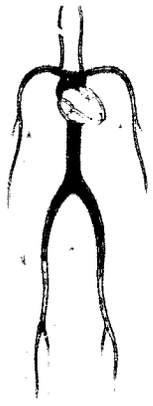
NASA CR 167737



SPECIAL REPORT ON THE

DATA COLLECTION PROGRAMS FOR THE

GROUND BASED NITROGEN WASHOUT EXPERIMENT

VOLUME TWO: DETAILED PROGRAM DESCRIPTIONS, LISTINGS, EXAMPLES AND HARDWARE SPECIFICATIONS

Prepared for the NASA Johnson Space Center
Life Sciences Medical Directorate
by Penelope A. Bueker

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Technology Incorporated
Life Sciences Division

P.O. Box 58827
Houston, Texas 77058

SPECIAL REPORT

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ABSTRACT

The Nitrogen Washout System measures nitrogen elimination on a breath basis from the body tissues of a subject breathing pure oxygen. The system serves as a prototype for a Space Shuttle Life Sciences experiment and in the Environmental Physiology Laboratory. Typically, a subject washes out body nitrogen for three hours while breathing oxygen from a mask enclosed in a positive pressure-oxygen tent. A nitrogen washout requires one test operator and the test subject.

A DEC LSI-11/02 computer is used to (1) control and calibrate the mass spectrometer and Skylab spirometer, (2) gather and store experimental data (3) and provide limited real time analysis and more extensive post-experiment analysis. Five programs are used to gather and store the experimental data and perform all the real time control and analysis.

The Personal Data Input Program collects the data on a subject's physical characteristics and body measurements as entered by the test operator. The body composition and body nitrogen content are calculated by the program for one or more processes: (1) Water Immersion, (2) Skinfold Process I, (3) Skinfold Process II and (4) Nutrition Journal Formula. Body composition and body nitrogen content are also calculated from the subject's known per cent body fat, if available. The program produces a subject characteristics profile on the printing terminal and stores the same information in a data file.

The Decompression Data Program collects data from a decompression experience experiment, then computes the final tissue nitrogen and the decompression ratio at the time of final decompression. The data is written to a data file suitable for analysis. It types a short report on final tissue nitrogen partial pressure and decompression ratio at time of final decompression for specified tissue saturation half times.

The Nitrogen Washout Program controls the gas valving system for the mass spectrometer, calibrates the mass spectrometer and spirometer, and records all the subject and test data entered by the test operator. It samples the spirometer and the gas channels from the mass spectrometer, calculates inspired/expired air gas concentrations and breath volumes, then writes the data to a floppy disk for storage. It also produces a typed report of the nitrogen washout parameters along with one minute summaries as the washout proceeds.

The Nitrogen Data Program reads the information from the nitrogen washout and produces a typed report of one of four available reports to a printing terminal. The Update Program takes a previously collected, unformatted data file generated by the old nitrogen washout program and rewrites it to a formatted data file for use with N2DATA report writing program or for transfer to the VAX.

APPROVAL SHEET FOR THE
DATA COLLECTION PROGRAMS FOR THE
GROUND BASED NITROGEN WASHOUT EXPERIMENTS

VOLUME TWO: DETAILED PROGRAM DESCRIPTIONS, LISTINGS, EXAMPLES
AND HARDWARE SPECIFICATIONS

Approved by:

Edward C. Moseley

Edward C. Moseley, Ph.D.

Medical Sciences Division

NASA/Johnson Space Center

Joseph T. Baker

Joseph T. Baker

Supervisor, Laboratory Research

Support Section

Technology Incorporated

Life Sciences Division

Houston, Texas

Harry F. Walbrecher

Harry F. Walbrecher

Project Manager

Technology Incorporated

Life Sciences Division

Houston, Texas

Prepared by:

Craig E. Litton

Task Manager, Biomathematics Services

Technology Incorporated

Life Sciences Division

Houston, Texas

Penelope Bueker

Junior Programmer

Biomathematics Services

Technology Incorporated

Life Sciences Division

Houston, Texas

PERSONNEL

Craig E. Litton - Project Design and Development

Penelope Bueker - Programming

Barry Levitan - Engineering, Programming

Linda Weaver - Graphics

Scott Thompson - Technical Assistance

Lita Holt - Typing

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1.1 PERSONAL DATA INPUT PROGRAM

1.1.1 PURPOSE

The PDINPT program is designed to collect descriptive information on the subject's physical characteristics and data from one or more of three skin measurement processes for determining body composition. This data is then used to compute nitrogen content information by the water immersion process, by each of the two skinfold processes used, by a nutrition journal formula and by a known per-cent body fat from the personal characteristics data.

1.1.2 INPUT FILES AND DATA

The data is entered by the test operator in response to computer prompts. Refer to section 2.1 INPUT DATA AND FORMATS.

1.1.3 OUTPUT FILES AND REPORTS

The program stores the data in a file on a floppy disk in device DY1: and produces a typed report on the printing terminal. Refer to section 3.1 PROGRAM OUTPUT, REPORTS AND DATA.

1.1.4 CALCULATIONS

1. Body Composition by Water Immersion

   a. Average under water weight from ($1 \leq N \leq 10$) (kg)

   b. Water Weight = Average under water weight - under water chair weight (kg)

   c. $$\text{Body volume} = \frac{\text{Nude Weight} - \text{Water Weight}}{\text{Water Density}} - \text{Residual Vol (L)}$$

   d. $$\text{Body Density} = \frac{\text{Nude Weight}}{\text{Body Volume}}$$

   e. $$\%\ \text{Body Fat} = \left(\frac{4.95}{\text{Density}} - 4.50\right) \times 100$$

2. Body Composition by Skinfold Process I

   a. Biceps skinfold thickness average from three trials (mm)

   b. Triceps skinfold thickness average from three trials (mm)

   c. Subscapular skinfold thickness average from three trials (mm)

   d. Suprailiac skinfold thickness average from three trials (mm)

   e. S = Log of the sum of Biceps average, Triceps average, Subscapular average, and Suprailiac average

   f. Body Density

      i. If Male = $1.1610 - (.0632 \times S)$

      ii. If Female = $1.1581 - (.0720 \times S)$

   g. $$\%\ \text{Body Fat} = \left(\frac{4.95}{\text{Density}} - 4.50\right) \times 100$$

3. Body Composition by Skinfold Process II

   a. Midclavicular skinfold thickness average from three trials (mm)

   b. Umbilicus skinfold thickness average from three trials (mm)

   c. Anterior mid thigh skinfold thickness average from three trials (mm)

   d. S = skinfold thickness sum of Midclavicular average, Umbilicus average, and Anterior mid thigh average (mm)

   e. Body Density

      i. If Male = $1.10938 - (8.267 \times 10^{-4}) \times S + (1.6 \times 10^{-6}) \times (S)^2 - (2.574 \times 10^{-4}) \times \text{Age}$

      ii. If Female = $1.105339 - (1.1964 \times 10^{-3}) \times S + (3.8 \times 10^{-6}) \times (S)^2 - (1.069 \times 10^{-4}) \times \text{Age}$

   f. $$\%\ \text{Body Fat} = \left(\frac{4.95}{\text{Density}} - 4.50\right) \times 100$$

4. Formula estimation of Body Characteristics from American Journal of Clinical Nutrition

   a. Volume = 1.015 x Nude Weight - 4.937 (L)

   b. $$\text{Density} = \frac{\text{Nude Weight}}{\text{Volume}}$$

   c. $$\%\ \text{Body Fat} = 52.67 - \frac{2454.38}{\text{Weight}}$$

   d. % Body Fat Free Mass = 100 - % Body Fat

   e. $$\%\ \text{Total Body Water} = 34.93 + \frac{1811.33}{\text{Weight}}$$

5. Estimated Total Nitrogen Content of Body Before Nitrogen Washout

   a. Fat Weight = % Body Fat x Nude Weight (kg)

   b. Fat Free Mass = Nude Weight - Fat Weight (kg)

   c. Essential Lean Body Water Mass = Fat Free Mass x .72 (kg)

   d. $$\text{Volume of Total Fat Tissue} = \frac{\text{Fat Weight (kg)}}{\text{.90 kg/Liter at 37 deg C}}\ (L)$$

   e. Volume of Essential Lean Body Water =

   $$\frac{\text{Essential Lean Body Water Mass (kg)}}{\text{.9933 kg/Liter at 37 deg C}}\ (L)$$

   f. Quantity of N2 in Total Fat Tissue = Fat Volume x .067 (L)

   g. Quantity of N2 in Essential Lean Body Water =

   Lean Body Water Volume x .013 (L)

   h. Total Body N2 = Fat N2 + Lean Body Water N2 (L)

   i. $$\text{Nitrogen/kg Body} = \frac{\text{Total Body N2}}{\text{Nude Weight}}\ (L)$$

1.2 DECOMPRESSION DATA PROGRAM

1.2.1 PURPOSE

The DECDAT program records the data from a decompression experience in the chamber and types a report on the final tissue partial pressure of nitrogen in psi for each of three types of body tissue and the decompression ratio for each type of tissue at the time of final decompression. Tissues of half saturation time 180 minutes, 240 minutes and 360 minutes are used.

1.2.2 INPUT FILES AND DATA

The test operator enters the data on the subject's identification, the nitrogen partial pressure and duration of washout for each phase of a nitrogen washout, the experimental conditions during the chamber run, and the subject's symptoms during decompression in the hypobaric chamber. Refer to section 2.2 INPUT DATA AND FORMATS

1.2.3 OUTPUT FILES AND REPORTS

The computer calculates the final tissue partial pressure of nitrogen in PSI for each of three types of body tissue and the decompression ratio for each type of tissue at the time of final decompression. The program produces a summary report on the printing terminal, containing subject identification, the partial pressure of nitrogen in each of the three types of tissue and the decompression ratio for each of the three types of tissue. It also produces a data file on a floppy disk which contains all the data entered by the test operator and the computed information in the summary on partial pressure of nitrogen in the three types of tissue and the decompression ratio for each of the three types of tissue. Refer to section 3.2 PROGRAM OUTPUT, REPORTS AND DATA

1.2.4 CALCULATIONS

1. Computation of the Final Tissue Partial Pressure in psi of Nitrogen after an Exposure of t Minutes

$$FP = Po + [(Pa - Po)\ (1 - e^{-kt})]$$

FP: Final Tissue Nitrogen Pressure for a specific tissue type at the end of a washout phase

Po: The original or beginning N2 partial pressure (equivalent to ambient N2 pressure in phase 1 of washout)

Pa: The N2 partial pressure in the breathing medium during the washout phase.

e: Base of natural logarithms

$$k: \frac{0.693}{t\ 1/2}$$

t 1/2: Tissue half saturation time in minutes

0.693: Logarithym to the base e of 2

2. Equation for the Computation of the Decompression Ratio

$$\text{Decompression Ratio} = \frac{\text{Final Tissue N2 Pressure (psi)}}{\text{Ambient (or Suit) Pressure (psi)}}$$

1.3 NITROGEN WASHOUT PROGRAM

1.3.1 PURPOSE

The N2WASH program is the main program for running the nitrogen washout experiment. A read only data file named DATCON.VAL is located on the system floppy and contains the initial calibration values used by the N2WASH program. The program prints the data constants and allows the test operator to make changes if necessary. It collects data on the subject's identification and the experimental conditions. The computer calibrates the spectrometer and spirometer and collects the test data as the experiment runs.

1.3.2 INPUT FILES AND DATA

The program prompts the test operator to enter data on the subject's identification and the experimental conditions. It collects the test data as the experiment runs. Refer to section 2.3 INPUT DATA AND FORMATS.

1.3.3 OUTPUT FILES AND REPORTS

During the washout, test data and one minute summaries are produced on the printing terminal. The test data is also being stored on a floppy disk along with the data that was entered by the test operator. Dummy zeroes mark the end of data input into the storage file. If a printing terminal is used, the hard copy provides a preliminary report on the nitrogen washout. A final report is obtained by using the N2DATA Program. Refer to section 3.3 PROGRAM OUTPUT, REPORTS AND DATA.

1.3.4 CALCULATIONS

1. Calculate Slopes and Intercepts for Hi and Lo range N2 and for O2 and CO2.
   CALCNT is the digital count equivalent to the voltage recorded.
   CALPCT is the concentration of a gas in a medium.
   GASSLP is the slope calculated for a gas.
   GSNTCP is the intercept calculated for a gas.

   Nitrogen-Hi Range

$$GASSLP = \frac{CALPCT\ N2\ in\ Air - CALPCT\ N2\ in\ Gas\ Mix}{CALCNT\ N2\ in\ Air - CALCNT\ N2\ in\ Gas\ Mix}$$

$$GSNTCP = CALPCT\ N2\ in\ Gas\ Mix - (GASSLP\ Hi\ N2 * CALCNT\ N2\ in\ Gas\ Mix)$$

   Nitrogen-Lo Range

$$GASSLP = \frac{CALPCT\ N2\ in\ Gas\ Mix - CALPCT\ N2\ in\ 100\%\ O2}{CALCNT\ N2\ in\ Gas\ Mix - CALCNT\ N2\ in\ 100\%\ O2}$$

$$GSNTCP = CALPCT\ N2\ in\ 100\%\ O2 - (GASSLP\ Lo\ N2 * CALCNT\ N2\ in\ 100\%\ O2)$$

   Oxygen

$$GASSLP = \frac{CALPCT\ O2\ in\ 100\%\ O2 - CALPCT\ O2\ in\ Gas\ Mix}{CALCNT\ O2\ in\ 100\%\ O2 - CALCNT\ O2\ in\ Gas\ Mix}$$

$$GSNTCP = CALPCT\ O2\ in\ Gas\ Mix - (GASSLP\ O2 * CALCNT\ O2\ in\ Gas\ Mix)$$

   Carbon Dioxide

$$GASSLP = \frac{CALPCT\ CO2\ in\ Gas\ Mix - CALPCT\ CO2\ in\ 100\%\ O2}{CALPCT\ CO2\ in\ Gas\ Mix - CALPCT\ CO2\ in\ 100\%\ O2}$$

$$GSNTCP = CALPCT\ CO2\ in\ 100\%\ O2 - (GASSLP\ CO2 * CALCNT\ CO2\ in\ 100\%\ O2)$$

2. Calculate Slope and Intercept for Calibrating the Spirometer. One liter was measured at one volt and one volt equals 410.5 counts.

   Hi Cal Cnt = Lo Cal Cnt + 410.5

$$\text{Slope} = \frac{\text{Hi Volume - Lo Volume}}{\text{Hi Cal CNT - Lo Cal Cnt}}$$

$$\text{Slope} = \frac{\text{1 liter - 0 liters}}{410.5} = \frac{1}{410.5}$$

   Intercept = Lo Volume - (Slope x Lo Cal Cnt)

3. Calculating the Average Digital Computer Count

   The computer samples the gas channels 25/sec and reads the digital count equating to the analog voltage. At the end of a breath (determined by no increase in voltage in the spirometer) the counts are summed and divided by the number of samples occuring in the breath. The average digital count is computed for the spirometer and is used to compute the volume of a breath. An average digital count is also computed for each gas channel and is used to determine the concentration of a gas.

4. Volume of Breath in Liters

   $y = mx + b$, where x is the average digital computer count corresponding to average voltage in spirometer during breath.

5. Gas Concentrations in Expired Breath

   $y = mx + b$, where x is the average digital computer count corresponding to average voltage in gas channel during breath.

6. N2 Volume of Breath = N2 Concentration * Volume of Breath

7. N2 Volume for the Minute = Sum of N2 volumes for the minute

8. Total N2 Volume = Sum of N2 volumes

1.4 NITROGEN DATA PROGRAM

1.4.1 PURPOSE

The N2DATA Program uses a data file from the N2WASH program to type a formatted report of the Nitrogen Washout Expeirment.

1.4.2 INPUT FILES AND DATA

The input data for N2DATA is stored on a floppy disk in a data file created by the N2WASH program. Refer to section 2.4 INPUT DATA AND FORMATS

1.4.3 OUTPUT FILES AND REPORTS

There are four types of reports produced by the N2DATA program.

(1) A short report types the data on subject identification and experimental conditons with a summary of the average breath volume, average nitrogen volume per breath, average oxygen concentration per breath, average nitrogen concentration per breath, average carbon dioxide concentration per breath, total nitrogen expired and total number of breaths.

(2) A full report types the data on subject identification and experimental conditions with a breath by breath account of breath number, elapsed time in seconds, breath volume, nitrogen volume per breath, oxygen concentration per breath, nitrogen concentration per breath and carbon dioxide concentration per breath. It also types a summary of the average breath volume, average nitrogen volume per breath, average oxygen concentration per breath, average nitrogen concentration per breath, average carbon dioxide concentration per breath, total nitrogen expired and total number of breaths.

(3) A One Minute Interval report types the data on subject identification and experimental conditions with elapsed time in minutes and one minute readings of CO2 ml/min, O2 ml/min, N2 ml/min, N2 ml/kg of body-mass/min, N2 Out (Torr)/minute, cummulative N2 washed out, cummulative % of N2 estimate washed out, and the metabolic rate for the minute as CO2 * 1362.4. It also types a summary of the average breath volume, average nitrogen volume per breath, average oxygen concentration per breath, average nitrogen concentration per breath, average carbon dioxide concentration per breath, total nitrogen expired and total number of breaths.

(4) A Five Minute Interval report types the data on subject identification and experimental conditions with five minute readings of CO2 ml/five-minute interval, O2 ml/five-minute interval, N2 ml/five-minute interval, N2 ml/kg of body-mass/five minute interval, N2 Out (Torr)/minute, cummulative N2 washed out, cummulative % of N2 estimate washed out, and the metabolic rate for five minutes as CO2 * 1362.4. It also types a summary of the average breath volume, average nitrogen volume per breath, average oxygen concentration per breath, average nitrogen concentration per breath, average carbon dioxide concentration per breath, total nitrogen expired and total number of breaths. Refer to section 3.4 PROGRAM OUTPUT, REPORTS AND DATA

1.4.4 CALCULATIONS

1. CO2 and O2 Volume/Breath in Liters x Breath Volume

   CO2 Volume O2 Concentration x Breath Volume

   O2 Volume = O2 Concentration * Breath Volume

2. The N2, O2, and CO2 Volume in ml for Interval

   N2 = Sum of N2 x 1000

   O2 = Sum of O2 x 1000

   CO2 = Sum of CO2 x 1000

3. The 1 Minute Average N2 Concentration

$$= \frac{\text{Sum of N2 Concentration Readings}}{\text{Number of Readings}}$$

4. The 1 Minute N2 ml/kg of Body Weight

$$= \frac{\text{N2 Volume in ml}}{\text{Body Weight in kg}}$$

5. The Cummulative N2 Eliminated by 1 Minute Intervals

   = Sum of N2 Eliminated in Previous Intervals

6. The % of Estimated Body N2 Content Eliminated by 1 Minute Intervals

$$= \left(\frac{\text{(Cummulative N2 / 1000)}}{\text{Estimated N2 Content of Body}}\right) \times 100$$

7. The Metabolic Rate (BTU/hr) during the 1 Minute Interval

   = Liters of CO2 Eliminated per Minute x 1362.4

8. The 5 Minute Average N2 Concentration

$$= \frac{\text{Sum of N2 Concentration Readings}}{\text{Number of Readings}}$$

9. The 5 Minute N2 ml/kg of Body Weight

$$= \frac{\text{N2 Volume in ml}}{\text{Body Weight in kg}}$$

10. The Cummulative N2 Eliminated by 5 Minute Intervals

    = Sum of N2 Eliminated in Previous Intervals

11. The % of Estimated Body N2 Content Eliminated by 5 Minute Intervals

$$= \left(\frac{\text{(Cummulative N2 (ml) / 1000)}}{\text{Estimated N2 Content of Body}}\right) \times 100$$

12. The Metabolic Rate (BTU/hr) during the 5 Minute Interval

    = Average Liters of CO2 Eliminated per Minute x 1362.4

13. Average of Breath Volumes

14. Average of N2 Volume of Breath

15. Average N2 Concentration per Breath

16. Average O2 Concentration per Breath

17. Average CO2 Concentration per Breath

1.5 UPDATE PROGRAM

1.5.1 PURPOSE

The UPDATE program was designed for limited use. It reads the unformatted data stored on a floppy disk file from an earlier version nitrogen washout program and writes it to another file so that it is formatted. It also records blanks or zeroes for the header information data which was not included in the early nitrogen washouts. The updated data floppy disk file format is then identical to the ones being produced by the current version of the nitrogen washout program.

1.5.2 INPUT FILES AND DATA

The input for UPDATE is the unformatted data stored on a floppy disk file from an earlier version of the nitrogen washout program. Refer to 2.5 INPUT DATA FORMATS.

1.5.3 OUTPUT FILES AND REPORTS

UPDATE creates a formatted file on a floppy disk which is identical to the format of the files being produced by the current version of the nitrogen washout program. Refer to section 3.5 PROGRAM OUTPUT REPORTS AND DATA.

2.0 INPUT DATA AND FORMATS

2.1 PERSONAL DATA INPUT PROGRAM

The following table lists the variables which the test operator will be asked to enter.

INPUT VARIABLE	FORMAT	UNITS	RANGE
FILENAME	(FILENAME.EXT, e.g., SMITH.PDI)		
SUBJECT ID CODE	(XXX-XX-XXXX)		
DATE OF DATA COLLECTION	(MM/DD/YY)		
DATE OF BIRTH	(MM/DD/YY)		
AGE	(XX)	yrs	0-99
SEX	(A)		(M/F)
HEIGHT	(XXX.X)	cm	0.0-250.0
NUDE WEIGHT	(XXX.X)	kg	0.0-250.0
KNOWN % BODY FAT	(XX.X)		0.0-99.9
	WATER IMMERSION PROCESS		
WATER TEMP	(XX.XX)	deg C	0.0-99.99
WATER DENSITY	(X.XXX)	kg/L	0.0-9.999
RESIDUAL VOLUME	(XX.XX)	L	0.0-99.99
UNDER WATER CHAIR WEIGHT	(XX.XX)	kg	0.0-99.99
NUMBER OF TRIALS	(XX)		1-10

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

UNDER WATER WEIGHT N	(XX.XX)	kg	0.0-99.99
MEASUREMENT DATE	(MM/DD/YY)		

SKINFOLD PROCESS I

BODY SIDE USED	(A)		(R/L)
NUMBER OF TRIALS	(X)		1-3

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

BICEPS N	(XX.XX)	mm	0.0-99.99
TRICEPS N	(XX.XX)	mm	0.0-99.99
SUBSCAPULAR N	(XXX.X)	mm	0.0-250.0
SUPRAILIAC N	(XXX.X)	mm	0.0-250.0
DATE OF MEASUREMENTS	(MM/DD/YY)		

SKINFOLD PROCESS II

BODY SIDE USED	(A)		(R/L)
NUMBER OF TRIALS	(X)		1-3

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

MIDCLAVICULAR N	(XXX.X)	mm	0.0-250.0
UMBILICUS N	(XXX.X)	mm	0.0-250.0
ANTERIOR MID-THIGH N	(XXX.X)	mm	0.0-250.0
DATE OF MEASUREMENTS	(MM/DD/YY)		

2.2 DECOMPRESSION DATA PROGRAM

The following table lists the variables which the test operator will be asked to enter.

INPUT VARIABLES	FORMAT	UNITS	RANGE
FILENAME	(FILENAME .EXT, e.g., SMITH.DEC)		
SUBJECT IDCODE	(XXX-XX-XXXX)		
TEST NUMBER	(XX)		(1-99)
TEST DATE	(MM-DD-YY)		
INITIAL PARTIAL PRESSURE OF NITROGEN	(XX.XX)	PSI	(4.0-20.99)
NUMBER OF WASHOUT PHASES	(XX)		(1-10)

(Let N represent the number of the washout phase and let N increase from 1 to the number of washout phases so that these next two items are entered for each phase)

PARTIAL PRESSURE OF NITROGEN IN WASHOUT PHASE N	(XX.XX)	PSI	(0.0-12.99)
DURATION OF WASHOUT PHASE N	(XXXX)	MIN	(0-1440)
FINAL PRESSURE	(XX.XX)	PSIA	(0.0-10.99)
TEMPERATURE	(XX)	deg C	(0-40)
TIME OF FINAL DECOMPRESSION	(HH:MM)	hrs:min	0-24:0-59
TIME OF RECOMPRESSION	(HH:MM)	hrs:min	0-24:0-59
EXERCISE LEVEL	(L/M/H)		
BUBBLES MEASURED?	(Y/N)		
BUBBLES PRESENT?	(Y/N)		
TIME OF ONSET OF BUBBLES	(HH:MM)	hrs:min	0-24:0-59
TIME OF REMISSION OF BUBBLES	(HH:MM)	hrs:min	0-24:0-59

PRESSURE AT REMISSION OF BUBBLES	(XX.X)		
BENDS PRESENT?	(Y/N)		
LOCATION OF BENDS	(Text)		
TIME OF ONSET OF BENDS	(HH:MM)	hrs:min	0-24:0-59
TIME OF REMISSION OF BENDS	(HH:MM)	hrs:min	0-24:0-59
PRESSURE AT REMISSION OF BENDS	(XX.X)		

2.3 NITROGEN WASHOUT PROGRAM

The following table lists the variables which the test operator will be asked to enter.

INPUT VARIABLES	FORMAT	UNITS	RANGE
FILENAME	(FILENAME.EXT, e.g., SMITH.N2W)		
DATE	(MM/DD/YY)		
NAME	(Up TO 30 CHAR)		
SUBJECT IDCODE	(xxx-xx-xxxx)		
SUBJECT AGE	(xx)	yrs	(0-99)
EXTERNAL TEMP	(xx.xx)	deg C	(0.0-99.99)
EXTERNAL GRAVITY	(1/0)		
SUBJECT IMMERSED	(Y/N)		
BODY POSITION CODE	(xx)		(0-99)
AMBIENT PRESSURE	(xxx.xx)	mm Hg	(0.0-999.99)
DRUG CODE	(xx)		(0-99)
EXERCISE CODE	(xx)		(0-99)
BREATHING MIXTURE CODE	(xx)		(0-99)
BODY HYDRATION CODE	(xx)		(0-99)
AMBIENT GAS CODE	(XX)		(0-99)
STARTING TIME	(HH:MM)	hrs:min	0-24:0-59
SPECIAL CONDITION CODE	(XX)		
COMMENTS	(UP TO 4 LINES OF TEXT)		

2.4 NITROGEN DATA PROGRAM

The input data for N2DATA is the formatted data stored on a floppy disk from a nitrogen washout. The test operator supplies the name of the data file in which the data is stored and answers yes or no to the question, "Do you want a full report?" If the answer is "no" a short report is produced.

2.5 UPDATE PROGRAM

The input data for the UPDATE program is the unformatted data stored on a floppy disk from an early nitrogen washout. The test operator enters the name of the data file where the unformatted data is stored and the name of the file where he would like the newly formatted data to be stored. The program puts zeros or blanks in the new data file for the new variables created in the modified nitrogen washout program.

3.0 PROGRAM OUTPUT, REPORTS AND DATA

3.1 PERSONAL DATA INPUT PROGRAM

The following table lists all the variables which are output in the hard copy report and which are stored on a data floppy for later use.

OUTPUT VARIABLE	FORMAT	UNITS
	DESCRIPTIVE OUTPUT	
SUBJECT ID CODE	(XXX-XX-XXXX)	
FILENAME	(FILENAME.EXT, e.g., SMITH.PDI)	
% BODY FAT	(XX.X)	
NUDE WEIGHT	(XXX.X)	kg
DATE OF BIRTH	(DD/MON/YY)	
	BODY COMPOSITION OUTPUT BY WATER IMMERSION	
NUDE WEIGHT	(XXX.XX)	kg
WATER TEMP	(XX.XX)	deg C
RESIDUAL VOLUME	(XX.XX)	L
WATER DENSITY	(X.XXX)	kg/L
UNDER WATER CHAIR WEIGHT	(XX.XX)	kg
AVERAGE UNDER WATER WEIGHT	(XX.XX)	kg

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

TRIAL N UNDER WATER WEIGHT	(XX.XX)	kg
WATER WEIGHT	(XX.XX)	kg
BODY VOLUME	(XX.XX)	L
BODY DENSITY	(XX.XX)	kg/L
% BODY FAT	(XX.XX)	

BODY COMPOSITION OUTPUT BY SKINFOLD PROCESS I

BODY SIDE USED	(RIGHT/LEFT)	
DATE	(DD/MON/YY)	

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

TRIAL N BICEPS	(XX.XX)	mm
TRIAL N TRICEPS	(XX.XX)	mm
TRIAL N SUBSCAPULAR	(XX.XX)	mm
TRIAL N SUPRAILIAC	(XX.XX)	mm
AVERAGE BICEPS	(XX.XX)	mm
AVERAGE TRICEPS	(XX.XX)	mm
AVERAGE SUBSCAPULAR	(XX.XX)	mm
AVERAGE SUPRAILIAC	(XX.XX)	mm
BODY DENSITY	(X.XXX)	kg/L
% BODY FAT	(XX.XX)	

BODY COMPOSITION OUTPUT BY SKINFOLD PROCESS II

BODY SIDE USED	(RIGHT/LEFT)	
DATE	(DD/MON/YY)	

(Let N represent the number of the trial and let N increase from 1 to the number of trials.)

TRIAL N MIDCLAVICULAR	(XX.XX)	mm
TRIAL N UMBILICUS	(XX.XX)	mm
TRIAL N ANTERIOR MID-THIGH	(XX.XX)	mm
AVERAGE MIDCLAVICULAR	(XX.XX)	mm
AVERAGE UMBILICUS	(XX.XX)	mm
AVERAGE ANTERIOR MID-THIGH	(XX.XX)	mm

BODY DENSITY	(X.XXX)	kg/L
% BODY FAT	(XX.XX)	

BODY COMPOSITION OUTPUT BY NUTRITION JOURNAL FORMULA

BODY VOLUME	(XXX.XX)	L
BODY DENSITY	(XX.XXX)	kg/L
% BODY FAT	(XX.XX)	
% FAT FREE MASS	(XX.XX)	
% TOTAL BODY WATER	(XX.XX)	

NITROGEN CONTENT OUTPUT FOR EACH OF THE 5 METHODS

(1) DESCRIPTIVE DATA - KNOWN % BODY FAT

% BODY FAT	(XX.XX)	
FAT WEIGHT	(XX.XX)	kg
FAT FREE MASS	(XX.XX)	kg
LEAN BODY WATER MASS	(XX.XX)	kg
FAT VOLUME	(XX.XX)	L
LEAN BODY WATER VOLUME	(XX.XX)	L
NITROGEN IN FAT	(X.XXX)	L
NITROGEN IN LEAN BODY WATER	(X.XXX)	L
TOTAL BODY NITROGEN	(X.XXX)	L
NITROGEN/KG BODY WEIGHT	(X.XXXX)	L

(2) WATER IMMERSION PROCESS

% BODY FAT	(XX.XX)	
FAT WEIGHT	(XX.XX)	kg
FAT FREE MASS	(XX.XX)	kg
LEAN BODY WATER MASS	(XX.XX)	kg
FAT VOLUME	(XX.XX)	L
LEAN BODY WATER VOLUME	(XX.XX)	L
NITROGEN IN FAT	(X,XXX)	L
NITROGEN IN LEAN BODY WATER	(X.XXX)	L
TOTAL BODY NITROGEN	(X.XXX)	L
NITROGEN/KG BODY WEIGHT	(X.XXXX)	L

(3) SKINFOLD PROCESS I

% BODY FAT	(XX.XX)	
FAT WEIGHT	(XX.XX)	kg
FAT FREE MASS	(XX.XX)	kg
LEAN BODY WATER MASS	(XX.XX)	kg
FAT VOLUME	(XX.XX)	L
LEAN BODY WATER VOLUME	(XX.XX)	L
NITROGEN IN FAT	(X.XXX)	L
NITROGEN IN LEAN BODY WATER	(X.XXX)	L
TOTAL BODY NITROGEN	(X.XXX)	L
NITROGEN/KG BODY WEIGHT	(X.XXXX)	L

(4) SKINFOLD PROCESS II

% BODY FAT	(XX.XX)	
FAT WEIGHT	(XX.XX)	kg
FAT FREE MASS	(XX.XX)	kg
LEAN BODY WATER MASS	(XX.XX)	kg
FAT VOLUME	(XX.XX)	L
LEAN BODY WATER VOLUME	(XX.XX)	L
NITROGEN III FAT	(X.XXX)	L
NITROGEN IN LEAN BODY WATER	(X.XXX)	L
TOTAL BODY NITROGEN	(X.XXX)	L
NITROGEN/KG BODY WEIGHT	(X.XXXX)	L

(5) NUTRITION JOURNAL FORMULA

% BODY FAT	(XX.XX)	
FAT WEIGHT	(XX.XX)	kg
FAT FREE MASS	(XX.XX)	kg
LEAN BODY WATER MASS	(XX.XX)	kg
FAT VOLUME	(XX.XX)	L
LEAN BODY WATER VOLUME	(XX.XX)	L
NITROGEN IN FAT	(X.XXX)	L
NITROGEN IN LEAN BODY WATER	(X.XXX)	L
TOTAL BODY NITROGEN	(X.XXX)	L
NITROGEN/KG BODY WEIGHT	(X.XXXX)	L

3.2 DECOMPRESSION DATA PROGRAM

The DECDAT Output consists of the hard copy from the printing terminal of all the input variables as they are entered by the test operator and the summary generated by the computer of the final tissue nitrogen partial pressure and decompression ratio at time of final decompression for each of the three types of tissues. Tissues of half saturation time 180 minutes, 240 minutes and 360 minutes will be used. The following table lists the variables calculated by the computer which make up the summary.

OUTPUT VARIABLE	FORMAT
PARTIAL PRESSURE OF NITROGEN IN 180 TISSUE	(XX.X)
PARTIAL PRESSURE OF NITROGEN IN 240 TISSUE	(XX.X)
PARTIAL PRESSURE OF NITROGEN IN 360 TISSUE	(XX.X)
DECOMPRESSION RATIO FOR 180 TISSUE	(XX.X)
DECOMPRESSION RATIO FOR 240 TISSUE	(XX.X)
DECOMPRESSION RATIO FOR 360 TISSUE	(XX.X)

DECDAT also writes a formatted data file containing the variables on subject identification, washout data, experimental conditions and the data on the chamber run.

RECORD 1

ITEM	FORMAT	STARTING COLUMN
IDCODE	11A1	1
TEST NUMBER	I2	12
TEST DATE	8A1	14
NUMBER OF PHASES	I2	22
INITAL PARTIAL PRESSURE OF N2	F5.2	24
FINAL PRESSURE	F5.2	29
TEMPERATURE	I2	34
TIME OF FINAL DECOMPRESSION	5A1	36

TIME OF RECOMPRESSION	5A1	41
EXERCISE LEVEL	A1	46
BUBBLES MEASURED?	A1	47
BUBBLES PRESENT?	A1	48

RECORD 2

ITEM	FORMAT	STARTING COLUMN

(Let N represent the number of the washout phase and let N increase from 1 to
the number of phases so that partial pressure is entered for each phase.)

PARTIAL PRESSURE OF N2 DURING PHASE N	F5.2	1

RECORD 3

ITEM	FORMAT	STARTING COLUMN

(Let N represent the number of the washout phase and let N increase from 1 to
the number of phases so that duration of phase is entered for each phase.)

DURATION OF PHASE N	I4	1

RECORD 4

ITEM	FORMAT	STARTING COLUMN
BUBBLES GRADE 1 ONSET TIME	5A1	1
BUBBLES GRADE 2 ONSET TIME	5A1	6
BUBBLES GRADE 3 ONSET TIME	5A1	11
BUBBLES GRADE 4 ONSET TIME	5A1	16

RECORD 5

ITEM	FORMAT	STARTING COLUMN
BUBBLES GRADE 1 REMISSION TIME	5A1	1
BUBBLES GRADE 2 REMISSION TIME	5A1	6

BUBBLES GRADE 3 REMISSION TIME	5A1	11
BUBBLES GRADE 4 REMISSION TIME	5A1	16

RECORD 6

ITEM	FORMAT	STARTING COLUMN
BUBBLES GRADE 1 REMISSION PRESSURE	F4.1	1
BUBBLES GRADE 2 REMISSION PRESSURE	F4.1	5
BUBBLES GRADE 3 REMISSION PRESSURE	F4.1	9
BUBBLES GRADE 4 REMISSION PRESSURE	F4.1	13

RECORD 7

ITEM	FORMAT	STARTING COLUMN
BENDS PRESENT?	A1	1
BENDS LOCATION?	15A1	2

RECORD 8

ITEM	FORMAT	STARTING COLUMN
BENDS GRADE 1 ONSET TIME	5A1	1
BENDS GRADE 2 ONSET TIME	5A1	6
BENDS GRADE 3 ONSET TIME	5A1	11
BENDS GRADE 4 ONSET TIME	5A1	16

RECORD 9

ITEM	FORMAT	STARTING COLUMN
BENDS GRADE 1 REMISSION TIME	5A1	1

BENDS GRADE 2 REMISSION TIME	5A1	6
BENDS GRADE 3 REMISSION TIME	5A1	11
BENDS GRADE 4 REMISSION TIME	5A1	16

RECORD 10

ITEM	FORMAT	STARTING COLUMN
BENDS GRADE 1 REMISSION PRESSURE	F4.1	1
BENDS GRADE 2 REMISSION PRESSURE	F4.1	5
BENDS GRADE 3 REMISSION PRESSURE	F4.1	9
BENDS GRADE 4 REMISSION PRESSURE	F4.1	13

RECORD 11

ITEM	FORMAT	STARTING COLUMN
PARTIAL PRESSURE OF NITROGEN IN 180 TISSUE	F5.2	1
PARTIAL PRESSURE OF NITROGEN IN 240 TISSUE	F5.2	6
PARTIAL PRESSURE OF NITROGEN IN 360 TISSUE	F5.2	11
DECOMPRESSION RATIO FOR 180 TISSUE	F4.2	16
DECOMPRESSION RATIO FOR 240 TISSUE	F4.2	20
DECOMPRESSION RATIO FOR 360 TISSUE	F4.2	24

3.3 NITROGEN WASHOUT PROGRAM

THE NITROGEN WASHOUT program output consists of a data file and the data which was output to the printing terminal during the run.

The data file contains all of the input variables on subject identification and experimental conditions plus the values collected in the run. For each breath there is :

Record 1

ITEM	FORMAT	STARTING COLUMN
NAME	30A1	1
DATE	8A1	31
IDCODE	11A1	39
AGE	I2	50
EXTERNAL TEMPERATURE	F7.2	52
EXTERNAL GRAVITY	I1	59
IMMERSION?	A1	60
BODY POSITION CODE	I2	61
AMBIENT PRESSURE	F7.2	63
DRUGS CODE	I2	70
EXERCISE CODE	I2	72
BREATHING MIXTURE CODE	I2	74
BODY HYDRATION CODE	I2	76
AMBIENT GAS CODE	I2	78
STARTING TIME	5A1	80
SPECIAL CONDITION CODE	I2	85
COMMENTS?	A1	87

RECORD 2

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 3

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 4

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 5

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 6 thru N, where N is the number of breaths

ITEM	FORMAT	STARTING COLUMN
BREATH NUMBER	I4	1
ELAPSED TIME	F10.1	5
BREATH VOLUME	F10.5	15
NITROGEN VOLUME IN BREATH	F10.5	25
CONCENTRATION OF O2 IN BREATH	F10.5	35
CONCENTRATION OF N2 IN BREATH	F10.5	45
CONCENTRATION OF CO2 IN BREATH	F10.5	55

The data file end is marked by dummy zero values for the variables in the last record.

The output to the printing terminal consists of the input variables on subject identification and experimental conditions and the following parameters for each breath:

1. Breath number
2. Elapsed time in seconds
3. Breath volume in liters
4. Nitrogen volume per breath in liters
5. Concentration of nitrogen in breath

At the end of every minute there is a summary of elapsed minutes, nitrogen eliminated for the minute and total nitrogen eliminated.

3.4 NITROGEN DATA PROGRAM

The N2DATA Program produces a hard copy report on the printing terminal of the data from a nitrogen washout.

The output for a short report is:

1. Subject identification
2. Experimental conditions
3. Average breath volume
4. Average nitrogen volume per breath
5. Average oxygen concentration per breath
6. Average nitrogen concentration per breath
7. Average carbon dioxide concentration per breath
8. Total nitrogen expired
9. Total number of breaths

A full report requires about 20 minutes. The output for a full report is the subject's identification, experimental conditions and the breath by breath account of:

1. Breath number
2. Elapsed time
3. Breath volume
4. Nitrogen volume in breath
5. Oxygen concentration in breath
6. Nitrogen concentration in breath
7. Carbon dioxide concentration in breath
8. Average breath volume
9. Average nitrogen volume per breath
10. Average oxygen concentration per breath
11. Average nitrogen concentration per breath
12. AVERAGE carbon dioxide concentration per breath
13. Total nitrogen eliminated
14. Total number of breaths

The output for a one minute report is the subject's identification, experimental conditions and the one minute interval parameters for:

1. Elapsed time in minutes
2. Nitrogen volume eliminated during the minute
3. Oxygen volume eliminated during the minute
4. Carbon dioxide volume eliminated during the minute
5. Nitrogen volume per kilogram of body weight during the interval
6. Average nitrogen concentration during the interval
7. Cummulated nitrogen volume eliminated
8. Per-cent of estimated nitrogen content eliminated
9. Metabolic rate during the interval
10. Average breath volume
11. Average nitrogen volume per breath
12. Average oxygen concentration per breath
13. Average nitrogen concentration per breath
14. Average carbon dioxide concentration per breath
15. Total nitrogen eliminated

16. Total number of breaths

The output for a five minute report is the subject's identification, experimental conditions and the one minute interval parameters for:

1. Elapsed time in minutes
2. Nitrogen volume eliminated during the five minute interval
3. Oxygen volume eliminated during the five minute interval
4. Carbon dioxide volume eliminated during the five minute interval
5. Nitrogen volume per kilogram of body weight during the interval
6. Average nitrogen concentration during the interval
7. Cummulative nitrogen volume eliminated
8. Per-cent of estimated nitrogen content eliminated
9. Metabolic rate during the interval
10. Average breath volume
11. Average nitrogen volume per breath
12. Average oxygen concentration per breath
13. Average nitrogen concentration per breath
14. Average carbon dioxide concentration per breath
15. Total nitrogen eliminated
16. Total number of breaths

3.5 UPDATE PROGRAM

The output of the UPDATE program is a formatted data file identical to the data files generated by the modified nitrogen washout program and suitable for use with the N2DATA report writing program or for transfer to the VAX. The updated data file is stored on a floppy disk. The data file contains zeros and blanks for all of the new input variables on subject identification and experimental conditions.

Record 1

ITEM	FORMAT	STARTING COLUMN
NAME	30A1	1
DATE	8A1	31
IDCODE	11A1	39
AGE	I2	50
EXTERNAL TEMPERATURE	F7.2	52
EXTERNAL GRAVITY	I1	59
IMMERSION?	A1	60
BODY POSITION CODE	I2	61
AMBIENT PRESSURE	F7.2	63
DRUGS CODE	I2	70
EXERCISE CODE	I2	72
BREATHING MIXTURE CODE	I2	74
BODY HYDRATION CODE	I2	76
AMBIENT GAS CODE	I2	78
STARTING TIME	5A1	80
SPECIAL CONDITION CODE	I2	85
COMMENTS?	A1	87

RECORD 2

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 3

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 4

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

RECORD 5

ITEM	FORMAT	STARTING COLUMN
COMMENT	80A1	1

The data file contains a record for each breath of the following variables collected in the run.

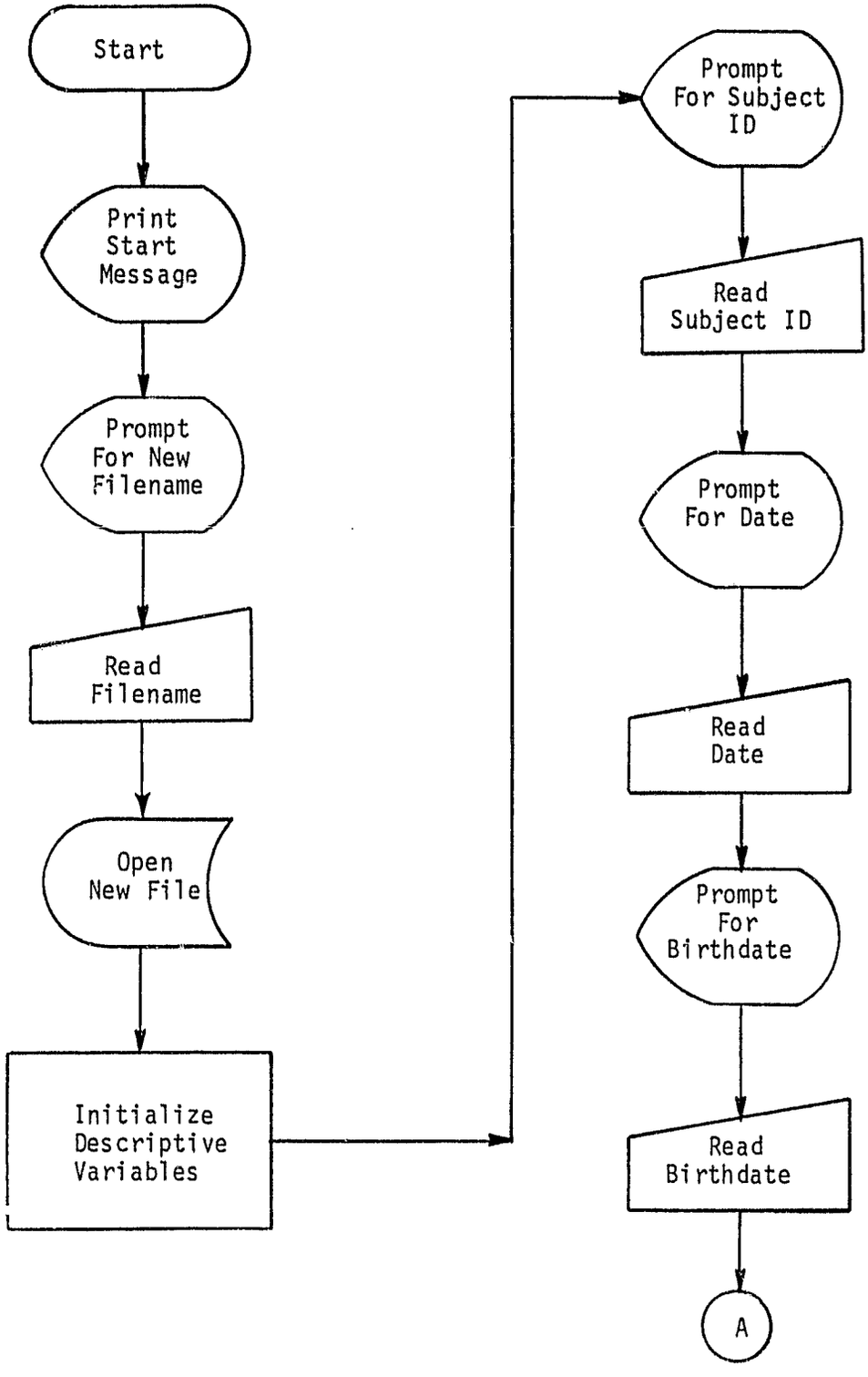
RECORD 6

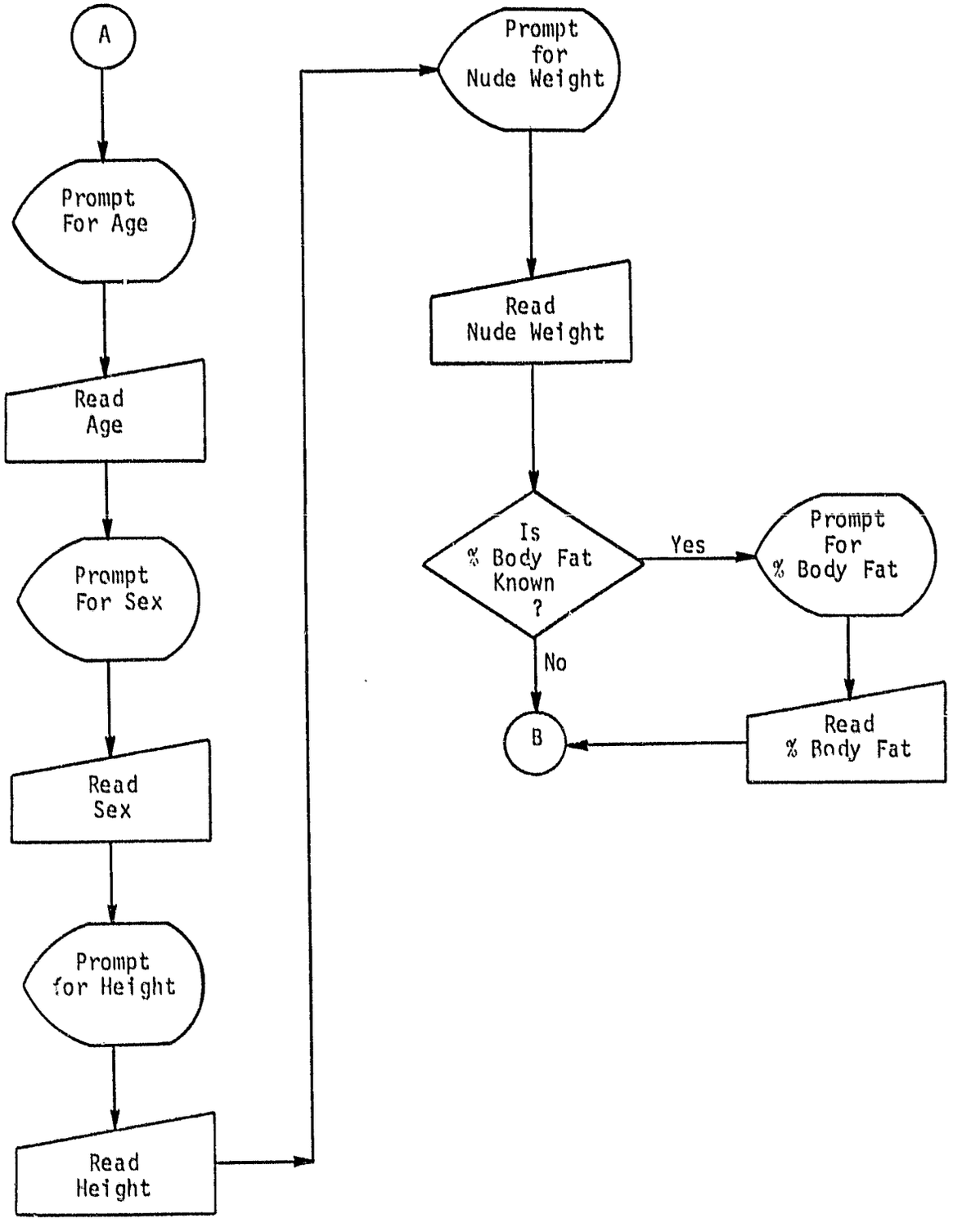
ITEM	FORMAT	STARTING COLUMN
BREATH NUMBER	I4	1
ELAPSED TIME	F10.1	5
BREATH VOLUME	F10.5	15
NITROGEN VOLUME IN BREATH	F10.5	25
CONCENTRATION OF O2 IN BREATH	F10.5	35
CONCENTRATION OF N2 IN BREATH	F10.5	45
CONCENTRATION OF CO2 IN BREATH	F10.5	55

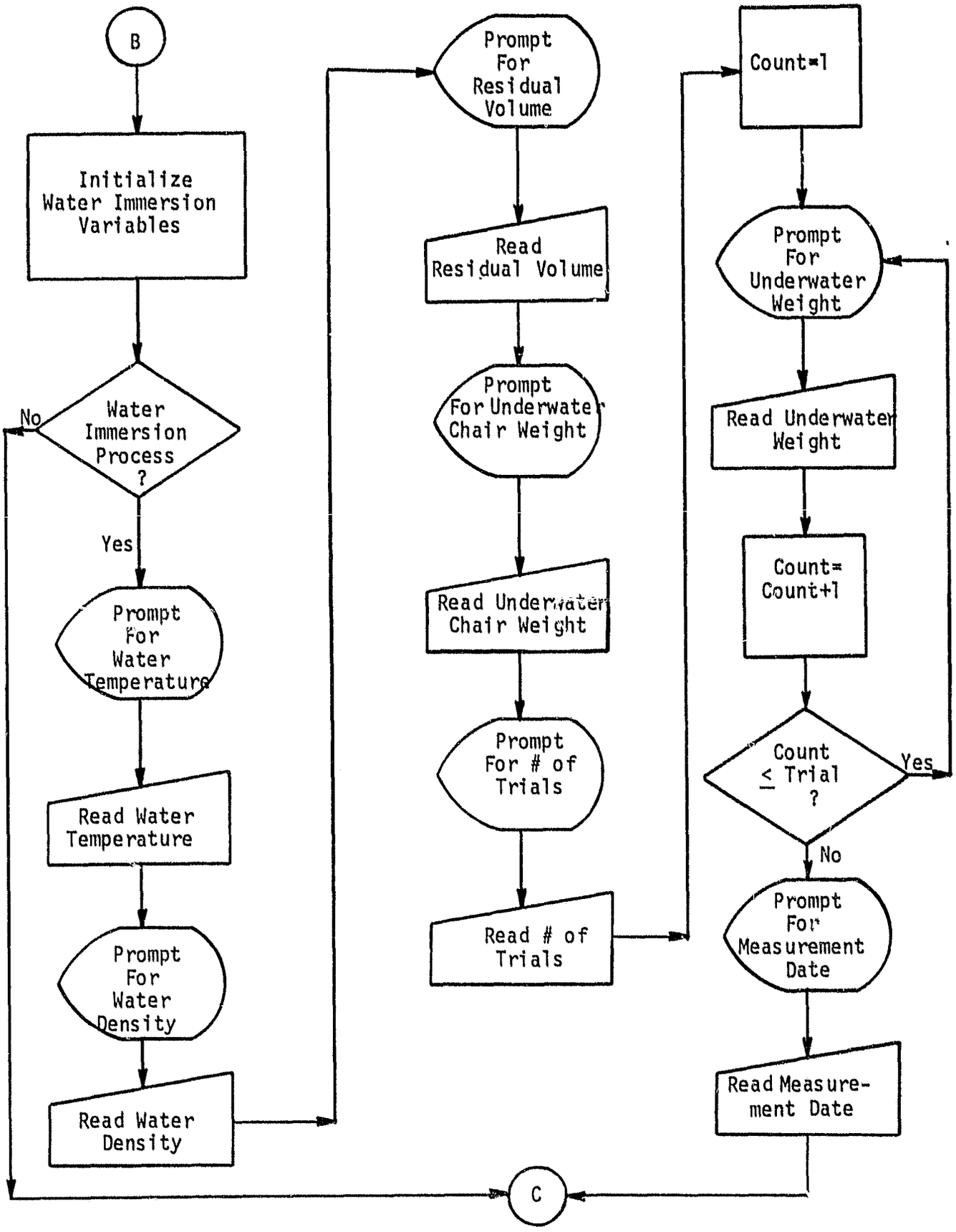
The data file end is marked by dummy zero values for the variables in record 6.

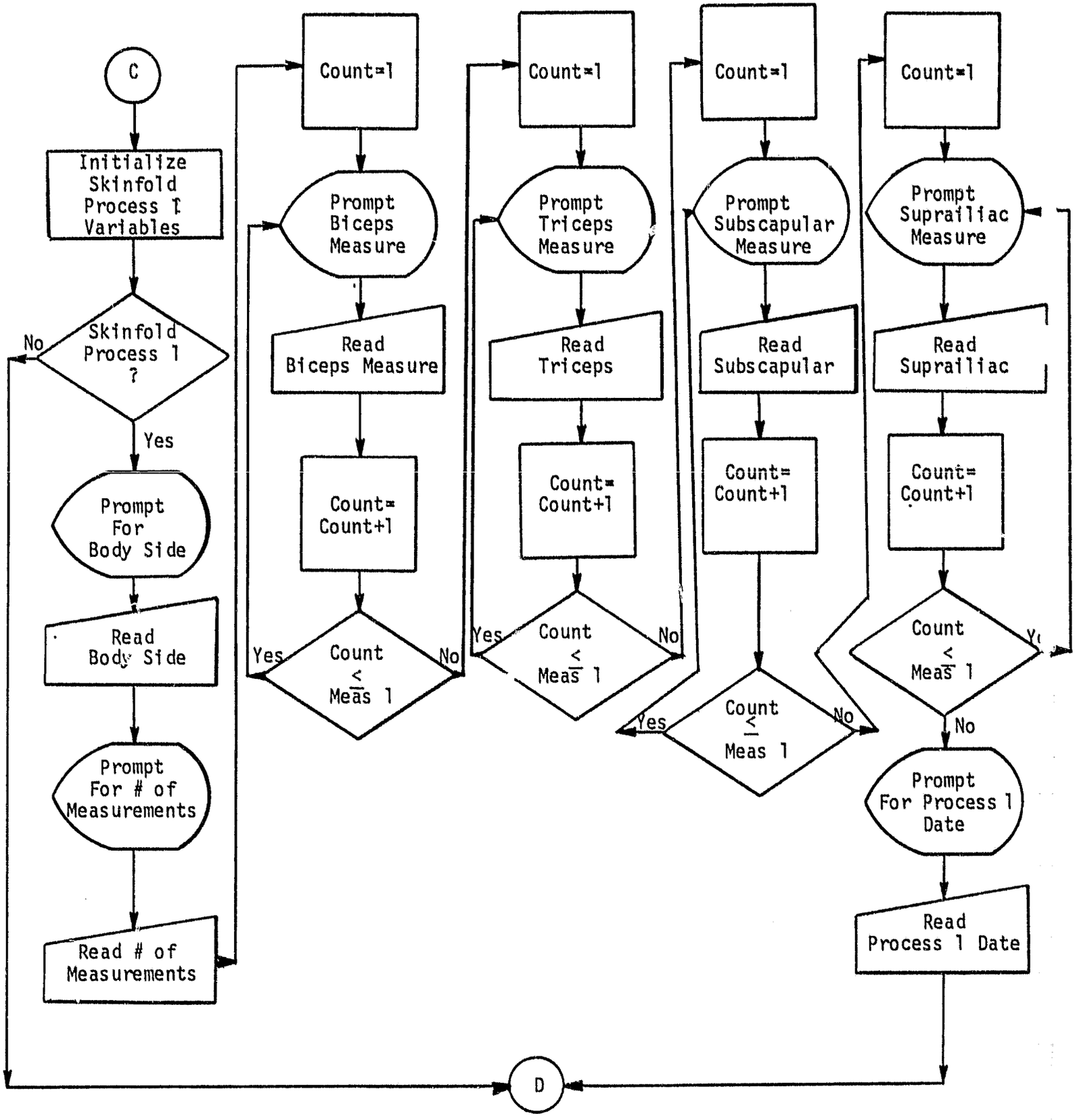
4.0 PROGRAM FLOWCHARTS

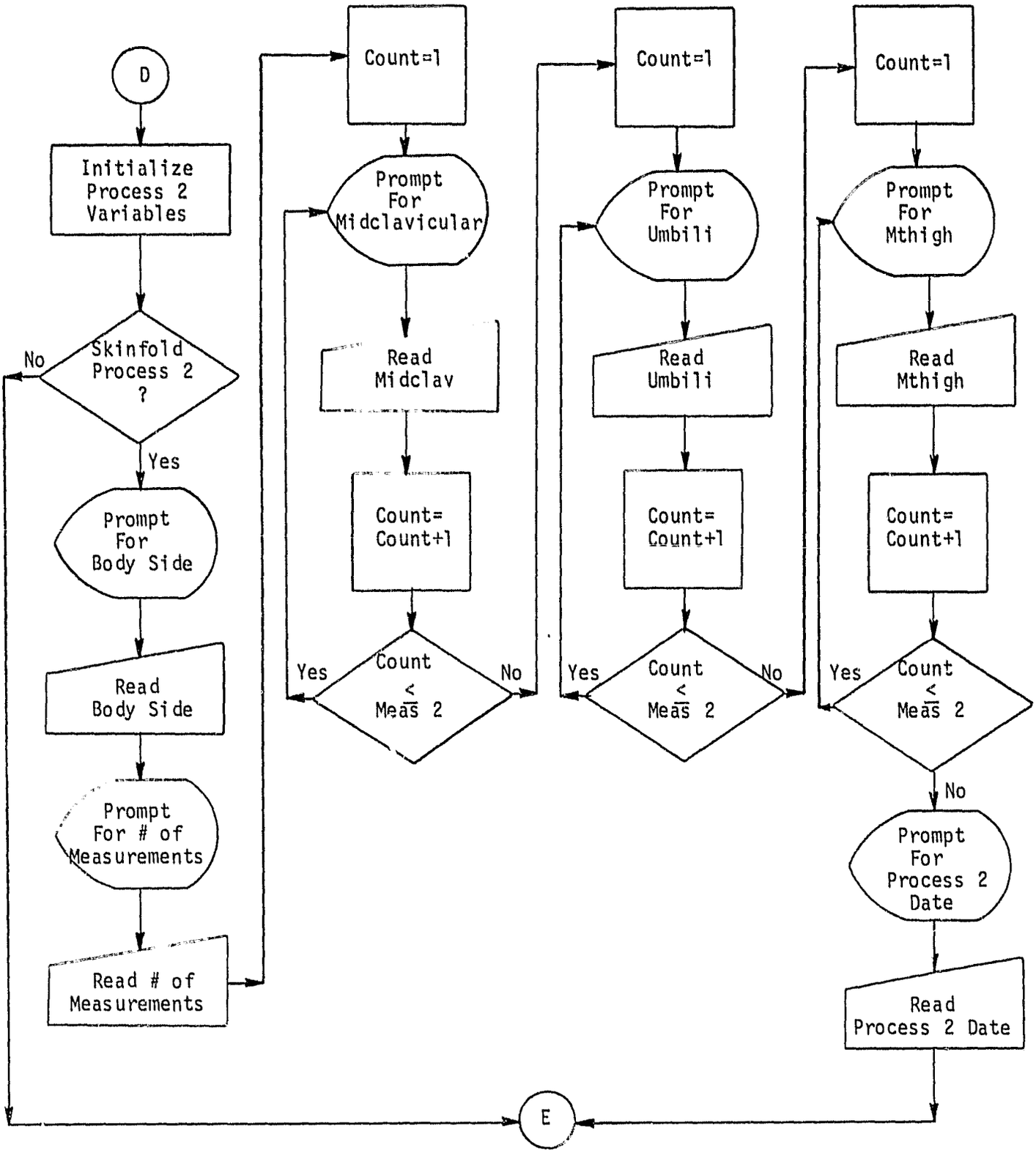
4.1 PERSONAL DATA INPUT PROGRAM

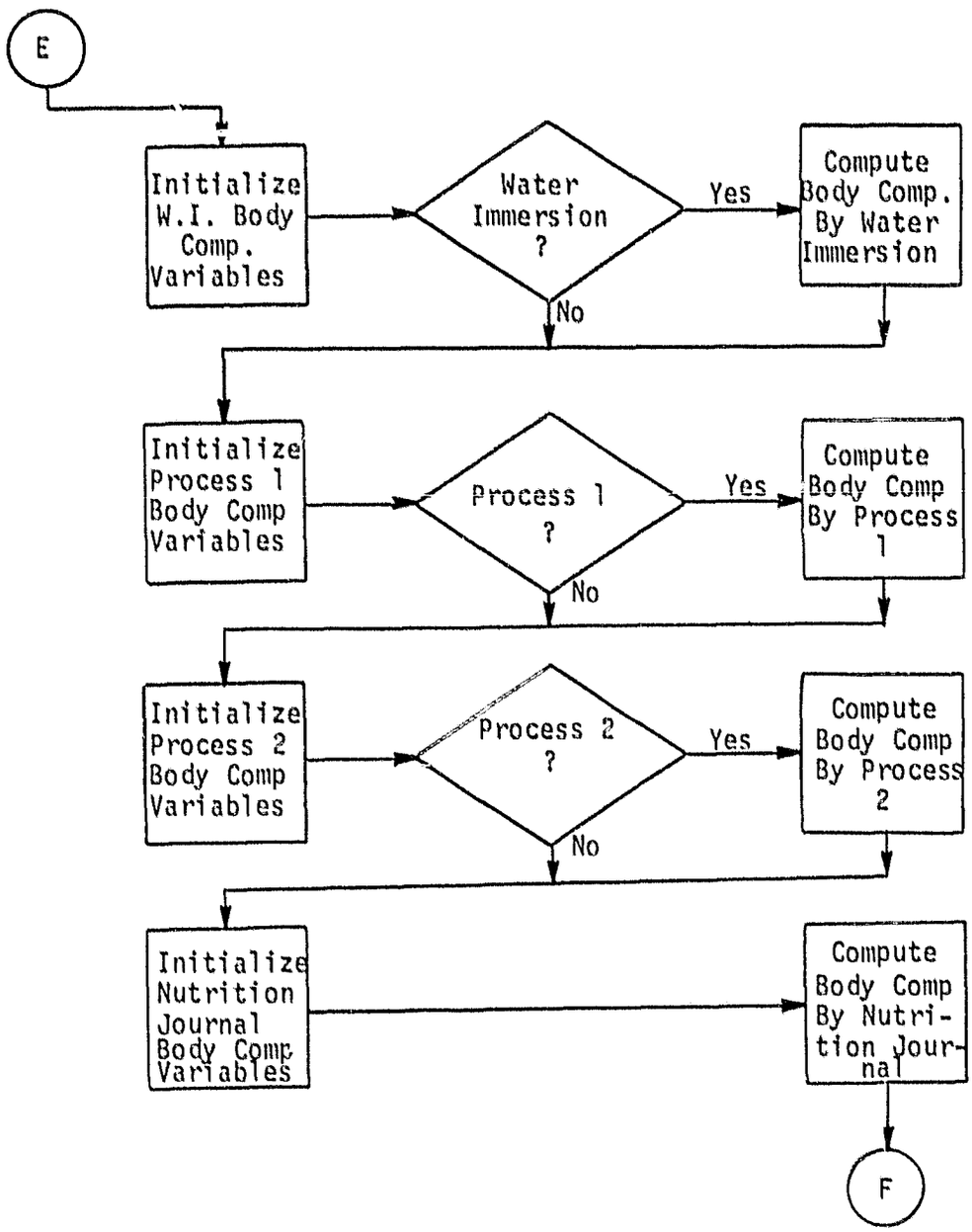


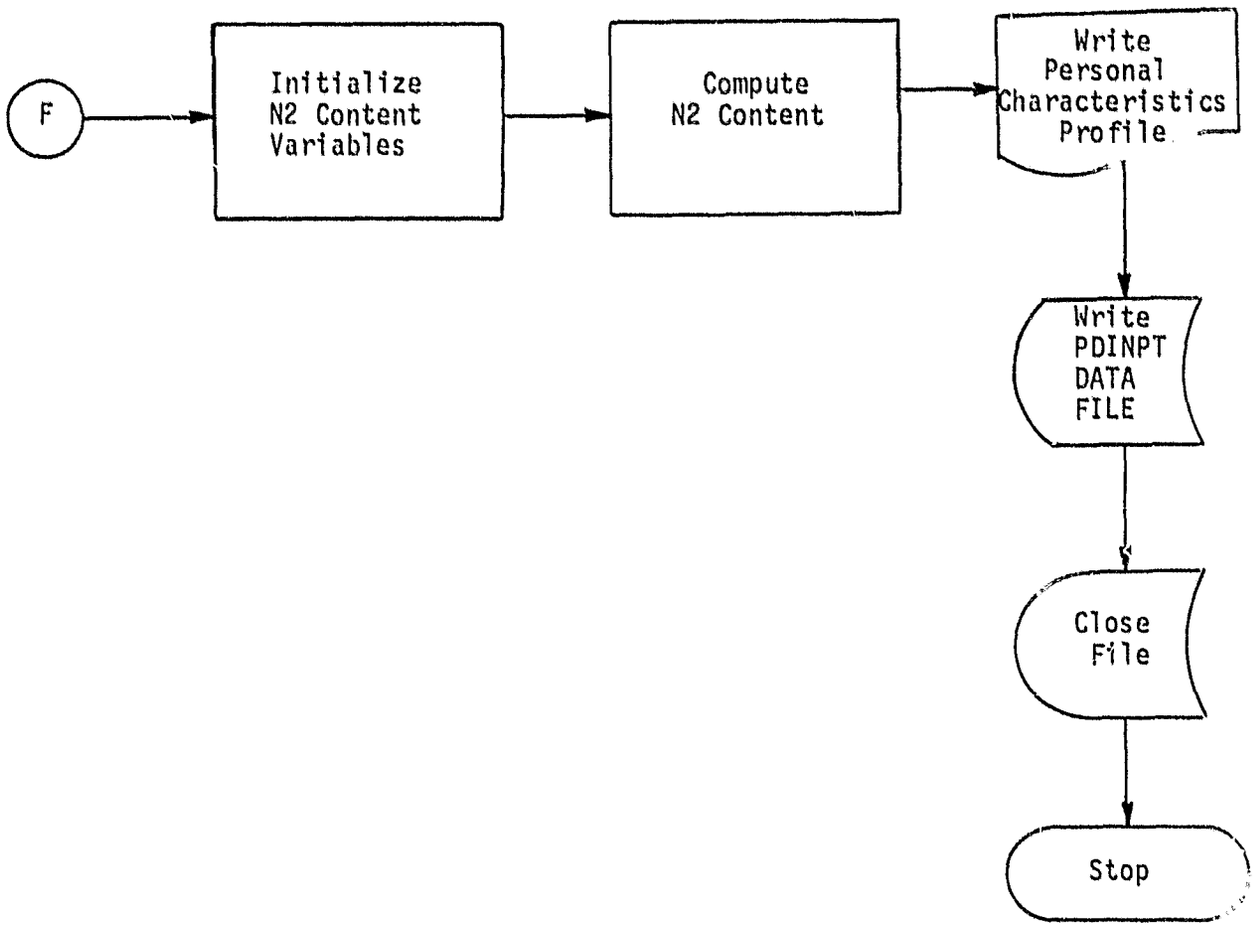




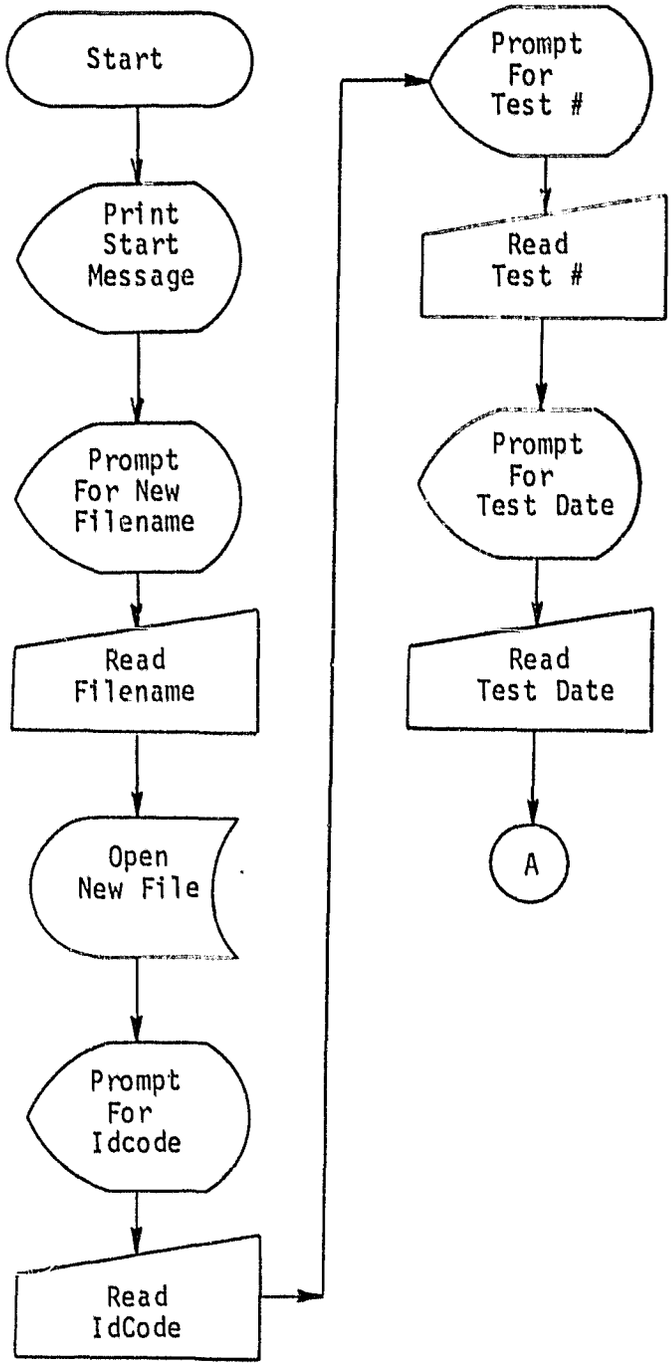


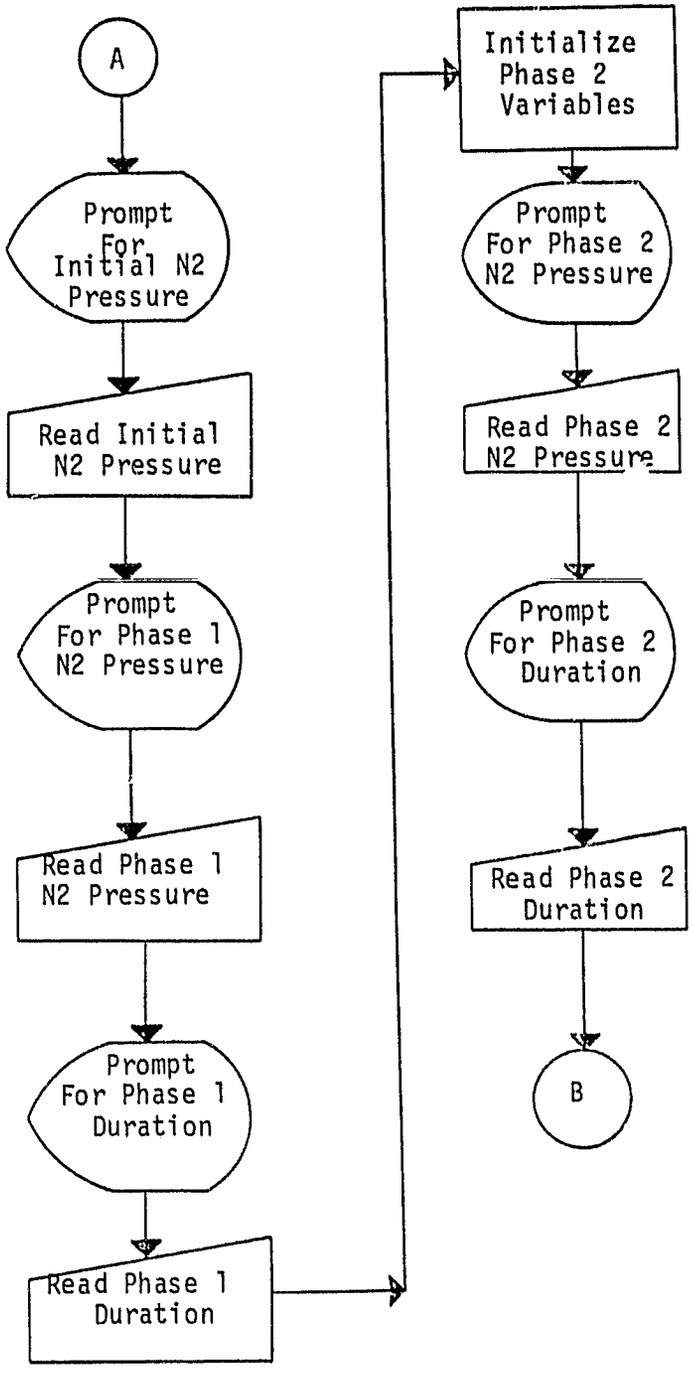


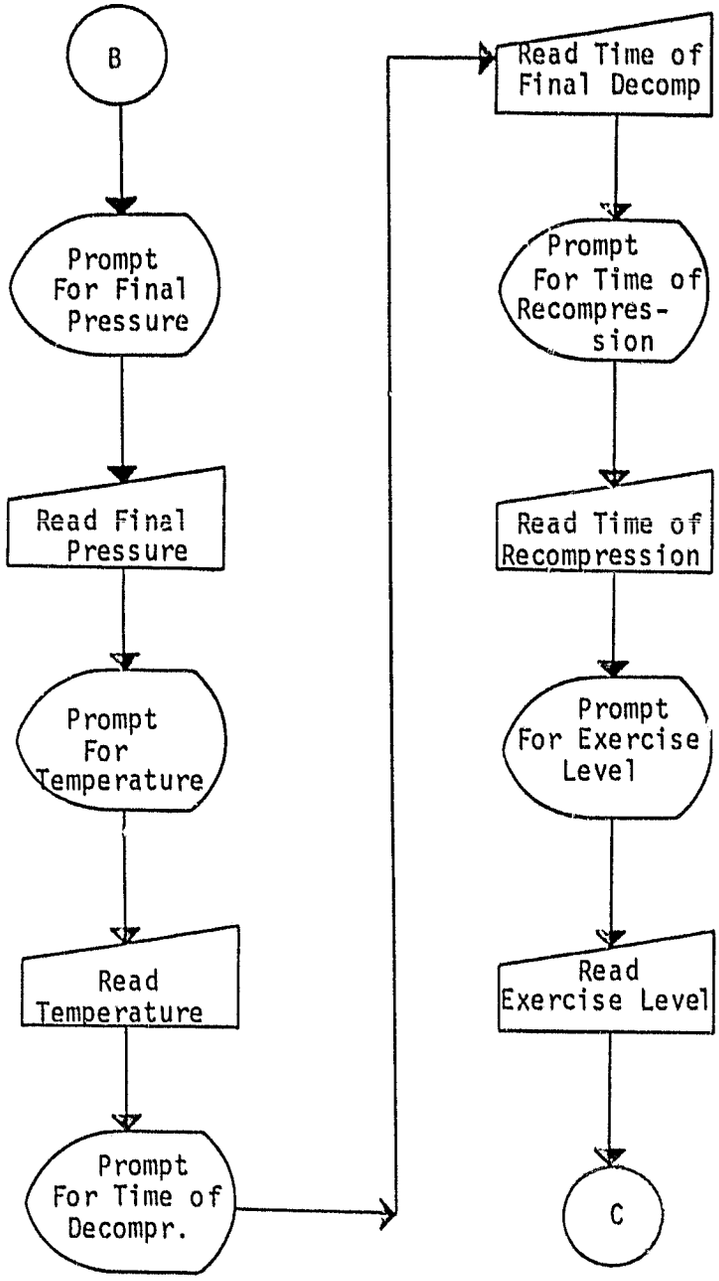


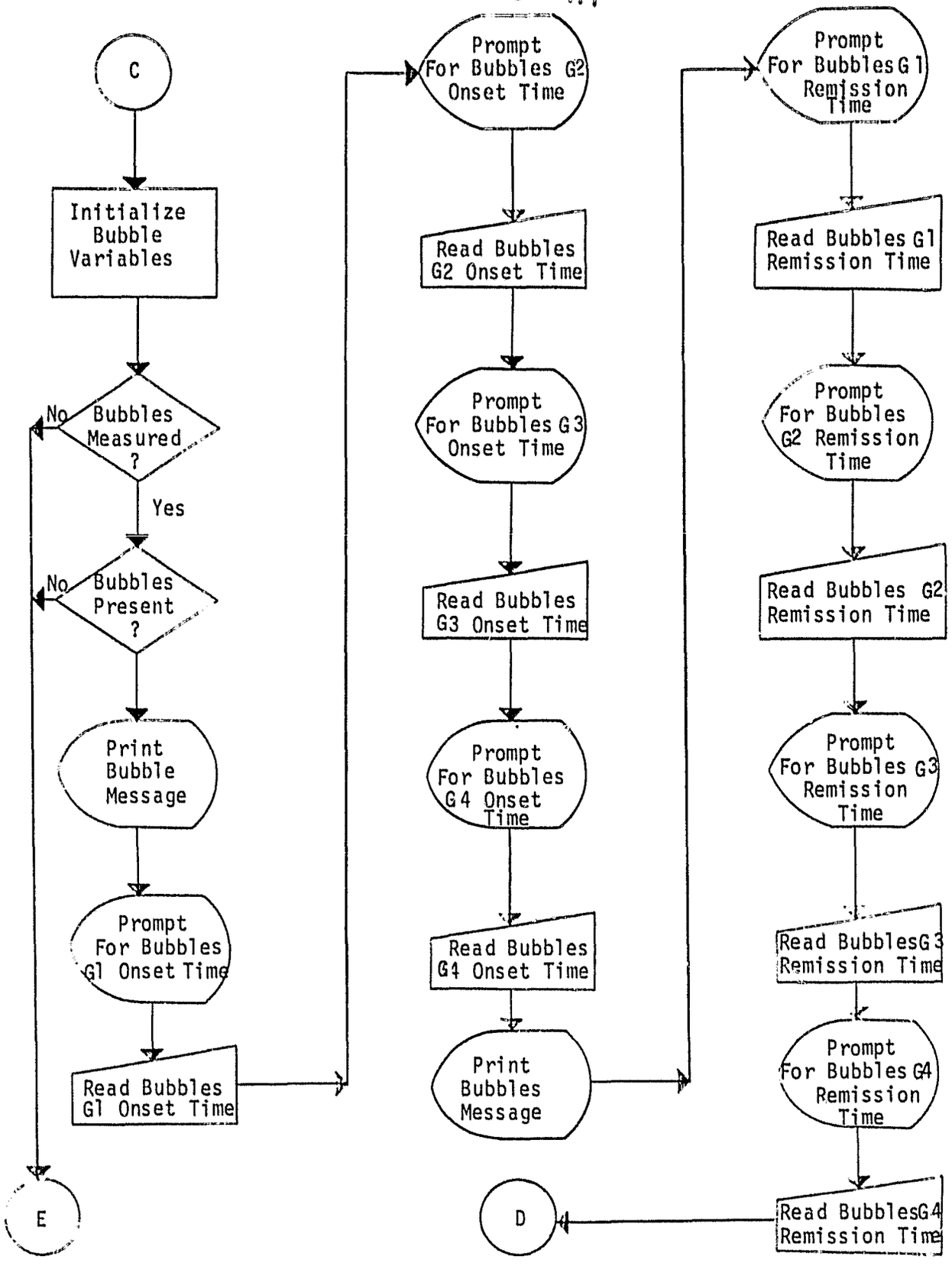


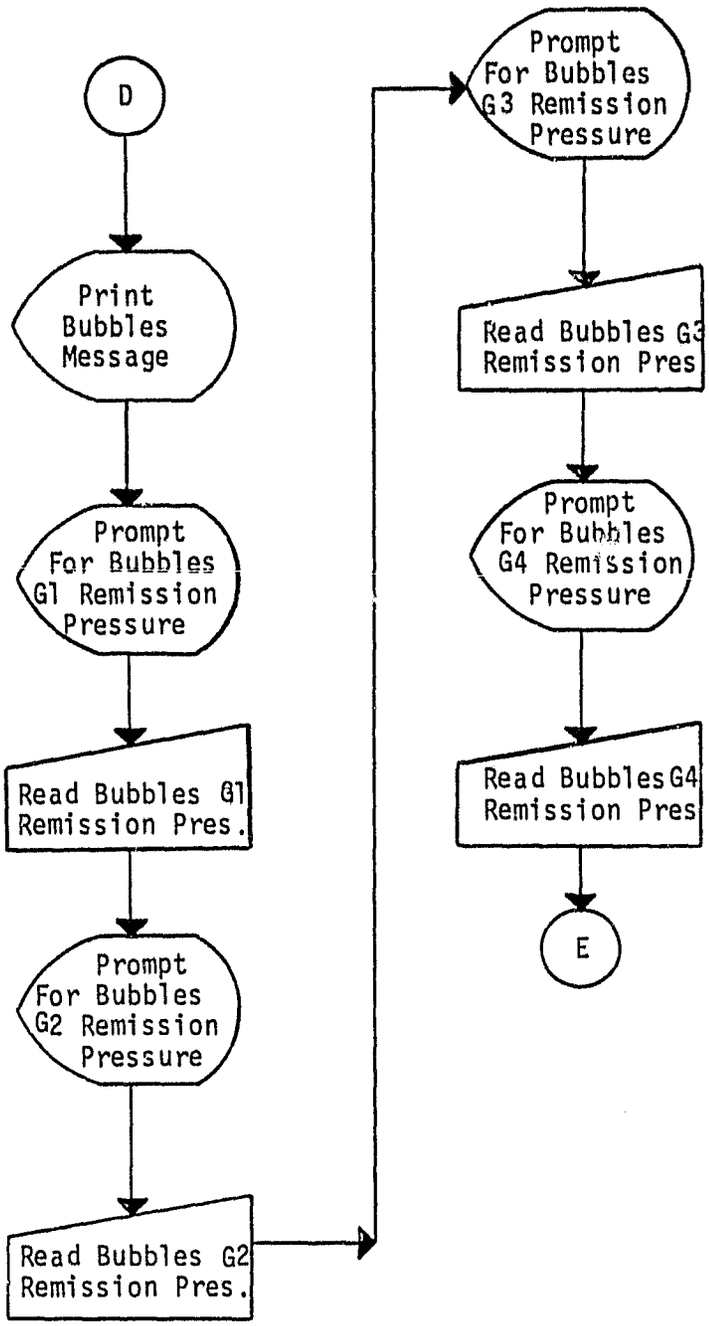
4.2 DECOMPRESSION DATA PROGRAM

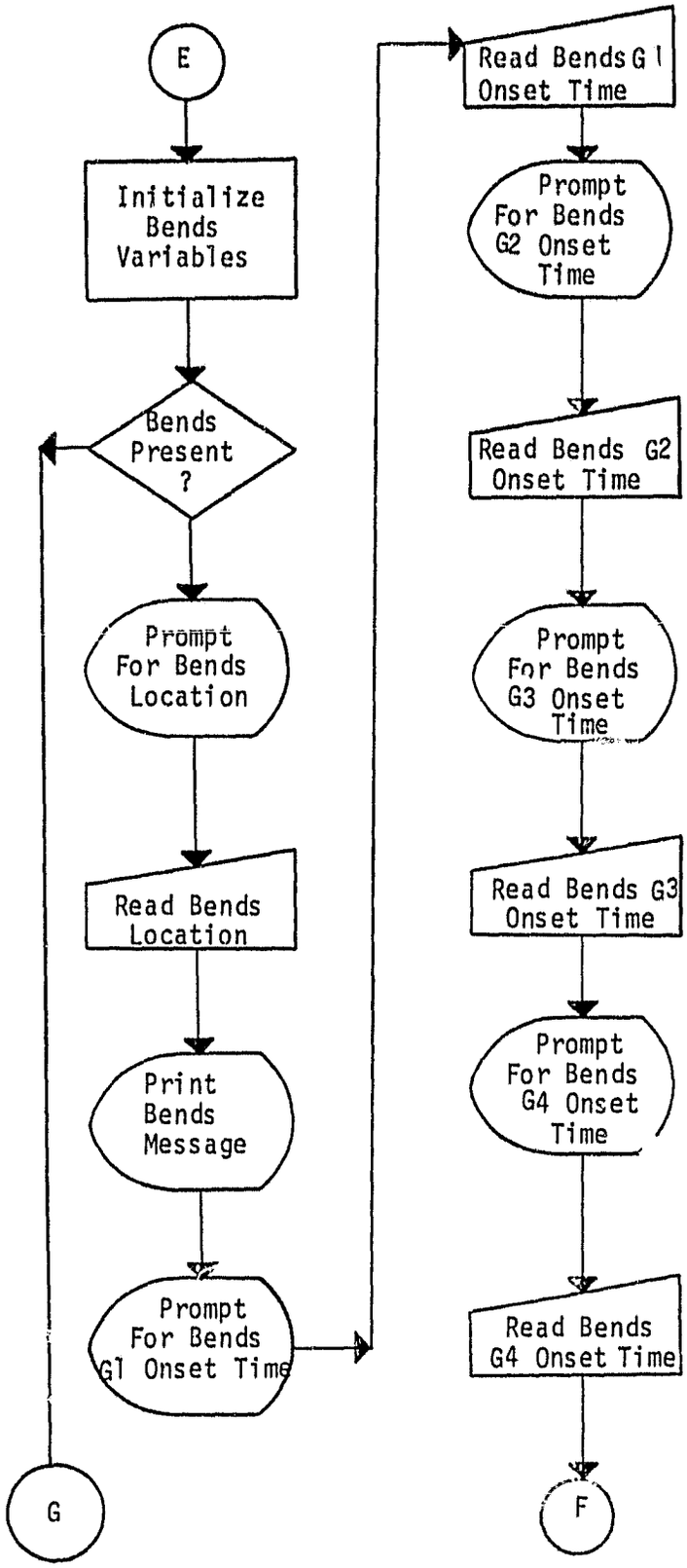


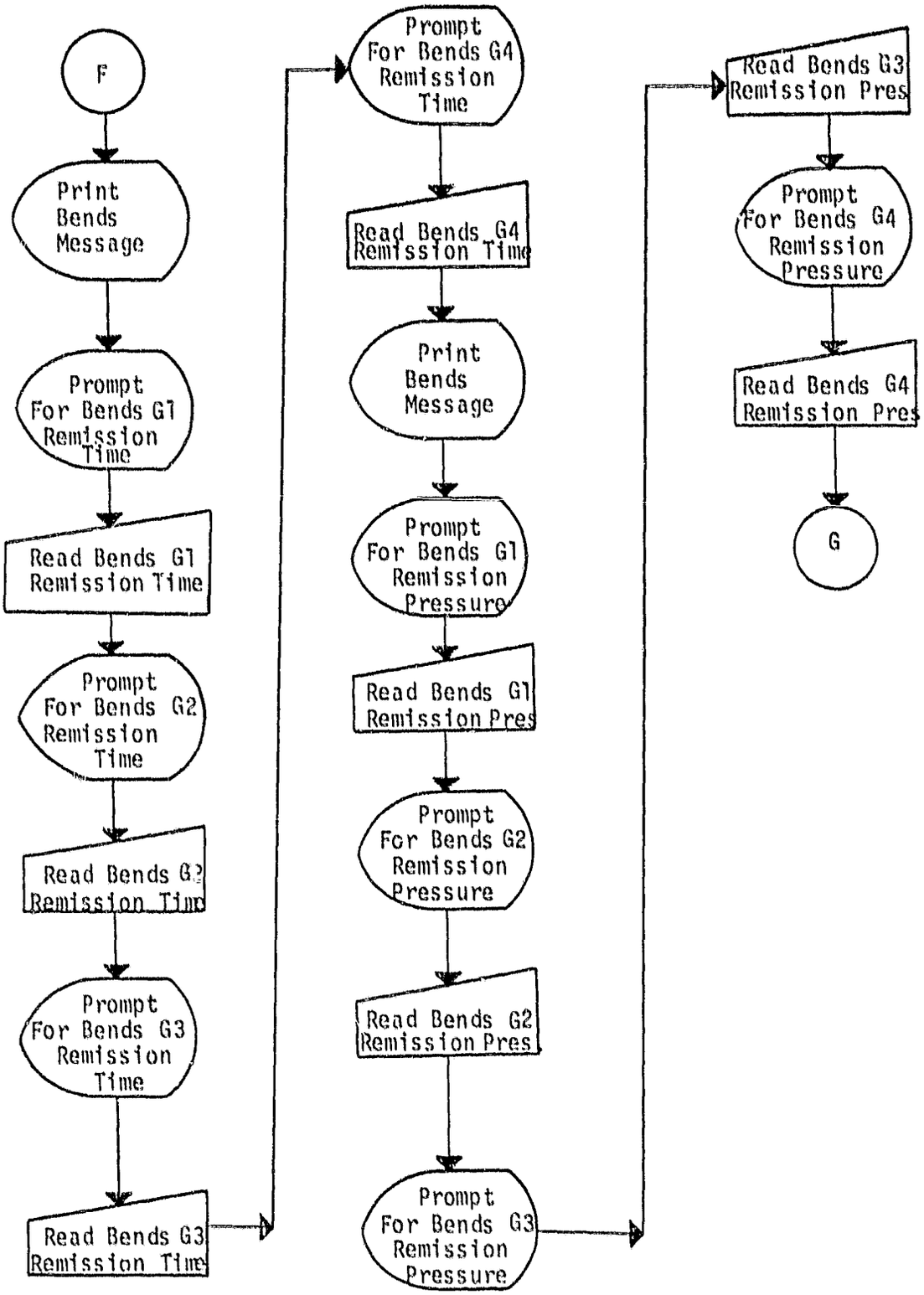


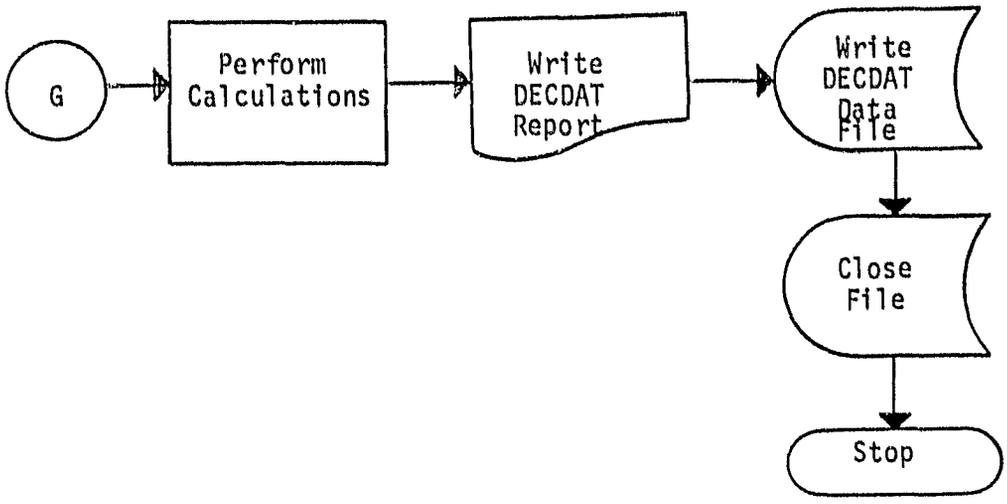




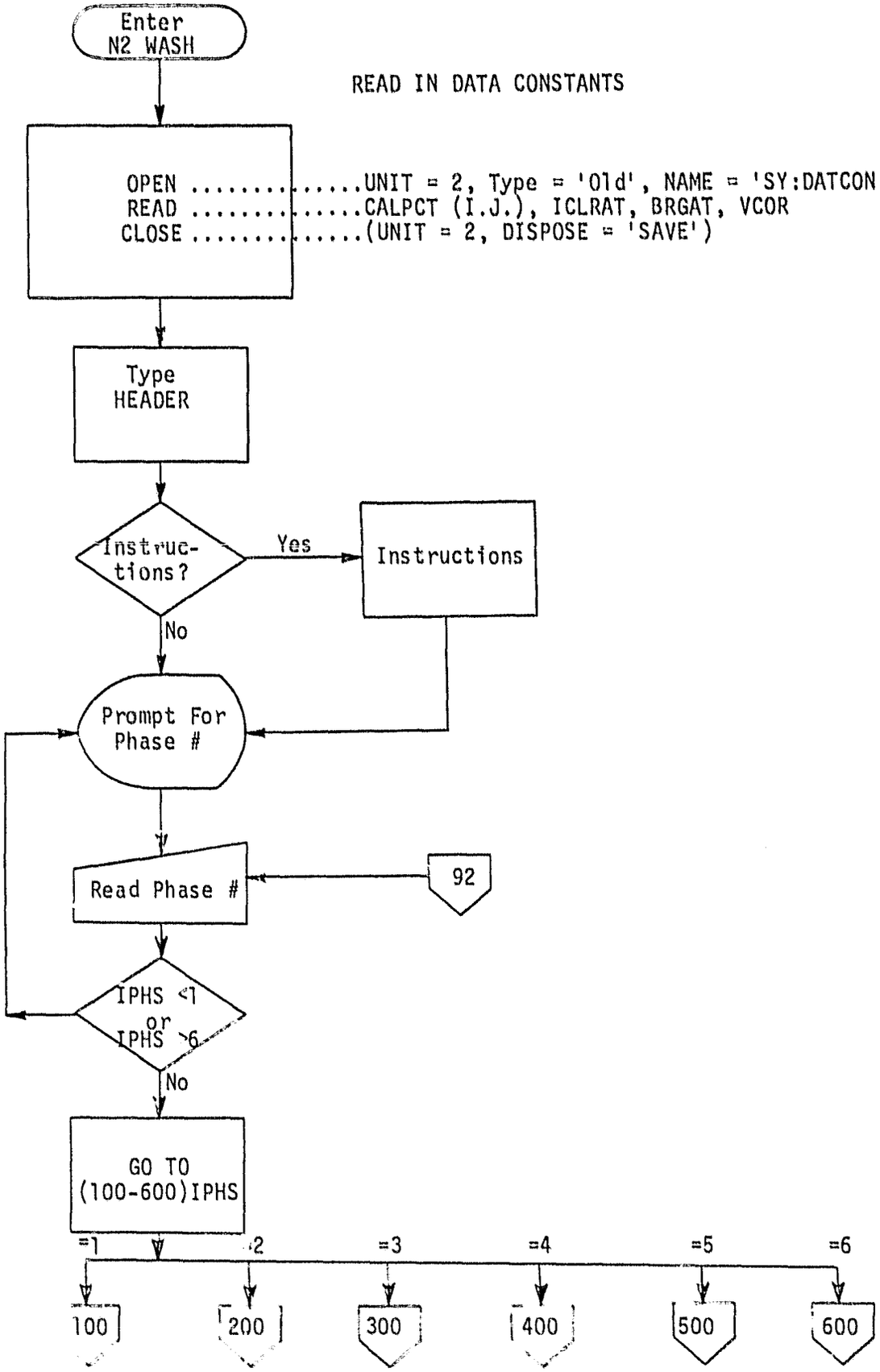


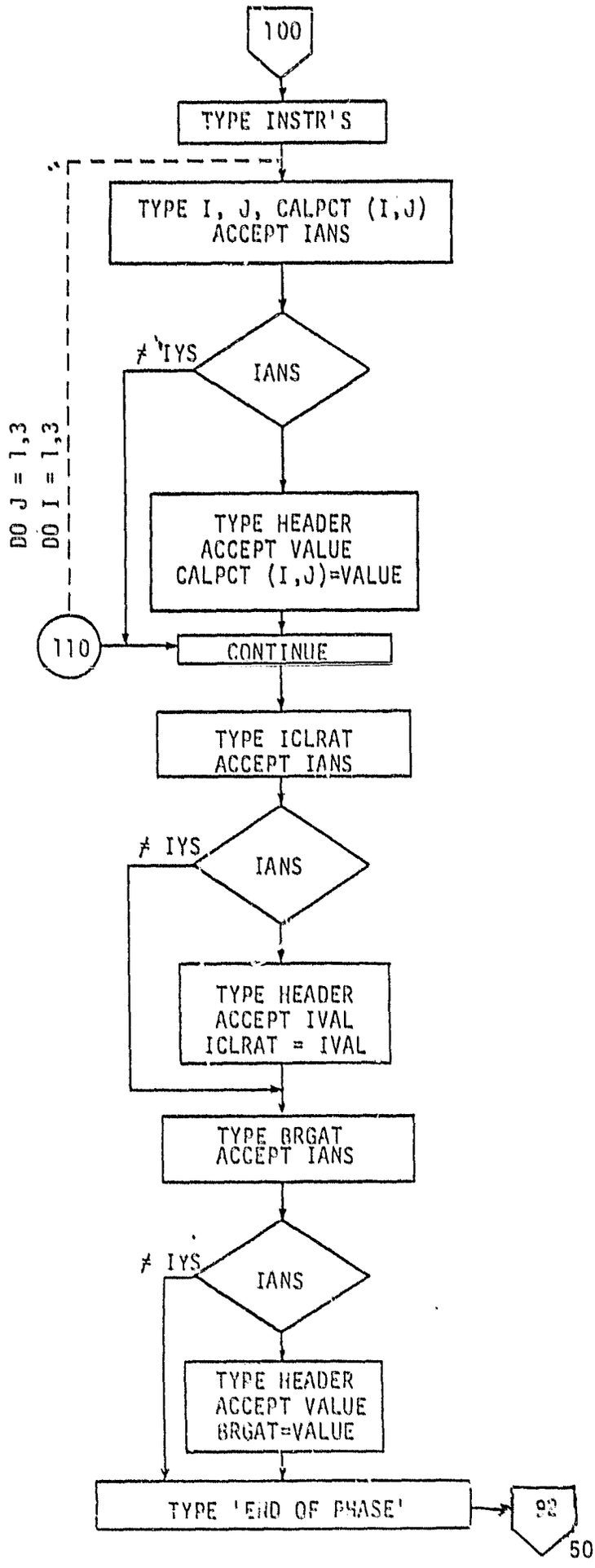






4.3 NITROGEN WASHOUT PROGRAM



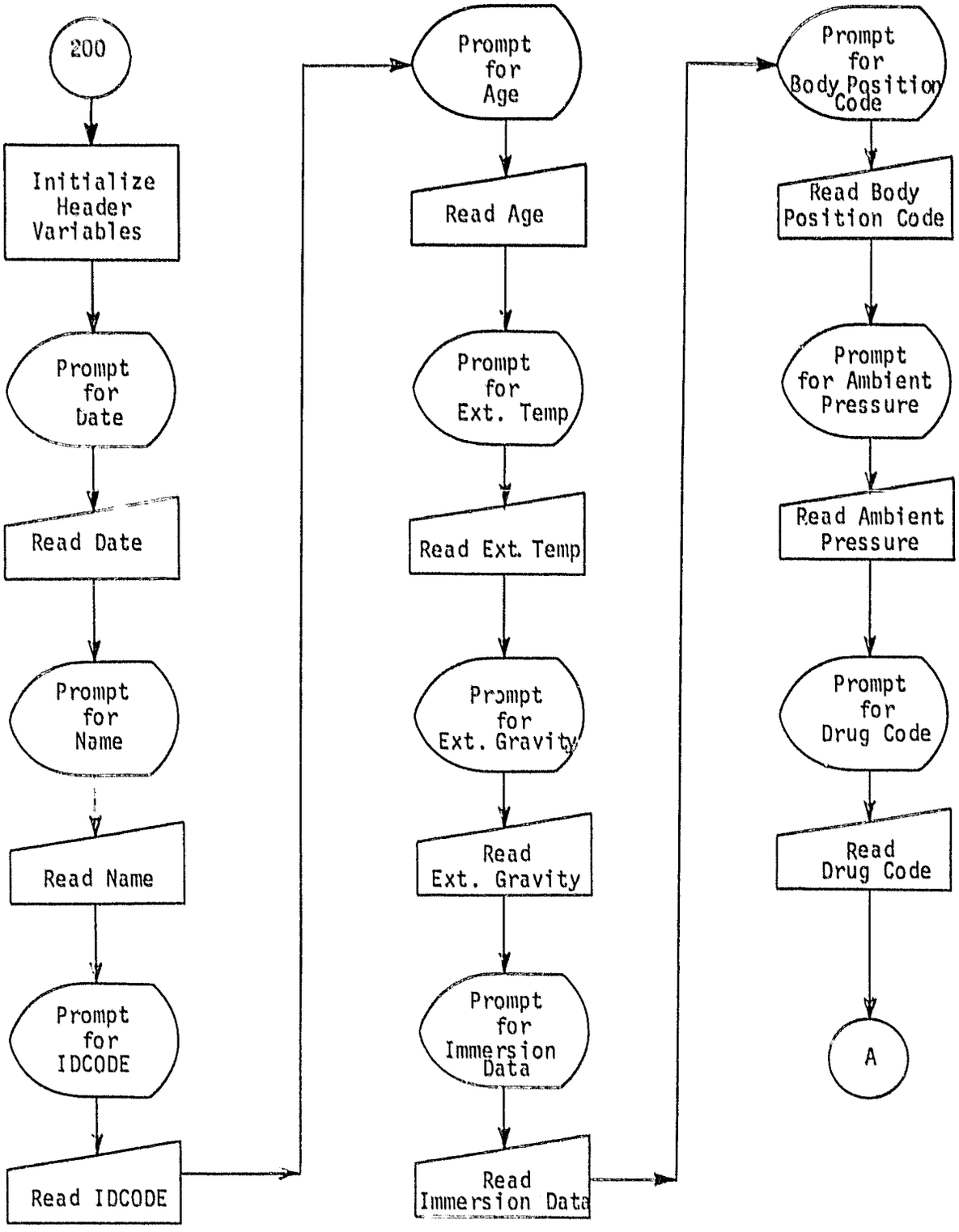


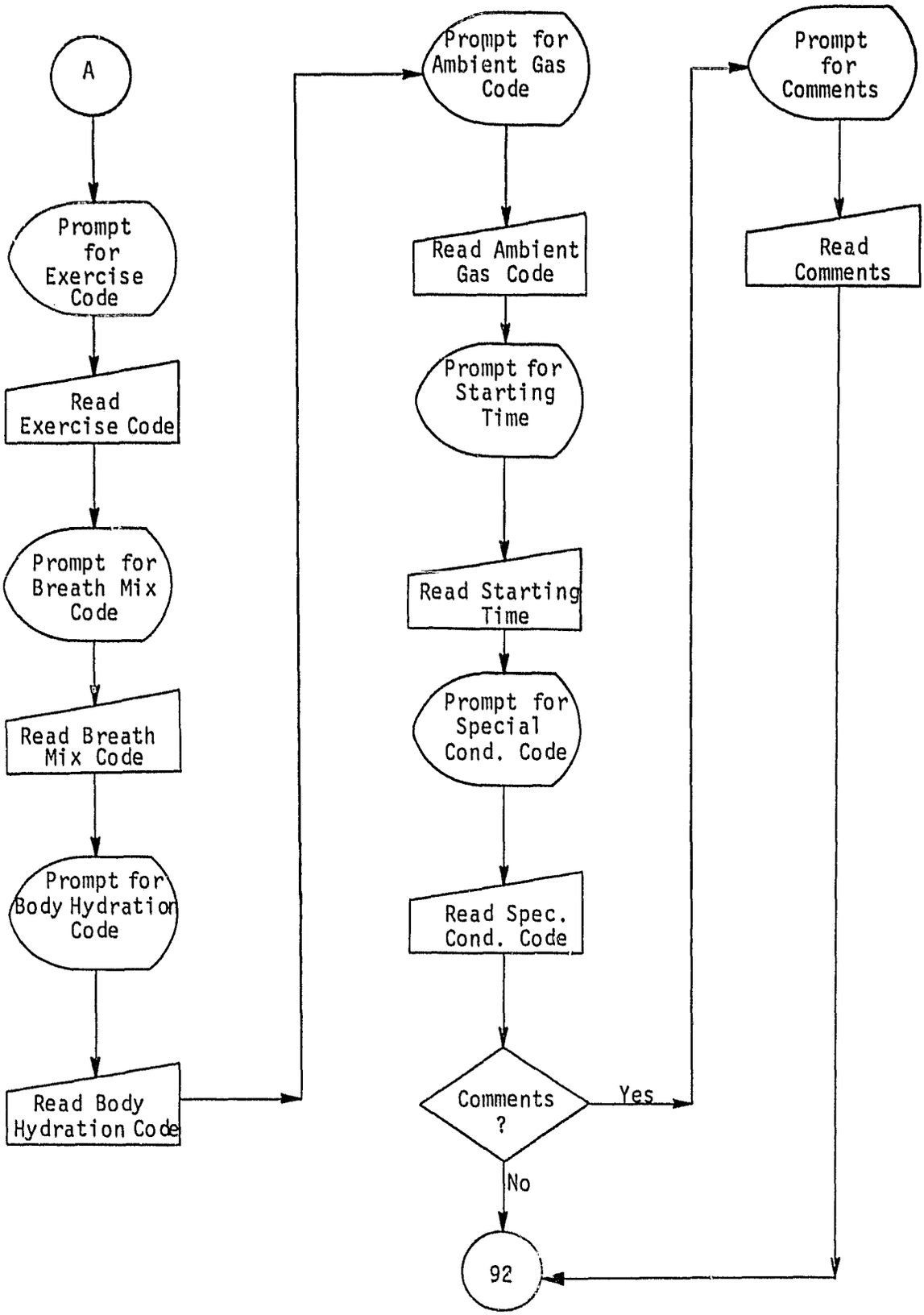
OPERATOR CAN CHANGE SELECTED DATA VALUES

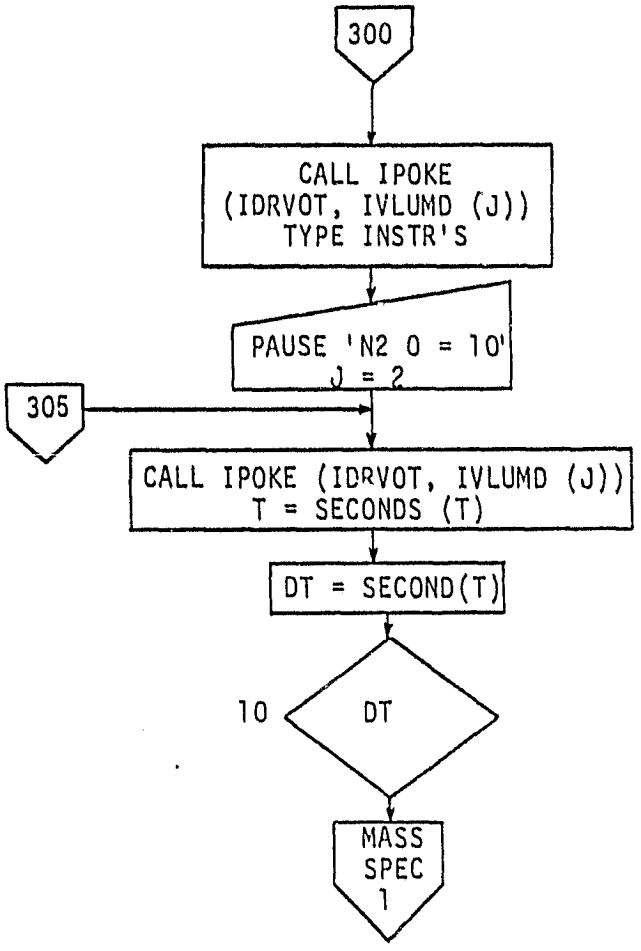
CAL GAS PERCENTAGES

INTERRUPT RATE i.e. 'SAMPLE' EXECUTION RATE

SPIROMETER NOISE, MINIMUM BREATH DIFFERENCE







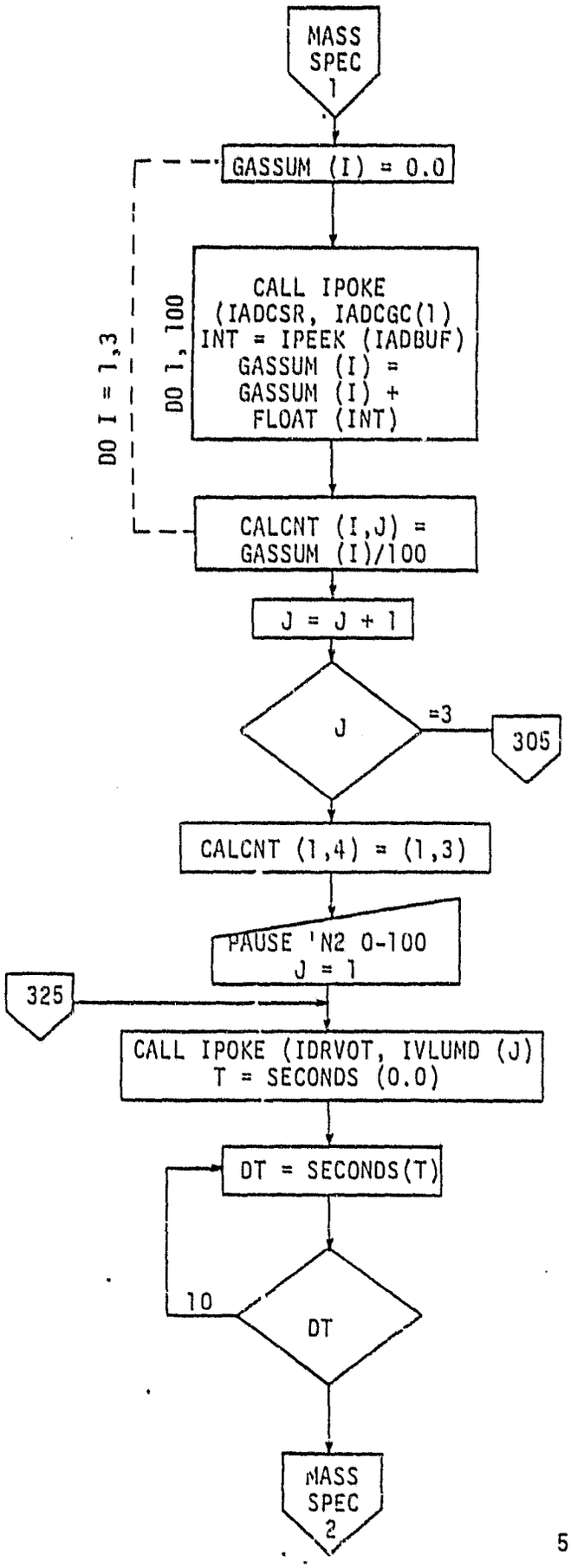
SELECT MASS SPEC PORT &
OPEN A VALVE FOR VENTING

SELECT MASS SPEC N2 RANGE

START CAL. SEQUENCE

OPEN A VALVE

FLUSH FOR 10 SEC'S



ZERO INTEGRATOR

READ A D CHANNEL

ADD TO INTEGRATOR

AVERAGE VALUE TO GET ANSWER

INCREMENT INDEX

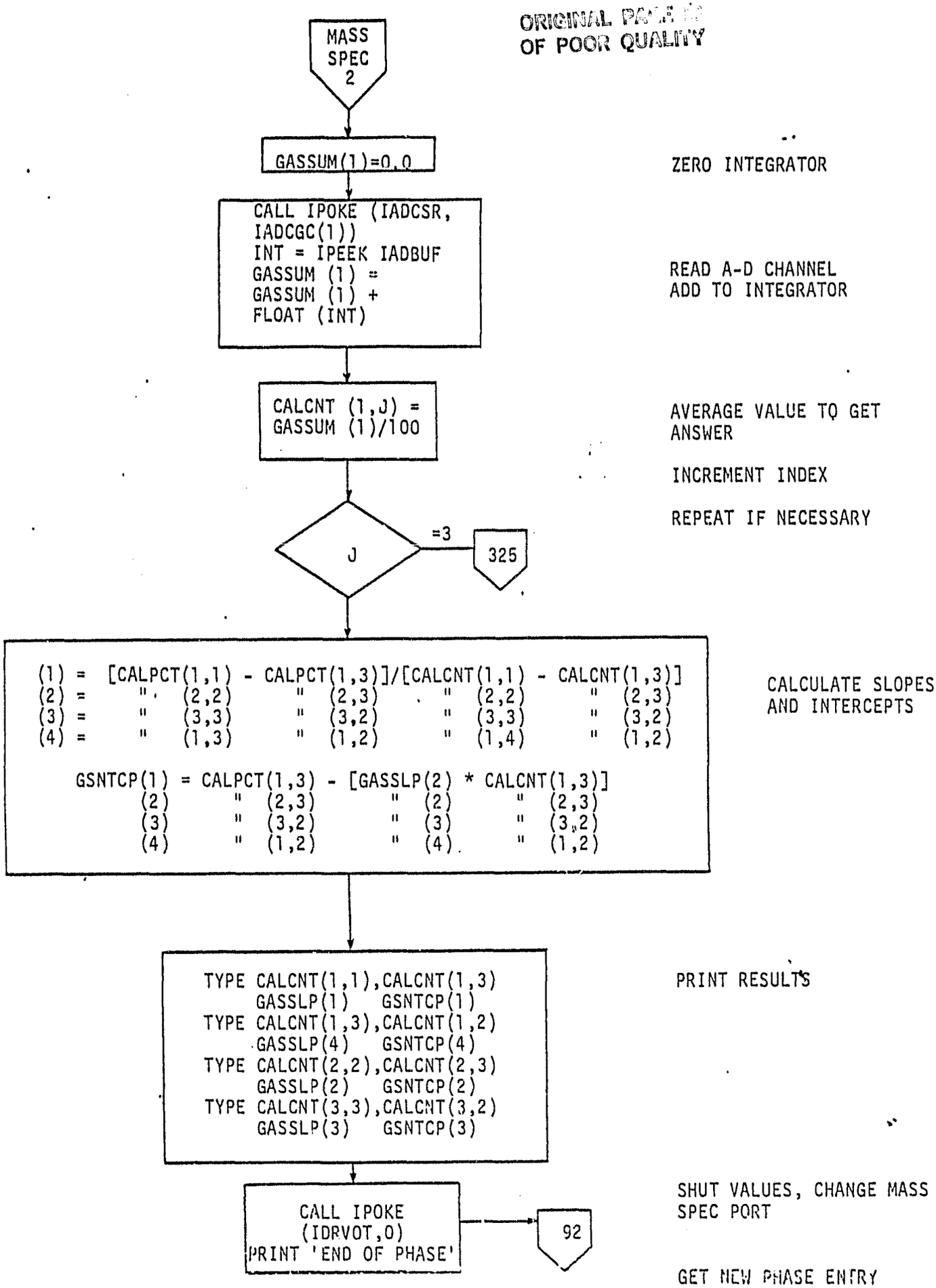
REPEAT IF NECESSARY

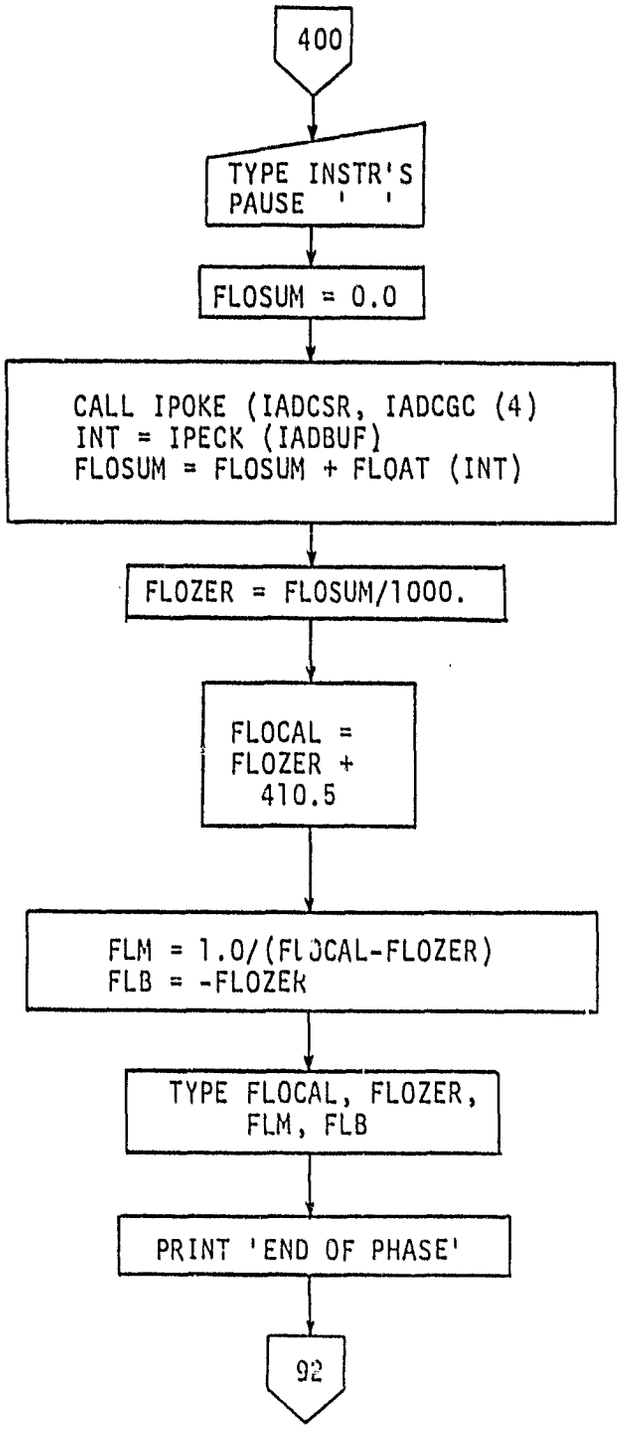
SELECT MASS SPEC N2 RANGE

START CAL SEQUENCE

OPEN A VALVE

FLUSH FOR 10 SEC'S





READ SPIROMETER 0

ZERO ACCUMULATOR

READ A-D
ADD TO ACCUMULATOR

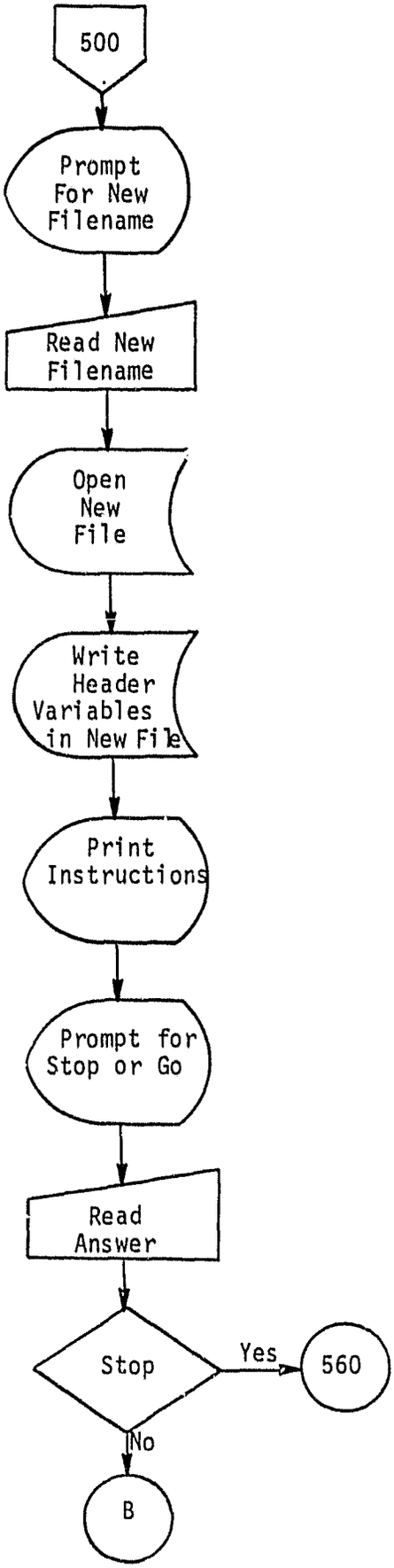
AVERAGE RESULTS

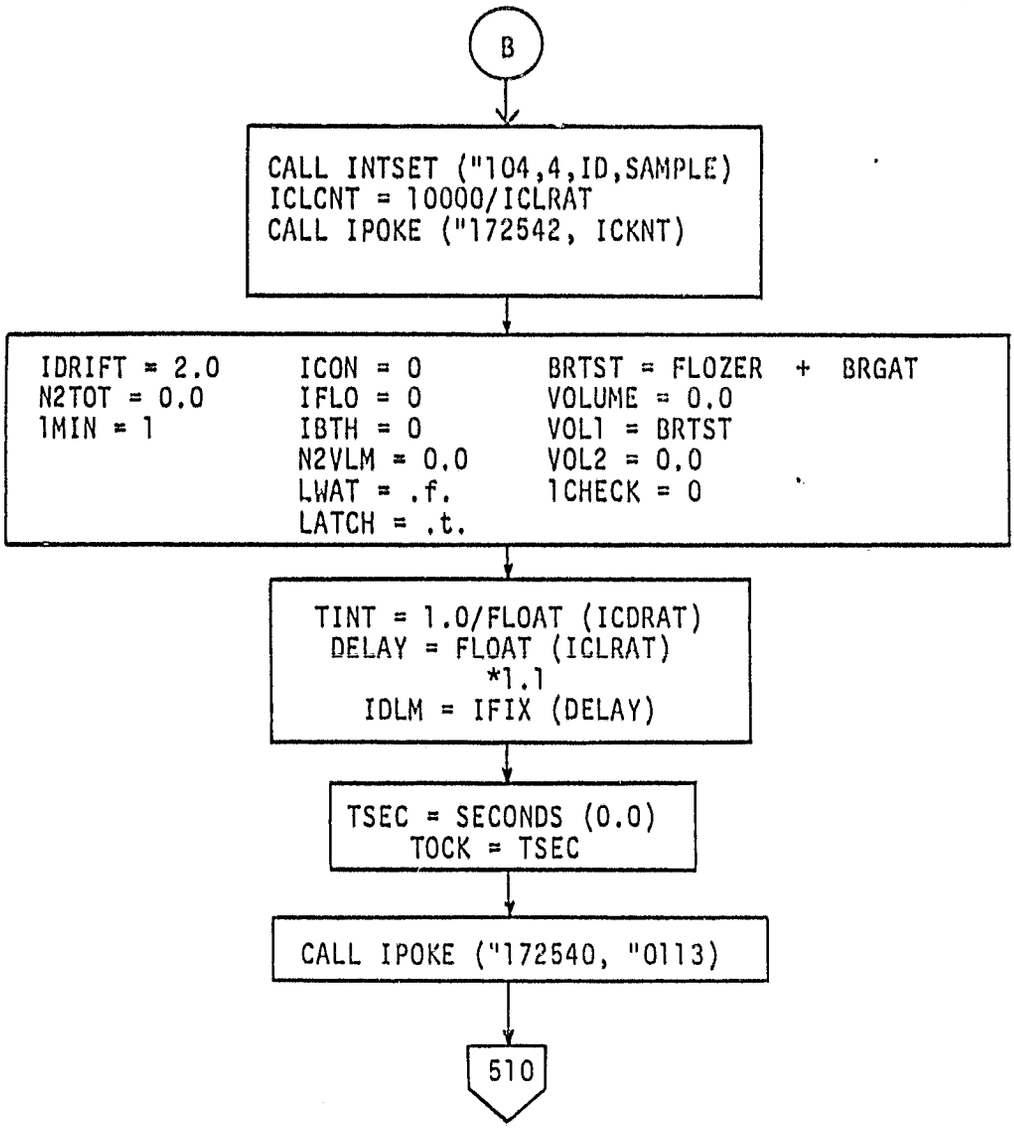
VALUE FOR HIGH CAL. VOLUME

GET SLOPE AND INTERCEPT

PRINT RESULTS

GET NEW PHASE ENTRY


500
Prompt For New Filename
Read New Filename
Open New File
Write Header Variables in New File
Print Instructions
Prompt for Stop or Go
Read Answer
Stop
Yes
560
No
B



ATTACH SUBROUTINE SAMPLE TO INTERRUPT

CALCULATE BUFFER COUNT FOR PROGRAM CLOCK

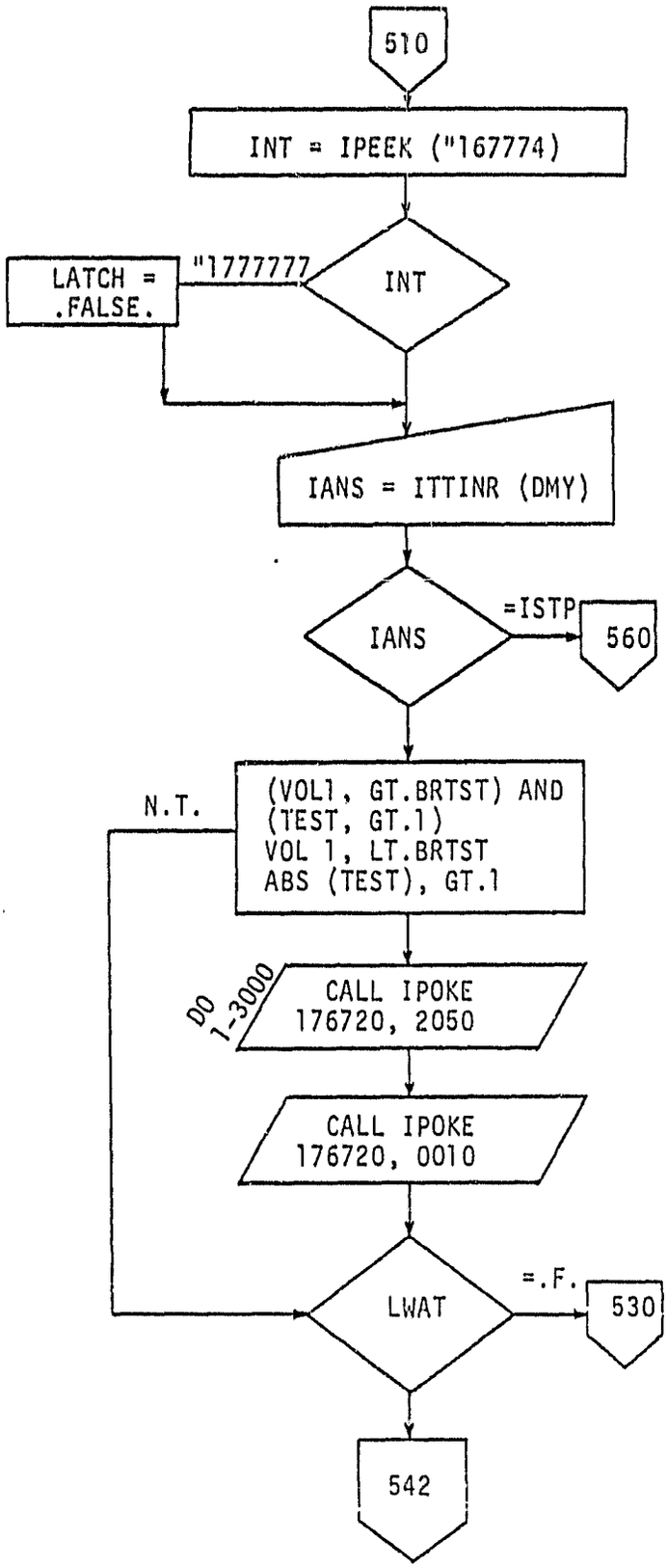
INITIALIZE SOME COUNTER'S AND LATCHES

CALCULATE INTEPRATING FACTOR

CALCULATE M.S. TRANSPORT LAG (=1.1 SEC'S) COUNTERS

INITIALIZE TIME TAG'S AND EXPERIMENT CLOCK

START CLOCK GENERATING INTERRUPTS



CHECK MASS SPEC. N2 RANGE

LOOK FOR KEYBOARD INPUT

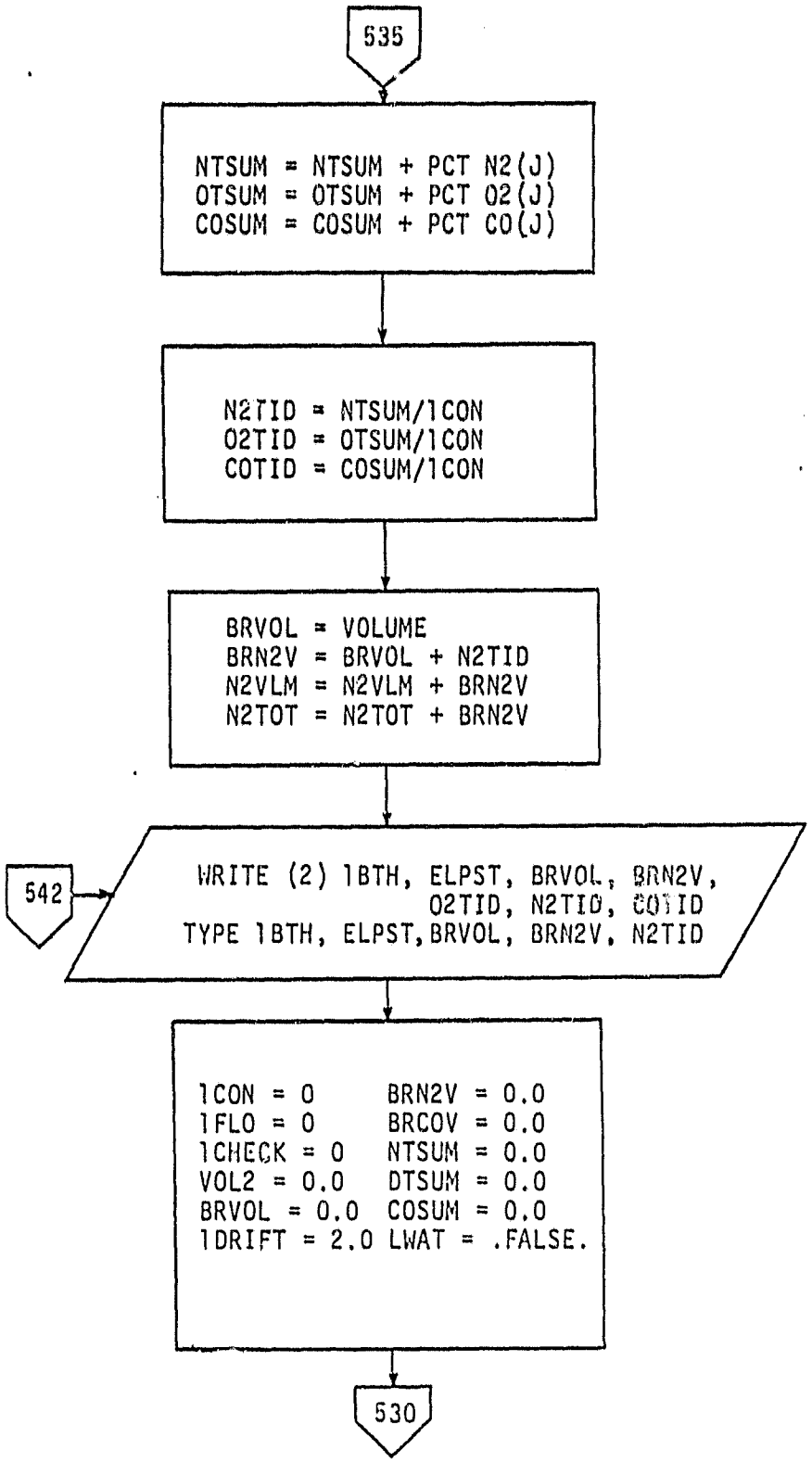
"S car set"

CHECK NEED TO PURGE SPIROMETER

PURGE SPIROMETER (OPEN DUMP)

CLOSE DUMP VALVE

IS DATA READY



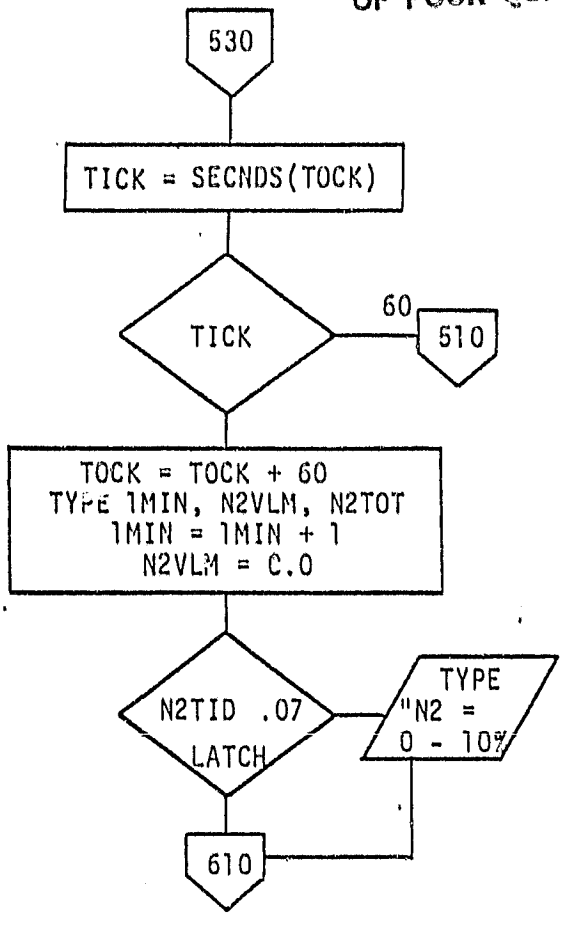
CALCULATE AVERAGE GAS CONCENTRATIONS IN EXPIRED BREATH

CALCULATE AVERAGE CONCENTRATIONS OF BREATH

GET BREATH VOLUME CALCULATE N2 VOLUME ADD MINUTE N2 VOLUME AND SUM TOTAL N2 VOLUME

WRITE DATA TO DISCS TYPE OUT SELECTED DATA TO TERMINAL

RESET COUNTERS AND LATCHES FOR NEXT BREATH

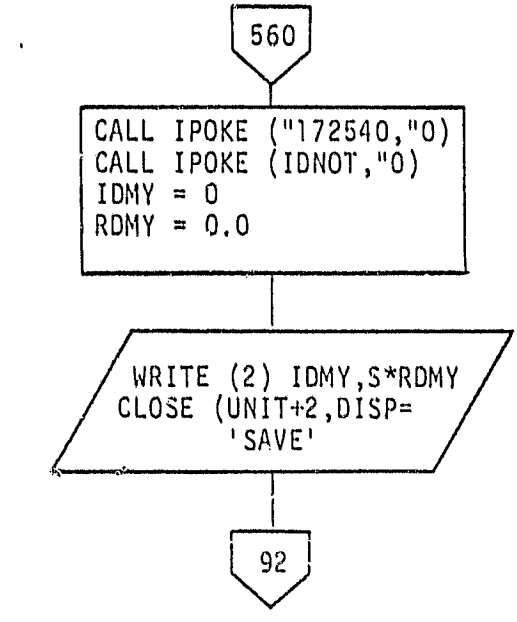


CHECK FOR 1 MINUTE OPERATION

TYPE 4 MINUTES, MINUTE N2 TOTAL N2 ON TERMINAL, INCREMENT MINUTE COUNTER

TYPE 1 MINUTE EXHALED N2 ON SCREEN

IF CONCENTRATION OF N2 10% TYPE OPER. MESSAGE



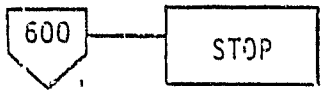
STOP REQUEST

STOP CLOCK SHUT VALVES ETC.

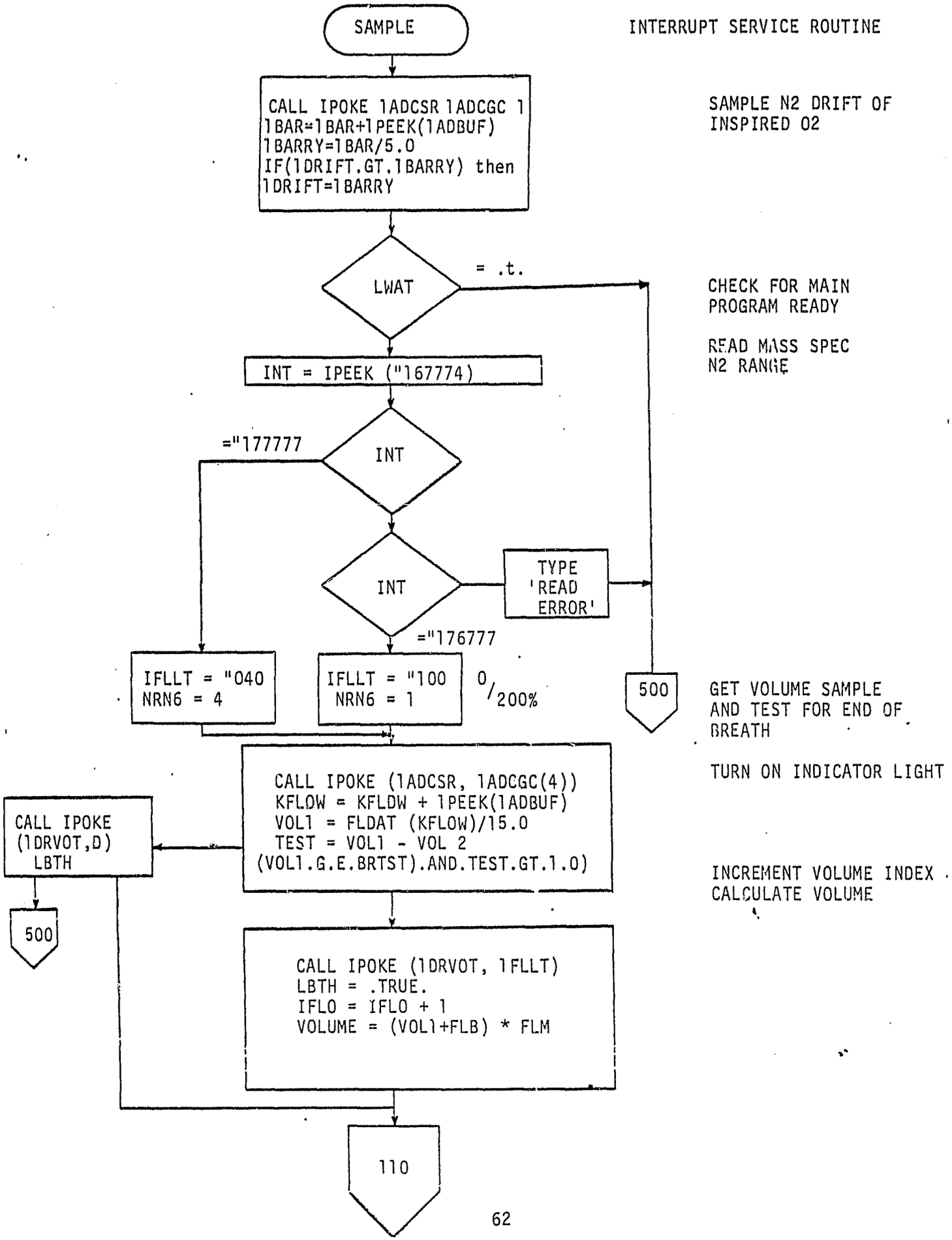
PREPARE 'END OF DATA TAG'

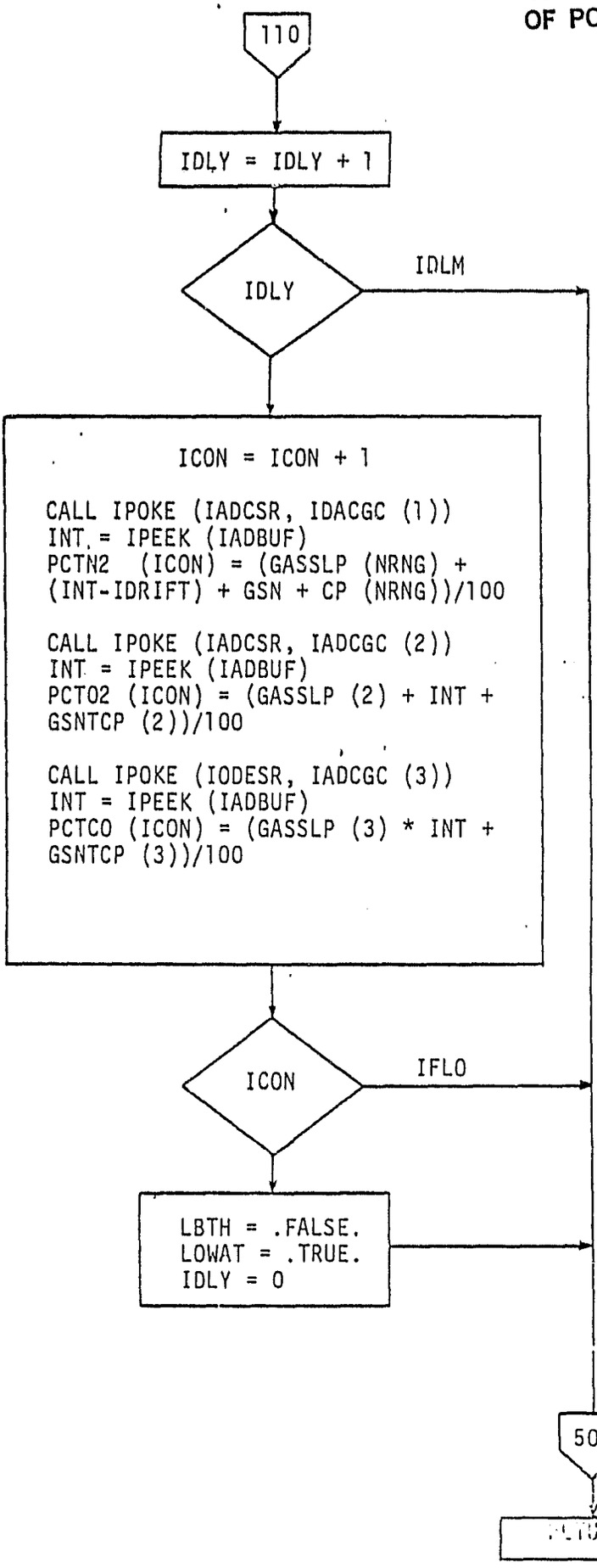
WRITE 'END OF DATA' TAG TO DISK, CLOSE FILE ACCEPT NEW PHASE

TYPE 'E-OF-PHASE'



RETURN CONTROL TO SYSTEM MON.





INCREMENT TRANSPORT DELAY COUNTER

IS DELAY COUNTER TRANSPORT LAG TIME

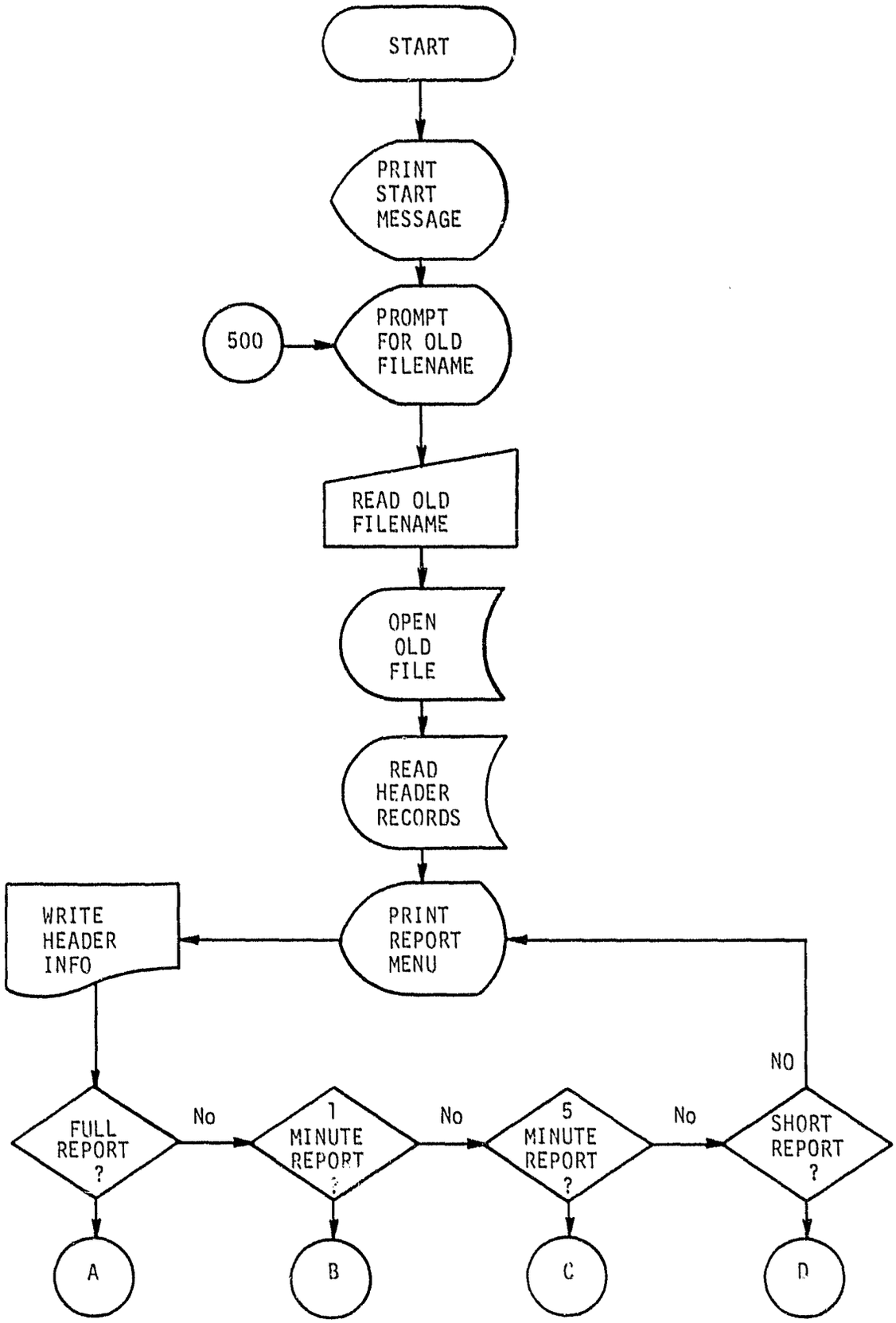
INCREMENT GAS CONCENTRATION INDEX

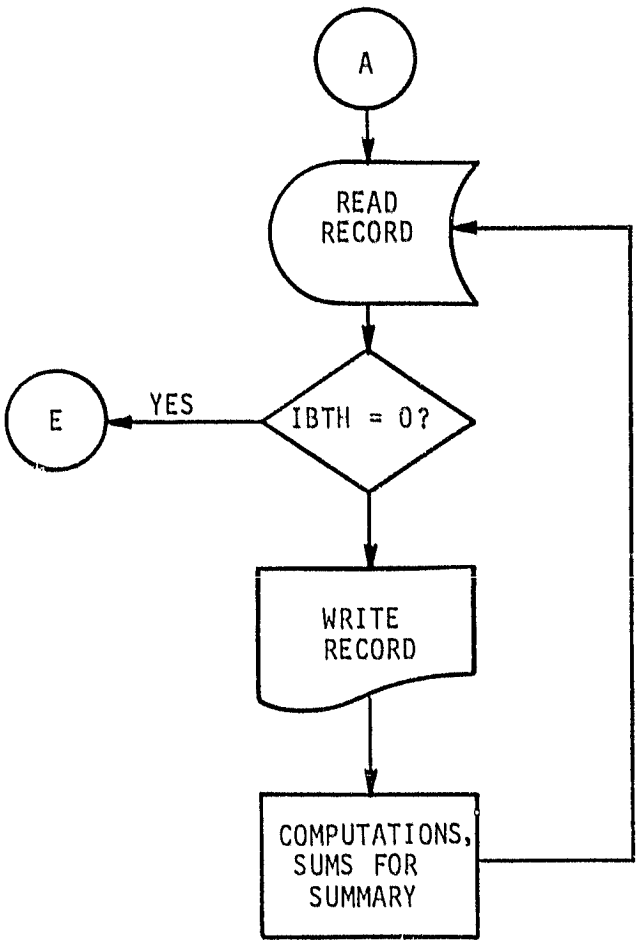
READ MASS SPE AND CALCULATE GAS CONCENTRATIONS FOR N2?O2. AND CO2.

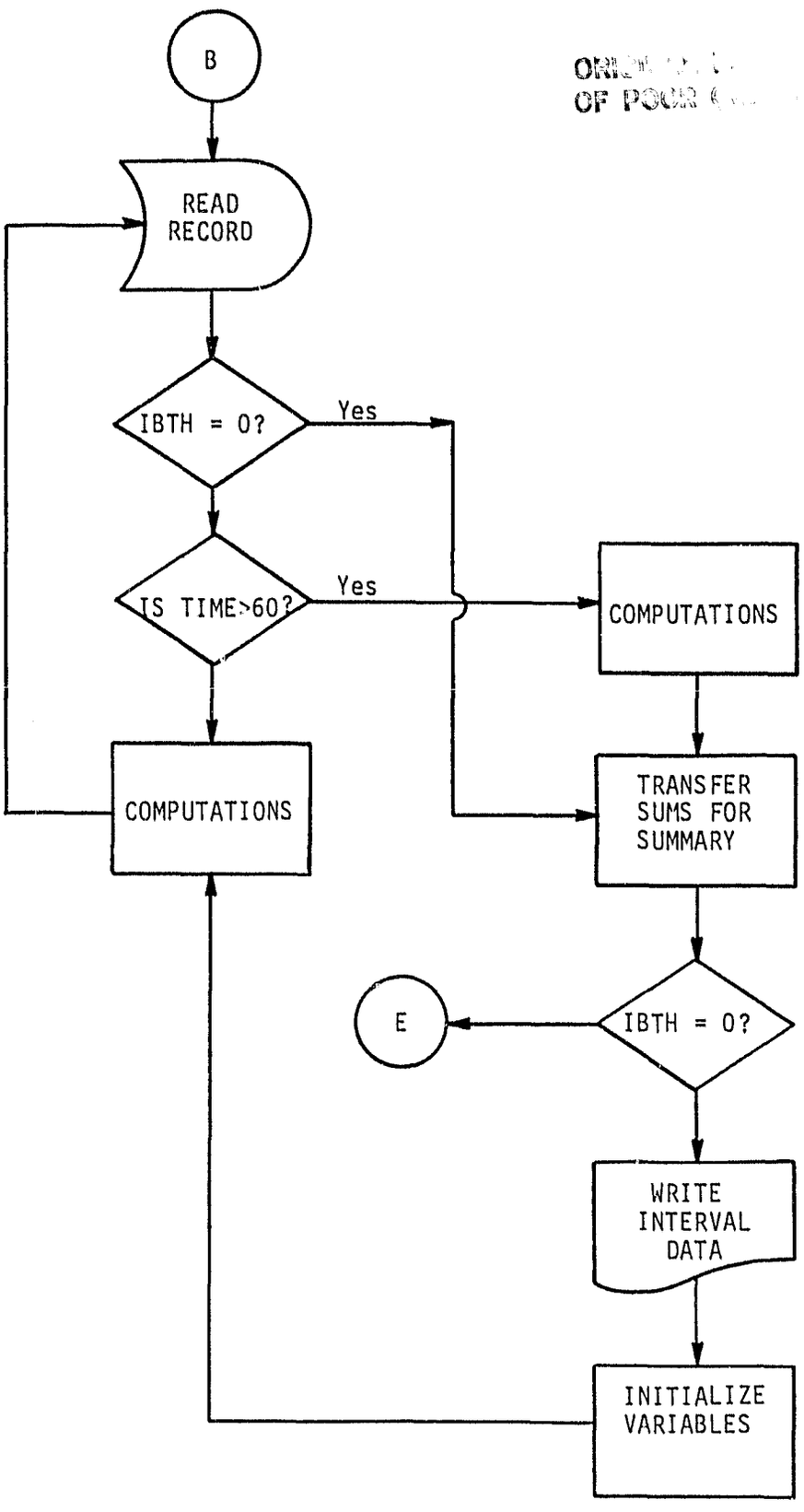
ARE INDEX'S EQUAL

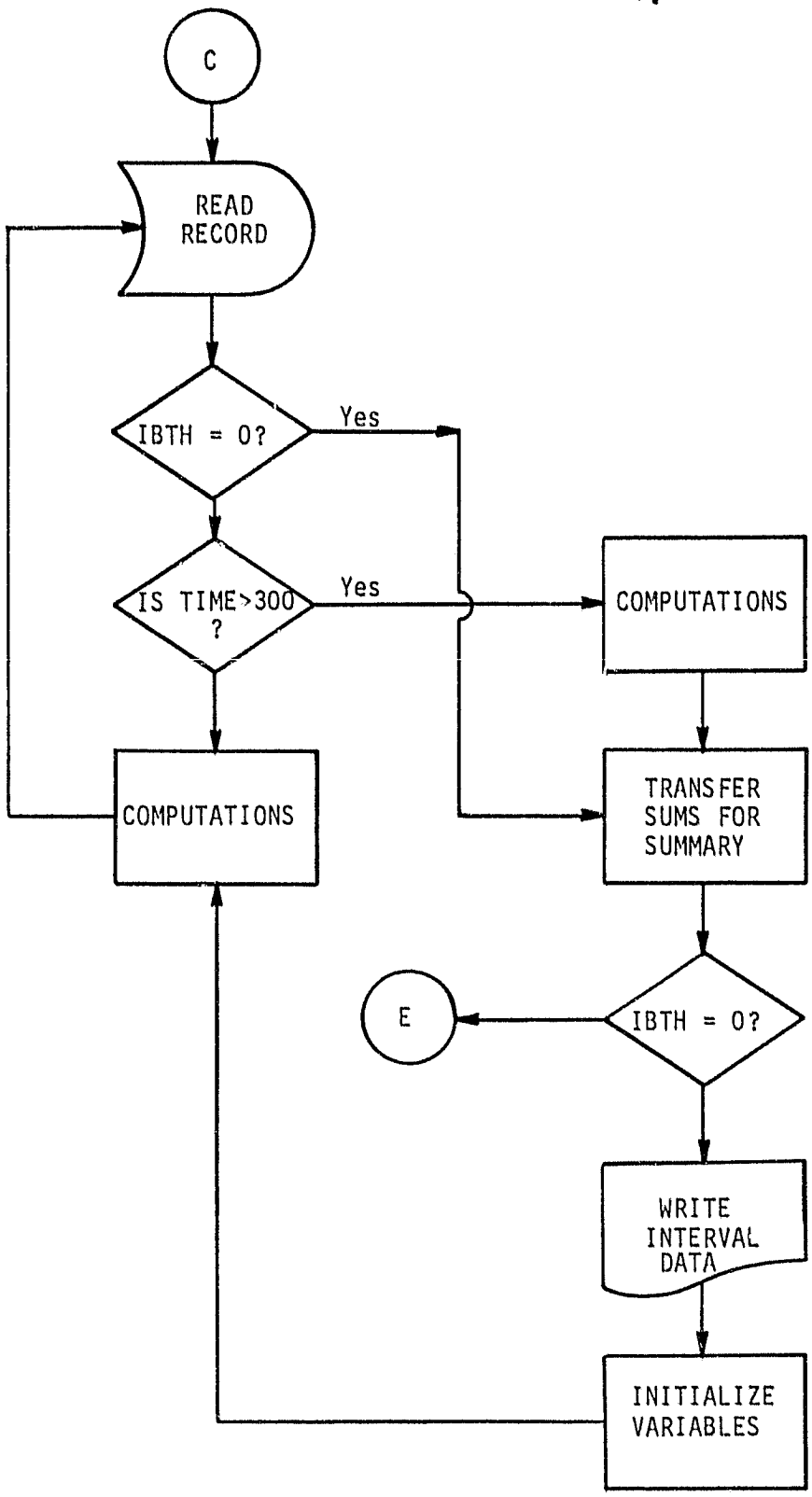
ALL DATA IS GATHERED: SET FLAG'S TO GIVE MAIN PROGRAM ANALYSIS CONTROL.

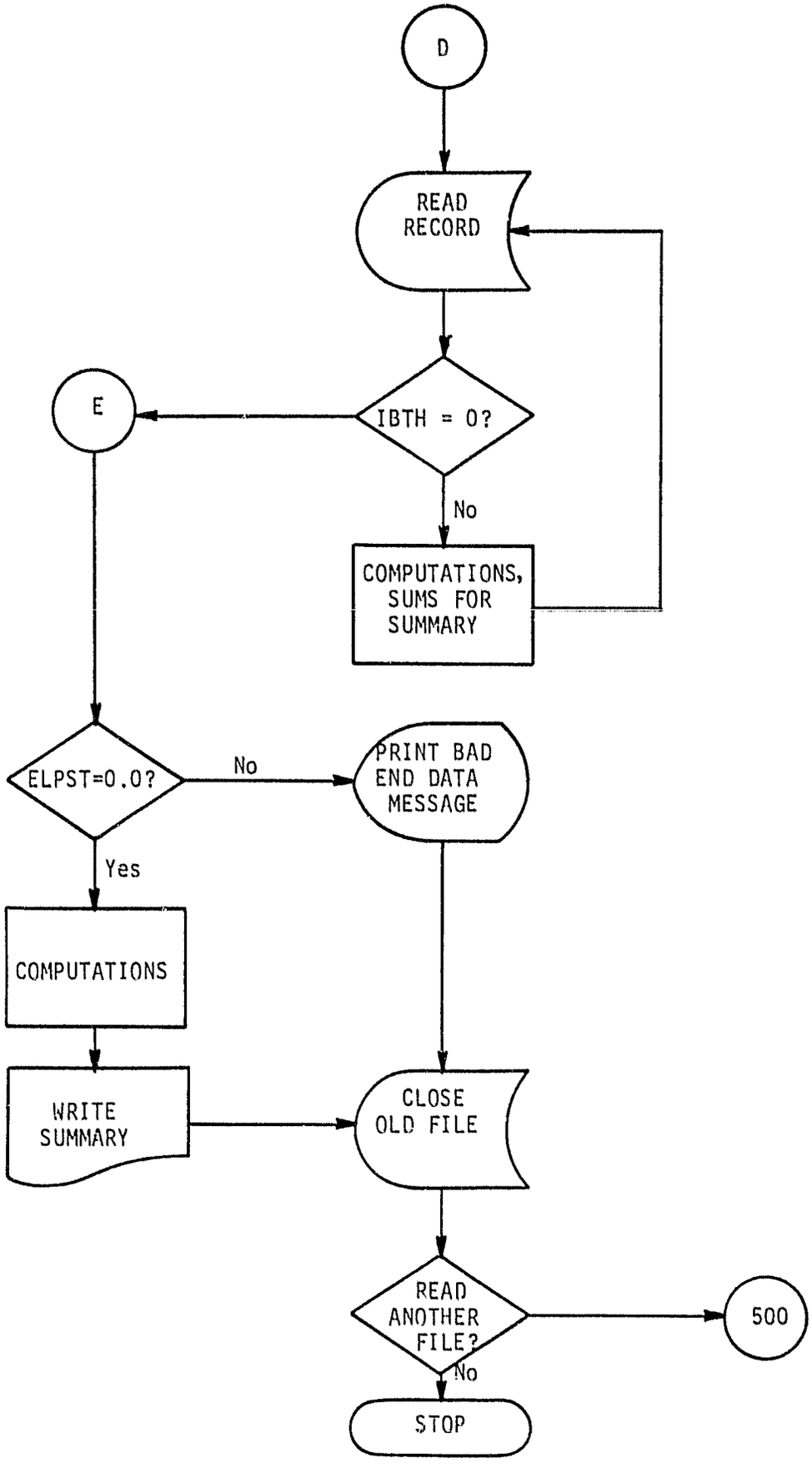
4.4 NITROGEN DATA PROGRAM



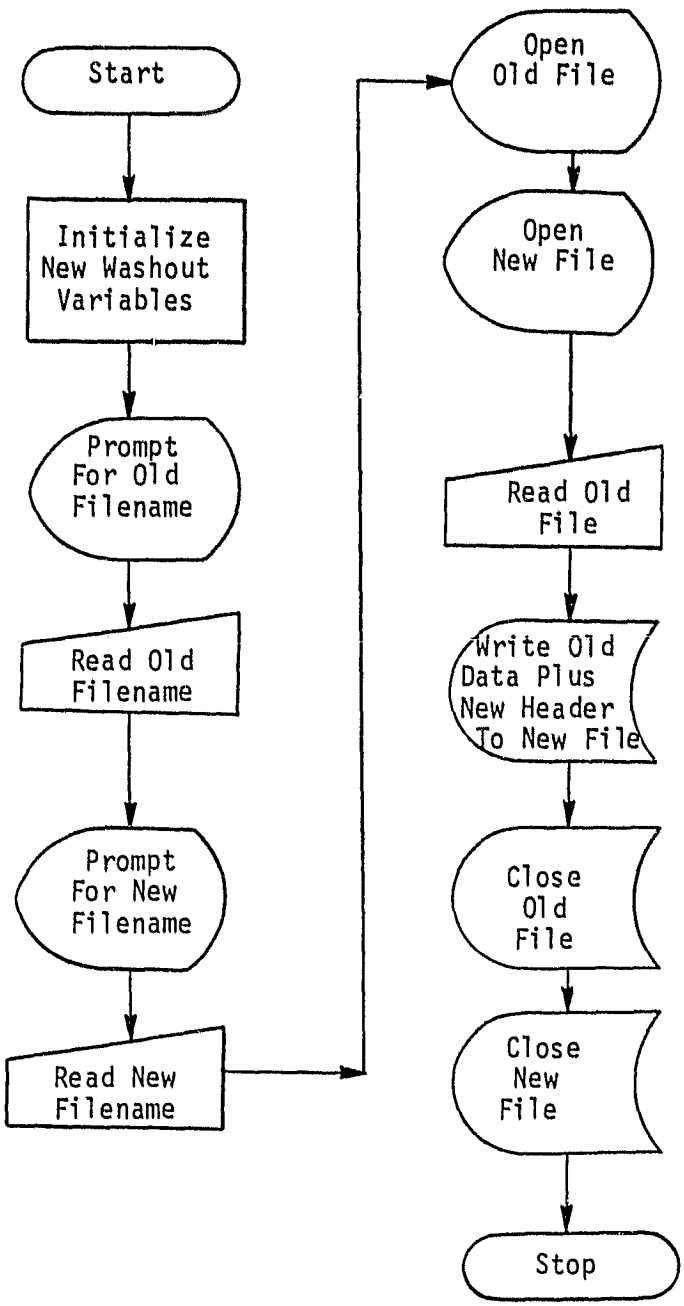



B
READ RECORD
IBTH = 0?
Yes
IS TIME>60?
Yes
COMPUTATIONS
COMPUTATIONS
TRANSFER SUMS FOR SUMMARY
E
IBTH = 0?
WRITE INTERVAL DATA
INITIALIZE VARIABLES





4.5 UPDATE PROGRAM



5.0 PROGRAM LISTINGS

5.1 PERSONAL DATA INPUT PROGRAM

```
C  ************************************************************************
C  ************************************************************************
C  *                                                                      *
C  *                                                                      *
C  *                    TECHNOLOGY INCORPORATED                           *
C  *                    LIFE SCIENCES DIVISION                            *
C  *              DEPARTMENT OF BIOMATHEMATICS SERVICES                   *
C  *                                                                      *
C  *                                                                      *
C  ************************************************************************
C  *                                                                      *
C  *                                                                      *
C  *     PROGRAM NAME:.....................PDINPT                         *
C  *     DESIGNER/ANALYST:.................CRAIG E. LITTON                *
C  *     PROGRAMMER:.......................PENNY BUEKER                   *
C  *     DATE:.............................31 DECEMBER 1981               *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *                                                                      *
C  *     COMPUTER SYSTEM:..................LSI-11                         *
C  *     OPERATING SYSTEM:.................RT-11v4                        *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *     COMPILING SEQUENCE:                                              *
C  *                                                                      *
C  *          LSI:  FORTRAN PDINPT                                        *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *     LINKING SEQUENCE:                                                *
C  *                                                                      *
C  *          LSI:  LINK PDINPT                                           *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *     EXECUTION SEQUENCE:  RUN PDINPT                                  *
C  *                                                                      *
C  *                                                                      *
C  ************************************************************************
C  ************************************************************************
```

```
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
0001        PROGRAM PDINPT
C
C                   TABLE OF VARIABLES
C
C
C     VARIABLE                  USE
C       AGE                   SUBJECT'S AGE
C       AVGBIC                AVERAGE OF BICEPS MEASUREMENTS
C       AVGMCL                AVERAGE OF MIDCLAVICULAR MEASUREMENTS
C       AVGMTH                AVERAGE OF MID THIGH MEASUREMENTS
C       AVGSUB                AVERAGE OF SUBSCAPULAR MEASUREMENTS
C       AVGSUP                AVERAGE OF SUPRAILIAC MEASUREMENTS
C       AVGTRI                AVERAGE OF TRICEPS MEASUREMENTS
C       AVGUMB                AVERAGE OF UMBILICUS MEASUREMENTS
C       AVSUM1                SUM OF AVERAGES OF BICEPS,
C                             TRICEPS, SUBSCAPULAR AND SUPRAILIAC
C       AVSUM2                SUM OF AVERAGES OF
C                             MIDCLAVICULAR, UMBILICUS AND MIDTHIGH
C       AVUWWT                AVERAGE OF UNDERWATER WEIGHT TRIALS
C       BDP1                  BODY DENSITY IN SKINFOLD PROCESS I
C       BDP2                  BODY DENSITY IN SKINFOLD PROCESS II
C       BDWI                  BODY DENSITY IN WATER IMMERSION PROCESS
C       BFKNOW                % BODY FAT IF KNOWN
C       BFPCT                 TEMPORARY FOR % BODY FAT
C       BSID1                 BODY SIDE USED IN SKINFOLD PROCESS I
C       BSID2                 BODY SIDE USED IN SKINFOLD PROCESS II
C       BVOLWI                BODY VOLUME IN WATER IMMERSION PROCESS
C       DEN                   BODY DENSITY IN NUTRITION JOURNAL FORMULA
C       HEIGHT                SUBJECT'S HEIGHT
C       J                     INDEX VARIABLE
C       K                     INDEX VARIABLE
C       KSP1                  DO SKINFOLD PROCESS I?
C       KSP2                  DO SKINFOLD PROCESS II?
C       KWI                   DO WATER IMMERSION PROCESS?
C       K1                    INTERMEDIATE VALUE
C       K2                    INTERMEDIATE VALUE
C       M                     INDEX VARIABLE
C       MEAS1                 NUMBER OF MEASUREMENTS MADE IN PROCESS I
C       MEAS2                 NUMBER OF MEASUREMENTS MADE IN PROCESS II
C       N                     INDEX VARIABLE
C       NC                    NUMBER OF CHARACTERS
C       NF                    NUMBER OF CHARACTERS
C       NUDEWT                SUBJECT'S WEIGHT
C       PCBFP1                % BODY FAT IN SKINFOLD PROCESS I
C       PCBFP2                % BODY FAT IN SKINFOLD PROCESS II
C       PCBFWI                % BODY FAT IN WATER IMMERSION PROCESS
C       PCF                   % BODY FAT IN NUTRTION JOURNAL FORMULA
C       PCFFM                 % FAT FREE MASS IN NUTRITION JOURNAL FORMULA
C       PCTBW                 % TOTAL BODY WATER , NUTRITION JOURNAL FORMULA
C       RESVOL                RESIDUAL VOLUME OF AIR IN LUNGS
C       SEX                   SUBJECT'S SEX
C       S1                    LOG OF AVSUM1
C       S2                    SQUARE OF AVSUM2
```

```
C       TEMP              TEMPORARY FOR SEX
C       TEMP1             TEMPORARY FOR BSID1
C       TEMP2             TEMPORARY FOR BSID2
C       TRIAL             NUMBER OF UNDER WATER WEIGHT TRIALS
C       UWCHWT            UNDER WATER CHAIR WEIGHT
C       VOL               BODY VOLUME IN NUTRITION JOURNAL FORMULA
C       WATERD            WATER DENSITY
C       WATERT            WATER TEMPERATURE
C       WATRWT            WATER WEIGHT
C
C
C
C     ARRAY                   USE
C       BICEP(3)          BICEPS SKINFOLD MEASUREMENT
C       BIRTHD(6)         DATE OF BIRTH
C       FATWT(4)          FAT WEIGHT
C       FFMASS(4)         FAT FREE MASS
C       FILENM(11)        SUBJECT'S IDENTIFICATION CODE
C       LBWM(4)           LEAN BODY WATER MASS
C       MEASDT(6)         DATE OF WATER IMMERSION PROCESS
C       MIDCLA(3)         MIDCLAVICULAR SKINFOLD MEASUREMENT
C       MTHIGH(3)         MID THIGH SKINFOLD MEASUREMENT
C       NITDEN(4)         NITROGEN/KG OF BODY WEIGHT
C       NITFAT(4)         NITROGEN IN TOTAL FAT TISSUE
C       NITLBW(4)         NITROGEN IN LEAN BODY WATER
C       PR1DT(6)          DATE OF SKINFOLD PROCESS I
C       PR2DT(6)          DATE OF SKINFOLD PROCESS II
C       SUBSCA(3)         SUBSCAPULAR SKINFOLD MEASUREMENT
C       SUPRAI(3)         SUPRAILIAC SKINFOLD MEASUREMENT
C       TBNIT(4)          TOTAL BODY NITROGEN
C       TRICEP(3)         TRICEPS SKINFOLD MEASUREMENT
C       UMBILI(3)         UMBILICUS SKINFOLD MEASUREMENT
C       UWWT(10)          UNDER WATER WEIGHT
C       VOLFAT(4)         VOLUME OF FAT
C       VOLLBW(4)         VOLUME OF LEAN BODY WATER
C
C
C
C          NITROGEN WASHOUT PERSONAL DATA INPUT PROGRAM
C
0002        LOGICAL*1 IDCODE(11), BIRTHD(8), SEX, DATE(8),
           1          KWI, MEASDT(8), KSP1, PR1DT(8),
           2          BSID2, KSP2, PR2DT(8), FILENM(31),
           3          BSID1
      C
0003        INTEGER*2 TRIAL, MEAS1, MEAS2, YORN, AGE
      C
0004        REAL*4    HEIGHT, BFKNOW, NUDEWT,
           1          WATERT, WATERD, RESVOL, MONTH,
           2          UWCHWT, UWWT(10), BICEP(3),
           3          TRICEP(3), SUBSCA(3), SUPRAI(3),
           4          MIDCLA(3), UMBILI(3), MTHIGH(3),
           5          FATWT(5), FFMASS(5), LBWM(5),
           6          VOLFAT(5), VOLLBW(5), NITFAT(5),
           7          NITLBW(5), TBNIT(5), NITDEN(5),BFPCT
```

```
      C
0005          REAL*8    TEMP, TEMP1, TEMP2
      C
      C
      C         PRINT START MESSAGE
      C
0006          WRITE(7,901)
      C
      C         GET DATA FILENAME
      C
0007     101  WRITE(7,902)
0008          READ(5,800, END=101) NF, (FILENM(J),J=1,NF)
0009          IF (NF.LE.0) GO TO 101
0011          FILENM (NF+1)=0
0012          OPEN(UNIT=1, NAME=FILENM, TYPE='NEW', ACCESS='SEQUENTIAL',
             1  FORM='FORMATTED', ERR=80, DISP='KEEP',
             2  CARRIAGECONTROL='FORTRAN')
0013          REWIND 1
0014          GO TO 90
0015      80  WRITE(7,936) (FILENM(J), J=1,NF)
0016          GO TO 101
      C
      C         GET DESCRIPTIVE INFORMATION
      C
0017      90  AGE=0
0018          SEX=' '
0019          HEIGHT=0.
0020          NUDEWT=0.
0021          BFKNOW=0.
0022          DO 91 J=1,11
0023      91  IDCODE(J)=' '
0024          DO 93 J=1,8
0025      93  BIRTHD(J)=' '
0026          DO 94 J=1,8
0027      94  DATE(J)=' '
0028     102  WRITE(7,903)
0029          READ(5,801, END=102) NC,(IDCODE(J),J=1,NC)
0030          IF(NC.NE.11) GO TO 102
0032     110  WRITE(7,924)
0033          READ(5,802, END=110) NC,(DATE(J),J=1,NC)
0034          IF(NC.NE.8) GO TO 110
0036     103  WRITE(7,904)
0037          READ(5,802, END=103) NC,(BIRTHD(J),J=1,NC)
0038          IF (NC.NE.8) GO TO 103
0040     104  WRITE(7,935)
0041          READ(5,*, END=104) AGE
0042     105  WRITE(7,905)
0043          READ(5,803, END=105) SEX
0044          IF (SEX.NE.'M'.AND.SEX.NE.'F') GO TO 105
0046          IF(SEX.EQ.'M') TEMP='MALE  '
0048          IF(SEX.EQ.'F') TEMP='FEMALE'
0050     106  WRITE(7,906)
0051          READ(5,*, END=106) HEIGHT
0052     202  WRITE(7,910)
0053          READ(5,*, END=202) NUDEWT
```

```
0054    107 WRITE(7,907)
0055        IF (YORN(0)) 200, 107, 108
0056    108 WRITE(7,908)
0057        READ(5,*, END=108) BFKNOW
0058    200 CONTINUE
0059        WATERT=0.
0060        WATERD=0.
0061        RESVOL=0.
0062        UWCHWT=0.
0063        TRIAL=0
0064        DO 230 N=1,10
0065    230 UWWT(N)=0.
0066        DO 210 J=1,8
0067    210 MEASDT(J)=' '
      C
      C          WATER IMMERSION
      C
0068    201 WRITE(7,909)
0069        KWI=YORN(0)
0070        IF (KWI) 300, 201, 203
0071    203 WRITE(7,911)
0072        READ(5,*, END=203) WATERT
0073    204 WRITE(7,912)
0074        READ(5,*, END=204) WATERD
0075    205 WRITE(7,913)
0076        READ(5,*, END=205) RESVOL
0077    206 WRITE(7,914)
0078        READ(5,*, END=206) UWCHWT
0079    207 WRITE(7,915)
0080        READ(5,*, END=207) TRIAL
0081        IF (TRIAL.LT.1.OR.TRIAL.GT.10) GO TO 207
0083        DO 220 N=1,TRIAL
0084    208 WRITE(7,916)N
0085        READ(5,*, END=208) UWWT(N)
0086    220 CONTINUE
0087    221 WRITE(7,917)
0088        READ(5,802, END=221) NC,(MEASDT(J),J=1,NC)
0089        IF(NC.NE.8)GO TO 221
0091    300 CONTINUE
0092        MEAS1=0
0093        BSID1=' '
0094        DO 330 N=1,3
0095        BICEP(N)=0.
0096        TRICEP(N)=0.
0097        SUBSCA(N)=0.
0098    330 SUPRAI(N)=0.
0099        DO 340 J=1,8
0100    340 PR1DT(J)=' '
      C
      C          SKINFOLD PROCESS I
      C
0101    301 WRITE(7,918)
0102        KSP1=YORN(0)
0103        IF (KSP1) 400, 301, 302
0104    302 WRITE(7,919)
```

```
0105         READ(5,803, END=302) BSID1
0106         IF(BSID1.NE.'R'.AND.BSID1.NE.'L') GO TO 302
0108         IF(BSID1.EQ.'R') TEMP1='RIGHT'
0110         IF(BSID1.EQ.'L') TEMP1='LEFT '
0112      303 WRITE(7,920)
0113         READ(5,*, END=303) MEAS1
0114         IF (MEAS1.LT.1.OR.MEAS1.GT.3) GO TO 303
0116         DO 305 N=1,MEAS1
0117      304 WRITE(7,921)N
0118         READ(5,*, END=304) BICEP(N)
0119      305 CONTINUE
0120         DO 307 N=1,MEAS1
0121      306 WRITE(7,923)N
0122         READ(5,*, END=306) TRICEP(N)
0123      307 CONTINUE
0124         DO 309 N=1,MEAS1
0125      308 WRITE(7,925)N
0126         READ(5,*, END=308) SUBSCA(N)
0127      309 CONTINUE
0128         DO 320 N=1,MEAS1
0129      310 WRITE(7,927)N
0130         READ(5,*, END=310) SUPRAI(N)
0131      320 CONTINUE
0132      321 WRITE(7,917)
0133         READ(5,802, END=321) NC,(PR1DT(J),J=1,NC)
0134         IF(NC.NE.8) GO TO 321
0136      400 CONTINUE
0137         MEAS2=0
0138         BSID2=' '
0139         DO 430 N=1,3
0140         MIDCLA(N)=0.
0141         UMBILI(N)=0.
0142      430 MTHIGH(N)=0.
0143         DO 440 J=1,8
0144      440 PR2DT(J)=' '
          C
          C          SKINFOLD PROCESS II
          C
0145      401 WRITE(7,928)
0146         KSP2=YORN(0)
0147         IF (KSP2) 500, 401, 402
0148      402 WRITE(7,919)
0149         READ(5,803, END=402) BSID2
0150         IF(BSID2.NE.'R'.AND.BSID2.NE.'L') GO TO 402
0152         IF(BSID2.EQ.'R') TEMP2='RIGHT'
0154         IF(BSID2.EQ.'L') TEMP2='LEFT '
0156      403 WRITE(7,920)
0157         READ(5,*, END=403)MEAS2
0158         IF (MEAS2.LT.1.OR.MEAS2.GT.3) GO TO 403
0160         DO 405 N=1,MEAS2
0161      404 WRITE(7,930)N
0162         READ(5,*, END=404) MIDCLA(N)
0163      405 CONTINUE
0164         DO 407 N=1,MEAS2
0165      406 WRITE(7,932)N
```

```
0166          READ(5,*, END=406) UMBILI(N)
0167      407 CONTINUE
0168          DO 409 N=1,MEAS2
0169      408 WRITE(7,934)N
0170          READ(5,*, END=408) MTHIGH(N)
0171      409 CONTINUE
0172      410 WRITE(7,917)
0173          READ(5,802, END=410) NC,(PR2DT(J),J=1,NC)
0174          IF(NC.NE.8) GO TO 410
0176      500 CONTINUE
          C
          C     COMPUTATION FORMULAE
          C
          C
          C     BODY COMPOSITION BY WATER IMMERSION
          C
0177          AVUWWT=0.
0178          WATRWT=0.
0179          BVOLWI=0.
0180          BDWI=0.
0181          PCBFWI=0.
0182          IF (KWI) 600,600,501
0183      501 DO 510 N=1,TRIAL
0184      510 AVUWWT=AVUWWT + UWWT(N)
0185          AVUWWT=AVUWWT/TRIAL
0186          WATRWT=AVUWWT - UWCHWT
0187          BVOLWI=((NUDEWT - WATRWT)/WATERD) -RESVOL
0188          BDWI=NUDEWT/BVOLWI
0189          PCBFWI=((4.95/BDWI) - 4.50)*100
          C
          C     BODY COMPOSITION BY SKINFOLD PROCESS 1
          C
0190      600 AVGBIC=0.
0191          AVGTRI=0.
0192          AVGSUB=0.
0193          AVGSUP=0.
0194          AVSUM1=0.
0195          S1=0.
0196          PCBFP1=0.
0197          BDP1=0.
0198          IF (KSP1) 700,700,601
0199      601 DO 603 N=1,MEAS1
0200      603 AVGBIC=AVGBIC + BICEP(N)
0201          AVGBIC=AVGBIC/MEAS1
0202          DO 605 N=1,MEAS1
0203      605 AVGTRI=AVGTRI + TRICEP(N)
0204          AVGTRI=AVGTRI/MEAS1
0205          DO 607 N=1,MEAS1
0206      607 AVGSUB=AVGSUB + SUBSCA(N)
0207          AVGSUB=AVGSUB/MEAS1
0208          DO 609 N=1,MEAS1
0209      609 AVGSUP=AVGSUP + SUPRAI(N)
0210          AVGSUP=AVGSUP/MEAS1
0211          AVSUM1=AVGBIC+AVGTRI+AVGSUB+AVGSUP
0212          S1=ALOG10(AVSUM1)
```

```
0213          IF (SEX.EQ.'M') BDP1=1.1610-.0632*S1
0215          IF (SEX.EQ.'F') BDP1=1.1581-.0720*S1
0217          PCBFP1=((4.95/BDP1)-4.50)*100
      C
      C       BODY COMPOSITION BY SKINFOLD PROCESS 2
      C
0218     700 AVGMCL=0.
0219          AVGUMB=0.
0220          AVGMTH=0.
0221          AVSUM2=0.
0222          S2=0.
0223          BDP2=0.
0224          PCBFP2=0.
0225          IF (KSP2) 1000,1000,701
0226     701 DO 703 N=1,MEAS2
0227     703 AVGMCL=AVGMCL+MIDCLA(N)
0228          AVGMCL=AVGMCL/MEAS2
0229          DO 705 N=1,MEAS2
0230     705 AVGUMB=AVGUMB+UMBILI(N)
0231          AVGUMB=AVGUMB/MEAS2
0232          DO 707 N=1,MEAS2
0233     707 AVGMTH=AVGMTH+MTHIGH(N)
0234          AVGMTH=AVGMTH/MEAS2
0235          AVSUM2=AVGMCL+AVGUMB+AVGMTH
0236          S2=AVSUM2*AVSUM2
0237          IF (SEX.EQ.'M') BDP2=1.10938-((8.267E-4)*AVSUM2)+((1.6E-6)*S2)-
             1  ((2.574E-4)*AGE)
0239          IF (SEX.EQ.'F') BDP2=1.105339-((1.1964E-3)*AVSUM2)+((3.8E-6)*S2)-
             1  ((1.069E-4)*AGE)
0241          PCBFP2=((4.95/BDP2)-4.50)*100
      C
      C       FORMULA ESTIMATION OF BODY CHARACTERISTICS FROM
      C     1  AMERICAN JOURNAL OF CLINICAL NUTRITION
      C
0242    1000 VOL=0.
0243          DEN=0.
0244          PCF=0.
0245          PCFFM=0.
0246          PCTBW=0.
0247          VOL=(1.015*NUDEWT)-4.937
0248          DEN=NUDEWT/VOL
0249          PCF=52.67-(2454.38/NUDEWT)
0250          PCFFM=100-PCF
0251          PCTBW=34.93+(1811.33/NUDEWT)
      C
      C       NITROGEN CONTENT CALCULATIONS
      C
0252    1101 DO 1900 N=1,5
0253          FATWT(N)=0.
0254          FFMASS(N)=0.
0255          LBWM(N)=0.
0256          VOLFAT(N)=0.
0257          VOLLBW(N)=0.
0258          NITFAT(N)=0.
0259          NITLBW(N)=0.
```

```
0260          TBNIT(N)=0.
0261          NITDEN(N)=0.
0262          BFPCT=0.
0263          IF(N.EQ.1.AND.BFKNOW.EQ.0.) GO TO 1900
0265          IF(N.EQ.2.AND.PCBFWI.EQ.0.) GO TO 1900
0267          IF(N.EQ.3.AND.PCBFP1.EQ.0.) GO TO 1900
0269          IF(N.EQ.4.AND.PCBFP2.EQ.0.) GO TO 1900
0271          IF(N.EQ.5.AND.PCF.EQ.0.) GO TO 1900
0273          IF(N.EQ.1) BFPCT=BFKNOW
0275          IF(N.EQ.2) BFPCT=PCBFWI
0277          IF(N.EQ.3) BFPCT=PCBFP1
0279          IF(N.EQ.4) BFPCT=PCBFP2
0281          IF(N.EQ.5) BFPCT=PCF
0283          FATWT(N)=BFPCT*NUDEWT/100.
0284          FFMASS(N)=NUDEWT-FATWT(N)
0285          LBWM(N)=FFMASS(N)*.72
0286          VOLFAT(N)=FATWT(N)/.90
0287          VOLLBW(N)=LBWM(N)/.9933
0288          NITFAT(N)=VOLFAT(N)*.067
0289          NITLBW(N)=VOLLBW(N)*.013
0290          TBNIT(N)=NITFAT(N)+NITLBW(N)
0291          NITDEN(N)=TBNIT(N)/NUDEWT
0292    1900  CONTINUE
0293          CALL LINE(0)
      C
      C       REPORT
      C
      C
      C       PERSONAL CHARACTERISTICS PROFILE
      C
0294    1901  WRITE(7,937)
0295          READ(5,804)
0296          WRITE(7,940)
0297          CALL LINE(5)
0298          WRITE(7,941) IDCODE,(FILENM(J),J=1,NF)
0299          CALL LINE(2)
0300          CALL SWAPDT(DATE,MONTH)
0301          WRITE(7,942) DATE(4),DATE(5),DATE(3),MONTH,
             1  DATE(6),DATE(7),DATE(8),TEMP,AGE
0302          CALL LINE(2)
0303          IF(BFKNOW.NE.0) GO TO 1920
0305          WRITE(7,943)HEIGHT
0306          CALL LINE(2)
0307          GO TO 1925
0308    1920  WRITE(7,944) HEIGHT,BFKNOW
0309          CALL LINE(2)
0310          CALL SWAPDT(BIRTHD,MONTH)
0311    1925  WRITE(7,938) NUDEWT,BIRTHD(4),BIRTHD(5),BIRTHD(3),
             1  MONTH,BIRTHD(6),BIRTHD(7),BIRTHD(8)
0312          CALL LINE(3)
      C
      C       WATER IMMERSION DATA
      C
0313    1930  IF  (KWI) 1931, 1931, 1932
0314    1931  WRITE(7,971)
```

```
0315          CALL LINE(5)
0316          GO TO 1945
0317    1932  CALL SWAPDT(MEASDT,MONTH)
0318          WRITE(7,945) NUDEWT,WATERT,RESVOL,WATERD,
             1  UWCHWT,MEASDT(4),MEASDT(5),MEASDT(3),MONTH,
             2  MEASDT(6),MEASDT(7),MEASDT(8)
0319          CALL LINE (12)
0320          WRITE(7,946) AVUWWT
0321          CALL LINE(4)
0322          N=(TRIAL+1)/2
0323          DO 1940 J=1,N
0324          K1=((J-1)*2)+1
0325          K2=K1+1
0326          IF(K2.LE.TRIAL) WRITE(7,947) K1,UWWT(K1),K2,UWWT(K2)
0328          IF(K2.GT.TRIAL) WRITE(7,947) K1,UWWT(K1)
0330          CALL LINE(2)
0331    1940  CONTINUE
0332          WRITE(7,948) WATRWT,BVOLWI,BDWI,PCBFWI
0333          CALL LINE(4)
0334    1945  CONTINUE
        C
        C       SKINFOLD PROCESS I DATA
        C
0335          IF (KSP1) 1946, 1946, 1947
0336    1946  CALL ESTIM(4)
0337          WRITE(7,972)
0338          CALL LINE(4)
0339          GO TO 1955
0340    1947  CALL ESTIM(14+(2*MEAS1))
0341          CALL SWAPDT(PR1DT,MONTH)
0342          WRITE(7,950) TEMP1, PR1DT(4),PR1DT(5),PR1DT(3),MONTH,
             1  PR1DT(6),PR1DT(7),PR1DT(8)
0343          CALL LINE(10)
0344          DO 1950 J=1,MEAS1
0345          WRITE(7,951) J, BICEP(J), TRICEP(J), SUBSCA(J),
             1  SUPRAI(J)
0346    1950  CALL LINE(2)
0347          WRITE(7,952) AVGBIC, AVGTRI, AVGSUB, AVGSUP
0348          CALL LINE(2)
0349          WRITE(7,953) BDP1, PCBFP1
0350          CALL LINE(2)
        C
        C       SKINFOLD PROCESS II DATA
        C
0351    1955  IF (KSP2) 1956, 1956, 1957
0352    1956  CALL ESTIM(4)
0353          WRITE(7,973)
0354          CALL LINE(4)
0355          GO TO 1965
0356    1957  CALL ESTIM(14+(MEAS2*2))
0357          CALL SWAPDT(PR2DT,MONTH)
0358          WRITE(7,954) TEMP2, PR2DT(4),PR2DT(5),PR2DT(3),MONTH,
             1  PR2DT(6),PR2DT(7),PR2DT(8)
0359          CALL LINE(10)
0360          DO 1960 J=1,MEAS2
```

```
0361          WRITE(7,955) J, MIDCLA(J), UMBILI(J), MTHIGH(J)
0362    1960  CALL LINE(2)
0363          WRITE(7,956) AVGMCL, AVGUMB, AVGMTH
0364          CALL LINE(2)
0365          WRITE(7,953) BDP2, PCBFP2
0366          CALL LINE(2)
      C
      C       NUTRITION JOURNAL FORMULA DATA
      C
0367    1965  CALL ESTIM(10)
0368          WRITE(7,960) VOL, DEN, PCF, PCFFM, PCTBW
0369          CALL LINE(10)
      C
      C       NITROGEN CONTENT DATA
      C
0370    1970  CALL ESTIM(32)
0371          WRITE(7,961)
0372          CALL LINE(7)
0373          WRITE(7,957) BFKNOW, PCBFWI, PCBFP1, PCBFP2, PCF
0374          CALL LINE(2)
0375          WRITE(7,962) (FATWT(K), K=1,5)
0376          CALL LINE(2)
0377          WRITE(7,963) (FFMASS(K), K=1,5)
0378          CALL LINE(2)
0379          WRITE(7,964) (LBWM(K), K=1,5)
0380          CALL LINE(3)
0381          WRITE(7,965) (VOLFAT(K), K=1,5)
0382          CALL LINE(2)
0383          WRITE(7,966) (VOLLBW(K), K=1,5)
0384          CALL LINE(3)
0385          WRITE(7,967) (NITFAT(K), K=1,5)
0386          CALL LINE(2)
0387          WRITE(7,968) (NITLBW(K), K=1,5)
0388          CALL LINE(3)
0389          WRITE(7,969) (TBNIT(K), K=1,5)
0390          CALL LINE(3)
0391          WRITE(7,970) (NITDEN(K), K=1,5)
0392          CALL LINE(3)
      C
      C       STORE DATA ON DATA FILE
      C
0393          WRITE(1,981) IDCODE, DATE, AGE, SEX, BIRTHD,
             1  HEIGHT, BFKNOW, NUDEWT
0394          WRITE(1,985) NUDEWT, RESVOL, BVOLWI, BDWI, PCBFWI
0395          WRITE(1,983) BDP1, PCBFP1
0396          WRITE(1,983) BDP2, PCBFP2
0397          WRITE(1,982) VOL, DEN, PCF, PCFFM, PCTBW
0398          DO 2000 M=1,5
0399          WRITE(1,984) FATWT(M), FFMASS(M), LBWM(M), VOLFAT(M),
             1  VOLLBW(M), NITFAT(M), NITLBW(M), TBNIT(M), NITDEN(M)
0400    2000  CONTINUE
0401          CLOSE(UNIT=1,DISPOSE='KEEP')
0402          CALL EXIT
0403     901  FORMAT(///10X,'NITROGEN WASHOUT PERSONAL DATA INPUT PROGRAM'///)
0404     902  FORMAT(10X,'FILENAME ON WHICH TO STORE DATA ',
```

```
     1  /10X,'DEVICE:FILENAME.TYPE = ',$)
0405  903 FORMAT(//1X,'IDENTIFICATION NUMBER OF ',
     1  'THE SUBJECT(XXX-XX-XXXX): ',$)
0406  924 FORMAT(/1X,'DATE (MM-DD-YY) : ',$)
0407  904 FORMAT(/1X,'DATE OF BIRTH (MM-DD-YY): ',$)
0408  905 FORMAT(/1X,'SEX (M/F): ',$)
0409  906 FORMAT(/1X,'HEIGHT IN CM: ',$)
0410  907 FORMAT(//1X,'IS % BODY FAT EXPLICITLY KNOWN (Y/N)? ',$)
0411  908 FORMAT(/1X,'ENTER % BODY FAT: ',$)
0412  909 FORMAT(//1X,'IS BODY COMPOSITION TO BE MEASURED BY WATER ',
     1  'IMMERSION (Y/N)? ',$)
0413  910 FORMAT(/1X,'NUDE WEIGHT IN KG: ',$)
0414  911 FORMAT(/3X,'WATER TEMPERATURE IN CENTIGRADE: ',$)
0415  912 FORMAT(/3X,'WATER DENSITY IN KG/L: ',$)
0416  913 FORMAT(/3X,'RESIDUAL VOLUME IN L: ',$)
0417  914 FORMAT(/3X,'WEIGHT OF UNDERWATER CHAIR IN KG: ',$)
0418  915 FORMAT(/3X,'ENTER THE NUMBER OF TRIALS FOR UNDERWATER ',
     1  'WEIGHT: ',$)
0419  916 FORMAT(/5X,'TRIAL ',I2,' UNDERWATER WEIGHT IN KG: ',$)
0420  917 FORMAT(/3X,'DATE OF MEASUREMENTS (MM-DD-YY): ',$)
0421  918 FORMAT(//1X,'IS BODY COMPOSITION TO BE MEASURED BY ',
     1  'SKINFOLD PROCESS I (Y/N)? ',$)
0422  919 FORMAT(/3X,'BODY SIDE USED (R/L)? ',$)
0423  920 FORMAT(/3X,'ENTER THE NUMBER OF MEASUREMENTS RECORDED: ',$)
0424  921 FORMAT(/5X,'MEASUREMENT ',I1,' BICEPS IN MM: ',$)
0425  923 FORMAT(/5X,'MEASUREMENT ',I1,' TRICEPS IN MM: ',$)
0426  925 FORMAT(/5X,'MEASUREMENT ',I1,' SUBSCAPULAR IN MM: ',$)
0427  927 FORMAT(/5X,'MEASUREMENT ',I1,' SUPRAILIAC IN MM: ',$)
0428  928 FORMAT(//1X,'IS BODY COMPOSITION TO BE MEASURED BY ',
     1  'SKINFOLD PROCESS II (Y/N)? ',$)
0429  930 FORMAT(/5X,'MEASUREMENT ',I1,' MIDCLAVICULAR IN MM: ',$)
0430  932 FORMAT(/5X,'MEASUREMENT ',I1,' UMBILICUS IN MM: ',$)
0431  934 FORMAT(/5X,'MEASUREMENT ',I1,' ANTERIOR MID-THIGH IN MM: ',$)
0432  999 FORMAT(1X)
0433  935 FORMAT(/1X,'AGE IN YEARS: ',$)
0434  936 FORMAT(/1X,'ERROR IN ENTERING FILENAME, FILENAME= ', 30A1)
0435  937 FORMAT(/1X,'ALIGN PAPER TO TOP OF PAGE AND HIT CARRIAGE ',
     1  'RETURN'/)
0436  940 FORMAT(/20X,'PERSONAL CHARACTERISTICS PROFILE'/)
0437  941 FORMAT(/2X,'SUBJECT',T11,11A1,T36,'DATA FILE',T52,30A1)
0438  942 FORMAT(/2X,'DATE',T11,3A1,A3,3A1,T36,A8,T52,'AGE',4X,I2)
0439  944 FORMAT(/2X,'HEIGHT',T11,F6.1,' CM',T36,'% BODY FAT',T51,F5.1,' %')
0440  943 FORMAT(/2X,'HEIGHT',T11,F6.1,' CM',T36,'% BODY FAT',
     1  T49,'UNKNOWN')
0441  938 FORMAT(/2X,'NUDE',
     1  /2X,'WEIGHT',T10,F7.1,' KG',T36,'DATE OF BIRTH',T52,
     2  3A1,A3,3A1)
0442  945 FORMAT(//T23,'BODY COMPOSITION EVALUATIONS',
     1  ///1X,22('-'),'  WATER IMMERSION PROCESS ',22('-'),
     2  //2X,'NUDE WEIGHT',T26,F7.2,' KG',T40,'WATER TEMPERATURE',T57,
     3  F6.2,' C',
     4  //2X,'RESIDUAL VOLUME',T26,F7.2,' L',T40,'WATER DENSITY',T57,
     5  F6.2,' KG/L',
     6  //2X,'UNDERWATER CHAIR WEIGHT',T26,F7.2,' KG',T40,'DATE',T58,
     7  3A1,A3,3A1)
```

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0443    946 FORMAT(/10X,'UNDERWATER WEIGHT (KG)',T41,
           1  'AVERAGE UNDERWATER WEIGHT =',F7.2,' KG',
           2  //10X,'TRIAL',T21,'WEIGHT (KG)',T41,'TRIAL',T51,'WEIGHT (KG)')
0444    947 FORMAT(/T13,I1,T19,F7.2,T43,I2,T49,F7.2)
0445    948 FORMAT(/2X,'WATER WEIGHT',T16,F7.2,' KG',T40,'BODY VOLUME',
           1  T53,F7.2,' L',
           2  //2X,'BODY DENSITY',T16,F8.3,' KG/L',T40,'% BODY FAT',
           3  T53,F7.2,' %')
0446    950 FORMAT(///1X,22('-'),'  SKINFOLD PROCESS I  ',22('-'),
           1  //2X,'BODY SIDE USED',2X,A5,T48,'DATE',2X,
           2  3A1,A3,3A1
           3  //2X,'TRIAL',T21,'MEASUREMENTS IN MM',
           4  //T11,'BICEPS',T25,'TRICEPS',T38,'SUBSCAPULAR',T54,
           5  'SUPRAILIAC')
0447    951 FORMAT(/T5,I1,T11,F5.2,T26,F5.2,T41,F5.2,T56,F5.2)
0448    952 FORMAT(/2X,'MEAN',T11,F5.2,T26,F5.2,T41,F5.2,T56,F5.2)
0449    953 FORMAT(/2X,'BODY DENSITY',T17,F7.3,' KG/L',T48,
           1  '% BODY FAT',T60,F7.2,' %')
0450    954 FORMAT(///1X,22('-'),'  SKINFOLD PROCESS II  ',22('-'),
           1  //2X,'BODY SIDE USED',2X,A5,T48,'DATE',2X,3A1,A3,3A1,
           2  //2X,'TRIAL',T21,'MEASUREMENTS IN MM',
           3  //T7,'MIDCLAVICULAR',T24,'UMBILICUS',T37,
           4  'ANTERIOR MID-THIGH')
0451    955 FORMAT(/T5,I1,T11,F5.2,T26,F5.2,T41,F5.2)
0452    956 FORMAT(/2X,'MEAN',T11,F5.2,T26,F5.2,T41,F5.2)
0453    957 FORMAT(/2X,'% BODY FAT',T26,F7.2,T38,F7.2,
           1  T49,F7.2,T60,F7.2,T72,F7.2)
0454    960 FORMAT(///1X,22('-'),'  NUTRITION JOURNAL FORMULA  ',
           1  22('-'),
           2  //2X,'BODY VOLUME',T23,F7.2,' L',T44,'BODY DENSITY',
           3  T60,F8.3,' KG/L',
           4  //2X,'% BODY FAT',T23,F7.2,' %',T44,'% FAT FREE MASS',
           5  T60,F7.2,' %',
           6  //2X,'% TOTAL BODY WATER',T23,F7.2,' %')
0455    961 FORMAT(///1X,22('-'),'  NITROGEN CONTENT DATA  ',32('-'),
           1  //T28,'KNOWN',T39,'WATER',T48,'SKINFOLD',T59,'SKINFOLD',T71,
           2  'NUTRITION',
           3  /T25,'% BODY FAT',T37,'IMMERSION',T48,'PROCESS I',
           4  T59,'PROCESS II',T72,'JOURNAL')
0456    962 FORMAT(/2X,'FAT WEIGHT (KG)',T26,F7.2,T38,F7.2,T49,F7.2,T60,F7.2,
           1  T72,F7.2)
0457    963 FORMAT(/2X,'FAT FREE MASS (KG)',T26,F7.2,T38,F7.2,T49,F7.2,T60,
           1  F7.2,T72,F7.2)
0458    964 FORMAT(/2X,'LEAN BODY',
           1  /2X,'WATER MASS (KG)',T26,F7.2,T38,F7.2,T49,F7.2,T60,
           2  F7.2,T72,F7.2)
0459    965 FORMAT(/2X,'VOLUME OF FAT (L)',T26,F7.2,T38,F7.2,T49,F7.2,T60,
           1  F7.2,T72,F7.2)
0460    966 FORMAT(/2X,'VOLUME LEAN',
           1  /2X,'BODY WATER (L)',T26,F7.2,T38,F7.2,T49,F7.2,T60,
           2  F7.2,T72,F7.2)
0461    967 FORMAT(/2X,'NITROGEN IN FAT (L)',T26,F8.3,T38,F8.3,T49,F8.3,T60,
           1  F8.3,T72,F8.3)
0462    968 FORMAT(/2X,'NITROGEN IN',
           1  /2X,'LEAN BODY WATER (L)',T26,F8.3,T38,F8.3,T49,F8.3,T60,
```

```
     2  F8.3,T72,F8.3)
0463  969 FORMAT(/2X,'TOTAL BODY',
     1  /2X,'NITROGEN (L)',T26,F8.3,T38,F8.3,T49,F8.3,T60,
     2  F8.3,T72,F8.3)
0464  970 FORMAT(/2X,'NITROGEN/KG',
     1  /2X,'BODY WEIGHT (L)',T26,F9.4,T38,F9.4,T49,F9.4,T60,F9.4,
     2  T72,F9.4)
0465  971 FORMAT(//T23,'BODY COMPOSITION EVALUATIONS',
     1 //1X,22('-'),'WATER IMMERSION PROCESS NOT DONE',22('-'))
0466  972 FORMAT(///1X,22('-'),'  SKINFOLD PROCESS I NOT DONE  ',22('-'))
0467  973 FORMAT(///1X,22('-'),'  SKINFOLD PROCESS II NOT DONE  ',22('-'))
0468  981 FORMAT(11A1,8A1,I2,A1,8A1,F6.1,F5.1,F7.2)
0469  982 FORMAT(F7.2,F7.3,F7.2,F7.2,F7.2)
0470  983 FORMAT(F7.3,F7.2)
0471  984 FORMAT(F7.2,F7.2,F7.2,F7.2,F7.2,F7.3,F7.3,F7.3,F7.4)
0472  985 FORMAT(F7.2,F7.2,F7.2,F7.3,F7.2)
0473  800 FORMAT(Q,30A1)
0474  801 FORMAT(Q,11A1)
0475  802 FORMAT(Q,8A1)
0476  803 FORMAT(A1)
0477  804 FORMAT(1X,
0478      END
```

```
      C
      C
FORTRAN IV                    Storage Map for Program Unit PDINPT
Local Variables, .PSECT $DATA, Size = 001326 (  363. words)

Name    Type  Offset     Name    Type  Offset     Name    Type  Offset

AGE     I*2   001040     AVGBIC  R*4   001172     AVGMCL  R*4   001232

AVGMTH  R*4   001242     AVGSUB  R*4   001202     AVGSUP  R*4   001206

AVGTRI  R*4   001176     AVGUMB  R*4   001236     AVSUM1  R*4   001212

AVSUM2  R*4   001246     AVUWW1  R*4   001146     BDP1    R*4   001226

BDP2    R*4   001256     BDWI    R*4   001162     BFKNOW  R*4   001046

BFPCT   R*4   001102     BSID1   L*1   001031     BSID2   L*1   001027

BVOLWI  R*4   001156     DEN     R*4   001272     HEIGHT  R*4   001042

J       I*2   001140     K       I*2   001316     KSP1    L*1   001026

KSP2    L*1   001030     KWI     L*1   001025     K1      I*2   001312

K2      I*2   001314     M       I*2   001320     MEAS1   I*2   001034

MEAS2   I*2   001036     MONTH   R*4   001072     N       I*2   001144

NC      I*2   001142     NF      I*2   001136     NUDEWT  R*4   001052

PCBFP1  R*4   001222     PCBFP2  R*4   001262     PCBFWI  R*4   001166

PCF     R*4   001276     PCFFM   R*4   001302     PCTBW   R*4   001306

RESVOL  R*4   001066     SEX     L*1   001024     S1      R*4   001216

S2      R*4   001252     TEMP    R*8   001106     TEMP1   R*8   001116

TEMP2   R*8   001126     TRIAL   I*2   001032     UWCHWT  R*4   001076

VOL     R*4   001266     WATERD  R*4   001062     WATERT  R*4   001056

WATRWT  R*4   001152

Local and COMMON Arrays:

Name      Type    Section Offset  ------Size------ Dimensions
BICEP     R*4     $DATA   000172  000014 (    6.) (3)
BIRTHD    L*1     $DATA   000013  000010 (    4.) (8)
DATE      L*1     $DATA   000023  000010 (    4.) (8)
FATWT     R*4     $DATA   000316  000024 (   10.) (5)
FFMASS    R*4     $DATA   000342  000024 (   10.) (5)
FILENM    L*1     $DATA   000063  000037 (   16.) (31)
IDCODE    L*1     $DATA   000000  000013 (    6.) (11)
```

LBWM	R*4	$DATA	000366	000024	(10.)	(5)
MEASDT	L*1	$DATA	000033	000010	(4.)	(8)
MIDCLA	R*4	$DATA	000252	000014	(6.)	(3)
MTHIGH	R*4	$DATA	000302	000014	(6.)	(3)
NITDEN	R*4	$DATA	000556	000024	(10.)	(5)
NITFAT	R*4	$DATA	000462	000024	(10.)	(5)
NITLBW	R*4	$DATA	000506	000024	(10.)	(5)
PR1DT	L*1	$DATA	000043	000010	(4.)	(8)
PR2DT	L*1	$DATA	000053	000010	(4.)	(8)
SUBSCA	R*4	$DATA	000222	000014	(6.)	(3)
SUPRAI	R*4	$DATA	000236	000014	(6.)	(3)
TBNIT	R*4	$DATA	000532	000024	(10.)	(5)
TRICEP	R*4	$DATA	000206	000014	(6.)	(3)
UMBILI	R*4	$DATA	000266	000014	(6.)	(3)
UWWT	R*4	$DATA	000122	000050	(20.)	(10)
VOLFAT	R*4	$DATA	000412	000024	(10.)	(5)
VOLLBW	R*4	$DATA	000436	000024	(10.)	(5)

FORTRAN IV Storage Map for Program Unit PDINPT
Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type
ALOG10	R*4	ESTIM	R*4	EXIT	R*4	LINE	I*2	SWAPDT	R*4
YORN	I*2								

```
0001          INTEGER FUNCTION YORN*2(K)
0002          LOGICAL*1 X
0003      801 FORMAT(A1)
0004      100 READ(5,801, END=200) X
0005          YORN=0
0006          IF (X.EQ.1HN.OR.X.EQ.1HN) YORN=-1
0008          IF (X.EQ.1HY.OR.X.EQ.1HY) YORN=1
0010          IF (YORN.EQ.0) GO TO 200
0012          RETURN
0013      200 WRITE(7,901)
0014      901 FORMAT(' PLEASE ANSWER Y OR N')
0015          GO TO 100
0016          END
        C
        C
FORTRAN IV                Storage Map for Program Unit YORN
Local Variables, .PSECT $DATA, Size = 000005 (    3. words)

Name    Type  Offset      Name    Type  Offset      Name    Type  Offset

K       I*2 @ 000000      X       L*1   000004      YORN    I*2   000002 Eqv
```

```
0001          SUBROUTINE LINE(N)
0002          COMMON/LCOUNT/LC
0003          IF (N.EQ.0) LC=0
0005          IF (N.NE.0) LC=LC+N
0007          RETURN
0008          END
      C
      C
FORTRAN IV                  Storage Map for Program Unit LINE
Local Variables, .PSECT $DATA, Size = 000002 (    1. words)

Name    Type  Offset     Name    Type  Offset     Name    Type  Offset

N       I*2 @ 000000


COMMON Block /LCOUNT/, Size = 000002 (    1. words)

Name    Type  Offset     Name    Type  Offset     Name    Type  Offset

LC      I*2   000000
```

```
0001          SUBROUTINE ESTIM(N)
0002          COMMON/LCOUNT/LC
0003          IF (N+LC.LT.51) RETURN
0005          ND=51-LC
0006          DO 100 I=1,ND
0007      100 WRITE(7,901)
0008      901 FORMAT(1X)
0009          LC=0
0010          RETURN
0011          END
```

FORTRAN IV Storage Map for Program Unit ESTIM

Local Variables, .PSECT $DATA, Size = 000006 (3. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
I	I*2	000004	N	I*2 @	000000	ND	I*2	000002

COMMON Block /LCOUNT/, Size = 000002 (1. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
LC	I*2	000000						

```
0001          SUBROUTINE SWAPDT(X,MONTH)
0002          LOGICAL*1 X(8)
0003          REAL*4 MONTH
0004          IF(X(1).EQ.'0'.AND.X(2).EQ.'1') MONTH='JAN'
0006          IF(X(1).EQ.'0'.AND.X(2).EQ.'2') MONTH='FEB'
0008          IF(X(1).EQ.'0'.AND.X(2).EQ.'3') MONTH='MAR'
0010          IF(X(1).EQ.'0'.AND.X(2).EQ.'4') MONTH='APR'
0012          IF(X(1).EQ.'0'.AND.X(2).EQ.'5') MONTH='MAY'
0014          IF(X(1).EQ.'0'.AND.X(2).EQ.'6') MONTH='JUN'
0016          IF(X(1).EQ.'0'.AND.X(2).EQ.'7') MONTH='JUL'
0018          IF(X(1).EQ.'0'.AND.X(2).EQ.'8') MONTH='AUG'
0020          IF(X(1).EQ.'0'.AND.X(2).EQ.'9') MONTH='SEP'
0022          IF(X(1).EQ.' '.AND.X(2).EQ.'1') MONTH='JAN'
0024          IF(X(1).EQ.' '.AND.X(2).EQ.'2') MONTH='FEB'
0026          IF(X(1).EQ.' '.AND.X(2).EQ.'3') MONTH='MAR'
0028          IF(X(1).EQ.' '.AND.X(2).EQ.'4') MONTH='APR'
0030          IF(X(1).EQ.' '.AND.X(2).EQ.'5') MONTH='MAY'
0032          IF(X(1).EQ.' '.AND.X(2).EQ.'6') MONTH='JUN'
0034          IF(X(1).EQ.' '.AND.X(2).EQ.'7') MONTH='JUL'
0036          IF(X(1).EQ.' '.AND.X(2).EQ.'8') MONTH='AUG'
0038          IF(X(1).EQ.' '.AND.X(2).EQ.'9') MONTH='SEP'
0040          IF(X(1).EQ.'1'.AND.X(2).EQ.'0') MONTH='OCT'
0042          IF(X(1).EQ.'1'.AND.X(2).EQ.'1') MONTH='NOV'
0044          IF(X(1).EQ.'1'.AND.X(2).EQ.'2') MONTH='DEC'
0046          RETURN
0047          END
FORTRAN IV                Storage Map for Program Unit SWAPDT
Local Variables, .PSECT $DATA, Size = 000004 (    2. words)

Name    Type  Offset      Name    Type  Offset      Name    Type  Offset

MONTH   R*4 @ 000002

Local and COMMON Arrays:

Name      Type    Section Offset  ------Size------ Dimensions
X         L*1     @ $DATA   000000  000010 (    4.) (8)
```


C-2

5.2 DECOMPRESSION DATA PROGRAM

```
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C  ************************************************************************
C  ************************************************************************
C  *                                                                      *
C  *                                                                      *
C  *                    TECHNOLOGY INCORPORATED                           *
C  *                    LIFE SCIENCES DIVISION                            *
C  *              DEPARTMENT OF BIOMATHEMATICS SERVICES                   *
C  *                                                                      *
C  *                                                                      *
C  ************************************************************************
C  *                                                                      *
C  *                                                                      *
C  *     PROGRAM NAME:.....................DECDAT                          *
C  *     DESIGNER/ANALYST:.................CRAIG E. LITTON                 *
C  *     PROGRAMMER:.......................PENNY BUEKER                    *
C  *     DATE:.............................31 JANUARY 1982                 *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *                                                                      *
C  *     COMPUTER SYSTEM:..................LSI-11                          *
C  *     OPERATING SYSTEM:.................RT-11v4                         *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *     COMPILING SEQUENCE:                                              *
C  *                                                                      *
C  *          LSI:  FORTRAN DECDAT                                        *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *     LINKING SEQUENCE:                                                *
C  *                                                                      *
C  *          LSI:  LINK DECDAT                                           *
C  *                                                                      *
C  *                                                                      *
C  *                                                                      *
C  *----------------------------------------------------------------------*
C  *                                                                      *
C  *     EXECUTION SEQUENCE:  RUN DECDAT                                  *
C  *                                                                      *
C  ************************************************************************
C  ************************************************************************
C
```

```
      CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
0001        PROGRAM DECDAT
            C
            C                TABLE OF VARIABLES
            C
            C       VARIABLE                USE
            C          BBG1OT          ONSET TIME OF GRADE 1 BUBBLES
            C          BBG2OT          ONSET TIME OF GRADE 2 BUBBLES
            C          BBG3OT          ONSET TIME OF GRADE 3 BUBBLES
            C          BBG4OT          ONSET TIME OF GRADE 4 BUBBLES
            C          BBG1RP          PRESSURE AT REMISSION OF GRADE 1 BUBBLES
            C          BBG2RP          PRESSURE AT REMISSION OF GRADE 2 BUBBLES
            C          BBG3RP          PRESSURE AT REMISSION OF GRADE 3 BUBBLES
            C          BBG4RP          PRESSURE AT REMISSION OF GRADE 4 BUBBLES
            C          BBG1RT          TIME OF REMISSION OF GRADE 1 BUBBLES
            C          BBG2RT          TIME OF REMISSION OF GRADE 2 BUBBLES
            C          BBG3RT          TIME OF REMISSION OF GRADE 3 BUBBLES
            C          BBG4RT          TIME OF REMISSION OF GRADE 4 BUBBLES
            C          BNG1OT          ONSET TIME OF GRADE 1 BENDS
            C          BNG2OT          ONSET TIME OF GRADE 2 BENDS
            C          BNG3OT          ONSET TIME OF GRADE 3 BENDS
            C          BNG4OT          ONSET TIME OF GRADE 4 BENDS
            C          BNG1RP          PRESSURE AT REMISSION OF GRADE 1 BENDS
            C          BNG2RP          PRESSURE AT REMISSION OF GRADE 2 BENDS
            C          BNG3RP          PRESSURE AT REMISSION OF GRADE 3 BENDS
            C          BNG4RP          PRESSURE AT REMISSION OF GRADE 4 BENDS
            C          BNG1RT          TIME OF REMISSION OF GRADE 1 BENDS
            C          BNG2RT          TIME OF REMISSION OF GRADE 2 BENDS
            C          BNG3RT          TIME OF REMISSION OF GRADE 3 BENDS
            C          BNG4RT          TIME OF REMISSION OF GRADE 4 BENDS
            C          BNDLC           LOCATION OF BENDS
            C          BNDPRS          ARE BENDS PRESENT (Y/N)?
            C          BUBMS           WERE BUBBLES MEASURED (Y/N)?
            C          BUBPRS          WERE BUBBLES PRESENT (Y/N)?
            C          DR180           DECOMPRESSION RATIO AT 180 MIN
            C          DR240           DECOMPRESSION RATIO AT 240 MIN
            C          DR360           DECOMPRESSION RATIO AT 360 MIN
            C          DURPH           DURATION OF PHASE I
            C          EXERLV          EXERCISE LEVEL
            C          FP              FINAL PRESSURE
            C          IDCODE          SUBJECT IDENTIFICATION CODE
            C          IPN2            INITIAL PRESSURE OF N2
            C          NPH             NUMBER OF PHASES
            C          PN2PH           PRESSURE OF N2 DURING WASHOUT PHASE I
            C          PPT180          TISSUE N2 (PSI) AT FINAL DECOMPRESSION 180 MIN
            C          PPT240          TISSUE N2 (PSI) AT FINAL DECOMPRESSION 240 MIN
            C          PPT360          TISSUE N2 (PSI) AT FINAL DECOMPRESSION 360 MIN
            C          TEMP            TEMPERATURE IN DEGREES CENTIGRADE
            C          TESTDT          TEST DATE
            C          TESTNO          TEST NUMBER
            C          TIMFD           TIME OF FINAL DECOMPRESSION
            C          TIMR            TIME OF RECOMPRESSION
            C
            C
            C          DECOMPRESSION EXPERIENCE DATA PROGRAM
```

```
      C
0002        LOGICAL*1 IDCODE(11), TESTDT(8), TIMFD(5), TIMR(5), EXERLV,
           1          BBG10T(5), BBG20T(5), BBG3CT(5), BUBMS, BUBPRS,
           2          BBG1RT(5), BBG2RT(5), BBG3RT(5), BBG4RT(5),
           3          BNG10T(5), BNG20T(5), BNG30T(5), BNG40T(5),
           4          BNG1RT(5), BNG2RT(5), BNG3RT(5), BNG4RT(5),
           5          BNDPRS, BNDLC(15), BBG40T(5), FILENM(31)
      C
0003        INTEGER*2 TESTNO, TEMP, DURPH(10), YORN, NPH
      C
0004        REAL*4    IPN2, PN2PH(10), FP, MONTH,
           1          BBG1RP, BBG2RP, BBG3RP, BBG4RP,
           2          BNG1RP, BNG2RP, BNG3RP, BNG4RP,
           5          PPT180,PPT240,PPT360,
           5          DR180, DR240, DR360
      C
      C
      C          PRINT START MESSAGE
      C
      C
0005    100 WRITE(7,900)
      C
      C          GET DATA FILE NAME
      C
      C
0006     50 WRITE(7,901)
0007        READ(5,805, END=50) NF, (FILENM(J),J=1,NF)
0008        IF (NF.LE.0) GO TO 50
0010        FILENM (NF+1)=0
0011        OPEN(UNIT=1, NAME=FILENM, TYPE='NEW', ACCESS='SEQUENTIAL',
           1  FORM='FORMATTED', ERR=80, DISP='KEEP',
           2  CARRIAGECONTROL='FORTRAN')
0012        REWIND 1
0013        GO TO 102
0014     80 WRITE(7,905) (FILENM(J), J=1,NF)
0015        GO TO 50
      C          TEST IDENTIFICATION
      C
0016    102 WRITE(7,902)
0017        READ(5,800,END=102) NC, (IDCODE(J),J=1,NC)
0018        IF(NC.NE.11) GO TO 102
0020    103 WRITE(7,903)
0021        READ(5,*,END=103) TESTNO
0022    104 WRITE(7,904)
0023        READ(5,801, END=104) NC, (TESTDT(J),J=1,NC)
0024        IF (NC.NE.8) GO TO 104
      C
      C          N2 WASHOUT
      C
0026        DO 112 I=1,10
0027        PN2PH(I)=0.
0028    112 DURPH(I)=0
0029    105 WRITE(7,911)
0030        READ(5,*,END=105) NPH
0031    106 WRITE(7,906)
```

```
0032          READ(5,*,END=106) IPN2
0033          DO 111 I=1,NPH
0034      108 WRITE(7,907)
0035          READ(5,*,END=108) PN2PH(I)
0036      110 WRITE(7,908)
0037      111 READ(5,*,END=110) DURPH(I)
          C
          C          CHAMBER RUN
          C
0038      116 WRITE(7,912)
0039          READ(5,*,END=116) FP
0040      118 WRITE(7,913)
0041          READ(5,*,END=118) TEMP
0042      120 WRITE(7,914)
0043          READ(5,802,END=120) NC, (TIMFD(J),J=1,NC)
0044          IF(NC.NE.5) GO TO 120
0046      122 WRITE(7,915)
0047          READ(5,802,END=122) NC, (TIMR(J),J=1,NC)
0048          IF(NC.NE.5) GO TO 122
0050      124 WRITE(7,916)
0051          READ(5,803,END=124) EXERLV
0052          IF(EXERLV.NE.'L'.AND.EXERLV.NE.'M'.AND.EXERLV.NE.'H')GO TO 124
          C
          C          SYMPTOMS
          C
0054          BUBMS=0
0055          BUBPRS=0
0056          DO 125 J=1,5
0057          BBG10T(J)=' '
0058          BBG20T(J)=' '
0059          BBG30T(J)=' '
0060          BBG40T(J)=' '
0061          BBG1RT(J)=' '
0062          BBG2RT(J)=' '
0063          BBG3RT(J)=' '
0064      125 BBG4RT(J)=' '
0065          BBG1RP=0.
0066          BBG2RP=0.
0067          BBG3RP=0.
0068          BBG4RP=0.
0069      126 WRITE(7,918)
0070          BUBMS=YORN(0)
0071          IF (BUBMS) 160, 126, 128
0072      128 WRITE(7,919)
0073          BUBPRS=YORN(0)
0074          IF (BUBPRS) 160, 128, 130
0075      130 WRITE(7,920)
0076      132 WRITE(7,921)
0077          READ(5,802,END=132) NC, (BBG10T(J),J=1,NC)
0078          IF(NC.LE.0) GO TO 132
0080      134 WRITE(7,922)
0081          READ(5,802,END=134) NC, (BBG20T(J),J=1,NC)
0082          IF(NC.LE.0) GO TO 134
0084      136 WRITE(7,923)
0085          READ(5,802,END=136) NC, (BBG30T(J),J=1,NC)
```

```
0086          IF(NC.LE.0) GO TO 136
0088      138 WRITE(7,924)
0089          READ(5,802,END=138) NC, (BBG40T(J),J=1,NC)
0090          IF(NC.LE.0) GO TO 138
0092      140 WRITE(7,920)
0093      142 WRITE(7,925)
0094          READ(5,802,END=142) NC, (BBG1RT(J),J=1,NC)
0095          IF(NC.LE.0) GO TO 142
0097      144 WRITE(7,926)
0098          READ(5,802,END=144) NC, (BBG2RT(J),J=1,NC)
0099          IF(NC.LE.0) GO TO 144
0101      146 WRITE(7,927)
0102          READ(5,802,END=146) NC, (BBG3RT(J),J=1,NC)
0103          IF(NC.LE.0) GO TO 146
0105      148 WRITE(7,928)
0106          READ(5,802,END=148) NC, (BBG4RT(J),J=1,NC)
0107          IF(NC.LE.0) GO TO 148
0109      150 WRITE(7,920)
0110      152 WRITE(7,929)
0111          READ(5,*,END=152) BBG1RP
0112      154 WRITE(7,930)
0113          READ(5,*,END=154) BBG2RP
0114      156 WRITE(7,931)
0115          READ(5,*,END=156) BBG3RP
0116      158 WRITE(7,932)
0117          READ(5,*,END=158) BBG4RP
0118      160 BNDPRS=0
0119          DO 162 J=1,15
0120      162 BNDLC(J)=' '
0121          DO 165 J=1,5
0122          BNG10T(J)=' '
0123          BNG20T(J)=' '
0124          BNG30T(J)=' '
0125          BNG40T(J)=' '
0126          BNG1RT(J)=' '
0127          BNG2RT(J)=' '
0128          BNG3RT(J)=' '
0129      165 BNG4RT(J)=' '
0130          BNG1RP=0.
0131          BNG2RP=0.
0132          BNG3RP=0.
0133          BNG4RP=0.
0134      161 WRITE(7,933)
0135          BNDPRS=YORN(0)
0136          IF (BNDPRS) 194, 161, 163
0137      163 WRITE(7,935)
0138          READ(5,804,END=163) NC,(BNDLC(J),J=1,NC)
0139          IF(NC.LE.0) GO TO 163
0141      164 WRITE(7,934)
0142      166 WRITE(7,921)
0143          READ(5,802,END=166) NC, (BNG10T(J),J=1,NC)
0144          IF(NC.LE.0) GO TO 166
0146      168 WRITE(7,922)
0147          READ(5,802,END=168) NC, (BNG20T(J),J=1,NC)
0148          IF(NC.LE.0) GO TO 168
```

```
0150     170 WRITE(7,923)
0151         READ(5,802,END=170) NC, (BNG3OT(J),J=1,NC)
0152         IF(NC.LE.0) GO TO 170
0154     172 WRITE(7,924)
0155         READ(5,802,END=172) NC, (BNG4OT(J),J=1,NC)
0156         IF(NC.LE.0) GO TO 172
0158     174 WRITE(7,934)
0159     175 WRITE(7,925)
0160         READ(5,802,END=176) NC, (BNG1RT(J),J=1,NC)
0161         IF(NC.LE.0) GO TO 176
0163     178 WRITE(7,926)
0164         READ(5,802,END=178) NC, (BNG2RT(J),J=1,NC)
0165         IF(NC.LE.0) GO TO 178
0167     180 WRITE(7,927)
0168         READ(5,802,END=180) NC, (BNG3RT(J),J=1,NC)
0169         IF(NC.LE.0) GO TO 180
0171     182 WRITE(7,928)
0172         READ(5,802,END=182) NC, (BNG4RT(J),J=1,NC)
0173         IF(NC.LE.0) GO TO 182
0175     184 WRITE(7,934)
0176     186 WRITE(7,929)
0177         READ(5,*,END=186) BNG1RP
0178     188 WRITE(7,930)
0179         READ(5,*,END=188) BNG2RP
0180     190 WRITE(7,931)
0181         READ(5,*,END=190) BNG3RP
0182     192 WRITE(7,932)
0183         READ(5,*,END=192) BNG4RP
0184     194 CONTINUE
         C
         C          CALCULATIONS
         C
0185         CALL  DECRAT (IPN2, NPH,
            1  PN2PH, DURPH, FP,
            2  PPT180, PPT240, PPT360, DR180,
            3  DR240, DR360)
         C
         C     REPORT
         C
         C     DECOMPRESSION DATA OUTPUT
         C
0186         WRITE(7,937)
0187         READ(5,806)
0188         CALL SWAPDT(TESTDT,MONTH)
0189     200 WRITE(7,940) IDCODE,TESTDT(4),TESTDT(5),TESTDT(3),
            1  MONTH,TESTDT(6),TESTDT(7),TESTDT(8)
0190     202 WRITE(7,941)PPT180, PPT240, PPT360
0191     204 WRITE(7,942)DR180, DR240, DR360
         C
         C          STORE DATA ON FILE
         C
0192         WRITE(1,981) IDCODE, TESTNO, TESTDT, NPH, IPN2,
            1  FP, TEMP, TIMFD, TIMR, EXERLV, BUBMS, BUBPRS
0193         WRITE(1,986) (PN2PH(J), J=1,NPH)
0194         WRITE(1,987) (DURPH(J), J=1,NPH)
```

```
0195        WRITE(1,982) BBG1OT, BBG2OT, BBG3OT, BBG4OT
0196        WRITE(1,982) BBG1RT, BBG2RT, BBG3RT, BBG4RT
0197        WRITE(1,983) BBG1RP, BBG2RP, BBG3RP, BBG4RP
0198        WRITE(1,984) BNDPRS, BNDLC
0199        WRITE(1,982) BNG1OT, BNG2OT, BNG3OT, BNG4OT
0200        WRITE(1,982) BNG1RT, BNG2RT, BNG3RT, BNG4RT
0201        WRITE(1,983) BNG1RP, BNG2RP, BNG3RP, BNG4RP
0202        WRITE(1,985) PPT180, PPT240, PPT360, DR180, DR240, DR360
0203        CLOSE(UNIT=1,DISP='SAVE')
0204        CALL EXIT
0205     900 FORMAT(///10X,'DECOMPRESSION EXPERIENCE DATA PROGRAM'/)
0206     901 FORMAT(10X,'FILENAME ON WHICH TO STORE DATA ',
            1  /10X,'DEVICE:FILENAME.TYPE= ',$)
0207     902 FORMAT(/1X,'SUBJECT IDENTIFICATION NUMBER (XXX-XX-XXXX): ',$)
0208     903 FORMAT(/1X,'TEST NUMBER (XX): ',$)
0209     904 FORMAT(/1X,'TEST DATE (MM-DD-YY): ',$)
0210     905 FORMAT(/1X,'ERROR IN ENTERING FILENAME, FILENAME= ', 30A1)
0211     906 FORMAT(/1X,'INITIAL PN2 (PSI) (XX.XX): ',$)
0212     907 FORMAT(/1X,'PN2 DURING WASHOUT, PHASE I (PSI) (XX.XX): ',$)
0213     908 FORMAT(/1X,'DURATION OF WASHOUT, PHASE I (MIN) (XXXX): ',$)
0214     911 FORMAT(/1X,'HOW MANY PHASES (XX): ',$)
0215     912 FORMAT(/1X,'FINAL PRESSURE (PSIA) (XX.XX): ',$)
0216     913 FORMAT(/1X,'TEMPERATURE IN CENTIGRADE (XX): ',$)
0217     914 FORMAT(/1X,'TIME OF FINAL DECOMPRESSION (HH:MM): ',$)
0218     915 FORMAT(/1X,'TIME OF RECOMPRESSION (HH:MM): ',$)
0219     916 FORMAT(/1X,'EXERCISE LEVEL ',
            1  /16X,'LOW   400- 800 BTU/HR',
            2  /16X,'MED   800-1600 BTU/HR',
            3  /16X,'HIGH 1600 BTU/HR AND ABOVE',
            4  /46X,'ENTER (L/M/H): ',$)
0220     918 FORMAT(/1X,'WERE BUBBLES MEASURED (Y/N)? ',$)
0221     919 FORMAT(/1X,'WERE BUBBLES PRESENT (Y/N)? ',$)
0222     920 FORMAT(/6X,'GRADE OF BUBBLES : ENTER 0 FOR NOT OBSERVED ')
0223     921 FORMAT(/1X,'TIME OF ONSET GRADE 1 (HH:MM): ',$)
0224     922 FORMAT(/1X,'TIME OF ONSET GRADE 2 (HH:MM): ',$)
0225     923 FORMAT(/1X,'TIME OF ONSET GRADE 3 (HH:MM): ',$)
0226     924 FORMAT(/1X,'TIME OF ONSET GRADE 4 (HH:MM): ',$)
0227     925 FORMAT(/1X,'TIME OF REMISSION GRADE 1 (HH:MM): ',$)
0228     926 FORMAT(/1X,'TIME OF REMISSION GRADE 2 (HH:MM): ',$)
0229     927 FORMAT(/1X,'TIME OF REMISSION GRADE 3 (HH:MM): ',$)
0230     928 FORMAT(/1X,'TIME OF REMISSION GRADE 4 (HH:MM): ',$)
0231     929 FORMAT(/1X,'PRESSURE AT REMISSION GRADE 1 (PSIA) (XX.XX): ',$)
0232     930 FORMAT(/1X,'PRESSURE AT REMISSION GRADE 2 (PSIA) (XX.XX): ',$)
0233     931 FORMAT(/1X,'PRESSURE AT REMISSION GRADE 3 (PSIA) (XX.XX): ',$)
0234     932 FORMAT(/1X,'PRESSURE AT REMISSION GRADE 4 (PSIA) (XX.XX): ',$)
0235     934 FORMAT(//6X,'GRADE OF BENDS : ENTER 0 FOR NOT OBSERVED ')
0236     933 FORMAT(/1X,'WERE BENDS PRESENT (Y/N)? ',$)
0237     935 FORMAT(/1X,'BENDS LOCATION (TEXT): ',$)
0238     937 FORMAT(/1X,'ALIGN PAPER TO TOP OF PAGE ',
            1  'AND HIT CARRIAGE RETURN')
0239     940 FORMAT(//5X,'DECOMPRESSION DATA OUTPUT',
            1  //1X,'SUBJECT #',T12,11A1,T26,'DATE',T32,
            2  3A1,A3,3A1)
0240     941 FORMAT(/1X,'NITROGEN PRESSURE AT TIME OF FINAL DECOMPRESSION',
            1  //10X,'FOR 180 MIN TISSUE : ',F6.2,' PSI',
```

```
     2  //10X,'FOR 240 MIN TISSUE : ',F6.2,' PSI',
     3  //10X,'FOR 360 MIN TISSUE : ',F6.2,' PSI')
0241    942 FORMAT(/1X,'DECOMPRESSION RATIO AT TIME OF FINAL DECOMPRESSION',
     1  //10X,'FOR 180 MIN TISSUE : ',F6.2,
     2  //10X,'FOR 240 MIN TISSUE : ',F6.2,
     3  //10X,'FOR 360 MIN TISSUE : ',F6.2)
0242    981 FORMAT(11A1,I2,8A1,I2,2F5.2,I2,2(5A1),3(A1))
0243    982 FORMAT(4(5A1))
0244    983 FORMAT(4(F4.1))
0245    984 FORMAT(A1,15A1)
0246    985 FORMAT(3(F5.2),3(F4.2))
0247    986 FORMAT(10F5.2)
0248    987 FORMAT(10I4)
0249    800 FORMAT(Q,11A1)
0250    801 FORMAT(Q,8A1)
0251    802 FORMAT(Q,5A1)
0252    803 FORMAT(A1)
0253    804 FORMAT(Q,70A1)
0254    805 FORMAT(Q,30A1)
0255    806 FORMAT(1X)
0256        END
      C
      C
```

Local Variables, .PSECT $DATA, Size = 000612 (197. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
BBG1RP	R*4	000512	BBG2RP	R*4	000516	BBG3RP	R*4	000522
BBG4RP	R*4	000526	BNDPRS	L*1	000467	BNG1RP	R*4	000532
BNG2RP	R*4	000536	BNG3RP	R*4	000542	BNG4RP	R*4	000546
BUBMS	L*1	000465	BUBPRS	L*1	000466	DR180	R*4	000566
DR240	R*4	000572	DR360	R*4	000576	EXERLV	L*1	000464
FP	R*4	000502	I	I*2	000610	IPN2	R*4	000476
J	I*2	000604	MONTH	R*4	000506	NC	I*2	000606
NF	I*2	000602	NPH	I*2	000474	PPT180	R*4	000552
PPT240	R*4	000556	PPT360	R*4	000562	TEMP	I*2	000472
TESTNO	I*2	000470						

Local and COMMON Arrays:

Name	Type	Section	Offset	------Size-----	Dimensions
BBG1OT	L*1	$DATA	000035	000005 (3.)	(5)
BBG1RT	L*1	$DATA	000054	000005 (3.)	(5)
BBG2OT	L*1	$DATA	000042	000005 (3.)	(5)
BBG2RT	L*1	$DATA	000061	000005 (3.)	(5)
BBG3OT	L*1	$DATA	000047	000005 (3.)	(5)
BBG3RT	L*1	$DATA	000066	000005 (3.)	(5)
BBG4OT	L*1	$DATA	000167	000005 (3.)	(5)
BBG4RT	L*1	$DATA	000073	000005 (3.)	(5)
BNDLC	L*1	$DATA	000150	000017 (8.)	(15)
BNG1OT	L*1	$DATA	000100	000005 (3.)	(5)
BNG1RT	L*1	$DATA	000124	000005 (3.)	(5)
BNG2OT	L*1	$DATA	000105	000005 (3.)	(5)
BNG2RT	L*1	$DATA	000131	000005 (3.)	(5)
BNG3OT	L*1	$DATA	000112	000005 (3.)	(5)
BNG3RT	L*1	$DATA	000136	000005 (3.)	(5)
BNG4OT	L*1	$DATA	000117	000005 (3.)	(5)
BNG4RT	L*1	$DATA	000143	000005 (3.)	(5)
DURPH	I*2	$DATA	000234	000024 (10.)	(10)
FILENM	L*1	$DATA	000174	000037 (16.)	(31)
IDCODE	L*1	$DATA	000000	000013 (6.)	(11)
PN2PH	R*4	$DATA	000260	000050 (20.)	(10)
TESTDT	L*1	$DATA	000013	000010 (4.)	(8)
TIMFD	L*1	$DATA	000023	000005 (3.)	(5)
TIMR	L*1	$DATA	000030	000005 (3.)	(5)

Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type

DECRAT R*4 EXIT R*4 SWAPDT R*4 YORN I*2

```
0001        SUBROUTINE DECRAT (IPN2, NPH, PN2, DUR,
           1  FP, PPT180, PPT240, PPT360, DR180, DR240, DR360)
      C                TABLE OF VARIABLES
      C
      C      VARIABLE                USE
      C         DR180          DECOMPRESSION RATIO AT 180 MIN
      C         DR240          DECOMPRESSION RATIO AT 240 MIN
      C         DR360          DECOMPRESSION RATIO AT 360 MIN
      C         DUR            DURATION OF WASHOUT PHASE
      C         FP             FINAL PRESSURE
      C         IPN2           INITIAL PRESSURE OF N2
      C         KT180          VALUE OF EXPONENT IN CALCULATION
      C         KT240          VALUE OF EXPONENT IN CALCULATION
      C         KT360          VALUE OF EXPONENT IN CALCULATION
      C         NPH            NUMBER OF PHASES
      C         PN2            PRESSURE OF N2 DURING WASHOUT PHASE
      C         PP             TEMPORAY FOR NEW INITIAL PRESSURE
      C         PPT180         PRESSURE OF N2 AT 180 MIN
      C         PPT240         PRESSURE OF N2 AT 240 MIN
      C         PPT360         PRESSURE OF N2 AT 360 MIN
      C
0002        INTEGER*2 DUR(10), NPH
0003        REAL*4 IPN2, PN2(10),
           1  FP, PPT180, PPT240, PPT360, DR180, DR240, DR360,
           2  KT180, KT240, KT360, PP
      C
0004        PP=IPN2
0005        DO 1100 I=1,10
0006   1001 KT180=(DUR(I)/180.)*0.693
0007        PPT180=PP+((PN2(I)-PP)*(1.-EXP(-KT180)))
0008        IF(I.EQ.NPH) GO TO 1200
0010        PP=PPT180
0011   1100 CONTINUE
0012   1200 DR180=PPT180/FP
      C
0013        PP=IPN2
0014        DO 2100 I=1,10
0015   2000 KT240=(DUR(I)/240.)*0.693
0016        PPT240=PP+((PN2(I)-PP)*(1.-EXP(-KT240)))
0017        IF(I.EQ.NPH) GO TO 2200
0019        PP=PPT240
0020   2100 CONTINUE
0021   2200 DR240=PPT240/FP
      C
0022        PP=IPN2
0023        DO 3100 I=1,10
0024   3000 KT360=(DUR(I)/360.)*0.693
0025        PPT360=PP+((PN2(I)-PP)*(1.-EXP(-KT360)))
0026        IF(I.EQ.NPH) GO TO 3200
0028        PP=PPT360
0029   3100 CONTINUE
0030   3200 DR360=PPT360/FP
      C
0031        RETURN
0032        END
```

FORTRAN IV Storage Map for Program Unit DECRAT
Local Variables, .PSECT $DATA, Size = 000100 (32. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
DR180	R*4	@ 000020	DR240	R*4	@ 000022	DR360	R*4	@ 000024
FP	R*4	@ 000010	I	I*2	000062	IPN2	R*4	@ 000000
KT180	R*4	000042	KT240	R*4	000046	KT360	R*4	000052
NPH	I*2	@ 000002	PP	R*4	000056	PPT180	R*4	@ 000012
PPT240	R*4	@ 000014	PPT360	R*4	@ 000016			

Local and COMMON Arrays:

Name	Type	Section	Offset	Size	Dimensions
DUR	I*2	@ $DATA	000006	000024 (10.)	(10)
PN2	R*4	@ $DATA	000004	000050 (20.)	(10)

Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type
EXP	R*4								

```
0001          INTEGER FUNCTION YORN*2(K)
0002          LOGICAL*1 X
0003      801 FORMAT(A1)
0004      100 READ(5,801,END=200) X
0005          YORN=0
0006          IF (X.EQ.1HN.OR.X.EQ.1Hn) YORN=-1
0008          IF (X.EQ.1HY.OR.X.EQ.1Hy) YORN=1
0010          IF (YORN.EQ.0) GO TO 200
0012          RETURN
0013      200 WRITE(7,901)
0014      901 FORMAT(' PLEASE ANSWER Y OR N')
0015          GO TO 100
0016          END
      C
      C
Local Variables, .PSECT $DATA, Size = 000006 (     3. words)

Name    Type  Offset      Name    Type  Offset      Name    Type  Offset

K       I*2 @ 000000      X       L*1   000004      YORN    I*2   000002 Eqv
```

```
0001          SUBROUTINE SWAPDT(X,MONTH)
0002          LOGICAL*1 X(8)
0003          REAL*4 MONTH
0004          IF(X(1).EQ.'0'.AND.X(2).EQ.'1') MONTH='JAN'
0006          IF(X(1).EQ.'0'.AND.X(2).EQ.'2') MONTH='FEB'
0008          IF(X(1).EQ.'0'.AND.X(2).EQ.'3') MONTH='MAR'
0010          IF(X(1).EQ.'0'.AND.X(2).EQ.'4') MONTH='APR'
0012          IF(X(1).EQ.'0'.AND.X(2).EQ.'5') MONTH='MAY'
0014          IF(X(1).EQ.'0'.AND.X(2).EQ.'6') MONTH='JUN'
0016          IF(X(1).EQ.'0'.AND.X(2).EQ.'7') MONTH='JUL'
0018          IF(X(1).EQ.'0'.AND.X(2).EQ.'8') MONTH='AUG'
0020          IF(X(1).EQ.'0'.AND.X(2).EQ.'9') MONTH='SEP'
0022          IF(X(1).EQ.' '.AND.X(2).EQ.'1') MONTH='JAN'
0024          IF(X(1).EQ.' '.AND.X(2).EQ.'2') MONTH='FEB'
0026          IF(X(1).EQ.' '.AND.X(2).EQ.'3') MONTH='MAR'
0028          IF(X(1).EQ.' '.AND.X(2).EQ.'4') MONTH='APR'
0030          IF(X(1).EQ.' '.AND.X(2).EQ.'5') MONTH='MAY'
0032          IF(X(1).EQ.' '.AND.X(2).EQ.'6') MONTH='JUN'
0034          IF(X(1).EQ.' '.AND.X(2).EQ.'7') MONTH='JUL'
0036          IF(X(1).EQ.' '.AND.X(2).EQ.'8') MONTH='AUG'
0038          IF(X(1).EQ.' '.AND.X(2).EQ.'9') MONTH='SEP'
0040          IF(X(1).EQ.'1'.AND.X(2).EQ.'0') MONTH='OCT'
0042          IF(X(1).EQ.'1'.AND.X(2).EQ.'1') MONTH='NOV'
0044          IF(X(1).EQ.'1'.AND.X(2).EQ.'2') MONTH='DEC'
0046          RETURN
0047          END
Local Variables, .PSECT $DATA, Size = 000004 (    2. words)

Name    Type  Offset     Name    Type  Offset     Name    Type  Offset

MONTH   R*4 @ 000002

Local and COMMON Arrays:

Name      Type    Section Offset  ------Size----- Dimensions
X       L*1     @ $DATA   000000  000010 (    4.) (8)
```

5.3 NITROGEN WASHOUT PROGRAM

```
0001        PROGRAM N2WASH
      C  ************************************************************************
      C  ************************************************************************
      C  *                                                                      *
      C  *                                                                      *
      C  *                    TECHNOLOGY INCORPORATED                           *
      C  *                    LIFE SCIENCES DIVISION                            *
      C  *                                                                      *
      C  *                                                                      *
      C  *                                                                      *
      C  ************************************************************************
      C  *                                                                      *
      C  *                                                                      *
      C  *     PROGRAM NAME:.....................N2WASH                          *
      C  *     PROGRAMMERS,VERSION 1.0 A:.......BARRY LEVITAN AND               *
      C  *                                      KEN KOESTER                     *
      C  *     PROGRAM MODIFIED,VERSION 1.0 B.....BARRY LEVITAN                 *
      C  *     PROGRAM MODIFIED,VERSION 2.0.......PENNY BUEKER                  *
      C  *     DATE:VERSION 1.0 A.................AUGUST 1980                    *
      C  *     DATE:VERSION 1.0 B.................AUGUST 1981                    *
      C  *     DATE:VERSION 2.0...................DECEMBER 1981                  *
      C  *                                                                      *
      C  *                                                                      *
      C  *----------------------------------------------------------------------*
      C  *                                                                      *
      C  *                                                                      *
      C  *     COMPUTER SYSTEM:...................LSI-11                         *
      C  *     OPERATING SYSTEM:..................RT-11v4                        *
      C  *                                                                      *
      C  *                                                                      *
      C  *----------------------------------------------------------------------*
      C  *                                                                      *
      C  *     COMPILING SEQUENCE:                                              *
      C  *                                                                      *
      C  *          LSI:  FORTRAN N2WASH                                        *
      C  *                                                                      *
      C  *                                                                      *
      C  *                                                                      *
      C  *                                                                      *
      C  *----------------------------------------------------------------------*
      C  *                                                                      *
      C  *     LINKING SEQUENCE:                                                *
      C  *                                                                      *
      C  *          LSI:  LINK N2WASH                                           *
      C  *                                                                      *
      C  *                                                                      *
      C  *                                                                      *
      C  *                                                                      *
      C  *----------------------------------------------------------------------*
      C  *                                                                      *
      C  *     EXECUTION SEQUENCE:  RUN N2WASH                                  *
      C  *                                                                      *
      C  ************************************************************************
```

```
C  ************************************************************************
C
C
C                  TABLE OF VARIABLES
C
C
C       AGE          SUBJECT'S AGE
C       AMGAS        AMBIENT GAS COMPOSITION
C       AMPRES       AMBIENT PRESSURE (MM HG)
C       BODHYD       BODY HYDRATION
C       BODPOS       BODY POSITION
C       BRGAT        MINIMUM NOISE LEVEL OF SPIROMETER
C       BRN2V        TOTAL NITROGEN VOLUME EXHALED PER BREATH
C       BRTMIX       BREATHING MIXTURE
C       BRTST        MINIMUM VOLUME TO DETERMINE A BREATH
C       BRVOL        TOTAL BREATH VOLUME
C       CALCNT       NOT USED
C       CALPCT       FROM DATCON.VAL CAL GAS CONCENTRATIONS
C       CALZER       VALUE EQUIVALENT TO CALCNT(1,2) FOR ADJUSTING
C                    N2 DRIFT BETWEEN BREATHS
C       COMMTS       ARRAY TO HOLD OPTIONAL TEXT OF COMMENTS
C       COSUM        ACCUMULATOR FOR CARBON DIOXIDE END TIDAL
C                    CONCENTRATION CALCULATION
C       COTID        AVERAGE CARBON DIOXIDE CONCENTRATION OF BREATH
C       DELAY        FLOATING CALCULATION OF MASS SPEC
C                    TRANSPORT LAG
C       DMY          DUMMY ARGUMENT FOR IFFINR SUBROUTINE
C       DRUGS        CODE FOR DRUGS
C       DT           ELAPSED TIME FOR CAL GAS VALUE,PLUMBING
C                    AND FLUSHING
C       ELPST        EXPERIMENTAL ELAPSED TIME
C       EXERCI       EXERCISE PROTOCOL
C       EXGRAV       EXTERNAL GRAVITY
C       EXTEMP       EXTERNAL TEMPERATURE IN CENTIGRADE
C       FLB          SPIROMETER CAL CURVE INTERCEPT
C       FLM          SPIROMETER CAL CURVE SLOPE
C       FLOCAL       HIGH CALIBRATION VALUE OF SPIROMETER (1 LITER)
C       FLOSUM       ACCUMULATOR FOR SPIROMETER ZERO
C                    CALIBRATION
C       FLOZER       LOW CAL VALUE OF SPIROMETER (0 LITERS)
C       GASSLP       MASS SPEC CAL CURVE SLOPE
C       GASSUM       ACCUMULATOR FOR CAL GAS SAMPLE READINGS
C       GSNTCP       MASS SPEC CAL CURVE INTERCEPT
C       I            GAS TYPE INDEX
C       IADBUF       ADDRESS OF A/D OUTPUT BUFFER
C       IADCGC       A/D CHANNEL AND GAIN CODES
C       IADCSR       ADDRESS OF A/D CONTROL STATUS REGISTER
C       IANS         OPERATOR RESPONSE CHARACTER (1-6)
C       IBTH         BREATH NUMBER I.D.
C       ICHECK       FLAG TO SET NEW VOLUME FOR BREATH OVER
C                    DETERMINATION
C       ICLCNT       PROGRAM CLOCK PRE-SET COUNT BUFFER
C       ICLRAT       INTERRUPT RATE OF SAMPLE PROGRAM (TIMES SPER SECOND)
C       ICON         NUMBER OF CONCENTRATION SAMPLES MADE
C       ID           PARAMETER OF RT-11 SUBROUTINE INTSET
```

```
C       IDAT        ALPHA-NUMERIC ARRAY FOR DATE TAG
C       IDCODE      SUBJECT IDENTIFICATION #
C       IDLM        MASS SPEC TRANSPORT LAG 1.1 SEC LAG + F
C       IDMY        INTEGER ZERO END OF DATA TAG
C                   (SAMPLE RATE)
C       IDRIFT      VALUE OF NITROGEN IN INSPIRED OXYGEN
C       IDRVIN      PARALLEL BOARD INPUT REGISTER ADDRESS
C       IDRVOT      PARALLEL BOARD OUTPUT REGISTER ADDRESS
C       IFIL        ALPHA-NUMERIC ARRAY FOR DATA FILE NAMING
C       IMIN        EXPERIMENT MINUTE COUNT
C       IMMERS      IMMERSION? (Y/N)
C       INAM        ALPHA-NUMERIC ARRAY FOR NAME TAG
C       INO         OPERATOR RESPONSE NO (FOR INSTRUCTIONS N,
C                   CARRIAGE RETURN)
C       INT         INTGER RESULT OF A/D CONVERSION OR
C                   PARALLEL BOARD READING
C       INTSET      PROCESSOR DEFINED SUBROUTINE
C       IPHS        PHASE NUMBER ENTERED BY OPERATOR
C       ISTP        STOP RESPONSE ENTERED BY OPERATOR (S,
C                   CARRIAGE RETURN)
C       IVAL        OPERATOR INPUT OF DATA CONSTANTS (INTEGERS)
C       IVLVMD      BIT STRUCTURE TO CONTROL GAS VALUES
C       IYS         OPERATOR RESPONSE YES (Y, CARRIAGE RETURN)
C       J           CAL GAS SOURCE INDEX
C       KC          NUMBER OF CHARACTERS IN COMMENT LINE
C       KCMMTS      COMMENTS? (Y/N)
C       LATCH       LOGICAL FLAG FOR NITROGEN RANGE SWITCHING
C       LBTH        LOGICAL LATCH FOR BREATH DATA GATHERING DONE
C       LWAT        LOGICAL LATCH OF DATA ANALYSIS DONE
C                   F -> DATA DONE
C                   T -> ANALYSIS IN PROGRESS
C       M           DO LOOP DUMMY COUNTER
C       NTSUM       ACCUMULATOR FOR NITROGEN END TIDAL
C                   CONCENTRATION CALCULATION
C       N2TID       AVERAGE NITROGEN CONCENTRATION OF BREATH
C       N2TOT       TOTAL VOLUME OF NITROGEN ELIMINATED
C       N2VLM       MINUTE ACCUMULATOR VOLUME OF NITROGEN ELIMINATED
C       OTSUM       ACCUMULATOR FOR OXYGEN END TIDAL
C                   CONCENTRATION CALCULATION
C       O2TID       AVERAGE OXYGEN CONCENTRATION OF BREATH
C       PCTCO       CONCENTRATION READING OF CARBON DIOXIDE
C       PCTN2       CONCENTRATION READING OF NITROGEN
C       PCTO2       CONCENTRATION READING OF OXYGEN
C       RDMY        FLOATING POINT ZERO END OF DATA TAG
C       SPCOND      OTHER SPECIAL CONDITIONS
C       STRTIM      STARTING TIME OF DAY
C       T           TIME FOR DELAY OF CAL GAS PLUMBING,
C                   VALVING, PURGING
C       TEST        CHANGE IN BREATH VOLUME TO DETERMINE END OF BREATH
C       TICK        EXPERIMENTAL TEST 1-MINUTE COUNTER
C       TINT        TIME INTERVAL (DT) INTEGRATOR (VOL=DV/DT)
C       TOCK        EXPERIMENTAL TEST START TIME (FOR ELAPSED TIME)
C       TSEC        CPU MONITOR TIME
C       VALUE       OPERATOR INPUT OF DATA CONSTANTS (FLOATING POINT)
C       VOLUME      BREATH VOLUME = BRVOL
```

```
C       VOL1            SAMPLE 1 OF VOLUME TO COMPARE TO 5TH SAMPLE
C                       TO DETERMINE IF BREATH IS COMPLETE
C       VOL2            SAMPLE 2 OF VOLUME TO COMPARE TO 5TH SAMPLE
C                       TO DETERMINE IF BREATH IS COMPLETE
C
C
C
C
C           TYPE
0002        IMPLICIT LOGICAL(L),REAL(N)
0003        LOGICAL*1 IANS,IYS,INO,ISTP,IDCODE(11),IDAT(8),
           1  IMMERS, STRTIM(5),  KCMMTS, COMMTS(4,80),
           2  INAM(30), IFIL(31)
0004        REAL*4 EXTEMP, AMPRES
0005        INTEGER*2 AMGAS, BODHYD, BODPOS, BRTMIX,
           1  DRUGS, EXERCI, EXGRAV, SPCOND, KC, AGE
C
C           SIZE
0006        DIMENSION CALCNT(3,4),CALPCT(3,3)
0007        DIMENSION GASSUM(3),GASSLP(4),GSNTCP(4)
0008        DIMENSION IVLVMD(3),IADCGC(4)
0009        DIMENSION PCTN2(300),PCTCO(300),PCTO2(300)
C
C           COMMON
0010        COMMON/FLOCOM/FLOZER,FLM,FLB,IFLO,BRTST
0011        COMMON/ADCON/IADCSR,IADBUF,IADCGC,VOLUME,VOL1,VOL2
0012        COMMON/GAS/GASSLP,GSNTCP,LBTH,BRGAT,TEST
0013        COMMON/PARPRS/ICON,PCTCO,PCTN2,PCTO2,CALZER
0014        COMMON/DRV11/IDRVIN,IDRVOT,IDLM,LWAT,IDRIFT
C
0015        EXTERNAL SAMPLE
C
C           DATA
0016        DATA IDRVOT/"167772/,IDRVIN/"167774/
0017        DATA IVLVMD/"030,"420,"220/
0018        DATA IYS/1HY/,INO/1HN/,ISTP/1HS/
0019        DATA IADCSR/"176770/,IADBUF/"176772/
0020        DATA IADCGC/"0431,"1031,"1431,"2021/
C
C                       READ DATA CONSTANTS
0021        OPEN (UNIT=2,TYPE='OLD',NAME='SY:DATCON.VAL',READONLY)
0022        READ (2,*)  ((CALPCT(I,J),J=1,3),I=1,3),ICLRAT,
           *  BRGAT
0023        CLOSE (UNIT=2,DISPOSE='SAVE')
C
C                       TYPE HEADER
0024        TYPE 10
0025        ACCEPT 11,IANS
0026        IF(IANS.EQ.INO) GO TO 91
C
C                       GET PHASE & BRANCH
0028     90 CONTINUE
0029        TYPE 12
0030        GO TO 92
0031     91 TYPE 15
```

```
0032      92 READ(5,13) IPHS
0033      93 IF(IPHS.LT.1.OR.IPHS.GT.6)GO TO 91
0035      94 GO TO (100,200,300,400,500,600) IPHS
          C
          C
          C                    PHASE 1--DATA CONSTANTS
          C
0036     100 CONTINUE
0037         TYPE 14
          C
          C          CAL-GAS %'S
0038         DO 110 J=1,3
0039         DO 110 I=1,3
0040         TYPE 16,I,J,CALPCT(I,J)
0041         ACCEPT 11,IANS
0042         IF(IANS.NE.IYS) GO TO 110
0044         TYPE 18
0045         ACCEPT 19,VALUE
0046         CALPCT(I,J)=VALUE
0047     110 CONTINUE
          C
          C          CLOCK RATE
0048         TYPE 161,ICLRAT
0049         ACCEPT 11,IANS
0050         IF(IANS.NE.IYS) GO TO 115
0052         TYPE 18
0053         ACCEPT 191,IVAL
0054         ICLRAT=IVAL
0055     115 CONTINUE
          C          BREATH GATE
0056         TYPE 162,BRGAT
0057         ACCEPT 11,IANS
0058         IF(IANS.NE.IYS) GO TO 120
0060         TYPE 18
0061         ACCEPT 19,VALUE
0062         BRGAT=VALUE
0063     120 CONTINUE
          C
          C          END OF PHASE 1--GET NEW PHASE
0064         TYPE 20,IPHS
0065         GO TO 92
          C
          C
          C                    PHASE 2-- HEADER INFO
0066     200 CONTINUE
          C
          C     INITIALIZE HEADER VARIABLES
0067         DO 201 M=1,8
0068     201 IDAT(M)='  '
0069         DO 202 M=1,30
0070     202 INAM(M)='  '
0071         DO 203 M=1,11
0072     203 IDCODE(M)='  '
0073         EXTEMP=0.0
0074         EXGRAV=0
```

```
0075          IMMERS=' '
0076          BODPOS=0
0077          AMPRES=0.0
0078          DRUGS=0
0079          EXERCI=0
0080          BRTMIX=0
0081          BODHYD=0
0082          AMGAS=0
0083          AGE=0
0084          DO 204 M=1,5
0085      204 STRTIM(M)=' '
0086          SPCOND=0
0087          KCMMTS=' '
0088          DO 216 J=1,4
0089          DO 216 I=1,80
0090      216 COMMTS(J,I)=' '
          C
          C       ENTER THE EXPERIMENTAL CONDITIONS
0091          TYPE 22
0092          ACCEPT 23,(IDAT(M),M=1,8)
0093          TYPE 24
0094          ACCEPT 25,IC,(INAM(M),M=1,IC)
0095          TYPE 26
0096          ACCEPT 27,(IDCODE(M),M=1,11)
0097          TYPE 28
0098          ACCEPT 29, AGE
0099          TYPE 900
0100          ACCEPT 800, EXTEMP
0101          TYPE 901
0102          ACCEPT 801, EXGRAV
0103          TYPE 902
0104          ACCEPT 802, IMMERS
0105          TYPE 903
0106          ACCEPT 803, BODPOS
0107          TYPE 904
0108          ACCEPT 800, AMPRES
0109          TYPE 905
0110          ACCEPT 803, DRUGS
0111          TYPE 906
0112          ACCEPT 803, EXERCI
0113          TYPE 907
0114          ACCEPT 803, BRTMIX
0115          TYPE 908
0116          ACCEPT 803, BODHYD
0117          TYPE 909
0118          ACCEPT 803, AMGAS
0119          TYPE 910
0120          ACCEPT 810, (STRTIM(M),M=1,5)
0121          TYPE 911
0122          ACCEPT 803, SPCOND
0123          TYPE 912
0124          ACCEPT 802, KCMMTS
0125          IF (KCMMTS.EQ.'N') GO TO 225
0127          TYPE 913
0128          ACCEPT 813
```

```
0129          DO 220 J=1,4
0130          TYPE 31
0131          READ(5,814) KC, (COMMTS(J,I), I=1,KC)
0132       220 CONTINUE
           C
           C          END OF PHASE 2--GET NEW PHASE
0133       225 TYPE 20,IPHS
0134          GO TO 92
           C
           C
           C           PHASE 3--MASS SPECTROMETER CALIBRATION
0135       300 CONTINUE
0136          CALL IPOKE(IDRVOT,IVLVMD(2))
0137          TYPE 30
           C
0138          PAUSE 'SELECT N-2 0-10%. RETURN'
0139          J=2
           C          OPEN VALVE J--WAIT 15 SECONDS
0140       305 CALL IPOKE(IDRVOT,IVLVMD(J))
0141          T=SECNDS(0.0)
0142       308 DT=SECNDS(T)
0143          IF(DT.LT.15.0) GO TO 308
           C
0145          DO 315,I=1,3
0146          GASSUM(I)=0.0
           C
0147          DO 310,M=1,100
0148          CALL IPOKE(IADCSR,IADCGC(I))
0149          INT=IPEEK(IADBUF)
0150       310 GASSUM(I)=GASSUM(I)+FLOAT(INT)
           C
0151          CALCNT(I,J)=GASSUM(I)/100.
0152       315 CONTINUE
0153          J=J+1
0154          IF(J.EQ.3) GO TO 305
0156          CALCNT(1,4)=CALCNT(1,3)
           C
0157          PAUSE 'SELECT N-2 0-100%. RETURN'
0158          J=1
           C          OPEN VALVE J--WAIT 15 SECONDS
0159       325 CALL IPOKE(IDRVOT,IVLVMD(J))
0160          T=SECNDS(0.0)
0161       328 DT=SECNDS(T)
0162          IF(DT.LT.15.) GO TO 328
0164          GASSUM(1)=0.0
0165          DO 330 M=1,100
0166          CALL IPOKE(IADCSR,IADCGC(1))
0167          INT=IPEEK(IADBUF)
0168       330 GASSUM(1)=GASSUM(1)+FLOAT(INT)
0169          CALCNT(1,J)=GASSUM(1)/100.
0170          J=J+2
0171          IF(J.EQ.3) GO TO 325
           C
           C
           C          GET SLOPES & INTERCEPTS
```

```
0173          GASSLP(1)=(CALPCT(1,1)-CALPCT(1,3))
             * /(CALCNT(1,1)-CALCNT(1,3))
0174          GSNTCP(1)=CALPCT(1,3)-(GASSLP(1)*CALCNT(1,3))
      C
0175          GASSLP(2)=(CALPCT(2,2)-CALPCT(2,3))
             * /(CALCNT(2,2)-CALCNT(2,3))
0176          GSNTCP(2)=CALPCT(2,3)-(GASSLP(2)*CALCNT(2,3))
      C
0177          GASSLP(3)=(CALPCT(3,3)-CALPCT(3,2))
             * /(CALCNT(3,3)-CALCNT(3,2))
0178          GSNTCP(3)=CALPCT(3,2)-(GASSLP(3)*CALCNT(3,2))
      C
0179          GASSLP(4)=(CALPCT(1,3)-CALPCT(1,2))
             * /(CALCNT(1,4)-CALCNT(1,2))
0180          GSNTCP(4)=CALPCT(1,2)-(GASSLP(4)*CALCNT(1,2))
      C
0181          TYPE 321
0182          TYPE 32,CALCNT(1,1),CALCNT(1,3),GASSLP(1),GSNTCP(1)
0183          TYPE 322
0184          TYPE 32,CALCNT(1,4),CALCNT(1,2),GASSLP(4),GSNTCP(4)
0185          TYPE 323
0186          TYPE 32,CALCNT(2,2),CALCNT(2,3),GASSLP(2),GSNTCP(2)
0187          TYPE 324
0188          TYPE 32,CALCNT(3,3),CALCNT(3,2),GASSLP(3),GSNTCP(3)
0189          CALZER=CALCNT(1,2)
      C
      C           END OF PHASE 3
0190          CALL IPOKE(IDRVOT,"0)
0191          TYPE 20,IPHS
0192          GO TO 92
      C
      C
      C                          PHASE 4--SPIROMETER CALIBRATION
0193        400 CONTINUE
0194          TYPE 40
      C
0195          PAUSE'ZERO SPIROMETER.RETURN THANK YOU'
      C           SAMPLE "ZERO FLOW"
0196          FLOSUM=0.0
0197          DO 415,M=1,1000
0198          CALL IPOKE(IADCSR,IADCCC(4))
0199          INT=IPEEK(IADBUF)
0200        415 FLOSUM=FLOSUM+FLOAT(INT)
0201          FLOZER=FLOSUM/1000.
      C       SIMULATE 1 LITER VOLUME
0202          FLOCAL=FLOZER+410.5
      C           GET FLOW SLOPES & INTERCEPTS
0203          FLM=1.0/(FLOCAL-FLOZER)
0204          FLB=-FLOZER
0205          TYPE 421
0206          TYPE 32,FLOCAL,FLOZER,FLM,FLB
      C
      C           END OF PHASE 4
0207          TYPE 20,IPHS
0208          GO TO 92
```

```
      C
      C
      C                        PHASE 5--TEST DATA
0209    499 PAUSE 'INSERT DATA FLOPPY WITH AT LEAST 400 FREE BLOCKS, RETURN'
0210    500 CONTINUE
      C
      C          OPEN DISK FILE & WRITE HEADER
0211    501 WRITE(7,920)
0212        READ(5,820,END=501) MC, (IFIL(M),M=1,MC)
0213        IF (MC.LE.0) GO TO 501
0215        IFIL(MC+1)=0
0216        OPEN(UNIT=2,TYPE='NEW',NAME=IFIL,FORM='FORMATTED',ERR=499,
           1  INITIALSIZE=400)
0217        WRITE (2,914) (INAM(I),I=1,30),(IDAT(I),I=1,8),
           1  (IDCODE(I),I=1,11), AGE,
           2  EXTEMP,EXGRAV,IMMERS,BODPOS,AMPRES,DRUGS,
           3  EXERCI,BRTMIX,BODHYD,AMGAS,(STRTIM(M),M=1,5),SPCOND,KCMNTS
0218        DO 502 I=1,4
0219        WRITE(2,915)(COMMTS(I,J),J=1,80)
0220    502 CONTINUE
0221        TYPE 505
0222        ACCEPT 11,IANS
0223        IF(IANS.EQ.ISTP) GO TO 560
      C
      C          PREPARE INTERRUPT ROUTINE 'SAMPLE'
0225        CALL INTSET("104,4,ID,SAMPLE)
0226        ICLCNT=10000/ICLRAT
0227        CALL IPOKE("172542,ICLCNT)
      C
      C          INITIALIZE SOME TERMS
0228        ICON=0
0229        IFLO=0
0230        IBTH=0
0231        N2VLM=0.0
0232        BRTST=FLOZER+BRGAT
0233        VOLUME=0.0
0234        VOL1=BRTST
0235        VOL2=0.0
0236        ICHECK=0
0237        IDRIFT=20
0238        LWAT=.FALSE.
0239        LATCH=.TRUE.
0240        N2TOT=0.0
0241        IMIN=1
      C
      C          SET TIME AND DELAY TERMS DUE TO CATHETER LAG
0242        TINT=1.0/FLOAT(ICLRAT)
0243        DELAY=FLOAT(ICLRAT)*.36
0244        IDLM=IFIX(DELAY)
      C
0245        TSEC=SECNDS(0.0)
0246        TOCK=TSEC
      C
      C          START SAMPLE ROUTINE
0247        CALL IPOKE("172540,"0113)
```

```
      C
      C       START TO MONITOR SAMPLE ROUTINE
      C
0248    510 CONTINUE
0249        INT=IPEEK("167774)
0250        IF(INT.EQ."177777) LATCH=.FALSE.
0252        IANS=ITTINR(DMY)
      C
0253        IF(IANS.EQ.ISTP) GO TO 560
      C
      C          CHECK NEED TO PURGE
0255        IF((VOL1.LE.BRTST).OR.(ABS(TEST).GT..5)) GOTO 520
0257        DO 515,J=1,3000
0258        CALL IPOKE("176760,"2050)
0259    515 CONTINUE
0260        CALL IPOKE("176760,"0010)
      C          CHECK FOR DATA READY
0261    520 IF(.NOT.LWAT) GO TO 530
      C
      C            BREATH DATA IS READY FOR PROCESSING
0263        IBTH=IBTH+1
0264        ELPST=SECNDS(TSEC)
      C
      C
0265        DO 540,J=2,ICON
      C
0266        NTSUM=NTSUM+PCTN2(J)
0267        OTSUM=OTSUM+PCTO2(J)
0268        COSUM=COSUM+PCTCO(J)
      C
0269    540 CONTINUE
      C
0270        N2TID=NTSUM/ICON
0271        O2TID=OTSUM/ICON
0272        COTID=COSUM/ICON
0273        BRVOL=VOLUME
0274        BRN2V=BRVOL*N2TID
0275        N2VLM=N2VLM+BRN2V
0276        N2TOT=N2TOT+BRN2V
      C
0277    542 CONTINUE
      C
0278        WRITE (2,916) IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0279        TYPE 55,IBTH,ELPST,BRVOL,BRN2V,N2TID
0280     55 FORMAT(5X,I4,F10.1,3F10.5)
      C            RESET COUNTERS & INTEGRATORS
0281        ICON=0
0282        IFLO=0
0283        ICHECK=0
0284        VOL2=0.0
0285        BRVOL=0.0
0286        BRN2V=0.0
0287        NTSUM=0.0
0288        OTSUM=0.0
0289        COSUM=0.0
```

```
0290        IDRIFT=20
0291        LWAT=.FALSE.
      C
      C          CHECK FOR 1-MIN OPERATIONS
0292    530 TICK=SECNDS(TOCK)
0293        IF(TICK.LE.60.) GO TO 510
      C
0295        TOCK=TOCK+60.
0296        TYPE 550,IMIN,N2VLM,N2TOT
0297        IMIN=IMIN+1
0298        N2VLM=0.0
0299        IF((N2TID.LT.0.070).AND.(LATCH)) TYPE 545
0301        GO TO 510
      C
      C          END OF PHASE 5
0302    560 CONTINUE
0303        CALL IPOKE("172540,"000)
0304        CALL IPOKE(IDRVOT,"000)
0305        IDMY=0
0306        RDMY=0.0
0307        WRITE (2,916) IDMY,RDMY,RDMY,RDMY,RDMY,RDMY,RDMY
0308        CLOSE(UNIT=2,DISP='SAVE')
0309        TYPE 20,IPHS
0310        GO TO 92
      C
      C
      C                    PHASE 6--TERMINATION
0311    600 CONTINUE
0312        STOP 'BYE'
      C
      C
      C
      C
0313     9 FORMAT(9F7.2,I5,F5.0,F7.2)
      C
0314    10 FORMAT(/,17X,'N 2   W A S H O U T',//1X,
     *  'INSTRUCTIONS (Y/N) ? ',$)
      C
0315    11 FORMAT(A1)
      C
0316    12 FORMAT(X,//,X,'TESTLOAD N2WASH HAS 6 PHASES',
     *  //,5X,'1  DATA CONSTANTS--ALLOWS USER',
     *  /,' MODIFICATION OF CAL-GAS %"S.  OTHERWISE',
     *  /,' PROGRAM USES DEFAULT VALUES.',
     *  //,5X,'2  INITIALIZATION--ENTER HEADER INFORMATION',
     *  //,5X,'3  CALIBRATE MASS SPECTROMETER',
     *  //,5X,'4  CALIBRATE SPIROMETER',
     *  //,5X,'5  TEST DATA--SAMPLES TEST DATA CONTINUOUSLY',
     *  /,' UNTIL USER TERMINATES',
     *  //,5X,'6  TERMINATE--RETURNS CONTROL TO SYSTEM MONITOR',
     *  ///,10X,'ENTER PHASE # & RETURN ',$)
      C
0317    13 FORMAT(I1)
      C
0318    14 FORMAT(X,//,10X,'PHASE 1  DATA CONSTANTS',
```

```
     * /,5X,' TO LEAVE VALUE UNCHANGED, ENTER',
     * /,5X,' N & RETURN.  TO CHANGE, ENTER Y',
     * /,5X,' & RETURN. GET "NEW VALUE" PROMPT,' ,
     * /,5X,' ENTER NEW VALUE & RETURN',/)
C
0319    15 FORMAT(5X,'ENTER PHASE #',$)
0320    16 FORMAT(5X,'CALPCT(',I1,',',I1,')=',F6.2,$)
C
0321   161 FORMAT(5X,'SAMPLE RATE=',I4,'/SEC',$)
C
0322   162 FORMAT(5X,'BREATH GATE=',F5.0,$)
C
0323    18 FORMAT(3X,'NEW VALUE =',$)
C
0324    19 FORMAT(F6.2)
C
0325   191 FORMAT(I4)
C
0326    20 FORMAT(X,/,5X,'END OF PHASE ',I3,/1X,
     * 'ENTER NEW PHASE # ',$)
C
0327    22 FORMAT(X,//,10X,'PHASE 2  INITIALIZATION',//,
     * 2X,'DATE (MM-DD-YY): ',$)
C
0328    23 FORMAT(8A1)
C
0329    24 FORMAT(/2X,'SUBJECT NAME : ',$)
C
0330    25 FORMAT(Q,30A1)
0331    26 FORMAT(/2X,'SUBJECT IDENTIFICATION # (XXX-XX-XXXX): ',$)
0332    27 FORMAT(11A1)
0333    28 FORMAT(/2X,'SUBJECT AGE (YEARS AS OF  THIS DATE): ',$)
0334    29 FORMAT(I2)
C
0335    30 FORMAT(X,//,10X,'PHASE 3  MASS SPEC CALIBRATION',
     * /,5X,'VERIFY CAL GASES ARE OPEN',
     * /,5X,'SET MASS SPEC FUNCTION TO "AUTO"')
0336    31 FORMAT(1X,'?',$)
C
0337    32 FORMAT(5X,'CTS-1',6X,'CTS-2',9X,'SLOPE',
     * 7X,'INTCPT',/,2(3X,F8.2),2X,2(3X,F9.3))
C
0338   321 FORMAT(/,10X,'NITROGEN, HI-RANGE')
0339   322 FORMAT(/,10X,'NITROGEN, LO-RANGE')
0340   323 FORMAT(/,10X,'OXYGEN')
0341   324 FORMAT(/,10X,'CARBON DIOXIDE')
C
0342    40 FORMAT(X,//,10X,'PHASE 4  SPIROMETER CALIBRATION')
C
0343   421 FORMAT(/,10X,'SPIROMETER')
C
0344   505 FORMAT(5X,'SELECT N-2 0-100% RANGE.',
     * /,5X,'RETURN TO START.',
     * /,5X,'TO STOP AT ANY TIME, ENTER S & RETURN.',$)
C
```

```
0345     545 FORMAT(5X,'SELECT N-2 0-10% RANGE')
         C
0346     550 FORMAT(2X,I3,2X,'MIN N2(L)',F8.5,3X,'N2TOT',2X,F8.5)
0347     900 FORMAT(/2X,'EXTERAL TEMPERATURE IN CENTIGRADE (XX.X): ',$)
0348     901 FORMAT(/2X,'EXTERNAL GRAVITY (1,0): ',$)
0349     902 FORMAT(/2X,'IS SUBJECT IMMERSED (Y/N): ',$)
0350     903 FORMAT(/2X,'ENTER CODE FOR BODY POSITION (0 FOR NO DATA ',
            * 'OR 1-99): ',$)
0351     904 FORMAT(/2X,'AMBIENT PRESSURE IN MM HG (XXX.X): ',$)
0352     905 FORMAT(/2X,'ENTER CODE FOR DRUGS (0 FOR NO DATA ',
            * 'OR 1-99): ',$)
0353     906 FORMAT(/2X,'ENTER CODE FOR EXERCISE PROTOCOL (0 FOR NO DATA ',
            * 'OR 1-99): ',$)
0354     907 FORMAT(/2X,'ENTER CODE FOR BREATHING MIXTURE (0 FOR NO DATA ',
            * 'OR 1-99): ',$)
0355     908 FORMAT(/2X,'ENTER CODE FOR BODY HYDRATION (0 FOR NO DATA ',
            * 'OR 1-99): ',$)
0356     909 FORMAT(/2X,'ENTER CODE FOR AMBIENT GAS COMPOSITION (0 FOR NO ',
            * 'DATA OR 1-99): ',$)
0357     910 FORMAT(/2X,'STARTING TIME OF DAY (HH:MM): ',$)
0358     911 FORMAT(/2X,'ENTER CODE FOR OTHER SPECIAL CONDITIONS (0 FOR ',
            * 'NO DATA OR 1-99): ',$)
0359     912 FORMAT(/2X,'ARE THERE ANY COMMENTS TO RECORD(Y/N)? ',$)
0360     913 FORMAT(/2X,'TO ENTER COMMENTS HIT CARRIAGE RETURN THEN ',
            * 'ENTER UP TO 4 LINES OF COMMENT ',$)
0361     914 FORMAT(30A1,8A1,11A1,I2,F7.2,I1,A1,I2,F7.2,5(I2),5A1,I2,A1)
0362     915 FORMAT(80A1)
0363     916 FORMAT(I4,F10.1,5(F10.5))
0364     920 FORMAT(10X,'FILENAME ON WHICH TO STORE DATA ',
            1  /10X,'DEVICE:FILENAME.TYPE = ',$)
0365     800 FORMAT(F7.2)
0366     801 FORMAT(I1)
0367     802 FORMAT(A1)
0368     803 FORMAT(I2)
0369     810 FORMAT(5A1)
0370     814 FORMAT(Q,80A1)
0371     813 FORMAT(1X)
0372     820 FORMAT(Q,30A1)
0373         END
```

Local Variables, .PSECT $DATA, Size = 001326 (363. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
AGE	I*2	001106	AMGAS	I*2	001064	AMPRES	R*4	001060
BODHYD	I*2	001066	BODPOS	I*2	001070	BRN2V	R*4	001270
BRTMIX	I*2	001072	BRVOL	R*4	001264	COSUM	R*4	001244
COTID	R*4	001260	DELAY	R*4	001210	DMY	R*4	001224
DRUGS	I*2	001074	DT	R*4	001136	ELPST	R*4	001230
EXERCI	I*2	001076	EXGRAV	I*2	001100	EXTEMP	R*4	001054
FLOCAL	R*4	001150	FLOSUM	R*4	001144	I	I*2	001110
IANS	L*1	001050	IBTH	I*2	001162	IC	I*2	001130
ICHECK	I*2	001170	ICLCNT	I*2	001160	ICLRAT	I*2	001114
ID	I*2	001156	IDMY	I*2	001300	IMIN	I*2	001202
IMMERS	L*1	001051	INO	L*1	000775	INT	I*2	001142
IPHS	I*2	001116	ISTP	L*1	000776	IVAL	I*2	001124
IYS	L*1	000774	J	I*2	001112	KC	I*2	001104
KCMMTS	L*1	001052	LATCH	L*4	001172	M	I*2	001126
MC	I*2	001154	NTSUM	R*4	001234	N2TID	R*4	001250
N2TOT	R*4	001176	N2VLM	R*4	001164	OTSUM	R*4	001240
O2TID	R*4	001254	RDMY	R*4	001302	SPCOND	I*2	001102
T	R*4	001132	TICK	R*4	001274	TINT	R*4	001204
TOCK	R*4	001220	TSEC	R*4	001214	VALUE	R*4	001120

COMMON Block /FLOCOM/, Size = 000022 (9. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
FLOZER	R*4	000000	FLM	R*4	000004	FLB	R*4	000010
IFLO	I*2	000014	BRTST	R*4	000016			

COMMON Block /ADCON /, Size = 000030 (12. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset

IADCSR	I*2	000000	IADBUF	I*2	000002	IADCGC	I*2	000004
VOLUME	R*4	000014	VOL1	R*4	000020	VOL2	R*4	000024

COMMON Block /GAS /, Size = 000054 (22. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
GASSLP	R*4	000000	GSNTCP	R*4	000020	LBTH	L*4	000040
BRGAT	R*4	000044	TEST	R*4	000050			

COMMON Block /PARPRS/, Size = 007026 (1803. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
ICON	I*2	000000	PCTCO	R*4	000002	PCTN2	R*4	002262
PCTO2	R*4	004542	CALZER	R*4	007022			

COMMON Block /DRV11 /, Size = 000014 (6. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
IDRVIN	I*2	000000	IDRVOT	I*2	000002	IDLM	I*2	000004
LWAT	L*4	000006	IDRIFT	I*2	000012			

Local and COMMON Arrays:

Name	Type	Section	Offset	------Size-----	Dimensions
CALCNT	R*4 Vec	$DATA	000626	000060 (24.)	(3,4)
CALPCT	R*4 Vec	$DATA	000706	000044 (18.)	(3,3)
COMMTS	L*1	$DATA	000030	000500 (160.)	(4,80)
GASSLP	R*4	GAS	000000	000020 (8.)	(4)
GASSUM	R*4	$DATA	000752	000014 (6.)	(3)
GSNTCP	R*4	GAS	000020	000020 (8.)	(4)
IADCGC	I*2	ADCON	000004	000010 (4.)	(4)
IDAT	L*1	$DATA	000013	000010 (4.)	(8)
IDCODE	L*1	$DATA	000000	000013 (6.)	(11)
IFIL	L*1	$DATA	000566	000037 (16.)	(31)
INAM	L*1	$DATA	000530	000036 (15.)	(30)
IVLVMD	I*2	$DATA	000766	000006 (3.)	(3)
PCTCO	R*4	PARPRS	000002	002260 (600.)	(300)
PCTN2	R*4	PARPRS	002262	002260 (600.)	(300)
PCTO2	R*4	PARPRS	004542	002260 (600.)	(300)
STRTIM	L*1	$DATA	000023	000005 (3.)	(5)

Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type
ABS	R*4	FLOAT	R*4	IFIX	I*2	INTSET	I*2	IPEEK	I*2
IPOKE	I*2	ITTINR	I*2	SAMPLE	R*4	SECNDS	R*4		

```
0001          SUBROUTINE SAMPLE
      C
      C
      C                         TABLE OF VARIABLES
      C
      C
      C        IBAR          ACCUMULATOR FOR NITROGEN DRIFT IN INSPIRED AIR
      C        IBARRY        AVERAGE COUNT FOR NITROGEN IN INSPIRED AIR
      C        ICHECK        FLAG TO SET NEW VOLUME FOR BREATH OVER DETERMINATION
      C        IDLY          MASS SPEC  TRANSPORT LAG COUNTER
      C        IFLLT         BIT CONFIGURATION FOR BREATH INDICATOR LAMPS
      C        K             DO LOOP DUMMY COUNTER
      C        KFLOW         ACCUMULATOR FOR VOLUME BREATH END DETERMINATION
      C        NRNG          INDEX FOR NITROGEN HI/LO SCALE USE
      C           TYPE
0002          IMPLICIT LOGICAL(L)
      C
      C           SIZE
0003          DIMENSION PCTCO(300),PCTN2(300),PCTO2(300)
0004          DIMENSION IADCGC(4),GASSLP(4),GSNTCP(4)
      C
      C           COMMON
0005          COMMON/FLOCOM/FLOZER,FLM,FLB,IFLO,BRTST
0006          COMMON/ADCON/IADCSR,IADBUF,IADCGC,VOLUME,VOL1,VOL2
0007          COMMON/GAS/GASSLP,GSNTCP,LBTH,BRGAT,TEST
0008          COMMON/PARPRS/ICON,PCTCO,PCTN2,PCTO2,CALZER
0009          COMMON/DRV11/IDRVIN,IDRVOT,IDLM,LWAT,IDRIFT
      C             SAMPLE N2 DRIFT BETWEEN BREATHS
0010          IF(LBTH) GO TO 45
0012          IBAR=0
0013          DO 44,J=1,5
0014          CALL IPOKE(IADCSR,IADCGC(1))
0015       44 IBAR=IBAR+IPEEK(IADBUF)
0016          IBARRY=IBAR/5
0017          IF(IDRIFT.GT.IBARRY)IDRIFT=IBARRY
      C
0019       45 IF(LWAT)GOTO 500
      C
      C
      C           CHECK N-2 RANGE SWITCH
0021          INT=IPEEK("167774)
0022          IF(INT.EQ."177777) GO TO 60
0024          IF(INT.EQ."177677) GO TO 50
0026          TYPE 55
0027       55 FORMAT(5X,'READ ERROR')
0028          GO TO 500
      C
      C           RANGE = 0-100%
0029       50 IFLLT="100
0030          NRNG=1
0031          GO TO 70
      C
      C           RANGE = 0-10%
0032       60 IFLLT="040
0033          NRNG=4
```

```
0034          GO TO 70
0035       70 CONTINUE
      C
      C            SET 'BREATH OVER' TEST EVERY 5th SAMPLE
0036          ICHECK=ICHECK+1
0037          IF(ICHECK.LT.10)GOTO 75
0039          VOL2=VOL1
0040          ICHECK=0
0041       75 KFLOW=0
0042          DO 80,K=1,15
0043          CALL IPOKE(IADCSR,IADCGC(4))
0044       80 KFLOW=KFLOW+IPEEK(IADBUF)
0045          VOL1=FLOAT(KFLOW)/15.0
      C           CHECK FOR BREATH
0046          TEST=VOL1-VOL2
0047          IF((VOL1.GE.BRTST).AND.(TEST.GT..5))GOTO 100
      C
0049          CALL IPOKE(IDRVOT,"0)
0050          IF(LBTH) GO TO 110
0052          GO TO 500
      C
0053      100 CONTINUE
0054          CALL IPOKE(IDRVOT,IFLLT)
0055          LBTH=.TRUE.
0056          IFLO=IFLO+1
0057          VOLUME=(VOL1+FLB)*FLM
      C
0058      110 IDLY=IDLY+1
      C
      C           CHECK DELAY
0059          IF(IDLY.LT.IDLM) GO TO 500
      C
      C           GET GAS CONCENTRATIONS
0061          ICON=ICON+1
0062          INT=0
0063          DO 111 J=1,5
0064          CALL IPOKE(IADCSR,IADCGC(1))
0065      111 INT=IPEEK(IADBUF)+INT
0066          INT=INT/5
0067          PCTN2(ICON)=(GASSLP(NRNG)*(INT+(CALZER-IDRIFT))
            *  +GSNTCP(NRNG))/100.
      C
0068          INT=0
0069          DO 112 J=1,5
0070          CALL IPOKE(IADCSR,IADCGC(2))
0071      112 INT=IPEEK(IADBUF)+INT
0072          INT=INT/5
0073          PCTO2(ICON)=(GASSLP(2)*INT
            *  +GSNTCP(2))/100.0
      C
0074          INT=0
0075          DO 113 J=1,5
0076          CALL IPOKE(IADCSR,IADCGC(3))
0077      113 INT=IPEEK(IADBUF)+INT
0078          INT=INT/5
```

```
0079          PCTCO(ICON)=(GASSLP(3)*INT
             *  +GSNTCP(3))/100.
      C
      C          CHECK END OF DELAY
      C
0080          IF(ICON.LT.IFLO)GO TO 500
0082          LBTH=.FALSE.
0083          LWAT=.TRUE.
0084          IDLY=0
      C
      C
0085     500 CONTINUE
0086          RETURN
0087          END
```

Local Variables, .PSECT $DATA, Size = 000024 (10. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
IBAR	I*2	000000	IBARRY	I*2	000004	ICHECK	I*2	000014
IDLY	I*2	000022	IFLLT	I*2	000010	INT	I*2	000006
J	I*2	000002	K	I*2	000020	KFLOW	I*2	000016
NRNG	I*2	000012						

COMMON Block /FLOCOM/, Size = 000022 (9. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
FLOZER	R*4	000000	FLM	R*4	000004	FLB	R*4	000010
IFLO	I*2	000014	BRTST	R*4	000016			

COMMON Block /ADCON /, Size = 000030 (12. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
IADCSR	I*2	000000	IADBUF	I*2	000002	IADCCC	I*2	000004
VOLUME	R*4	000014	VOL1	R*4	000020	VOL2	R*4	000024

COMMON Block /GAS /, Size = 000054 (22. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
GASSLP	R*4	000000	GSNTCP	R*4	000020	LBTH	L*4	000040
BRGAT	R*4	000044	TEST	R*4	000050			

COMMON Block /PARPRS/, Size = 007026 (1803. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
ICON	I*2	000000	PCTC0	R*4	000002	PCTN2	R*4	002262
PCTO2	R*4	004542	CALZER	R*4	007022			

COMMON Block /DRV11 /, Size = 000014 (6. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
IDRVIN	I*2	000000	IDRVOT	I*2	000002	IDLM	I*2	000004
LWAT	L*4	000006	IDRIFT	I*2	000012			

Local and COMMON Arrays:

Name	Type	Section	Offset	-------Size-----	Dimensions
GASSLP	R*4	GAS	000000	000020 (8.)	(4)
GSNTCP	R*4	GAS	000020	000020 (8.)	(4)
IADCCC	I*2	ADCON	000004	000010 (4.)	(4)
PCTCO	R*4	PARPRS	000002	002260 (600.)	(300)
PCTN2	R*4	PARPRS	002262	002260 (600.)	(300)
PCTO2	R*4	PARPRS	004542	002260 (600.)	(300)

Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type
FLOAT	R*4	IPEEK	I*2	IPOKE	I*2				

5.4 NITROGEN DATA PROGRAM

```
0001        PROGRAM N2DATA
C   ************************************************************************
C   ************************************************************************
C   *                                                                      *
C   *                                                                      *
C   *                    TECHNOLOGY INCORPORATED                           *
C   *                    LIFE SCIENCES DIVISION                            *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   ************************************************************************
C   *                                                                      *
C   *                                                                      *
C   *     PROGRAM NAME:.....................N2DATA                          *
C   *     PROGRAMMERS,VERSION 1.0 A:.......BARRY LEVITAN AND               *
C   *                                      KEN KOESTER                     *
C   *     PROGRAM MODIFIED,VERSION 1.0 B.....BARRY LEVITAN                 *
C   *     PROGRAM MODIFIED,VERSION 2.0.......PENNY BUEKER                  *
C   *     DATE:VERSION 1.0 A.................AUGUST 1980                    *
C   *     DATE:VERSION 1.0 B.................AUGUST 1981                    *
C   *     DATE:VERSION 2.0...................DECEMBER 1981                  *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *                                                                      *
C   *     COMPUTER SYSTEM:...................LSI-11                         *
C   *     OPERATING SYSTEM:..................RT-11v4                        *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *     COMPILING SEQUENCE:                                              *
C   *                                                                      *
C   *          LSI:  FORTRAN N2DATA                                        *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *     LINKING SEQUENCE:                                                *
C   *                                                                      *
C   *          LSI:  LINK N2DATA                                           *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *     EXECUTION SEQUENCE:  RUN N2DATA                                  *
C   *                                                                      *
C   ************************************************************************
```

```
C  ***********************************************************************
C
C
C     N2DATA PROGRAM WRITES A REPORT (FULL, 1 MINUTE, 5 MINUTE OR SHORT)
C     ON THE NITROGEN WASHOUT EXPERIMENT
C
C       VARIABLE          USE
C     AGE               SUBJECT'S AGE
C     AMGAS             CODE FOR AMBIENT GAS MIXTURE
C     AMPRES            AMBIENT PRESSURE IN MM HG
C     ANSWER            TEMPORARY FOR VALUE OF IMMERS
C     BMR               METABOLIC RATE
C     BODHYD            CODE FOR BODY HYDRATION
C     BODPOS            CODE FOR BODY POSITION
C     BRAVG             AVERAGE BREATH VOLUME
C     BRN2V             AVERAGE BREATH NITROGEN VOLUME
C     BRSM              INTERVAL SUM OF BREATH VOLUMES
C     BRSUM             SUM OF BREATH VOLUMES
C     BRTMIX            CODE FOR BREATHING MIXTURE
C     BRVOL             BREATH VOLUME
C     BTH               RUNNING TOTAL NUMBER OF BREATHS
C     CO2DAV            AVERAGE CO2 CONCENTRATION
C     CO2DSM            SUM OF CO2 CONCENTRATIONS
C     CO2ID             CO2 CONCENTRATION OF BREATH
C     CO2SM             SUM OF CO2 CONCENTRATION OF INTERVAL
C     COUNT             BREATH COUNTER
C     COVOL             INTERVAL VOLUME OF CO2 IN LITERS
C     CO2               INTERVAL VOLUME OF CO2 IN ml
C     CUMTIM            ELAPSED TIME BEYOND INTERVAL
C     DRUGS             CODE FOR DRUGS
C     ELPST             ELAPSED TIME
C     EXERCI            CODE FOR EXERCISE PROTOCOL
C     EXGRAV            EXTERNAL GRAVITY (1 OR 0)
C     EXTEMP            EXTERNAL TEMPERATURE DEGREES CENTIGRADE
C     I                 INDEX COUNTER
C     IANS              OPERATOR SUPPLIED ANSWER
C     IBTH              BREATH NUMBER
C     IMMERS            IMMERSION (YES/NO)
C     IMIN              ELAPSED MINUTES
C     IYS               YES
C     J                 INDEX COUNTER
C     KCM               TEMPORARY FOR VALUE OF KCMMTS
C     KCMMTS            COMMENTS (YES/NO)
C     M                 INDEX COUNTER
C     MONTH             MONTH
C     N2                INTERVAL VOLUME OF N2 IN ML
C     N2AVG             AVERAGE N2 VOLUME
C     N2AVT             INTERVAL AVERAGE OF N2 CONCENTRATION
C     N2CONT            ESTIMATED N2 CONTENT OF BODY
C     N2CUM             CUMMULATIVE N2 ELIMINATED
C     N2SM              INTERVAL VOLUME OF N2 IN LITERS
C     N2SUM             SUM OF N2 VOLUME
C     N2TID             N2 CONCENTRATION OF BREATH
C     N2TSM             SUM OF N2 CONCENTRATIONS OF INTERVAL
C     N2VOL             INTERVAL VOLUME OF N2 IN LITERS
```

```
C       N2VWT               ELIMINATED N2 ml/kg BODY WEIGHT
C       NTDAVG              AVERAGE OF AVERAGE N2 CONCENTRATION
C                           PER BREATH
C       NTDSM               SUM OF AVERAGE N2 CONCENTRATION
C                           PER BREATH
C       O2                  INTERVAL VOLUME OF O2 IN ml
C       O2TID               O2 CONCENTRATION OF BREATH
C       O2TSM               SUM OF O2 CONCENTRATIONS OF INTERVAL
C       O2VOL               INTERVAL VOLUME OF O2 IN LITERS
C       OTDAVG              AVERAGE O2 CONCENTRATION
C       OTDSM               SUM OF O2 CONCENTRATIONS
C       PCTN2               % OF ESTIMATED N2 CONTENT ELIMINATED
C       PULN2               PULMONARY N2
C       SPCOND              CODE FOR OTHER SPECIAL CONDITIONS
C       TIMCNT              ELAPSED TIME IN INTERVAL
C       WEIGHT              SUBJECT'S BODY WEIGHT IN kg
C
C         ARRAY               USE
C       COMMTS              OPTIONAL SECTION FOR COMMENTS
C       IDAT                DATE
C       IDCODE              SUBJECT IDENTIFICATION NUMBER
C       IFIL                FILE NAME
C       INAM                NAME OF SUBJECT
C       STRTIM              STARTING TIME OF DAY
C
C
0002        IMPLICIT REAL(N)
0003        LOGICAL*1 IANS,IYS,COMMTS(4,80),IMMERS,KCMMTS,
           1  STRTIM(5),IDAT(8),IDCODE(11),
           2  INAM(30),IFIL(31)
0004        INTEGER*2 AMGAS,BODHYD,BODPOS,BRTMIX,DRUGS,EXERCI,
           1  EXGRAV,SPCOND,AGE,BTH,IMIN
0005        REAL*4 ANSWER,KCM,MONTH,BRSM,BRVOL,COAVT,COTDAV,COTDSM,
           1  COTSM,COVOL,CUMTIM,N2AVT,N2CONT,N2CUM,N2SM,N2TSM,
           2  N2VOL,N2VWT,O2AVT,O2TSM,O2VOL,OTDAVG,OTDSM,PCTN2,
           3  TIMCNT,WEIGHT,COSM,O2SM,BMR,PULN2
      C
0006        DATA IYS/1HY/
      C
0007      5 WRITE(7,910)
0008        READ(5,810) MC,(IFIL(M),M=1,MC)
0009        IFIL(MC+1)=0
      C
0010        OPEN(UNIT=2,TYPE='OLD',NAME=IFIL,FORM='FORMATTED')
      C
0011        READ(2,814) (INAM(I),I=1,30),(IDAT(I),I=1,8),
           1  (IDCODE(J),J=1,11),AGE,
           2  EXTEMP,EXGRAV,IMMERS,BODPOS,AMPRES,DRUGS,
           3  EXERCI,BRTMIX,BODHYD,AMGAS,STRTIM,SPCOND,KCMMTS
0012        IF(IMMERS.EQ.'N') ANSWER=' NO'
0014        IF(IMMERS.EQ.'Y') ANSWER='YES'
0016        IF(IMMERS.EQ.' ') ANSWER=' NO'
0018        IF(KCMMTS.EQ.'N') KCM=' NO'
0020        IF(KCMMTS.EQ.'Y') KCM='YES'
0022        IF(KCMMTS.EQ.' ') KCM=' NO'
```

```
0024          DO 10 I=1,4
0025       10 READ(2,815) (COMMTS(I,J),J=1,80)
0026       11 WRITE(7,939)
0027          READ(5,877)IANS
0028          IF (.NOT.((IANS.EQ.'F').OR.(IANS.EQ.'1').OR.(IANS.EQ.'5')
           1  .OR.(IANS.EQ.'S'))) GO TO 11
0030          PAUSE ' ADVANCE CARRIAGE IF DESIRED.  RETURN'
      C
      C       N2DATA REPORT
      C       WRITE HEADER INFORMATION
0031          WRITE(7,920)
0032          CALL SWAPDT(IDAT,MONTH)
0033          WRITE(7,921)(INAM(I),I=1,30),AGE,IDAT(4),IDAT(5),
           1  IDAT(3),MONTH,IDAT(6),IDAT(7),IDAT(8)
0034          WRITE(7,922)(IDCODE(J),J=1,11),(STRTIM(J),J=1,5)
0035          WRITE(7,923)EXTEMP,EXGRAV
0036          WRITE(7,924)ANSWER,BODPOS
0037          WRITE(7,925)AMPRES,DRUGS
0038          WRITE(7,926)EXERCI,BRTMIX
0039          WRITE(7,927)BODHYD,AMGAS
0040          WRITE(7,928)SPCOND,KCM
0041          IF(KCMMTS.EQ.'N') GO TO 100
0043          WRITE(7,929)
0044          DO 20 I=1,4
0045       20 WRITE(7,930)(COMMTS(I,J),J=1,80)
      C
      C       BREATH BY BREATH PARAMETERS FOR FULL REPORT
      C
0046      100 IF(IANS.NE.'F')GO TO 200
0048          WRITE(7,938)
      C       INITIALIZE VARIABLES
0049          BRSUM=0.0
0050          N2SUM=0.0
0051          NTDSM=0.0
0052          OTDSM=0.0
0053          COTDSM=0.0
      C       READ A RECORD AND WRITE A RECORD
0054          DO 150,J=1,10000
0055          READ(2,816) IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0056          IF(IBTH.EQ.0) GO TO 500
0058          BTH=IBTH
0059          WRITE(7,935)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
      C       SUM THE PARAMETERS
0060          BRSUM=BRSUM+BRVOL
0061          N2SUM=N2SUM+BRN2V
0062          NTDSM=NTDSM+N2TID
0063          OTDSM=OTDSM+O2TID
0064          COTDSM=COTDSM+COTID
0065      150 CONTINUE
      C
      C       1 MINUTE INTERVAL PARAMETERS FOR 1 MINUTE INTERVAL REPORT
      C
0066      200 IF (IANS.NE.'1') GO TO 300
0068          WRITE(7,941)
0069          READ(5,*)WEIGHT
```

```
0070          WRITE(7,942)
0071          READ(5,*)N2CONT
0072          WRITE(7,944)
0073          READ(5,*)PULN2
0074          WRITE(7,940)
      C       INITIALIZE VARIABLES
0075          IMIN=0
0076          COUNT=0
0077          N2CUM=0.0
0078          CUMTIM=0.0
0079          BRSM=0.0
0080          N2SM=0.0
0081          O2SM=0.0
0082          COSM=0.0
0083          N2TSM=0.0
0084          O2TSM=0.0
0085          COTSM=0.0
0086          BRSUM=0.0
0087          N2SUM=0.0
0088          NTDSM=0.0
0089          OTDSM=0.0
0090          COTDSM=0.0
      C       READ A 1 MINUTE INTERVAL
0091          DO 220,J=1,10000
0092        210 READ(2,816)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0093          IF(IBTH.EQ.0) GO TO 215
0095          TMCNT=ELPST-CUMTIM
0096          IF (TMCNT.GT.60) GO TO 213
0098        211 BTH=IBTH
      C       SUM THE BREATH AND N2 VOLUMES IN LITERS
0099          BRSM=BRSM+BRVOL
0100          N2SM=N2SM+BRN2V
      C       COMPUTE THE O2 AND CO2 VOLUME IN LITERS
0101          O2VOL=O2TID*BRVOL
0102          COVOL=COTID*BRVOL
      C       SUM THE O2 AND CO2 VOLUME
0103          O2SM=O2SM+O2VOL
0104          COSM=COSM+COVOL
      C       SUM THE O2, CO2 AND N2 CONCENTRATIONS
0105          O2TSM=O2TSM+O2TID
0106          COTSM=COTSM+COTID
0107          N2TSM=N2TSM+N2TID
0108          COUNT=COUNT+1
0109          GO TO 210
0110        213 IMIN=IMIN+1
0111          CUMTIM=CUMTIM+60
      C       CHANGE THE VOLUMES TO ml
0112          N2=N2SM*1000
0113          O2=O2SM*1000
0114          CO2=COSM*1000
      C       COMPUTE THE 1 MINUTE AVERAGE N2 CONCENTRATION
0115          N2AVT=N2TSM/COUNT
      C       COMPUTE THE 1 MINUTE N2 ml/kg BODY WEIGHT
0116          N2VWT=N2/WEIGHT
      C       COMPUTE THE CUMMULATIVE N2 ELIMINATED
```

```
0117          N2CUM=N2CUM+N2
      C       COMPUTE THE % OF ESTIMATED BODY N2 CONTENT ELIMINATED
0118          PCTN2=(((N2CUM/1000)-PULN2)/N2CONT)*100
      C       COMPUTE THE METABOLIC RATE
0119          BMR=COSM*1362.4
      C       TRANSFER THE SUMS TO SUMMARY VARIABLES
0120      215 BRSUM=BRSUM+BRSM
0121          N2SUM=N2SUM+N2SM
0122          OTDSM=OTDSM+O2TSM
0123          NTDSM=NTDSM+N2TSM
0124          COTDSM=COTDSM+COTSM
0125          IF(IBTH.EQ.0)GO TO 500
      C       WRITE THE 1 MINUTE INTERVAL AVERAGES
0127          WRITE(7,943)IMIN,N2,O2,CO2,N2VWT,N2AVT,N2CUM,PCTN2,BMR
      C       INITIALIZE VARIABLES
0128          COUNT=0
0129          BRSM=0.0
0130          N2SM=0.0
0131          N2TSM=0.0
0132          O2TSM=0.0
0133          COTSM=0.0
0134          COSM=0.0
0135          O2SM=0.0
0136          GO TO 211
0137      220 CONTINUE
      C
      C       5 MINUTE INTERVAL PARAMETERS FOR 5 MINUTE INTERVAL REPORT
      C
0138      300 IF(IANS.NE.'5') GO TO 400
0140          WRITE(7,941)
0141          READ(5,*)WEIGHT
0142          WRITE(7,942)
0143          READ(5,*)N2CONT
0144          WRITE(7,944)
0145          READ(5,*)PULN2
0146          WRITE(7,940)
      C       INITIALIZE VARIABLES
0147          IMIN=0
0148          COUNT=0
0149          N2CUM=0.0
0150          CUMTIM=0.0
0151          BRSM=0.0
0152          N2SM=0.0
0153          COSM=0.0
0154          O2SM=0.0
0155          N2TSM=0.0
0156          O2TSM=0.0
0157          COTSM=0.0
0158          BRSUM=0.0
0159          N2SUM=0.0
0160          NTDSM=0.0
0161          OTDSM=0.0
0162          COTDSM=0.0
      C       READ A 5 MINUTE INTERVAL AND SUM THE PARAMETERS
0163          DO 320,J=1,10000
```

```
0164     310 READ(2,816)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0165         IF(IBTH.EQ.0) GO TO 315
0167         TMCNT=ELPST-CUMTIM
0168         IF(TMCNT.GT.300)GO TO 313
0170     311 BTH=IBTH
         C   SUM THE BREATH AND N2 VOLUMES IN LITERS
0171         BRSM=BRSM+BRVOL
0172         N2SM=N2SM+BRN2V
         C   COMPUTE THE O2 AND CO2 VOLUME IN LITERS
0173         O2VOL=O2TID*BRVOL
0174         COVOL=COTID*BRVOL
         C   SUM THE O2 AND CO2 VOLUME
0175         O2SM=O2SM+O2VOL
0176         COSM=COSM+COVOL
         C   SUM THE O2, CO2 AND N2 CONCENTRATIONS
0177         O2TSM=O2TSM+O2TID
0178         COTSM=COTSM+COTID
0179         N2TSM=N2TSM+N2TID
0180         COUNT=COUNT+1
0181         GO TO 310
0182     313 IMIN=IMIN+5
0183         CUMTIM=CUMTIM+300
         C   CHANGE THE VOLUMES TO ml
0184         N2=N2SM*1000
0185         O2=O2SM*1000
0186         CO2=COSM*1000
         C   COMPUTE THE 5 MINUTE AVERAGE N2 CONCENTRATION
0187         N2AVT=N2TSM/COUNT
         C   COMPUTE THE 5 MINUTE N2 ml/kg BODY WEIGHT
0188         N2VWT=N2/WEIGHT
         C   COMPUTE THE CUMMULATIVE N2 ELIMINATED
0189         N2CUM=N2CUM+N2
         C   COMPUTE THE % OF ESTIMATED BODY N2 CONTENT ELIMINATED
0190         PCTN2=(((N2CUM/1000)-PULN2)/N2CONT)*100
         C   COMPUTE THE METABOLIC  RATE
0191         BMR=(COSM/5)*1362.4
         C   TRANSFER THE SUMS TO SUMMARY VARIABLES
0192     315 BRSUM=BRSUM+BRSM
0193         N2SUM=N2SUM+N2SM
0194         OTDSM=OTDSM+O2TSM
0195         NTDSM=NTDSM+N2TSM
0196         COTDSM=COTDSM+COTSM
0197         IF(IBTH.EQ.0)GO TO 500
         C   WRITE THE 5 MINUTE INTERVAL AVERAGES
0199         WRITE(7,943)IMIN,N2,O2,CO2,N2VWT,N2AVT,N2CUM,PCTN2,BMR
         C   INITIALIZE VARIABLES
0200         COUNT=0
0201         BRSM=0.0
0202         N2SM=0.0
0203         N2TSM=0.0
0204         O2TSM=0.0
0205         COTSM=0.0
0206         COSM=0.0
0207         O2SM=0.0
0208         GO TO 311
```

```
0209    320 CONTINUE
      C
      C     SHORT REPORT
      C
0210    400 IF(IANS.NE.'S') GO TO 11
      C     INITIALIZE VARIABLES
0212        BRSUM=0.0
0213        N2SUM=0.0
0214        NTDSM=0.0
0215        OTDSM=0.0
0216        COTDSM=0.0
      C     READ RECORDS AND SUM PARAMETERS
0217        DO 440,J=1,10000
0218        READ(2,816)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0219        IF(IBTH.EQ.0) GO TO 500
0221        BTH=IBTH
0222        BRSUM=BRSUM+BRVOL
0223        N2SUM=N2SUM+BRN2V
0224        OTDSM=OTDSM+O2TID
0225        NTDSM=NTDSM+N2TID
0226        COTDSM=COTDSM+COTID
0227    440 CONTINUE
      C     CHECK FOR END OF DATA
0228    500 IF(ELPST.EQ.0.0) GO TO 600
0230        WRITE(7,955)
0231        GO TO 670
      C     COMPUTE AVEARAGES FOR SUMMARY
0232    600 BRAVG=BRSUM/BTH
0233        N2AVG=N2SUM/BTH
0234        OTDAVG=OTDSM/BTH
0235        NTDAVG=NTDSM/BTH
0236        COTDAV=COTDSM/BTH
0237        WRITE(7,961)
0238        WRITE(7,962)
0239        WRITE(7,963)BRAVG,N2AVG,OTDAVG,NTDAVG,COTDAV
0240        WRITE(7,964)N2SUM
0241        WRITE(7,965)BTH
      C
0242    670 CLOSE(UNIT=2,DISP='SAVE')
      C
0243        IANS=' '
0244    700 WRITE(7,972)
      C     CHECK TO SEE IF THEY WANT TO READ ANOTHER FILE
0245        ACCEPT 877,IANS
0246        IF(IANS.EQ.IYS) GO TO 5
0248    910 FORMAT(//10X,'NITROGEN WASHOUT DATA ANALYSIS',
           1  /,5X,'ENTER FILENAME ON WHICH DATA IS STORED ',
           2  /5X,'(DEVICE:FILENAME.TYPE): ',$)
0249    920 FORMAT(/25X,'N2DATA REPORT'/)
0250    921 FORMAT(/2X,30A1,T41,'AGE: ',I2,T52,'DATE: ',2X,3A1,A3,3A1)
0251    922 FORMAT(/2X,'SUBJECT ID NUMBER: ',T24,11A1,T41,'STARTING ',
           1  'TIME: ',4X,5A1)
0252    923 FORMAT(/2X,'EXTERNAL TEMPERATURE: ',T28,F7.2,T41,'EXTERNAL ',
           1  'GRAVITY: ',T68,I1)
0253    924 FORMAT(/2X,'IMMERSION? ',T32,A3,T41,'BODY POSITION CODE: ',
```

```
          1  T67,I2)
0254    925 FORMAT(/2X,'AMBIENT PRESSURE: ',T28, F7.2,T41,'DRUG CODE: ',
          1  T67,I2)
0255    926 FORMAT(/2X,'EXERCISE CODE: ',T33,I2,T41,'BREATH MIXTURE CODE: ',
          1  T67,I2)
0256    927 FORMAT(/2X,'BODY HYDRATION CODE: ',T33,I2,T41,'AMBIENT GAS CODE: ',
          1  T67,I2)
0257    928 FORMAT(/2X,'SPECIAL CONDITION CODE: ',T33,I2,T41,'COMMENTS? ',
          1  T66,A3)
0258    929 FORMAT(/2X,'COMMENTS: ')
0259    930 FORMAT(2X,80A1)
0260    935 FORMAT(5X,I4,F10.1,5(F10.5))
0261    938 FORMAT(/2X,'BREATH # ',2X,'ELAPSED ',2X,'BREATH ',
          1  2X,'N2 VOL ',2X,'02 CONC ',2X,'N2 CONC ',
          2  2X,'C02 CONC',
          3  /13X,'  TIME  ',2X,'VOLUME',2X,'/BREATH ',2X,
          4  '/BREATH ',2X,'/BREATH ',2X,'/BREATH ',
          5  /13X,' (SEC)  ',2X,' (L)  ',2X,'  (L)   ')
0262    939 FORMAT(/5X,'A FULL REPORT (F) GIVES BREATH BY BREATH PARAMETERS',
          1  /5X,'A 1 MINUTE REPORT (1) GIVES PARAMETERS FOR 1 MINUTE ',
          2  'INTERVALS',
          3  /5X,'A 5 MINUTE REPORT (5) GIVES PARAMETERS FOR 5 MINUTE ',
          4  'INTERVALS',
          5  /5X,'A SHORT REPORT (S) GIVES THE OVERALL AVERAGES',
          6  //5X,'DO YOU WANT A FULL REPORT (F), A 1 MINUTE REPORT (1),',
          7  /5X,'A 5 MINUTE REPORT (5),OR  A SHORT REPORT (S) ?',
          8  /5X,'TYPE (F/1/5/S): ',$)
0263    940 FORMAT(/3X,'TIME',2X,'N2 VOL/',2X,'02 VOL/',1X,'C02 VOL/',
          1  1X,'N2/WEIGHT',1X,'N2 CONC/',1X,'CUMMUL.',2X,'% OF EST.',2x,
          2  'BMR',/2X,'(min)',1X,'INTERVAL',1X,'INTERVAL',1X,'INTERVAL',
          3  2X,'(ml/kg)',2x,'INTERVAL',3x,'N2',6X,'N2 CONT.','(BTU/hr)',
          4  /10X,'(ml)',5X,'(ml)',5x,'(ml)',23x,'(ml)',6x,'(%)')
0264    941 FORMAT(/2X,39HENTER THE SUBJECT'S BODY WEIGHT IN kg: ,$)
0265    942 FORMAT(/2X,52HENTER THE SUBJECT'S ESTIMATED N2 CONTENT IN LITERS:
          1 ,$)
0266    944 FORMAT(/2X,42HENTER THE SUBJECT'S ESTIMATED PULMONARY N2,
          1 20H CONTENT IN LITERS: ,$)
0267    943 FORMAT(2X,I3,1X,F9.2,1X,F9.2,F9.2,F9.5,F9.5,F9.2,F9.2,F9.2)
0268    955 FORMAT(10X,'BAD END DATA')
0269    961 FORMAT(/25X,'AVERAGES: ')
0270    962 FORMAT(//4X,' BREATH  ',4X,'N2 VOLUME ',4X,
          1  '02 CONC',4X,'N2 CONC',4X,'C02 CONC',
          2  /4X,'VOLUME(L)',4X,'/BREATH(L)',4X,'/BREATH',
          3  4X,'/BREATH',4X,'/BREATH')
0271    963 FORMAT(/5X,F7.5,6X,F7.5,5X,F8.5,3X,F8.5,3X,F8.5)
0272    964 FORMAT(/2X,'TOTAL N2 VOLUME IN LITERS= ',F8.5)
0273    965 FORMAT(/2X,'TOTAL # OF BREATHS= ',I6)
0274    972 FORMAT(//,5X,'END OF DATA..READ ANOTHER FILE (Y/N): ',$)
0275    810 FORMAT(Q,30A1)
0276    814 FORMAT(30A1,8A1,11A1,I2,F7.2,I1,A1,I2,F7.2,5(I2),5A1,I2,A1)
0277    815 FORMAT(80A1)
0278    816 FORMAT(I4,F10.1,5(F10.5))
0279    877 FORMAT(1A1)
0280        END
      C
```

Local Variables, .PSECT $DATA, Size = 001220 (328. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
AGE	I*2	000670	AMGAS	I*2	000650	AMPRES	R*4	001102
ANSWER	R*4	000676	BMR	R*4	001056	BODHYD	I*2	000652
BODPOS	I*2	000654	BRAVG	R*4	001174	BRN2V	R*4	001130
BRSM	R*4	000712	BRSUM	R*4	001106	BRTMIX	I*2	000656
BRVOL	R*4	000716	BTH	I*2	000672	COAVT	R*4	000722
COSM	R*4	001046	COTDAV	R*4	000726	COTDSM	R*4	000732
COTID	R*4	001144	COTSM	R*4	000736	COUNT	R*4	001150
COVOL	R*4	000742	CO2	R*4	001170	CUMTIM	R*4	000746
DRUGS	I*2	000660	ELPST	R*4	001124	EXERCI	I*2	000662
EXGRAV	I*2	000664	EXTEMP	R*4	001076	I	I*2	001072
IANS	L*1	000644	IBTH	I*2	001122	IMIN	I*2	000674
IMMERS	L*1	000645	IYS	L*1	000625	J	I*2	001074
KCM	R*4	000702	KCMMTS	L*1	000646	M	I*2	001070
MC	I*2	001066	MONTH	R*4	000706	NTDAVG	R*4	001204
NTDSM	R*4	001116	N2	R*4	001160	N2AVG	R*4	001200
N2AVT	R*4	000752	N2CONT	R*4	000756	N2CUM	R*4	000762
N2SM	R*4	000766	N2SUM	R*4	001112	N2TID	R*4	001140
N2TSM	R*4	000772	N2VOL	R*4	000776	N2VWT	R*4	001002
OTDAVG	R*4	001022	OTDSM	R*4	001026	O2	R*4	001164
O2AVT	R*4	001006	O2SM	R*4	001052	O2TID	R*4	001134
O2TSM	R*4	001012	O2VOL	R*4	001016	PCTN2	R*4	001032
PULN2	R*4	001062	SPCOND	I*2	000666	TIMCNT	R*4	001036
TMCNT	R*4	001154	WEIGHT	R*4	001042			

Local and COMMON Arrays:

Name	Type	Section	Offset	------Size------	Dimensions
COMMTS	L*1	$DATA	000000	000500 (160.)	(4,80)
IDAT	L*1	$DATA	000505	000010 (4.)	(8)
IDCODE	L*1	$DATA	000515	000013 (6.)	(11)
IFIL	L*1	$DATA	000566	000037 (16.)	(31)
INAM	L*1	$DATA	000530	000036 (15.)	(30)
STRTIM	L*1	$DATA	000500	000005 (3.)	(5)

Subroutines, Functions, Statement and Processor-Defined Functions:

Name	Type	Name	Type	Name	Type	Name	Type	Name	Type
SWAPDT	R*4								

```
0001          SUBROUTINE SWAPDT(X,MONTH)
0002          LOGICAL*1 X(8)
0003          REAL*4 MONTH
0004          IF(X(1).EQ.'0'.AND.X(2).EQ.'1') MONTH='JAN'
0006          IF(X(1).EQ.'0'.AND.X(2).EQ.'2') MONTH='FEB'
0008          IF(X(1).EQ.'0'.AND.X(2).EQ.'3') MONTH='MAR'
0010          IF(X(1).EQ.'0'.AND.X(2).EQ.'4') MONTH='APR'
0012          IF(X(1).EQ.'0'.AND.X(2).EQ.'5') MONTH='MAY'
0014          IF(X(1).EQ.'0'.AND.X(2).EQ.'6') MONTH='JUN'
0016          IF(X(1).EQ.'0'.AND.X(2).EQ.'7') MONTH='JUL'
0018          IF(X(1).EQ.'0'.AND.X(2).EQ.'8') MONTH='AUG'
0020          IF(X(1).EQ.'0'.AND.X(2).EQ.'9') MONTH='SEP'
0022          IF(X(1).EQ.' '.AND.X(2).EQ.'1') MONTH='JAN'
0024          IF(X(1).EQ.' '.AND.X(2).EQ.'2') MONTH='FEB'
0026          IF(X(1).EQ.' '.AND.X(2).EQ.'3') MONTH='MAR'
0028          IF(X(1).EQ.' '.AND.X(2).EQ.'4') MONTH='APR'
0030          IF(X(1).EQ.' '.AND.X(2).EQ.'5') MONTH='MAY'
0032          IF(X(1).EQ.' '.AND.X(2).EQ.'6') MONTH='JUN'
0034          IF(X(1).EQ.' '.AND.X(2).EQ.'7') MONTH='JUL'
0036          IF(X(1).EQ.' '.AND.X(2).EQ.'8') MONTH='AUG'
0038          IF(X(1).EQ.' '.AND.X(2).EQ.'9') MONTH='SEP'
0040          IF(X(1).EQ.'1'.AND.X(2).EQ.'0') MONTH='OCT'
0042          IF(X(1).EQ.'1'.AND.X(2).EQ.'1') MONTH='NOV'
0044          IF(X(1).EQ.'1'.AND.X(2).EQ.'2') MONTH='DEC'
0046          RETURN
0047          END


Local Variables, .PSECT $DATA, Size = 000004 (     2. words)

Name    Type  Offset      Name    Type  Offset      Name    Type  Offset

MONTH   R*4 @ 000002

Local and COMMON Arrays:

Name       Type    Section Offset  ------Size-----  Dimensions
X          L*1     @ $DATA   000000  000010 (     4.) (8)
```

5.5 UPDATE PROGRAM

```
0001        PROGRAM UPDATE
C   ************************************************************************
C   ************************************************************************
C   *                                                                      *
C   *                                                                      *
C   *                        TECHNOLOGY INCORPORATED                       *
C   *                        LIFE SCIENCES DIVISION                        *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   ************************************************************************
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *      PROGRAM NAME:.....................UPDATE                         *
C   *      PROGRAMMER:.......................PENNY BUEKER                   *
C   *      DATE:.............................DECEMBER 1981                  *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *                                                                      *
C   *      COMPUTER SYSTEM:..................LSI-11                         *
C   *      OPERATING SYSTEM:.................RT-11v4                        *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *      COMPILING SEQUENCE:                                             *
C   *                                                                      *
C   *           LSI:  FORTRAN UPDATE                                       *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *      LINKING SEQUENCE:                                               *
C   *                                                                      *
C   *           LSI:  LINK UPDATE                                          *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *                                                                      *
C   *----------------------------------------------------------------------*
C   *                                                                      *
C   *      EXECUTION SEQUENCE:  RUN UPDATE                                 *
C   *                                                                      *
C   ************************************************************************
```

```
      C  ***************************************************************
      C
      C     PROGRAM UPDATE TAKES PREVIOUSLY COLLECTED, UNFORMATTED
      C     N2 DATA AND WRITES A FORMATTED FILE FOR A REPORT BY
      C     N2DATA PROGRAM
      C
      C       VARIABLES          USE
      C     AGE                SUBJECT'S AGE
      C     AMGAS              CODE FOR AMBIENT GAS COMPOSITION
      C     AMPRES             AMBIENT PRESSURE IN MM HG
      C     BODHYD             CODE FOR BODY HYDRATION
      C     BODPOS             CODE FOR BODY POSITION
      C     BRN2V              N2 VOLUME OF BREATH
      C     BRTMIX             CODE FOR BREATHING MIXTURE
      C     BRVOL              VOLUME OF BREATH
      C     COTID              CO2 CONCENTRATION OF BREATH
      C     DRUGS              CODE FOR DRUGS
      C     ELPST              ELAPSED TIME
      C     EXERCI             CODE FOR EXERCISE PROTOCOL
      C     EXGRAV             EXTERNAL GRAVITY (1, 0)
      C     EXTEMP             EXTERNAL TEMPERATURE DEGREES CENTIGRADE
      C     I                  INDEX COUNTER
      C     IBTH               BREATH NUMBER
      C     IDMY               DUMMY INTEGER ZERO END OF DATA TAG
      C     IMMERS             IMMERSION (YES/NO)
      C     J                  INDEX COUNTER
      C     KCMMTS             COMMENTS (YES/NO)
      C     N2TID              N2 CONCENTRATION OF BREATH
      C     O2TID              O2 CONCENTRATION OF BREATH
      C     RDMY               DUMMY REAL ZERO END OF DATA TAG
      C     SPCOND             CODE FOR OTHER SPECIAL CONDITIONS
      C
      C       ARRAY              USE
      C     COMMTS             SECTION FOR OPTIONAL COMMENTS
      C     IDAT               OLD INTEGER ARRAY FOR DATE
      C     IDCODE             SUBJECT IDENTIFICATION NUMBER
      C     IFIL               FILE NAME
      C     INAM               NAME OF SUBJECT
      C     LDAT               NEW LOGICAL ARRAY FOR DATE
      C     STRTIM             STARTING TIME OF DAY
      C
0002        LOGICAL*1 IDCODE(11),IMMERS,STRTIM(5),KCMMTS,
           1  COMMTS(4,80),IFIL(20),IFIL2(20),LNAM(30)
0003        INTEGER*2 INAM(15),IDAT(3),EXGRAV,BODPOS,
           1  DRUGS,EXERCI,BRTMIX,BODHYD,AMGAS,SPCOND,IBTH,AGE
0004        REAL*4 EXTEMP,AMPRES,ELPST,BRVOL,BRN2V,O2TID,
           1  N2TID,COTID
      C
      C
0005        EQUIVALENCE (INAM,LNAM)
      C
      C     INITIALIZE NEW VARIABLES
      C
0006        DO 20 J=1,11
0007     20 IDCODE(J)=' '
```

```
0008          IMMERS=' '
0009          DO 30 J=1,5
0010       30 STRTIM(J)=' '
0011          KCMMTS=' '
0012          DO 40 J=1,30
0013       40 LNAM(J)=' '
0014          DO 80 I=1,4
0015          DO 80 J=1,80
0016       80 COMMTS(I,J)=' '
0017          AGE=0
0018          EXGRAV=0
0019          BODPOS=0
0020          DRUGS=0
0021          EXERCI=0
0022          BRTMIX=0
0023          BODHYD=0
0024          AMGAS=0
0025          SPCOND=0
0026          EXTEMP=0.0
0027          AMPRES=0.0
      C
      C
0028          WRITE(7,917)
0029          READ(5,810) MC, (IFIL(J),J=1,MC)
0030          IFIL(MC+1)=0
0031          WRITE(7,918)
0032          READ(5,810) MC, (IFIL2(J),J=1,MC)
0033          IFIL2(MC+1)=0
0034          OPEN(UNIT=1,TYPE='OLD',NAME=IFIL,FORM='UNFORMATTED')
0035          OPEN(UNIT=2,TYPE='NEW',NAME=IFIL2,FORM='FORMATTED')
      C
      C
0036          READ(1)INAM,IDAT
0037          WRITE(2,914)(LNAM(I),I=1,30),IDAT(1),'-',
             1  IDAT(2),'-',IDAT(3),(IDCODE(I),I=1,11),
             2  AGE,EXTEMP,EXGRAV,IMMERS,BODPOS,AMPRES,DRUGS,EXERCI,
             3  BRTMIX,BODHYD,AMGAS,(STRTIM(I),I=1,5),SPCOND,KCMMTS
0038          DO 90 I=1,4
0039       90 WRITE(2,915)(COMMTS(I,J),J=1,80)
0040      100 READ(1,END=150,ERR=150)IBTH,ELPST,BRVOL,BRN2V,O2TID,
             1  N2TID,COTID
0041          IF(IBTH.EQ.0)GO TO 200
0043          WRITE(2,916)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
0044          GO TO 100
0045      150 IBTH=0
0046          ELPST=0.
0047          BRVOL=0.
0048          BRN2V=0.
0049          O2TID=0.
0050          N2TID=0.
0051          COTID=0.
0052      200 WRITE(2,916)IBTH,ELPST,BRVOL,BRN2V,O2TID,N2TID,COTID
      C
      C
0053      300 CLOSE(UNIT=1,DISP='SAVE')
```

```
0054          CLOSE(UNIT=2,DISP='SAVE')
      C
      C
0055      914 FORMAT(30A1,2(I2,A1),I2,11A1,I2,F7.2,I1,A1,I2,F7.2,5(I2),
             1  5A1,I2,A1)
0056      915 FORMAT(80A1)
0057      916 FORMAT(I4,F10.1,5(F10.5))
0058      917 FORMAT(/5X,'ENTER FILENAME ON WHICH DATA IS STORED ',
             1  /10X,'(DEVICE:FILENAME.TYPE): ',$)
0059      918 FORMAT(/5X,'ENTER FILENAME ON WHICH DATA IS TO BE PLACED ',
             1  /10X,'(DEVICE:FILENAME.TYPE): ',$)
0060      919 FORMAT(I4,F10.1,4(F10.5))
0061      810 FORMAT(Q,20A1)
0062          END
```

FORTRAN IV Storage Map for Program Unit UPDATE
Local Variables, .PSECT $DATA, Size = 000754 (246. words)

Name	Type	Offset	Name	Type	Offset	Name	Type	Offset
AGE	I*2	000700	AMGAS	I*2	000672	AMPRES	R*4	000706
BODHYD	I*2	000670	BODPOS	I*2	000660	BRN2V	R*4	000722
BRTMIX	I*2	000666	BRVOL	R*4	000716	COTID	R*4	000736
DRUGS	I*2	000662	ELPST	R*4	000712	EXERCI	I*2	000664
EXGRAV	I*2	000656	EXTEMP	R*4	000702	I	I*2	000744
IBTH	I*2	000676	IMMERS	L*1	000654	J	I*2	000742
KCMMTS	L*1	000655	MC	I*2	000746	N2TID	R*4	000732
O2TID	R*4	000726	SPCOND	I*2	000674			

Local and COMMON Arrays:

Name	Type	Section	Offset	------Size-----	Dimensions
COMMTS	L*1	$DATA	000020	000500 (160.)	(4,80)
IDAT	I*2	$DATA	000626	000006 (3.)	(3)
IDCODE	L*1	$DATA	000000	000013 (6.)	(11)
IFIL	L*1	$DATA	000520	000024 (10.)	(20)
IFIL2	L*1	$DATA	000544	000024 (10.)	(20)
INAM	I*2	$DATA	000570	000036 (15.)	(15)
LNAM	L*1	$DATA	000570	000036 (15.)	(30)
STRTIM	L*1	$DATA	000013	000005 (3.)	(5)

6.0 SAMPLE RUNS WITH INPUT AND OUTPUT

6.1 PERSONAL DATA INPUT PROGRAM

```
.RUN DY1:PDINPT

        NITROGEN WASHOUT PERSONAL DATA INPUT PROGRAM

         FILENAME ON WHICH TO STORE DATA
         DEVICE:FILENAME.TYPE = SY:TEST.PDI

IDENTIFICATION NUMBER OF THE SUBJECT(XXX-XX-XXXX): [redacted]

DATE (MM-DD-YY) : 07-08-82

DATE OF BIRTH (MM-DD-YY): [redacted]

AGE IN YEARS: 36

SEX (M/F): M

HEIGHT IN CM: 178

NUDE WEIGHT IN KG: 78

IS % BODY FAT EXPLICITLY KNOWN (Y/N)? YU

ENTER % BODY FAT: 15

IS BODY COMPOSITION TO BE MEASURED BY WATER IMMERSION (Y/N)? Y

  WATER TEMPERATURE IN CENTIGRADE: 34

  WATER DENSITY IN KG/L: .988

  RESIDUAL VOLUME IN L: 1.3

  WEIGHT OF UNDERWATER CHAIR IN KG: 3.1

  ENTER THE NUMBER OF TRIALS FOR UNDERWATER WEIGHT: 10

    TRIAL  1 UNDERWATER WEIGHT IN KG: 4

    TRIAL  2 UNDERWATER WEIGHT IN KG: 4

    TRIAL  3 UNDERWATER WEIGHT IN KG: 5

    TRIAL  4 UNDERWATER WEIGHT IN KG: 5

    TRIAL  5 UNDERWATER WEIGHT IN KG: 4

    TRIAL  6 UNDERWATER WEIGHT IN KG: 5

    TRIAL  7 UNDERWATER WEIGHT IN KG: 5

    TRIAL  8 UNDERWATER WEIGHT IN KG: 6

    TRIAL  9 UNDERWATER WEIGHT IN KG: 5

    TRIAL 10 UNDERWATER WEIGHT IN KG: 4

  DATE OF MEASUREMENTS (MM-DD-YY): 12-22-81
```

```
IS BODY COMPOSITION TO BE MEASURED BY SKINFOLD PROCESS I (Y/N)? Y
  BODY SIDE USED (R/L)? R
  ENTER THE NUMBER OF MEASUREMENTS RECORDED: 3
    MEASUREMENT 1 BICEPS IN MM: 15
    MEASUREMENT 2 BICEPS IN MM: 15
    MEASUREMENT 3 BICEPS IN MM: 14
    MEASUREMENT 1 TRICEPS IN MM: 9
    MEASUREMENT 2 TRICEPS IN MM: 9
    MEASUREMENT 3 TRICEPS IN MM: 10
    MEASUREMENT 1 SUBSCAPULAR IN MM: 5
    MEASUREMENT 2 SUBSCAPULAR IN MM: 5
    MEASUREMENT 3 SUBSCAPULAR IN MM: 4
    MEASUREMENT 1 SUPRAILIAC IN MM: 18
    MEASUREMENT 2 SUPRAILIAC IN MM: 19
    MEASUREMENT 3 SUPRAILIAC IN MM: 18
  DATE OF MEASUREMENTS (MM-DD-YY): 12-18-82

IS BODY COMPOSITION TO BE MEASURED BY SKINFOLD PROCESS II (Y/N)? Y
  BODY SIDE USED (R/L)? R
  ENTER THE NUMBER OF MEASUREMENTS RECORDED: 3
    MEASUREMENT 1 MIDCLAVICULAR IN MM: 5
    MEASUREMENT 2 MIDCLAVICULAR IN MM: 5
    MEASUREMENT 3 MIDCLAVICULAR IN MM: 4
    MEASUREMENT 1 UMBILICUS IN MM: 11
    MEASUREMENT 2 UMBILICUS IN MM: 10
    MEASUREMENT 3 UMBILICUS IN MM: 10
    MEASUREMENT 1 ANTERIOR MID-THIGH IN MM: 11
    MEASUREMENT 2 ANTERIOR MID-THIGH IN MM: 11
    MEASUREMENT 3 ANTERIOR MID-THIGH IN MM: 12
  DATE OF MEASUREMENTS (MM-DD-YY): 12-25-82
```

ALIGN PAPER TO TOP OF PAGE AND HIT CARRIAGE RETURN

PERSONAL CHARACTERISTICS PROFILE

SUBJECT [redacted]		DATA FILE	SY:TEST.PDI
DATE	08-JUL-82	MALE	AGE 36
HEIGHT	178.0 CM	% BODY FAT	15.0 %
NUDE WEIGHT	78.0 KG	DATE OF BIRTH	[redacted]

BODY COMPOSITION EVALUATIONS

WATER IMMERSION PROCESS

NUDE WEIGHT	78.00 KG	WATER TEMPERATURE	34.00 C
RESIDUAL VOLUME	1.30 L	WATER DENSITY	0.99 KG/L
UNDERWATER CHAIR WEIGHT	3.10 KG	DATE	22-DEC-81

UNDERWATER WEIGHT (KG) AVERAGE UNDERWATER WEIGHT = 4.70 KG

TRIAL	WEIGHT (KG)	TRIAL	WEIGHT (KG)
1	4.00	2	4.00
3	5.00	4	5.00
5	4.00	6	5.00
7	5.00	8	6.00
9	5.00	10	4.00

WATER WEIGHT	1.60 KG	BODY VOLUME	76.03 L
BODY DENSITY	1.026 KG/L	% BODY FAT	32.48 %

---------- SKINFOLD PROCESS I ----------

BODY SIDE USED RIGHT DATE 18-DEC-82

TRIAL MEASUREMENTS IN MM

	BICEPS	TRICEPS	SUBSCAPULAR	SUPRAILIAC
1	15.00	9.00	5.00	18.00
2	15.00	9.00	5.00	19.00
3	14.00	10.00	4.00	18.00
MEAN	14.67	9.33	4.67	18.33

BODY DENSITY 1.055 KG/L % BODY FAT 19.05 %

---------- SKINFOLD PROCESS II ----------

BODY SIDE USED RIGHT DATE 25-DEC-82

TRIAL MEASUREMENTS IN MM

	MIDCLAVICULAR	UMBILICUS	ANTERIOR MID-THIGH
1	5.00	11.00	11.00
2	5.00	10.00	11.00
3	4.00	10.00	12.00
MEAN	4.67	10.33	11.33

BODY DENSITY 1.079 KG/L % BODY FAT 8.57 %

---------- NUTRITION JOURNAL FORMULA ----------

BODY VOLUME 74.23 L BODY DENSITY 1.051 KG/L

% BODY FAT 21.20 % % FAT FREE MASS 78.80 %

% TOTAL BODY WATER 58.15 %

NITROGEN CONTENT DATA

	KNOWN % BODY FAT	WATER IMMERSION	SKINFOLD PROCESS I	SKINFOLD PROCESS II	NUTRITION JOURNAL
% BODY FAT	15.00	32.48	19.05	8.57	21.20
FAT WEIGHT (KG)	11.70	25.34	14.86	6.68	16.54
FAT FREE MASS (KG)	66.30	52.66	63.14	71.32	61.46
LEAN BODY WATER MASS (KG)	47.74	37.92	45.46	51.35	44.25
VOLUME OF FAT (L)	13.00	28.15	16.51	7.42	18.38
VOLUME LEAN BODY WATER (L)	48.06	38.17	45.77	51.70	44.55
NITROGEN IN FAT (L)	0.871	1.886	1.106	0.497	1.231
NITROGEN IN LEAN BODY WATER (L)	0.625	0.496	0.595	0.672	0.579
TOTAL BODY NITROGEN (L)	1.496	2.383	1.701	1.169	1.810
NITROGEN/KG BODY WEIGHT (L)	0.0192	0.0305	0.0218	0.0150	0.0232

ORIGINAL PAGE IS
OF POOR QUALITY

6.2 DECOMPRESSION DATA PROGRAM

```
.RUN DY1:DECDAT


          DECOMPRESSION EXPERIENCE DATA PROGRAM

          FILENAME ON WHICH TO STORE DATA
          DEVICE:FILENAME.TYPE= SY:TEST.DEC

SUBJECT IDENTIFICATION NUMBER (XXX-XX-XXXX): [redacted]

TEST NUMBER (XX): 01

TEST DATE (MM-DD-YY): 07-08-82

HOW MANY PHASES (XX): 2

INITIAL PN2 (PSI) (XX.XX): 11.2

PN2 DURING WASHOUT, PHASE I (PSI) (XX.XX): 9

DURATION OF WASHOUT, PHASE I (MIN) (XXXX): 80

PN2 DURING WASHOUT, PHASE I (PSI) (XX.XX): 8.3

DURATION OF WASHOUT, PHASE I (MIN) (XXXX): 80

FINAL PRESSURE (PSIA) (XX.XX): 5.7

TEMPERATURE IN CENTIGRADE (XX): 32

TIME OF FINAL DECOMPRESSION (HH:MM): 12:00

TIME OF RECOMPRESSION (HH:MM): 14:40

EXERCISE LEVEL
                LOW    400- 800 BTU/HR
                MED    800-1600 BTU/HR
                HIGH 1600 BTU/HR AND ABOVE
                                        ENTER (L/M/H): L

WERE BUBBLES MEASURED (Y/N)? Y

WERE BUBBLES PRESENT (Y/N)? Y

     GRADE OF BUBBLES : ENTER 0 FOR NOT OBSERVED

TIME OF ONSET GRADE 1 (HH:MM): 13:00

TIME OF ONSET GRADE 2 (HH:MM): 0

TIME OF ONSET GRADE 3 (HH:MM): 0

TIME OF ONSET GRADE 4 (HH:MM): 0
```

```
     GRADE OF BUBBLES : ENTER 0 FOR NOT OBSERVED
TIME OF REMISSION GRADE 1 (HH:MM): 15:00
TIME OF REMISSION GRADE 2 (HH:MM): 0
TIME OF REMISSION GRADE 3 (HH:MM): 0
TIME OF REMISSION GRADE 4 (HH:MM): 0
     GRADE OF BUBBLES : ENTER 0 FOR NOT OBSERVED
PRESSURE AT REMISSION GRADE 1 (PSIA) (XX.XX): 10
PRESSURE AT REMISSION GRADE 2 (PSIA) (XX.XX): 0
PRESSURE AT REMISSION GRADE 3 (PSIA) (XX.XX): 0
PRESSURE AT REMISSION GRADE 4 (PSIA) (XX.XX): 0
WERE BENDS PRESENT (Y/N)? Y
BENDS LOCATION (TEXT): LEFT ELBOW

     GRADE OF BENDS : ENTER 0 FOR NOT OBSERVED
TIME OF ONSET GRADE 1 (HH:MM): 14:00
TIME OF ONSET GRADE 2 (HH:MM): 0
TIME OF ONSET GRADE 3 (HH:MM): 0
TIME OF ONSET GRADE 4 (HH:MM): 0

     GRADE OF BENDS : ENTER 0 FOR NOT OBSERVED
TIME OF REMISSION GRADE 1 (HH:MM): 14:50
TIME OF REMISSION GRADE 2 (HH:MM): 0
TIME OF REMISSION GRADE 3 (HH:MM): 0
TIME OF REMISSION GRADE 4 (HH:MM): 0

     GRADE OF BENDS : ENTER 0 FOR NOT OBSERVED
PRESSURE AT REMISSION GRADE 1 (PSIA) (XX.XX): 10
PRESSURE AT REMISSION GRADE 2 (PSIA) (XX.XX): 0
PRESSURE AT REMISSION GRADE 3 (PSIA) (XX.XX): 0
PRESSURE AT REMISSION GRADE 4 (PSIA) (XX.XX): 0
ALIGN PAPER TO TOP OF PAGE AND HIT CARRIAGE RETURN
```

DECOMPRESSION DATA OUTPUT

SUBJECT # [redacted] DATE 08-JUL-82

NITROGEN PRESSURE AT TIME OF FINAL DECOMPRESSION

FOR 180 MIN TISSUE : 10.00 PSI

FOR 240 MIN TISSUE : 10.24 PSI

FOR 360 MIN TISSUE : 10.52 PSI

DECOMPRESSION RATIO AT TIME OF FINAL DECOMPRESSION

FOR 180 MIN TISSUE : 1.49

FOR 240 MIN TISSUE : 1.53

FOR 360 MIN TISSUE : 1.57

6.3 NITROGEN WASHOUT PROGRAM

```
.RUN N2WASH

                N 2   W A S H O U T

INSTRUCTIONS ?


TESTLOAD N2WASH HAS 6 PHASES

    1  DATA CONSTANTS--ALLOWS USER
MODIFICATION OF CAL-GAS %"S.  OTHERWISE
PROGRAM USES DEFAULT VALUES.

    2  INITIALIZATION--ENTER HEADER INFORMATION

    3  CALIBRATE MASS SPECTROMETER

    4  CALIBRATE FLOW METER

    5  TEST DATA--SAMPLES TEST DATA CONTINUOUSLY
UNTIL USER TERMINATES

    6  TERMINATE--RETURNS CONTROL TO SYSTEM MONITOR


       ENTER # & RETURN

         PHASE 1  DATA CONSTANTS
     TO LEAVE VALUE UNCHANGED, ENTER
      N & RETURN.  TO CHANGE, ENTER Y
      & RETURN. GET "NEW VALUE" PROMPT,
      ENTER NEW VALUE & RETURN

     CALPCT(1,1)= 79.00
     CALPCT(2,1)= 21.00
     CALPCT(3,1)=  0.05
     CALPCT(1,2)=  0.00
     CALPCT(2,2)= 99.99
     CALPCT(3,2)=  0.00
     CALPCT(1,3)=  9.31Y
   NEW VALUE =8.010
     CALPCT(2,3)= 82.69Y
   NEW VALUE =86.99
     CALPCT(3,3)=  7.99Y
   NEW VALUE =5.004
     SAMPLE RATE=  25/SECY
   NEW VALUE =15
     BREATH GATE=  15.

     END OF PHASE   1
 NTER NEW PHASE # 2
```

```
        PHASE 2  INITIALIZATION

DATE (MM-DD-YY): 03-09-82

SUBJECT NAME : JOHN SMITH

SUBJECT IDENTIFICATION # (XXX-XX-XXXX): [redacted]

SUBJECT AGE (YEARS AS OF THIS DATE): 22

EXTERAL TEMPERATURE IN CENTIGRADE (XX.X): 35

EXTERNAL GRAVITY (1,0): 1

IS SUBJECT IMMERSED (Y/N): N

ENTER CODE FOR BODY POSITION (0 FOR NO DATA OR 1-99): 0

AMBIENT PRESSURE IN MM HG (XXX.X): 760

ENTER CODE FOR DRUGS (0 FOR NO DATA OR 1-99): 0

ENTER CODE FOR EXERCISE PROTOCOL (0 FOR NO DATA OR 1-99): 0

ENTER CODE FOR BREATHING MIXTURE (0 FOR NO DATA OR 1-99): 0

ENTER CODE FOR BODY HYDRATION (0 FOR NO DATA OR 1-99): 0

ENTER CODE FOR AMBIENT GAS COMPOSITION (0 FOR NO DATA OR 1-99): 0

STARTING TIME OF DAY (HH:MM): 08:00

ENTER CODE FOR OTHER SPECIAL CONDITIONS (0 FOR NO DATA OR 1-99): 0

ARE THERE ANY COMMENTS TO RECORD(Y/N)? Y

 TO ENTER COMMENTS HIT CARRIAGE RETURN THEN ENTER UP TO 4 LINES OF COMMENT
?TIS IS THE FIRST LINE OF A TEST
?THIS IS THE SECOND LINE OF A TEST
?THIS IS ANOTHER TEST LINE
?TIS IS THE LAST LINE FOR ENTERING TEXT.

    END OF PHASE   2
```

```
NTER NEW PHASE # 3

        PHASE 3  MASS SPEC CALIBRATION
    VERIFY CAL GASES ARE OPEN
    SET MASS SPEC FUNCTION TO "AUTO"
PAUSE -- SELECT N-2 0-10%. RETURN


PAUSE -- SELECT N-2 0-100%. RETURN


        NITROGEN, HI-RANGE
 CTS-1       CTS-2          SLOPE        INTCPT
1601.49      171.30          0.050       -0.493

        NITROGEN, LO-RANGE
 CTS-1       CTS-2          SLOPE        INTCPT
1651.81       -0.27          0.005        0.001

        OXYGEN
 CTS-1       CTS-2          SLOPE        INTCPT
2047.00     1813.27          0.056      -13.884

        CARBON DIOXIDE
 CTS-1       CTS-2          SLOPE        INTCPT
1036.52       -0.64          0.005        0.003

 END OF PHASE   3
```

```
NTER NEW PHASE # 4


        PHASE 4  FLOW METER CALIBRATION
PAUSE -- ZERO SPIROMETER.RETURN THANK YOU


        SPIROMETER
    CTS-1       CTS-2          SLOPE        INTCPT
    460.93       50.43          0.002      -50.426

    END OF PHASE   4
```

```
NTER NEW PHASE # 5
    SELECT N-2 0-100% RANGE.
    RETURN TO START.
    TO STOP AT ANY TIME, ENTER S & RETURN.
       1       9.0   2.51719   0.32105   0.12754
       2      17.0   2.77444   0.32822   0.11830
       3      29.0   3.02292   0.20593   0.06812
       4      40.0   2.95325   0.13357   0.04523
       5      50.0   2.46571   0.06869   0.02786
   1  MIN N2(L) 1.05747   N2TOT   1.05747
    SELECT N-2 0-10% RANGE
       6      63.0   2.08422   0.03345   0.01605
       7      72.0   2.46863   0.05014   0.02031
       8      85.0   2.54334   0.03602   0.01416
       9      97.0   2.02381   0.02119   0.01047
      10     108.0   2.05873   0.01837   0.00892
      11     120.0   2.19856   0.01782   0.00811
   2  MIN N2(L) 0.17699   N2TOT   1.23446
      12     128.0   1.82779   0.01440   0.00788
      13     137.0   1.39287   0.01011   0.00726
      14     146.0   1.56421   0.00942   0.00602
      15     155.0   1.17964   0.00696   0.00590
      16     157.0   1.17736   0.00011   0.00009
      17     165.0   1.65856   0.00764   0.00461
      18     173.0   1.78037   0.00832   0.00467
   3  MIN N2(L) 0.05695   N2TOT   1.29141
      19     183.0   1.56372   0.00624   0.00399
      20     193.0   1.42941   0.00547   0.00383
      21     201.0   1.08268   0.00432   0.00399
      22     204.0   1.08333   0.00005   0.00005
      23     211.0   1.45686   0.00474   0.00328
      24     220.0   1.31297   0.00423   0.00322
      25     228.0   1.27058   0.00403   0.00317
      26     237.0   1.32840   0.00382   0.00287
   4  MIN N2(L) 0.03292   N2TOT   1.32433
      27     248.0   1.32580   0.00391   0.00295
      28     256.0   1.22592   0.00348   0.00284
      29     264.0   1.21098   0.00328   0.00271
      30     273.0   1.19766   0.00338   0.00282
      31     282.0   1.27091   0.00365   0.00288
      32     290.0   1.34025   0.00370   0.00276
      33     299.0   1.55187   0.00416   0.00288
   5  MIN N2(L) 0.02556   N2TOT   1.34989
      34     308.0   1.44159   0.00384   0.00266
      35     316.0   1.20903   0.00307   0.00254
      36     325.0   1.21488   0.00306   0.00252
      37     334.0   1.27188   0.00322   0.00253
      38     343.0   1.14439   0.00287   0.00251
      39     350.0   0.99904   0.00230   0.00230
      40     360.0   1.10623   0.00208   0.00188
   6  MIN N2(L) 0.02044   N2TOT   1.37033
      41     367.0   1.12036   0.00225   0.00201
      42     373.0   1.24167   0.00274   0.00221
      43     383.0   1.14131   0.00191   0.00168
      44     390.0   1.20010   0.00261   0.00217
      45     396.0   0.16559   0.00022   0.00132
      46     398.0   0.16851   0.00001   0.00004
      47     406.0   1.79222   0.00388   0.00216
      48     414.0   1.18597   0.00273   0.00231
```

```
 7  MIN N2(L) 0.01635   N2TOT   1.38668
    49      421.0   1.11711   0.00249   0.00223
    50      430.0   1.19636   0.00246   0.00205
    51      438.0   1.30323   0.00290   0.00222
    52      446.0   1.13595   0.00210   0.00185
    53      454.0   1.18483   0.00228   0.00193
    54      465.0   1.25126   0.00208   0.00167
    55      472.0   1.34025   0.00270   0.00202
    56      480.0   1.20887   0.00229   0.00189
 8  MIN N2(L) 0.01930   N2TOT   1.40597
    57      489.0   1.19718   0.00230   0.00192
    58      496.0   1.15430   0.00216   0.00187
    59      505.0   1.13238   0.00209   0.00185
    60      513.0   1.26928   0.00244   0.00192
    61      515.0   1.26457   0.00010   0.00008
    62      522.0   1.33863   0.00241   0.00180
    63      531.0   1.33928   0.00233   0.00174
    64      540.0   1.27822   0.00192   0.00150
 9  MIN N2(L) 0.01576   N2TOT   1.42173
    65      547.0   1.12426   0.00186   0.00166
    66      555.0   1.04370   0.00175   0.00168
    67      562.0   0.97712   0.00165   0.00169
            571.0   1.04906   0.00182   0.00173
            578.0   1.02259   0.00172   0.00168
                    1.19571   0.00207   0.00173
                    .07034    0.00180   0.00168
                          TOT   1.43440
                                .00209    0.00172
    1251                                  0.00172
    1252    1061..                        .196
177  MIN N2(L) 0.001..
    1253    10622.0   1.44...
    1254    10632.0   1.21001   0.
    1255    10640.0   1.20221   0.0002.
    1256    10653.0   1.55836   0.00032   0..
    1257    10664.0   1.48544   0.00030   0.00020
    1258    10673.0   1.13205   0.00028   0.00025
178  MIN N2(L) 0.00174   N2TOT   2.17932
    1259    10683.0   0.82219   0.00015   0.00018
    1260    10685.0   0.00000   0.00000   0.00000
    1261    10696.0   1.76007   0.00043   0.00025
    1262    10709.0   1.52344   0.00031   0.00021
    1263    10721.0   1.42649   0.00029   0.00020
    1264    10731.0   1.27074   0.00026   0.00020
    1265    10733.0   0.08211   0.00000   0.00003
179  MIN N2(L) 0.00145   N2TOT   2.18077
    1266    10742.0   0.87919   0.00016   0.00018
    1267    10752.0   1.79904   0.00051   0.00028
    1268    10763.0   1.34236   0.00030   0.00023
    1269    10774.0   2.00254   0.00047   0.00034
    1270    10785.0   1.68634   0.00034   0.00020
    1271    10797.0   1.75503   0.00036   0.00021
S180  MIN N2(L) 0.00215   N2TOT   2.18292


   END OF PHASE   5
NTER NEW PHASE # 6

STOP -- BYE
```

6.4 NITROGEN DATA PROGRAM

```
.RUN DY1:N2DATA

        NITROGEN WASHOUT DATA ANALYSIS
    ENTER FILENAME ON WHICH DATA IS STORED
    (DEVICE:FILENAME.TYPE): DY1:IERWW1.N2W

    A FULL REPORT (F) GIVES BREATH BY BREATH PARAMETERS
    A 1 MINUTE REPORT (1) GIVES PARAMETERS FOR 1 MINUTE INTERVALS
    A 5 MINUTE REPORT (5) GIVES PARAMETERS FOR 5 MINUTE INTERVALS
    A SHORT REPORT (S) GIVES THE OVERALL AVERAGES

    DO YOU WANT A FULL REPORT (F), A 1 MINUTE REPORT (1),
    A 5 MINUTE REPORT (5),OR  A SHORT REPORT (S) ?
    TYPE (F/1/5/S): F

PAUSE --  ADVANCE CARRIAGE IF DESIRED.  RETURN
```

N2DATA REPORT

IERWW1		AGE: 0 DATE:	1-DEC-81
SUBJECT ID NUMBER:		STARTING TIME:	
EXTERNAL TEMPERATURE:	0.00	EXTERNAL GRAVITY:	0
IMMERSION?	NO	BODY POSITION CODE:	0
AMBIENT PRESSURE:	0.00	DRUG CODE:	0
EXERCISE CODE:	0	BREATH MIXTURE CODE:	0
BODY HYDRATION CODE:	0	AMBIENT GAS CODE:	0
SPECIAL CONDITION CODE:	0	COMMENTS?	NO
COMMENTS:			

BREATH #	ELAPSED TIME (SEC)	BREATH VOLUME (L)	N2 VOL /BREATH (L)	O2 CONC /BREATH	N2 CONC /BREATH	CO2 CONC /BREATH
1	9.0	2.51719	0.32105	0.81261	0.12754	0.03284
2	17.0	2.77444	0.32822	0.81574	0.11830	0.03991
3	29.0	3.02292	0.20593	0.88528	0.06812	0.03382
4	40.0	2.95325	0.13357	0.90448	0.04523	0.03693
5	50.0	2.46571	0.06869	0.92569	0.02786	0.03502
6	63.0	2.08422	0.03345	0.94523	0.01605	0.02927
7	72.0	2.46863	0.05014	0.93448	0.02031	0.03974
8	85.0	2.54334	0.03602	0.94588	0.01416	0.03561
9	97.0	2.02381	0.02119	0.95163	0.01047	0.03204
10	108.0	2.05873	0.01837	0.95308	0.00892	0.03265
11	120.0	2.19856	0.01782	0.94887	0.00811	0.03480
12	128.0	1.82779	0.01440	0.94779	0.00788	0.03720
13	137.0	1.39287	0.01011	0.94576	0.00726	0.03748
14	146.0	1.56421	0.00942	0.95191	0.00602	0.03308
15	155.0	1.17964	0.00696	0.94392	0.00590	0.03781
16	157.0	1.17736	0.00011	0.89991	0.00009	0.00064
17	165.0	1.65856	0.00764	0.95518	0.00461	0.03209
18	173.0	1.78037	0.00832	0.95117	0.00467	0.03601
19	183.0	1.56372	0.00624	0.95605	0.00399	0.03333
	193.0	1.42941	0.00547	0.95516	0.00383	0.03344
		1.08268	0.00432	0.94535	0.00399	0.03817
			0.00005	0.88880	0.00005	0.00093
				0.95675	0.00326	0.03187
					0.00322	0.03221
1258	10683.0				0.00317	0.03512
1259	10683.0					0.03327
1260	10685.0	0.00000				
1261	10696.0	1.76007	0.00045			
1262	10709.0	1.52344	0.00031	0.96...		
1263	10721.0	1.42649	0.00029	0.96334	0.00...	
1264	10731.0	1.27074	0.00026	0.95785	0.00020	
1265	10733.0	0.08211	0.00000	0.79992	0.00003	0.00120
1266	10742.0	0.87919	0.00016	0.96392	0.00018	0.02311
1267	10752.0	1.79904	0.00051	0.96155	0.00028	0.03352
1268	10763.0	1.34236	0.00030	0.96183	0.00023	0.03021
1269	10774.0	2.00254	0.00047	0.96173	0.00024	0.03223
1270	10785.0	1.68634	0.00034	0.95896	0.00020	0.03037
1271	10797.0	1.75503	0.00036	0.96345	0.00021	0.02912

AVERAGES:

BREATH VOLUME(L)	N2 VOLUME /BREATH(L)	O2 CONC /BREATH	N2 CONC /BREATH	CO2 CONC /BREATH
1.27147	0.00172	0.94703	0.00095	0.03036

TOTAL N2 VOLUME IN LITERS= 2.18273

TOTAL # OF BREATHS= 1271

END OF DATA..READ ANOTHER FILE (Y/N): Y

```
      NITROGEN WASHOUT DATA ANALYSIS
ENTER FILENAME ON WHICH DATA IS STORED
(DEVICE:FILENAME.TYPE): DY1:IERWW1.N2W

A FULL REPORT (F) GIVES BREATH BY BREATH PARAMETERS
A 1 MINUTE REPORT (1) GIVES PARAMETERS FOR 1 MINUTE INTERVALS
A 5 MINUTE REPORT (5) GIVES PARAMETERS FOR 5 MINUTE INTERVALS
A SHORT REPORT (S) GIVES THE OVERALL AVERAGES

DO YOU WANT A FULL REPORT (F), A 1 MINUTE REPORT (1),
A 5 MINUTE REPORT (5),OR  A SHORT REPORT (S) ?
TYPE (F/1/5/S): 1

PAUSE --  ADVANCE CARRIAGE IF DESIRED.  RETURN

                    N2DATA REPORT

IERWW1                                AGE:  0    DATE:    1-DEC-81

SUBJECT ID NUMBER:                    STARTING TIME:

EXTERNAL TEMPERATURE:       0.00      EXTERNAL GRAVITY:          0

IMMERSION?                    NO      BODY POSITION CODE:        0

AMBIENT PRESSURE:           0.00      DRUG CODE:                 0

EXERCISE CODE:                0       BREATH MIXTURE CODE:       0

BODY HYDRATION CODE:          0       AMBIENT GAS CODE:          0

SPECIAL CONDITION CODE:       0       COMMENTS?                 NO

COMMENTS:



ENTER THE SUBJECT'S BODY WEIGHT IN ks: 77.2

ENTER THE SUBJECT'S ESTIMATED N2 CONTENT IN LITERS: 2.3
```

TIME (min)	N2 VOL/ INTERVAL (ml)	O2 VOL/ INTERVAL (ml)	CO2 VOL/ INTERVAL (ml)	N2/WEIGHT (ml/ks)	N2 CONC/ INTERVAL	CUMMUL. N2 (ml)	% OF EST. N2 CONT. (%)	BMR (BTU/hr)
1	1057.46	11938.49	491.04	13.69767	0.07741	1057.46	45.98	668.99
2	176.99	12657.25	458.25	2.29262	0.01300	1234.45	53.67	624.32
3	56.96	9989.33	334.63	0.73782	0.00320	1291.41	56.15	455.90
4	32.90	9966.83	319.79	0.42617	0.00305	1324.31	57.58	435.68
5	25.56	8694.38	307.06	0.33109	0.00281	1349.87	58.69	418.34
6	20.44	7980.53	279.52	0.26477	0.00242	1370.31	59.58	380.82
7	16.35	7618.70	249.28	0.21179	0.00174	1386.66	60.29	339.63
8	19.30	9279.59	321.17	0.25000	0.00198	1405.96	61.13	437.56
9	15.75	9319.81	284.61	0.20402	0.00159	1421.71	61.81	387.76
10	12.67	7109.67	247.16	0.16412	0.00169	1434.38	62.36	336.73
11	14.64	8037.31	284.84	0.18964	0.00173	1449.02	63.00	388.07
12	14.31	8019.60	277.13	0.18536	0.00170	1463.33	63.62	377.57

13	12.08	7249.82	247.84	0.15648	0.00158	1475.41	64.15	337.66
14	12.62	8022.86	285.11	0.16347	0.00149	1488.03	64.70	388.43
15	10.45	6435.98	228.16	0.13536	0.00154	1498.48	65.15	310.84
16	12.50	8785.69	308.66	0.16192	0.00136	1510.98	65.69	420.51
17	11.20	8726.81	299.61	0.14508	0.00123	1522.18	66.18	408.20
18	10.47	8156.81	287.66	0.13562	0.00122	1532.65	66.64	391.91
19	10.93	8746.92	297.07	0.14158	0.00119	1543.58	67.11	404.73
20	9.29	7559.20	267.16	0.12034	0.00117	1552.87	67.52	363.98
21	10.61	10228.19	344.54	0.13744	0.00098	1563.48	67.98	469.41
22	8.56	8421.31	290.79	0.11088	0.00097	1572.04	68.35	396.17
23	7.93	8158.42	273.69	0.10272	0.00092	1579.97	68.69	372.87
24	7.88	9452.10	281.93	0.10207	0.00079	1587.85	69.04	384.10
25	8.98	9396.11	320.56	0.11632	0.00091	1596.83	69.43	436.73
26	6.77	6709.58	233.98	0.08769	0.00096	1603.60	69.72	318.78
27	7.45	8046.30	268.78	0.09650	0.00088	1611.05	70.05	366.19
28	7.81	9113.00	305.07	0.10117	0.00082	1618.86	70.39	415.63
29	6.32	7008.47	225.62	0.08187	0.00086	1625.18	70.66	307.39
30	9.64	11420.86	362.66	0.12487	0.00081	1634.82	71.08	494.09
31	11.23	14616.33	462.58	0.14547	0.00073	1646.05	71.57	630.22
32	10.67	11642.66	421.87	0.13821	0.00088	1656.72	72.03	574.76
33	8.68	9911.68	320.73	0.11244	0.00081	1665.40	72.41	436.96
34	6.80	7733.59	268.99	0.08808	0.00085	1672.20	72.70	366.47
35	6.37	7373.51	263.86	0.08251	0.00082	1678.57	72.98	359.48
[illegible]	6.24	6916.55	247.06	0.08083	0.00086	1684.81	73.25	336.59
[illegible]	[illegible]34	7512.04	244.87	0.08212	0.00081	1691.15	73.53	333.62
[illegible]	[illegible]	[illegible]737.26	216.42	0.06813	0.00079	1696.41	73.76	294.85
161	[illegible]	[illegible]	[illegible]240.60	0.07850	0.00077	1702.47	74.02	355.04
162	1.82	[illegible]	[illegible]	[illegible]07176	0.00064	1708.01	74.26	368.85
163	2.19	8122.80	[illegible]	[illegible]	[illegible]00071	1713.33	74.49	327.49
164	2.29	8234.90	267.7[illegible]	[illegible]	[illegible]	1719.88	74.78	393.75
165	1.99	7510.80	237.47	0.025[illegible]	[illegible]	[illegible]	75.04	384.78
166	1.97	7009.65	220.03	0.02552	0.000[illegible]	[illegible]	[illegible]	359.74
167	2.14	8772.87	270.56	0.02772	0.00023	215[illegible]	[illegible]	[illegible]
168	1.89	8361.51	242.34	0.02448	0.00021	2159.76	[illegible]	[illegible]
169	2.27	9930.67	311.13	0.02940	0.00022	2162.03	94.00	[illegible]
170	2.04	9507.63	265.19	0.02642	0.00020	2164.07	94.09	361.29
171	1.81	7592.87	229.31	0.02345	0.00023	2165.88	94.17	312.42
172	2.31	9223.87	280.34	0.02992	0.00024	2168.19	94.27	381.93
173	2.36	10104.62	304.94	0.03057	0.00022	2170.55	94.37	415.40
174	1.83	8429.64	243.98	0.02370	0.00021	2172.38	94.45	332.40
175	1.90	9398.94	291.70	0.02461	0.00019	2174.28	94.53	397.41
176	1.72	9246.69	281.06	0.02228	0.00018	2176.00	94.61	382.91
177	1.41	6099.01	179.05	0.01826	0.00018	2177.41	94.67	243.93
178	1.74	7718.02	241.92	0.02254	0.00022	2179.15	94.75	329.60
179	1.44	6590.36	209.12	0.01865	0.00015	2180.59	94.81	284.90

AVERAGES:

BREATH VOLUME(L)	N2 VOLUME /BREATH(L)	O2 CONC /BREATH	N2 CONC /BREATH	CO2 CONC /BREATH
1.27147	0.00172	0.94703	0.00095	0.03036

TOTAL N2 VOLUME IN LITERS= 2.18273

TOTAL # OF BREATHS= 1271

END OF DATA..READ ANOTHER FILE (Y/N): Y

```
        NITROGEN WASHOUT DATA ANALYSIS
    ENTER FILENAME ON WHICH DATA IS STORED
    (DEVICE:FILENAME.TYPE): DY1:IERWW1.N2W

    A FULL REPORT (F) GIVES BREATH BY BREATH PARAMETERS
    A 1 MINUTE REPORT (1) GIVES PARAMETERS FOR 1 MINUTE INTERVALS
    A 5 MINUTE REPORT (5) GIVES PARAMETERS FOR 5 MINUTE INTERVALS
    A SHORT REPORT (S) GIVES THE OVERALL AVERAGES

    DO YOU WANT A FULL REPORT (F), A 1 MINUTE REPORT (1),
    A 5 MINUTE REPORT (5),OR  A SHORT REPORT (S) ?
    TYPE (F/1/5/S): 5

PAUSE --  ADVANCE CARRIAGE IF DESIRED.  RETURN

                        N2DATA REPORT

 IERWW1                                AGE:  0    DATE:    1-DEC-81

 SUBJECT ID NUMBER:                    STARTING TIME:

 EXTERNAL TEMPERATURE:        0.00     EXTERNAL GRAVITY:           0

 IMMERSION?                     NO     BODY POSITION CODE:         0

 AMBIENT PRESSURE:            0.00     DRUG CODE:                  0

 EXERCISE CODE:                  0     BREATH MIXTURE CODE:        0

 BODY HYDRATION CODE:            0     AMBIENT GAS CODE:           0

 SPECIAL CONDITION CODE:         0     COMMENTS?                  NO

 COMMENTS:
```

ENTER THE SUBJECT'S BODY WEIGHT IN Ks: 77.2

ENTER THE SUBJECT'S ESTIMATED N2 CONTENT IN LITERS: 2.3

TIME (min)	N2 VOL/ INTERVAL (ml)	O2 VOL/ INTERVAL (ml)	CO2 VOL/ INTERVAL (ml)	N2/WEIGHT (ml/ks)	N2 CONC/ INTERVAL	CUMMUL. N2 (ml)	% OF EST. N2 CONT. (%)	BMR (BTU/hr)
5	1349.87	53246.28	1910.77	17.48537	0.01653	1349.87	58.69	520.65
10	84.51	41308.30	1381.75	1.09469	0.00187	1434.38	62.36	376.50
15	64.10	37765.59	1323.08	0.83031	0.00161	1498.48	65.15	360.51
20	54.39	41975.43	1460.17	0.70453	0.00123	1552.87	67.52	397.87
25	43.96	45656.13	1511.51	0.56943	0.00091	1596.83	69.43	411.86
30	37.99	42298.21	1396.12	0.49210	0.00087	1634.82	71.08	380.41
35	43.75	51277.77	1738.03	0.56671	0.00081	1678.57	72.98	473.58
40	29.44	36199.19	1239.68	0.38135	0.00077	1708.01	74.26	337.79
45	41.90	41562.05	1353.97	0.54275	0.00100	1749.91	76.08	368.93
50	30.13	41909.43	1349.61	0.39028	0.00065	1780.04	77.39	367.74
55	26.74	46125.07	1452.00	0.34637	0.00054	1806.78	78.56	395.64
60	23.51	43617.86	1393.54	0.30453	0.00051	1830.29	79.58	379.71
65	24.94	40958.88	1405.17	0.32306	0.00058	1855.23	80.66	382.88
70	19.91	37431.40	1269.87	0.25790	0.00051	1875.14	81.53	346.01
75	18.88	39210.10	1230.53	0.24456	0.00046	1894.02	82.35	335.30
80	18.62	40979.50	1244.67	0.24119	0.00043	1912.64	83.16	339.15
85	20.39	45240.64	1426.25	0.26412	0.00043	1933.03	84.04	388.63
90	21.10	54872.51	1620.45	0.27332	0.00038	1954.13	84.96	441.54
95	17.45	41760.23	1213.42	0.22604	0.00040	1971.58	85.72	330.63
100	16.98	42485.95	1355.14	0.21995	0.00037	1988.56	86.46	369.25
105	14.79	40231.99	1347.70	0.19158	0.00035	2003.35	87.10	367.22
110	15.91	43093.18	1414.17	0.20609	0.00035	2019.26	87.79	385.33
115	15.45	41953.68	1310.54	0.20013	0.00036	2034.71	88.47	357.09
120	14.87	45553.75	1400.65	0.19262	0.00030	2049.58	89.11	381.65
125	13.82	47164.87	1477.40	0.17902	0.00028	2063.40	89.71	402.56
130	12.19	39932.64	1288.64	0.15790	0.00029	2075.59	90.24	351.13
135	11.67	41307.94	1264.48	0.15117	0.00026	2087.26	90.75	344.54
140	11.05	39403.11	1274.23	0.14313	0.00027	2098.31	91.23	347.20
145	11.13	40149.90	1334.43	0.14417	0.00026	2109.44	91.71	363.61
150	10.94	44346.65	1327.57	0.14171	0.00022	2120.38	92.19	361.74
155	12.65	48831.21	1485.62	0.16386	0.00025	2133.03	92.74	404.80
160	10.70	40833.64	1302.66	0.13860	0.00024	2143.73	93.21	354.95
165	10.03	36201.57	1179.06	0.12992	0.00026	2153.76	93.64	321.27
170	10.31	43582.33	1309.25	0.13355	0.00022	2164.07	94.09	356.74
175	10.21	44749.94	1350.27	0.13225	0.00022	2174.28	94.53	367.92

AVERAGES:

BREATH VOLUME(L)	N2 VOLUME /BREATH(L)	O2 CONC /BREATH	N2 CONC /BREATH	CO2 CONC /BREATH
1.27147	0.00172	0.94703	0.00095	0.03036

TOTAL N2 VOLUME IN LITERS= 2.18273

TOTAL # OF BREATHS= 1271

END OF DATA..READ ANOTHER FILE (Y/N): Y

```
        NITROGEN WASHOUT DATA ANALYSIS
    ENTER FILENAME ON WHICH DATA IS STORED
    (DEVICE:FILENAME.TYPE): DY1:IERWW1.N2W

    A FULL REPORT (F) GIVES BREATH BY BREATH PARAMETERS
    A 1 MINUTE REPORT (1) GIVES PARAMETERS FOR 1 MINUTE INTERVALS
    A 5 MINUTE REPORT (5) GIVES PARAMETERS FOR 5 MINUTE INTERVALS
    A SHORT REPORT (S) GIVES THE OVERALL AVERAGES

    DO YOU WANT A FULL REPORT (F), A 1 MINUTE REPORT (1),
    A 5 MINUTE REPORT (5),OR  A SHORT REPORT (S) ?
    TYPE (F/1/5/S): S

PAUSE --  ADVANCE CARRIAGE IF DESIRED.  RETURN

                        N2DATA REPORT

 IERWW1                                  AGE:  0     DATE:     1-DEC-81

 SUBJECT ID NUMBER:                      STARTING TIME:

 EXTERNAL TEMPERATURE:        0.00       EXTERNAL GRAVITY:            0

 IMMERSION?                     NO       BODY POSITION CODE:          0

 AMBIENT PRESSURE:            0.00       DRUG CODE:                   0

 EXERCISE CODE:                  0       BREATH MIXTURE CODE:         0

 BODY HYDRATION CODE:            0       AMBIENT GAS CODE:            0

 SPECIAL CONDITION CODE:         0       COMMENTS?                   NO

 COMMENTS:


                          AVERAGES:

   BREATH       N2 VOLUME      O2 CONC     N2 CONC     CO2 CONC
  VOLUME(L)    /BREATH(L)     /BREATH     /BREATH     /BREATH

   1.27147       0.00172       0.94703     0.00095     0.03036

 TOTAL N2 VOLUME IN LITERS=  2.18273

 TOTAL # OF BREATHS=   1271

    END OF DATA..READ ANOTHER FILE (Y/N): N

STOP --
```

6.5 UPDATE PROGRAM

```
.R UPDATE

     ENTER FILENAME ON WHICH DATA IS STORED
          (DEVICE:FILENAME.TYPE): DY1:ENTNW1.N2W

     ENTER FILENAME ON WHICH DATA IS TO BE PLACED
          (DEVICE:FILENAME.TYPE): SY:TEST.UPD

STOP --
```

7.0 HARDWARE OPERATION

7.1 OVERVIEW

The volume of nitrogen eliminated from a subject is measured on a breath by breath basis by carefully measuring the volume and the gas composition of each expired breath. A Perkin-Elmer Medical Gas Analyzer 1100 Mass Spectrometer is used to measure the concentrations of nitrogen, oxygen, and carbon dioxide (in percent of total gas concentration) in expired breaths and the nitrogen concentration of the inspired air. The volume of nitrogen eliminated is equal to the breath volume times the concentration of nitrogen in the expired air less the volume of nitrogen inspired (this should be zero when breathing pure oxygen). The mass spectrometer has two nitrogen range settings, 0-100% and 0-10% to allow for greater resolution of nitrogen concentration at low levels. The output signal for each channel is 0-10 volts, including the two nitrogen ranges.

Breath volume is determined by a Skylab exhalation spirometer. The spirometer is a dry roller seal type which outputs an increasing voltage (approximately 0-7 volts) as the measured breath volume increases. The maximum measurable volume is five liters. After each breath, a five volt signal from the computer activates a solenoid which dumps the spirometer. The dump solenoid is gas driven and is connected to a high pressure (160 PSI) nitrogen source. A return spring empties the spirometer chamber, forcing over four liters of air out in less than 0.25 seconds. The breath is determined to be over when five consecutive samples of the spirometer input have not increased. The accuracy of the spirometer has been measured and is within 2% of the actual volume (1.000 liter reads 1.000 $\pm$ 0.0201).

Calibration of the mass spectrometer is performed by analyzing calibration gases of known purity and concentrations and determining slope and intercept values for each of the three gases analyzed (N2, C02, and 02). Real time analysis solves the linear equation y (% concentration) = slope x mass spectrometer output + b (intercept). Three N2 concentrations are used to provide high and low range calibration curves for each N2 range.

The LSI-11/02 measures the gas concentrations and breath volume by means of an ADAC 1030 analog to digital converter. The ADAC 1030 has 8 channels for differential analog input signals. Sampling of the analog input determines a digital output to the computer of an integer from 0-2047. The gain and channel selection is under computer software control. It is this count which is converted to the appropriate measurement (% or liters) by means of the slope and intercept determined by the calibration procedure.

The spirometer is calibrated by emptying the spirometer and having the computer sample the zero volume output. A one liter volume is simulated by the computer and determines the high calibration volume. Slope and intercept values are then calculated from the zero and one liter values.

Breath volume is continuously updated during a breath; a breath being defined as a spirometer analog output being greater than a minimum noise gate over the zero volume output. Consecutive volume samples are compared to each other to determine if the breath volume is still increasing. If

there is no additional volume measured between five samplings, the breath is considered to be over. The computer then loads one ADAC 1030 digital to analog channel with a 5 volt signal to the spirometer controller that dumps the spirometer. The spirometer purges to the ambient air.

The parallel interface board (ADAC 1632TTL) output controls the three 12 volt calibration gas solenoids and valves, and the LED breath indicators. The input buffer reads the mass spectrometer nitrogen range select switch and inlet valve select position.

The MDB KW11P Programmable Clock board regulates the interrupt timings for the subroutine SAMPLE. The two MDB DLV11 serial interface boards allow the use of either the printing terminal or a CRT terminal.

7.2 MASS SPECTROMETER

The Perkin-Elmer MGA 1100 Mass Spectrometer has been found to have a severe baseline drift (approximately + 0.5 %) due to a nitrogen exposure problem. When subjected to more than several minutes of gas samples with a high (ambient) N2 concentration, several hours may be required to read a true 0.00% nitrogen when pure oxygen is being sampled. It is necessary to flush pure oxygen into the mass spectrometer for at least two days prior to and up to the time of a test. With this flushing, a pure oxygen source will read 0.00% N2. The 30 seconds of nitrogen during the calibration does not affect the baseline drift for more than the first fifteen minutes of the washout, during which time the drift is a small (less than 2%) fraction of the expired breath nitrogen concentration. If the mass spectrometer is not adequately flushed out, pure oxygen will show up to 0.5 - 0.6% nitrogen, which is up to twenty times the value that may actually exist after a three hour washout. The software subtracts out low level nitrogen baseline drifts measured in the inspired air, but cannot cancel the effect of large drifts that overwhelm the desired measurement. Following lengthy oxygen flushing and minimizing the mass spectrometer exposure to nitrogen has given repeatable three hour washouts on a subject that are within 50 ml. of nitrogen of each other.

Typically, an easy method to flush the mass spectrometer is to insert the face mask catheter (inlet #1) into the oxygen tent 02 line set at a low flow. The inlet select switch must be switched to inlet #2 during calibration and returned to inlet #1 for the test and no longer than one or two minutes of ambient nitrogen exposure will occur.

7.3 CALIBRATION VALUES

A read only data file named DATCON.VAL is stored on the system floppy (DY0:), and contains all the initial calibration values used by the main program N2WASH.SAV. The three gas mixture calibration gas tank should be 9% N2, 86% O2, and 5% CO2 (all + 1 %). Certification must be precise to at least 20 parts per million (0.002%). The first three values in DATCON.VAL represent the concentrations of N2 in ambient air, in 100% O2 and in the three gas mixture. The next three values in DATCON.VAL represent the concentrations of O2 in ambient air, in 100% O2 and in the three gas mixture. The next three values in DATCON.VAL represent the concentrations of CO2 in ambient air, in 100% O2 and in the three gas mixture. These nine values, all separated by commas, are followed by the sample rate and the breath gate.

Each time a new tank of three gas calibration mixture gas is received in the Environmental Laboratory it will be necessary to change the gas percentages in DATCON.VAL.

In order to change the values listed in DATCON.VAL (originally 79.0,0.0,9.313,21.0,99.99,82.69,0.05,0.00,7.99,25,15.0),

Type

```
R LEDITV
```

The computer will type:

```
LINE-ORIENTED TEXT EDITOR
VERSION 2.0/A
FILE (DEVICE:FILENAME.TYPE) =
```

Type

```
DY0:DATCON.VAL
```

The computer will type:

```
NEW FILE (Y/N)?
```

Type

```
N (for no)
```

The computer will type:

```
FILE:DATCON.VAL                CONTAINS 1 LINES
BEGIN TEXT EDITING
```

Type

```
L (to list the line)
```

The computer will type the line. The N2, O2, and CO2 in the three gas mixture are the 3rd, 6th, and 9th values, respectively.

To replace the current value with a new value type:

RS:/(current value)/,/(new value)/

To check that the new value has been entered correctly type:

L (to list the line)

Repeat the previous 2 steps for each value which needs to be replaced. When you are satisfied tnat the line is correct with the new values , type:

END

This will make the changes permanent. Typing stop will abort the editing process and leave DATCON.VAL in its original form.

7.4 OPERATING THE N2WASH PROGRAM

N2WASH collects all the header information prior to the washout, prompting the test operator to enter all the information. Next, it controls and calibrates all of the subsystems necessary to the measurement of the washout, determining slopes and intercepts from calibration values. Finally, the program reads all the data during the experiment, performs some real time analysis and loads the data to the floppy disk and prints out the measured parameters on a breath by breath basis. One minute summary reports are also typed out.

This report assumes that the test operator is familiar with the general operation of the DEC LSI-RT11 operating system. If this is not so, refer to the APPENDIX: RT11 COMMANDS.

Before starting the program, the following must be available and, where appropriate, connected correctly (see Interconnections):

Perkin-Elmer Mass Spectrometer MGA 1100
Skylab Exhalation Spirometer and control electronics
LSI-11/02 Computer console w/floppy disk drive and printing terminal
Breathing O2 gas
Calibration gases (100% O2, and three gas mixture)
Mask assembly and hoses to spirometer
Floppy disk containing N2WASH.SAV on RT-11 version 4.0 Operating System (System floppy)
An initialized, double density, single sided floppy disk containing
at least 400 free blocks for 3 hours worth of data (Data Floppy)
N2 gas with approximately 160 psi (depends on the actuating pressure listed on the air diverter 3-way valve) to drive spirometer dump solenoid

1. Turn power on the following, (verify with on lights)

   Computer console
   LSI-11/02 computer (Line Time Clock, Run/Halt switches in up position)
   Disk drive (write protect off)
   Spirometer controller
   Mass spectrometer (on switch depressed)
   Printing terminal

2. Open all calibration gas valves (low flow, approximately 5 psi)

3. Instructions

   a. Insert the system floppy into the left hand slot DY1: with the label on the top. The exposed portion is inserted first. Push the floppy in all the way and close the door.

b. Insert the data floppy in the right hand slot DY1: in the same manner and close the door. (Note: DY1: is vital to program startup).

c. The disk drive will engage (with a series of audible clicks and the door LED flashing) and the terminal will respond by printing:

RT-11 SJ V04.00A

.D 56 = 1012

SET TT:SCOPE

ASS DY1: DK

TYPE SY:REMIND.TXT

ENTER DATE AND TIME

Enter the current date and time by typing:

DATE dd-mmm-yy (where dd=day 0-31, mmm=month three letters of the month JAN-DEC and yy=year 81,82..., separated by hyphens).

Press Return

Type TIME hh:mm (where hh=hours 00-24 and mm=minutes 00-59, separated by a colon).

Press Return

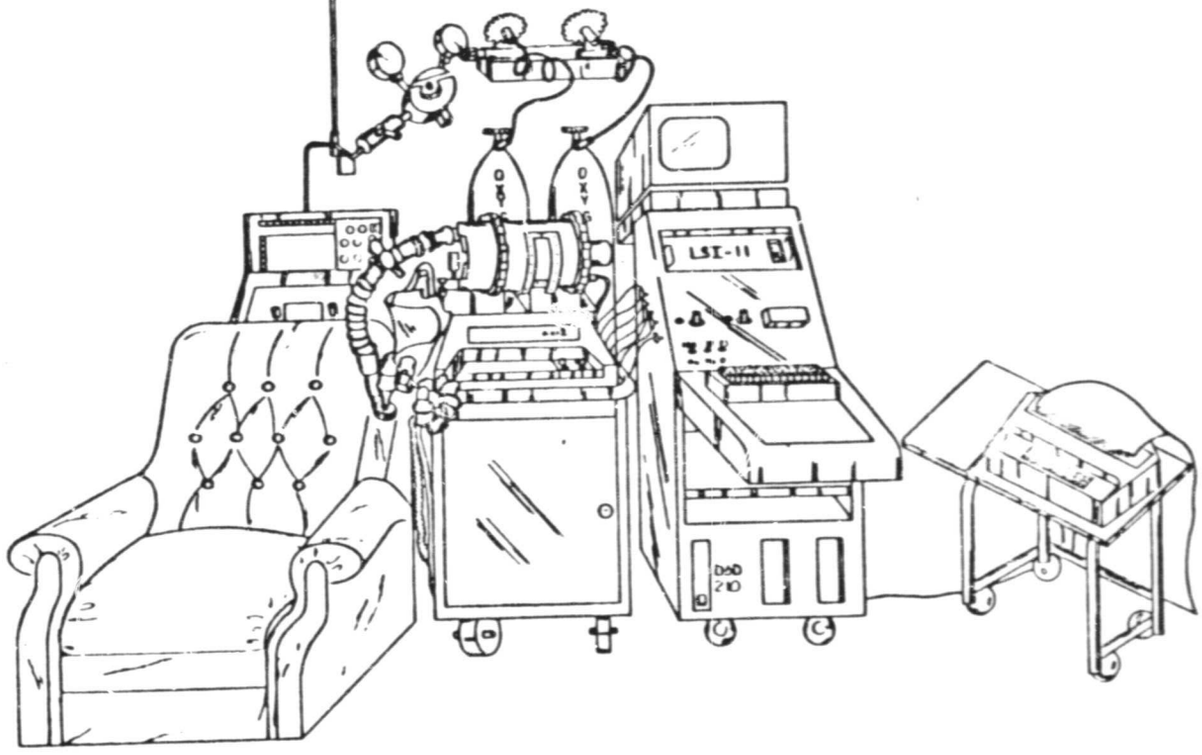
Verify the time by typing TIME and return, and the computer will respond by printing the updated time.

To switch the printing terminal to a CRT terminal, one must type

R TTY and press return.

The prompt character will then appear on the CRT (if turned on and connected). There will be no hard copy of the test generated unless R TTY is again typed in to return control to the printing terminal. This must be done while under monitor control, not in the N2WASH program.

8.0 ENGINEERING DIAGRAMS AND TABLES



ORIGINAL PAGE IS
OF POOR QUALITY

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

CONTRACT NO

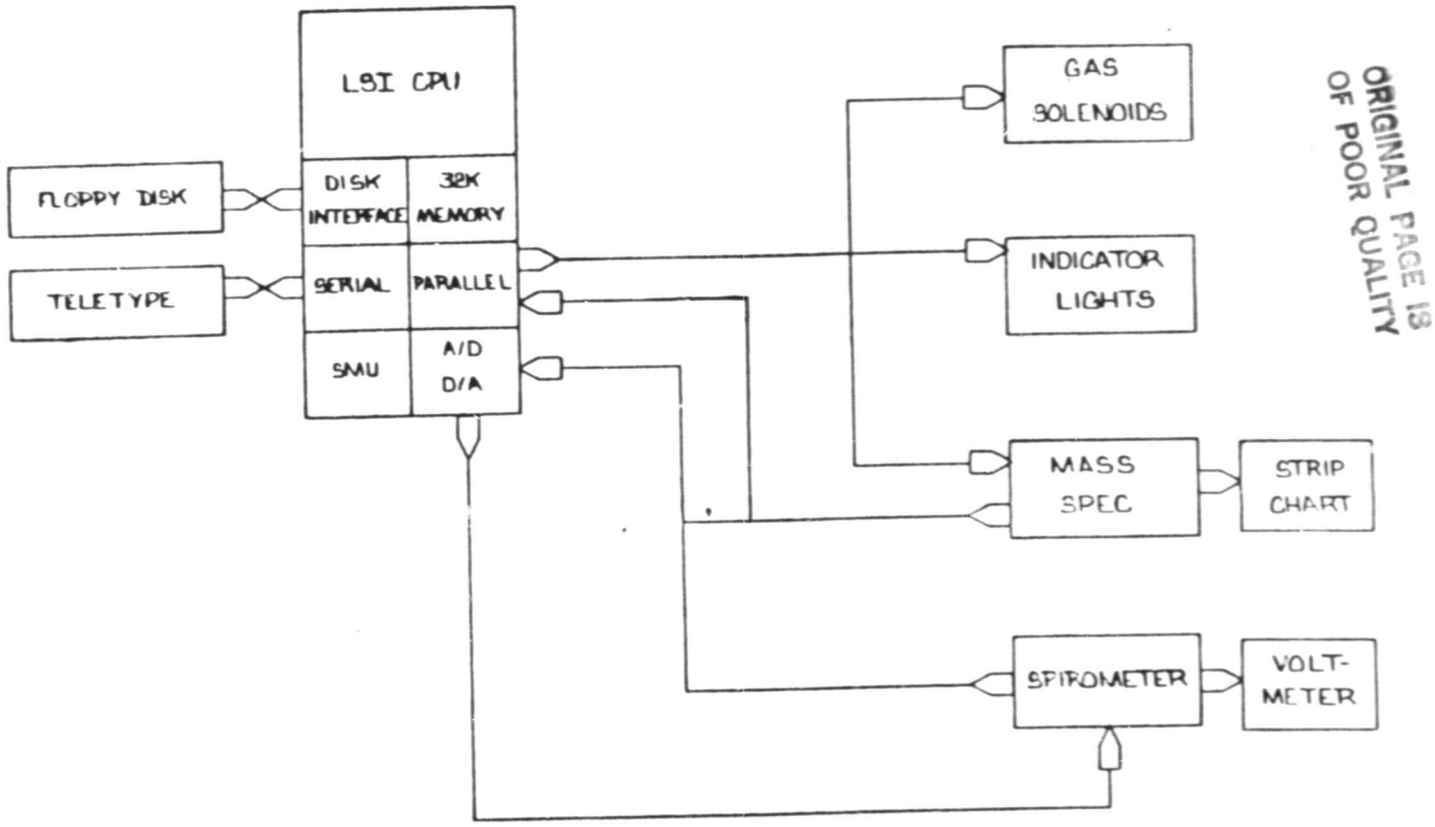
APPROVALS	DATE
DRAWN LINDA WEAVER	7-13-81
CHECKED	

Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

NITROGEN WASHOUT SYSTEM

SIZE C | CODE IDENT NO | DRAWING NO TH8187-0H01-0000

SCALE N/A | SHEET 1 OF 2



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS ± DECIMALS .X ± .XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

CONTRACT NO

APPROVALS	DATE
DRAWN LINDA WEAVER	10-19-81
CHECKED	

Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

BLOCK DIAGRAM OF N_2 WASHOUT HARDWARE

SIZE	CODE IDENT NO	DRAWING NO
C		THR167-1E03 E000

SCALE N/A SHEET 3 OF 13

174

BOARD CONFIGURATION OF THE LSI-11 MICROCOMPUTER

Slot Location	Manufacturer	Device #	Description
1A	DEC	M7270	LSI-11/2 microprocessor
1B	DEC	M8044	32K memory
2A	MDB	DLV11	Serial interface (1)
2B	Data Systems	DSD480	Floppy disk interface
3A & B	MDB	KW11P	Programmable clock
4A & B	ADAC	1030	A/D, D/A Programmable Gain
5A	ADAC	1632 TTL	Parallel interface
6A	MDB	DLV11	Serial interface (2)
6B-7B	EMPTY		
8A	MDB	SMU	Line clock/system monitoring unit
	MDB	M2689A	Power Supply 5/12/12
	Data Systems	480	Dual Floppy Disc Drive
	ITT	43	Teletype
	Hazeltine	2000	CRT

N_2 WASHOUT ELECTRONICS CARD CONNECTOR DESIGNATIONS

Top of Plug		2	1		
		4	3		
		6	5		
		8	7		
		10	9		
		12	11		
		14	13	Brn #2	S2 No.
Clear Ind. Sig.	Cable Blk	16	15	Red #2	S1 No.
		18	17	Rib.Cable	DRV11 J2 Pin 29 (HH) In 5 Flow Meter Cal Done
S1 N.C. Cal Done	Yel #2	20	19	Or #2	S2 N.C. Hi Cal Done
		22	21	Rib.Cable	DRV11 J1 Pin 10 (L) Out 4 Inlet Select
Flow Meter Hi Cal Done DRV11 J1 Pin 31 (KK) In 4	Rib Cable	24	23	Cable Yel	Select Inlet #2
		26	25	Cable Red	24 VDC Grnd. from Mass Spec
Select Inlet #1	Cable Wh	28	27	Rib.Cable	DRV11 J1 Pin 12 (N) Out 5 Do Hi Cal L.E.D.
		30	29	Sol. Wire	Cal #3 83% O_2 Solenoid
Do Cal L.E.D. DRV11 J1 Pin 14 (R) Out 6	Rib Cable	32	31	Gry	Red L.E.D. L3 83% O_2
		34	33		
Capacitor C5 3K FD	Brn	36	35	Blk	Grnd
		38	37	Blk	
		40	39		
		42	41	Lt. Grn	Transformer
Transformer	Lt. Grn.	44	43		
		46	45	Red	VR #1 Pin 2
+5V D.C. VR #1 Pin 1	Grn #2	48	47	Red	3K FD Capacitor C5 +5 V.D.C.
		50	49	Red	VR #1 Pin 2

		52	51	Or	VR #2 Pin 2
		54	53	Or	VR #2 Pin 2 +12 V.D.C.
Capacitor 3K FD C6 +12 V.D.C.	Red	56	55	Or	VR #2 Pin 1
		10	9		
		12	11		
		14	13	Brn #2	S2 No.
Clear Ind. Sig.	Cable Blk	16	15	Red #2	S1 No.
		18	17	Rib.Cable	DRV11 J2 Pin 29 (HH) In 5 Flow Meter Cal Done
S1 N.C. Cal Done	Yel #2	20	19	Or #2	S2 N.C. Hi Cal Done
		22	21	Rib.Cable	DRV11 J1 Pin 10 (L) Out 4 Inlet Select
Flow Meter Hi Cal Done DRV11 J1 Pin 31 (KK) In 4	Rib Cable	24	23	Cable Yel	Select Inlet #2
		26	25	Cable Red	24 VDC Grnd. from Mass Spec
Select Inlet #1	Cable Wh	28	27	Rib.Cable	DRV11 J1 Pin 12 (N) Out 5 Do Hi Cal L.E.D.
		30	29	Sol. Wire	Cal #3 83% O_2 Solenoid
Do Cal L.E.D. DRV11 J1 Pin 14 (R) Out 6	Rib Cable	32	31	Gry	Red L.E.D. L3 83% O_2
		34	33		
Capacitor C5 3K FD	Brn	36	35	Blk	Grnd
		38	37	Blk	
		40	39		
		42	41	Lt. Grn	Transformer
Transformer	Lt. Grn.	44	43		
		46	45	Red	VR #1 Pin 2
+5V D.C. VR #1 Pin 1	Grn #2	48	47	Red	3K FD Capacitor C5 +5 V.D.C.
		50	49	Red	VR #1 Pin 2
		52	51	Or	VR #2 Pin 2
		54	53	Or	VR #2 Pin 2 +12 V.D.C.
Capacitor 3K FD C6 +12 V.D.C.	Red	56	55	Or	VR #2 Pin 1

		58	57		
		60	59	Rib.Cable	DRV11 J1 Pin 16 (T) Out 7 Cal #3 On-Off
		62	61	Grn	Green L.E.D. L5 Do Hi Cal
Amber L.E.D. L4 Do Cal	Yel	64	63	Sol.Wire	Cal #2 100% N_2 Solenoid
		66	65	Vio	Red I.E.D. L2 100% N_2
Pin 21 (Y) DRV11 J1 Comp. Grnd	Rib Cable	68	67	Rib.Cable	DRV11 J1 Pin 17 (U) Out 3 Cal # 2 On-Off
		70	69	Sol.Wire	Cal #1 100% O_2 Solenoid
Red L.E.D. L1 100% O_2	Blu	72	71	Rib.Cable	DRV11 J1 Pin 19 (W) Out 8 Cal #1 On-Off

A/D CONVERTER

Command Statis Register	"176770$_8$
Output Buffer	"176772$_8$

Bit 0	1	on
(enable)	0	off
Bits 3-4	00	x 10
gain	01	x 5
	10	x 2
	11	x 1
Bits 8-10	001	ch 2
channel	010	3
selection	011	4
	100	5
	101	6
	110	7
	111	8

IADCGC (1)	"0431	Nitrogen channel enable
IADCGC (2)	"1031	Oxygen channel enable
IADCGC (3)	"1431	Carbon Dioxide channel enable
IADCGC (4)	"2021	Spirometer channel enable

DRV11 PARALLEL BOARD

Output buffer 167772

Input buffer 167774

Output control

bit		5	4	3	2	1	0
0							
1							
2							
3	cal gas 1	*					
4	mass spectrometer port 1 select	*	*	*			
5	#1 lamp						
6	#2 lamp			*			
7	cal gas 3		*				
8	cal gas 2						

IVLVMD

IVLVMD (1) = "030

IVLVMD (2) = "420

IVLVMD (3) = "220

Input data

bit		
0		
1		
2		
3		
4	#1 switch	switches are not used
5	#2 switch	
6	= 0	100% N_2 range
7	= 1	10% N_2 range
8		

LEGEND

1. 3-Way Rudolf Valve
   1A. One way valve from regulator (4) to face mask inhalation port (open on inspiration)
   1B. One way valve from face mask exhalation port (3) to spirometer (open on exhalation)

2. 3-Way Rudolf Valve
   2A. One way valve from 1 to spirometer (open on exhalation)
   2B. Sample port for mass spectrometer catheter #1
   2C. Adapter to demand regulator (4)

3. Sierra Firefighters Face Mask 651-02-4
   3A. Inhalation port
   3B. Exhalation port

4. 900-002-074-01 Regulator
   4A. High pressure O_2 supply hose to regulator
   4B. High pressure O_2 supply hose to O2 source

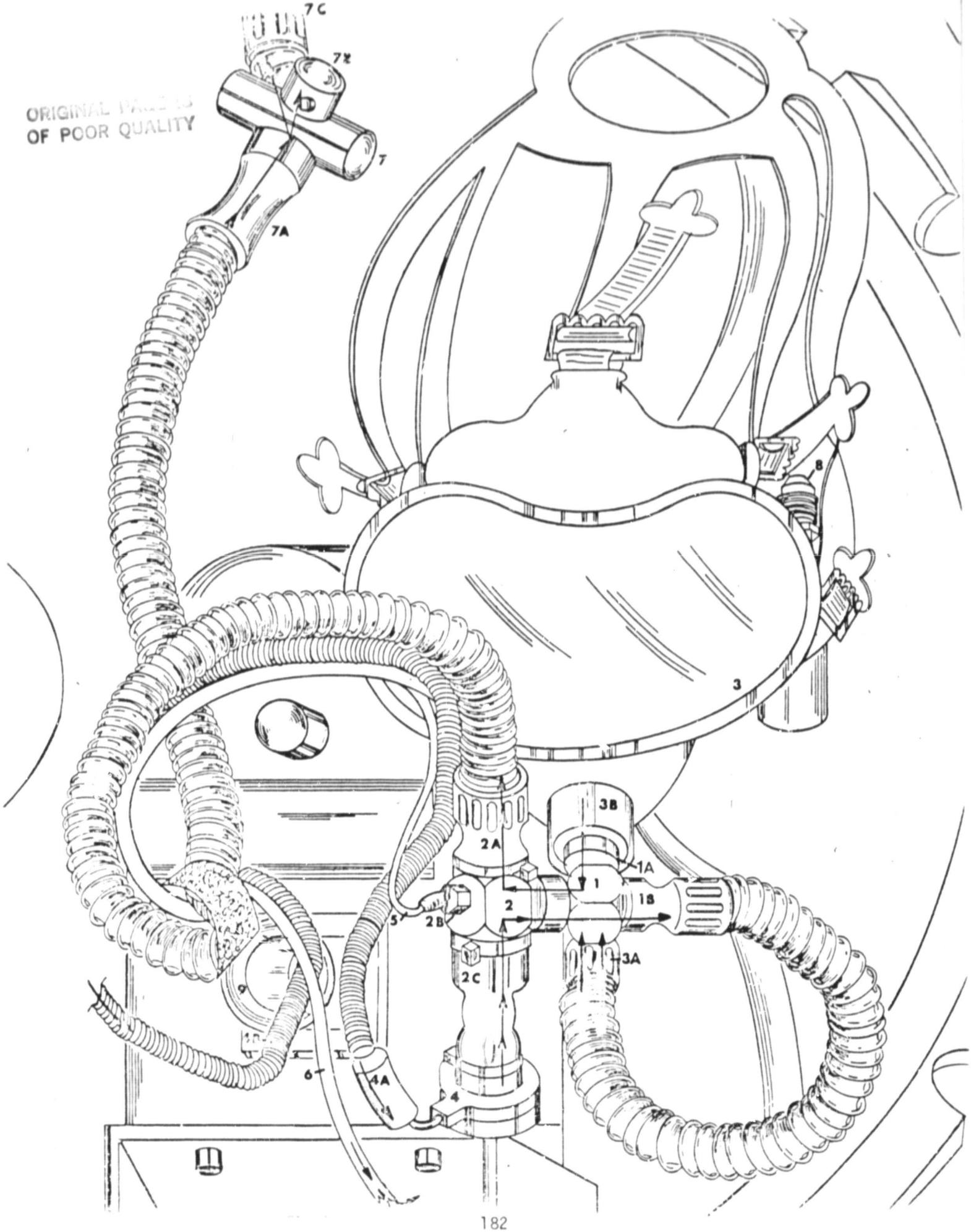
5. Mass spectrometer catheter #1 from mass spectrometer inlet #1 to sample port (2B)

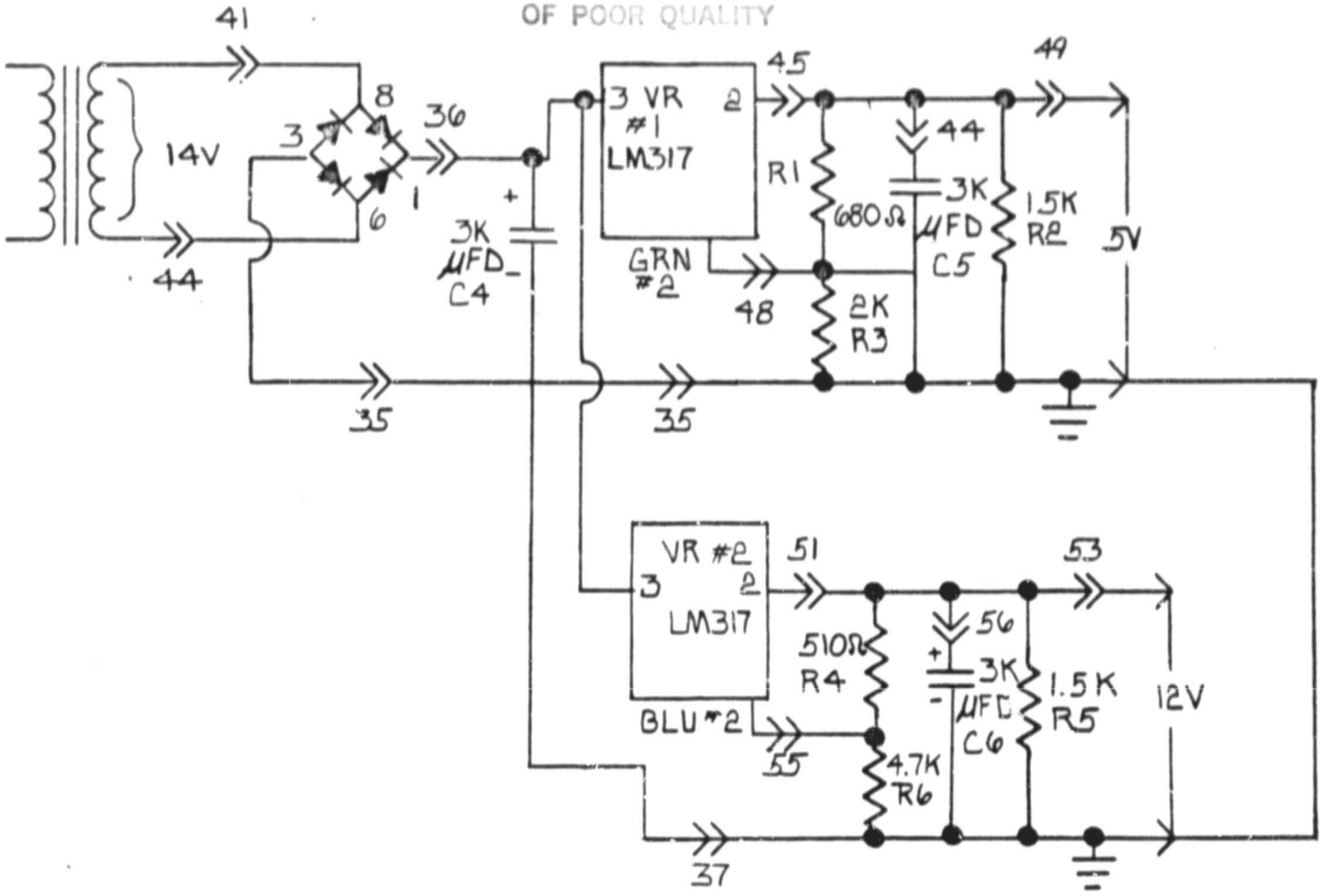
6. Oxygen tent O_2 supply hose (from O_2 source to inside O_2 positive pressure tent)

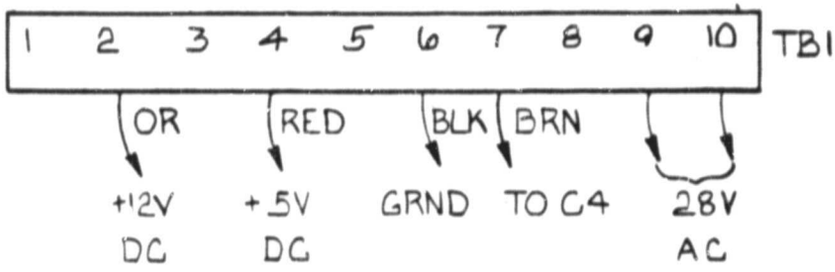
7 Air Diverter 3-Way Valve
   7A. Opening to face mask
   7B. Opening to ambient air (note: connect only between A+B or A+C)
   7C. Opening to spirometer intake port

8. Nitrogen gas solenoid drive connector (3/8" swagelock stainless fitting)

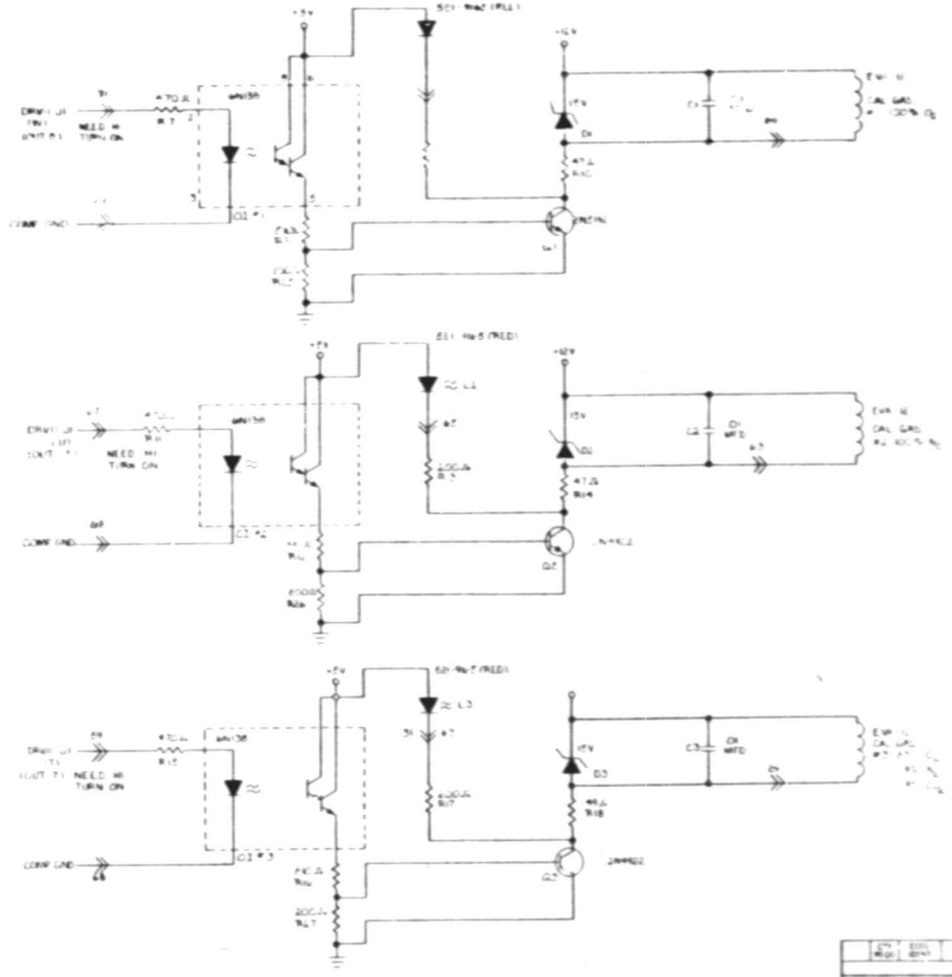
9. Spirometer dump port







CONTRACT NO.		Technology Incorporated LIFE SCIENCES DIVISION HOUSTON, TEXAS
APPROVALS	DATE	
DRAWN		POWER SUPPLIES FOR
CHECKED		N_2 WASHOUT SYS. ELECTRONICS
		SIZE: A; CODE IDENT NO.: ; DRAWING NO.: TH8187-5E07-E000
		SCALE N/A; SHEET 7 OF 13



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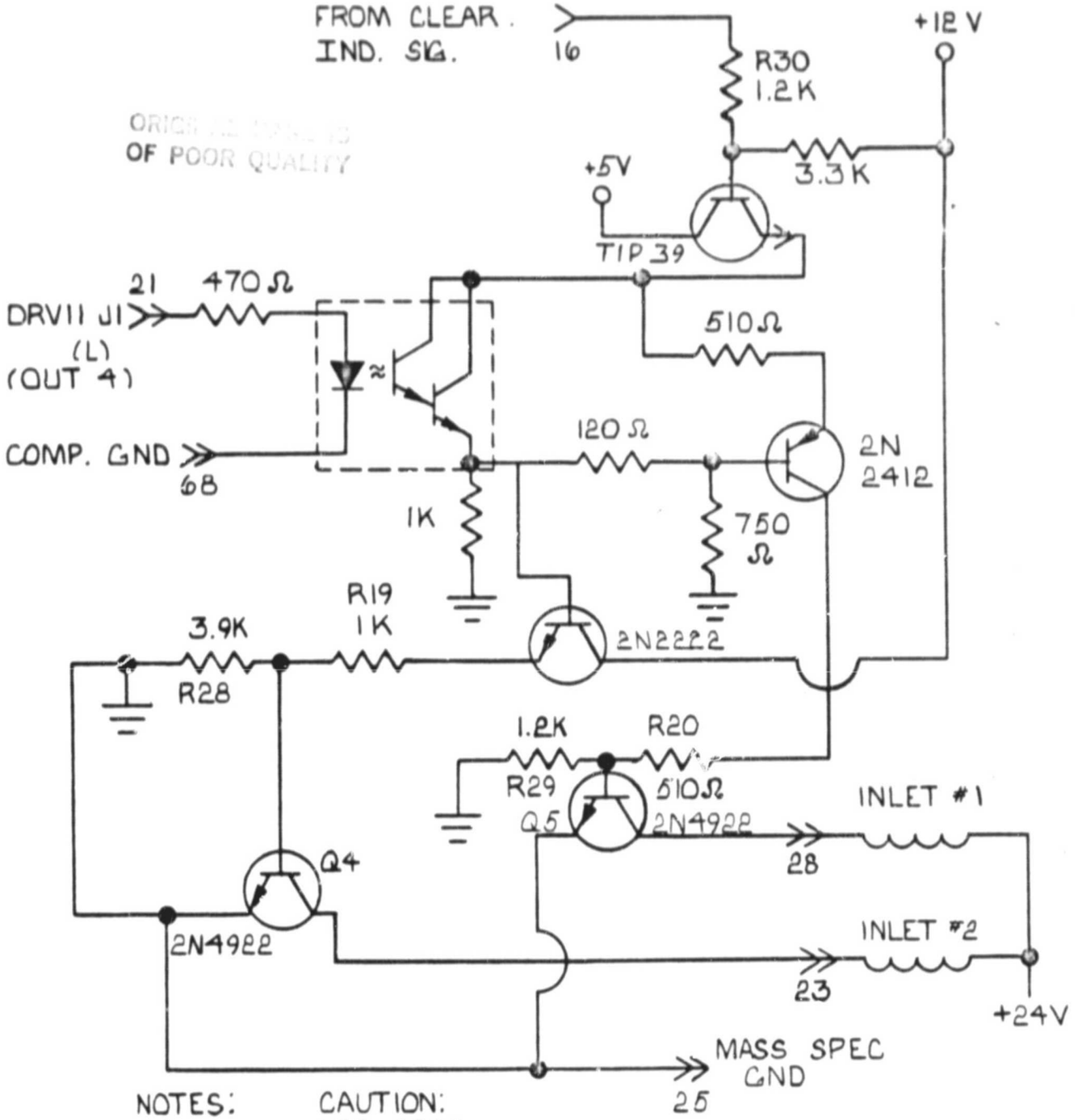
CAL GAS SELECT CIRCUIT
K_c WASHOUT

D | THI-187-5E10-E000



NOTES:

3
EDGE
CONN. PIN NO.

CAUTION:
USE ADAC
PARALLEL
BOARD ONLY

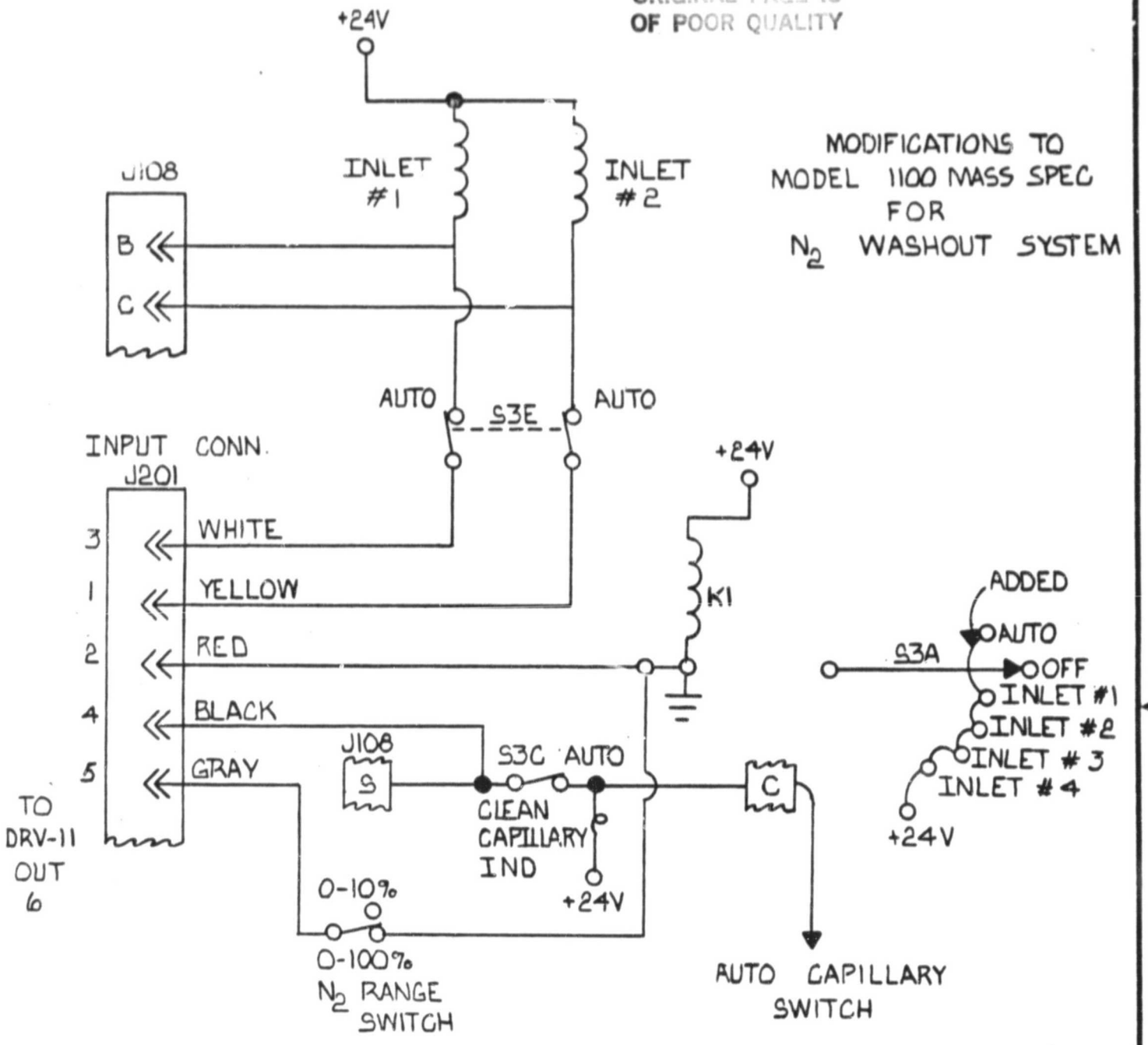
CONTRACT NO.	
APPROVALS	DATE
DRAWN LINDA WEAVER	9-11-81
CHECKED	

Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

MASS SPEC INLET CIRCUIT
N_2 WASHOUT SYSTEM

SIZE	CODE IDENT NO.	DRAWING NO.
A		TH8187-5E09-E000

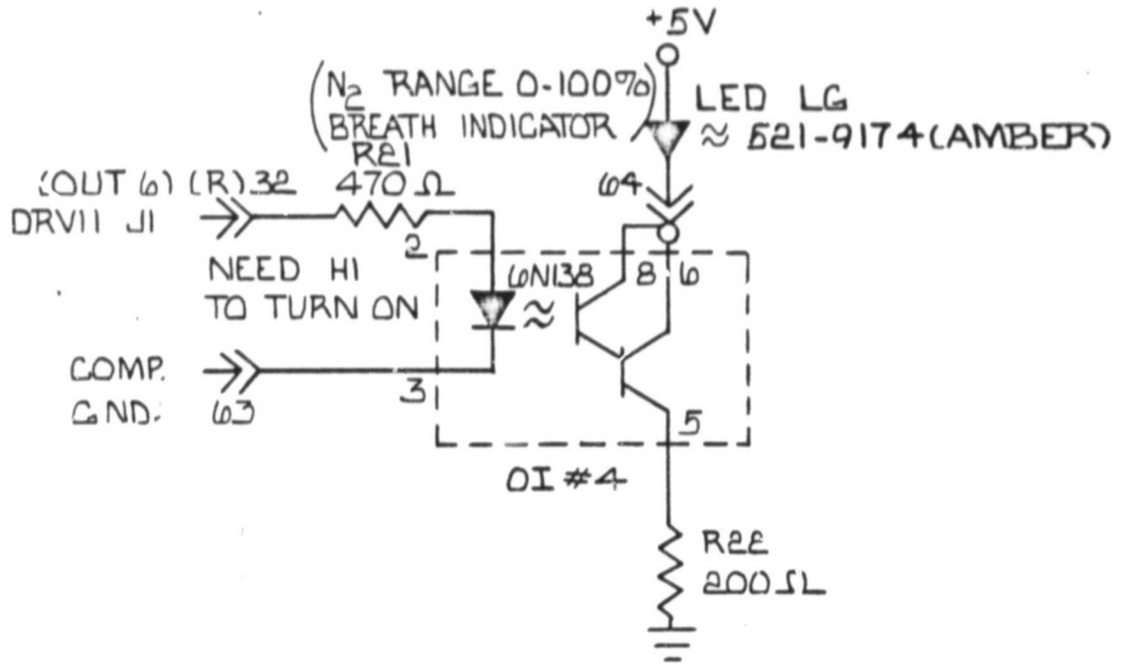
SCALE N/A | SHEET 4 OF 13

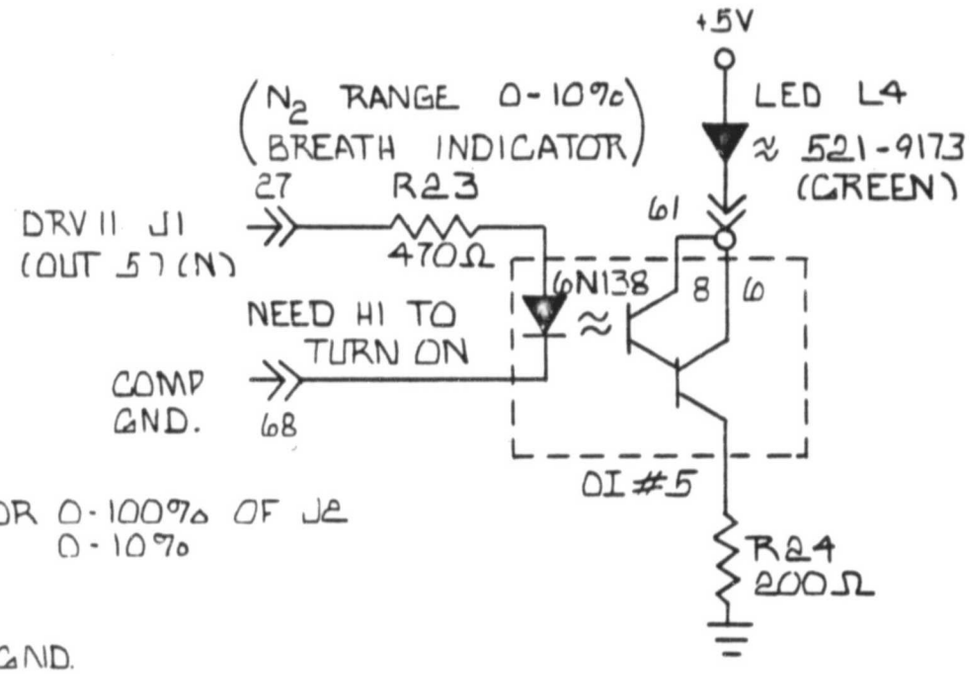


MODIFICATIONS TO MODEL 1100 MASS SPEC FOR N_2 WASHOUT SYSTEM

CONTRACT NO.		Technology Incorporated LIFE SCIENCES DIVISION HOUSTON, TEXAS		
APPROVALS	DATE	MODIFICATIONS TO MODEL 1100 MASS SPEC FOR N_2 WASHOUT SYSTEM		
DRAWN				
CHECKED				
		SIZE: A	CODE IDENT NO.	DRAWING NO.: TH8187-5E08-E000
		SCALE: N/A		SHEET 8 OF 13

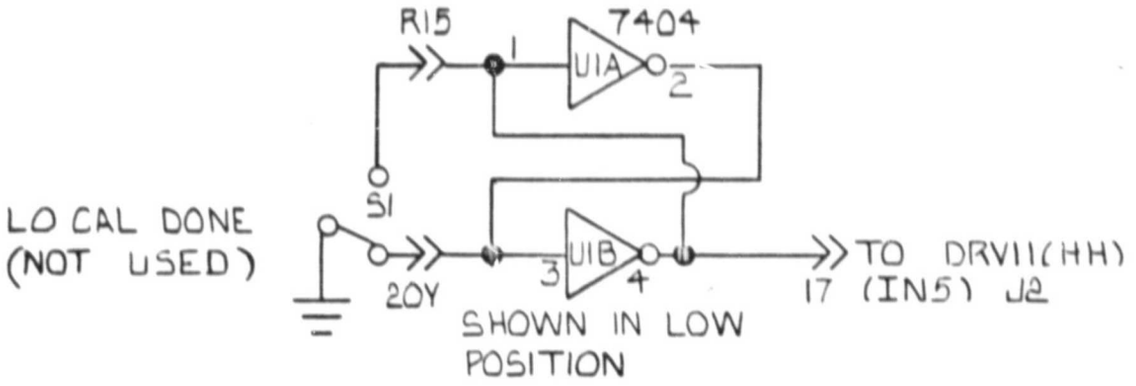
C-3

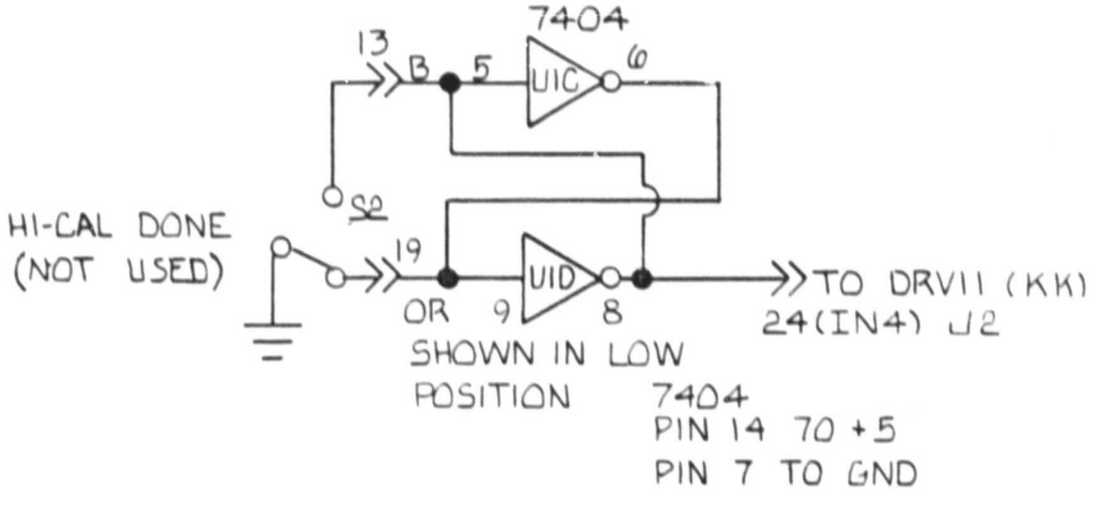




NOTES.
BIT 6 USED FOR 0-100% OF J2
0-10%
SWIN 0-100%
POSIT.
BIT = 0 OR GND.

CONTRACT NO.		Technology Incorporated LIFE SCIENCES DIVISION HOUSTON, TEXAS	
APPROVALS	DATE	SPIROMETER LED INDICATORS N_2 WASHOUT SYSTEM	
DRAWN LINDA WEAVER	10/5/81		
CHECKED		SIZE: A	CODE IDENT NO.
		DRAWING NO.: TH8187-5E05-E000	
		SCALE N/A	SHEET 5 OF 13





NOTES:

→ 3 EDGE CONN. PIN NO.

CAUTION:
USE ADAC PARALLEL BOARD ONLY

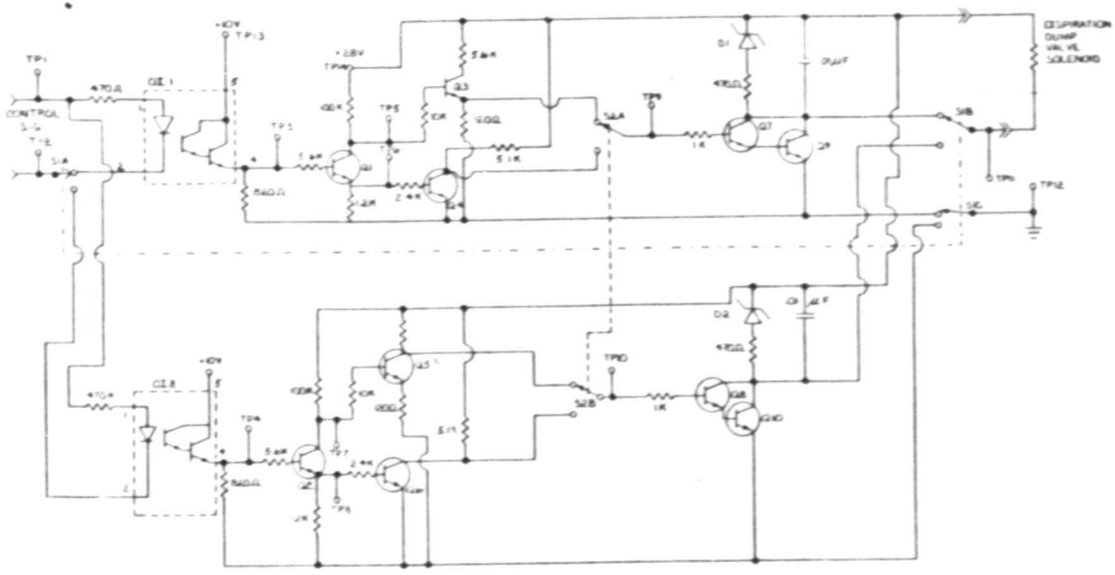
CONTRACT NO.	
APPROVALS	DATE
DRAWN LINDA WEAVER	9-22-81
CHECKED	

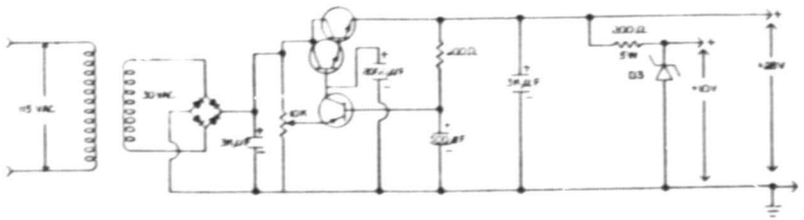
Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

SPIROMETER CAL SWITCHES(PUSHBUTTON)
N_2 WASHOUT SYSTEM

SIZE	CODE IDENT NO.	DRAWING NO.
A		THS187-5E04-E000

SCALE N/A | SHEET 4 OF 13





NOTES:
1. Q1 THROUGH Q8 ARE 2N3058
2. Q9 & Q10 ARE 2N3055 OR 2N5302
3. D1 & D2 ARE IN 9728 30V
4. D3 IS IN3020B 10V 1W
5. CI1 & CI2 ARE 4N33
6. S1 SHOWN IN PRIME POSITION
7. S2 SHOWN IN NC POSITION
8. TP READINGS MADE WITH +5V APPLIED FIRST, THEN ON
9. FOR THE EXPIRATION CARD, S1 = S3, AND S2 = S4

TEST POINT READINGS

TP1 TP2 (GRND)	+5V OR 0V
TP3 TP4	+9.1V OR 0V
TP5 TP7	+1.4V OR +3.58V
TP6 TP8	+1.4V OR 0V
TP9 TP10	S2IN C. +3V OR +6V
TP9 TP10	S2IN D. 0V OR +5.6V
TP11	S2IN C. +6V OR +27V
TP11	S2IN D. +27V OR +6V

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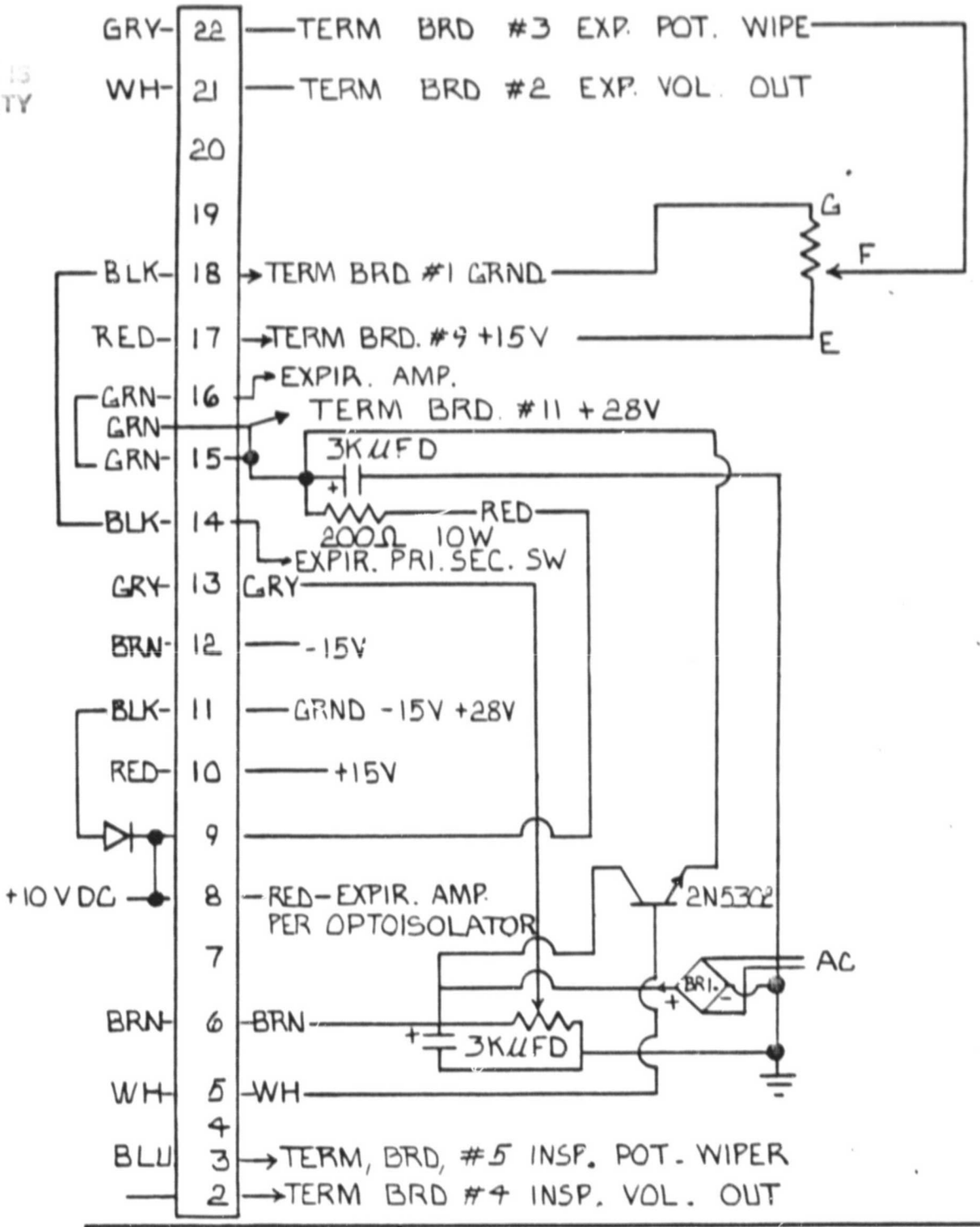
DUMP VALVE ELECTRONICS

D | TH8187-5E13-E000



CONTRACT NO.	
APPROVALS	DATE
DRAWN LINDA WEAVER	9-22-81
CHECKED	

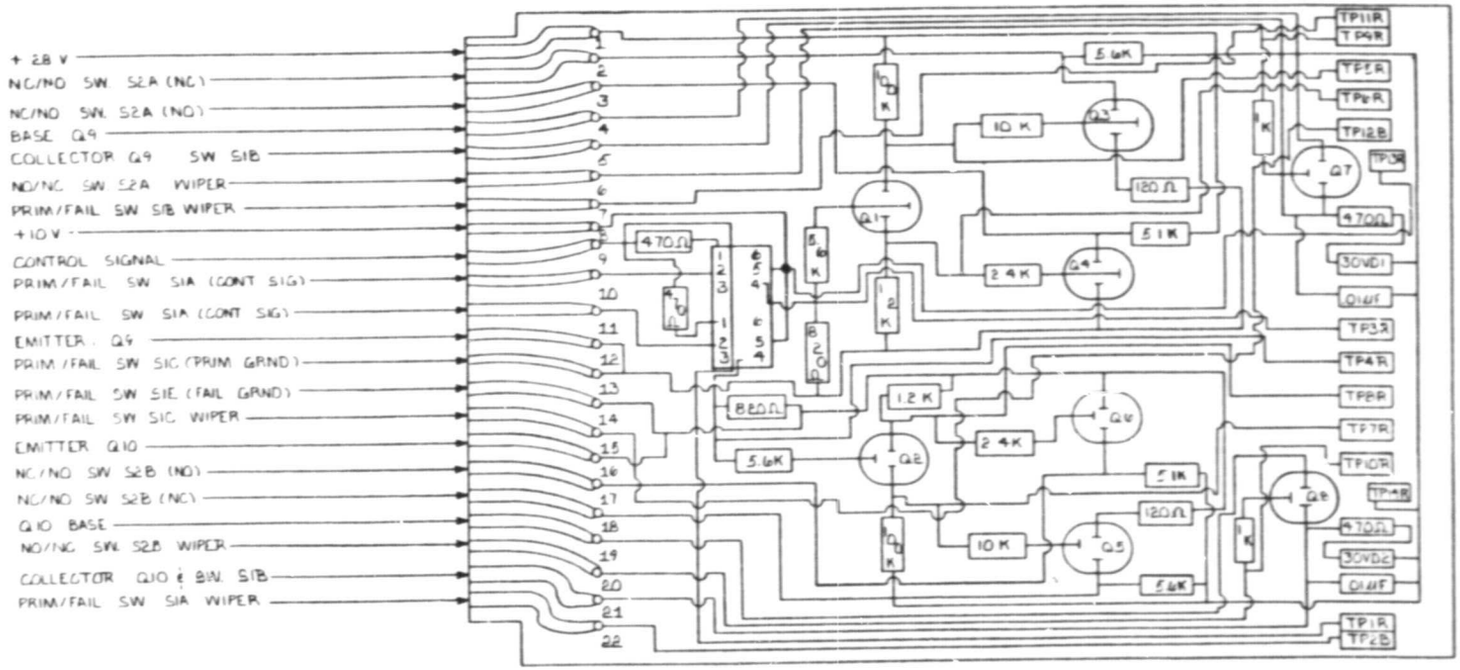
Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

SPIROMETER ELECTRONICS CHASIS WIRING (N_2)

SIZE	CODE IDENT NO.	DRAWING NO.
A		TH8187-5E06-E000

SCALE N/A SHEET 6 OF 13

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± DECIMALS XX ± XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

CONTRACT NO

APPROVALS	DATE
DRAWN LINDA WEAVER	
CHECKED	

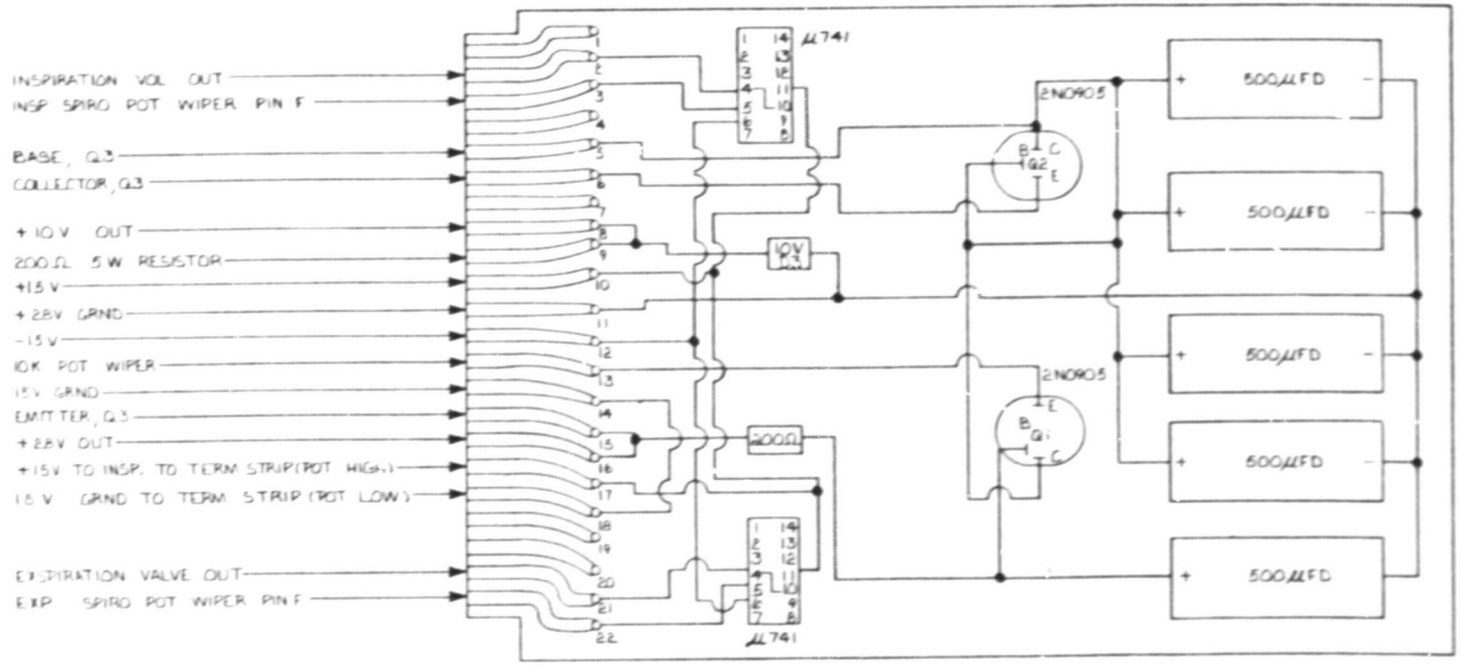
Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON, TEXAS

DUMP VALVE ELECTRONICS PRIM/FAIL SAFE (N2)

SIZE	CODE IDENT NO	DRAWING NO
C		TH8187-5G12-E000

SCALE | SHEET 12 OF 13

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±

MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

CONTRACT NO

APPROVALS	DATE
DRAWN LINDA WEAVER	9 23 86
CHECKED	

Technology Incorporated
LIFE SCIENCES DIVISION HOUSTON TEXAS

DUMP VALVE ELECTRONICS
POWER SUPPLY AND
VOLUME READ OUT (N_2)

SIZE	CODE IDENT NO	DRAWING NO
C		THE167-5G11-E000

SCALE N/A SHEET 1 OF 13

9.0 APPENDIX: RT-11 COMMANDS

9.1 SPECIAL FUNCTION KEYS

The special functions of certain terminal keys you need for communication with the keyboard monitor are explained below. A more complete list of special function keys and commands is provided in section 3 of the RT-11 System User's Guide.

Enter CTRL commands by holding the CTRL key down while typing the appropriate letter.

CTRL/C terminates program execution and returns control to the keyboard monitor. CTRL/C echoes C on the terminal. You must type two CTRL/C's to terminate execution unless the program to be terminated is waiting for terminal input or is using the TT handler for input. In these cases, one CTRL/C terminates execution.

CTRL/O causes RT-11 to suppress terminal output while continuing program execution. CTRL/O echoes O on the terminal. RT-11 enables terminal output when one of the following occurs:

1. You type a second CTRL/O.

2. You return the control to the monitor by typing CTRL/C when program terminates.

Note that when you are using CTRL/O the system can print an extraneous character after the monitor echoes the CTRL/O and a carriage return/line feed.

CTRL/Q resumes printing characters on the terminal from the point previously stopped because of a CTRL/S.

CTRL/S temporarily suspends output to the terminal until you type a CTRL/Q. CTRL/S does not echo. You can alternate between CTRL/S and CTRL/Q to temporarily stop and then resume the display of output on a CRT terminal. Type CTRL/S when the screen is almost full, then CTRL/Q to continue when you are ready.

DELETE OR RUBOUT deletes the last character from the current line and echoes a backlash plus the character deleted. Each RUBOUT succeeding DELETE deletes and echoes another character. The system prints an enclosing backlash when you type a key other than DELETE. This erasure is performed from right to left up to the beginning of the current line.

If you are using a video display terminal and you have issued the SET TT SCOPE command, DELETE erases the characters with a backspace, space, backspace sequence. Your corrections appear on the screen; RUBOUT does not enclose them with backlash characters.

9.2 USING THE SYSTEM UTILITIES FOR FILE MAINTENANCE

Keyboard commands let you communicate with the RT-11 monitor to allocate system resources, start programs, and use various services.

The following keyboard commands are the ones most frequently used with our LSI-11 computers.

They should be used regularly to do such things as obtaining listings of the directory information for the data floppies and making backup copies of files. For more detailed information about using these or other commands, refer to the DEC RT-11 System User's Guide.

Some of the more commonly used RT-11 commands for performing file maintenance tasks are listed below. They may be used in any order, whenever the system has typed a "." to let you know it is ready.

All information that you enter is underlined here. Anything which is not underlined is typed by the computer.

A. Initializing a Floppy Disk

This is done either:

1. When you want to use a new floppy disk which has never been used before, or
2. When a floppy has old data on it which is of no value, and you want to remove the old information so that the floppy can be used again.

To initialize the floppy, put it in the right hand disk slot and type:

DIR DY1:

The system will then type: DIR-F-Illegal Directory (if the floppy is new and has never been initialized before), or it will type a list of the files already stored in the floppy. Make sure that there are none that you might want to save.

Next type:

INIT/BAD/VOL DY1:

When the system asks "Are you sure?", check to make sure that you have the correct floppy in DY1 and that you have not erroneously typed DY0 instead of DY1. The type Y (for Yes) followed by a carriage return. If you are not sure, type N instead, and repeat the INIT command.

The /BAD option with the INIT command will cause the floppy to be checked for any bad blocks that might be present on it. This will take a minute or so. When finished, the system will type ?DUP-I-No bad blocks detected DY1: if the floppy has no bad spots, it will then ask for a volume (or floppy) identification

code, follwed by the owner name. You may type in anything you want for these two entries, but each must be 12 characters or less in length, including spaces, hyphens, etc. Typically, you would use a floppy ID number or code for the Volume ID, and the laboratory name (or your own name) for the owner. For example:

Volume ID? Disk 52A

Owner? G Washington

The INIT command causes the directory on the floppy in DY1 to be zeroed out. This effectively erases the information on it. Although it is sometimes possible to retrieve information from a floppy after it has had its directory zeroed (if nothing on it has been overwritten), it is rather difficult and generally not practical.

B. Getting a Floppy Directory (Contents) Listing

To get a complete, formatted summary of what is stored on a floppy disk, type the following:

DIR/VOL/FULL/BLOCKS DY1: (Carriage Return)

This causes a listing of the file names, their creation dates, and other information concerning such things as their physical locations on the floppy in DY1 to be printed on the terminal. The date printed for each file is the date the file was created or last modified, whichever is later.

To get a simplified directory listing, type:

DIR DY1: (Return).

A listing of each subject data floppy, using the DIR command, should be obtained regularly if data files are being created on it. This should preferably be done at the end of each day in which tests were run. The latest listing for each floppy should be saved in order to help keep track of what information is on each floppy, and also because it can sometimes be useful in retrieving files which have accidentally been deleted or overwritten. Each such listing should be labeled to correspond with the particular floppy it summarizes, and then taped on the special protective envelope for that floppy. Alternatively, the listings can be kept in a notebook.

If you need to see if a particular file is on a floppy without getting a complete listing, put the floppy in DY1 and type:

DIR DY1:name.suf (Return)

Here name is the filename that you used when creating the file, and "suf" is the 3-letter suffix (or extension or file type) for that file. If you are not sure what the suffix is, just type DIR.DY1: name with no period following the name. If the file

exists on the floppy, the system will print a line containing the directory information for that file, preceeded by the date if it has been entered into the system, and followed by the total number of files listed (not the total number on the floppy) and the number of free (unused) blocks on it. The number of free blocks can be used to estimate how many more subject data files can be stored on the floppy. If the requested filename does not exist on the floppy, then only the date, "0 files", and number of free blocks will be printed. Therefore, this is also an easy way of determining how much unused space is on the floppy. Note that the unused space may not all be in one contiguous area, however, the /FULL option can be used to tell you where the unused blocks are distributed.

C. Deleting Files

To delete a single file which has erroneous or useless information on it, put the floppy in DY1 (the right hand disk slot), and type:

DELETE DY1:name.suf followed by a carriage return,

Where "name" is the filename that you want to delete. This can be repeated for several files, if desired. Be sure that the filename is entered correctly, because a different file could be inadvertantly deleted if the incorrect filename is typed in. The system will type the file name followed by "?".

Respond with Y (Return) if you are sure that you want to delete a file.

D. Renaming a File

If a test has been run and it is later discovered that an incorrect filename was used throughout, then it can be renamed, without changing any of the data stored in it, by inserting the floppy into DY1 and typing:

RENAME DY1:oldname.suf DY1:newname.suf

Where "newname" is the new filename under which you want the data to be stored, and "oldname" is the old filename that was previously used.

For example:

RENAME DY1:T00900.DAT DY1:T01000.DAT

will cause the filename for file T00900.DAT to be changed to T01000.DAT and the old filename will no longer exist.

E. Copying Data Files (Making Disk Backups)

Data files may be copied from one floppy to another very easily. This enables one or more backup copies to be made of all important data.

To copy all files from one floppy disk to another, do the following:

1. Initialize the blank floppy you are going to copy onto as described above in "A. Initializing a Floppy Disk". Note that this will destroy any information stored on it, so be sure you have used a floppy which does not have any data that you want to save.

   This step can be skipped if you are only going to add or replace files on a floppy which already has files on it.

2. Several options are now available depending on what you want to do.

   (a) To copy all files from DY0 to DY1, type:

   COPY/WAIT/SYS DY0:*.* DY1*.*

   (You do not need to include /SYS unless you are copying system files from a system floppy.)

   The system will then let you take out the system floppy (if it is not the one you are copying from) and replace it with whatever floppy has the files you wish to copy.

   (The /WAIT option is not necessary if you are copying from your system floppy.) This process can take from several seconds to several minutes, depending on how many files are being copied. When the system has finished, it will tell you to replace (mount) the original system floppy back in DY0: (if you used the /WAIT option), and then let you type Y when you are ready. The system will type a period when it is ready for a new command.

   (b) To copy only those files with the current date (which were created or last modified today), include /NEWFILES in the list of options with the copy command.

   COPY/NEWFILES/WAIT DY0:*.* DY1:*.*

   The /NEWFILES causes the system to compare the dates of each file in the disk directory with the current date entered previously with the DATE command. Therefore, the current date must have been entered correctly when the computer was powered up in order for this to work properly.

   (c) To selectively copy certain files, include /Q (for QUERY) in the list of options. For example:

COPY/SYS/Q DY0:*.* DY1:*.*

The /Q causes the system to individually list each filename on DY0 to see if it is to be copied. To bypass copying a particular file, simply hit the Carriage Return Key after the filename is printed. For files that you do want to copy, type Y(Return) (Y for yes) after their names. For example: if DY0 has files named A.DAT, B.DAT, and C.DAT on it and you want to copy only A.DAT and C.DAT do the following (your responses are underlined as usual):

Type:

COPY/Q DY0:*.* DY1:*.*

A .DAT? Y(Return) (yes, copy it)

B .DAT? (Return) (no, do not copy it)

C .DAT? Y(Return) (yes, copy it)

(d) To copy one or a few files from DY0 to DY1, type:

COPY/SYS/WAIT DY0:name.suf DY1:*.*

Where "name" is the filename. This can be repeated for several files, if desired.

3. A backup system floppy can be created in a similar manner. First, put a blank floppy in DY1 and perform step (1) above. Next, type:

COPY/SYS DY0:*.* DY1:*.* (A list of files copied will follow.)

COPY/BOOT DY1:RT11SJ DY1:

DY1 now contains a floppy which has all of the files that the original system floppy had on it. Note that the copying caused by the first line above may take a minute or so to perform, so wait until it is finished and the system responds with another "." before typing the second line.

4. These procedures can be used regularly to maintain backup copies of all data files. The recommended procedure is:
   (a) First, perform step (1) above.
   (b) Second, perform step (2) (a) to copy all the files onto a new backup floppy.
   (c) Third, perform step (2) (b) at the end of each day to copy new files onto the backup floppy. As an alternative, the new files from one or more days may be copied using the procedures in steps (2) (c) or (2) (d).

It is probably best to keep two backup floppies, in addition to the original, for important files, since it takes only a few minutes to perform the copying operation.

If you try to copy a data file from one floppy onto another that already contains a file with the same name, then the file on the floppy being copied into will be deleted and the copy operation will be performed as requested. Normally, this is not really problem, since files with the same name should generally be identical. However, if an erroneous filename was entered when creating a file, for example, then it is possible that this file might replace one on the backup floppy unintentioanlly. This could happen of the file was copied before correcting the filename using the Reanme command (step D above). Therefore, be particularly careful when entering filenames or copying with possibly erroneous filenames, since valuable data might be deleted. Frequently the /NOREPLACE option with the COPY command will help to avoid this potential problem.

F. Getting Help with System Commands

If you do not remember which command or option to use for a particular function, or the syntax for a particular command, use the HELP command. If you type only HELP followed by a carriage return, information on the help command itself will be typed. For a list of all the possible commands (some are not always available, depending on which system disk you are presently using), type HELP (Return). For more information on one of these commands, including possible options, type HELP (space) command, where "command" is the name of the command (or the first few letters of it). For example, for information on the DIRECTORY (or DIR) command, type:

HELP DIR followed by a carriage return.

If the information typed is not clear or you need more details, refer to the RT-11 System User's Guide. The first half of that manual contains an alphabetized list of all commands, with complete information and examples on most options.

9.3 GLOSSARY

Breath gate - the minimum noise level of the spirometer. Also referred to as minimum noise gate.

DATCON.VAL - a data file on the system disk which contains the default values for calibrating the spirometer and mass spectrometer.

DECDAT - a program on the system disk which accepts information from the test operator on a decompression experience experiment, types a report on the printing terminal, then stores the data in a data file.

DY1: - the disk drive device on the right where a floppy disk can be inserted, e.g., for a data file.

External gravity - the gravity outside of the experimental environment, one if the experimnt is conducted at ground level and zero if conducted in space.

N2DATA - a program on the system disk which reads the nitrogen washout data from a data file and types a report on the printing terminal.

N2WASH - the main program on the system disk which calibrates the spirometer and spectrometer, records the data during a nitrogen washout experiment and stores it in a data file.

PDINPT - a program on the system disk which accepts information from the test operator on the physical characteristics of a subject, types a report on the printing terminal and stores the data in a data file.

UPDATE - a program on a system disk which reads an unformatted nitrogen washout data file, formats the data, then stores it in a data file.