   33.0   28.3   17.5    3.2     6.6     7.5    13.4     6.8    10.0     5.4     7.2     8.6     8.2   96.0   142.3
202    72.6    83.3  52.0  33.6 34.1 20.4   36.4   35.0   27.1   16.5    2.4     5.6    13.2    15.0     3.4     8.8     5.4     7.0     7.8     5.6   83.0   132.5
203    83.0    98.5  61.3  35.4 38.0 23.5   33.4   32.0   28.8   17.5    5.6     9.0     9.0    14.6     9.6    13.6     5.2     6.6     8.8     7.0   90.3   141.0
204    73.4    90.9  53.6  36.4 37.0 21.5   32.7   30.5   27.2   17.5    2.4     5.2     6.8     7.8     3.4     6.8     3.8     3.6     6.4     6.0   92.8   139.0
205    79.1    90.8  54.0  36.6 34.8 20.5   31.5   30.0   26.1   16.0    2.6     6.8     7.2    14.8     7.0     7.0     5.0     6.2     7.6     7.0   86.2   139.0
206    84.3    95.2  55.8  37.6 34.6 21.2   32.9   31.0   27.7   17.4    3.4    12.2    12.2    20.8    10.0    14.4     7.2     9.8    12.0     7.0   90.9   139.1

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL      FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

198    9.9     7.7      7.6      6.0     8.7   80.2 60.6 28.9 41.0        25.5   45.2     40.8    30.1     29.9     37.8   97.0  46.6   22.3     743    27.5   11.25   6.92    3
199    9.9     7.2      7.6      6.1     8.8   78.1 60.5 27.6 39.7        24.8   47.3     40.2    28.4     27.3     36.6   94.1  45.3   20.5     747    28.2   11.00   7.39    3
200    9.2     7.0      6.7      5.0     8.2   68.2 51.2 24.5 38.9        22.8   46.6     38.3    28.7     28.0     37.1   85.9  46.1   21.3     747    28.2   11.00   8.38    3
201    8.8     6.5      7.2      5.8     8.6   77.3 58.3 27.6 [illegible] 23.9   48.5     42.3    31.5     30.0     32.5   95.0  45.1   18.3     747    28.2   11.00   7.08    3
202    8.7     6.4      6.8      5.4     8.2   71.0 54.7 27.0 [illegible] 23.0   44.7     37.0    28.0     23.7     30.8   90.6  43.8   21.2     747    28.2   11.00   8.08    3
203    9.2     7.5      7.2      6.1     9.2   78.5 59.8 28.0 [illegible] 15.6   47.0     44.0    31.5     29.0     36.3   95.4  43.8   22.7     747    28.2   11.00   7.00    3
204    9.2     7.2      6.8      6.3     9.0   75.1 56.9 28.3 [illegible] 24.4   45.0     39.2    27.2     26.1     31.5   91.4  41.7   18.0     747    28.0   11.00   7.60    3
205    8.9     6.7      6.9      5.6     8.5   76.0 57.6 27.3 [illegible] 24.4   45.6     40.3    28.0     27.6     31.6   94.3  46.9   20.1     747    28.0   11.00   7.48    3
206    9.7     7.1      6.8      6.1     8.5   74.7 55.3 27.5 [illegible] 25.6   45.7     39.8    26.6     28.5     33.9   89.5  44.7   20.8     747    28.0     .      .      .
```

```
                                                   SAS                                   13:59 TUESDAY, APRIL 1, 1986   68
------------------------------------------------------------ SEX=M ------------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC   HRV2   H2OVAP   HRV1     HRV3

198  11.25   7.00    3    11.25   7.08    3   4.19 3.56 482   25     2.68    3.75    1.600    2.12     1.48     1.87     1.37     2.33   1.86186  27.83  1.92095  1.80411
199  11.00   7.57    3    11.00   7.58    3   5.01 3.80 455   28     2.93    5.40    2.800    3.69     4.10     3.77     3.36     2.24   1.36635  29.02  1.47644  1.36027
200  11.00   8.49    3    11.00   8.50    3   3.74 3.03 313   28     2.83    3.75    3.600    0.50     3.30     0.65     3.45     0.65   0.86767  29.02  0.92153  0.86284
201  11.00   7.24    3    11.00   7.41    3   6.40 4.87 552   28     2.83    6.10    1.780    4.36     3.40     2.62     3.87     2.19   1.57610  29.02  1.68484  1.46571
202  11.00   8.23    3    11.00   8.37    3   4.27 3.59 534   28     2.83    3.69    2.850    2.75     2.99     3.29     2.81     3.10   0.99730  29.02  1.07588  0.92650
203  11.00   7.01    3      .       .       .  6.03 4.58 649   28     2.83    4.80    1.750    4.30     2.35     3.87     2.20     4.12   1.73397  29.02  1.74107     .
204  11.00   7.60    3      .       .       .  5.10 4.33 584   28     2.83    6.09    4.750    1.32     5.01     0.99     5.08     0.94   1.34971  28.68  1.34971     .
205  11.00   7.70    3    11.00   7.68    3   4.70 4.03 491   28     2.83    6.25    2.990    3.32     3.77     2.83     3.50     2.62   1.29012  28.68  1.42333  1.30191
206  11.00   6.91    3    11.00   6.93    3   4.97 4.20 536   28     2.83    5.85    2.500    3.55     4.75     1.86     1.60     1.65   1.80795  28.68     .     1.79338

OBS    A          B          C       MINRVDIF    HRV     H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

198 0.059085   0.116835   0.057750   0.057750   1.83299  0.997455  1.03702   1.03657   1.03186   1.03630   1.03654   1.03299   1.02838
199 0.112090   0.118161   0.006071   0.006071   1.36331  0.996424  1.04957   1.06366   1.08228   1.05231   1.04921   1.05966   1.07812
200 0.053861   0.058689   0.004827   0.004827   0.86525  0.996424  1.02360   1.02809   1.02615   1.02809   1.02338   1.02516   1.02319
201 0.108738   0.219128   0.110389   0.108738   1.63047  0.996424  1.07584   1.07624   1.07435   1.07506   1.07530   1.07101   1.06974
202 0.078581   0.149381   0.070801   0.070801   0.96190  0.996424  1.03259   1.04703   1.07988   1.07264   1.03224   1.06190   1.07442
203 0.007099       .          .      0.007099   1.73752  0.996424  1.05270   1.07103   1.07363   1.07514   1.05218   1.06618   1.06889
204 0.000000       .          .      0.000000   1.34971  0.996424  1.07898   1.07853   1.07729   1.07765   1.07848   1.07396   1.07285
205 0.133217   0.121422   0.011795   0.011795   1.29601  0.996424  1.07804   1.07888   1.08401   1.07561   1.07757   1.07376   1.07902
206     .          .      0.014566   0.014566   1.80066  0.996424  1.07602   1.07715   1.08871   1.03432   1.07541   1.07401   1.08406

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC       X        Y        Z      MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

198 1.03268  26.4863  26.6789  28.6888  26.7906       2.00986   0.1117   1.8981  0.11174  26.7348  26.6902  28.2042  30.1863  28.3393
199 1.04878  21.2178  15.4483   8.0559  20.0820       7.39243   4.6336  12.0261  4.63363  17.7651  21.3670  17.0691   9.6855  21.5441
200 1.02511  32.2619  30.3119  31.1549  30.3169       0.84300   0.0030   0.8400  0.00300  30.3134  32.3609  31.5841  32.4442  31.6042
201 1.07256  10.5837  10.4263  11.1602  10.8923       0.73394   0.4660   0.2679  0.26794  11.0262  10.7986  12.5011  13.0058  12.6812
202 1.06753  28.3784  16.0916   8.9935  11.7753       5.09819   2.3214   4.7768  2.32138  12.9310  28.5261  16.1601  11.1448  13.8925
203 1.07030  19.9225  12.4914  11.4589  10.8624       1.03247   1.6290   0.5965  0.59651  11.1607  20.1361  14.4331  13.3478  12.787[illegible]
204 1.07323   9.3475   9.5233  10.0126   9.8[illegible]92 0.48936   0.3459   0.1435  0.14349   9.9409   9.5436  11.3281  11.7695  11.618[illegible]
205 1.07077   9.7186   9.3877   7.3816  10.6769       2.00613   1.2893   3.2954  1.28923  10.0323   9.9007  11.4064   9.3314  12.5973
206 1.03019  10.5121   9.2813   5.5620  27.6349       3.71934  18.3535  22.0729  3.71934   7.4217  10.7538  11.3090   7.3628  29.4075
```

```
                                          SAS                          13:59 TUESDAY, APRIL 1, 1986   69
--------------------------------------------------------- SEX=M ---------------------------------------------------------

OBS  H        N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF  TSF    RIR    AGE

198  1.98204  0.1351   1.8469   0.13510  28.2718  29.3    64.6   83.6     19.6  31.7   50.4    37.0    5.6     72.4  174.8    96.8  -7335  44.0274
199  7.38367  4.4749  11.8566   4.47494  19.3066  30.6    58.8   81.4     17.6  32.9   48.8    36.1    5.6     76.0  189.2   121.0   1101  20.9151
200  0.86016  0.0202   0.8400   0.02016  31.5942  30.0    52.7   77.4     17.0  26.7   39.8    31.3    7.2     97.0  251.8   158.8    877  21.5288
201  0.50467  0.1801   0.3246   0.18007  12 [illegible]911  34.2    61.8   80.5     19.0  30.7   49.9    35.4    5.8     31.0   77.2    46.4    552  22.4192
202  5.01526  2.2676   2.7476   2.26763  1[illegible]   31.0    52.0   80.5     16.3  27.7   46.8    36.7    4.4     36.2   74.[illegible]    50.4   1209  20.6192
203  1.08533  1.6511   0.5656   0.56577  13.[illegible]    32.0    58.3   82.7     18.7  31.8   51.6    38.9    5.0     38.2   89.0    55.0  -1048  26.8027
204  0.44143  0.2907   0.1507   0.15075  11.6942  33.7    59.1   79.9     18.2  28.6   49.7    38.2    4.7     22.2   52.2    33.0   -574  25.5041
205  2.07496  1.1909   3.2659   1.19094  12.0018  30.6    55.6   83.4     18.4  30.3   47.4    36.5    6.1     31.4   71.2    43.4    -54  24.0795
206  3.94617 18.0985  22.0447   3.94617   9.3359  31.7    59.2   79.9     19.4  27.8   44.8    35.2    5.8     48.6  109.0    71.6  -1554  28.1890
```

```
                                          SAS                          13:59 TUESDAY, APRIL 1, 1986 . 70
--------------------------------------------------------- SEX=M ---------------------------------------------------------

OBS NAME       BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

207 TODGAS     2 2 12  3 62 73.0   184.0    215    .  1 PETAWAWA 227 182.5 101.4 58.0 40.4 129.3 112.0 101 9   .  94.8
208 CHALIFOUX  2 1 24  5 50 68.5     .    1 156    .  1 PETAWAWA 228 171.6  68.5 57.1 36.6 112.3  96.4  9  .1  .  76.3
209 MACLEAN    3 1 17  8 49 70.5     .    1 178    .  1 PETAWAWA 229 175.6  76.7 56.7 38.5 113.8 102.4  9  .8  .  81.0
210 CARROLL    2 1 29 12 48 66.5     .    1 155    .  1 PETAWAWA 230 167.5  68.7 55.4 39.2 109.3 103.0  99.7   .  79.0
211 GAGNON     2 2 20  3 49 68.0     .    1 185    .  1 PETAWAWA 231 171.1  80.9 55.6 40.0 121.6 104.7 102.7   .  90.0
212 POTTIE     3 1  3  8 47 71.0   180.4    174  80.0   PETAWAWA 232 177.3  76.1 55.2 38.3 112.1  99.9  97.0   .  83.6
213 HYDE       3 1 31  1 47 71.0   180.5    180  85.4   PETAWAWA 233 179.8  82.3 56.9 39.0 112.0 107.5 105.4   .  95.4
214 JACKSON    1 1 18 10 48 70.0   177.8    155  70.4   PETAWAWA 234 179.8  70.5 56.3 36.3 112.8  95.8  92.7   .  72.3
215 GALVIN     5 3  3  5 45 69.0     .    1 176  80.0   PETAWAWA 235 170.5  78.7 56.4 39.8 115.5 107.2 102.3   .  87.2

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UFARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

207 101.0 112.6 69.8 43.5 43.8 25.8 36.6 34.6 30.8 18.9 5.2 14.6 16.8 33.8 13.0 26.4 12.6 16.0 19.2 18.2 98.0 148.8
208  77.1  93.1 55.4 37.4 37.2 22.1 33.7 31.7 28.0 17.3 3.4  8.6 10.2  9.6  7.4 11.2  4.6  7.6 11.2 10.4 90.9 139.0
209  83.2  97.3 58.3 38.8 40.0 23.4 34.9 33.3 28.6 17.3 3.8 11.4 10.4 17.0 17.2 15.8  6.8  8.4 10.4  5.0 95.3 145.4
210  79.0  93.7 55.8 34.3 36.2 20.7 35.9 34.3 29.3 16.2 3.2  7.6  9.6 12.2  6.2  8.0  5.4  6.2 11.8  6.2 89.8 136.1
211  93.7  99.9 57.9 40.6 39.1 23.9 35.4 33.6 28.8 17.8 8.4 16.4 17.2 26.6 16.2 28.0 14.2 17.8 24.2 15.4 91.1 140.0
212  86.5  98.0 57.9 37.8 36.3 21.4 33.3 32.5 28.6 18.0 5.4  9.2  9.4 22.0 10.0 22.8  8.2 10.6 18.0 11.6 95.1 146.1
213  96.5 102.6 57.9 40.9 37.0 24.2 33.1 31.5 28.5 19.1 9.6 18.4 16.2 32.4 18.2 36.6 15.0 16.6 16.0 19.0 94.8 148.6
214  73.3  94.4 55.3 37.5 37.8 23.1 30.3 29.2 27.2 17.3 2.2  5.8  7.8  8.4  4.6  5.4  4.6  4.8  7.0  3.6 97.5 146.3
215  86.6  99.5 59.9 39.9 40.6 22.7 35.7 33.8 30.2 17.6 2.8  8.8 10.8 19.2  6.2 18.0 11.4 11.0 18.2 13.4 85.8 141.4

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

207 10.0 7.7 7.4 6.5 8.7 81.5 61.4 30.0 41.7 26.2 52.6 45.1 32.8 31.6 40.0 101.0 48.5 21.5 747 28.0 11.0 7.50 3 11.0
208  9.9 7.0 7.1 5.7 8.7 78.6 59.1 28.0 40.0 26.2 45.9 38.7 27.8 27.4 33.6  94.4 45.4 19.8 747 28.0   .    .   . 11.0
209  9.7 7.2 7.6 5.8 8.8 75.8 57.3 27.8 39.9 25.3 48.4 40.7 30.3 29.0 34.6  95.4 44.8 20.9 747 28.0 11.0 6.89 3 11.0
210  8.8 6.5 7.1 5.5 8.2 75.4 56.6 26.4 37.5 24.5 45.4 39.0 29.4 26.7 33.4  89.7 41.7 20.7 747 28.2 11.0 6.92 3 11.0
211 10.1 7.5 7.3 5.9 8.9 76.0 57.5 27.6 39.5 25.1 48.2 40.9 31.0 29.5 35.5  94.6 43.0 22.1 747 28.0 11.1 7.09 3 11.1
212  9.7 7.3 7.2 6.1 9.0 80.0 59.9 27.0 41.2 25.8 46.0 39.1 28.7 27.5 34.4  97.8 45.9 21.3 747 28.2 11.0 6.91 3 11.0
213 10.4 7.7 7.6 6.1 8.6 79.3 60.9 28.5 39.6 26.0 43.3 36.5 30.8 30.9 34.6  98.3 46.6 22.4 747 28.2 11.0 6.78 3 11.0
214 10.1 7.1 7.4 6.1 9.0 78.5 59.7 28.5 39.0 25.2 45.6 40.6 27.8 28.2 34.5  96.7 44.1 21.2 747 28.2 11.0 6.61 3 11.0
215  9.3 7.2 7.3 5.7 9.0 77.6 58.8 29.0 41.1 26.1 47.4 40.7 29.9 29.4 36.4  96.6 46.1 20.4 747 28.0 11.1 7.08 3 11.1
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS  H2FINAL  H2VOL  H3INIT  H3FINAL  H3VOL  FVC   FEV1  FER  H2OTEMP  BASEWGT  H2OWGT1  H2OWGTA  LUNGVOLA  H2OWGTB  LUNGVOLB  H2OWGTC  LUNGVOLC  HRV2     H2OVAP  HRV1     HRV3

207  7.62     3      11.0    8.03     4      6.05  4.69  653  28       2.83     5.50     3.340    1.93      2.98     1.91      .        .         1.33767  28.68   1.41090  1.49487
208  7.56     3      11.0    7.51     3      4.61  4.20  626  28       2.83     5.20     2.550    1.63      2.92     3.19      3.60     2.38      1.36182  28.68   .        1.60471
209  7.20     3      11.0    7.20     3      5.53  4.96  731  28       2.83     5.95     3.600    2.39      3.70     2.24      3.87     2.33      1.60466  28.68   1.82260  1.60466
210  7.20     3      11.0    7.40     3      4.89  3.60  393  28       2.83     5.45     3.100    2.00      3.12     1.78      2.97     2.11      1.60283  27.02   1.79861  1.47206
211  7.21     3      11.1    7.02     3      5.39  4.13  527  28       2.83     4.45     3.600    0.94      2.40     2.39      2.90     2.56      1.64191  28.68   1.72453  1.77402
212  7.00     3      11.0    7.19     3      4.81  3.71  571  28       2.83     4.60     3.340    1.12      2.95     1.43      3.33     1.19      1.74107  29.02   1.80589  1.60956
213  6.82     3      11.0    6.61     3      4.68  3.77  349  28       2.83     3.30     1.600    1.96      1.15     2.63      1.48     2.19      1.87242  29.02   1.90256  1.87992
214  6.66     3      11.0    6.80     3      6.57  5.29  621  28       2.83     5.87     2.150    3.98      4.35     1.54      3.50     2.46      1.99514  29.02   2.03470  1.88744
215  7.20     3      11.1    7.67     4      5.00  3.67  666  28       2.83     5.25     3.310    0.74      3.65     1.18      3.70     1.04      1.64969  28.68   1.73154  1.82179

OBS  A         B         C         MINRVDIF  HRV      H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

207  0.073231  0.083969  0.157200  0.073231  1.37429  0.996424  1.04271  1.04017   1.03612   .         1.04241   1.03732   1.03330
208  .         .         0.042886  0.042886  1.38327  0.996424  1.07646  1.07590   1.07474   1.07259   1.07598   1.07081   1.06981
209  0.217941  0.217941  0.000000  0.000000  1.60466  0.996424  1.06729  1.06776   1.06702   1.07091   1.06680   1.06359   1.06290
210  0.195774  0.326542  0.130768  0.130768  1.53745  0.996424  1.06622  1.06032   1.06034   1.05999   1.06570   1.05588   1.05597
211  0.082615  0.049496  0.132111  0.049496  1.74925  0.996424  1.04488  1.04606   1.04939   1.05862   1.04440   1.04262   1.04553
212  0.064819  0.116330  0.131511  0.064819  1.77348  0.996424  1.05038  1.04829   1.04711   1.04915   1.04985   1.04455   1.04330
213  0.030136  0.022635  0.007501  0.007501  1.87617  0.996424  1.03065  1.03394   1.03679   1.03537   1.03016   1.03034   1.03298
214  0.039567  0.147258  0.107691  0.039567  2.01492  0.996424  1.07907  1.08316   1.07648   1.08042   1.07839   1.07781   1.07400
215  0.082847  0.090253  0.173100  0.082847  1.69012  0.996424  1.05664  1.03979   1.05064   1.04938   1.05615   1.03637   1.04702

OBS  DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC  X        Y        Z        MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

207  .         24.0789  25.1504  26.8689  .        1.71845  .        .        1.71845  26.0097  24.2059  26.3571  28.0737  .
208  1.06796   10.3406  10.5614  11.0196  11.8706  0.45815  1.30917  0.85102  0.45815  10.7905  10.5298  12.5814  12.9793  13.7196
209  1.06673   13.9866  13.7986  14.0963  12.5415  0.29578  1.25701  1.55279  0.29578  13.9464  14.1826  15.4781  15.7556  14.2138
210  1.05551   14.4164  16.8008  16.7955  16.9369  0.00525  0.13615  0.14140  0.00525  16.7981  14.6261  18.6136  18.5783  18.7647
211  1.05464   23.1694  22.6782  21.2903  17.4954  1.38791  5.18284  3.79493  1.38791  21.9843  23.3720  24.1194  22.8994  19.1242
212  1.04539   20.8818  21.7497  22.2385  21.3896  0.48882  0.36010  0.84892  0.36010  21.5697  21.1001  23.3070  23.8340  22.9558
213  1.03169   29.2074  27.7975  26.5849  27.1891  1.21266  0.60642  0.60424  0.60424  26.8870  29.4210  29.3448  28.2084  28.7625
214  1.07561    9.3137   7.7149   9.5447   8.7854  1.82985  1.07056  0.75926  0.75926   9.1651   9.5815   9.8079  11.3136  10.6765
215  1.04581   18.3020  25.3107  20.7742  21.2958  4.53644  4.01486  0.52156  0.52156  21.0350  18.5032  26.7613  22.2773  22.7822
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  TSFDW  TOTALSF  TSF    BIP    AGE

207  1.71660  .        .        1.71660  27.2154  33.7     64.3    84.5      20.1   31.4    52.5     36.0     6.8      70.4   175.8    110.8   801   21.7372
208  0.39797  1.13821  0.74024  0.39797  12.7804  32.6     53.3    80.7      19.5   31.1    49.0     35.3     5.4      31.8    84.2     50.8  -3509   33.5455
209  0.27745  1.26434  1.54179  0.27745  15.6169  30.4     64.9    80.5      18.5   29.5    50.6     35.7     4.9      42.6   106.2     65.0  -3789   34.3123
210  0.03525  0.15115  0.18640  0.03525  13.5960  29.4     60.4    77.7      18.8   30.2    48.0     36.0     4.2      32.6    76.4     49.2  -4020   34.9452
211  1.22000  4.99524  3.77524  1.22000  23.50[illegible]  31.1  60.0  80.0  18.5   29.9    51.6     37.0     3.5      68.6   184.4    112.4  -3939   34.7233
212  0.52699  0.35148  0.87647  0.35148  23.1312  31.2     63.9    82.2      20.1   32.9    51.9     36.3     4.7      46.0   127.2     81.4  -4534   36.3534
213  1.13639  0.58224  0.55415  0.55415  28.4855  31.2     63.6    85.0      18.4   32.4    51.7     38.4     7.0      76.6   196.0    119.6  -4718   36.8575
214  1.50560  0.86860  0.63701  0.63701  10.9950  33.5     64.0    82.3      18.8   31.2    52.6     38.2     5.1      24.2    54.2     34.4  -4092   35.1425
215  4.48406  3.97915  0.50491  0.50491  22.5297  29.1     56.7    84.7      18.6   29.8    50.5     38.6     5.0      41.6   119.8     75.0  -5356   38.6055
```

```
------------------------------------------------------ SEX=M ------------------------------------------------------

OBS NAME       BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

216 FOLEY        3     1     27   10    50   66.0         168.0           160          73.0            PETAHAHA 236  165.8  73.0  56.3 38.8  114.0   102.3   100.6  .    83.3
217 ST AUBIN     2     1     11    2    36   70.0             .           180             .            PETAHAHA 237  174.4  81.0  57.1 39.6  110.1   106.2   103.4  .    97.2
218 SURRETT      3     1     26    3    36   68.0             .           185             .            PETAHAHA 238  172.1  84.0  57.3 42.4  114.6   106.8   103.1  .   100.1
219 POIRIER                  14    1    41   71.0             .      1    150             .        1   PETAHAHA 239  180.4  66.0  55.7 34.4  113.7    96.0    93.2  .    76.7
220 LAROSE       2     2     24    5    57      .     1       .      1      .          64.5            PETAHAHA 240  162.4  64.5  56.1 39.1  112.0    97.7    95.0  .    77.3
221 BLAIN        2     2     15    3    41   72.0         182.0           193          85.0            PETAHAHA 241  181.0  90.0  56.2 38.2  113.4   109.2   105.1  .    90.6
222 KELLY        2     1     30    3    41   64.0             .      1    144             .        1   PETAHAHA 242  162.8  65.1  53.3 36.3  112.9    96.9    93.8  .    82.9
223 PAYNE        1     1     26    7    44   69.0             .      1    162             .        1   PETAHAHA 243  173.7  73.2  55.4 39.0  110.0    98.3    93.4  .    84.8
224 HIRSCHFELD   3     4      5    8    41   67.0             .      1    147             .        1   PETAHAHA 244  169.8  64.2  56.5 37.3  109.6    98.3    94.1  .    78.2

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

216   85.5    95.7  59.1 36.2 39.7 21.3  34.5  33.8  28.3  16.2  8.4  15.8  21.8  30.2  15.4  24.6   8.8  14.2  19.6  10.6  89.7  133.6
217  100.0    99.9  56.1 41.5 36.1 21.6  33.4  31.7  27.8  17.5  6.2  12.6   9.6  24.2  10.6  23.6   9.4  12.8  14.4   8.0  89.9  142.9
218  101.5   101.1  57.2 39.8 41.0 23.0  35.6  34.5  30.4  17.7  9.0  10.4  25.8  30.2  20.6  24.0  12.2  18.6  11.4  13.8  88.3  141.0
219   80.2    91.2  49.9 37.0 33.0 20.5  31.7  29.2  28.7  17.7  2.6   6.2   7.8   7.6   7.0   6.2   3.8   5.6   7.4   3.4  89.9  146.7
220   79.7    92.5  56.0 36.7 34.4 21.4  34.6  32.0  27.5  16.5  2.6   7.2   8.7  12.2   8.0   8.2   4.8   7.6  10.2   7.2  86.5  131.0
221   98.0   107.1  65.7 40.7 38.3 23.0  35.4  34.3  28.0  17.8  4.4  17.8   9.6  33.6   4.8  20.4  14.0  12.0  22.4  11.6  93.9  151.3
222   84.8    92.0  55.5 36.9 36.4 21.8  33.9  32.9  27.9  17.2  4.0  10.4  11.4  24.0  10.2  22.6  10.8  11.4  14.4   6.4  86.5  132.5
223   86.0    95.4  55.7 36.9 35.0 22.0  35.8  33.1  27.8  16.9  3.0   7.2   9.4  13.4   9.0  10.4   6.0  11.2   9.0   5.0  89.6  143.3
224   80.7    92.6  54.2 35.0 35.2 21.1  32.3  30.9  27.2  16.8  3.2   8.4   8.6  15.4   8.4  13.0   5.0   6.6   9.6   5.2  91.2  139.8

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL

216   9.3  6.7  6.6  5.4  8.5  72.9  56.2  26.5  37.7  23.4  46.4  39.0  30.5  25.8  34.0   89.5  41.7  20.7  747  28.0  11.10  7.80  3
217   9.9  7.2  7.4  6.0  8.7  80.4  61.1  28.7  41.4  27.1  45.7  41.0  29.7  29.9  33.2   98.2  46.0  22.7  747  28.0  11.10  6.40  3
218   9.6  6.9  7.5  5.9  8.2  76.4  56.0  27.7  40.4  25.0  45.0  39.0  30.5  29.8  35.2   98.1  46.5  21.0  747  28.0  11.10  7.23  3
219   9.8  7.4  7.6  6.4  9.0  84.5  64.2  32.6  42.7  26.6  47.2  43.0  28.3  30.7  32.2  103.4  49.3  22.0  747  28.0  11.10  6.25  3
220   9.1  6.8  6.8  5.7  8.7  69.5  52.2  26.3  37.6  24.1  44.5  38.7  29.1  27.2  32.9   88.2  43.8  19.0  747  28.0  11.10  7.08  3
221   9.7  7.1  7.8  6.2  9.1  84.5  64.9  30.6  42.9  27.5  44.2  39.8  30.2  29.4  38.2  103.2  49.1  23.9  747  28.0  11.10  6.60  3
222   9.3  7.1  6.8  5.9  8.5  69.9  52.2  25.5  36.7  23.2  42.2  35.7  27.[illegible]  27.0  33.3   85.9  42.4  19.8  747  28.0  11.10  7.78  3
223   9.2  6.9  7.0  5.6  9.1  78.0  56.5  26.0  40.3  25.2  45.7  38.9  28.3  24.3  33.6   95.2  45.9  19.4  747  28.0  11.10  6.60  3
224   9.0  6.5  7.1  5.9  8.3  76.4  58.4  27.9  38.4  24.1  42.8  37.5  29.0  28.8  33.6   93.3  43.5  19.4  747  28.0  11.10  6.80  3
```

```
------------------------------------------------------ SEX=M ------------------------------------------------------

OBS H2INIT H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

216  11.10  8.29  3  11.10  7.96  3  3.78  3.36  483  28  2.83  4.40  3.555  1.17  2.65  2.01  2.58  1.98  1.00601  28.68  1.27270  1.18200
217  11.10  6.49  3  11.10  6.48  3  5.01  3.86  455  28  2.83  3.00  2.700  0.84  3.25  0.34  2.60  0.96  2.18343  28.68  2.25969  2.19180
218  11.10  7.10  3  11.10  7.36  3  4.67  3.88  461  28  2.83  4.53  2.700  1.74  3.40  1.01  3.65  0.57  1.71754  28.68  1.62641  1.54243
219  11.10  6.39  3  11.10  6.51  3  5.70  4.30  520  28  2.83  4.85  3.120  1.88  2.10  2.92  2.55  2.64  2.26829  28.68  2.39166  2.16677
220  11.10  7.42  3  11.10  7.53  3  4.91  4.08  537  28  2.83  6.58  3.850  2.20  3.10  2.14  2.42  3.87  1.50377  28.68  1.73154  1.43448
221  11.10  6.74  3  11.10  7.42  4  6.17  4.69  643  28  2.83  4.90  1.800  2.71  1.02  3.22  1.70  2.97  1.98229  28.68  2.09305  2.02792
222  11.10  7.96  3  11.10  7.91  3  3.66  3.01  497  28  2.83  5.10  3.800  1.18  3.36  1.49  2.95  2.00  1.18200  28.68  1.26435  1.20995
223  11.10  6.83  3  11.10  6.64  3  5.06  3.97  467  28  2.83  5.45  3.320  2.17  3.65  1.91  3.29  2.31  1.91349  28.68  2.09305  2.06093
224  11.10  7.01  3  11.10  7.00  3  5.10  4.31  647   .  2.83     .      .     .     .     .     .     .  1.78118  28.68  1.93622  1.78635

OBS     A          B          C       MINRVDIF     HRV     H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

216  0.266690   0.090693   0.175997   0.090693   1.22735   0.996424   1.04141   1.04622   1.04520   1.04370   1.04104   1.04250   1.04123
217  0.076257   0.067888   0.008368   0.008368   2.18761   0.996424   1.03130   1.03842   1.03912   1.03869   1.03071   1.03495   1.03577
218  0.089126   0.085978   0.175104   0.085978   1.58542   0.996424   1.04207   1.04083   1.04047   1.03933   1.04165   1.03738   1.03722
219  0.123369   0.224891   0.101522   0.101522   2.21753   0.996424   1.07047   1.07297   1.07326   1.07626   1.06968   1.06804   1.06795
220  0.227772   0.297060   0.069287   0.069287   1.46912   0.996424   1.09013   1.08027   1.06577   1.06454   1.08957   1.07531   1.06096
221  0.110760   0.045131   0.045629   0.045629   2.00511   0.996424   1.04874   1.04386   1.04057   1.04579   1.04824   1.04028   1.03688
222  0.102291   0.074344   0.027947   0.027947   1.19598   0.996424   1.05809   1.05595   1.05370   1.05539   1.05767   1.05171   1.04937
223  0.179565   0.032122   0.147443   0.032122   2.07699   0.996424   1.07028   1.07078   1.07190   1.07251   1.06961   1.06630   1.06749
224  0.155043   0.147871   0.007172   0.007172   1.78476          .         .         .         .         .         .         .         .

OBS DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC     X        Y        Z      MINFAT   EXPFAT  PERFAT1  PERFATX  PERFATY  PERFATZ

216  1.03975  24.6265  22.6109  23.0382  23.6658  0.42725  1.05485  0.62760  0.42725  22.8245  24.7840  24.1706  24.7057  25.3294
217  1.03517  28.9308  25.8902  25.5969  25.7794  0.29323  0.11081  0.18242  0.11081  25.8348  29.1838  27.3687  27.0177  27.2718
218  1.03617  24.3485  24.8739  25.0234  25.5082  0.14955  0.63431  0.48476  0.14955  24.9486  24.5253  26.3329  26.4010  26.8478
219  1.07103  12.7157  11.7200  11.6069  10.4186  0.11314  1.30144  1.18830  0.11314  11.6635  13.0305  13.6865  13.7210  12.4930
220  1.07892   5.0172   8.8418  14.6000   7.1777  5.75814  1.66411  7.42225  1.66411   8.0098   5.2306  10.7918  16.5412   9.3703
221  1.04214  21.5620  23.5988  24.9841  22.7882  1.38521  0.81062  2.19583  0.81062  23.1935  21.7707  25.1052  26.5435  24.3217
222  1.05086  17.7098  18.5849  19.5086  18.8169  0.92368  0.23201  0.69167  0.23201  18.7009  17.8819  20.3308  21.2991  20.6808
223  1.06797  12.7929  12.5909  12.1465  11.9048  0.44441  0.68608  0.24166  0.24166  12.0256  13.0587  14.3831  13.9054  13.7149
224        .        .        .        .        .        .        .        .        .        .        .        .        .        .
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADHGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  TSFDW  TOTALSF  TSF    BIR    AGE

216  0.53505  1.15880  0.62375  0.53505  24.4382  32.2     57.5    76.1      16.7   [illegible].7   47.8     34.4     4.0      76.2   169.4    112.0  -3353  33.1178
217  0.35104  0.09694  0.25413  0.09694  27.3203  31.5     58.4    84.5      19.3   [illegible].4   52.2     38.5     4.6      52.6   131.4    84.4   -8725  47.8356
218  0.06813  0.51497  0.44684  0.06813  26.3669  31.1     57.2    83.8      18.4   30.3    51.6     37.5     6.1      75.4   176.0    101.8  -8681  47.7151
219  0.73448  1.19356  1.22805  0.03448  13.7038  33.7     56.2    90.5      20.3   33.6    54.1     41.2     6.6      24.2   57.6     35.2   -6926  42.9068
220  5.74942  1.42154  7.17097  1.42154  10.0810  31.4     55.1    75.9      17.3   25.9    44.4     32.1     6.2      30.7   76.7     46.5   -952   26.5397
221  1.43930  0.78376  2.22186  0.78356  24.7134  29.7     64.2    87.1      19.6   34.3    54.1     38.0     6.2      65.4   150.6    103.8  -6863  42.7342
222  0.96679  0.35002  0.61828  0.35002  20.5058  30.3     56.2    76.3      17.7   26.7    43.5     33.9     5.7      49.8   125.6    82.8   -6851  42.7014
223  0.47769  0.66816  0.19047  0.19047  13.8101  30.4     59.2    84.1      19.5   30.5    49.3     38.2     5.6      33.0   83.6     49.4   -5637  39.3753
224  .        .        .        .        .        30.0     61.2    78.6      18.0   30.5    49.8     35.1     5.1      35.6   83.4     55.0   -6723  47.3507
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS  NAME        BIRTH  ORIGIN  BDAY  BMONTH  BYEAR  HGTIN  NOHGTIN  HGTCM  NOHGTCM  HGTLBS  NOHGTLBS  HGTKGS  NOHGTKGS  LOCATION  ID   HEIGHT  WEIGHT  HEAD  NECK  SHOULDER  CHESTIN       CHEST  BUST  ABDOMEN1

225  WOODRUFF    1      .       6     4       58     67.0   .        172.0  .        159     .         .       1         PETAHAHA  245  174.0   72.5    54.8  37.3  119.9     110.2         106.0  .     77.0
226  MCLEAN      1      1       14    10      43     68.0   .        .      1        160     .         .       1         PETAHAHA  246  170.5   70.0    55.1  37.5  114.0     [illegible]   95.1   .     81.7
227  CRANSTON    1      1       4     10      36     .      1        .      1        .       1         .       1         PETAHAHA  247  171.5   84.1    57.2  41.8  117.8     [illegible]   105.1  .     88.8
228  TEGGART     2      1       4     1       48     60.0   .        180.0  .        175     .         80.0    .         PETAHAHA  248  182.0   82.0    55.5  37.5  112.7     [illegible]   98.9   .     86.1
229  BEAUREGARD  2      2       19    2       33     67.0   .        .      1        140     .         .       1         PETAHAHA  249  169.5   62.7    56.5  38.6  106.4     103.5         101.0  .     88.5
230  BEAUREGARD  2      2       19    2       33     67.0   .        .      1        140     .         .       1         PETAHAHA  249  169.5   62.7    56.5  38.6  106.4     103.5         101.0  .     88.5
231  GRANT       3      4       21    3       59     .      1        .      1        .       1         .       1         PETAHAHA  250  182.1   76.1    56.4  37.3  121.7     103.4         100.6  .     76.0
232  RANSOME     1      .       10    9       59     69.0   .        .      1        165     .         7[illegible].0  .  PETAHAHA  251  175.7   71.7    55.8  37.3  121.2     103.9         100.0  .     79.5
233  KNOWLES     1      1       26    9       52     69.0   .        175.5  .        168     .         76.0    .         PETAHAHA  252  174.4   63.2    55.0  38.2  118.6     104.6         100.2  .     80.2

OBS  ABDOMEN2  GLUTEAL  THIGH  KNEE  CALF  ANKLE  FLUPARM  UPARM  FOREARM  WRIST  BICEPSSF  TRICEPSF  SCAPSF  SILIACSF  CHESTSF  ABDOMSF  AILIACSF  AXILLSF  THIGHSF  CALFSF  SITHGT  TRUNKHGT

225  77.7      89.3     59.0   37.5  37.7  23.3   36.9     34.9   27.8     15.9   2.2       6.6       6.6     8.2       4.2      6.2      5.4       5.0      6.2      7.6     87.1    143.1
226  85.6      98.7     57.4   37.7  37.0  21.8   31.7     29.8   27.1     17.1   5.6       8.4       12.6    18.0      12.2     13.2     8.6       15.4     9.8      9.4     91.8    142.9
227  90.9      98.7     61.0   40.2  40.0  22.8   37.4     34.7   30.3     18.3   5.2       10.0      12.8    16.0      9.2      15.4     8.4       10.6     6.4      7.2     88.3    142.6
228  91.2      101.8    61.2   41.5  40.9  24.1   34.9     32.9   28.8     17.2   6.4       15.2      14.0    27.4      14.6     28.6     11.6      12.4     20.6     19.4    88.3    151.5
229  86.0      86.6     47.9   37.8  33.0  21.6   28.5     26.8   26.0     16.9   2.4       6.2       10.8    14.6      4.4      17.6     6.8       8.0      5.2      4.2     79.3    141.8
230  86.0      86.6     47.9   37.8  33.0  21.6   28.5     26.8   26.0     16.9   2.4       6.2       10.8    14.6      4.4      17.6     6.8       8.0      5.2      4.2     79.3    141.8
231  77.4      94.3     55.0   38.4  36.2  21.3   34.0     32.1   29.2     17.8   2.6       4.8       7.6     7.2       3.6      5.6      3.8       4.0      4.6      3.6     94.2    151.2
232  81.2      89.9     54.2   35.0  36.4  21.6   35.9     33.7   28.0     16.8   2.6       5.2       8.4     14.2      3.6      12.2     7.0       7.4      6.6      4.0     85.3    143.1
233  83.4      98.4     58.1   38.2  37.5  22.6   33.6     30.8   28.0     17.2   3.6       9.4       9.8     21.0      5.2      14.4     7.6       9.0      12.0     9.8     88.2    142.4

OBS  EPIFEWTH  ANKLEWTH  EPIHUWTH  WRISTWTH  HANDWTH  TAL   TAS   LAS   SHANKL  FOOTL  SHOLDWTH  BIACWTH  CHESTWTH  ILIACWTH  TROCHWTH  LEGL   LLEGL        CHESTDEP  BARPRES  AMBTEMP  H1INIT  H1FINAL  H1VOL  H2INIT

225  9.8       7.2       6.6       5.4       7.8      74.3  57.3  27.3  39.8    24.1   46.3      39.9     28.2      26.0      32.3      99.1   48.0         20.0      747      28.0     11.10   7.30     3      11.10
226  9.3       6.8       6.7       5.7       8.6      75.6  56.9  27.0  39.2    24.5   46.6      40.8     28.8      28.5      34.0      95.3   47.9         19.4      747      28.0     11.10   7.23     3      11.10
227  10.1      7.1       7.4       6.2       9.3      77.0  57.6  27.6  40.4    25.7   47.8      42.0     32.0      30.0      35.8      96.5   47.5         21.8      747      28.0     11.10   6.20     3      11.10
228  9.9       7.7       7.9       6.1       8.8      79.8  60.0  28.8  44.2    26.3   45.4      39.1     29.2      29.9      37.0      104.0  51.2         20.8      747      28.0     11.10   7.20     3      11.10
229  9.5       7.4       7.0       6.0       9.1      80.8  61.0  28.6  41.5    26.8   43.0      39.0     28.3      27.1      31.6      98.7   45.6         24.3      765      28.0     .       .        .      11.04
230  9.5       7.4       7.0       6.0       9.1      80.8  61.0  28.6  41.5    26.8   43.0      39.0     28.3      27.1      31.6      98.7   45.6         24.3      765      28.0     .       .        .      11.04
231  9.4       7.6       7.3       6.0       9.3      82.3  62.6  31.2  45.0    27.9   50.5      44.9     29.2      27.1      33.5      103.9  50.3         21.4      765      28.3     11.04   7.20     3      .
232  8.9       6.8       6.7       5.7       8.3      79.8  60.7  29.2  41.8    24.4   47.5      40.5     28.3      26.3      32.2      99.4   47.7         22.4      765      28.0     11.04   8.01     3      11.04
233  9.7       7.0       6.8       5.9       8.8      77.6  58.2  29.2  40.0    25.3   49.1      40.9     30.6      27.5      34.0      95.7   [illegible]  19.6      765      28.3     11.04   7.18     3      11.04
```

```
------------------------------------------- SEX=M -------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3

225 7.60  3  11.10  7.67  3  5.50  2.90  204  28.0  2.83  6.40  4.85  2.10  3.71  3.07  4.07  3.73  1.39143  28.68  1.58173  1.34917
226 7.52  3  11.10  7.59  3  5.12  4.08  579  28.0  2.83  4.50  3.60  1.32  3.10  2.13  2.85  2.36  1.44069  28.68  1.67841  1.39753
227 6.40  3  11.10  6.67  3  6.04  4.93  457  28.0  2.83  3.75  3.83  2.15  2.87  4.16  3.04  2.72  2.25969  28.68  2.43707  2.07694
228 7.48  3  11.10  7.49  3  4.77  3.93  595  28.0  2.83  5.00  3.10  1.87  3.70  1.21  3.09  1.70  1.46572  28.68  1.64869  1.45944
229 6.57  3    .      .   .  5.92  3.77  360  28.0  2.83  5.15  1.20  4.33  4.03  0.64  4.35  0.45  2.08711  28.68   .        .
230 6.57  3    .      .   .  5.92  3.77  360  28.0  2.83   .    1.39  2.29  1.45  3.15  1.10  3.28  2.08711  28.68   .        .
231  .    .  11.04  6.89  3  6.01  5.16  726  28.0  2.83  7.44  3.90  4.70  3.25  4.22  3.00  4.26   .       29.19  1.61850  1.83672
232 7.92  3  11.04  8.02  3  5.50  4.56  680  28.0  2.83  5.60  3.02  3.39  2.60  4.17  1.48  4.58  1.17956  28.68  1.12993  1.12449
233 7.06  3    .      .   .  5.69  4.45  631  28.0  2.83  5.80  3.10  2.44  4.15  1.67  4.15  1.66  1.71468  29.19  1.63201   .

OBS A         B         C         MINRVDIF  HRV      H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

225 0.190302  0.232564  0.042262  0.042262  1.37030  0.996424  1.07492  1.08367  1.08085  1.09757  1.07467  1.07929  1.07619
226 0.187716  0.230878  0.043162  0.043162  1.41911  0.996424  1.04783  1.05441  1.05932  1.05899  1.04737  1.05035  1.05497
227 0.177385  0.360130  0.182744  0.177385  2.34838  0.996424  1.06833  1.07136  1.08584  1.06833  1.06768  1.06739  1.08119
228 0.182971  0.189253  0.006282  0.006282  1.46259  0.996424  1.04779  1.04730  1.04653  1.04490  1.04739  1.04372  1.04314
229  .         .         .         .         .       0.996424   .        .        .        .        .        .        .
230  .         .         .         .         .       0.996424   .        .        .        .        .        .        .
231  .        0.218225   .        0.218225  1.72761  0.996424  1.09267  1.11097  1.09291  1.08961  1.09212  1.10562  1.08788
232 0.049626  0.005445  0.055072  0.005445  1.12721  0.996424  1.05920  1.07188  1.07765  1.06621  1.05883  1.06721  1.07268
233 0.082670   .         .        0.082670  1.67334  0.996424  1.08134  1.07822  1.08160  1.07773  1.08071  1.07301  1.07665

OBS DENSITYZ PERFAT   PERFATA  PERFATB  PERFATC  X       Y       Z        MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

225 1.09253  10.9480   7.5161   8.6135   2.1758  1.0974  5.3403  6.43766  1.09737   8.0648  11.1230   9.2253  10.4480   4.0956
226 1.05456  21.9405  19.2196  17.2075  17.3439  2.0121  1.8757  0.13643  0.13643  17.2757  22.1304  20.8919  18.9882  19.1554
227 1.06422  13.5713  12.3589   6.6719  13.5698  5.6870  1.2109  6.89787  1.21089  12.9643  13.8329  13.9468   8.4837  15.2217
228 1.04138  21.9543  22.1595  22.4819  23.1629  0.3224  1.0034  0.68098  0.37239  22.3207  22.1214  23.6549  23.9019  24.6388
229  .        .        .        .        .       .       .       .        .        .        .        .        .        .
230  .        .        .        .        .       .       .       .        .        .        .        .        .        .
231 1.08459   4.0412  -2.8487   3.9513   5.2178  6.7999  8.0664  1.26649  1.26649   4.5845   4.2538  -0.8563   5.8845   7.156
232 1.06121  17.2593  12.1556   9.8706  14.4216  2.2850  2.2660  4.55100  2.26604  13.2886  17.7066  14.0205  11.8375  16.442
233 1.07289   8.4238   9.6482   8.3220   9.8405  1.3262  0.1923  1.51851  0.19228   9.7443   8.6718  11.7041  10.2638  11.75[illegible]1
```

```
------------------------------------------- SEX=M -------------------------------------------

OBS M        N       O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL LFARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR   AGE

225 1.22272  5.1297  6.35237  1.22272   9.8366  30.9  56.2  86.9  17.0  30.0  51.1  38.9  8.2  23.6   58.2   33.8   -635  25.6712
226 1.90374  1.7365  0.16721  0.16721  19.0718  27.6  64.2  78.7  18.7  29.9  47.4  30.8  6.7  44.8  113.4   62.0  -5923  40.1589
227 5.46308  1.2744  6.73746  1.27438  14.5840  29.1  59.2  83.2  19.4  30.0  49.0  35.7  7.1  44.0  101.2   60.6  -8489  47.1890
228 0.24699  0.9839  0.73696  0.24699  23.7784  30.5  57.8  93.7  19.8  31.2  52.8  42.5  7.0  63.0  170.2  105.8  -4380  35.9315
229  .        .       .        .         .      27.7  51.6  90.2  19.8  32.4  53.1  44.6  4.1  34.0   80.2   54.4  -9812  50.8137
230  .        .       .        .         .      27.7  51.6  90.2  19.8  32.4  53.1  44.6  4.1  34.0   80.7   54.4  -9812  50.8137
231 6.74085  8.0123  1.27142  1.27142   6.5202  30.9  63.3  87.9  19.7  31.4  53.6  37.6  5.3  22.2   47.4   29.8   -206  24.7151
232 2.18304  2.4215  4.60457  2.18304  12.9290  32.6  52.7  90.4  19.1  31.5  51.7  42.7  5.9  30.4   71.2   46.6   -113  24.2411
233 1.44037  0.0470  1.48738  0.04701  11.7276  32.0  56.2  86.2  19.4  29.0  50.2  40.7  5.5  43.3  101.8   66.6  -2653  31.2000
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS NAME       BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

234 RICHARDSON 3 1 28  2 26 67.5          .   1 168    .  1 PETAWAWA 253 167.5 76.5 55.6 39.5 115.3 102.6 100.9 . 93.0
235 MOON       1 1 10 11 43 70.5          .   1 160  74.0    PETAWAWA 254 175.4 72.7 54.7 38.8 112.3 105.2 101.7 . 87.3
236 VELLA      1 1 22 12 59 68.0          .   1 149  68.0    PETAWAWA 255 171.0 65.5 55.4 37.7 117.4  98.9  94.6 . 74.8
237 SHAMESS    1 4  4  2 38 71.0          .   1 175    .  1 PETAWAWA 257 178.5 80.4 56.7 38.5 116.2 107.3 104.7 . 89.1
238 FRYC       9   26  9 43 69.0      174.0     185  80.4    PETAWAWA 258 175.1 83.5 55.8 39.0 119.6 107.8 105.0 . 92.2
239 BUTT       3 1  2  1 39 78.0        0.1     180  80.0    PETAWAWA 266 174.4 82.6 58.4 39.5 115.0 112.9 106.8 . 91.1
240 ALEXANDER  3 1 17 11 59 72.0          .   1 195  87.0    HALIFAX  323 180.7 91.0 58.7 41.1 122.7 105.7 102.6 . 93.9
241 WHITE      3 1 16  7 63 72.0          .     180  80.0    HALIFAX  324 178.6 81.0 56.9 38.4 110.2 104.8 102.2 . 83.7
242 CLARKE     1 1  2 12 61 68.0      180.0     195  87.0    HALIFAX  325 173.3 88.0 56.1 39.3 119.8 112.3 109.6 . 90.9

OBS ABDOMEN2 GLUTFAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

234 93.9  96.6 56.4 37.3 38.9 21.8 35.4 32.7 29.0 18.3 3.2  9.6 14.0 19.6 11.0 17.4  8.2 11.6 11.4  8.0 88.9 136.9
235 90.4  96.1 53.1 37.5 34.5 20.0 34.3 32.4 27.2 16.1 5.4 10.6 15.2 25.2 13.6 15.6 14.8 14.2 12.2 12.0 91.1 146.5
236 76.0  90.3 54.3 36.6 34.4 20.8 33.9 31.2 24.7 17.7 2.8  6.8 11.8 15.8  6.6 11.8  6.4  8.0  8.0  5.6 86.5 137.5
237 90.7 101.0 57.4 37.6 35.6 22.7 37.0 35.7 29.8 18.4 9.6 15.4 20.4 30.4 13.2 31.2 14.8 20.2 14.0 12.0 92.4 147.3
238 93.2 101.1 59.9 39.1 38.3 21.8 36.5 35.4 31.3 17.8 9.8 15.2 11.2 24.2 14.4 23.0 10.0 18.5  9.6 10.0 95.1 146.2
239 95.4  96.5 57.0 39.9 38.0 22.4 34.0 33.3 29.3 17.5 4.0 11.0 17.8 20.2 15.6 24.6  9.6 13.4  9.6  8.6 91.4 141.4
240 99.0 104.3 59.6 41.0 40.7 23.6 36.8 34.4 30.3 17.8 7.6 14.6 21.0 40.6 14.2 37.2 17.4 15.8 15.4 15.8 94.2 148.9
241 87.8  99.8 60.9 39.8 37.7 23.4 35.4 33.3 28.9 16.9 4.8 16.8 10.4 30.6 10.0 29.8 14.0 11.2 24.2 19.0 94.2 148.2
242 96.0 104.2 64.7 41.3 41.6 25.1 34.0 33.2 28.0 17.2 6.4 18.0 13.8 33.6 18.2 28.4 17.0 15.4 11.0 15.0 90.9 140.4

OBS EPIFEMTH ANKLEWTH EPIHUMTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

234 9.4 6.9 7.3 6.4 8.9 76.0 57.0 28.2 38.6 23.7 45.5 38.6 27.6 28.2 33.6  93.1 44.7 22.0 765 28.7 11.04 7.10 3 11.04
235 9.4 6.6 7.0 5.5 8.1 80.1 61.2 29.0 40.9 23.8 47.3 40.5 28.7 29.3 34.0  99.2 46.7 21.1 765 28.7 11.04 6.92 3 11.04
236 9.5 7.2 6.9 6.2 8.7 78.0 59.1 28.0 39.8 25.8 47.5 40.2 27.2 25.8 32.8  97.5 45.1 20.5 765 28.7 11.09 8.30 3 11.09
237 9.7 7.3 7.5 6.3 9.1 80.5 60.1 29.8 43.2 27.4 46.6 41.0 29.2 29.7 36.2 100.3 48.2 23.3 765 28.7 11.09 7.08 3 11.09
238 9.7 7.4 7.2 6.1 9.7 77.1 58.7 27.6 38.1 25.5 48.5 39.3 31.0 29.0 36.3  97.2 44.2 23.0 765 28.7 11.09 6.81 3 11.09
239 9.6 7.1 7.3 5.8 8.7 74.8 56.4 26.8 39.6 26.8 45.9 38.2 28.8 29.2 33.8  95.6 45.3 24.4 765 27.9 11.06 6.68 3     .
240 9.8 7.2 7.2 6.1 9.0 79.7 60.8 27.4 40.4 25.2 51.1 43.2 30.6 30.2 36.4  99.1 46.6 21.3 746 21.8 11.41 7.72 3 11.41
241 9.2 7.0 7.2 5.6 9.2 81.1 62.0 28.5 40.4 25.5 45.3 37.7 27.7 28.7 35.2 101.1 47.0 21.2 746 21.8 11.41 7.53 3 11.41
242 9.9 7.6 6.8 6.0 8.9 77.3 58.2 28.1 40.2 25.4 49.4 42.5 29.5 29.4 34.7  96.1 46.5 24.4 746 21.8 11.41 7.94 3 11.41
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS H2FINAL H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTE LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3

234 7.40 3 11.04 7.18 3 3.86 2.78 557 28.0 2.83 5.30 3.40 1.48 3.90 0.99 3.90 0.83 1.48407 29.87 1.68302 1.62634
235 7.17 3 11.04 7.00 3 5.67 4.96 671 28.0 2.83 4.95 3.50 1.32 3.38 1.73 3.50 1.32 1.63511 29.87 1.81067 1.75312
236 8.29 3     .    .  . 4.18 3.66 583 28.0 2.83 6.80 3.70 3.18 3.88 3.06 3.95 2.90 0.99760 29.87 0.99252       .
237 7.07 3     .    .  . 5.24 4.01 540 28.0 2.83 5.00 3.95 0.40 4.05 0.38 3.94 0.38 1.72616 29.87 1.71917       .
238 6.84 3 11.09 7.00 3 5.88 4.46 467 28.0 2.83 4.42 2.40 2.04 1.50 2.83 2.60 1.82 1.89263 29.87 1.91517 1.77567
239    . . 11.06 6.32 3 4.81 3.88 504 28.0 2.83 5.40 4.75 0.70 4.40 0.60 4.65 0.41       . 28.51 2.01005 2.30905
240 7.80 3 11.41 7.76 3 6.22 4.64 470 24.5 2.72 5.25 3.20 2.03 3.56 1.57 3.38 1.72 1.44916 18.14 1.49896 1.47393
241 7.71 3 11.41 7.79 3 5.36 4.37 571 24.8 2.72 5.25 3.59 2.14 4.05 1.58 4.49 1.09 1.50525 18.14 1.62146 1.45533
242 8.13 3 11.41 8.20 3 5.68 4.46 469 24.8 2.72 5.31 2.60 4.71 3.65 1.68 2.66 1.73 1.25411 18.14 1.36443 1.21476

OBS A        B        C        MINRVOL  HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY

234 0.192952 0.054679 0.144272 0.054679 1.55568 0.996424 1.05860 1.05236 1.05255 1.05024 1.05810 1.04857 1.04886
235 0.175562 0.057544 0.118016 0.057544 1.78190 0.996424 1.05837 1.05629 1.06075 1.05629 1.05781 1.05226 1.05656
236 0.005067        .        . 0.005067 0.99506 0.996424 1.08407 1.08530 1.08639 1.06476 1.08370 1.08019 1.08132
237 0.006992        .        . 0.006992 1.72267 0.996424 1.05236 1.04343 1.04452 1.04303 1.05188 1.04015 1.04123
238 0.022542 0.139504 0.116962 0.022542 1.90390 0.996424 1.04505 1.04522 1.04374 1.04497 1.04454 1.04156 1.03988
239        . 0.298997        . 0.298997 2.15955 0.996424 1.06223 1.06288 1.05674 1.05757 1.06162 1.05935 1.05328
240 0.049795 0.025026 0.024769 0.024769 1.46154 0.997626 1.04715 1.04685 1.04566 1.04529 1.04679 1.04359 1.04252
241 0.116208 0.166132 0.049924 0.049924 1.48029 0.997523 1.05354 1.06010 1.05873 1.05806 1.05313 1.05631 1.05511
242 0.110320 0.149676 0.039355 0.039355 1.23443 0.997523 1.04676 1.07218 1.04696 1.03559 1.04644 1.06799 1.04373

OBS DENSITYZ PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ

234 1.04663 17.5035 20.0532 19.9828 20.9386  0.0705  0.8854 0.95582 0.07046 20.0180 17.7062 21.6320 21.5015 22.4377
235 1.05226 17.5958 18.4457 16.6255 18.4457  1.8203  0.0000 1.82026 0.00000 18.4457 17.8255 20.1027 18.3352 20.1027
236 1.07978  7.3612  6.8806  6.4575  7.0837  0.4231  0.2031 0.62619 0.20305  6.9822  7.5035  8.8732  8.4329  5.0362
237 1.03975 20.0611 23.7772 23.3204 23.9479  0.4568  0.1707 0.62749 0.17073 23.8625 20.2618 25.1613 24.7022 25.3297
238 1.04136 23.0992 23.0294 23.6491 23.1349  0.6197  0.1055 0.51418 0.10553 23.0871 23.3128 24.5665 25.2748 24.6473
239 1.05416 16.0286 15.7648 18.2615 17.9246  2.4967  2.1597 0.33692 0.33692 18.0930 16.2735 17.1957 19.6810 19.3226
240 1.04212 22.2221 22.3471 22.8450 22.9978  0.4979  0.6507 0.15281 0.15281 22.9214 22.3726 23.7109 24.1614 24.3297
241 1.05458 19.5744 16.8895 17.4473 17.7232  0.5578  0.8337 0.27594 0.27594 17.5852 19.7456 18.4366 18.9296 19.1489
242 1.03242 22.3863 12.0349 22.3038 27.0941 10.2690 15.0592 4.79023 4.79023 24.6990 22.5177 13.7064 23.6528 28.4483
```

```
------------------------------------------------- SEX=M -------------------------------------------------

OBS  M       N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF    BIR    AGE

234  0.1305  0.8058  0.93622  0.13046  21.5668  30.6  58.3  78.6  19.0  28.8  48.4  33.9  6.1  46.4  114.0   72.0  -12360  57.7945
235  1.7674  0.0000  1.76743  0.00000  20.1027  26.9  62.2  84.3  18.9  32.2  52.5  37.6  5.8  56.4  138.8   78.8   -5896  40.0849
236  0.4403  0.1630  0.60330  0.16301   8.9547  33.5  53.0  84.5  18.9  31.1  52.4  39.4  5.3  37.2   85.6   54.2     -10  23.9589
237  0.4591  0.1684  0.62749  0.16840  25.2455  31.2  61.2  86.1  20.4  30.3  52.1  37.9  5.0  75.8  181.2  111.4   -8001  45.8521
238  0.7083  0.0808  0.62750  0.08085  24.6069  28.9  66.2  80.0  18.4  31.1  53.0  35.8  5.1  60.4  145.9   83.2   -5941  40.2082
239  2.4853  2.1268  0.35847  0.35847  19.5018  33.0  58.4  83.0  18.4  29.6  50.3  37.7  5.7  53.0  134.4   83.2   -7669  44.9425
240  0.4505  0.6188  0.16825  0.16825  24.2456  31.8  62.4  86.5  18.9  33.4  52.5  39.9  6.2  83.8  199.6  128.8     -45  24.0548
241  0.4930  0.7122  0.21926  0.21926  19.0392  30.4  63.8  84.4  19.1  33.5  54.1  37.4  6.6  62.6  170.8  111.8    1292  20.3918
242  9.9464 14.7419  4.79556  4.79556  26.0505  32.9  58.0  82.4  19.1  30.1  49.6  35.9  6.3  71.8  176.8  104.8     701  22.0110
```

```
------------------------------------------------- SEX=M -------------------------------------------------

OBS NAME     BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN WOHGTIN HGTCM WOHGTCM WGTLBS WOWGTLBS WGTKGS WOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1

243 SPURR    3 1  1  7 56 73.8     .  1 215     .    1 HALIFAX 326 185.7 97.3 58.8 40.4 122.1 113.0 110.6 .  98.5
244 POWELL   1 1 14 10 59 65.0   210    165   70.0     HALIFAX 327 174.0 72.8 56.9 40.0 107.5  97.5  95.2 .  82.9
245 DEVEAU   1 1  4 11 60 73.0     .  1 190   85.0     HALIFAX 328 182.5 85.1 58.4 40.9 117.1 105.2 102.0 .  87.7
246 SCANLAN  1 1  7  7 59 68.0     .  1 147     .    1 HALIFAX 329 172.0 67.0 56.6 36.6 113.7  95.2  92.1 .  80.2
247 DAWSON   1 1  9  4 60    .  1  .  1   .  1 70.5     HALIFAX 330 164.6 70.4 55.4 37.2 118.2 102.7  99.4 .  80.9
248 POOLEY   3 1 19  7 55    .  1  .  1   .  1    .  1 HALIFAX 331 170.9 69.5 56.8 38.7 111.2  95.6  92.8 .  81.5
249 BIGELOW  3 1 15 11 52    .  1  .  1   .  1    .  1 HALIFAX 332 175.1 80.9 62.1 41.0 119.1 103.3  99.6 .  90.0
250 MACNEIL  9 1 21  2 63    .  1  .  1   .  1    .  1 HALIFAX 333 162.3 75.0 56.4 38.1 118.4 100.2  99.7 .  90.6
251 COYLE    3 1 11  7 44    .  1  .  1   .  1    .  1 HALIFAX 334 166.7 75.6 54.9 39.1 111.8 108.6 105.5 .  92.1

OBS ABDOMEN2 GLUTEAL THIGH KNEE CALF ANKLE FLUFARM UPARM FOREARM WRIST BICEPSSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT

243 105.0 108.6 64.9 41.8 38.7 24.2 37.9 36.8 29.1 18.0 6.4 23.2 36.8 36.6 16.8 44.0 17.4 16.0 25.6 20.0 95.9 154.0
244  89.1  96.2 57.8 39.2 37.1 21.8 34.3 31.5 27.8 16.6 5.4 18.0 13.0 31.2 15.0 33.2 15.2 13.2 17.8 13.6 87.9 142.8
245  90.9 103.5 61.2 39.3 40.3 24.6 34.8 33.6 30.3 17.7 2.8  9.0 12.2 32.2 15.0 27.2 18.4 18.2  8.2  9.6 93.5 151.3
246  82.2  88.9 54.8 35.6 37.4 20.7 34.3 31.6 27.8 16.3 3.2  7.6  8.4 18.2 10.8 18.8  8.6  7.2 11.0  5.4 92.7 138.8
247  84.8  96.1 60.0 36.1 36.5 21.6 34.5 33.0 28.0 15.3 3.4 10.0 11.8 20.2  9.2 19.6 10.2  9.4 13.2 11.8 88.5 130.6
248  95.6  96.5 57.5 39.5 35.7 21.6 31.8 29.9 26.4 15.7 6.0 13.2 14.6 22.0 13.8 25.0 14.4 13.4 18.8 15.0 86.6 140.8
249  94.4 100.1 58.5 37.8 38.5 22.6 34.7 31.3 28.0 17.6 2.2  7.2  8.8 21.8  6.4 16.2  7.6  7.2 10.8 10.0 92.7 140.3
250  94.5  99.2 58.2 39.4 42.3 23.8 33.0 32.2 28.0 16.0 4.4 16.6 21.8 39.0 15.2 31.4 20.0 18.8  9.6  9.4 86.5 129.0
251  94.7  99.5 59.0 38.8 37.4 21.1 35.6 34.4 29.0 16.2 5.4 14.0 20.4 21.2 14.8 27.4 11.2 14.6 13.2 13.2 84.6 133.0

OBS EPIFEWTH ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT

243 9.6 7.2 7.0 6.1 8.6 82.0 63.9 30.3 43.4 25.5 48.9 41.2 29.8 29.1 35.1 104.3 50.1 24.6 746 22.8 11.4 7.43 3 11.4
244 9.6 6.8 6.7 5.7 8.7 76.6 58.3 28.0 39.4 25.9 43.0 37.1 25.7 27.6 33.8  97.1 45.3 19.7 747 23.2 11.4 7.85 3 11.4
245 9.8 7.2 7.5 6.0 8.6 77.9 58.9 28.2 42.2 26.9 46.1 39.8 31.1 27.5 35.0 102.9 48.7 22.6 747 23.1 11.4 7.30 3 11.4
246 9.2 6.3 7.0 5.6 8.2 73.3 56.1 26.4 37.5 24.1 46.1 38.7 26.3 26.2 30.7  92.1 44.7 19.1 747 23.2 11.4 7.99 3 11.4
247 8.4 6.3 6.7 5.3 7.9 72.1 54.5 26.5 36.9 22.5 49.0 42.2 30.1 26.6 34.3  89.3 42.5 19.2 747 23.2 11.4 7.91 3 11.4
248 9.2 6.7 6.8 5.5 8.3 75.0 56.7 27.0 39.1 24.2 46.2 40.8 27.7 26.7 33.9  94.5 46.7 18.2 747 25.4 11.4 8.24 3 11.4
249 9.2 7.0 6.9 5.9 8.8 79.4 61.0 29.2 40.6 24.0 48.1 43.3 28.1 29.3 34.7  95.1 46.3 20.1 747 25.1    .    . . 11.4
250 9.3 6.5 6.5 5.0 7.8 69.7 53.2 24.4 34.6 24.9 46.5 38.5 27.8 27.2 32.6  85.6 42.0 20.4 747 27.1 11.4 8.27 3 11.4
251 9.7 6.8 7.2 5.6 8.5 75.0 57.5 27.5 38.2 24.2 46.4 39.8 27.4 27.2 35.6  91.0 43.9 22.2 747 27.2 11.4 7.80 3 11.4
```

```
----------------------------------------------- SEX=M ------------------------------------------------

OBS  N        O        MINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF    BIR    AGE

252  9.14835  8.66030  0.48805  24.0093  29.9    58.2   87.7     19.7  34.1   52.6    39.0    7.5      76.6  161.2   103.4  -6021  40.4274
253  0.99164  0.78827  0.20337  21.6363  27.8    64.6   85.4     18.4  31.6   52.3    36.6    6.2      81.8  198.2   123.4    819  21.6877
254  3.87224  1.55638  1.55638  15.2401  30.8    58.6   82.9     18.7  30.1   49.8    36.7    5.9      31.2   81.0    50.8   1151  20.7781
255  1.03287  9.84082  1.03287  23.4579  31.3    53.1   80.1     17.8  29.5   45.9    34.4    7.0      69.8  187.0   107.6  -5833  39.9123
256  1.25078  0.62360  0.62360  14.8996  32.6    55.1   77.4     17.4  28.2   45.7    34.2    5.7      43.6  113.0    72.0    685  22.0548
257  0.43707  0.15457  0.15457  22.1790  30.1    65.4   81.9     19.0  31.0   51.7    33.6    7.6      71.8  180.8   112.0   1165  20.7397
258  3.41217  4.57627  1.16410  16.4004  28.9    54.7   92.9     20.4  33.0   53.2    43.0    6.6      57.4  138.0    89.8  -7577  44.6904
259  6.93409  2.29582  2.29582  37.0403  31.3    53.6   85.4     16.2  30.7   47.7    39.4    7.1      72.0  179.8   111.8  -3129  32.5041
260  0.33336  0.62666  0.29330  34.5341  31.4    61.1   81.2     19.9  30.6   48.3    31.9    7.3     120.6  300.0   176.2  -3904  34.6274
```

```
----------------------------------------------- SEX=M ------------------------------------------------

OBS NAME        BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1 ABDOMEN2

261 DESCHAMPS   1 2 27 11 60 66.0    167     136    61.0    HALIFAX 344 166.3 60.9 54.3 35.7 108.8  94.0  88.7 .  74.4  74.4
262 GALE             7 10 56 66.0      .  1  145      .   1 HALIFAX 345 168.0 66.3 55.5 37.7 108.7  96.6  94.2 .  83.4  84.3
263 WHYTE            6  7 43 69.0      .  1  176    79.0    HALIFAX 346 169.1 76.5 56.7 40.7 110.4 109.8 108.2 .  94.0  99.5
264 RICHARDSON  1 1 17 10 59 68.0      .  1  136      .   1 HALIFAX 347 171.8 62.3 55.4 36.6 106.4  98.7  97.0 .  77.9  77.0
265 WHITTAKER   3 1 10 12 63 70.0    175     158    72.0    HALIFAX 348 175.4 71.0 54.8 37.0 111.6 100.5  97.8 .  81.2  84.7
266 ROWSELL     3 1  7  1 64 64.0    140     140    64.0    HALIFAX 349 165.3 63.0 56.3 36.6 111.2  94.3  90.4 .  78.7  79.7
267 MOORES      3 1  8  4 62   .   1   .  1  165      .   1 HALIFAX 350 166.8 74.8 57.0 38.0 114.1 106.2 102.6 .  86.5  87.8
268 SMITH       1 1 21  4 41 71.1      .  1  206      .   1 HALIFAX 351 181.2 93.6 57.2 42.5 120.0 111.2 107.1 .  99.5 100.9
269 HEIMAN      1 4 10  3 39 69.0      .  1    .  1   .   1 HALIFAX 352 175.6 89.3 56.6 42.2 117.0 108.4 104.5 .  97.5 103.1

OBS GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF ILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT EPIFEMTH

261  88.8  52.0  36.1  35.5  21.1  31.3  28.5  27.2  16.6   2.2   4.4   6.8   9.6   4.6   7.6   4.6   4.2   6.0   3.4  88.5  135.6   9.3
262  92.5  52.5  35.2  38.0  22.3  31.9  30.1  27.6  16.4   2.2   9.4  18.0  19.8  14.0  22.2   9.6  12.8   8.0   5.6  84.3  138.0   9.1
263  99.3  58.3  38.0  36.2  22.3  33.6  32.6  27.8  17.1   3.8  10.2  27.2  25.4  13.0  34.0  14.8  17.6  12.2  10.8  84.3  143.5   9.2
264  88.9  51.6  35.6  33.6  20.6  30.9  25.0  27.2  15.5   2.4   6.0   7.2  10.0   6.0   7.2   4.6   5.0   9.6   5.0  86.9  140.7   9.1
265  94.8  53.8  36.6  34.2  21.2  32.3  30.5  26.0  16.1   3.8  11.6  12.8  20.0  10.2  16.4   8.2   8.0  11.8  11.0  88.1  142.0   8.9
266  89.1  52.9  35.8  38.0  23.3  31.6  29.7  27.3  16.0   2.6   7.0   7.4  16.4   7.4  15.4   7.6   6.6  11.2   9.6  86.9  132.6   9.1
267  97.3  59.3  39.1  36.7  21.8  34.1  32.6  28.6  16.3   4.4  11.6  12.4  24.8  14.2  17.2  14.0  14.8  10.8  16.8  88.6  139.2   9.7
268 104.9  60.6  42.3  43.1  25.9  37.7  35.8  31.4  18.6  11.4  19.4  26.4  39.2  19.0  33.3  15.4  25.2  14.0  14.8  91.6  148.3   9.8
269 106.0  60.6  41.5  40.7  23.0  37.3  35.8  30.2  18.0   9.4  16.2  33.2  31.6  20.2  41.2  13.2  22.4  13.2  16.6  89.4  144.9  10.1

OBS ANKLENTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT H2FINAL

261 6.9 6.8 5.5 8.5 72.8 55.3 25.5 36.0 23.1 44.9 38.7 25.6 26.2 31.1  89.6 44.1 19.2 747 23.0 11.40 7.77 3 11.40 8.01
262 6.5 7.2 5.5 8.1 74.8 57.3 26.1 36.6 24.1 44.6 39.4 27.4 27.0 31.6  92.4 45.2 19.7 747 23.0 11.40 6.60 3 11.40 7.00
263 6.9 7.5 5.8 8.9 78.6 60.5 29.4 41.0 24.5 45.6 37.1 29.9 29.2 36.4  96.6 47.1 23.6 747 22.8   .     .  . 11.40 7.88
264 7.1 6.9 5.1 8.1 78.7 59.8 27.7 40.9 24.4 43.0 37.7 27.0 25.5 31.3  97.5 47.9 22.2 747 23.1 11.40 7.40 3 11.40 7.58
265 6.4 7.0 5.6 8.1 79.7 61.5 29.1 41.2 24.1 45.8 39.6 29.0 29.5 32.0  97.4 48.4 22.0 747 22.8   .     .  . 11.40 7.38
266 6.7 6.5 5.6 8.5 71.7 54.4 26.0 35.7 24.0 45.6 39.6 26.5 24.9 31.0  87.0 41.3 17.5 747 22.8   .     .  . 11.40 7.81
267 7.0 7.3 5.5 8.3 73.9 56.2 26.6 38.1 23.9 46.5 38.0 30.0 29.2 33.3  91.0 44.5 21.1 747 22.8 11.40 7.60 3 11.40  .87
268 7.7 7.4 5.9 8.9 81.3 61.0 29.5 41.0 27.2 47.5 40.3 30.3 30.9 35.1 102.0 48.5 23.5 747 23.1   .     .  . 11.40 7.23
269 7.9 7.3 6.2 8.8 77.0 58.2 27.0 39.3 26.0 46.7 38.5 28.8 30.8 34.9  96.2 44.8 26.2 747 23.3 11.40 7.00 3 11.40 7.11
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS NAME      BIRTH ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION  ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1 ABDOMEN2

252 FAUVELLE    1     1     8     7     63    .      1       .      1      220             .      1     HALIFAX  335  175.8  99.9  57.5 41.0  127.4   118.0  115.4  .    104.9    106.6
253 POWER       3     1    30     3     62           1       .      1       .       1        .      1     HALIFAX  336  177.8  82.9  55.3 37.9  122.0   103.5  100.4  .     89.5     94.3
254 HALL        3     1    25     2     63   68.0            .      1      150              .      1     HALIFAX  337  172.3  67.2  56.3 37.8  111.9    99.7   96.2  .     78.7     80.0
255 CURRIE      1     1    12     1     44   65.0            .      1      167              .      1     HALIFAX  338  164.5  75.7  61.5 42.3  117.5   108.7  102.9  .     93.2     97.2
256 GRAHAM      3     1    16    11     61    .      1      167             .       1        .      1     HALIFAX  339  165.1  58.4  56.8 35.4  104.7    88.7   86.3  .     74.3     76.9
257 SIGRIST     3     1    11     3     63   71.1            .      1      191              .      1     HALIFAX  340  177.4  87.3  60.1 39.3  122.7   105.1  101.0  .     88.4     92.8
258 GAGE        9     5     4     4     39   72.0           176            185            84.6           HALIFAX  341  176.5  84.4  58.0 39.6  121.3   109.2  107.5  .     92.9     93.3
259 BALL        1     1     8     6     51   68.0            .      1      159              .      1     HALIFAX  342  170.3  74.0  54.8 36.8  114.4   103.4  100.5  .     87.6     90.9
260 CRAIG       6     1    24     4     49   69.0            .      1      215            94.0           HALIFAX  343  173.7  98.7  56.5 40.1  124.1   117.6  113.7  .    104.4    110.4

OBS GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT EPIFEWTH

252  107.1  63.3  42.2 45.0  23.7   37.3   36.4   31.2   18.1    8.2    14.2    15.8   38.4     7.2    26.8    13.8    16.0     8.2   12.6   88.1  145.9    10.2
253   99.7  60.1  40.7 38.3  22.3   34.6   32.2   28.3   17.9   10.2    17.2    14.2   40.2    18.4    34.6    15.2    12.8    17.2   18.2   92.4  150.0     9.9
254   89.8  53.8  36.0 35.4  22.5   33.0   31.8   27.7   17.2    2.6     9.0     7.8   11.8     6.2    12.8     5.6     6.4     9.4    9.4   89.4  141.5     8.8
255   95.7  58.0  39.0 36.4  22.9   34.3   32.1   28.6   16.9   11.2    16.2    17.8   24.6    13.8    36.4    19.2    23.2    12.6   12.0   84.4  133.2     9.8
256   90.2  50.9  35.5 35.1  20.3   30.3   28.7   26.3   15.7    5.2    12.4     8.2   17.8     8.0    13.8     6.4     8.4    19.8   13.0   87.7  132.5     9.2
257  102.2  62.0  40.3 41.1  23.8   36.6   35.0   29.1   17.2    8.0    15.8    16.0   32.0    14.4    30.4    21.0    12.8    17.8   12.6   95.5  147.3     9.5
258   96.0  60.4  37.7 37.1  21.5   37.5   33.1   29.7   17.2    4.2     9.4    16.6   27.[illegible]  11.0  26.6  13.4   14.0    10.0    5.6   83.6  147.6     9.3
259  101.8  57.2  39.8 36.2  22.8   32.2   31.6   27.5   16.7    8.0    14.8    20.8   28.4    15.0    27.2    14.6    14.6    20.6   15.8   84.9  139.0     9.9
260  117.5  68.2  43.0 42.4  24.4   37.0   34.4   31.8   18.4   18.6    23.4    31.0   47.6    23.4    44.0    30.4    28.2    30.2   23.2   92.5  142.3    10.3

OBS ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL  LLEGL CHESTDEP BAKPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT H2FINAL

252   7.3     7.4      6.0     9.4   81.8 62.1 28.0  41.2  24.8   51.8    40.8     32.3     31.0     38.1   101.3  48.7   23.9     747    24.0   11.40   7.21    3   11.40   7.40
253   7.3     7.3      6.0     9.0   78.9 60.5 28.9  42.6  24.8   49.9    42.7     30.6     28.2     34.6   101.1  48.8   20.1     747    24.8     .       .     .   11.40   8.18
254   6.7     7.0      6.0     8.7   77.8 59.1 29.0  40.3  24.5   45.5    38.9     28.3     26.1     31.5    96.0  46.2   20.8     747    24.4   11.40   7.88    3   11.40   8.00
255   7.2     7.5      6.1     8.2   75.3 57.5 28.0  38.7  25.7   47.0    41.3     31.8     30.0     34.0    91.6  45.7   22.8     747    27.6   11.40   7.20    3   11.40   7.27
256   6.3     6.8      5.3     7.8   72.6 55.2 27.0  37.5  22.6   43.5    38.0     27.0     24.6     33.4    88.9  43.2   17.1     747    25.5   11.40   8.16    3   11.40   8.19
257   7.1     6.9      5.7     8.6   77.6 58.6 27.6  40.7  23.4   49.7    41.4     29.1     29.3     35.5   100.0  48.3   21.0     747    26.0   11.40   7.86    3   11.40   8.00
258   7.2     7.2      5.8     8.8   86.2 65.8 32.8  43.3  26.7   48.3    40.8     28.8     28.5     33.3   103.1  49.9   20.0     747    23.3   11.40   7.16    3   11.40   7.28
259   7.2     7.2      5.7     8.4   73.2 57.0 26.3  38.9  24.7   46.7    39.5     28.4     30.2     35.8    93.7  46.0   23.3     747    23.0   11.40   7.68    3   11.40   7.60
260   7.5     7.8      6.2     9.0   80.1 60.2 29.6  47.0  25.8   50.1    42.2     31.5     32.3     40.5    97.6  49.3   22.7     747    23.3   11.40   6.65    3   11.40   6.80
```

```
------------------------------------------------ SEX=M ------------------------------------------------

OBS H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC   HRV2   H2OVAP   HRV1     HRV3       A

252   3   11.40   7.51    3   5.34 4.19 532   24.5    2.72    4.78    2.45    2.98     1.64    3.70     1.95    1.45   1.68306  21.88  1.81475  1.60987  0.131683
253   3   11.40   8.17    3   5.63 4.52 536   24.5    2.72    5.28    3.10    2.41     3.0[illegible]  2.55  2.40  3.31   1.20108  23.24     .     1.20658     .
254   3   11.40   8.14    3   5.90 5.19 699   24.5    2.72    5.40    3.30    2.77     3.40    2.32     4.10    1.37   1.30530  22.56  1.37553  1.22598  0.070229
255   3   11.40   7.29    3   5.46 4.33 750   24.5    2.72    3.73    1.90    2.57     1.88    4.04     [illegible].70  2.60  1.73641  28.00  1.78486  1.72274  0.048446
256   3   11.40   8.27    3   4.71 4.05 589   24.5    2.72    5.10    3.60    1.52     3.25    1.96     4.8[illegible]  2.42  1.19082  24.43  1.20727  1.14751  0.016458
257   3   11.40   8.00    3   5.79 4.89 599   24.5    2.72    5.55    2.74    2.88     2.95    2.61     3.80    1.71   1.29344  25.28  1.37464  1.29344  0.081396
258   3   11.40   7.10    3   4.43 3.74 620   24.5    2.72    5.80    2.70    3.33     3.15    2.65     3.70    2.95   1.77251  20.69  1.85798  1.90179  0.085471
259   3   11.40   7.60    3   5.45 4.09 573   24.5    2.72    3.30    1.45    1.75     1.16    1.28     1.18    0.88   1.56045  20.18  1.50948  1.56045  0.050973
260   3   11.40   6.89    3   6.00 4.92 70[illegible]  24.5  2.72  2.83  2.30    0.29     2.10    0.43     2.45    0.21   2.13249  20.69  2.25564  2.06117  0.123152

OBS     B         C       MINRVDIF    HRV     H2ODENS   DENSITY  DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY DENSITYZ

252  0.204875  0.073192  0.073192  1.64647  0.997626  1.03934  1.04669  1.04568  1.02487  1.03898  1.04346  1.04230  1.02211
253      .     0.005505  0.005508  1.20383  0.997626  1.04857  1.05196  1.05249  1.05461  1.04824  1.04831  1.04880  1.05070
254  0.149546  0.079317  0.070229  1.34041  0.997626  1.06543  1.07678  1.07078  1.06656  1.06496  1.07190  1.06611  1.06225
255  0.062117  0.013671  0.013671  1.72958  0.997626  1.03901  1.04960  1.07175  1.04713  1.03850  1.04543  1.06693  1.04296
256  0.059762  0.043304  0.016458  1.19904  0.997626  1.06734  1.06766  1.06941  1.07116  1.06686  1.06270  1.06425  1.06580
257  0.081396  0.000000  0.000000  1.29344  0.997626  1.05092  1.05172  1.05097  1.05036  1.05059  1.04812  1.04744  1.04707
258  0.043819  0.129289  0.043819  1.87989  0.997626  1.06387  1.06687  1.06379  1.07533  1.06336  1.06275  1.05988  1.07125
259  0.050973  0.000000  0.000000  1.56045  0.997626  1.03124  1.02974  1.01896  1.01365  1.03078  1.02592  1.01535  1.01019
260  0.194469  0.071317  0.071317  2.09683  0.997626  1.02393  1.02138  1.02074  1.02212  1.02348  1.01875  1.01809  1.01951

OBS  PERFAT   PERFATA  PERFATB  PERFATC     X        Y        Z     MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ     M

252  25.5022  22.4165  22.8370  31.7083  0.42053  9.29183   8.8713  0.42053  22.6268  25.6566  23.7653  24.2533  32.9136  0.48805
253  21.6322  20.2271  20.0079  19.1338  0.21920  1.09335   0.8742  0.21920  20.1175  21.7682  21.7380  21.5347  20.7464  0.20335
254  14.7354  10.2129  12.5915  14.2804  2.37859  4.06741   1.6888  1.68862  13.4359  14.9222  12.1461  14.4620  16.0183  2.31585
255  25.6430  21.2019  12.2071  22.2311  8.99483  1.02916  10.0240  1.02916  21.7165  25.8571  22.9414  14.1335  23.9743  8.80798
256  13.9659  13.8373  13.1396  14.4422  0.69776  1.39516   0.6974  0.69739  12.7909  14.1583  15.8386  15.2114  14.5878  0.62718
257  20.6558  20.3244  20.6358  20.8870  0.31147  0.56263   0.2512  0.25115  20.7614  20.7946  21.8192  22.1017  22.2563  0.28250
258  15.3626  14.1572  15.3967  10.7872  1.23958  3.36999   4.6096  1.23958  14.7769  15.5713  15.8184  16.9825  12.4062  1.16410
259  28.9552  29.5999  34.2977  36.6442  4.69777  7.04424   2.3465  2.34646  35.4709  29.1527  31.2542  35.8924  38.1883  4.63827
260  32.1177  33.2348  33.5148  32.9090  0.28001  0.32577   0.6058  0.28001  33.3748  32.3168  34.3874  34.6807  34.0540  0.29330
```

```
-------------------------------------------------------------- SEX=M --------------------------------------------------------------

OBS  H2FINAL  H2VOL  H3INIT  H3FINAL  H3VOL  FVC   FEV1  PFR  H2OTEMP  BASEWGT  H2OWGT1  H2OWGTA  LUNGVOLA  H2OWGTB  LUNGVOLB  H2OWGTC  LUNGVOLC  HRV2     H2OVAP  HRV1     HRV3

243  7.72     3      11.4    7.77     3      6.34  4.48  402  24.8     2.72     4.20     0.93     3.75      2.67     1.48      2.65     1.55      1.48617  19.84   1.67442  1.45513
244  8.07     3      11.4    8.02     3      5.32  4.18  547  24.5     2.72     4.90     1.50     3.49      2.59     1.43      2.70     2.89      1.27400  20.52   1.40301  1.30270
245  7.58     3      11.4    7.67     3      6.15  5.18  563  24.5     2.72     5.55     3.45     2.90      3.97     1.45      4.13     1.18      1.57247  20.35   1.76055  1.51493
246  8.04     3      11.4    8.00     3      5.17  4.54  677  24.5     2.72     5.35     3.30     1.90      .        .         .        .         1.29118  20.52   1.32009  1.31628
247  8.02     3      11.4    8.09     3      4.61  3.82  541  24.5     2.72     5.32     1.37     1.52      3.25     2.27      2.48     3.10      1.30270  20.52   1.36711  1.26262
248  8.20     3      11.4    8.01     3      4.54  3.93  516  24.5     2.72     3.32     1.95     2.04      2.12     2.24      2.10     2.24      1.18603  24.26   1.16432  1.29215
249  7.90     3      11.4    7.98     3      5.79  5.07  613  24.5     2.72     5.70     3.05     3.53      3.25     3.28      2.80     3.76      1.35824  23.75   .        1.31161
250  8.29     3      .       .        .      4.94  4.20  534  24.5     2.72     3.75     2.12     2.57      3.02     1.63      2.55     1.88      1.12650  27.15   1.13710  .
251  7.88     3      11.4    7.95     3      4.49  3.87  725  24.5     2.72     4.45     1.85     3.64      1.77     3.51      2.05     3.06      1.35375  27.32   1.40101  1.31317

OBS  A         B         C         MIN?VDIF   HRV      H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY

243  0.188251  0.219287  0.031037  0.0310368  1.47065  0.997523  1.03241  1.03760   1.03182   1.03237   1.03208   1.03422   1.02898
244  0.129005  0.100307  0.028698  0.0286979  1.28835  0.997626  1.05162  1.05287   1.03834   1.06213   1.05122   1.04835   1.03457
245  0.188080  0.245618  0.057538  0.0575380  1.54370  0.997626  1.05557  1.06609   1.05383   1.05240   1.05516   1.06221   1.05043
246  0.028913  0.005812  0.023102  0.0058115  1.31718  0.997626  1.06439  1.06178   .         .         1.06394   1.05733   .
247  0.064413  0.104490  0.040078  0.0400778  1.28266  0.997626  1.06006  1.02250   1.06319   1.06412   1.05964   1.01870   1.05882
248  0.021717  0.127832  0.106116  0.0217166  1.17517  0.997626  1.02775  1.03798   1.04376   1.04344   1.02738   1.03388   1.03954
249  .         .         0.046631  0.0466312  1.33492  0.997626  1.05782  1.07005   1.06934   1.06975   1.05744   1.06582   1.06520
250  0.010598  .         .         0.0105983  1.13180  0.997626  1.03113  1.04457   1.04402   1.04082   1.03080   1.04056   1.04031
251  0.047259  0.067631  0.040572  0.0405717  1.33346  0.997626  1.04373  1.05884   1.05574   1.05325   1.04334   1.05438   1.05134

OBS  DENSITYZ  PERFAT   PERFATA  PERFATB  PERFATC  X        Y        Z       MINFAT   EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

243  1.02950   28.4544  26.2381  28.7071  28.4725  2.4690   2.2344   0.2346  0.23461  28.5898  28.5960  27.6801  29.9306  29.702
244  1.05772   20.3672  19.8530  25.9259  16.0686  6.0729   3.7844   9.8573  3.78441  17.9608  20.5330  21.7234  27.5312  17.861
245  1.04908   18.7394  14.4701  19.4577  20.0464  4.9876   5.5763   0.5887  0.58867  19.7521  18.9094  16.0333  20.8613  21.470
246  .         15.1519  16.2083  .        .        .        .        .       .        .        15.3361  18.0223  .        .
247  1.05946   16.9065  32.7418  15.6402  15.2626  17.1016  17.4792  0.3776  0.37760  15.4514  17.0772  34.4130  17.4112  17.1441
248  1.03923   30.4603  26.0762  23.6405  23.7724  2.4356   2.3038   0.1318  0.13182  23.7065  30.6187  27.8247  25.4160  25.547
249  1.06546   17.8203  12.8848  13.1646  13.0011  0.2798   0.1163   0.1634  0.11634  12.9430  17.9749  14.5780  14.8288  14.720
250  1.03705   29.0032  23.2991  23.5298  24.8771  0.2307   1.5780   1.3473  0.23069  23.4144  29.1446  24.9801  25.0934  26.472
251  1.04901   23.6521  17.4027  18.6733  19.6969  1.2706   2.2942   1.0236  1.02362  19.1851  23.8173  19.2280  20.4825  21.450
```

```
-------------------------------------------------------------- SEX=M --------------------------------------------------------------

OBS  M        N        O        MINFAT1  EXPFAT1  HEADWGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  TSFDW  TOTALSF  TSF    BIR    AGE

243  2.2505   2.0226   0.22787  0.22787  29.8166  31.7     64.2    89.8      18.1   33.6    54.2     39.7     6.7      103.0  242.8    166.2  -1279  27.4356
244  5.8076   3.8616   9.66939  3.86162  19.7926  31.2     56.7    86.1      18.3   30.3    51.8     40.8     5.9      67.6   175.6    113.2  -79    24.1679
245  5.8280   5.3869   0.55895  0.55895  21.1408  31.2     62.3    89.0      19.0   30.7    54.2     40.3     6.5      56.2   152.8    88.8   308    23.0577
246  .        .        .        .        .        33.2     59.5    79.3      17.2   29.7    47.4     34.6     7.2      37.4   99.2     64.0   -178   24.4192
247  17.0018  17.2690  0.26714  0.26714  17.2777  34.0     54.5    76.1      17.6   28.0    46.8     33.6     5.6      45.4   118.8    74.8   99     23.6633
248  2.4086   2.2768   0.13182  0.13182  25.4819  30.1     56.[illegible]    84.1      18.3   29.7    47.8     37.4     7.6      55.8   156.2    93.6   -1627  28.3595
249  0.2508   0.1430   0.10783  0.10783  14.7749  34.8     57.9    82.4      18.4   31.8    48.8     36.1     5.7      40.0   98.2     64.8   -2603  31.0631
250  0.1133   1.4918   1.37858  0.11327  25.0368  33.3     53.2    75.8      16.5   28.8    43.6     33.8     7.4      81.8   186.2    118.4  1153   20.7726
251  1.2545   2.2223   0.96785  0.96785  20.9664  33.7     50.9    82.1      17.5   30.0    47.1     38.2     5.7      61.0   155.4    96.2   -5652  39.4164
```

```
---------------------------------------------- SEX=M ----------------------------------------------

OBS H2VOL H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3    A

261 3     11.40  8.03    3     5.49 4.94 634 24.5    2.72    5.940   2.25    4.22     2.43    4.13     3.48    2.47     1.30998 20.18  1.45339 1.29842 0.143411
262 3     11.40  7.02    3     4.30 2.64 395 24.5    2.72    3.290   0.80    3.01     1.30    2.53     1.18    2.65     1.97989 20.18  2.30188 1.96475 0.121990
263 3     11.40  7.86    3     4.35 3.47 393 24.5    2.72    3.600   1.15    3.21     2.16    1.80     1.48    2.97     1.38816 19.84  .       1.40018 .
264 3     11.40  7.71    3     5.09 4.60 661 24.5    2.72    5.080   2.90    2.39     3.80    1.36     2.79    2.25     1.57247 20.35  1.69174 1.48979 0.119275
265 3     11.40  7.39    3     5.65 5.04 669 24.5    2.72    5.240   1.50    4.02     2.07    3.78     2.50    3.37     1.70828 19.84  .       1.70145 .
266 3     11.40  7.67    3     5.26 4.21 576 24.5    2.72    5.050   4.44    0.97     3.60    1.77     3.50    1.77     1.43051 19.84  .       1.51753 .
267 3     .      .       .     5.19 4.63 556 24.5    2.72    4.850   3.25    2.45     2.95    1.90     3.00    1.95     1.39417 19.84  1.56224 .       0.168073
268 3     11.40  7.21    3     5.41 4.40 713 24.8    2.72    4.200   1.75    3.11     2.40    0.57     2.95    1.31     1.80984 20.35  .       1.82410 .
269 3     11.40  7.18    3     3.34 2.56 426 24.5    2.72    3 150   1.50    2.62     1.46    2.02     1.20    2.59     1.89444 20.69  1.97650 1.84353 0.082055

OBS B        C         MINRVOLF HRV     H2ODENS  DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY DENSITYZ

261 0.154975 0.0115640 0.011564 1.30420 0.997626 1.08232 1.09244  1.09421  1.08240  1.08180  1.08633  1.08812  1.07109
262 0.337127 0.0151363 0.015136 1.97232 0.997626 1.04153 1.05001  1.05036  1.05036  1.04087  1.04501  1.04552  1.04548
263 .        0.0120227 0.012023 1.39417 0.997626 1.03122 1.04195  1.03607  1.04279  1.03083  1.03789  1.03245  1.03880
264 0.201954 0.0826792 0.082679 1.53113 0.997626 1.06855 1.07232  1.06996  1.06772  1.06798  1.06717  1.06522  1.06266
265 .        0.0068269 0.006827 1.70487 0.997626 1.06496 1.06931  1.07467  1.07501  1.06440  1.06422  1.06961  1.07009
266 .        0.0870168 0.087017 1.47402 0.997626 1.06616 1.07304  1.07190  1.07006  1.06562  1.06849  1.06707  1.06526
267 .        .         0.168073 1.47820 0.997626 1.05224 1.06491  1.05217  1.05365  1.05179  1.06068  1.04820  1.04966
268 .        0.0142604 0.014260 1.81697 0.997523 1.03770 1.04528  1.02369  1.03836  1.03727  1.04178  1.02091  1.03532
269 0.132963 0.0509078 0.050908 1.86899 0.997626 1.02762 1.03917  1.03149  1.03519  1.02717  1.03565  1.02817  1.03170

OBS PERFAT  PERFATA PERFATB PERFATC X       Y       Z       MINFAT  EXPFAT  PERFAT1 PERFATX PERFATY PERFATZ M

261  8.0420  4.1308  3.4522  8.0109 0.67858 3.88017 4.55876 0.67858  3.7915  8.2427  6.4814  5.7890 10.0924 0.6924
262 24.5774 21.0339 20.8878 20.8898 0.14606 0.14409 0.00197 0.00197 20.8888 24.8561 23.1165 22.9026 22.9215 0.2138
263 28.9662 24.4006 26.8903 24.0471 2.48974 0.35345 2.84319 0.35345 24.2239 29.1326 26.1144 28.4359 25.7323 2.3214
264 13.4820 11.9796 12.9175 13.8154 0.93790 1.83579 0.89788 0.89788 13.3665 13.7123 14.0364 14.8194 15.8511 0.7830
265 14.9239 13.1789 11.0461 10.9108 2.13281 2.26813 0.13532 0.13532 10.9784 15.1486 15.2216 13.0572 12.8677 2.164
266 14.4402 11.6938 12.1439 12.8710 0.45008 1.17720 0.72712 0.45008 11.9189 14.6593 13.5081 14.0771 14.8042 0.5690
267 20.1133 14.9434 20.1409 19.5292 5.19734 4.58585 0.61169 0.61169 19.8351 20.2985 16.6573 21.7860 21.1805 5.1266
268 26.1964 23.0037 32.2237 25.9186 9.22001 2.91494 6.30506 2.91494 24.4617 26.3783 24.4733 33.4391 27.2081 8.965
269 30.5178 25.5738 26.8495 27.2662 3.27574 1.69245 1.58328 1.58328 28.0579 30.7138 27.0682 30.2810 28.7576 3.2127
```

```
---------------------------------------------- SEX=M ----------------------------------------------

OBS N       O       MINFAT1 EXPFAT1 HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDH TOTALSF TSF   BIR   AGE

261 3.31096 4.30339 0.69243  6.1352 30.7    57.9   77.8     17.5  29.8   45.5    33.7    8.1     23.0   53.4    34.4   331 23.0247
262 0.19496 0.01892 0.01892 22.9121 30.0    54.3   83.7     17.5  31.2   47.2    38.5    8.6     49.4  121.6    77.4 -1181 27.1671
263 0.38210 2.70356 0.38210 25.9234 25.6    58.7   84.8     18.1  31.1   49.5    37.7    6.1     66.6  169.0   109.0 -6023 40.4329
264 1.81474 1.03172 0.78302 14.4279 31.1    55.8   84.9     18.9  32.1   49.6    37.0    7.0     25.6   63.0    40.0   -76 24.1397
265 2.35390 0.18942 0.18942 12.9624 33.4    54.7   87.3     18.2  32.4   49.0    38.9    7.2     48.2  113.8    72.6  1439 19.9890
266 1.29617 0.72712 0.56905 13.7926 32.7    54.2   78.4     17.3  28.4   45.7    37.1    5.6     33.4   91.2    57.4  1467 19.9123
267 4.52323 0.60543 0.60543 21.4833 27.6    61.0   78.2     17.7  29.6   46.5    33.7    6.4     53.2  141.0    76.8   828 21.6633
268 2.73478 6.23100 2.73478 25.8407 32.9    58.7   89.0     20.3  31.5   53.5    41.1    7.5     96.4  220.1   134.3 -6829 42.6411
269 1.68931 1.52349 1.52349 29.5193 30.7    58.7   86.2     18.8  31.2   49.4    39.4    7.5     90.4  217.2   135.4 -7602 44.7589
```

```
----------------------------------------------- SEX=M -----------------------------------------------

OBS NAME       BIRTHM ORIGIN BDAY BMONTH BYEAR HGTIN NOHGTIN HGTCM NOHGTCM WGTLBS NOWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1 ABDOMEN2

270 FENERTY     3 1 20  4 31 71.0       .   198  89.0   HALIFAX 353 176.6 86.2 61.2 42.3 114.5 107.5 104.3 .  99.7 100.5
271 GUADAGNOLO  2 4 26  4 37 67.0       . 1 186  84.0   HALIFAX 354 167.5 84.3 57.4 44.0 121.7 112.5 110.2 .  96.4 101.2
272 HEARD       1 1 25 11 35 68.0       .   154  70.0   HALIFAX 355 173.5 70.5 55.7 35.0 107.1  95.7  92.9 .  79.9  83.1
273 LEWIS         1 27  4 33 70.5       . 1 205   .  1 HALIFAX 356 177.2 95.2 56.2 41.5 124.4 115.9 114.2 . 108.1 108.4
274 KVERME      9 4  5  3 32   .  1 168       .  70.0   HALIFAX 357 166.8 75.6 59.0 39.0 116.8 106.7 103.0 .  91.9  92.4
275 HAMILTON    1 1 23  2 33 69.0       . 1 163  73.7   HALIFAX 358 173.7 73.4 57.8 37.8 108 1  98.8  95.0 .  78.4  81.3
276 D'COSTA     9 4 25 12 55 69.0       . 1 148   .  1 HALIFAX 360 173.3 65.9 57.6 38.3 112.4  96.1  89.4 .  75.6  78.7
277 HASLETT       4 25 10 32 68.0       . 1 155   .  1 HALIFAX 361 171.1 71.0 58.8 38.9 109.0 103 2 100.5 .  87.6  90.8
278 WALSH       3 1 30  6 31 67.5       . 1 160   .  1 HALIFAX 362 171.5 71.7 55.3 39.5 116.0 107.0 105.7 .  85.3  86.6

OBS GLUTEAL THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT EPIFEWTH

270 101.3 56.3 41.7 39.4 23.2 35.2 33.3 29.1 18.7  6.0 16.2 21.2 31.4 16.2 25.8 14.2 19.4 13.0 11.2 88.9 145.1 10.2
271 103.2 58.7 39.3 40.2 23.2 35.4 34.3 29.6 17.4  6.8 10.6 20.8 22.8 12.4 35.0  8.8 14.8 11.2  6.8 86.7 140.1  9.5
272  93.8 55.0 38.4 37.6 23.6 30.5 28.4 26.0 16.1  4.2  8.6  9.6 14.2  4.2 15.8  8.4  9.0 11.8  6.6 90.2 141.4  9.4
273 110.9 64.5 41.9 40.4 24.8 36.1 35.2 28.9 18.5  8.0 20.2 21.8 35.8 22.2 32.4 15.0 24.6 28.8 17.4 90.9 145.5  9.1
274  97.2 52.0 38.6 38.0 22.3 33.8 32.1 28.9 18.0  4.0 10.8 18.0 17.4 14.8 21.8  9.0 16.8 12.4  8.2 87.1 136.5  9.9
275  97.9 56.4 40.0 38.5 22.7 33.0 31.7 27.7 17.6  2.4  7.8  9.0 10.4  7.6  9.4  6.0  4.4  8.0  6.4 95.2 140.2  9.9
276  90.0 51.4 35.7 35.0 21.8 31.4 28.7 27.9 18.2  3.0  5.0  8.2 14.0  7.4 17.4  4.7  7.0  5.8  5.0 91.7 141.2  9.7
277  96.6 52.2 39.4 33.6 21.2 32.3 30.3 26.9 17.0  5.6 13.4 11.0 31.4 14.2 33.2 11.0 14.0 10.6  7.6 92.1 143.8  9.1
278  94.3 52.2 38.3 35.0 22.7 33.7 32.7 28.6 17.7 10.8 17.0 16.0 17.6 20.4 19.0  9.4 24.8 13.0 10.4 95.0 140.6  8.9

OBS ANKLEWTH EPIHUWTH WRISTWTH HANDWTH TAL TAS LAS SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT H2FINAL

270 7.3 7.4 6.2 8.9 82.0 62.0 27.7 39.7 26.8 45.9 39.9 29.3 30.8 34.3 100.4 47.2 24.2 751 23.2 11.42 7.43 3 11.42 7.43
271 7.5 7.3 6.2 8.6 76.1 56.8 27.3 39.2 25.3 48.2 38.3 31.7 31.5 36.4  95.1 47.2 23.2 751 23.2 11.42 7.34 3 11.42 7.37
272 6.9 6.9 5.6 8.2 76.0 56.5 26.2 39.2 23.3 43.3 37.9 29.2 29.5 34.8  93.2 45.2 21.2 751 23.2 11.42 7.00 3 11.42 6.92
273 7.5 7.7 6.1 8.8 81.7 62.3 30.0 42.4 26.4 50.6 40.7 32.0 31.8 39.0 100.6 46.0 24.3   .    .     .    . .     .    .
274 7.3 7.5 6.0 9.0 77.0 57.4 26.3 39.0 25.5 47.3 38.7 30.3 28.3 34.3  92.5 44.0 23.2 751 23.2 11.42 7.01 3 11.42 7.02
275 7.7 7.4 6.2 9.0 74.7 55.8 26.0 38.1 26.2 43.0 36.4 25.6 28.7 36.3  91.5 44.8 22.4 751 23.3 11.36 6.75 3     .    .
276 7.7 7.2 6.2 8.8 78.0 58.7 27.9 39.8 25.6 47.2 40.6 27.5 27.1 32.2  95.5 45.2 16.3 752 23.9 11.42 8.16 3 11.42 8.17
277 7.0 7.3 5.8 8.4 73.8 56.5 27.3 37.3 23.0 45.6 37.0 29.6 29.8 32.9  92.6 44.6 20.8   .    .     .    . .     .    .
278 7.0 7.0 6.0 8.5 74.4 56.9 26.8 36.3 23.6 45.1 36.2 30.8 28.0 30.0  89.8 42.1 21.4 752 23.9 11.42 7.01 3 11.42 7.28
```

```
----------------------------------------------- SEX=M -----------------------------------------------

OBS H2VOL H3INIT H3FINAL H3VOL FVC FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2 H2OVAP HRV1 HRV3 A

270 3     .     .   .    5.13 3.81 451 24.5 2.72 3.470 2.25 1.94 2.10 2.08 2.97 0.86 1.67893 20.52 1.67893       .  0.000000
271 3 11.42  7.48   3    5.60 4.47 350 24.5 2.72 4.100 2.10 3.13 1.85 3.41 2.23 2.81 1.71969 20.52 1.74033 1.64546 0.020633
272 3 11.42  7.01   3    4.75 3.97 560 24.5 2.72 4.285 1.80 3.99 2.20 3.21 2.60 2.43 2.04797 20.52 1.98652 1.97894 0.061445
273 .     .     .   .     .    .    .    .  2.72   .     .    .    .    .    .    .      .       .      .       .        .
274 3     .     .   .     .    .    .  24.5 2.72   .     .    .    .    .    .    .  1.97138 20.52 1.97894       .  0.007560
275 . 11.36  6.97   3    5.67 4.57 718 24.5 2.72 5.150 2.30 3.27 1.50 4.83 2.95 2.55       .  20.69 2.15319 1.98023        .
276 3     .     .   .    4.72 3.92 510 24.5 2.72 5.570 3.75 2.17 3.95 2.92 4.25 1.74 1.22044 21.71 1.22600       .  0.005558
277 .     .     .   .     .    .    .    .  2.72   .     .    .    .    .    .    .      .       .      .       .        .
278 3 11.42  7.27   3    4.14 3.07 571 24.5 2.72 3.980 2.95 0.77 2.60 1.34 2.23 1.63 1.77492 21.71 1.97096 1.78192 0.196047

OBS B C MINRVDIF HRV H2ODENS DENSITY DENSITYA DENSITYB DENSITYC DENSITY1 DENSITYX DENSITYY DENSITYZ

270        .          .     0.000000 1.67893 0.997626 1.03025 1.03915 1.03902 1.03468 1.02982 1.03573 1.03556 1.03156
271 0.094870 0.0742375 0.020633 1.73001 0.997626 1.03963 1.05426 1.05465 1.05176 1.03917 1.05032 1.05063 1.04793
272 0.007582 0.0690269 0.007582 1.98273 0.997626 1.05462 1.07882 1.07259 1.06644 1.05398 1.07352 1.06762 1.06178
273        .          .          .       .        .       .       .       .       .       .       .       .       .
274        .          .     0.007560 1.97516 0.997626       .       .       .       .       .       .       .       .
275 0.172962          .     0.172962 2.06671 0.997626 1.06690 1.07335 1.08538 1.07227 1.06624 1.06851 1.07993 1.06768
276        .          .     0.005558 1.22322 0.997626 1.06773 1.07374 1.09063 1.07499 1.06729 1.06904 1.08551 1.07043
277        .          .          .       .        .       .       .       .       .       .       .       .       .
278 0.189045 0.0070013 0.007001 1.77842 0.997626 1.04582 1.04183 1.04516 1.04393 1.04527 1.03803 1.04116 1.03984

OBS PERFAT PERFATA PERFATB PERFATC X Y Z MINFAT EXPFAT PERFAT1 PERFATX PERFATY PERFATZ M

270 29.3831 25.5813 25.6362 27.4808 0.05491 1.89950 1.84459 0.05491 25.6088 29.5656 27.0350 27.1051 28.8171 0.07012
271 25.3804 19.2803 19.1209 20.3086 0.15941 1.02834 1.18774 0.15941 19.2006 25.5726 20.9046 20.7763 21.8974 0.12829
272 19.1303  9.4128 11.8699 14.3270 2.45709 4.91419 2.45709 2.45709 10.6413 19.3938 11.5029 13.8564 16.2098 2.35344
273       .       .       .       .       .       .       .       .       .       .       .       .       .       .
274       .       .       .       .       .       .       .       .       .       .       .       .       .       .
275 14.1442 11.5714  6.8514 11.9976 4.72003 0.42620 5.14623 0.42620 11.7845 14.4080 13.4978  8.9769 13.8321 4.52092
276 13.8127 11.4156  4.8243 10.9219 6.59131 0.49368 6.09763 0.49368 11.1688 13.9866 13.2849  6.8002 12.7301 6.48469
277       .       .       .       .       .       .       .       .       .       .       .       .       .       .
278 22.7773 24.4501 23.0532 23.5687 1.39692 0.88141 0.51551 0.51551 23.3109 23.0097 26.0579 24.7354 25.2888 1.32265
```

```
------------------------------------------------------------ SEX=M ------------------------------------------------------------

OBS  W        O        WINFAT1  EXPFAT1  HEADHGT TRUNKL TOTALLEG HANDL UPARML THIGHL1 THIGHL2 FOOTHGT TSFDW TOTALSF TSF   BIR    AGE

270  1.78212  1.71200  0.07012  27.0700  31.5    57.4   87.7     20.0  34.3   53.2    40.5    7.5     74.8  174.6   107.6 -10483 52.6521
271  0.99277  1.12104  0.12829  20.8405  27.4    59.3   80.8     19.3  29.5   47.9    33.6    8.0     61.0  150.0   100.4  -8285 46.6301
272  4.70688  2.35344  2.35344  12.6797  32.1    58.1   83.3     19.5  30.3   48.0    38.1    6.0     36.6   92.4    60.0  -8803 48.0493
273  .        .        .        .        31.7    59.2   86.3     19.4  32.3   52.6    38.3    5.6     85.8  226.2   139.0  -9745 50.6301
274  .        .        .        .        30.3    56.8   79.7     19.6  31.1   48.5    35.7    5.0     50.2  133.2    80.4 -10163 51.7753
275  0.33430  4.85522  0.33430  13.6650  33.5    61.7   78.5     18.9  27.8   46.7    33.7    6.7     29.6   71.4    44.6  -9808 50.8027
276  0.55481  5.92988  0.55481  13.0075  32.1    59.6   81.6     19.3  30.8   50.3    36.4    5.4     30.2   77.5    50.4  -1468 27.9534
277  .        .        .        .        27.3    64.8   79.0     17.3  29.2   48.0    34.4    7.3     61.4  152.0    99.6  -9929 51.1342
278  0.76904  0.55341  0.55341  25.0121  30.9    64.1   76.5     17.5  30.1   47.7    34.4    5.8     61.4  158.6    82.6 -10412 52.4575
```

```
------------------------------------------------------------ SEX=M ------------------------------------------------------------

OBS NAME     BIRTH ORIGIN BDAY BMONTH EYEAF HGTIN NDHGTIN HGTCM NCHGTCM WGTLBS NCWGTLBS WGTKGS NOWGTKGS LOCATION ID  HEIGHT WEIGHT HEAD NECK SHOULDER CHESTIN CHEST BUST ABDOMEN1 ABDOMEN2 GLUTEAL

279 WARDELL  9     1      23   5      61    76            .     1       220             .      1        HALIFAX  363 190.3  98.7   57.7 39.3 129.7    110.2   108.5 .    87.6     89.0     103.8
280 DYER     2            24   6      41    75            .     1       180             .      1        HALIFAX  373 189.3  80.2   56.7 37.4 177.9    108.0   105.0 .    75.9     79.6     95.4

OBS THIGH KNEE CALF ANKLE FLUPARM UPARM FOREARM WRIST BICEPSF TRICEPSF SCAPSF SILIACSF CHESTSF ABDOMSF AILIACSF AXILLSF THIGHSF CALFSF SITHGT TRUNKHGT EPIFEWTH ANKLEWTH

279 63.5  40.7 42.8 25.3  37.5    35.4  31.6    18.3  5.6     11.6     13.8   24.2     11.0    21.4    8.2      10.6    16.6    12.0   101.8  156.9    10.1     7.6
280 56.3  39.3 37.8 22.3  27.3    35.9  31.4    18.8  2.8     5.8      6.4    12.2     3.2     7.4     4.4      5.6     8.2     6.2    99.2   155.6    10.3     7.4

OBS EPIHUWTH WRISTWTH HANDWTH TAL  TAS  LAS  SHANKL FOOTL SHOLDWTH BIACWTH CHESTWTH ILIACWTH TROCHWTH LEGL  LLEGL CHESTDEP BARPRES AMBTEMP H1INIT H1FINAL H1VOL H2INIT H2FINAL H2VOL

279 7.7      6.4      9.1     84.0 62.8 30.7 45.2   28.2  53.8     46.0    32.9     31.9     37.6     105.8 52.6  22.5     752     23.9    11.4   7.45    3     11.4   7.52    3
280 8.1      6.6      9.1     85.7 65.6 32.0 44.1   27.2  48.2     43.4    29.4     29.5     35.1     104.0 50.1  24.0     752     24.2    11.4   6.13    3     11.4   6.22    3

OBS H3INIT H3FINAL H3VOL FVC  FEV1 PFR H2OTEMP BASEWGT H2OWGT1 H2OWGTA LUNGVOLA H2OWGTB LUNGVOLB H2OWGTC LUNGVOLC HRV2    H2OVAP HRV1    HRV3    A

279 11.4   7.49    3     6.09 5.42 745 24.8    2.72    6.95    4.56    3.22     4.20    3.02     3.35    4.53     1.60384 21.71  1.65006 1.62354 0.0462176
280 11.4   6.29    3     7.87 5.88 741 24.8    2.72    4.95    3.80    3.04     3.62    1.95     2.72    2.77     2.62741 22.22  2.71457 2.56134 0.0871633
```

```
----------------------------------------------------------------- SEX=M -----------------------------------------------------------------

OBS  B         C          MINRVDIF   HRV      H2ODENS   DENSITY  DENSITYA  DENSITYB  DENSITYC  DENSITY1  DENSITYX  DENSITYY  DENSITYZ

279  0.026516  0.0197018  0.0197018  1.61369  0.997523  1.0642   1.07351   1.06723   1.07487   1.06382   1.07002   1.06383   1.07107
280  0.153232  0.0660692  0.0660692  2.59438  0.997523  1.0655   1.09290   1.07430   1.07312   1.06474   1.08823   1.07010   1.06868

OBS  PERFAT   PERFATA  PERFATB  PERFATC  X        Y        Z        MINFAT    EXPFAT   PERFAT1  PERFATX  PERFATY  PERFATZ

279  15.2309  11.5082  14.0124  10.9662  2.50421  0.54194  3.04616  0.541943  11.2372  15.3841  12.8930  15.3783  12.4754
280  14.7081   3.9547  11.1940  11.6626  7.23933  7.70792  0.46859  0.468593  11.4283  15.0112   5.7525  12.8645  13.4289

OBS  M        N        O        MINFAT1   EXPFAT1  HEADHGT  TRUNKL  TOTALLEG  HANDL  UPARML  THIGHL1  THIGHL2  FOOTHGT  SFUM  TOTALSF  TSF   BIR    AGE

279  2.48523  0.41760  2.90283  0.417600  12.6842  33.4     68.4    88.5      21.2   32.1    53.2     35.5     7.4      55.2  135.0    87.6   528   22.5397
280  7.11200  7.67635  0.56438  0.564381  13.1467  33.7     65.5    90.1      20.1   33.6    53.9     40.0     6.0      27.2   62.2    40.0  -6765  42.4658
```