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Preface

This open file presents the numerical code for the 31 computer programs used in the operation of the automated size analyzers located in the soft sediment laboratory at the Atlantic Geoscience Centre, Bedford Institute of Oceanography, Dartmouth, Nova Scotia. The three principle instruments include the BIST-2 (Bedford Institute of Oceanography Settling Tube #2) settling tube, the Micromeritics SediGraph 5000D, and the Coulter Counter TAII. The computer programs are written in AppleSoft Basic, and in a few instances, binary format. The settling tube and the SediGraph are interfaced to Apple IIplus microcomputers, and the Coulter Counter is interfaced to an Apple IIe.

The programs were written principally for internal use only. However, the many requests from laboratories around the world for the code relating to our size analysis programs have encouraged us in the release of these program codes. We are presently converting these same programs into TurboPascal code to be operated on IBM type microcomputers.

Following the preface is a Program Flow diagram that can be used to locate individual programs and their relationship to the flow of data among and between instruments. Individual chapter numbers and program names are indicated on the diagram. The diagram also shows whether a particular program reads files, creates files and/or outputs either on a screen or as a paper copy. Preceding each chapter (or program) is another Program Flow Diagram specifically detailing the location of the program with respect to an individual instrument series. A brief description precedes the program code in each case. Program Ready is mentioned in each of these Flow Diagrams. It is the ultimate data graphics and statistical program that provides the final reports to the end-user. Program Ready can be obtained as a Geological Survey of Canada Open File 1240 under the authors D.W. Hackett, J.P.M. Syvitski, W. Prime, and A.G. Sherin and title Sediment Size Analysis System Users Guide.

Aspects of this very complex nesting of programs owes much to the time and consideration of D.A. Clattenburg (lab officer), and G. Duchesne (consultant). Part of the main Coulter Counter program came from the Florida Coulter laboratory with their permission to incorporate it into our software structure. We thank these individuals for their time and effort.

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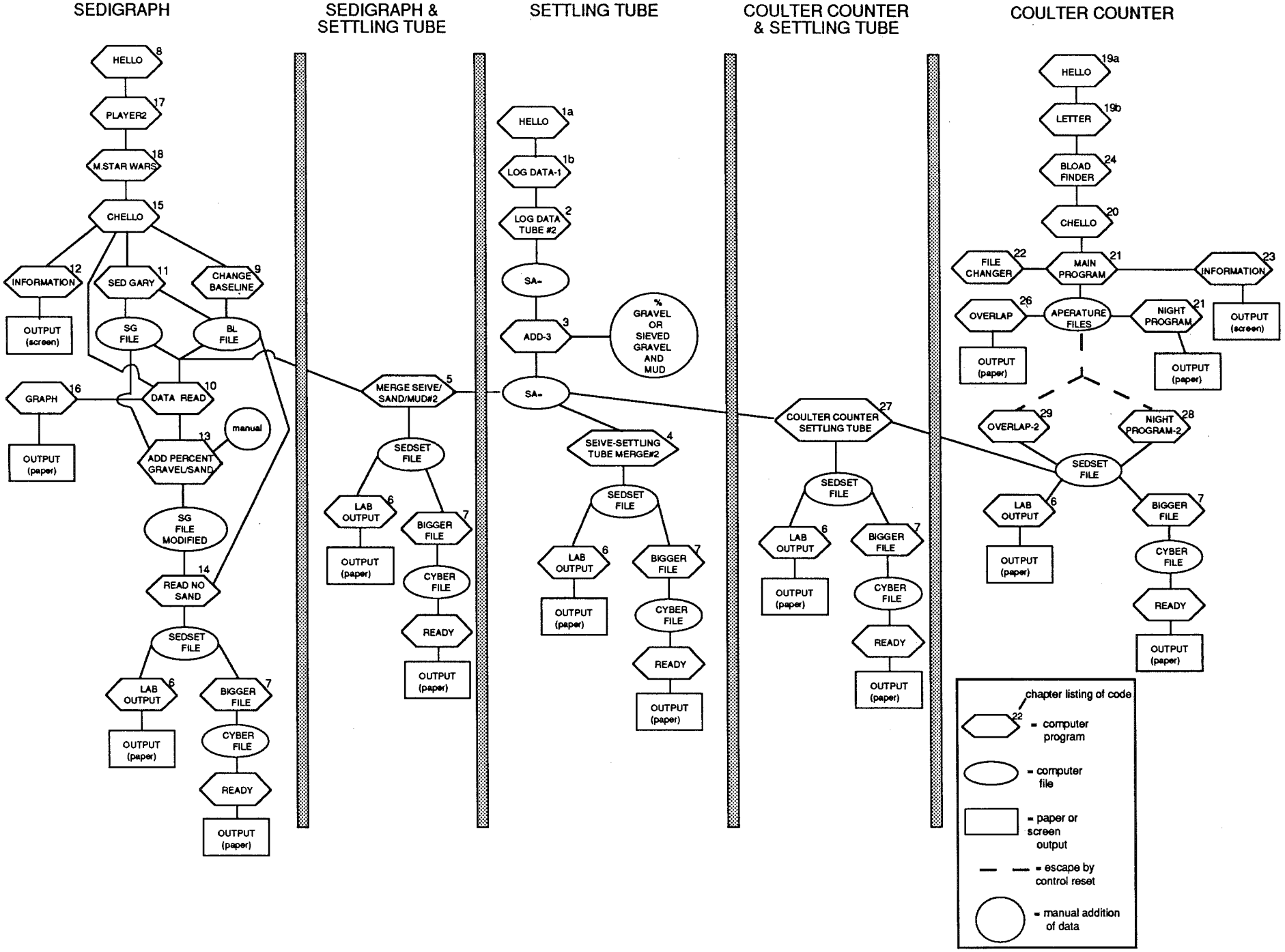
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= computer file
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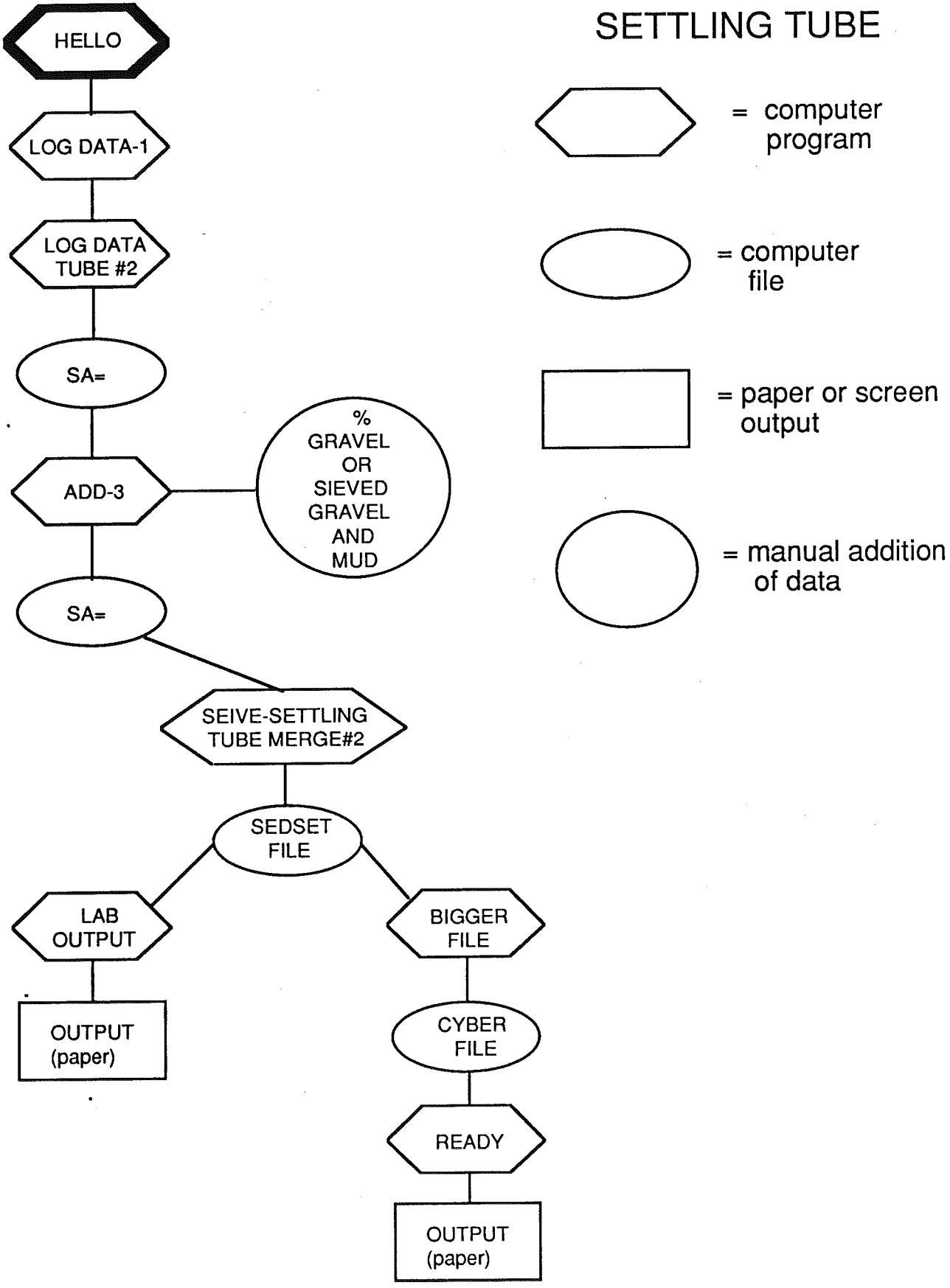
= escape by control reset
= manual addition of data

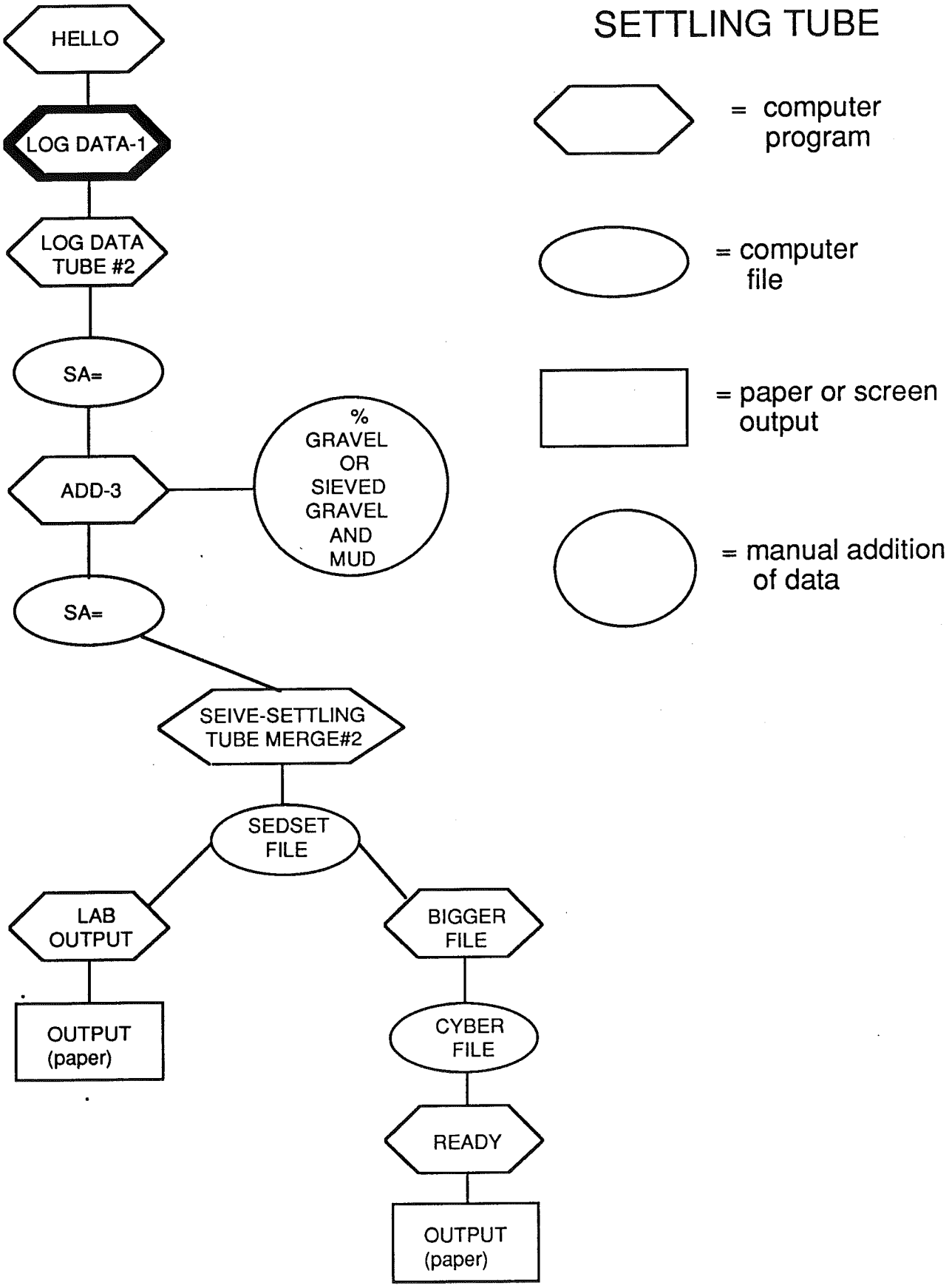
SETTLING TUBE



This program initializes the settling tube diskette.

```
10    REM
20    PRINT "SETTLING COLUMN RAW DATA DISKETTE #152-AE163 + APPLE SYSTEM"
30    END
```

SETTLING TUBE



This program is the first part of the logging program for the settling tube. It checks to see if the Mountain® Apple clock is functioning, the status of the balance, and the amount of disk space used and the amount left. If there is less than 20 sectors left a warning will be given. It will next ask if you wish to use "LOG DATA" for the old tube or "LOG DATA TUBE #2" for the present tube.

```
0 REM
1 D$ = "*": REM  CONTROL D WITHIN QUOTES
5  DIM T$(2)
8  PRINT D$;"IN#4"
10  PRINT D$;"PR#4"
12  FOR J = 1 TO 2
14  INPUT " ";T$(J)
16  NEXT J
18  PRINT D$;"IN#0"
20  PRINT D$;"PR#0"
22  IF  RIGHT$ (T$(1),3) < > RIGHT$ (T$(2),3) THEN 30
24  INVERSE
25  PRINT  TAB( 5);"CLOCK MALFUNCTION - PLEASE RESET    ": NORMAL
27  GOTO 815
30 MEM = ( PEEK (978) - ( PEEK (978) > 127) * 256) * 256 + 2947:AE = 174 - (157 -  PEEK
(978))
40 NS = 403 + 93 * ( PEEK (MEM + 2925) = 16)
490  RESTORE : FOR I = 896 TO 960: READ P: POKE I,P: NEXT
500 AE = 149 - (157 -  PEEK (978)): POKE 905,AE: POKE 938,AE
510 D =  PEEK (MEM + 485):S =  PEEK (MEM + 487)
520  POKE 897,S * 16: POKE 911,S * 16: POKE 898,D: POKE 912,D
530  CALL 919: REM  $397
540 R =  PEEK (917) + 256 *  PEEK (918):U = NS - R
550  PRINT "SECTORS USED=";: PRINT "*";U
560  PRINT "SECTORS FREE=";: PRINT "*";R
570  IF R > 25 THEN 600
```

```
LEFT": NORMAL
590 PRINT TAB( 5);: INVERSE : FLASH : PRINT "PRESS CTRL 'C' AND RETURN TO
ESCAPE": NORMAL
600 NORMAL
630 DATA
1,96,1,0,17,0,145,3,0,149,0,0,1,0,0,96,1,0,1,239,216,0,0,169,3,160,128,32,217,3,162,0,14
2,149,3,142,150,3,160,56,185,0,149,162,8,10,144,8,238,149,3,208,3,238,150,3,202,208,24
2,200,192,196,144,232,96
650 PRINT
660 PRINT
670 PRINT
700 PRINT TAB( 5);"DO YOU WISH TO RUN:"
705 PRINT
710 PRINT TAB( 7);"(1) LOG DATA"
715 PRINT
720 PRINT TAB( 14);"OR"
725 PRINT
730 PRINT TAB( 7);"(2) LOG DATA TUBE #2"
740 PRINT
750 PRINT TAB( 5);"PLEASE CHOOSE A NUMBER"
755 PRINT
760 INPUT X$
770 IF X$ = "1" GOTO 800
780 IF X$ = "2" GOTO 810
790 GOTO 700
800 PRINT D$;"RUN LOG DATA"
805 END
810 PRINT D$;"RUN LOG DATA TUBE #2"
815 END
```

This program automatically is run by running "Log Data-1"after making the the selection of Tube #2. It sets up header information such as sample ID, height of column, temperature etc. through prompts. It creates an output file called "SA=lab number". The program allows 449 data points to be saved. In addition to logging the raw data points (time vs cumulative weight), the program performs the interactive communication between the balance and the micro-computer. A built-in (user friendly menu-driven) stepping routine allows, for instance, a greater number of data points in the coarse end of the size spectrum.

```
0 REM
1  GOTO 1000
2 G$ =  CHR$ (4)
7  PRINT G$"IN#3"
15  FOR J = 1 TO NF
16  FOR K = 1 TO NK: GOSUB 8000: NEXT K
17 WT =  VAL ( MID$ (Z$(1),5,9))
20 NR = NR + 1
25 W(NR) = WT
30  NEXT J
99  RETURN
1000  REM
1010  REM  MAIN PROGRAM
1020  REM  ------------
1030 D$ = "*": REM  CONTROL D
1040  PRINT D$;"NOMON I,O,C"
1050 SC = 4: REM  APPLE CLOCK SLOT
1060  DIM DU(10),ST(10)
1065  DIM TB(10),TE(10)
1067  DIM NL(10)
1070  DIM W(500),Z$(1)
1096  PRINT "AGC SETTLING COLUMN DATA ACQUISITION"
```

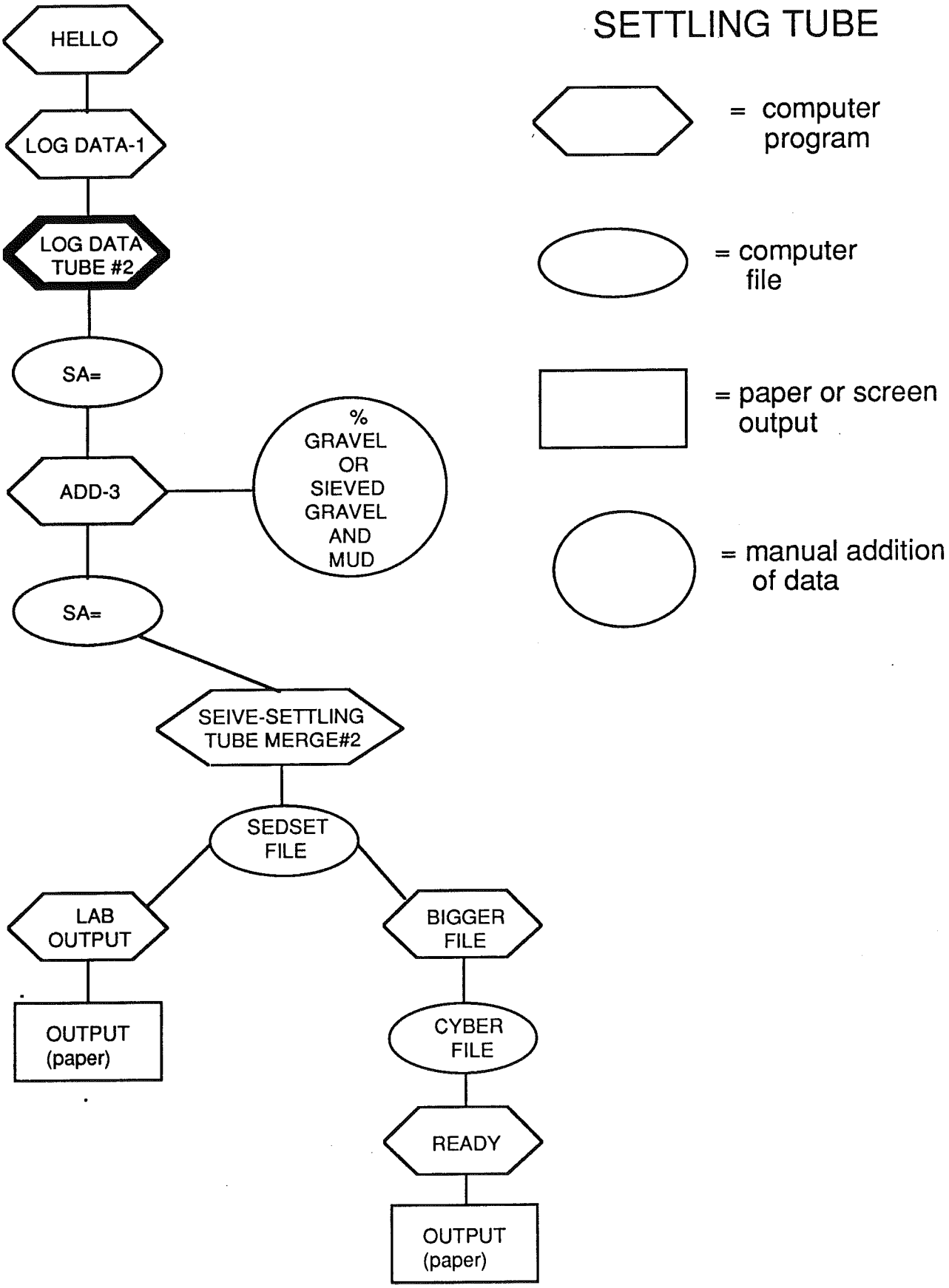
```
1098  PRINT : PRINT
1100  INPUT "SAMPLE NUMBER =";SA
1105  INPUT "SCIENTIST =";GH$
1108  INPUT "PERCENT SAND =";UF
1110  INPUT "SAMPLE INFORMATION ";S$
1115  INPUT "HEIGHT OF COLUMN =";HT
1120  INPUT "WATER TEMPERATURE=";TC
1125  INPUT "NUMBER OF STEPS=";NI
1135  IF NI > 10 THEN  PRINT "MAX OF 10 ALLOWED."
1140  IF NI > 10 THEN  GOTO 1125
1141  PRINT
1142  PRINT "IS THIS INFORMATION CORRECT (Y/N)": PRINT
1144  INPUT Y$
1146  IF Y$ = "N" GOTO 1098
1148 NZ = 0
1150  FOR I = 1 TO NI
1151  PRINT : PRINT "FOR INTERVAL ";I;" -"
1156  INPUT "DURATION (MINUTES),SPEED FACTOR =";DU(I),ST(I)
1158 NK = ST(I):NF =  INT (DU(I) * 60 / .41 / NK + .5)
1160  PRINT "THIS INTERVAL WILL CONTAIN ";NF;" POINTS."
1162 NL(I) = NF
1165 NZ = NZ + NF
1170  NEXT I
1172  PRINT
1174  PRINT "ARE THESE INTERVALS CORRECT (Y/N)"
1180  INPUT Y$
1190  IF Y$ = "N" GOTO 1148
1200  PRINT "TOTAL N OF POINTS WILL BE ";NZ: PRINT
1210  IF NZ > 449 THEN  PRINT "ERROR - MAXIMUM OF 449 POINTS ALLOWED":
PRINT : GOTO 1125
1303  IF  PEEK (49249) < 127 THEN 1303
```

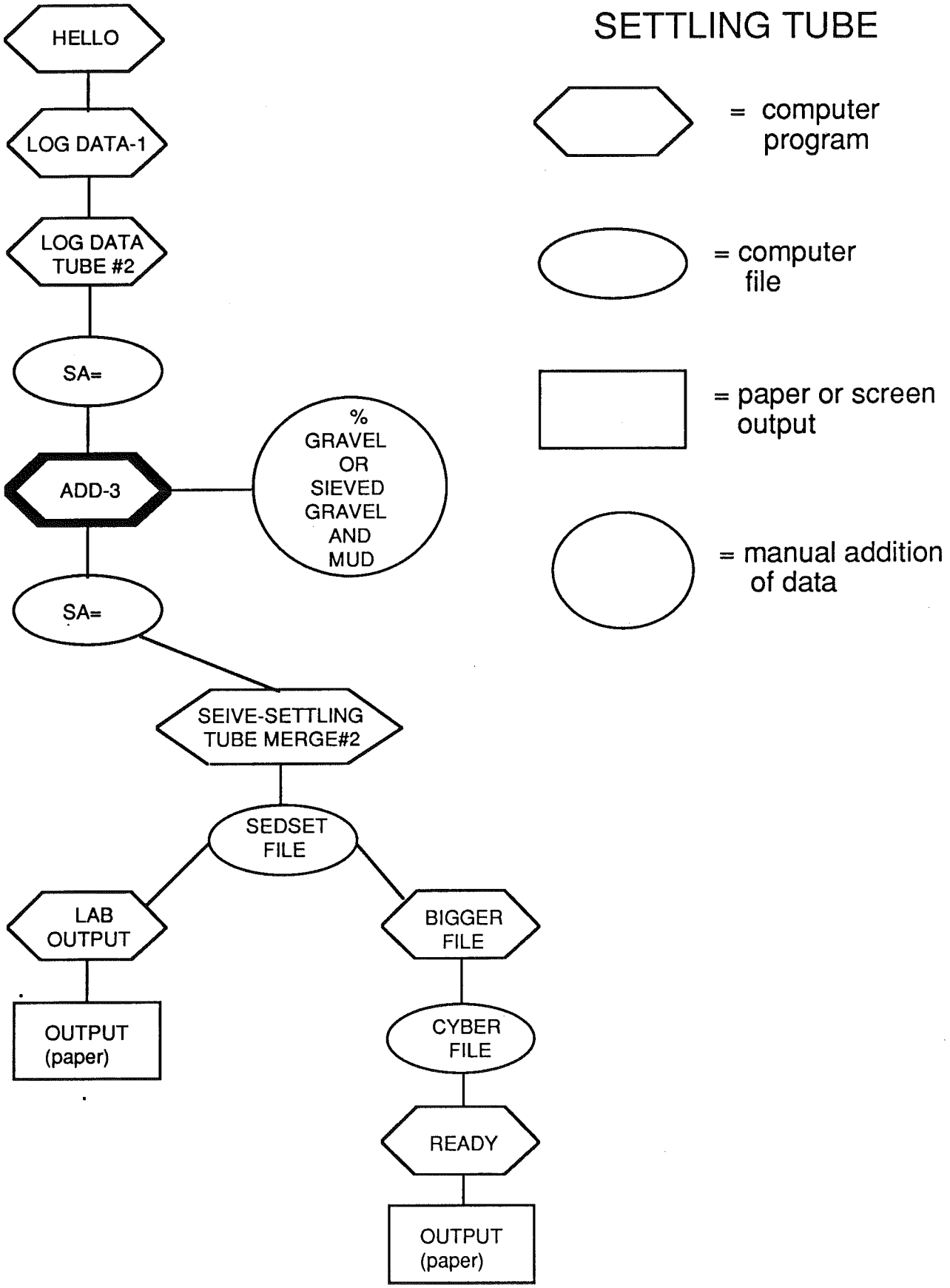
```
1305  GOSUB 9000
1310 T0$ = T$
1320  GOSUB 9500
1330 T0 = SD
1350 NR = 0
1360 IP = 1
1365 TW = 20
1370 XM = 1000
1400  FOR L = 1 TO NI
1405  GOSUB 9000: GOSUB 9500:TB(L) = SD
1410 NK = ST(L)
1420 NF = NL(L)
1440  GOSUB 2
1450  GOSUB 9000: GOSUB 9500:TE(L) = SD
1451 TT = SD - T0: PRINT
1452  PRINT "END OF INTERVAL ";L
1453  PRINT "TIME =";TT
1460  NEXT L
1600  REM  SAVE RESULTS ON DISK
1610  REM  --------------------
1620  PRINT D$;"OPEN SA="SA
1630  PRINT D$;"WRITE SA="SA
1650  PRINT GH$
1660  PRINT S$
1665  PRINT UF
1670  PRINT HT
1680  PRINT TC
1690  PRINT T0$
1700 NI$ =  STR$ (NI): PRINT NI$
1710 NZ$ =  STR$ (NZ): PRINT NZ$
1720  FOR I = 1 TO NI
```

```
1730 ST$ =  STR$ (ST(I)): PRINT ST$
1740 DU$ =  STR$ (DU(I)): PRINT DU$
1750 TB$ =  STR$ (TB(I)): PRINT TB$
1760 TE$ =  STR$ (TE(I)): PRINT TE$
1770 NL$ =  STR$ (NL(I)): PRINT NL$
1780  NEXT I
1800  FOR I = 1 TO NZ
1810 W$ =  STR$ (W(I)): PRINT W$
1820  NEXT I
1830  PRINT D$;"CLOSE SA="SA
1835  PRINT
1845  PRINT "ACQUIRE PROGRAM STOPS."
1850  GOTO 11000
7000  PRINT "TOO MANY POINTS. MAX 1000."
7001  STOP
7999  STOP
8000  REM
8010  REM
8020  INPUT Z$(1)
8040  RETURN
9000  PRINT D$;"IN#";SC
9010  PRINT D$;"PR#";SC
9020  INPUT " ";T$
9030  PRINT D$;"IN#0"
9040  PRINT D$;"PR#0"
9050  RETURN
9500 H =  VAL ( MID$ (T$,7,2))
9505  IF H < 0 GOTO 11100
9510 M =  VAL ( MID$ (T$,10,2))
9515  IF M < 0 GOTO 11100
9520 S =  VAL ( MID$ (T$,13,6))
```

```
9525  IF S < 0 GOTO 11100
9530 SD = H * 3600 + M * 60 + S
9540  RETURN
11000  PRINT D$;"RUN LOG DATA-1"
11100  INVERSE
11110  PRINT  TAB( 5);"NEG. TIME READ - CLOCK SCREW UP    "
11120  PRINT  TAB( 15);"RUN ABORTED            ": NORMAL
11130  END
```

SETTLING TUBE



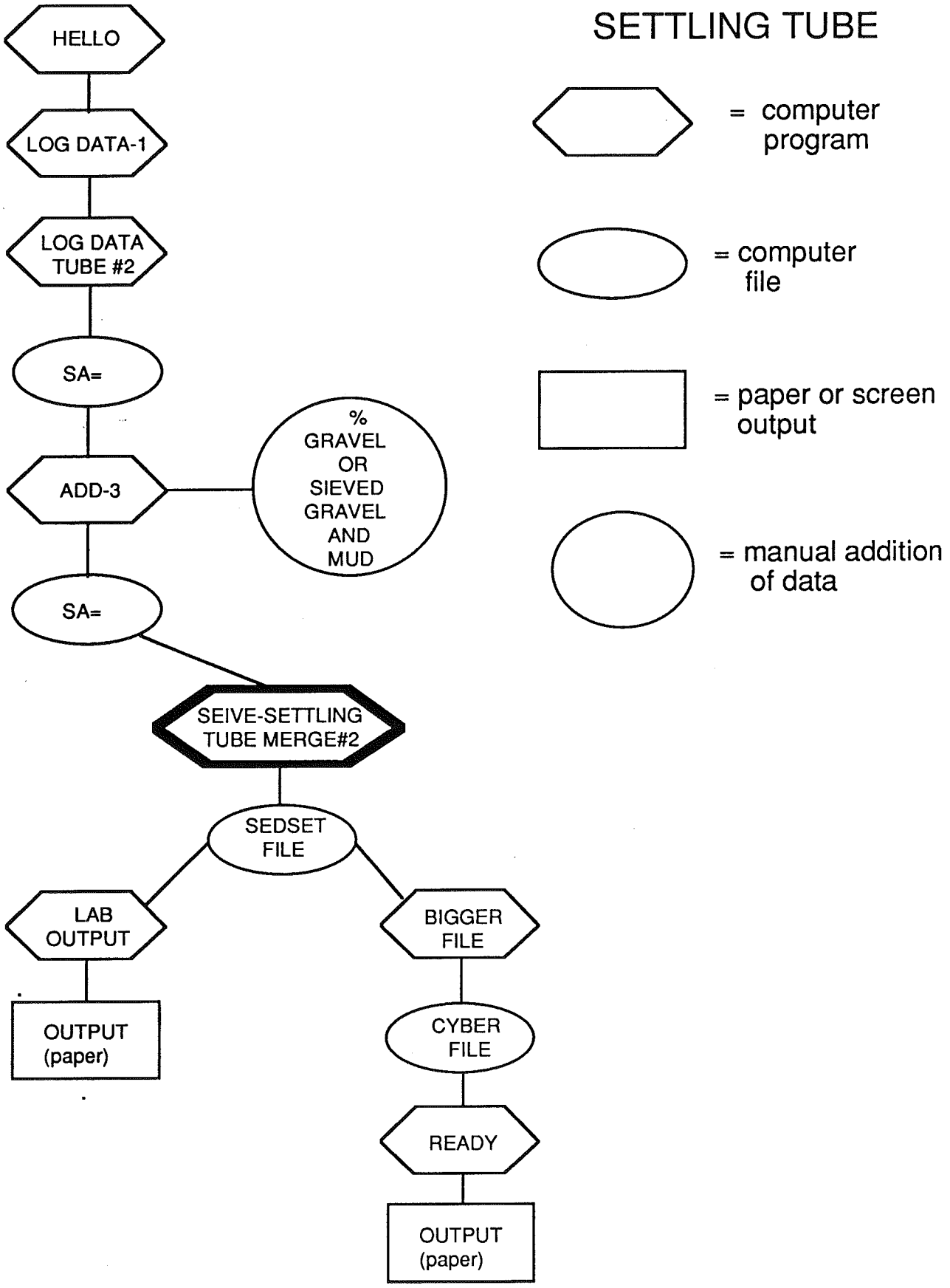

SETTLING TUBE
HELLO
LOG DATA-1
LOG DATA TUBE #2
SA=
ADD-3
% GRAVEL OR SIEVED GRAVEL AND MUD
SA=
SEIVE-SETTLING TUBE MERGE#2
SEDSET FILE
LAB OUTPUT
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)
= computer program
= computer file
= paper or screen output
= manual addition of data

This program modifies the output file of the "Log Data Tube #2" program. It must be run prior to doing the merge. It allows the addition of sieved gravel information (midpoint Phi vs weight) or percent gravel. It requires the entering of percent mud interval. These values are stored at the end of the existing file.

```
0 REM
1 REM GM-GRAVEL MIDPOINT,GW-GRAVEL WEIGHT,PG-PERCENT GRAVEL,SF-NO.
OF FRACTIONS
3 DIM GM(25),GW(25),A1$(600)
5 INPUT "SAMPLE NUMBER";SA
10 D$ = "*"
30 GOSUB 240
35 INPUT "WHAT IS THE PERCENT MUD  ";PM
40 INPUT "WHAT IS THE PERCENT GRAVEL";PG
50 INPUT "HOW MANY SIEVE FRACTIONS? (USE 1 FOR JUST TOTAL GRAVEL)";SF
55 INPUT "ARE THESE VALUES CORRECT (Y=0,N=1)";B
57 IF B > 0 THEN GOTO 35
60 IF SF = 1 THEN GOTO 110
70 PRINT "TYPE IN PHI MIDPOINT THEN RETURN FOLLOWED BY GRAVEL
FRACTION WEIGHT THEN RETURN"
80 FOR I = 1 TO SF
90 INPUT GM(I)
95 INPUT GW(I)
100 NEXT I
105 GOTO 130
110 GM(1) = - 3.0
120 GW(1) = PG
130 FOR I = 1 TO SF
140 PRINT I,GM(I),GW(I)
150 NEXT I
```

```
150 NEXT I
155 PRINT "8.0",PM
160 INPUT "ARE THESE VALUES CORRECT (Y=0,N=1)";A
165 IF A > 0 THEN GOTO 70
166 D$ = "*"
167 PRINT D$;"OPEN SA=";SA
168 PRINT D$;"WRITE SA=";SA
170 FOR I = 1 TO A4
171 PRINT A1$(I)
172 NEXT I
173 PRINT PG
174 PRINT SF
175 FOR I = 1 TO SF
176 PRINT GM(I)
177 PRINT GW(I)
178 NEXT I
179 PRINT 8.0: PRINT PM
180 PRINT D$;"CLOSE SA=";SA
190 GOTO 5
200 END
240 D$ = "*"
250 PRINT D$;"OPEN SA=";SA
260 PRINT D$;"READ SA=";SA
270 FOR I = 1 TO 8
280 INPUT A1$(I)
290 NEXT I
300 A2 = VAL (A1$(7)) * 5
310 A3 = A2 + VAL (A1$(8))
315 A4 = A3 + 8
320 FOR I = 1 TO A3
325 INPUT A1$(I + 8)
```

```
330 NEXT I
340 PRINT D$;"CLOSE SA=";SA
350 RETURN
```


SETTLING TUBE
HELLO
LOG DATA-1
LOG DATA TUBE #2
SA=
ADD-3
% GRAVEL OR SIEVED GRAVEL AND MUD
SA=
SEIVE-SETTLING TUBE MERGE#2
SEDSET FILE
LAB OUTPUT
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)
= computer program
= computer file
= paper or screen output
= manual addition of data

This program generates an output file (SEDSET) that eventually is sent ot the main frame to be used with Program READY (Cyber). It is only used with percent gravel or sieved gravel data, settling tube data and percent mud. It specifies the size intervals for the settling tube data, i.e. 0.1 to 1.0 Ø.

```
0 REM
10 D$ = "*"
12  PRINT D$;"MAXFILES 6"
20 SC = 4
30  DIM PHI(450): DIM WT(450): DIM CWT(450): DIM C1(450)
40  DIM B(450)
50  DIM ST(10),DU(10),TB(10)
60  DIM CLASD(450): DIM CMD(450): DIM CCLWT(450)
70  DIM TE(10),NL(10),E1(80),E2(80)
80  DIM W(450),T(450)
90 P1 = 10:P2 = 100:P3 = 1000
100  HOME
110  INPUT "PHI INTERVAL     =";CI
112  INPUT "DO YOU WANT OUTPUT STORED ON DISK ?(Y=1,N=0)  ";VX
120  PRINT "INPUT YOUR FIRST SAMPLE,LASTSAMPLE  ";: INPUT R,S
130  FOR SA = R TO S
140  GOSUB 1210: PRINT "START TIME IS ";T$
150  PRINT D$;"OPEN SA=";SA;",D1"
160  PRINT D$;"READ SA=";SA
170  INPUT GH$
180  INPUT S$
190  INPUT UF
200  INPUT HT
210  INPUT TC
220  INPUT T0$
```

```
230  INPUT NI$
240  INPUT NZ$
250 NI =  VAL (NI$)
260 NZ =  VAL (NZ$)
270 T1$ = T$: GOSUB 1130
280 TD$ = T2$
290 T1$ = T0$: GOSUB 1130
300 TR$ = T2$
301  PRINT
302  FOR I = 1 TO NI
304  INPUT ST$:ST(I) =  VAL (ST$)
306  INPUT DU$:DU(I) =  VAL (DU$)
308  INPUT TB$:TB(I) =  VAL (TB$)
310  INPUT TE$:TE(I) =  VAL (TE$)
312  INPUT NL$:NL(I) =  VAL (NL$)
314  NEXT I
530 T0 = TB(1)
540  FOR I = 1 TO NI
550 TB(I) = TB(I) - T0
560 TE(I) = TE(I) - T0
570 TX =  INT (TB(I) * P2 + .5) / P2
580 TY =  INT (TE(I) * P2 + .5) / P2
590  PRINT
600  PRINT "INTERVAL ";I;"  REQ. DURATION ";DU(I);" MIN"
610  PRINT  SPC( 12);"START ";TX; SPC( 2);"END ";TY
620  PRINT  SPC( 12);"SPEED FACTOR =";ST(I)
630  PRINT  SPC( 12);"N OF POINTS = ";NL(I)
640  NEXT I
650  PRINT
660 NR = 0
670  FOR I = 1 TO NI
```

```
680 N = NL(I)
690 T1 = TB(I)
700 T2 = TE(I)
710 SL = (T2 - T1) / (N - 1)
720  FOR J = 1 TO N
730 NR = NR + 1
740  INPUT W$:W(NR) =  VAL (W$)
750 T(NR) = SL * (J - 1) + T1
751  NEXT J
752  NEXT I
754 MR = 0
755 GW = 0
756  INPUT PG
757  INPUT SF
758 MR = SF
759  FOR I = 1 TO MR
760  INPUT E1(I)
761  INPUT E2(I)
762  IF E2(I) = 0 THEN  GOTO 764
763  GOTO 765
764 E2(I) = .0001
765 GW = E2(I) + GW
766  NEXT I
767  FOR I = 1 TO MR
768 E2(I) = (E2(I) / GW) * PG
769  NEXT I
770 MR = SF
771  INPUT AM: INPUT PM
772  PRINT D$;"CLOSE SA=";SA
775  GOSUB 3200
780  REM   VISCOSITY CALCULATIONS
```

```
790  IF TC <  = 20 THEN  GOTO 830
800 LN = (((1.3272 * (20 - TC)) - (0.001053 * ((TC - 20)^ 2))) / (TC + 105)) / 1.002
810 NT = (10 ^LN) / 100
820  GOTO 850
830 LN = ((1301) / ((998.333) + (8.1855 * (TC - 20)) + (0.00585 * ((TC - 20)^ 2)))) - (3.30233)
840 NT = (10 ^LN)
850 X = 1
860  REM    PHI (X) IS THE CLASS   BOUNDARY IN PHI UNITS
870  REM    CALCULATION OF GIBBS'  SETTLING VELOCITY
880 PF = 1: REM    DENSITY OF WATER
890 PS = 2.65: REM   DENSITY OF S EDIMENT
900 G = 981: REM   GRAVITY(CM/SEC/SEC)
910 TTIME = 0
920 KE = NZ
930  PRINT  TAB( 2);"POINT"; TAB( 10);"TIME"; TAB( 20);"WEIGHT"
940  FOR I = 1 TO NZ
950 TP = T(I):WP = W(I)
960 P = P2: IF TP < 10 THEN P = P3
970 TP =  INT (TP * P + .5) / P
980 TP = TP + .6
990 TIME = TP
1000 VEL = HT / TIME
1010 RAD = ((0.055804 * (VEL ^2)) +  SQR ((0.003114 * (VEL^ 4)) + G * (PS - PF) * (4.5 *
NT * VEL + 0.008705 * (VEL^ 2) * PF))) / (G * (PS - PF))
1020 DIAM = RAD * 20
1030 LGD =  LOG (DIAM)
```

```
1040 PHI(I) =  - (LGD / 0.301) * 0.434294
1050 P = P2: IF WP < 10 THEN P = P3
1070 B(I) = WP
1080  PRINT  TAB( 2);I; TAB( 10);TP; TAB( 20);WP
1090 TP = TP - .6
1100  NEXT I
1110  GOTO 1320
1120  STOP
1130 MN$ =  MID$ (T1$,1,2)
1140 DA$ =  MID$ (T1$,4,2)
1150 HR$ =  MID$ (T1$,7,2)
1160 MT$ =  MID$ (T1$,10,2)
1170 SC$ =  MID$ (T1$,13,2)
1180 YR$ = "82"
1190 T2$ = DA$ + "/" + MN$ + "/" + YR$ + "  " + HR$ + "." + MT$
1200  RETURN
1210  PRINT D$;"IN#";SC
1220  PRINT D$;"PR#";SC
1230  INPUT " ";T$
1240  PRINT D$;"IN#0"
1250  PRINT D$;"PR#0"
1260  RETURN
1270 H =  VAL ( MID$ (T$,7,2))
1280 M =  VAL ( MID$ (T$,10,2))
1290 S =  VAL ( MID$ (T$,13,6))
1300 SD = H * 3600 + M * 90 + S
1310  RETURN
1320 CLASD(1) = 0
1325 CMD(1) = 0 - (CI * 0.5)
1330  FOR M = 2 TO 100
```

```
1335 CLASD(M) = CLASD(M - 1) + CI
1340 CMD(M) = CMD(M - 1) + CI
1345  IF CLASD(M) > PHI(KE) THEN  GOTO 1360
1350  NEXT M
1360 DUMMY = 0
1370 B(KE + 1) = B(KE)
1380 MARKER = B(2)
1390  FOR N = 3 TO KE
1400 WT(N - 1) = B(N) - B(N - 1)
1410  IF MARKER > B(N) THEN  GOTO 1450
1420 MARKER = B(N)
1430 CWT(N - 1) = WT(N - 1) + DUMMY
1440  GOTO 1470
1450 WT(N - 1) = 0
1460 CWT(N - 1) = WT(N - 1) + DUMMY
1470 DUMMY = CWT(N - 1)
1480  NEXT N
1490 KE = KE - 2
1500  FOR N = 1 TO KE
1510 WT(N) = (WT(N) / CWT(KE)) * 100
1520 CWT(N) = WT(N) + CWT(N - 1)
1530  NEXT N
1540  REM  COMPUTER SIEVING
1550 XXX = 1
1560  FOR N = 1 TO KE
1570  IF PHI(N) >  - 1.0 THEN  GOTO 1690
1580 C1(1) = CWT(N)
1590  REM  C1=OLD CLASWT
1600 XXX = XXX + 1
1610  NEXT N
1690 DUMMY = C1(1)
```

```
1700 L = 2
1710  FOR N = XXX TO KE
1720  IF PHI(N) > CLASD(L) THEN  GOTO 1780
1730 C1(L) = CWT(N) - DUMMY
1740  IF PHI(N + 1) < CLASD(L) THEN  GOTO 1820
1750 L = L + 1
1760 DUMMY = CWT(N)
1770  GOTO 1820
1780 C1(L) = 0
1790 L = L + 1
1800  IF PHI(N) > CLASD(L) THEN  GOTO 1780
1810  GOTO 1730
1820  NEXT N
1830 TCI = L
1840  PRINT D$;"PR#1": POKE 1657,80
1845  PRINT  CHR$ (27)"E"
1850  PRINT "DIAMETER    DIAMETER    WEIGHT    CUM. WEIGHT"
1860  PRINT "  (PHI)       (MM)       (%)         (%)"
1865  PRINT  CHR$ (27)"F"
1866 C1(1) = 0
1870 CCLWT(1) = C1(1)
1880  FOR M = 2 TO TCI
1890 CCLWT(M) = C1(M) + CCLWT(M - 1)
1892  NEXT M
1900  FOR I = 1 TO TCI
1901 C1(I) = (C1(I) / CCLWT(TCI)) * UF
1902 E1(SF + I) = CMD(I)
1903 E2(SF + I) = C1(I)
1904  NEXT I
1905 TCI = TCI + SF:CCLWT(1) = E2(1)
1906  FOR N = 2 TO TCI
```

```
1907 CCLWT(N) = E2(N) + CCLWT(N - 1)
1908  NEXT N
1909 E1(TCI + 1) = AM:E2(TCI + 1) = PM:CCLWT(TCI + 1) = CCLWT(TCI) + PM:TCI =
TCI+ 1
1910  FOR N = 1 TO TCI
1920 MMCLAS = 10 ^( - E1(N) * .301)
1930 PD = 10 ^3:MMCLAS =  INT (MMCLAS * PD + .5) / PD:E1(N) =  INT (E1(N) * PD + .5)
/ PD
1940 DD = 10 ^3:E2(N) =  INT (E2(N) * DD + .5) / DD
1942 CCLWT(N) =  INT (CCLWT(N) * DD + .5) / DD
1945 STAR = 49312 + 256
1950  CALL STAR:E1(N);F5.2,"     ":
1952  CALL STAR:MMCLAS;F5.3,"     ":
1954  CALL STAR:E2(N);F5.3,"     ":
1956  CALL STAR:CCLWT(N);F6.3, CHR$ (13):
1960  NEXT N
1965  IF VX = 1 THEN  GOSUB 4700
1970  PRINT ""
1980  PRINT "        SAND STATISTICS USING METHOD OF MOMENTS"
1990  FOR BB = 1 TO 49: PRINT "-";: NEXT BB: PRINT
2000 YY = 0
2010 UU = 0
2020 DUM = 0
2030 ZZZ = 0
2035 TCI = (TCI - SF) - 1
2040  FOR N = 1 TO TCI
2050 C1(N) = C1(N) * (100 / UF)
2060  NEXT N
2070  FOR N = 1 TO TCI
2080 DUM = CMD(N) * C1(N) + DUM
2082  NEXT N
```

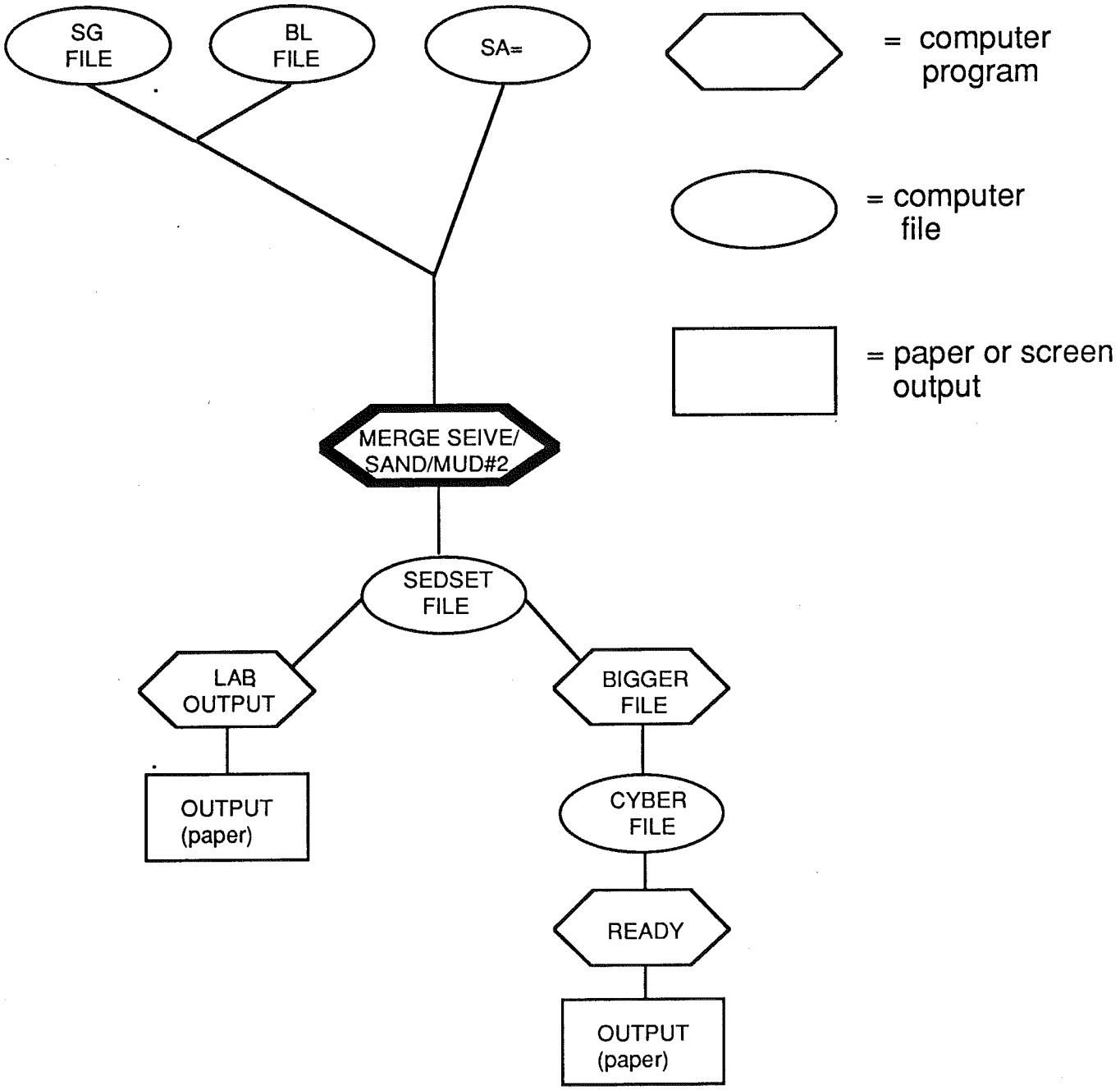
```
2084 MEAN = DUM / 100
2085 MEAN =  INT (MEAN * 1000 + .5) / 1000
2086 XBAR = 10^( - MEAN * 0.301)
2100 XBAR =  INT (XBAR * 1000 + .5) / 1000
2110  FOR N = 1 TO TCI
2120 YY = C1(N) * (CMD(N) - MEAN) ^2 + YY
2130 UU = C1(N) * (CMD(N) - MEAN) ^3 + UU
2140 ZZZ = C1(N) * (CMD(N) - MEAN) ^4 + ZZZ
2150  NEXT N
2160 M2 = YY / (100 - 1)
2170 SD = M2 ^0.5
2175 SD =  INT (SD * 1000 + .5) / 1000
2180 M3 = UU / 100
2190 A3 = M3 / M2^1.5
2195 A3 =  INT (A3 * 1000 + .5) / 1000
2200 M4 = ZZZ / 100
2210 A4 = M4 / M2^2.0
2215 A4 =  INT (A4 * 1000 + .5) / 1000
2220  PRINT "MEAN=";XBAR;"   MM"
2230  PRINT "MEAN=";MEAN;"   PHI"
2240  PRINT ""
2250  PRINT "STANDARD DEVIATION=";SD;"0"
2260  PRINT ""
2270  PRINT "SKEWNESS=";A3
2280  PRINT ""
2290  PRINT "KURTOSIS=";A4
2300  PRINT "                    "
2310 X =  FRE (0)
2320 D$ = "*": REM  CNTL D
2340  PRINT "HISTOGRAM OF SAND DISTRIBUTION    SAMPLE NUMBER=";SA
2351  PRINT "PHI","0%          16%          32%          48%"
```

```
2352 PRINT " ","*          *          *          *"
2353 PRINT
2354 FOR X = 1 TO TCI
2355 IF  INT (C1(X) / 2) < = 0 THEN  GOTO 2390
2360 PRINT CMD(X),
2370 FOR ZZ = 1 TO  INT (C1(X)): PRINT "*";: NEXT : PRINT : NEXT
2380 GOTO 2400
2390 PRINT CMD(X),"*": NEXT
2400 FOR BB = 1 TO 2: PRINT : NEXT BB
2410 FOR BB = 1 TO 70: PRINT "*";: NEXT BB: PRINT : PRINT
2420 GOTO 2530
2430 PRINT "CUMULATIVE ARITHMETIC SAND DISTRIBUTION    SAMPLE NUMBER
= ";SA
2440 PRINT " "
2450 PRINT "PHI","0%          32%          64%          96%"
2460 PRINT " ","*          *          *          *"
2470 FOR X = 1 TO TCI
2480 IF  INT (CCLWT(X)) < = 0 THEN  GOTO 2520
2490 PRINT CMD(X),
2500 FOR ZZ = 1 TO  INT (CCLWT(X) / 2): PRINT "*";: NEXT : PRINT
2510 NEXT : GOTO 2530
2520 PRINT CMD(X),"*": NEXT
2530 REM  GOTO STATEMENT RETURN
2540 D$ =  CHR$ (4)
2550 PRINT D$;"PR#0"
2560 HOME
2570 G$ =  CHR$ (7): FOR BB = 1 TO 10: PRINT G$: NEXT : PRINT
2580 NEXT SA
2590 END
3200 PRINT D$;"PR#1": POKE 1657,80
3300 FOR BB = 1 TO 5: PRINT : NEXT BB
```

```
3325  PRINT  CHR$ (27)"E"; CHR$ (14);
3400  PRINT  TAB( 10)"SEDIMENT SIZE ANALYSIS"
3500  PRINT  CHR$ (27); CHR$ (14);: PRINT  TAB( 9)"----------"
3600  FOR BB = 1 TO 3: PRINT : NEXT BB
3700  PRINT  TAB( 5)"SAMPLE NUMBER:   "SA," ","SCIENTIST:  "GH$
3800  PRINT
4100  PRINT  TAB( 5)"PHI INTERVAL:"CI," ","PERCENT SAND  :  "UF
4200  PRINT
4300  PRINT  TAB( 5)"HEIGHT OF COLUMN:   "HT," ","WATER TEMPERATURE:   "TC
4400  PRINT
4410  PRINT  TAB( 5)"SAMPLE INFORMATION:   " LEFT$ (S$,40)
4420 SX$ = S$
4421 LNTH =  LEN (S$)
4430  IF LNTH < 41 GOTO 4510
4440 S$ =  MID$ (S$,41)
4450  PRINT  TAB( 23) LEFT$ (S$,40)
4500  GOTO 4421
4510 S$ = SX$: FOR BB = 1 TO 5: PRINT : NEXT BB
4580  PRINT  CHR$ (27)"F"
4585  PRINT
4599  PRINT D$;"PR#0"
4600  RETURN
4700  PRINT D$;"OPEN SEDSET ";SA;",D2"
4710  PRINT D$;"WRITE SEDSET ";SA
4715 R7 = TCI - 1
4720  PRINT R7
4730  PRINT S$,"   ",GH$
4740  PRINT "SAMPLE NUMBER= ";SA
4741 E2(SF) = E2(SF) + E2(SF + 1)
4742  FOR LL = SF + 1 TO R7
4743 E1(LL) = E1(LL + 1)
```

```
4744 E2(LL) = E2(LL + 1)
4745  NEXT LL
4750  FOR I = 1 TO R7
4760  PRINT E1(I);",";E2(I)
4770  NEXT I
4780  PRINT D$;"CLOSE SEDSET ";SA
4790  RETURN
```

SEDIGRAPH & SETTLING TUBE



This program generates an output file (SEDSET) that eventually is sent ot the main frame to be used with program READY (Cyber). It is only used with percent gravel or sieved gravel data, settling tube data(sand) and SediGraph® data (mud). It specifies the size intervals for the output file, i.e. 0.1 to 1.0 Ø. In other words SA files are merged with SG files to create SEDSET files.

```
0 REM
10 D$ =  CHR$ (4)
20 SC = 4
30  DIM PHI(450): DIM WT(450): DIM CWT(450): DIM C1(450)
40  DIM B(450)
50  DIM ST(10),DU(10),TB(10)
60  DIM CLASD(100): DIM CMD(100): DIM CCLWT(450)
70  DIM Z1(150),Z2(150)
90  DIM W(450),T(450)
100  DIM A(110),PI(217),ACUM(217),BLINE(110)
110 P1 = 10:P2 = 100:P3 = 1000
120  HOME : PRINT : PRINT "     SED/SET TUBE MERGE PROGRAM"
130  PRINT : PRINT : PRINT "PUT SET TUBE  DISK IN DRIVE # 1"
140  PRINT "PUT SEDIGRAPH DISK IN DRIVE # 2"
150  PRINT "PUT MERGE DISK IN DRIVE # 3"
160  PRINT : INPUT "THE STARTING  SAMPLE # : ";R
170  INPUT "THE FINISHING SAMPLE # : ";S
180  INPUT "ENTER THE PHI INTERVAL : ";CI
190 SA = R
200 D$ =  CHR$ (4)
210  HOME : PRINT : PRINT  SPC( 10);"SAMPLE # ";SA: PRINT : PRINT : PRINT "-
READING SA";SA;" FILE"
220  PRINT D$;"OPEN SA=";SA;",S6,D1"
230  PRINT D$;"READ SA=";SA
240  INPUT GH$
```

```
250  INPUT S$
260  INPUT UF
270  INPUT HT
280  INPUT TC
290  INPUT T0$
300  INPUT NI$
310  INPUT NZ$
320 NI =  VAL (NI$)
330 NZ =  VAL (NZ$)
340  FOR I = 1 TO NI
350  INPUT ST$:ST(I) =  VAL (ST$)
360  INPUT DU$:DU(I) =  VAL (DU$)
370  INPUT TB$:TB(I) =  VAL (TB$)
380  INPUT TE$:TE(I) =  VAL (TE$)
390  INPUT NL$:NL(I) =  VAL (NL$)
400  NEXT I
410 T0 = TB(1)
420  FOR I = 1 TO NI
430 TB(I) = TB(I) - T0
440 TE(I) = TE(I) - T0
450 TX =  INT (TB(I) * P2 + .5) / P2
460 TY =  INT (TE(I) * P2 + .5) / P2
470  NEXT I
480 NR = 0
490  FOR I = 1 TO NI:N = NL(I):T1 = TB(I):T2 = TE(I):SL = (T2 - T1) / (N - 1)
500  FOR J = 1 TO N
510 NR = NR + 1: INPUT W$:W(NR) =  VAL (W$):T(NR) = SL * (J - 1) + T1
520  NEXT J
530  NEXT I
540 MR = 0
550 GW = 0
```

```
560  INPUT PG
561  IF PG = 0 THEN PG = PG + .0001
570  INPUT SF
580 MR = SF
590  FOR I = 1 TO MR
600  INPUT Z1(I)
610  INPUT Z2(I)
611  IF Z2(I) = 0 THEN  GOTO 615
613  GOTO 620
615 Z2(I) = .0001
620 GW = Z2(I) + GW
630  NEXT I
640  FOR I = 1 TO MR
650 Z2(I) = (Z2(I) / GW) * PG
660  NEXT I
670 D$ =  CHR$ (4)
680  PRINT D$;"CLOSE SA=";SA
685 DF$ = S$
690  IF TC <  = 20 THEN  GOTO 720
700 LN = (((1.3272 * (20 - TC)) - (0.001053 * ((TC - 20) ^
2))) / (TC + 105)) / 1.002
710 NT = (10 ^
LN) / 100: GOTO 740
720 LN = ((1301) / ((998.333) + (8.1855 * (TC - 20)) + (0.00585 * ((TC - 20) ^
2)))) - (3.30233)
730 NT = (10 ^
LN)
740 X = 1
750  PRINT : PRINT "- CALCULATING GIBB'S SETTLING VELOCITY"
760 PF = 1: REM    DENSITY OF WATER
770 PS = 2.65: REM   DENSITY OF SEDIMENT
```

```
780 G = 981: REM  GRAVITY(CM/SEC /SEC)
790 KE = NZ
800  FOR I = 1 TO NZ:TP = T(I):WP = W(I):P = P2: IF TP < 10 THEN P = P3
810 TP =  INT (TP * P + .5) / P:TP = TP + .6:TIME = TP:VEL = HT / TIME
820 RAD = ((0.055804 * (VEL^
2)) +  SQR ((0.003114 * (VEL^
4)) + G * (PS - PF) * (4.5 * NT * VEL + 0.008705 * (VEL^
2) * PF))) / (G * (PS - PF))
830 DIAM = RAD * 20:LGD =  LOG (DIAM):PHI(I) =  - (LGD / 0.301) * 0.434294
840 P = P2: IF WP < 10 THEN P = P3
850 B(I) = WP:TP = TP - 0.6
860  NEXT I
870 CLASD(1) = 0:CMD(1) = 0 - (CI * 0.5)
880  FOR M = 2 TO 100
890 CLASD(M) = CLASD(M - 1) + CI:CMD(M) = CMD(M - 1) + CI
900  IF CLASD(M) > PHI(KE) THEN  GOTO 920
910  NEXT M
920 DUMMY = 0:B(KE + 1) = B(KE):MARKER = B(2)
930  FOR N = 3 TO KE
940 WT(N - 1) = B(N) - B(N - 1)
950  IF MARKER > B(N) THEN  GOTO 990
960 MARKER = B(N)
970 CWT(N - 1) = WT(N - 1) + DUMMY
980  GOTO 1000
990 WT(N - 1) = 0:CWT(N - 1) = WT(N - 1) + DUMMY
1000 DUMMY = CWT(N - 1)
1010  NEXT N
1020 KE = KE - 2
1030  FOR N = 1 TO KE:WT(N) = (WT(N) / CWT(KE)) * 100:CWT(N) = WT(N) + CWT(N -
1): NEXT N
1040  PRINT : PRINT "- PERFORMING COMPUTERIZED SIEVE"
```

```
1050 XXX = 1
1060  FOR N = 1 TO KE
1070  IF PHI(N) >  - 2.0 THEN  GOTO 1090
1080 C1(1) = CWT(N):XXX = XXX + 1: NEXT N
1090 DUMMY = C1(1)
1100 L = 2
1110  FOR N = XXX TO KE
1120  IF PHI(N) > CLASD(L) THEN  GOTO 1160
1130 C1(L) = CWT(N) - DUMMY
1140  IF PHI(N + 1) < CLASD(L) THEN  GOTO 1180
1150 L = L + 1:DUMMY = CWT(N): GOTO 1180
1160 C1(L) = 0:L = L + 1: IF PHI(N) > CLASD(L) GOTO 1160
1170  GOTO 1130
1180  NEXT N
1190 TCI = L
1200  FOR N = 1 TO TCI
1210  IF CMD(N) <  - 1.3 GOTO 1240
1220  IF CMD(N) > 2.17 GOTO 1248
1230 CF = (0.19 * CMD(N)) + 0.59:C1(N) = C1(N) * CF: GOTO 1241
1240 C1(N) = C1(N) * .34
1241  NEXT N
1248  FOR I = 1 TO 4
1249 CMD(TCI + I) = CMD(TCI - 1 + I) + CI
1250  NEXT I
1251 C1(TCI + 1) = C1(TCI) * 0.45
1252 C1(TCI + 2) = C1(TCI) * 0.30
1253 C1(TCI + 3) = C1(TCI) * 0.15
1254 C1(TCI + 4) = C1(TCI) * 0.10
1255 TCI = TCI + 4
1260 C1(1) = 0:CCLWT(1) = C1(1)
1270  FOR M = 2 TO TCI:CCLWT(M) = C1(M) + CCLWT(M - 1): NEXT M
```

```
1280  FOR N = 1 TO TCI
1290 C1(N) = (C1(N) / CCLWT(TCI)) * UF
1300 CCLWT(N) = (C1(N) * 120 / UF) + CCLWT(N - 1)
1310 MMCLAS = 10^
( - CMD(N) * .301)
1320 PD = 10 ^
3:MMCLAS =  INT (MMCLAS * PD + .5) / PD:CMD(N) =  INT (CMD(N) * PD + .5) / PD
1330 DD = 10^
3:C1(N) =  INT (C1(N) * DD + .5) / DD:CCLWT(N) =  INT (CCLWT(N) * DD + .5) / DD
1340 MR = MR + 1:Z1(MR) = CMD(N):Z2(MR) = ( INT (C1(N) * 100 + 0.5) / 100)
1350  NEXT N
1360 FF = 31
1370 PI(0) = 4 - (1 / FF)
1380 D$ =  CHR$ (4):AMM = CI:NUMBER = SA:WH = 1
1390 S$ = "SG"
1400 N1 = N
1410  PRINT : PRINT "- READING SG";NUMBER;" FILE"
1420  PRINT D$;"OPEN ";S$;NUMBER;",S6,D2"
1430  PRINT D$;"READ ";S$;NUMBER
1440  INPUT BNUMBER
1450  INPUT NAME$
1460  INPUT PT
1470  INPUT IMAX
1480 IMAX = IMAX - 1
1490  IF IMAX > 217 THEN IMAX = 217
1500  INPUT INFO$(1)
1510  INPUT INFO$(2)
1520  INPUT INFO$(3)
1530  INPUT INFO$(4)
1540  FOR I = 1 TO IMAX
1550  INPUT ACUM(I)
```

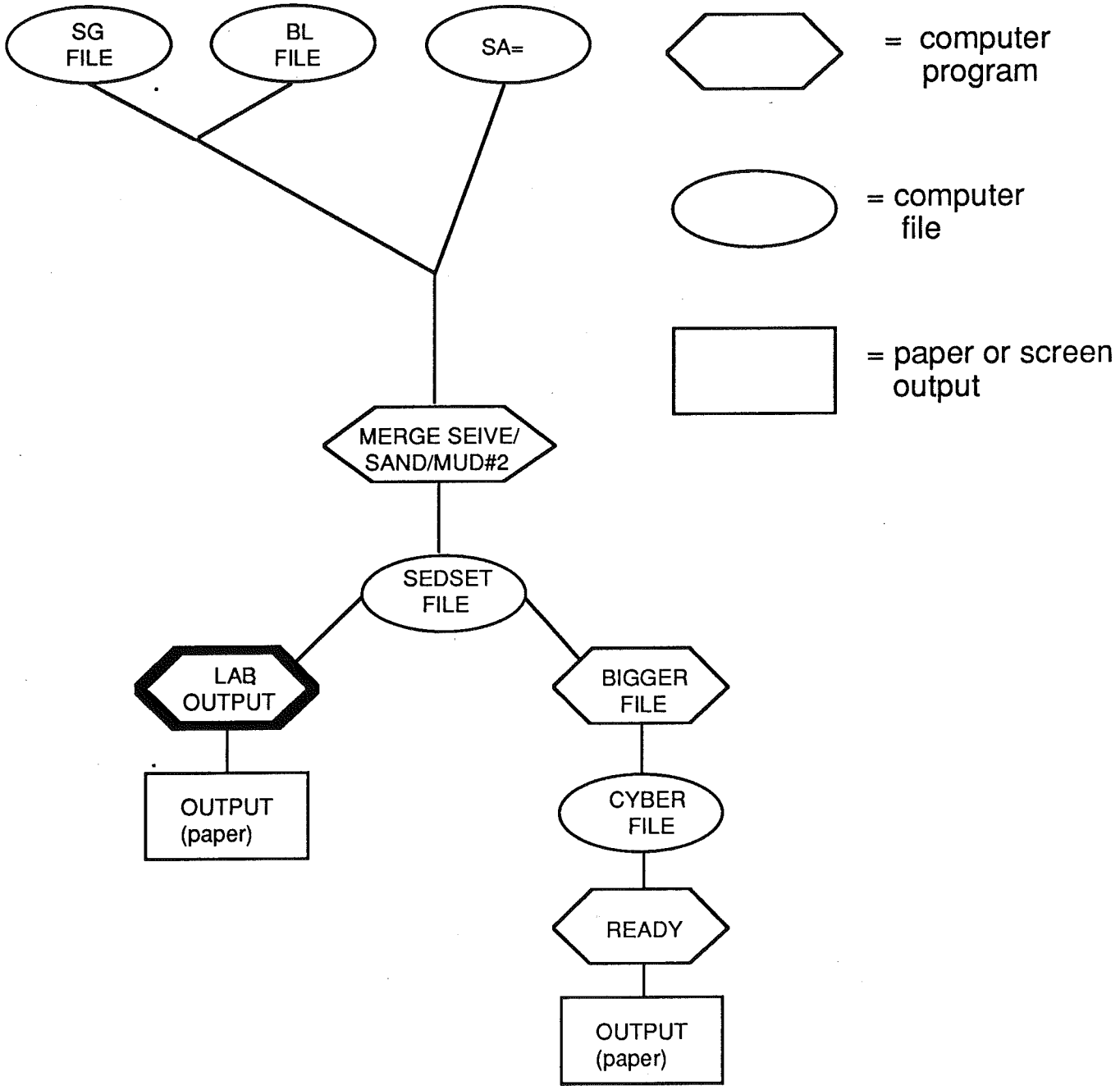
```
1560  IF ACUM(I) > 100 THEN ACUM(I) = 100
1570 ACUM(0) = ACUM(1)
1580  IF ACUM(I) > ACUM(I - 1) THEN ACUM(I) = ACUM(I - 1)
1590  IF ACUM(I) < 0 THEN ACUM(I) = 0
1600 PI(I) = PI(I - 1) + 1 / FF
1610  NEXT I
1620  PRINT D$;"CLOSE "S$;NUMBER
1630  PRINT : PRINT "- MAKING BASELINE CORRECTIONS"
1640 BL = BNUMBER: PRINT D$;"OPEN BL";BL
1650  PRINT D$;"READ BL";BL: INPUT BMAX
1660  FOR I = 1 TO IMAX
1670  INPUT C
1680  IF C > 100 THEN C = 100
1690  IF I = 1 THEN C0 = C:C2 = C
1700  IF C > C2 THEN C = C2
1710 ACUM(I) = ACUM(I) + (C - C0)
1720  IF ACUM(I) < 0 THEN ACUM(I) = 0
1730 C2 = C
1740  NEXT I: PRINT D$;"CLOSE BL";BL
1750 A(1) = 100 - ACUM(1)
1760 N = 0
1770 BBB = 0:Y = 1
1780  FOR XX = 4 TO 16 STEP AMM
1790 BBB = BBB + 1
1800  IF XX = 4 THEN PI(BBB) = XX: GOTO 1900
1810  FOR X = Y TO IMAX
1820  IF PI(X) = 0 THEN 1910
1830  IF PI(X) > XX OR PI(X) = XX THEN 1860
1840  NEXT X
1850 X = X - 1
1860 MM = (ACUM(X) - ACUM(X - 1)) / (PI(X) - PI(X - 1))
```

```
1870 NACUM = (MM * XX) - ((MM * PI(X)) - ACUM(X))
1880 PI(BBB) = XX:ACUM(BBB) = NACUM
1890 ACUM(BBB) = NACUM
1900 Y = X: NEXT XX
1910 IMAX =  INT ((IMAX / 31) / AMM) + 1:N = 0
1920  FOR I = 1 TO IMAX
1930 N = N + 1
1940  IF I = 1 THEN 1960
1950 A(N) = ACUM(I - 1) - ACUM(I)
1960 PI(I) = PI(I) - (AMM / 2)
1970  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(N)
1980  NEXT I
1990  IF AMM >  = .5 THEN 2140
2000  FOR I = 4 TO (IMAX - 3)
2010 BLINE(1) = .65 * A(1) + .2 * A(2) + .1 * A(3) + .05 * A(4)
2020 BLINE(2) = .2 * A(1) + .45 * A(2) + .2 * A(3) + .1 * A(4) + .05 * A(5)
2030 BLINE(3) = .1 * A(1) + .2 * A(2) + .35 * A(3) + .2 * A(4) + .1 * A(5) + .05 * A(6)
2040 BLINE(I) = .05 * A(I - 3) + .1 * A(I - 2) + .2 * A(I - 1) + .30 * A(I) + .2 * A(I + 1) + .1 *
A(I + 2) + .05 * A(I + 3)
2050 BLINE(IMAX - 2) = .05 * A(IMAX - 5) + .1 * A(IMAX - 4) + .2 * A(IMAX - 3) + .35 *
A(IMAX - 2) + .2 * A(IMAX - 1) + .1 * A(IMAX)
2060 BLINE(IMAX - 1) = .05 * A(IMAX - 4) + .1 * A(IMAX - 3) + .2 * A(IMAX - 2) + .45 *
A(IMAX - 1) + .2 * A(IMAX)
2070 BLINE(IMAX) = .05 * A(IMAX - 3) + .1 * A(IMAX - 2) + .2 * A(IMAX - 1) + .65 *
A(IMAX)
2080  NEXT I
2090 ACUM(1) = 100 - BLINE(1):A(1) = BLINE(1):CLAY = A(1)
2100  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
2110  FOR I = 2 TO IMAX:A(I) = BLINE(I)
2120  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
2130 ACUM(I) = ACUM(I - 1) - A(I): NEXT I
```

```
2140 I = 0
2150 MC = MR:TROL = 0.0000001
2160  FOR N = 1 TO IMAX
2170  LET I = I + 1
2180 A9 = A(I) * PT / 100
2190 PI = PI(N)
2200 PI =  INT (PI * 1000 + .5) / 1000
2201 LS = 10 ^
( - PI * .301)
2202 LS =  INT (LS * 10000 + .5) / 10000
2203 A9 =  INT (A9 * 100 + .5) / 100
2204 ACUM =  INT (ACUM * 100 + .5) / 100
2210  FOR M = 1 TO MC:MAC = ( ABS (Z1(M) - PI))
2220  IF MAC < TROL THEN Z2(M) = A9 + Z2(M): GOTO 2250
2230  NEXT M
2240 MR = MR + 1:Z1(MR) = PI:Z2(MR) = A9
2250  NEXT N
2260 MR = MR + 1
2270 Z1(MR) = PI(IMAX) + 1
2280 Z2(MR) = ACUM(IMAX) * PT / 100
2290 MA = 0
2300  FOR I = 1 TO MR
2310 MA = Z2(I) + MA
2320  NEXT I
2330 QR = MA - PG
2340 LG = 100 - PG
2350  FOR I = SF TO MR
2360 Z2(I) = Z2(I) * LG / QR
2365 Z2(I) =  INT (Z2(I) * 1000 + .5) / 1000
2370  NEXT I
2380  PRINT : PRINT "- WRITING SEDSET ";NUMBER;" FILE"
```

```
2390 D$ =  CHR$ (4): PRINT D$;"OPEN SEDSET ";NUMBER;",S5,D1": PRINT D$;"WRITE
SEDSET ";NUMBER
2395 R7 = MR - 1
2400  PRINT R7: PRINT DF$: PRINT "SAMPLE NUMBER ";SA
2401 Z2(SF) = Z2(SF) + Z2(SF + 1)
2402  FOR LL = SF + 1 TO R7
2403 Z1(LL) = Z1(LL + 1)
2404 Z2(LL) = Z2(LL + 1)
2405  NEXT LL
2410  FOR LL = 1 TO R7: PRINT Z1(LL);",";Z2(LL): NEXT LL
2420  PRINT D$;"CLOSE SEDSET ";NUMBER
2430 I = 0:N = 0:DUM = 0:CLAY = 0:YY = 0:UU = 0:ZZZ = 0: TEXT
2440 BBB = 0: FOR X = 1 TO 210:PI(X) = 0: NEXT X
2450 X = 0
2460 SA = SA + 1: IF SA > S GOTO 2480
2470  GOTO 200
2480  HOME : PRINT : PRINT "- ALL DONE.": END
```

SEDIGRAPH & SETTLING TUBE



This program is designed to give the lab a quick output of frequency distribution tables, percent , gravel, sand, silt, clay, and mud, moment statiscs and crude graphics on dot matrix printer from merged files (sedset). It is designed to give the lab operator a chance to review a selection of sample outputs without doing Ready.

```
0 REM
10 D$ = "*"
12  PRINT D$;"MAXFILES 6"
20 SC = 4
70  DIM TE(10),NL(10),E1(80),E2(80)
75  DIM CCLWT(80)
90 P1 = 10:P2 = 100:P3 = 1000
100  HOME
120  PRINT "INPUT YOUR FIRST SAMPLE,LASTSAMPLE  ";: INPUT R,S
130  FOR SEDSET = R TO S
150  PRINT D$;"OPEN SEDSET ";SEDSET
160  PRINT D$;"READ SEDSET ";SEDSET
560  INPUT SF
660  INPUT GH$
761  INPUT S$
762  FOR I = 1 TO SF
763  INPUT E1(I),E2(I)
766  NEXT I
772  PRINT D$;"CLOSE SEDSET ";SEDSET
1840  PRINT D$;"PR#1": POKE 1657,80
1845  PRINT  CHR$ (27)"E"
1846  PRINT " "
1847  PRINT GH$
1848  PRINT " "
1849  PRINT S$
1850  PRINT "DIAMETER    DIAMETER    WEIGHT    CUM. WEIGHT"
```

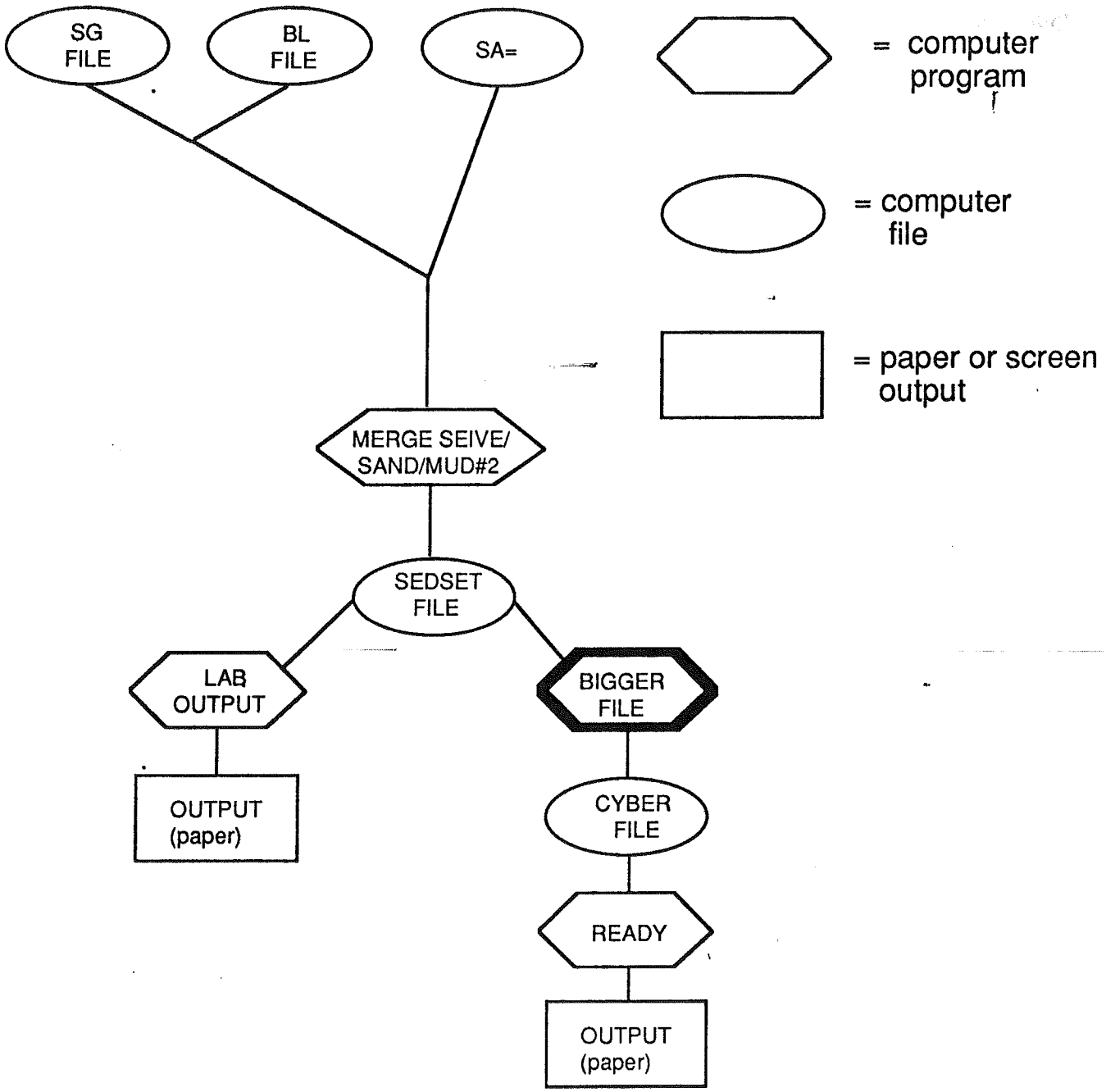
```
1860 PRINT "  (PHI)     (MM)       (%)        (%)"
1865 PRINT  CHR$ (27)"F"
1870 CCLWT(1) = E2(1)
1880  FOR M = 2 TO SF
1890 CCLWT(M) = E2(M) + CCLWT(M - 1)
1892  NEXT M
1908 TCI = SF
1910  FOR N = 1 TO TCI
1920 MMCLAS = 10 ^
( - E1(N) * .301)
1930 PD = 10 ^
3:MMCLAS =  INT (MMCLAS * PD + .5) / PD:E1(N) =  INT (E1(N) * PD + .5) / PD
1940 DD = 10^
3:E2(N) =  INT (E2(N) * DD + .5) / DD
1942 CCLWT(N) =  INT (CCLWT(N) * DD + .5) / DD
1945 STAR = 49312 + 256
1950  CALL STAR:E1(N);F5.2,"     ":
1952  CALL STAR:MMCLAS;F5.3,"     ":
1954  CALL STAR:E2(N);F5.3,"     ":
1956  CALL STAR:CCLWT(N);F6.3, CHR$ (13):
1960  NEXT N
1970  PRINT ""
1980  PRINT "        SAND STATISTICS USING METHOD OF MOMENTS"
1990  FOR BB = 1 TO 49: PRINT "-";: NEXT BB: PRINT
2000 YY = 0
2010 UU = 0
2020 DUM = 0
2030 ZZZ = 0
2070  FOR N = 1 TO TCI
2080 DUM = E1(N) * E2(N) + DUM
2082  NEXT N
2084 MEAN = DUM / 100
```

```
2085 MEAN =  INT (MEAN * 1000 + .5) / 1000
2086 XBAR = 10^
( - MEAN * 0.301)
2100 XBAR =  INT (XBAR * 1000 + .5) / 1000
2110  FOR N = 1 TO TCI
2120 YY = E2(N) * (E1(N) - MEAN)^
2 + YY
2130 UU = E2(N) * (E1(N) - MEAN) ^
3 + UU
2140 ZZZ = E2(N) * (E1(N) - MEAN) ^
4 + ZZZ
2150  NEXT N
2160 M2 = YY / (100 - 1)
2170 SD = M2^
0.5
2175 SD =  INT (SD * 1000 + .5) / 1000
2180 M3 = UU / 100
2190 A3 = M3 / M2 ^
1.5
2195 A3 =  INT (A3 * 1000 + .5) / 1000
2200 M4 = ZZZ / 100
2210 A4 = M4 / M2 ^
2.0
2215 A4 =  INT (A4 * 1000 + .5) / 1000
2220  PRINT "MEAN=";XBAR;"   MM"
2230  PRINT "MEAN=";MEAN;"   PHI"
2240  PRINT ""
2250  PRINT "STANDARD DEVIATION=";SD;"0"
2260  PRINT ""
2270  PRINT "SKEWNESS=";A3
2280  PRINT ""
2290  PRINT "KURTOSIS=";A4
```

```
2300 PRINT "                "
2301 T1 = 0:T2 = 0:T3 = 0:T4 = 0
2302 FOR I = 1 TO SF
2303 IF E1(I) <  - 1.0 THEN T1 = T1 + E2(I)
2304 IF E1(I) < 4.0 AND E1(I) >  - 1.0 THEN T2 = T2 + E2(I)
2305 IF E1(I) < 8.0 AND E1(I) > 4.0 THEN T3 = T3 + E2(I)
2306 IF E1(I) > 8.0 THEN T4 = T4 + E2(I)
2307 NEXT I
2308 PRINT "PERCENT GRAVEL=  ";T1
2309 PRINT "PERCENT SAND=    ";T2
2310 PRINT "PERCENT SILT=    ";T3
2311 PRINT "PERCENT CLAY=    ";T4
2312 PRINT "PERCENT MUD =    ";T3 + T4
2313 X =  FRE (0)
2320 D$ = "*": REM  CNTL D
2340 PRINT "HISTOGRAM OF SAND DISTRIBUTION   SAMPLE NUMBER=";SEDSET
2351 PRINT "PHI","0%          16%          32%          48%"
2352 PRINT " ","*           *           *           *"
2353 PRINT
2354 FOR X = 1 TO TCI
2355 IF  INT (E2(X) / 2) <  = 0 THEN  GOTO 2390
2360 PRINT E1(X),
2370 FOR ZZ = 1 TO  INT (E2(X)): PRINT "*";: NEXT : PRINT : NEXT
2380 GOTO 2400
2390 PRINT E1(X),"*": NEXT
2400 FOR BB = 1 TO 2: PRINT : NEXT BB
2410 FOR BB = 1 TO 70: PRINT "*";: NEXT BB: PRINT : PRINT
2530 REM  GOTO STATEMENT RETURN
2540 D$ =  CHR$ (4)
2550 PRINT D$;"PR#0"
2560 HOME
2570 G$ =  CHR$ (7): FOR BB = 1 TO 10: PRINT G$: NEXT : PRINT
```

```
2580 NEXT SEDSET
2590 END
```

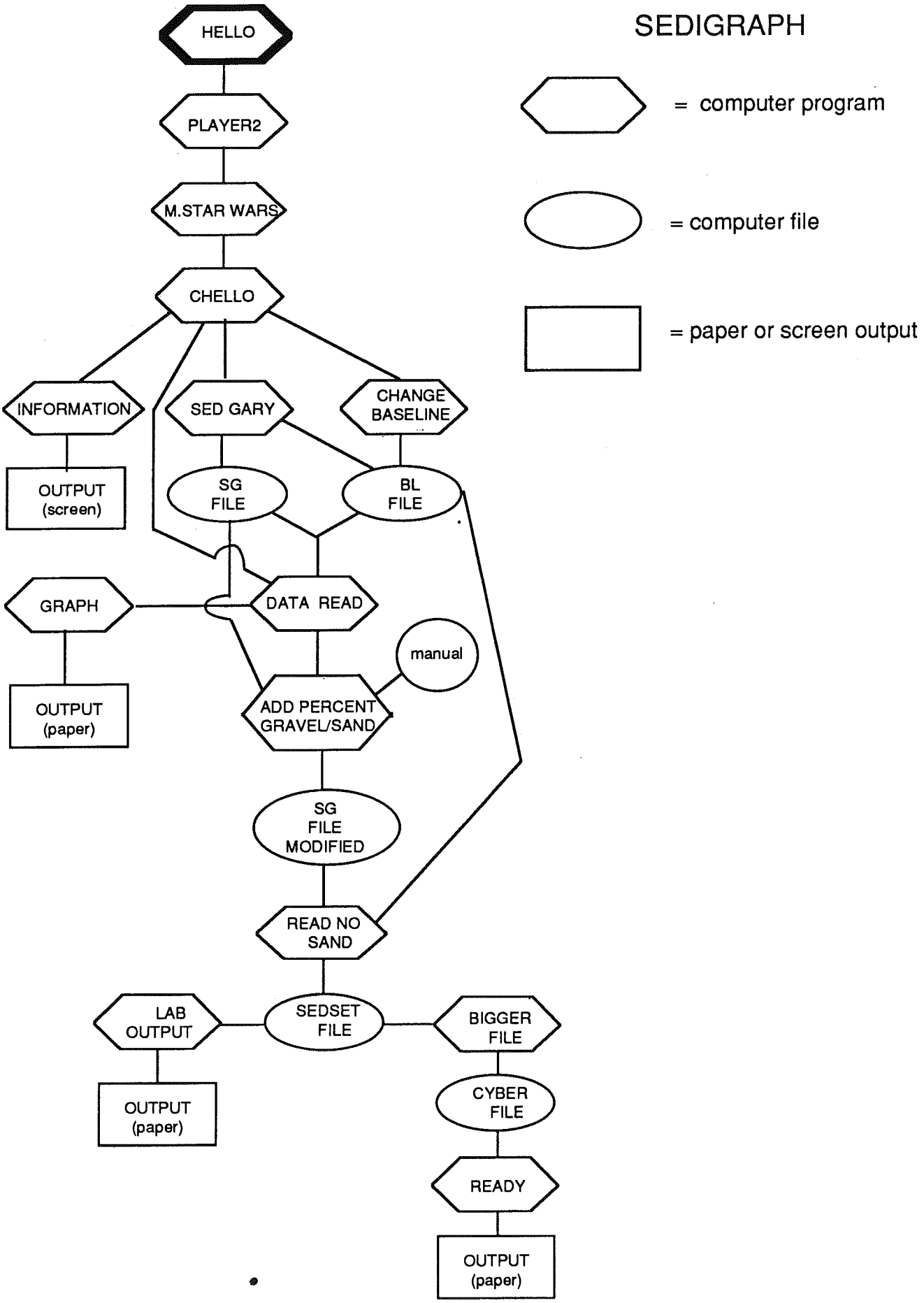
SEDIGRAPH & SETTLING TUBE



This program allows individual files (SEDSET) to be merged together into a larger file in order to transfer large numbers of samples to the mainframe at any one time.

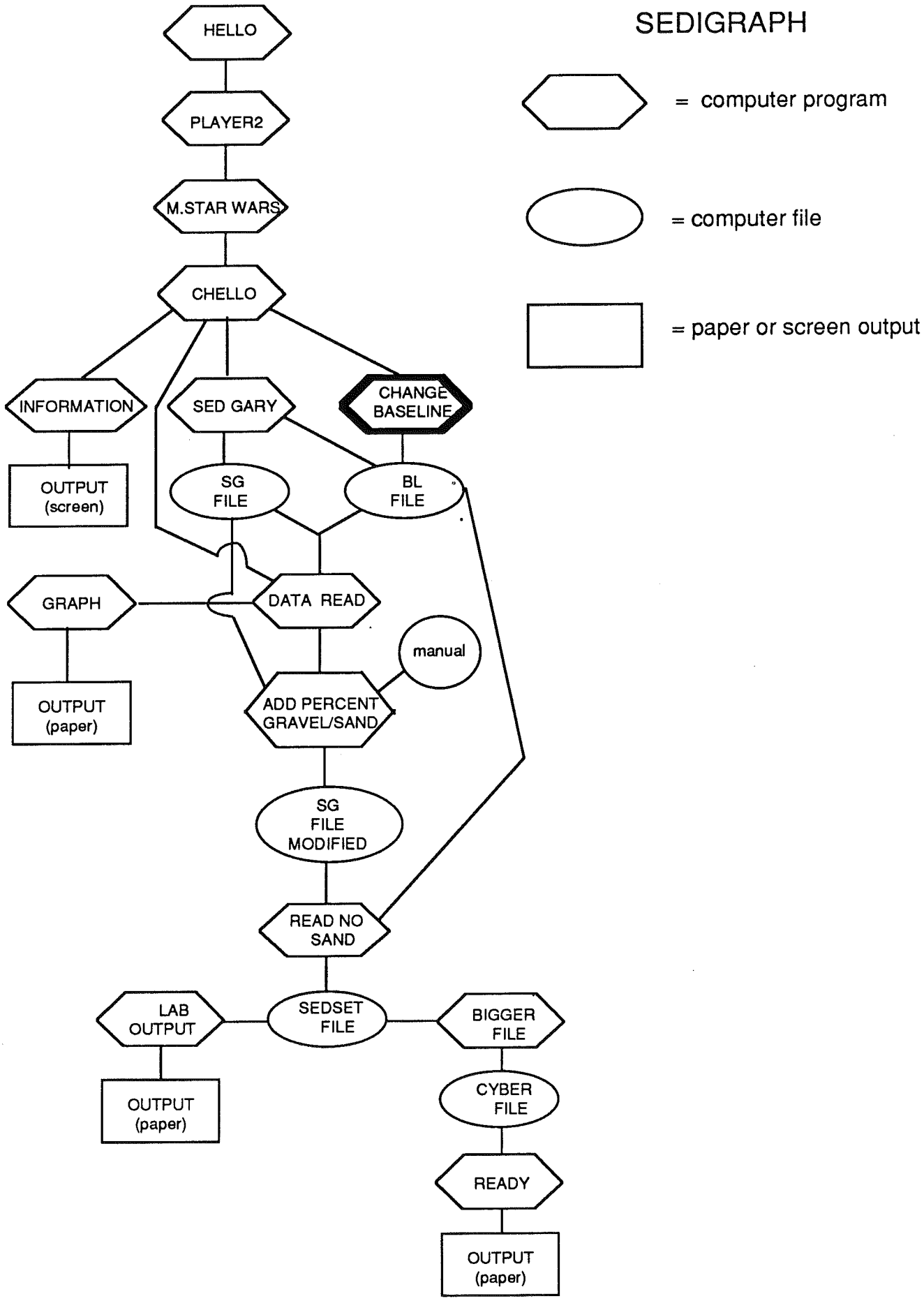
```
0 REM
10 D$ = "*"
15 R$ =  CHR$ (13): REM  CARRIAGE RETURN
20  PRINT "WHAT IS THE FIRST SAMPLE"
30  INPUT "SEDSET";S1
40  PRINT "WHAT IS THE LAST SAMPLE"
50  INPUT "SEDSET";S2
60  PRINT "WHAT IS YOUR MERGE FILE TO BE CALLED?"
70  INPUT B$
80  DIM A$(150)
90  PRINT D$;"OPEN";B$;",D1"
93  PRINT D$;"WRITE";B$
95  PRINT D$;"CLOSE";B$
100  FOR I = S1 TO S2
110  PRINT D$;"OPEN SEDSET ";I;",D2";",S6"
120  PRINT D$;"READ SEDSET ";I
130  INPUT NI$
140 TI =  VAL (NI$) + 3
145 A$(1) = NI$
150  FOR J = 2 TO TI
155  GET Z$
160  IF Z$ = R$ GOTO 170
165 A$(J) = A$(J) + Z$
166  GOTO 155
170  NEXT J
175 D$ =  CHR$ (4)
180  PRINT D$;"CLOSE SEDSET ";I
```

```
185  PRINT D$;"CLOSE SEDSET ";I
190  PRINT D$;"APPEND ";B$;",D1"
195  PRINT D$;"WRITE ";B$
210  FOR J = 1 TO TI
220  PRINT A$(J)
225 A$(J) = " "
230  NEXT J
240  PRINT D$;"CLOSE ";B$
250  NEXT I
```


SEDIGRAPH
= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

An initialization program for the program diskette to be used with the SediGraph®.

```
0 REM
5  HOME
6 D$ = "*": REM  CONTROL 'D'
8  INVERSE
10  HTAB 8: PRINT "******************************"
20  HTAB 8: PRINT "**                          **"
30  HTAB 8: PRINT "**  DELTA MARINE COMPUTER  **"
40  HTAB 8: PRINT "**        SERVICES          **"
50  HTAB 8: PRINT "**                          **"
60  HTAB 8: PRINT "**        827-3163          **"
70  HTAB 8: PRINT "**     GARY DUCHESNE        **"
80  HTAB 8: PRINT "**                          **"
90  HTAB 8: PRINT "******************************"
95  NORMAL
96  PRINT : PRINT : HTAB 15: FLASH : PRINT "PLEASE STANDBY": NORMAL
100  PRINT D$;"RUN CHELLO"
```


SEDIGRAPH
= computer program
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HELLO
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INFORMATION
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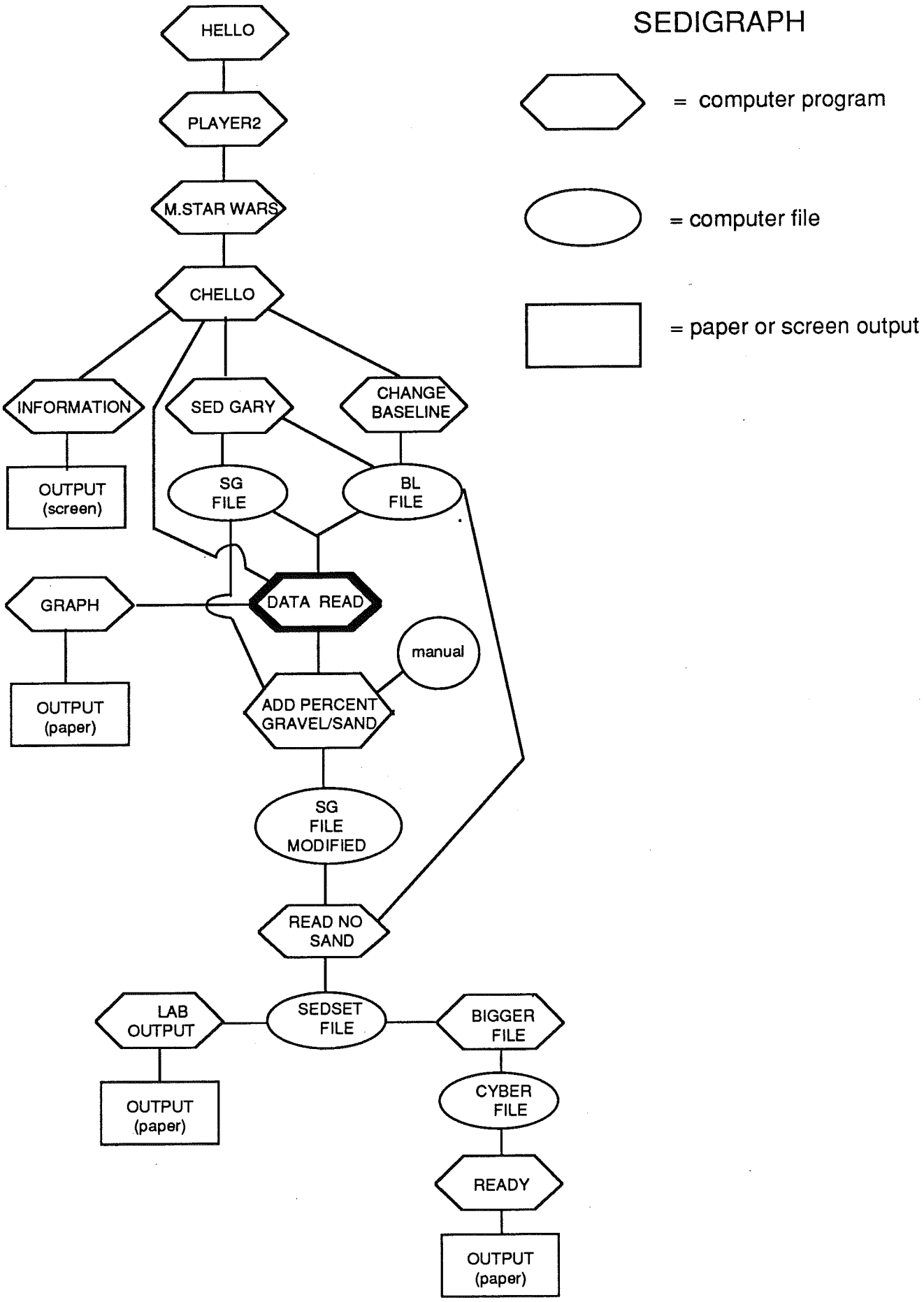
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

This is a menu driven program from the program "Chello". This program must be run at the beginning of each new data disk. It generates an output file (text)called baseline. This file holds the last baseline number. At this time a new baseline must be run or a copy of the last baseline must be copied from the last disk to the new data diskette. Usually samples are run using the most recent baseline. Baselines are usually run at the beginning of each day.

```
0 REM
2  HOME : VTAB 12: HTAB 8: PRINT "READY TO CHANGE BASELINE #"
5  VTAB 15: HTAB 8
10 D$ = "*"
20  PRINT "WHAT IS YOUR CODE 'XXX' ";
30  GET A$: GET B$: GET C$: PRINT "**":A$ = A$ + B$ + C$
35  IF A$ < > "GWD" THEN  VTAB 15: HTAB 34: NORMAL : PRINT A$
40  IF A$ < > "GWD" THEN  FLASH : VTAB 14: HTAB 8: PRINT "CODE IS NOT CORRECT
": GOTO 5
45  NORMAL : HOME : VTAB 15: HTAB 5
50  PRINT "WHAT IS YOUR 'NEW' BASELINE #";: INPUT BNUMBER
1500  PRINT D$;"OPEN BASELINE,D2"
1520  PRINT D$;"WRITE BASELINE"
1540  PRINT BNUMBER
1560  PRINT D$;"CLOSE BASELINE"
1565  PRINT : PRINT : FLASH
1600  PRINT "NEW BASELINE ENTERED"
1650  NORMAL
1700  PRINT : FOR X = 1 TO 200: NEXT X
1800  PRINT D$;"RUN CHELLO,D1"
```

SEDIGRAPH


HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)
= computer program
= computer file
= paper or screen output

This is a menu driven program from the program "Chello". It is executed by responding to the menu 'CALCULATE FROM FILE'. It produces a hard copy of the grain size distribution at a desired Phi interval, i.e. 0.1 to 1 Ø. The copy includes moment statistics, frequency tables and graphs on a dot matrix printer. Graphs are produced by a binary program called GRAPH (not listed but on diskette).

```
0 REM
50 FF = 31
100  HOME
140  REM
142  REM     MEMORY IS SET HIGHER TO ALLOW MORE ROOM FOR DATA.
150  HIMEM: 38400
200  DIM A(110),PI(217),ACUM(217),BLINE(110)
300 PI(0) = 4 - (1 / FF)
400 D$ = "*"
401  PRINT "IF ONLY ONE SAMPLE IS NEEDED LET ": PRINT "START AND FINISH
SAMPLE BE THE SAME": PRINT
404  PRINT "INPUT STARTING SAMPLE # ";: INPUT S1
406  PRINT "INPUT FINISH SAMPLE # ";: INPUT S2
407  HOME
408  PRINT "WHICH CURVES DO YOU WANT TO PLOT "
410  HTAB 7: PRINT "<1> CUMULATIVE SIZE"
412  HTAB 7: PRINT "<2> ARITHMETIC SIZE"
414  HTAB 7: PRINT "<3> LOG/LOG GRAPH"
416  HTAB 7: PRINT "<4> CUMULATIVE & ARITHMETIC "
418  HTAB 7: PRINT "<5> CUMULATIVE & LOG/LOG"
420  HTAB 7: PRINT "<6> ARITHMETIC & LOG/LOG"
422  HTAB 7: PRINT "<7> ALL THREE CURVES"
423  HTAB 7: PRINT "<8> NO PRINTED CURVES"
```

```
424  PRINT : PRINT "INPUT YOUR CHOICE # ": GET W$: PRINT
426 WH =  VAL (W$)
428  IF WH = 0 OR WH > 8 THEN  HOME : GOTO 408
430  IF W$ = "" THEN HOME : GOTO 408: REM IF W$=CONTROL 'C'
440  HOME
600  PRINT "INPUT YOUR PHI INTERVAL****";
700  INPUT AMM
800  IF AMM < .1 THEN  PRINT "*INTERVAL CAN NOT BE LESS THAN .1": PRINT :
GOTO 600
1400  IF AMM < 0 OR AMM > 1 THEN  HOME : GOTO 600
1410  FOR NUMBER = S1 TO S2
1500 S$ = "SG"
1600  HOME
1700 N1 = N
1745  REM
1750  REM     READING SAMPLE INFORMATION AND DATA
1755  REM
1800  FLASH : VTAB 6: HTAB 15: PRINT "READING SG";NUMBER;" FILE"
1900  VTAB 8: HTAB 15: PRINT " PLEASE STANDBY ": NORMAL
2000  PRINT D$;"OPEN ";S$;NUMBER;",D2"
2100  PRINT D$;"READ ";S$;NUMBER
2200  INPUT BNUMBER
2300  INPUT NAME$
2400  INPUT PT
2500  INPUT IMAX
2700 IMAX = IMAX - 1
2750  IF IMAX > 217 THEN IMAX = 217
2800  INPUT INFO$(1)
2900  INPUT INFO$(2)
3000  INPUT INFO$(3)
```

```
3100  INPUT INFO$(4)
3200  VTAB 10: HTAB 15: PRINT "BASELINE # ";BNUMBER
3300  VTAB 12: HTAB 15: PRINT "SCIENTIST ";NAME$
3400  VTAB 14: HTAB 15: PRINT "PERCENT TOTAL ";PT
3500  VTAB 16: HTAB 15: PRINT "INFORMATION"
3600  VTAB 17: HTAB 15: PRINT "-----------"
3700  VTAB 19: HTAB 15: PRINT INFO$(1)
3800  HTAB 15: PRINT INFO$(2)
3900  HTAB 15: PRINT INFO$(3): HTAB 15: PRINT INFO$(4)
4000  FOR I = 1 TO IMAX
4100  INPUT ACUM(I)
4150  IF ACUM(I) > 100 THEN ACUM(I) = 100
4200 ACUM(0) = ACUM(1)
4300  IF ACUM(I) > ACUM(I - 1) THEN ACUM(I) = ACUM(I - 1)
4305  IF ACUM(I) < 0 THEN ACUM(I) = 0
4400 PI(I) = PI(I - 1) + 1 / FF
4500  NEXT I
4600  PRINT D$;"CLOSE "S$;NUMBER
4644  REM
4645  REM     READING BASELINE DATA AND MAKING CORRECTIONS TO SAMPLE
DATA TO
4650  REM     ALLOW FOR BASELINE DRIFT.
4655  REM
4700 BL = BNUMBER: PRINT D$;"OPEN BL";BL
4800  PRINT D$;"READ BL";BL: INPUT BMAX
4900  INVERSE : VTAB 6: PRINT "READING AND MAKING BASELINE CORRECTIONS"
5000  NORMAL
5100  FOR I = 1 TO IMAX
5200  INPUT C
5250  IF C > 100 THEN C = 100
```

```
5300  IF I = 1 THEN C0 = C:C2 = C
5400  IF C > C2 THEN C = C2
5450 ACUM(I) = ACUM(I) + (C - C0)
5460  IF ACUM(I) < 0 THEN ACUM(I) = 0
5500 C2 = C
5600  NEXT I: PRINT D$;"CLOSE BL";BL
5700 A(1) = 100 - ACUM(1)
5800 N = 0
5815 BBB = 0:Y = 1
5820  FOR XX = 4 TO 16 STEP AMM
5821 BBB = BBB + 1
5825  IF XX = 4 THEN PI(BBB) = XX: GOTO 5890
5830  FOR X = Y TO IMAX
5832  IF PI(X) = 0 THEN 5899
5840  IF PI(X) > XX OR PI(X) = XX THEN 5860
5850  NEXT X
5855 X = X - 1
5860 MM = (ACUM(X) - ACUM(X - 1)) / (PI(X) - PI(X - 1))
5870 NACUM = (MM * XX) - ((MM * PI(X)) - ACUM(X))
5880 PI(BBB) = XX:ACUM(BBB) = NACUM
5885 ACUM(BBB) = NACUM
5890 Y = X: NEXT XX
5899 IMAX =  INT ((IMAX / 31) / AMM) + 1:N = 0
5900  FOR I = 1 TO IMAX
6000 N = N + 1
6100  IF I = 1 THEN 6250
6200 A(N) = ACUM(I - 1) - ACUM(I)
6250 PI(I) = PI(I) - (AMM / 2)
6300  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(N)
6400  NEXT I
```

```
6450  IF AMM >  = .5 THEN 6600
6500  GOTO 25000
6600  VTAB 8: HTAB 15: FLASH : PRINT "TURN PRINTER ON": NORMAL
6700 I = 0
6800  PRINT D$;"PR#1": PRINT "  ": PRINT D$;"PR#0"
6900  VTAB 8: HTAB 15: INVERSE : PRINT "PRINTER ON STANDBY": NORMAL : PRINT
D$;"PR#1"
6945  REM
6950  REM     CALCULATING THE STATISTICS USING METHOD OF MOMENTS.
6955  REM
7800  FOR N = 1 TO IMAX
7900  LET I = I + 1
8000 DUM = (PI(N) * A(I)) + DUM
8900  NEXT N
9000 MEAN = DUM / (100 - ACUM(I)): REM    MEAN PHI
9100 XBAR = 10^
( - MEAN * .301): REM      MEAN MILLIMETERS
9200 I = 0
9300  FOR N = 1 TO IMAX
9400 I = I + 1
9500 YY = A(I) * (PI(N) - MEAN)^
2 + YY
9600 UU = A(I) * (PI(N) - MEAN)^
3 + UU
9700 ZZZ = A(I) * (PI(N) - MEAN)^
4 + ZZZ
9800  NEXT N
10000 M2 = YY / 100
10100 SD = M2 ^
.5: REM       STANDARD DEVIATION
```

```
10200 M3 = UU / 100
10300 A3 = M3 / M2 ^
1.5: REM  SKEWNESS
10400 M4 = ZZZ / 100
10500 A4 = M4 / M2 ^
2: REM   KURTOSIS
10600  HOME : TEXT
10700  PRINT : PRINT
10800  PRINT  CHR$ (27); CHR$ (65); CHR$ (12): REM   CHANGING SPACING BACK TO
NORMAL
10830  POKE 1657,94
10850  PRINT  CHR$ (27); CHR$ (14);: REM   CHANGE PRINT TO ENLARGE PRINT
10900  PRINT  TAB( 3)"SEDIGRAPH  SEDIMENT SIZE ANALYSIS "
10950  PRINT  CHR$ (27); CHR$ (14);
11000  PRINT  TAB( 3)"--------------------------------"
11200  FOR X = 1 TO 6: PRINT : NEXT X
11300  HTAB 7: PRINT "SAMPLE NUMBER :....";NUMBER;: PRINT  TAB( 23);"
SCIENTIST:.......";NAME$
11400  PRINT
11500  HTAB 7: PRINT "PHI INTERVAL:....  ";AMM;: PRINT  TAB( 24);" NUMBER OF
POINTS:...";IMAX
11600  PRINT
11700  HTAB 7: PRINT "BASELINE #:.....";BNUMBER;: PRINT  TAB( 24);" PERCENT
MUD:....";PT
11800  PRINT : PRINT : PRINT : PRINT
11900  PRINT  TAB( 29)"SAMPLE INFORMATION:"
12000  PRINT  TAB(  29)"....................."
12100  PRINT
12200  PRINT  TAB( 15);INFO$(1)
12300  PRINT  TAB( 15);INFO$(2)
```

```
12400  PRINT  TAB( 15);INFO$(3)
12500  PRINT  TAB( 15);INFO$(4)
12600  PRINT : PRINT : PRINT : PRINT
12650 STAR = 49312 + 256 * 1
12700 XBAR =  INT (XBAR * 1000 + .5) / 1000:MEAN =  INT (MEAN * 100 + .5) / 100:SD =
INT (SD * 100 + .5) / 100:A3 =  INT (A3 * 100 + .5) / 100:A4 = (A4 * 100 + .5) / 100
12800  HTAB 20: PRINT "########################################"
12900  HTAB 20: PRINT "##                                    ##"
13000  HTAB 20: PRINT "##   MEAN ..... =";: CALL STAR:XBAR;F5.3," MM   ##",
CHR$ (13):
13100  HTAB 20: PRINT "##   MEAN ..... =";: CALL STAR:MEAN;F5.2," PHI  ##",
CHR$ (13):
13200  HTAB 20: PRINT "##  STANDARD DEVIATION =";: CALL STAR:SD;F5.2,"      ##",
CHR$ (13):
13300  HTAB 20: PRINT "##   SKEWNESS..... =";: CALL STAR:A3;F5.2,"      ##", CHR$
(13):
13400  HTAB 20: PRINT "##   KURTOSIS..... =";: CALL STAR:A4;F5.2,"      ##", CHR$
(13):
13500  HTAB 20: PRINT "##                                    ##"
13600  HTAB 20: PRINT "########################################"
13700  PRINT
13750 CLAY =  INT (CLAY * 100 + .5) / 100
13800  PRINT  TAB( 20);"PERCENT CLAY=";100 - CLAY
13900  PRINT  TAB( 20);"PERCENT SILT=";CLAY
14000  PRINT : PRINT : PRINT : PRINT
14100  PRINT  CHR$ (12): REM  INSERT CONTROL 'L' FOR PAGE EJECT
14103  POKE 1657,79: PRINT  CHR$ (27); CHR$ (65); CHR$ (8): REM   SUBPRESS LINE
SPACING
14104  PRINT "SAMPLE NUMBER "NUMBER: PRINT : PRINT
14105  HTAB 28: PRINT "CONDENSED CLASS DATA (RAW)"
```

```
14106 HTAB 28: PRINT "------------------------": PRINT
14107 PRINT
14110 HTAB 15: PRINT
"======================================================="
14120 HTAB 15: PRINT "!         !         !         !          !"
14125 HTAB 15: PRINT "! DIAMETER ! DIAMETER ! WEIGHT ! CUM WEIGHT !"
14130 HTAB 15: PRINT "!   (PHI)  !   (MM)  !   (%)  !   (%)    !"
14135 HTAB 15: PRINT "!         !         !         !          !"
14140 HTAB 15: PRINT
"======================================================="
14142 I = 0
14145 FOR N = 1 TO IMAX
14150 LET I = I + 1
14152 A9 = A(I) * PT / 100
14155 PI = PI(N)
14160 PI =  INT (PI * 1000 + .5) / 1000:LS = 10
( - PI * .301):LS =  INT (LS * 10000 + .5) / 10000:A9 =  INT (A9 * 100 + .5) / 100:ACUM =
INT (ACUM(N) * 100 + .5) / 100
14165 STAR = 49312 + 256 * 1
14170 HTAB 15: PRINT "! ";
14175 CALL STAR:PI;F5.3," ! ":
14180 CALL STAR:LS;F5.4," ! ":
14185 CALL STAR:A9;F5.2," ! ":
14190 CALL STAR:ACUM;F5.2,"  !", CHR$ (13):
14195 HTAB 15: PRINT "!-----------!-----------!----------!-------------!"
14198 NEXT N
14199 PRINT CHR$ (27); CHR$ (65); CHR$ (12): REM  BRING BACK NORMAL
SPACING
14200 PRINT CHR$ (12): REM  INSERT CONTROL 'L' FOR PAGE EJECT
14210 PRINT D$;"PR#0"
```

```
14215 REM
14220 REM      SET PARAMETERS AND LOAD GRAPHICS INTO MEMORY.
14240 REM      MUST BE RELOADED AFTER THE DATA TABLE HAS BEEN PRINTED.
14245 REM
14246 PRINT D$;"OPEN OPENER,D1": PRINT D$;"CLOSE OPENER"
14250 ADDRESS = 24576
14300 DEF FN H(X) = INT (X / 256): DEF FN L(X) = X - FN H(X) * 256
14400 POKE 1013,76: POKE 1014, FN L(ADDRESS + 832): POKE 1015, FN H(ADDRESS +
832)
14500 POKE 232, FN L(ADDRESS): POKE 233, FN H(ADDRESS)
14600 POKE 237,76: POKE 238, FN L(ADDRESS + 1152): POKE 239, FN H(ADDRESS +
1152): REM     "RESUME" RE-ENTRY POINT
14700 POKE 973,76: POKE 974, FN L(ADDRESS + 996): POKE 975, FN H(ADDRESS +
996): REM      "OSRETUR" STRING RETURN ENTRY POINT
14800 POKE 970,76: POKE 971, FN L(ADDRESS + 1112): POKE 972, FN H(ADDRESS +
1112): REM     "ORETUR" ARITHMETIC EXPR. RE-ENTRY POINT
14900 D$ = CHR$ (4)
15000 NORMAL : PRINT D$;"BLOAD GRAPH,A";ADDRESS
15100 POKE ADDRESS + 1144, FN L(ADDRESS + 1164): POKE ADDRESS + 1148, FN
H(ADDRESS + 1164)
15200 POKE ADDRESS + 934, FN L(ADDRESS + 1164): POKE ADDRESS + 938, FN
H(ADDRESS + 1164)
15300 PRINT D$;"PR#0"
15305 IF WH = 1 OR WH = 4 OR WH = 5 OR WH = 7 THEN 15400
15310 GOTO 18100
15400 HGR2
15410 REM
15420 REM      SETS UP AND DRAWS CUMATIVE ARITHMETIC SIZE CURVE IN
MEMORY.
15430 REM      DRAWS POINT ONLY CURVE----CURVE MAXIUM VALUE =110%.
```

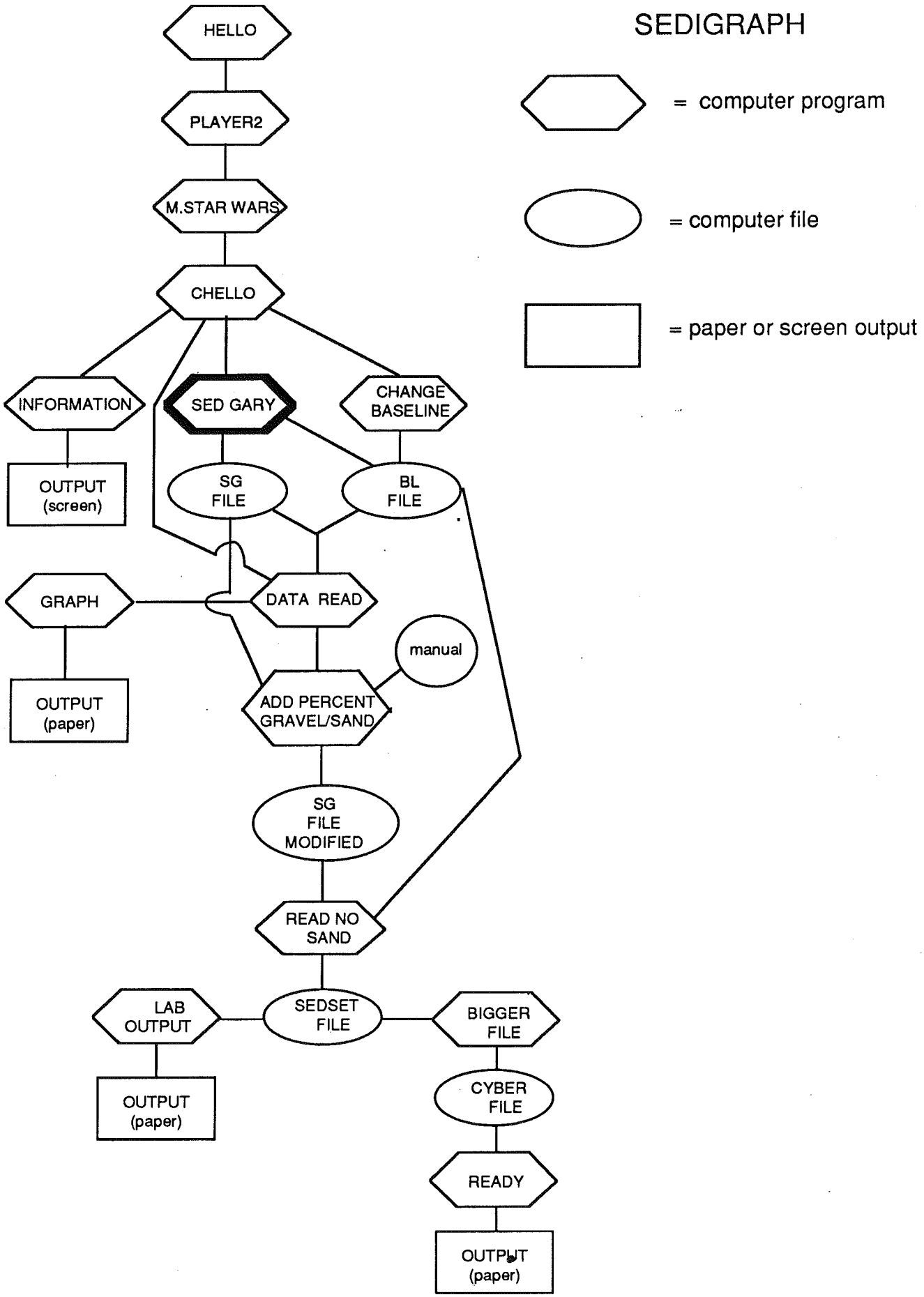
```
15440  REM
15500  & SCALE,3,14, - 10,110
15600 LX$ = "PHI UNITS":LY$ = "PERCENTAGE (%)"
15700  & LABELAXES,1,10
16300  &  DRAW ,13, - 10: &  DRAW ,13,110
16400  FOR I = 1 TO IMAX
16500  & PENUP
16600  &  DRAW ,PI(I),ACUM(I)
16900  NEXT I
17100 D$ = "*"
17400  PRINT
17500  PRINT D$;"PR#1"
17600  HTAB 30: PRINT "GRAPH OF CUMULATIVE ARITHMETIC SIZE DISTRIBUTION"
17700  HTAB 30: PRINT
"==============================================": PRINT : PRINT
17800  POKE 1913,66: PRINT  CHR$ (17): REM  INSERT CONTROL 'Q' TO PRINT GRAPH
17900 N = 0: PRINT : PRINT : PRINT
18000  PRINT  TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
18005  PRINT : PRINT
18010  PRINT  TAB( 29);"SAMPLE INFORMATION"
18015  PRINT  TAB( 29);"------------------": PRINT
18020  PRINT  TAB( 15);INFO$(1)
18040  PRINT  TAB( 15);INFO$(2)
18060  PRINT  TAB( 15);INFO$(3)
18080  PRINT  TAB( 15);INFO$(4)
18090  PRINT  CHR$ (12): REM  INSERT CONTROL 'L' TO EJECT PAGE
18095  PRINT D$;"PR#0"
18096  REM
18097  REM      SETS UP AND DRAWS ARITHMETIC SIZE CURVE IN MEMORY.
18098  REM      DRAWS LINE CURVE----------CURVE MAXIUM VALUE =30%.
```

```
18099  REM
18100  HGR2
18105  IF WH = 2 OR WH = 4 OR WH = 6 OR WH = 7 THEN 18200
18110  GOTO 20700
18200  & SCALE,3,14, - 10,30
18300 LX$ = "PHI UNITS":LY$ = "PERCENTAGE (%)"
18400  & LABELAXES,1,10
18500  &  DRAW ,13, - 10: &  DRAW ,13,30: & PENUP
18600  FOR I = 1 TO IMAX
18650 N = 0
19000  PRINT
19100  &  DRAW ,PI(I),A(I)
19200  NEXT I
19400 D$ = "*"
19500  PRINT
19600  PRINT D$;"PR#1"
19700  HTAB 36: PRINT "GRAPH OF ARITHMETIC SIZE DISTRIBUTION"
19800  HTAB 32: PRINT
"================================================": PRINT : PRINT
19900  PRINT D$;"PR#0"
20200  PRINT
20300  PRINT D$;"PR#1": POKE 1913,66: PRINT  CHR$ (17): REM   INSERT CONTROL 'Q'
TO PRINT GRAPH
20400  PRINT : PRINT : PRINT
20500  PRINT  TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
20505  PRINT : PRINT
20510  PRINT  TAB( 29);"SAMPLE INFORMATION"
20515  PRINT  TAB( 29);"------------------": PRINT
20520  PRINT  TAB( 15);INFO$(1)
20540  PRINT  TAB( 15);INFO$(2)
```

```
20560 PRINT TAB( 15);INFO$(3)
20580 PRINT TAB( 15);INFO$(4)
20590 PRINT CHR$ (12): REM INSERT CONTROL 'L' TO EJECT PAGE
20595 PRINT D$;"PR#0"
20600 PRINT CHR$ (12): REM INSERT CONTROL 'L' TO EJECT PAGE"
20700 PRINT
20705 IF WH = 3 OR WH = 5 OR WH = 6 OR WH = 7 THEN 20800
20710 GOTO 23295
20745 REM
20750 REM     SETS UP AND DRAWS LOG/LOG ARITHMETIC SIZE CURVE IN
MEMORY.
20755 REM     DRAWS LINE CURVE----------CURVE MAXIUM VALUE =2.
20760 REM
20800 HGR2
20900 & SCALE,3,14, - .5,2
21000 LX$ = "PHI UNITS":LY$ = "PERCENTAGE LOG"
21100 & LABELAXES,1,.5
21200 N = 0
21300 & DRAW ,13, - .5: & DRAW ,13,2: & PENUP
21400 FOR I = 1 TO IMAX
21500 N = N + 1
21600 PRINT
21650 IF A(N) < 0 THEN A(N) = 0
21700 IF A(N) = 0 THEN V = 0: GOTO 21900
21800 V = LOG (A(N)) * .434294
21850 IF V < 0 THEN V = 0: REM     WHEN %<1 THE LOG (%) GOES -VE
21900 & DRAW ,PI(I),V
22000 NEXT I
22100 PRINT D$;"PR#1"
22200 HTAB 32: PRINT "LOG/LOG GRAPH OF ARITHMETIC SIZE DISTRIBUTION"
```

```
22300  HTAB 30: PRINT
"================================================="
22400  PRINT : PRINT
22500  PRINT D$;"PR#0"
22900  PRINT
23000  PRINT D$;"PR#1": POKE 1913,66: PRINT  CHR$ (17): REM   INSERT CONTROL 'Q'
TO PRINT GRAPH
23100  PRINT : PRINT : PRINT
23200  PRINT  TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
23205  PRINT : PRINT
23210  PRINT  TAB( 29);"SAMPLE INFORMATION"
23215  PRINT  TAB( 29);"------------------": PRINT
23220  PRINT  TAB( 15);INFO$(1)
23240  PRINT  TAB( 15);INFO$(2)
23260  PRINT  TAB( 15);INFO$(3)
23280  PRINT  TAB( 15);INFO$(4)
23290  PRINT  CHR$ (12): REM  INSERT CONTROL 'L' TO EJECT PAGE
23295  PRINT D$;"PR#0"
23400 I = 0:N = 0:DUM = 0:CLAY = 0:YY = 0:UU = 0:ZZZ = 0: TEXT
23450 BBB = 0: FOR X = 1 TO 210:PI(X) = 0: NEXT X
23455 X = 0
24000  NEXT NUMBER
24100  PRINT D$;"RUN CHELLO"
25000  FOR I = 4 TO (IMAX - 3)
25010 BLINE(1) = .65 * A(1) + .2 * A(2) + .1 * A(3) + .05 * A(4)
25020 BLINE(2) = .2 * A(1) + .45 * A(2) + .2 * A(3) + .1 * A(4) + .05 * A(5)
25025 BLINE(3) = .1 * A(1) + .2 * A(2) + .35 * A(3) + .2 * A(4) + .1 * A(5) + .05 * A(6)
25027 BLINE(I) = .05 * A(I - 3) + .1 * A(I - 2) + .2 * A(I - 1) + .30 * A(I) + .2 * A(I + 1) + .1 *
A(I + 2) + .05 * A(I + 3)
25030 BLINE(IMAX - 2) = .05 * A(IMAX - 5) + .1 * A(IMAX - 4) + .2 * A(IMAX - 3) + .35 *
```

```
A(IMAX - 2) + .2 * A(IMAX - 1) + .1 * A(IMAX)
25040 BLINE(IMAX - 1) = .05 * A(IMAX - 4) + .1 * A(IMAX - 3) + .2 * A(IMAX - 2) + .45 *
A(IMAX - 1) + .2 * A(IMAX)
25050 BLINE(IMAX) = .05 * A(IMAX - 3) + .1 * A(IMAX - 2) + .2 * A(IMAX - 1) + .65 *
A(IMAX)
25060  NEXT I
25065 ACUM(1) = 100 - BLINE(1):A(1) = BLINE(1):CLAY = A(1)
25068  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
25070  FOR I = 2 TO IMAX:A(I) = BLINE(I)
25071  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
25075 ACUM(I) = ACUM(I - 1) - A(I): NEXT I
25080  GOTO 6600
```


SEDIGRAPH
= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

A menu driven program from Chello. It is executed form chosing the option SAVE DATA. This program allows the running of a baseline. If the operator chooses not to run a baseline, the operator responds no and the program assumes the mode to run a sample. Baseline samples produce output files with the prefix BL, and samples produce output files with the prefix SG. The program allows header information such as sample number and information. (Samples and baselines will only use the first 217 data points). The instrument may be allowed to run passed this point but the extra data generated will not be used.

```
0 REM
5  REM    THIS PROGRAMS SAVES DATA FROM THE SEDIGRAPH TO A DISKETTE.
6  REM
10 D$ = "*"
15  DIM A(500),LD(500)
20  HOME
25  INVERSE
30  HTAB 8: PRINT "*******************************"
40  HTAB 8: PRINT "*                             *"
50  HTAB 8: PRINT "* AGC FINE SEDIMENT ANALYSIS *"
70  HTAB 8: PRINT "*    DIGITIZE SEDI-GRAPH    *"
72  HTAB 8: PRINT "*                             *"
74  HTAB 8: PRINT "*                             *"
76  HTAB 8: PRINT "*    CREATED BY D.M.C.S.    *"
79  HTAB 8: PRINT "*     GARY DUCHESNE         *"
80  HTAB 8: PRINT "*                             *"
82  HTAB 8: PRINT "*                             *"
90  HTAB 8: PRINT "*******************************"
110  PRINT : PRINT : PRINT : FOR X = 1 TO 20: NEXT X
150  PRINT D$;"OPEN BASELINE,D2"
170  PRINT D$;"READ BASELINE"
190  INPUT BNUMBER
```

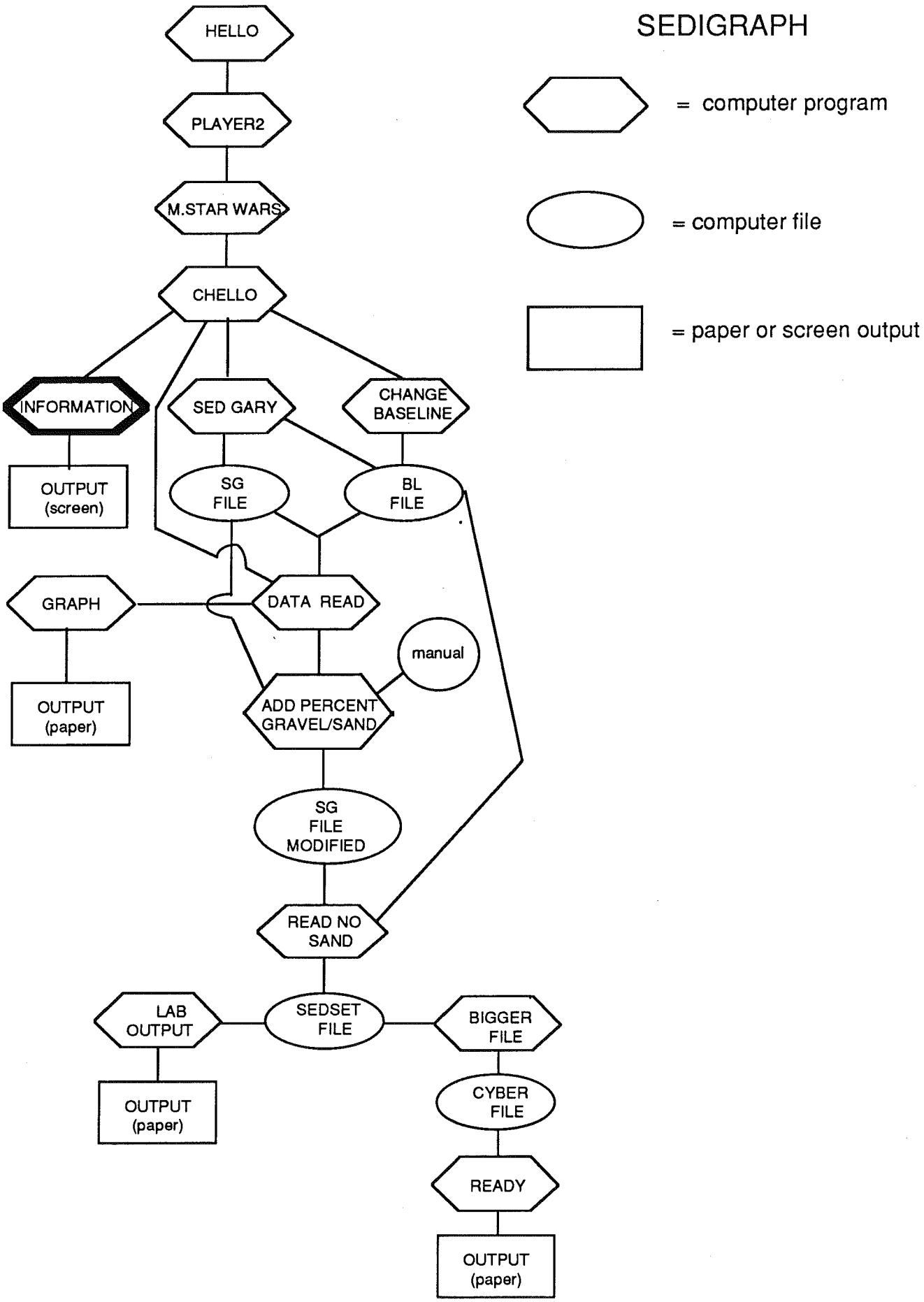
```
210  PRINT D$;"CLOSE BASELINE"
230  VTAB 14: HTAB 10: PRINT "OLD BASE LINE ",BNUMBER
250  PRINT : PRINT
260  NORMAL
265  GOSUB 7790
266  PRINT : PRINT
270  PRINT "IS THIS A NEW BASE LINE "
290   PRINT "INPUT 'Y' OR 'N'"
310  GET B$
315  INVERSE
330  IF B$ = "Y" THEN S$ = "BL":BNUMBER = BNUMBER + 1:NUMBER = BNUMBER:
GOTO 790
350 S$ = "SG"
370  HOME
390  VTAB 6: HTAB 10: PRINT "SAMPLE # "
410  VTAB 8: HTAB 10: PRINT "SCIENTIST'S NAME "
430  VTAB 10: HTAB 10: PRINT "% TOTAL SAMPLE "
450  VTAB 18: HTAB 5: PRINT "INFORMATION"
470  VTAB 20: HTAB 10: PRINT ":"
490  VTAB 21: HTAB 10: PRINT ":"
510  VTAB 22: HTAB 10: PRINT ":"
530  VTAB 23: HTAB 10: PRINT ":"
540  NORMAL
550  VTAB 6: HTAB 20: INPUT A$: IF A$ = "" THEN  INVERSE : VTAB 6: HTAB 21: PRINT
NUMBER: NORMAL : GOTO 570
560 NUMBER =  VAL (A$)
570  VTAB 8: HTAB 27: INPUT B$: IF B$ = "" THEN  INVERSE : VTAB 8: HTAB 27: PRINT
NAME$: NORMAL : GOTO 590
580 NAME$ = B$
590  VTAB 10: HTAB 24: INPUT C$: IF C$ = "" THEN  INVERSE : VTAB 10: HTAB 25:
PRINT PT: NORMAL : GOTO 610
```

```
600 PT =  VAL (C$)
610  VTAB 20: HTAB 12: INPUT E$: IF E$ = "" THEN  INVERSE : VTAB 20: HTAB 13:
PRINT INFO$(1): NORMAL : GOTO 630
620 INFO$(1) = E$
630  VTAB 21: HTAB 12: INPUT F$: IF F$ = "" THEN  INVERSE : VTAB 21: HTAB 13:
PRINT INFO$(2): NORMAL : GOTO 650
640 INFO$(2) = F$
650  VTAB 22: HTAB 12: INPUT G$: IF G$ = "" THEN  INVERSE : VTAB 22: HTAB 13:
PRINT INFO$(3): NORMAL : GOTO 670
660 INFO$(3) = G$
670  VTAB 23: HTAB 12: INPUT H$: IF H$ = "" THEN  INVERSE : VTAB 23: HTAB 13:
PRINT INFO$(4): NORMAL : GOTO 690
680 INFO$(4) = H$
690  VTAB 1
710  PRINT : PRINT : PRINT "ARE THESE VALUES CORRECT "
730  INPUT Y$
750  IF Y$ = "N" THEN 390
770  HOME
790  PRINT
830 AD = 49328: REM  A/D ADDRESS
850 PA = 49249: REM  PULSE ADDRESS
870 RH = 49241: REM  RESET HIGH
890 RL = 49240
910 GO = 49250: REM  PROGRAM IN PROGESS ADDRESS
930 N = 312
970 LC = 1 /  LOG (10)
990  PRINT "ZERO RECORDER & TYPE Z"
1010  INPUT C$
1030  IF C$ < > "Z" THEN 1010
1050 Z =  PEEK (AD): REM  ALWAYS PEEK AD TWICE
1070 Z =  PEEK (AD)
```

```
1090  PRINT Z
1110  PRINT "SET 100%"
1130  INPUT C$
1150 F =  PEEK (AD)
1170 F =  PEEK (AD)
1190  PRINT F
1200  IF F = Z OR F < Z THEN  PRINT "100% SETTING MUST BE GREATER THAN ZERO
SETTING": GOTO 990
1210  PRINT "SET DIA. TO 63 ON RECORDER THEN ENTER": PRINT " SAME VALUE.";
1230  INPUT D
1250 X1 = LC *  LOG (100 / D)
1270  PRINT X1,"  START UP"
1290  IF  PEEK (GO) <  = 127 GOTO 1290
1310  PRINT "RUNNING"
1330  FOR I = 1 TO 248
1350  IF ( PEEK (PA) < 128) AND ( PEEK (GO) > 127) GOTO 1350
1370  IF  PEEK (GO) < 128 GOTO 1610
1390  LET Q =  PEEK (RH) +  PEEK (RL)
1490  LET A(I) =  PEEK (AD)
1495  LET A(I) =  PEEK (AD)
1510  REM  DIGITIZE X AXIS
1530  PRINT I,A(I)
1550  NEXT I
1570 IMAX = 217
1590  GOTO 1650
1610  PRINT "PULL OUT"
1630 IMAX = I - 1
1635  REM
1640  REM     SAVE DATA ROUTINE
1645  REM
1650  PRINT D$;"OPEN ";S$;NUMBER;",D2"
```

```
1670  PRINT D$;"WRITE ";S$;NUMBER
1690  IF B$ = "Y" THEN  PRINT IMAX: GOTO 1850
1710  PRINT BNUMBER
1730  PRINT NAME$
1750  PRINT PT
1760  PRINT IMAX
1770  PRINT INFO$(1)
1790  PRINT INFO$(2)
1810  PRINT INFO$(3)
1830  PRINT INFO$(4)
1850  FOR I = 1 TO IMAX
1870 A(I) = 100 * (A(I) - Z) / (F - Z)
1890 X = X1 + 3 * I / N
1910 LD(I) = 10^
(2 - X)
1950  PRINT A(I)
1990  NEXT I
2010  PRINT D$;"CLOSE "S$;NUMBER
2030  PRINT D$;"OPEN BASELINE,D2"
2050  PRINT D$;"WRITE BASELINE"
2070  PRINT BNUMBER
2090  PRINT D$;"CLOSE BASELINE"
7000  HOME
7100  VTAB 15: HTAB 8: FLASH : PRINT "ALL DATA IS NOW SAVE "
7120  HTAB 8: NORMAL : PRINT " PRESS 'S' KEY TO RESTART "
7124  FOR X = 1 TO 25: PRINT "*";: NEXT X
7125  HTAB 9: PRINT "PRESS   SPACE BAR FOR MAIN MENU"
7126  GET A$: IF A$ = "S" THEN  HOME : GOTO 230
7130  PRINT : PRINT D$;"RUN CHELLO,D1"
7500  END
7790 MEM = ( PEEK (978) - ( PEEK (978) > 127) * 256) * 256 + 2947:AE = 174 - (157 -
```

```
PEEK (978))
7800 NS = 403 + 93 * ( PEEK (MEM + 2925) = 16)
7810  RESTORE : FOR I = 896 TO 960: READ P: POKE I,P: NEXT
7820 AE = 149 - (157 -  PEEK (978)): POKE 905,AE: POKE 938,AE
7830 D =  PEEK (MEM + 485):S =  PEEK (MEM + 487)
7840  POKE 897,S * 16: POKE 911,S * 16: POKE 898,D: POKE 912,D
7850  CALL 919
7860 R =  PEEK (917) + 256 *  PEEK (918):U = NS - R
7870  PRINT "SECTORS USED=";: PRINT "*";U
7880  PRINT "SECTORS FREE=";: PRINT "*";R
7885  IF R > 20 THEN 9000
7890  PRINT  TAB( 8);" ";: INVERSE : FLASH : PRINT "WARNING ONLY "R" SECTORS
LEFT": NORMAL
7900  PRINT  TAB( 9);: INVERSE : FLASH : PRINT "PRESS 'CTRL RESET' TO ESCAPE":
NORMAL
7950  NORMAL
8000  DATA
1,96,1,0,17,0,145,3,0,149,0,0,1,0,0,96,1,0,1,239,216,0,0,169,3,160,128,32,217,3,162,0,14
2,149,3,142,150,3,160,56,185,0,149,162,8,10,144,8,238,149,3,208,3,238,150,3,202,208,24
2,200,192,196,144,232,96
9000  RETURN
```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= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
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INFORMATION
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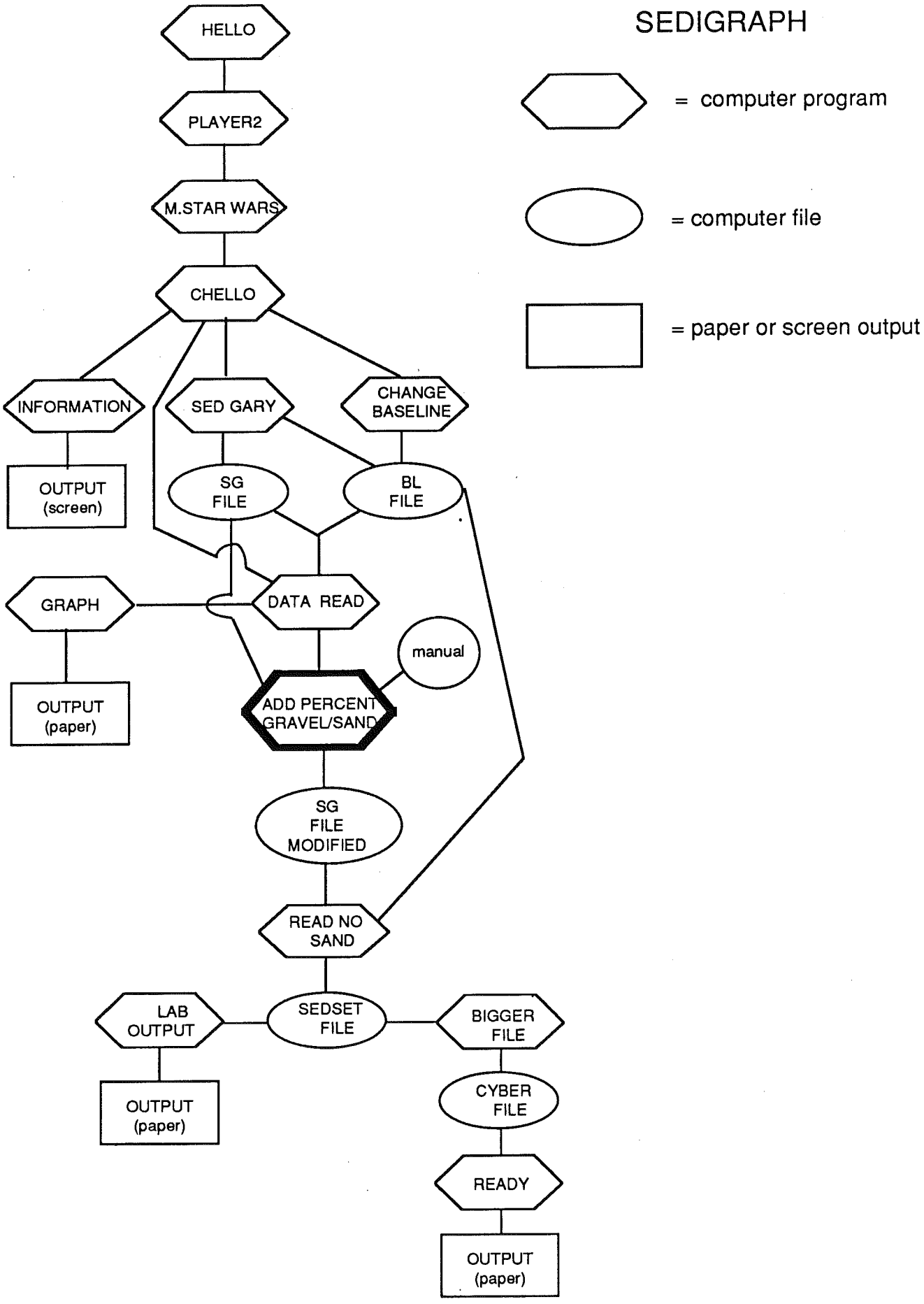
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

This is a menu driven program that allows the first time operator of the SediGraph® a chance to be given some background information on the operation of the SediGraph® and its accompanying software (a help program).

```
0 REM
1 D$ =  CHR$ (4)
2  HOME
5  SPEED= 100
10  FOR X = 1 TO 58
20  READ A$
30  PRINT A$
40  NEXT X
400  DATA  "       THE SEDIGRAPH PROGRAM"
410  DATA  "       ----------"
420  DATA   "    "
430  DATA  "    "
500  DATA   "    THE SEDIGRAPH PROGRAM PROVIDES "
510  DATA   "A STATISTICAL AND GRAPHICAL OUTPUT OF"
520  DATA  "DATA AS MEASURED BY THE SEDIGRAPH WITH"
530  DATA  "THE APPLE II PLUS, MICRO COMPUTER."
540  DATA  "    "
550  DATA  "   THERE ARE THREE DATA FILES WHICH "
560  DATA  "ARE SET UP FOR STORAGE AND RETRIEVAL "
570  DATA  "OF RAW DATA;"
575  DATA  "     "
580  DATA  "   (A) BASELINE NUMBER FILE-"
585  DATA  "  "
590  DATA  "       THIS FILE KEEPS TRACK OF THE"
600  DATA  "       MOST RECENT BASELINE BEING USED."
610  DATA  "     "
```

```
620 DATA  "   (B) BASELINE DATA FILE-"
630 DATA  "     "
640 DATA  "       THIS FILE IS FOR STORAGE AND "
650 DATA  "       RETRIEVAL OF DATA FOR THE "
660 DATA  "       BASELINE.  DATA IS NEEDED TO "
670 DATA  "       CALCULATE THE CORRECTIONS FOR"
680 DATA  "       SEDIGRAPH BASELINE DRIFT."
690 DATA  "      "
700 DATA  "   (C) SAMPLE DATA FILE-"
705 DATA  "  "
710 DATA  "       THIS FILE CONTAINS A HEADER"
720 DATA  "       FILE AND RAW DATA.  THE HEADER"
730 DATA  "       CONTAINS IDENTIFICATION AND "
740 DATA  "       DESCRIPTION OF THE SAMPLE.  THE"
750 DATA  "       RAW DATA CONTAINS THE DATA"
760 DATA  "       FROM THE SEDIGRAPH."
770 DATA  "    "
780 DATA  "    "
790 DATA  "    FROM THE ABOVE, THE PROGRAM WILL"
800 DATA "CALCULATE THE MEAN,STANDARD DEVIATION,"
810 DATA "SKEWNESS AND KURTOSIS.  THE PROGRAM"
820 DATA "ALSO PROVIDES GRAPHIC OUTPUTS TO THE "
830 DATA "MONITOR AND PRINTER, OF THE CUMULATIVE"
840 DATA "PLOT, ARITHMETIC SIZE PLOT AND LOG/LOG"
850 DATA "PLOT.  THE OPERATOR HAS THE CHOICE OF "
860 DATA "WHICH PLOTS HE/SHE WISHES TO SEE."
865 DATA  "    "
866 DATA  "    "
870 DATA  "    THE PROGRAM IS DESIGN TO RUN AS "
880 DATA "SOON AS THE COMPUTER IS TURNED ON."
890 DATA "ALL DIRECTIONS AND CHOICES ARE GIVEN"
```

```
900 DATA  "TO THE OPERATOR AS THE PROGRAM IS "
910 DATA   "RUNNING.  IF THE OPERATOR RUNS INTO A"
920 DATA   "SITUATION WHICH REQUIRES THE OPERATOR"
930 DATA   "TO ESCAPE THE PROGRAM, A CONTROL RESET"
940 DATA  "WILL BRING THE OPERATOR OUT OF THE "
950 DATA  "SYSTEM.  TYPE 'PR#6 + RETURN' TO "
960 DATA  "REBOOT SYSTEM AND START OVER AGAIN."
970 DATA  "    "
980 DATA  "    "
990 DATA  "NOTE:  NEVER RESET SYSTEM WHILE SAVING"
1000 DATA "OR RETRIEVING DATA FROM A DISKETTE."
1050 SPEED= 255
1100 HTAB 10: PRINT "PRESS A KEY TO CON'T": GET X$
1150 PRINT
1200 PRINT D$;"RUN CHELLO"
```


SEDIGRAPH
= computer program
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HELLO
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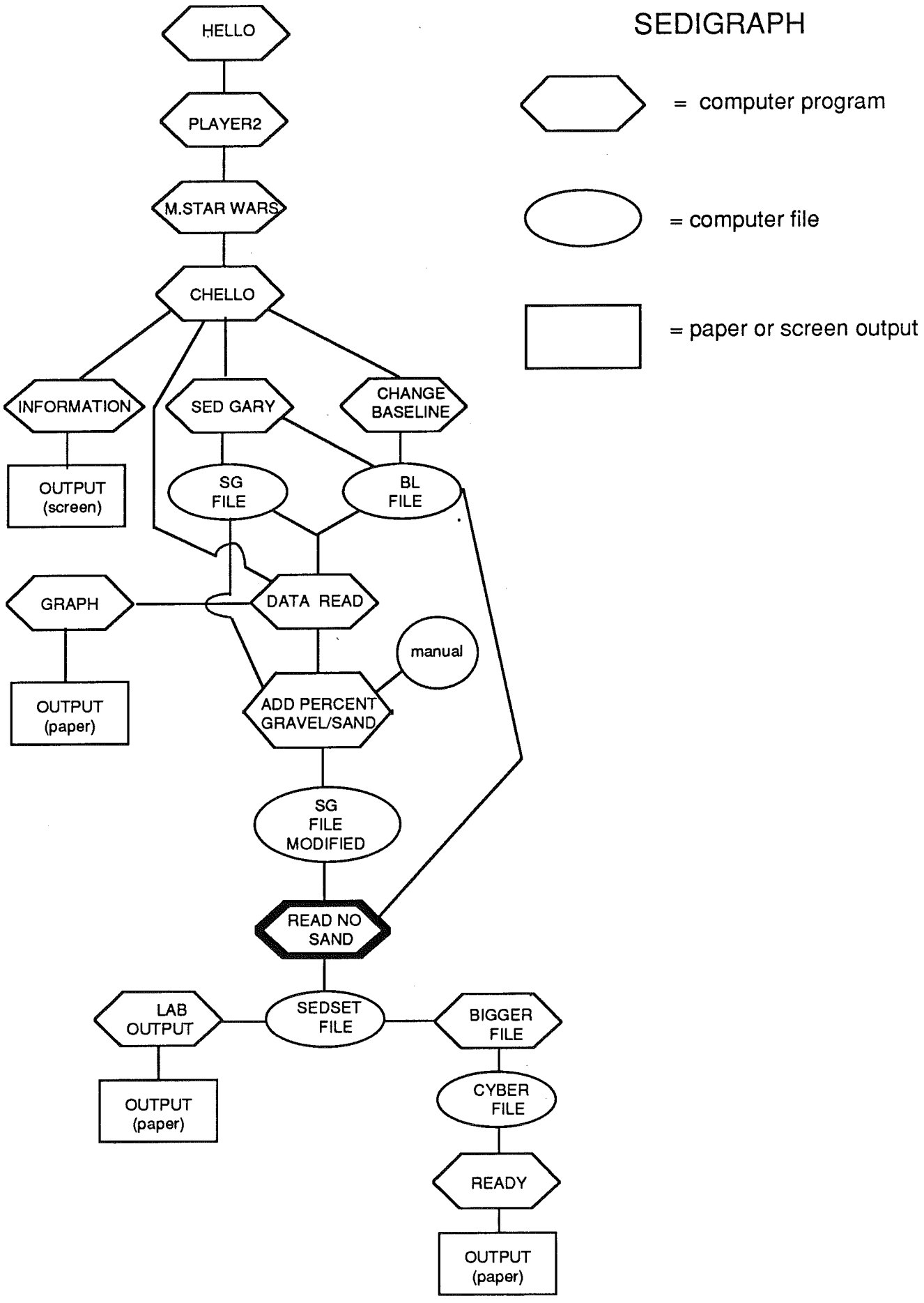
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

This program must be run prior to running the merge program called READ NO SAND (only to be used with samples analyzed on the SediGraph that are complete onto themselves). The program modifies the SediGraph output files SG to include values of percent gravel and sand.

```
0 REM
1  REM  GRAVEL%,SAND%,SEDIGRAPH DATA
5  INPUT "SAMPLE NUMBER  ";SG
10 D$ = "*"
40  INPUT "WHAT IS THE PERCENT GRAVEL?";PG
50  INPUT "WHAT IS THE PERCENT SAND?";PS
55  PRINT PG,PS
60  INPUT "ARE THESE VALUES CORRECT (YES=0,NO=1)";A
70  IF A > 0 THEN  GOTO 5
100  PRINT D$;"APPEND SG";SG
110  PRINT D$;"WRITE SG";SG
120  PRINT PG
130  PRINT PS
140  PRINT D$;"CLOSE SG";SG
150  GOTO 5
160  END
```

SEDIGRAPH


HELLO
PLAYER2
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SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)
= computer program
= computer file
= paper or screen output

A merging program for use with the SediGraph® for percent gravel and percent sand only. It produces an output file (SEDSET) from SG files.

```
0 REM
10 FF = 31
20  HOME
30  REM
40  REM     MEMORY IS SET HIGHER TO ALLOW MORE ROOM FOR DATA.
50  HIMEM: 38400
60  DIM A(110),PI(217),ACUM(217),BLINE(110)
70 PI(0) = 4 - (1 / FF)
80 D$ = "*"
90  PRINT "IF ONLY ONE SAMPLE IS NEEDED LET ": PRINT "START AND FINISH
SAMPLE BE THE SAME": PRINT
100  PRINT "INPUT STARTING SAMPLE # ";: INPUT S1
110  PRINT "INPUT FINISH SAMPLE # ";: INPUT S2
120  HOME
130  PRINT "WHICH CURVES DO YOU WANT TO PLOT "
140  HTAB 7: PRINT "<1> CUMULATIVE SIZE"
150  HTAB 7: PRINT "<2> ARITHMETIC SIZE"
160  HTAB 7: PRINT "<3> LOG/LOG GRAPH"
170  HTAB 7: PRINT "<4> CUMULATIVE & ARITHMETIC "
180  HTAB 7: PRINT "<5> CUMULATIVE & LOG/LOG"
190  HTAB 7: PRINT "<6> ARITHMETIC & LOG/LOG"
200  HTAB 7: PRINT "<7> ALL THREE CURVES"
210  HTAB 7: PRINT "<8> NO PRINTED CURVES"
220  PRINT : PRINT "INPUT YOUR CHOICE # ": GET W$: PRINT
230 WH =  VAL (W$)
240  IF WH = 0 OR WH > 8 THEN  HOME : GOTO 130
250  IF W$ = "" THEN HOME : GOTO 130: REM IF W$=CONTROL 'C'
```

```
260 HOME
270 PRINT "INPUT YOUR PHI INTERVAL****";
280 INPUT AMM
290 IF AMM < .1 THEN  PRINT "*INTERVAL CAN NOT BE LESS THAN .1": PRINT :
GOTO 270
300 IF AMM < 0 OR AMM > 1 THEN  HOME : GOTO 270
310 FOR NUMBER = S1 TO S2
320 S$ = "SG"
330 HOME
340 N1 = N
350 REM
360 REM     READING SAMPLE INFORMATION AND DATA
370 REM
380 FLASH : VTAB 6: HTAB 15: PRINT "READING SG";NUMBER;" FILE"
390 VTAB 8: HTAB 15: PRINT " PLEASE STANDBY ": NORMAL
400 PRINT D$;"OPEN ";S$;NUMBER;",D2"
410 PRINT D$;"READ ";S$;NUMBER
420 INPUT BNUMBER
430 INPUT NAME$
440 INPUT PT
450 INPUT JMAX
460 IMAX = JMAX - 1
470 IF IMAX > 217 THEN IMAX = 217
480 INPUT INFO$(1)
490 INPUT INFO$(2)
500 INPUT INFO$(3)
510 INPUT INFO$(4)
520 VTAB 10: HTAB 15: PRINT "BASELINE # ";BNUMBER
530 VTAB 12: HTAB 15: PRINT "SCIENTIST ";NAME$
540 VTAB 14: HTAB 15: PRINT "PERCENT TOTAL ";PT
550 VTAB 16: HTAB 15: PRINT "INFORMATION"
```

```
560 VTAB 17: HTAB 15: PRINT "----------"
570 VTAB 19: HTAB 15: PRINT INFO$(1)
580 HTAB 15: PRINT INFO$(2)
590 HTAB 15: PRINT INFO$(3): HTAB 15: PRINT INFO$(4)
600 FOR I = 1 TO IMAX
610 INPUT ACUM(I)
620 IF ACUM(I) > 100 THEN ACUM(I) = 100
630 ACUM(0) = ACUM(1)
640 IF ACUM(I) > ACUM(I - 1) THEN ACUM(I) = ACUM(I - 1)
650 IF ACUM(I) < 0 THEN ACUM(I) = 0
660 PI(I) = PI(I - 1) + 1 / FF
670 NEXT I
680 IF JMAX < 217 THEN  GOTO 720
690 FOR I = 218 TO JMAX
700 INPUT V2
710 NEXT I
720 INPUT V2
730 INPUT V3
740 PRINT D$;"CLOSE "S$;NUMBER
750 REM
760 REM     READING BASELINE DATA AND MAKING CORRECTIONS TO SAMPLE
DATA TO
770 REM     ALLOW FOR BASELINE DRIFT.
780 REM
790 BL = BNUMBER: PRINT D$;"OPEN BL";BL
800 PRINT D$;"READ BL";BL: INPUT BMAX
810 INVERSE : VTAB 6: PRINT "READING AND MAKING BASELINE CORRECTIONS"
820 NORMAL
830 FOR I = 1 TO IMAX
840 INPUT C
850 IF C > 100 THEN C = 100
```

```
860  IF I = 1 THEN C0 = C:C2 = C
870  IF C > C2 THEN C = C2
880 ACUM(I) = ACUM(I) + (C - C0)
890  IF ACUM(I) < 0 THEN ACUM(I) = 0
900 C2 = C
910  NEXT I: PRINT D$;"CLOSE BL";BL
920 A(1) = 100 - ACUM(1)
930 N = 0
940 BBB = 0:Y = 1
950  FOR XX = 4 TO 16 STEP AMM
960 BBB = BBB + 1
970  IF XX = 4 THEN PI(BBB) = XX: GOTO 1070
980  FOR X = Y TO IMAX
990  IF PI(X) = 0 THEN 1080
1000  IF PI(X) > XX OR PI(X) = XX THEN 1030
1010  NEXT X
1020 X = X - 1
1030 MM = (ACUM(X) - ACUM(X - 1)) / (PI(X) - PI(X - 1))
1040 NACUM = (MM * XX) - ((MM * PI(X)) - ACUM(X))
1050 PI(BBB) = XX:ACUM(BBB) = NACUM
1060 ACUM(BBB) = NACUM
1070 Y = X: NEXT XX
1080 IMAX =  INT ((IMAX / 31) / AMM) + 1:N = 0
1090  FOR I = 1 TO IMAX
1100 N = N + 1
1110  IF I = 1 THEN 1130
1120 A(N) = ACUM(I - 1) - ACUM(I)
1130 PI(I) = PI(I) - (AMM / 2)
1140  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(N)
1150  NEXT I
1160 CLAY = CLAY * PT / 100
```

```
1170  IF AMM >  = .5 THEN 1190
1180  GOTO 3190
1190  VTAB 8: HTAB 15: FLASH : PRINT "TURN PRINTER ON": NORMAL
1200 I = 0
1210  PRINT D$;"PR#1": PRINT "  ": PRINT D$;"PR#0"
1220  VTAB 8: HTAB 15: INVERSE : PRINT "PRINTER ON STANDBY": NORMAL : PRINT
D$;"PR#1"
1230  REM
1240  REM     CALCULATING THE STATISTICS USING METHOD OF MOMENTS.
1250  REM
1260  FOR N = 1 TO IMAX
1270  LET I = I + 1
1280 DUM = (PI(N) * A(I)) + DUM
1290  NEXT N
1300 MEAN = DUM / (100 - ACUM(I)): REM    MEAN PHI
1310 XBAR = 10^
( - MEAN * .301): REM      MEAN MILLIMETERS
1320 I = 0
1330  FOR N = 1 TO IMAX
1340 I = I + 1
1350 YY = A(I) * (PI(N) - MEAN) ^
2 + YY^
1360 UU = A(I) * (PI(N) - MEAN) ^
3 + UU
1370 ZZZ = A(I) * (PI(N) - MEAN) ^
4 + ZZZ
1380  NEXT N
1390 M2 = YY / 100
1400 SD = M2 ^
.5: REM       STANDARD DEVIATION
1410 M3 = UU / 100
```

```
1420 A3 = M3 / M2 ^
1.5: REM  SKEWNESS
1430 M4 = ZZZ / 100
1440 A4 = M4 / M2 ^
2: REM   KURTOSIS
1450  HOME : TEXT
1460  PRINT : PRINT
1470  PRINT  CHR$ (27); CHR$ (65); CHR$ (12): REM   CHANGING SPACING BACK TO
NORMAL
1480  POKE 1657,94
1490  PRINT  CHR$ (27); CHR$ (14);: REM   CHANGE PRINT TO ENLARGE PRINT
1500  PRINT  TAB( 3)"SEDIGRAPH  SEDIMENT SIZE ANALYSIS "
1510  PRINT  CHR$ (27); CHR$ (14);
1520  PRINT  TAB( 3)"---------------------------------"
1530  FOR X = 1 TO 6: PRINT : NEXT X
1540  HTAB 7: PRINT "SAMPLE NUMBER :....";NUMBER;: PRINT  TAB( 23);"
SCIENTIST:.....";NAME$
1550  PRINT
1560  HTAB 7: PRINT "PHI INTERVAL:....  ";AMM;: PRINT  TAB( 24);" NUMBER OF
POINTS:...";IMAX
1570  PRINT
1580  HTAB 7: PRINT "BASELINE #:.....";BNUMBER;: PRINT  TAB( 24);" PERCENT
MUD:....";PT
1590  PRINT : PRINT : GOSUB 3510
1600  PRINT : PRINT : PRINT : PRINT
1610 STAR = 49312 + 256 * 1
1620 XBAR =  INT (XBAR * 1000 + .5) / 1000:MEAN =  INT (MEAN * 100 + .5) / 100:SD =
INT (SD * 100 + .5) / 100:A3 =  INT (A3 * 100 + .5) / 100:A4 = (A4 * 100 + .5) / 100
1630  PRINT "MOMENT MEASURE STATISTICS ON JUST THE MUD FRACTION"
1640  HTAB 20: PRINT "########################################"
1650  HTAB 20: PRINT "##                                    ##"
```

```
1660 HTAB 20: PRINT "##   MEAN ..... =";: CALL STAR:XBAR;F5.3," MM  ##",
CHR$ (13):
1670 HTAB 20: PRINT "##   MEAN ..... =";: CALL STAR:MEAN;F5.2," PHI  ##",
CHR$ (13):
1680 HTAB 20: PRINT "##  STANDARD DEVIATION =";: CALL STAR:SD;F5.2,"     ##",
CHR$ (13):
1690 HTAB 20: PRINT "##   SKEWNESS..... =";: CALL STAR:A3;F5.2,"     ##", CHR$
(13):
1700 HTAB 20: PRINT "##  KURTOSIS..... =";: CALL STAR:A4;F5.2,"     ##", CHR$
(13):
1710 HTAB 20: PRINT "##                              ##"
1720 HTAB 20: PRINT "########################################"
1730 PRINT
1740 CLAY =  INT (CLAY * 100 + .5) / 100
1750 PRINT  TAB( 20);"PERCENT CLAY=";PT - CLAY
1760 PRINT  TAB( 20);"PERCENT SILT=";CLAY
1770 PRINT : PRINT : PRINT : PRINT
1780 PRINT  CHR$ (12): REM  INSERT CONTROL 'L' FOR PAGE EJECT
1790 POKE 1657,79: PRINT  CHR$ (27); CHR$ (65); CHR$ (8): REM  SUBPRESS LINE
SPACING
1800 PRINT "SAMPLE NUMBER "NUMBER: PRINT : PRINT
1810 HTAB 28: PRINT "CONDENSED CLASS DATA (RAW)"
1820 HTAB 28: PRINT "-------------------------": PRINT
1830 PRINT
1840 HTAB 15: PRINT
"================================================="
1850 HTAB 15: PRINT "!        !        !        !          !"
1860 HTAB 15: PRINT "!  DIAMETER  !  DIAMETER  !  WEIGHT  !  CUM WEIGHT  !"
1870 HTAB 15: PRINT "!   (PHI)  !   (MM)   !   (%)  !   (%)     !"
1880 HTAB 15: PRINT "!        !        !        !          !"
1890 HTAB 15: PRINT
```

```
"=================================================="
1900 I = 0
1910  FOR N = 1 TO IMAX
1920  LET I = I + 1
1930 A9 = A(I) * PT / 100
1940 PI = PI(N)
1950 PI =  INT (PI * 1000 + .5) / 1000:LS = 10^ ( - PI * .301):LS =  INT (LS * 10000 + .5) /
10000:A9 =  INT (A9 * 100 + .5) / 100:ACUM =  INT (ACUM(N) * 100 + .5) / 100
1960 STAR = 49312 + 256 * 1
1970  HTAB 15: PRINT "!  ";
1980  CALL STAR:PI;F5.3,"   !  ":
1990  CALL STAR:LS;F5.4,"   !  ":
2000  CALL STAR:A9;F5.2,"  !   ":
2010  CALL STAR:ACUM;F5.2,"    !", CHR$ (13):
2020  HTAB 15: PRINT "!------------!------------!----------!-------------!"
2030  NEXT N
2040  IF V1 = O THEN  GOSUB 3340
2050  PRINT  CHR$ (27); CHR$ (65); CHR$ (12): REM    BRING BACK NORMAL
SPACING
2060  PRINT  CHR$ (12): REM    INSERT CONTROL 'L' FOR PAGE EJECT
2070  PRINT D$;"PR#0"
2080  REM
2090  REM      SET PARAMETERS AND LOAD GRAPHICS INTO MEMORY.
2100  REM      MUST BE RELOADED AFTER THE DATA TABLE HAS BEEN PRINTED.
2110  REM
2120  PRINT D$;"OPEN OPENER,D1,S6": PRINT D$;"CLOSE OPENER"
2130 ADDRESS = 24576
2140  DEF  FN H(X) =  INT (X / 256): DEF  FN L(X) = X -  FN H(X) * 256
2150  POKE 1013,76: POKE 1014, FN L(ADDRESS + 832): POKE 1015, FN H(ADDRESS +
832)
```

```
2160  POKE 232, FN L(ADDRESS): POKE 233, FN H(ADDRESS)
2170  POKE 237,76: POKE 238, FN L(ADDRESS + 1152): POKE 239, FN H(ADDRESS +
1152): REM     "RESUME" RE-ENTRY POINT
2180  POKE 973,76: POKE 974, FN L(ADDRESS + 996): POKE 975, FN H(ADDRESS +
996): REM      "OSRETUR" STRING RETURN ENTRY POINT
2190  POKE 970,76: POKE 971, FN L(ADDRESS + 1112): POKE 972, FN H(ADDRESS +
1112): REM     "ORETUR" ARITHMETIC EXPR. RE-ENTRY POINT
2200 D$ =  CHR$ (4)
2210  NORMAL : PRINT D$;"BLOAD GRAPH,A";ADDRESS
2220  POKE ADDRESS + 1144, FN L(ADDRESS + 1164): POKE ADDRESS + 1148, FN
H(ADDRESS + 1164)
2230  POKE ADDRESS + 934, FN L(ADDRESS + 1164): POKE ADDRESS + 938, FN
H(ADDRESS + 1164)
2240  PRINT D$;"PR#0"
2250  IF WH = 1 OR WH = 4 OR WH = 5 OR WH = 7 THEN 2270
2260  GOTO 2550
2270  HGR2
2280  REM
2290  REM      SETS UP AND DRAWS CUMATIVE ARITHMETIC SIZE CURVE IN
MEMORY.
2300  REM      DRAWS POINT ONLY CURVE----CURVE MAXIUM VALUE =110%.
2310  REM
2320  & SCALE,3,14, - 10,110
2330 LX$ = "PHI UNITS":LY$ = "PERCENTAGE (%)"
2340  & LABELAXES,1,10
2350  &  DRAW ,13, - 10: &  DRAW ,13,110
2360  FOR I = 1 TO IMAX
2370  & PENUP
2380  &  DRAW ,PI(I),ACUM(I)
2390  NEXT I
2400 D$ = "*"
```

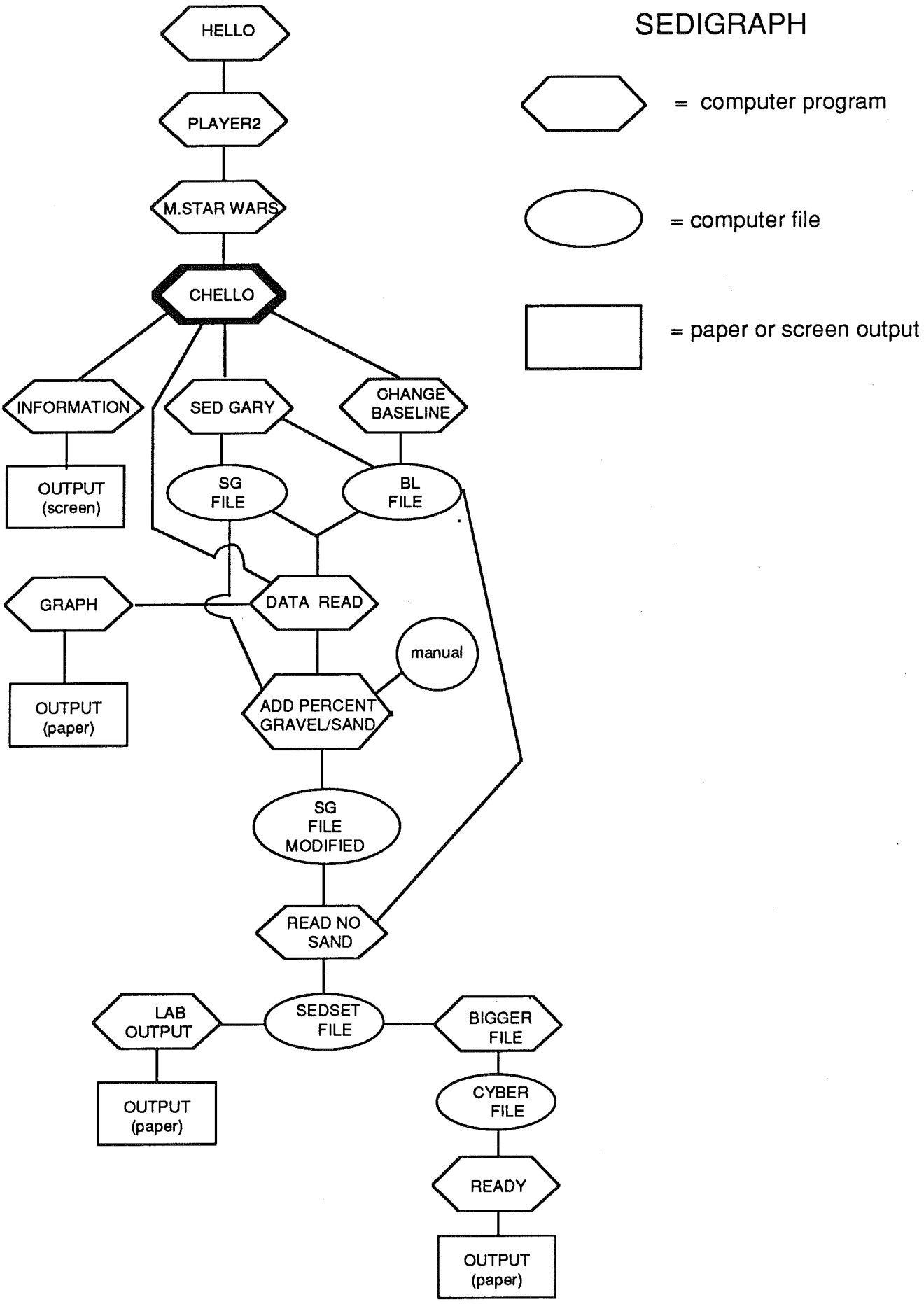
```
2410  PRINT
2420  PRINT D$;"PR#1"
2430  HTAB 30: PRINT "GRAPH OF CUMULATIVE ARITHMETIC MUD DISTRIBUTION"
2440  HTAB 30: PRINT
"================================================": PRINT : PRINT
2450  POKE 1913,66: PRINT  CHR$ (17): REM  INSERT CONTROL 'Q' TO PRINT GRAPH
2460 N = 0: PRINT : PRINT : PRINT
2470  PRINT  TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
2480  GOSUB 3510
2490  PRINT  CHR$ (12): REM  INSERT CONTROL 'L' TO EJECT PAGE
2500  PRINT D$;"PR#0"
2510  REM
2520  REM      SETS UP AND DRAWS ARITHMETIC SIZE CURVE IN MEMORY.
2530  REM      DRAWS LINE CURVE----------CURVE MAXIUM VALUE =30%.
2540  REM
2550  HGR2
2560  IF WH = 2 OR WH = 4 OR WH = 6 OR WH = 7 THEN 2580
2570  GOTO 2800
2580  & SCALE,3,14, - 10,30
2590 LX$ = "PHI UNITS":LY$ = "PERCENTAGE (%)"
2600  & LABELAXES,1,10
2610  &  DRAW ,13, - 10: &  DRAW ,13,30: & PENUP
2620  FOR I = 1 TO IMAX
2630 N = 0
2640  PRINT
2650  &  DRAW ,PI(I),A(I)
2660  NEXT I
2670 D$ = "*"
2680  PRINT
2690  PRINT D$;"PR#1"
2700  HTAB 36: PRINT "GRAPH OF ARITHMETIC MUD DISTRIBUTION"
```

```
2710 HTAB 32: PRINT
"================================================": PRINT : PRINT
2720 PRINT D$;"PR#0"
2730 PRINT
2740 PRINT D$;"PR#1": POKE 1913,66: PRINT CHR$ (17): REM  INSERT CONTROL 'Q'
TO PRINT GRAPH
2750 PRINT : PRINT : PRINT
2760 PRINT TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
2770 GOSUB 3510
2780 PRINT CHR$ (12): REM  INSERT CONTROL 'L' TO EJECT PAGE
2790 PRINT D$;"PR#0"
2800 PRINT
2810 IF WH = 3 OR WH = 5 OR WH = 6 OR WH = 7 THEN 2870
2820 GOTO 3130
2830 REM
2840 REM     SETS UP AND DRAWS LOG/LOG ARITHMETIC SIZE CURVE IN MEMORY.
2850 REM     DRAWS LINE CURVE----------CURVE MAXIUM VALUE =2.
2860 REM
2870 HGR2
2880 & SCALE,3,14, - .5,2
2890 LX$ = "PHI UNITS":LY$ = "PERCENTAGE LOG"
2900 & LABELAXES,1,.5
2910 N = 0
2920 & DRAW ,13, - .5: & DRAW ,13,2: & PENUP
2930 FOR I = 1 TO IMAX
2940 N = N + 1
2950 PRINT
2960 IF A(N) < 0 THEN A(N) = 0
2970 IF A(N) = 0 THEN V = 0: GOTO 3000
2980 V = LOG (A(N)) * .434294
2990 IF V < 0 THEN V = 0: REM     WHEN %<1 THE LOG (%) GOES -VE
```

```
3000 & DRAW ,PI(I),V
3010 NEXT I
3020 PRINT D$;"PR#1"
3030 HTAB 32: PRINT "LOG/LOG GRAPH OF ARITHMETIC MUD DISTRIBUTION"
3040 HTAB 30: PRINT
"================================================="
3050 PRINT : PRINT
3060 PRINT D$;"PR#0"
3070 PRINT
3080 PRINT D$;"PR#1": POKE 1913,66: PRINT  CHR$ (17): REM   INSERT CONTROL 'Q'
TO PRINT GRAPH
3090 PRINT : PRINT : PRINT
3100 PRINT  TAB( 33);"ABOVE GRAPH IS FOR SAMPLE NUMBER ";NUMBER
3110 GOSUB 3510
3120 PRINT  CHR$ (12): REM  INSERT CONTROL 'L' TO EJECT PAGE
3130 PRINT D$;"PR#0"
3140 I = 0:N = 0:DUM = 0:CLAY = 0:YY = 0:UU = 0:ZZZ = 0: TEXT
3150 BBB = 0: FOR X = 1 TO 210:PI(X) = 0: NEXT X
3160 X = 0
3170 NEXT NUMBER
3180 INPUT "ANOTHER SAMPLE GROUP (Y=0,N=1)";C
3182 IF C = 0 THEN  GOTO 70
3184 STOP
3190 FOR I = 4 TO (IMAX - 3)
3200 BLINE(1) = .65 * A(1) + .2 * A(2) + .1 * A(3) + .05 * A(4)
3210 BLINE(2) = .2 * A(1) + .45 * A(2) + .2 * A(3) + .1 * A(4) + .05 * A(5)
3220 BLINE(3) = .1 * A(1) + .2 * A(2) + .35 * A(3) + .2 * A(4) + .1 * A(5) + .05 * A(6)
3230 BLINE(I) = .05 * A(I - 3) + .1 * A(I - 2) + .2 * A(I - 1) + .30 * A(I) + .2 * A(I + 1) + .1 *
A(I + 2) + .05 * A(I + 3)
3240 BLINE(IMAX - 2) = .05 * A(IMAX - 5) + .1 * A(IMAX - 4) + .2 * A(IMAX - 3) + .35 *
A(IMAX - 2) + .2 * A(IMAX - 1) + .1 * A(IMAX)
```

```
3250 BLINE(IMAX - 1) = .05 * A(IMAX - 4) + .1 * A(IMAX - 3) + .2 * A(IMAX - 2) + .45 *
A(IMAX - 1) + .2 * A(IMAX)
3260 BLINE(IMAX) = .05 * A(IMAX - 3) + .1 * A(IMAX - 2) + .2 * A(IMAX - 1) + .65 *
A(IMAX)
3270  NEXT I
3280 ACUM(1) = 100 - BLINE(1):A(1) = BLINE(1):CLAY = A(1)
3290  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
3300  FOR I = 2 TO IMAX:A(I) = BLINE(I)
3310  IF PI(I) < 8 OR PI(I) = 8 THEN CLAY = CLAY + A(I)
3320 ACUM(I) = ACUM(I - 1) - A(I): NEXT I
3330  GOTO 1190
3340  PRINT D$;"OPEN SEDSET ";NUMBER;",D1,S5"
3350  PRINT D$;"WRITE SEDSET ";NUMBER
3360 V4 = IMAX + 3
3370  PRINT V4
3372 INFO$(5) = INFO$(1) + "   " + INFO$(4)
3374 INFO$(6) = INFO$(2) + "   " + INFO$(3) + "   " +  STR$ (NU)
3380  PRINT INFO$(5)
3390  PRINT INFO$(6)
3400  PRINT  - 2;",";V2
3410  PRINT 2;",";V3
3420  FOR I = 1 TO IMAX
3430 PI(I) =  INT (PI(I) * 100 + .5) / 100
3440 A(I) = A(I) * PT / 100
3450 A(I) =  INT (A(I) * 100 + .5) / 100
3460  PRINT PI(I);",";A(I)
3470  NEXT I
3475 ACUM(IMAX) = ACUM(IMAX) * PT / 100
3480  PRINT PI(IMAX) + 1;",";ACUM(IMAX)
3490  PRINT D$;"CLOSE SEDSET ";NUMBER
3500  RETURN
```

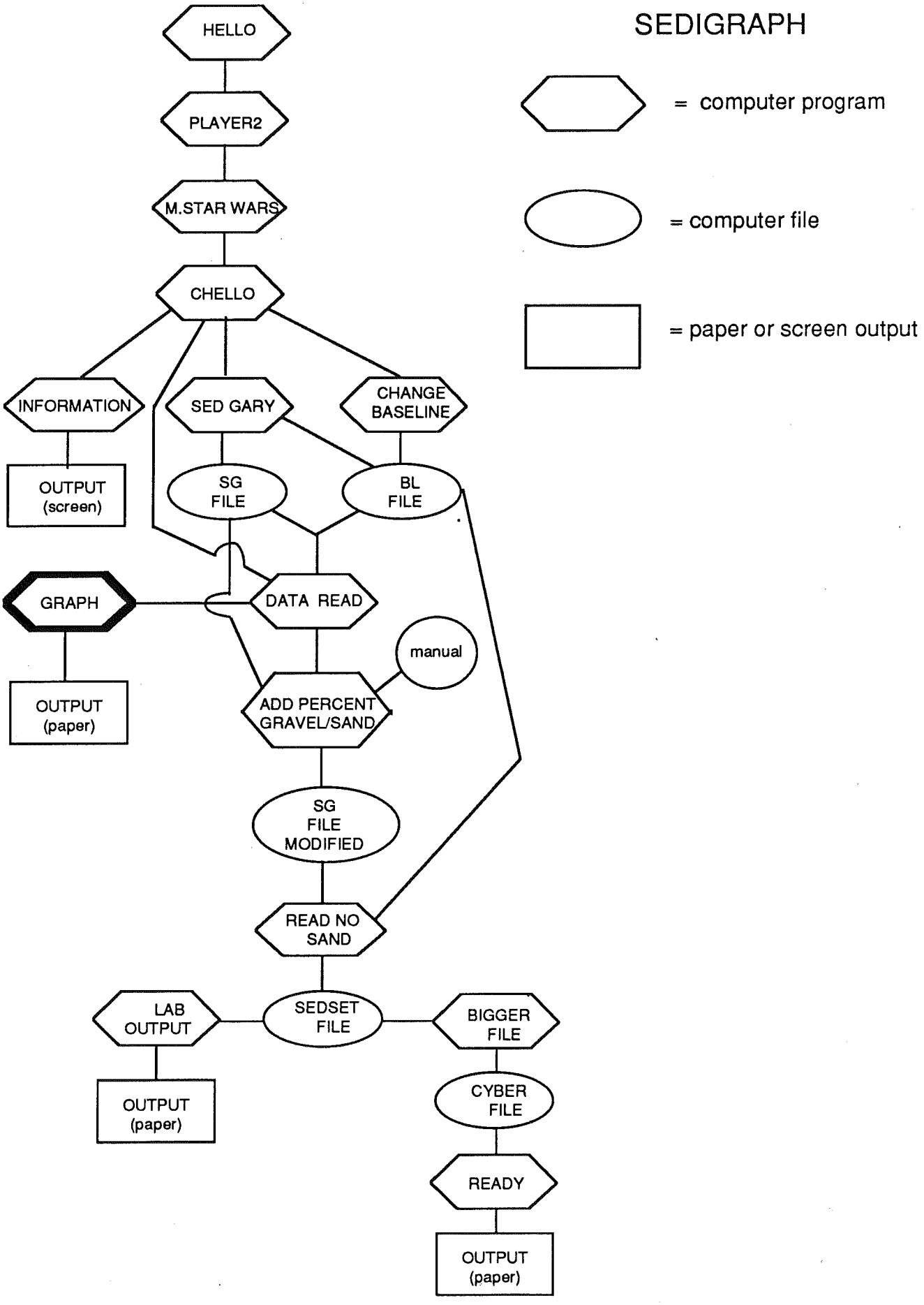
```
3510 PRINT : PRINT
3520 PRINT TAB( 29)"SAMPLE INFORMATION:": PRINT TAB(  29)".....":
PRINT : PRINT TAB( 15);INFO$(1): PRINT TAB( 15);INFO$(2): PRINT TAB(
15);INFO$(3): PRINT TAB( 15);INFO$(4)
3530 RETURN
```


SEDIGRAPH
= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

This program automatically runs when the SediGraph program disk is booted. It is directly executed by the diskette's Hello Program, thus giving it its name. The program acts as a master program allowing several larger programs to be executed through a menu.

```
0 REM
5  HOME
6 D$ = "*": REM  CONTROL 'D'
8  INVERSE
10  HTAB 8: PRINT "*****************************"
20  HTAB 8: PRINT "**                         **"
30  HTAB 8: PRINT "**  DELTA MARINE COMPUTER  **"
40  HTAB 8: PRINT "**        SERVICES         **"
50  HTAB 8: PRINT "**                         **"
60  HTAB 8: PRINT "**        827-3163         **"
70  HTAB 8: PRINT "**     GARY DUCHESNE       **"
80  HTAB 8: PRINT "**                         **"
90  HTAB 8: PRINT "*****************************"
95  NORMAL
100  VTAB 12: HTAB 10: PRINT "CHANGE BASELINE #  "
120  VTAB 14: HTAB 10: PRINT "SAVE DATA "
140  VTAB 16: HTAB 10: PRINT "CALCULATE FROM FILE "
150  VTAB 18: HTAB 10: PRINT "INFORMATION"
155  VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157  PRINT "PRESS ANY OTHER KEY + 'RETURN' WILL RUN SELECTION": NORMAL
158  PRINT "NOTE: SPACE BAR HAS EFFECT"
159  PRINT  CHR$ (4)"BLOAD PLAYER2"
160 I$ = "M.STAR WARS"
161  POKE  - 16368,0
162  PRINT  CHR$ (4)"BLOAD ";I$;",A24576": POKE 30,0: POKE 31,96: CALL  - 958: CALL
768
164  VTAB 12: HTAB 29: INPUT N$: IF N$ = "" THEN 180
```

```
165 PRINT
170 PRINT D$;"RUN CHANGE BASELINE #,D1"
180 VTAB 14: HTAB 21: INPUT N$: IF N$ = "" THEN 200
185 PRINT
190 PRINT D$;"RUN SED GARY,D1"
200 VTAB 16: HTAB 31: INPUT N$: IF N$ = "" THEN 220
205 VTAB 21: FLASH
210 PRINT "LOADING AND RUNNING ": NORMAL
212 PRINT D$;"RUN DATA READ,D1"
220 VTAB 18: HTAB 22: INPUT N$: IF N$ = "" THEN 160
300 PRINT D$;"RUN INFORMATION,D1"
400 HOME
```


SEDIGRAPH
= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

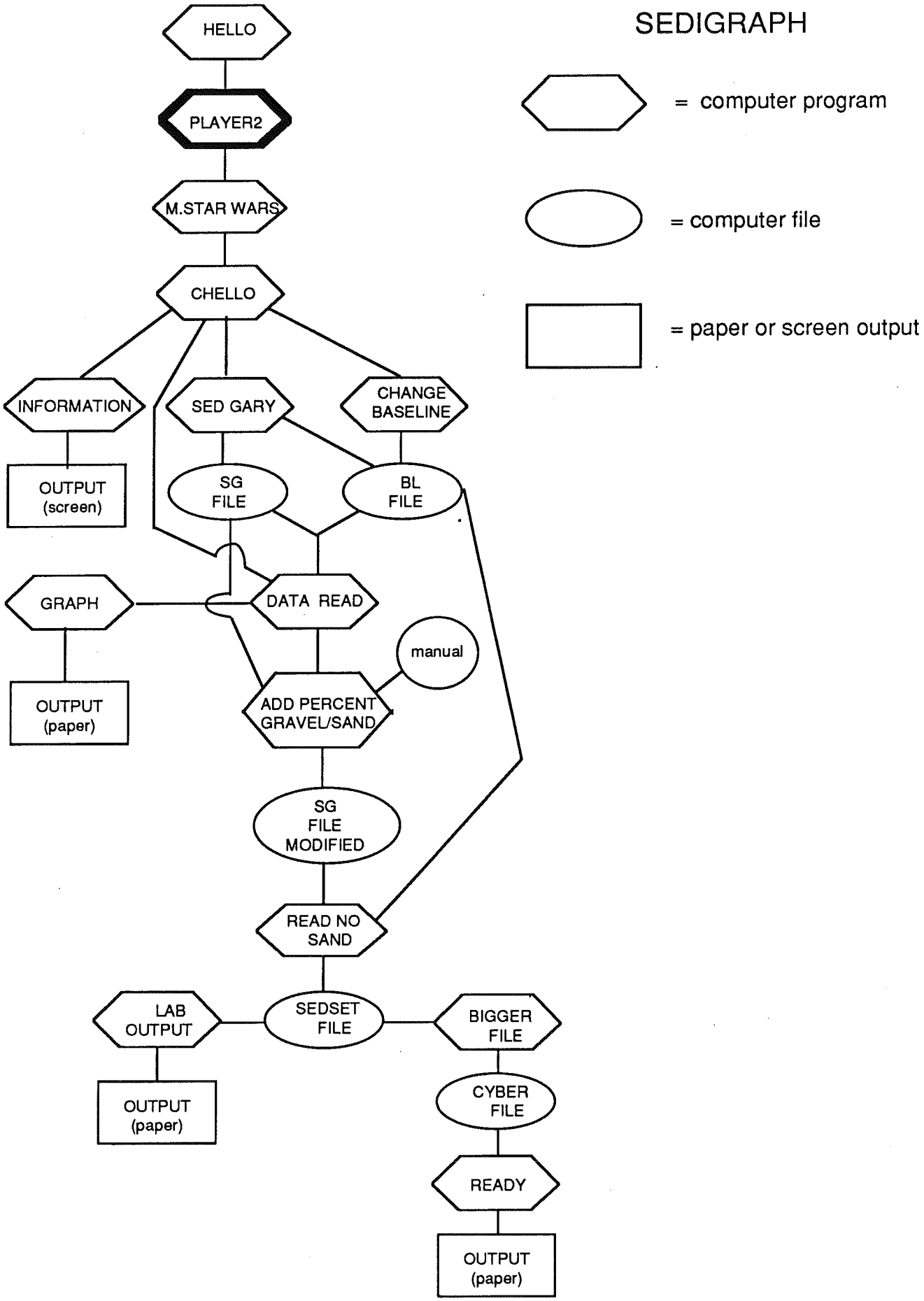
This is a binary file which graphs frequency data onto an EPSON 100 dot matrix printer

```
5 HOME
6 D$ = "": REM  CONTROL 'D'
8  INVERSE
10  HTAB 8: PRINT "*****************************"
20  HTAB 8: PRINT "**                         **"
30  HTAB 8: PRINT "**  DELTA MARINE COMPUTER  **"
40  HTAB 8: PRINT "**        SERVICES         **"
50  HTAB 8: PRINT "**                         **"
60  HTAB 8: PRINT "**        827-3163         **"
70  HTAB 8: PRINT "**     GARY DUCHESNE       **"
80  HTAB 8: PRINT "**                         **"
90  HTAB 8: PRINT "*****************************"
95  NORMAL
100  VTAB 12: HTAB 10: PRINT "CHANGE BASELINE #  "
120  VTAB 14: HTAB 10: PRINT "SAVE DATA "
140  VTAB 16: HTAB 10: PRINT "CALCULATE FROM FILE "
150  VTAB 18: HTAB 10: PRINT "INFORMATION"
155  VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157  PRINT "PRESS ANY OTHER KEY + 'RETURN' WILL RUN SELECTION": NORMAL
158  PRINT "NOTE: SPACE BAR HAS EFFECT"
159  PRINT  CHR$ (4)"BLOAD PLAYER2"
160 I$ = "M.STAR WARS"
161  POKE  - 16368,0
162  PRINT  CHR$ (4)"BLOAD ";I$;",A24576": POKE 30,0: POKE 31,96: CALL  -
   958: CALL 768
164  VTAB 12: HTAB 29: INPUT N$: IF N$ = "" THEN 180
165  PRINT
170  PRINT D$;"RUN CHANGE BASELINE #,D1"
180  VTAB 14: HTAB 21: INPUT N$: IF N$ = "" THEN 200
185  PRINT
190  PRINT D$;"RUN SED GARY,D1"
200  VTAB 16: HTAB 31: INPUT N$: IF N$ = "" THEN 220
205  VTAB 21: FLASH
210  PRINT "LB
```

```
256 (5@KVcl{ DIM PR# VLIN ROT= POP LET ON THEN SGN TAN SYNTAX
    TYPE MISMATCH '/7CKXdox DEL HGR INVERSE RECALL REM CLEAR ^ PDL
    ATN RETURN WITHOUT GOSUB ILLEGAL DIRECT #2I
18208 STRING TOO LONG ( SPEED= HGR2 i TAN DEL . RETURN &E0%.Q& HGR &`

34
10451 LOG (O9) / LOG (10))),O8,1)) - 31 AT O7 + 14,176:O7 = O7 + 7: NEXT
   O8
12487 : HPLOT FN OX(O9), FN OY(O4) TO FN OX(O9), FN OY(O4) - 4:O9 = O9 +
   OH:OG = OG + 1: IF (OG < 10 AND O9 < O3 * 1.0001) THEN NEXT O9
24600 CALL NORMAL STOP D REM RUN NORMAL STOP + HGR B PLOT SCRN(
    WAIT GR IF OUT OF MEMORY WAIT HGR B PLOT FRE WAIT & FRE
    SAVE SPEED= TAB(
 USR WAIT PLOT USR WAIT` RESTORE MID$ WAIT HLIN CLEAR WAIT RESTORE
     WAIT HLIN GET WAIT RESTORE SYNTAX WAIT RUN RETURN WITHOUT
GOSUB WAIT HLIN NEW WAIT CALL TAB( WAIT LEFT$ = + ^ RIGHT$ WAIT =
SYNTAX LEFT$ WAIT = VTAB]
```

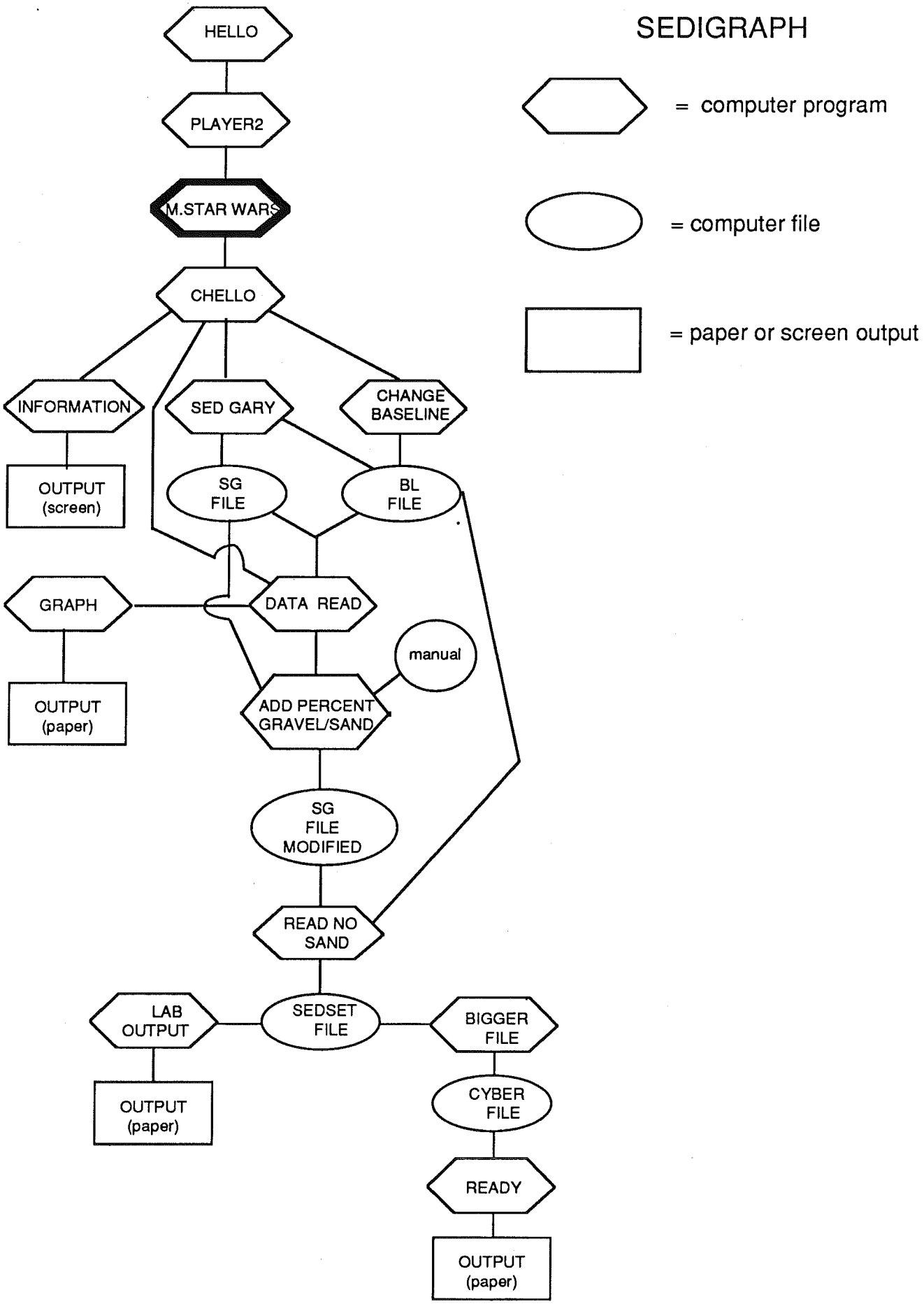
SEDIGRAPH


HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)
= computer program
= computer file
= paper or screen output

This is a binary file.

```
5 HOME
6 D$ = "": REM CONTROL 'D'
8 INVERSE
10 HTAB 8: PRINT "*****************************"
20 HTAB 8: PRINT "** **"
30 HTAB 8: PRINT "** DELTA MARINE COMPUTER **"
40 HTAB 8: PRINT "** SERVICES **"
50 HTAB 8: PRINT "** **"
60 HTAB 8: PRINT "** 827-3163 **"
70 HTAB 8: PRINT "** GARY DUCHESNE **"
80 HTAB 8: PRINT "** **"
90 HTAB 8: PRINT "*****************************"
95 NORMAL
100 VTAB 12: HTAB 10: PRINT "CHANGE BASELINE # "
120 VTAB 14: HTAB 10: PRINT "SAVE DATA "
140 VTAB 16: HTAB 10: PRINT "CALCULATE FROM FILE "
150 VTAB 18: HTAB 10: PRINT "INFORMATION"
155 VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157 PRINT "PRESS ANY OTHER KEY + 'RETURN' WILL RUN SELECTION": NORMAL
158 PRINT "NOTE: SPACE BAR HAS EFFECT"
159 PRINT CHR$ (4)"BLOAD PLAYER2"
160 I$ = "M.STAR WARS"
161 POKE - 16368,0
162 PRINT CHR$ (4)"BLOAD ";I$;",A24576": POKE 30,0: POKE 31,96: CALL -
958: CALL 768
164 VTAB 12: HTAB 29: INPUT N$: IF N$ = "" THEN 180
165 PRINT
170 PRINT D$;"RUN CHANGE BASELINE #,D1"
180 VTAB 14: HTAB 21: INPUT N$: IF N$ = "" THEN 200
185 PRINT
190 PRINT D$;"RUN SED GARY,D1"
200 VTAB 16: HTAB 31: INPUT N$: IF N$ = "" THEN 220
205 VTAB 21: FLASH
210 PRINT "LOADING AND RUNNING ": NORMAL
```

```
212 PRINT D$;"RUN DATA READ,D1"
220 VTAB 18: HTAB 22: INPUT N$: IF N$ = "" THEN 160
300 PRINT D$;"RUN INFORMATION,D1"
400 HOME
```

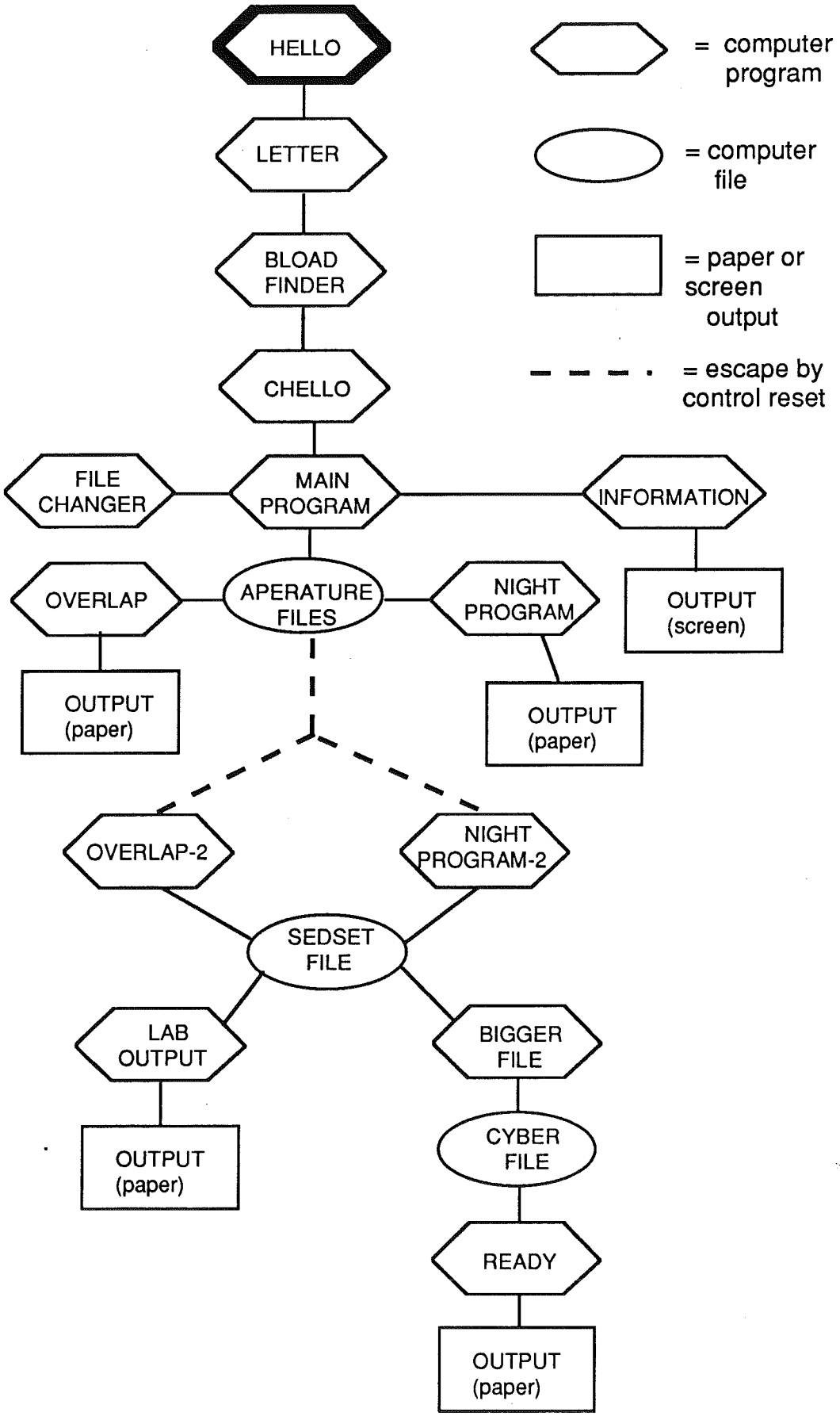

SEDIGRAPH
= computer program
= computer file
= paper or screen output
HELLO
PLAYER2
M.STAR WARS
CHELLO
INFORMATION
SED GARY
CHANGE BASELINE
OUTPUT (screen)
SG FILE
BL FILE
GRAPH
DATA READ
manual
OUTPUT (paper)
ADD PERCENT GRAVEL/SAND
SG FILE MODIFIED
READ NO SAND
LAB OUTPUT
SEDSET FILE
BIGGER FILE
OUTPUT (paper)
CYBER FILE
READY
OUTPUT (paper)

This is a binary file that

```
5 HOME
6 D$ = "": REM  CONTROL 'D'
8 INVERSE
10 HTAB 8: PRINT "******************************"
20 HTAB 8: PRINT "**                          **"
30 HTAB 8: PRINT "**  COULTER ACCUCOMP/TAII  **"
40 HTAB 8: PRINT "**       SYSTEM             **"
50 HTAB 8: PRINT "**                          **"
60 HTAB 8: PRINT "**      REVISION B1         **"
70 HTAB 8: PRINT "**      AUG 31,1983         **"
80 HTAB 8: PRINT "**                          **"
90 HTAB 8: PRINT "******************************"
95 NORMAL
100  VTAB 12: HTAB 10: PRINT "MAIN PROGRAM"
120  VTAB 14: HTAB 10: PRINT "NIGHT RUN"
140  VTAB 16: HTAB 10: PRINT "OVERLAP RUN"
150  VTAB 18: HTAB 10: PRINT "INFORMATION"
155  VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157  PRINT "ANY KEY + 'RETURN' TO RUN SELECTION": NORMAL
158  PRINT "NOTE: SPACE BAR HAS NO EFFECT": GOSUB 500: GOTO 164
159  POKE 103,1: POKE 104,64: POKE 16384,0
160  PRINT D$;"BLOAD LETTER,D1"
161  RETURN
164  VTAB 12: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 180
165  PRINT
166  GOSUB 159
170  PRINT D$;"RUN MAIN PROGRAM,D1"
180  VTAB 14: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 200
185  PRINT
188  GOSUB 159
190  PRINT D$;"RUN NIGHT PROGRAM,D1"
200  VTAB 16: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 220
210  GOSUB 159
212  PRINT D$;"RUN OVERLAP,D1"
```

```
214 PRINT
220 VTAB 18: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 164
222  GOSUB 159
225  PRINT D$;"RUN INFORMATION,D1"
230  PRINT
400  HOME
500  PRINT D$;"BLOAD PLAYER2"
510  POKE  - 16368,0
520  PRINT D$;"BLOAD M.SONATA,A24576": POKE 30,0: POKE 31,96: CALL  - 958
   : CALL 768
530  RETURN
```

COULTER COUNTER

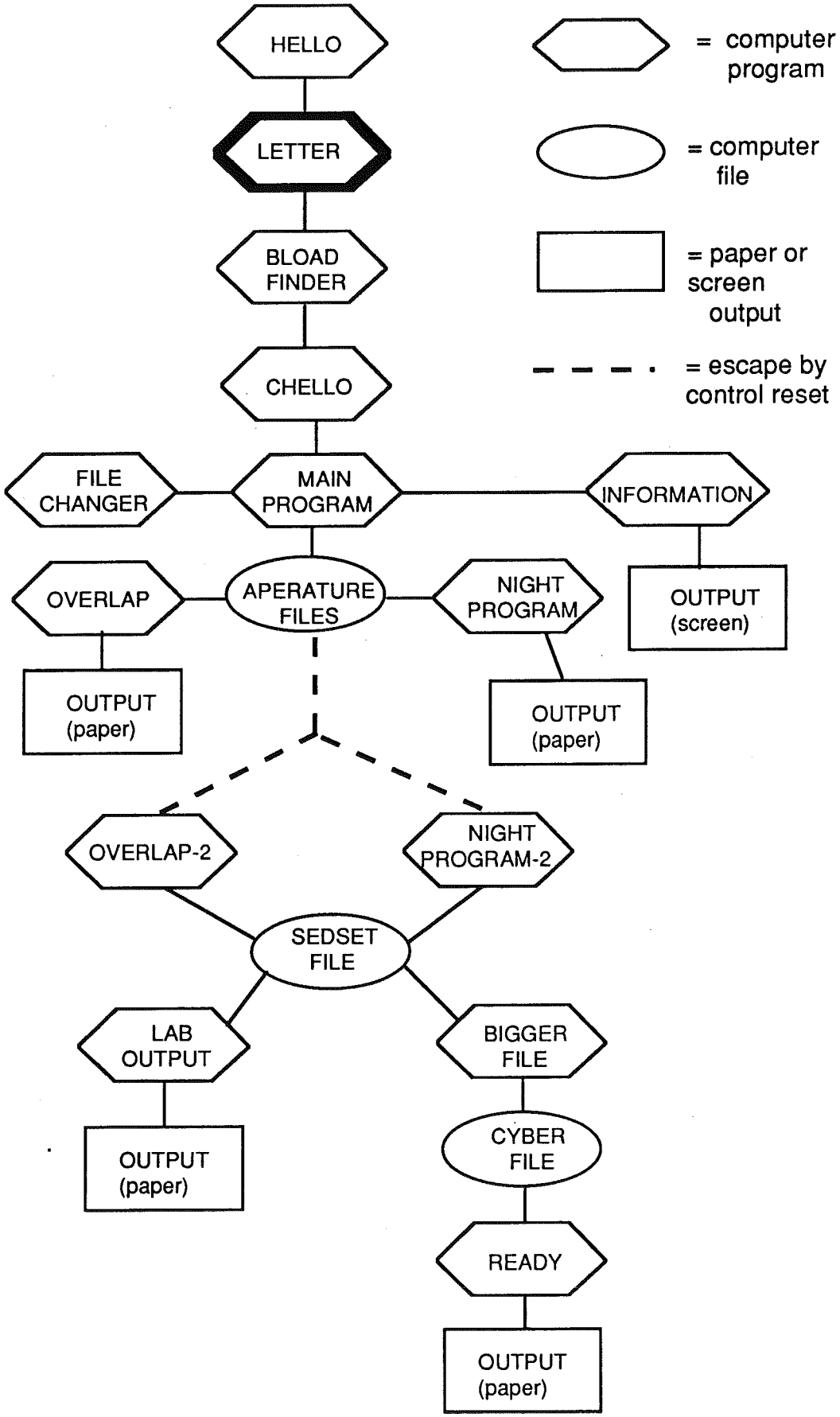


This program is the hello file for all the Coulter Counter diskettes. It automatically boots the Apple computer then loads and runs the program CHELLO.

```
0 REM
5  HOME
6 D$ = "*": REM  CONTROL 'D'
8  INVERSE
10  HTAB 8: PRINT "******************************"
20  HTAB 8: PRINT "**                          **"
30  HTAB 8: PRINT "**  COULTER ACCUCOMP/TAII  **"
40  HTAB 8: PRINT "**        SYSTEM            **"
50  HTAB 8: PRINT "**                          **"
60  HTAB 8: PRINT "**      REVISION B1         **"
70  HTAB 8: PRINT "**      AUG 31,1983         **"
80  HTAB 8: PRINT "**                          **"
90  HTAB 8: PRINT "******************************"
95  NORMAL
100  VTAB 12: HTAB 10: PRINT "MAIN PROGRAM"
120  VTAB 14: HTAB 10: PRINT "NIGHT RUN"
140  VTAB 16: HTAB 10: PRINT "OVERLAP RUN"
150  VTAB 18: HTAB 10: PRINT "INFORMATION"
155  VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157  PRINT "ANY KEY + 'RETURN' TO RUN SELECTION": NORMAL
158  PRINT "NOTE: SPACE BAR HAS NO EFFECT": GOSUB 500: GOTO 164
159  POKE 103,1: POKE 104,64: POKE 16384,0
160  PRINT D$;"BLOAD LETTER,D1"
161  RETURN
164  VTAB 12: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 180
165  PRINT
166  GOSUB 159
170  PRINT D$;"RUN MAIN PROGRAM,D1"
180  VTAB 14: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 200
```

```
185  PRINT
188  GOSUB 159
190  PRINT D$;"RUN NIGHT PROGRAM,D1"
200  VTAB 16: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 220
210  GOSUB 159
212  PRINT D$;"RUN OVERLAP,D1"
214  PRINT
220  VTAB 18: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 164
222  GOSUB 159
225  PRINT D$;"RUN INFORMATION,D1"
230  PRINT
400  HOME
500  PRINT D$;"BLOAD PLAYER2"
510  POKE  - 16368,0
520  PRINT D$;"BLOAD M.SONATA,A24576": POKE 30,0: POKE 31,96: CALL  - 958: CALL
768
530  RETURN
```

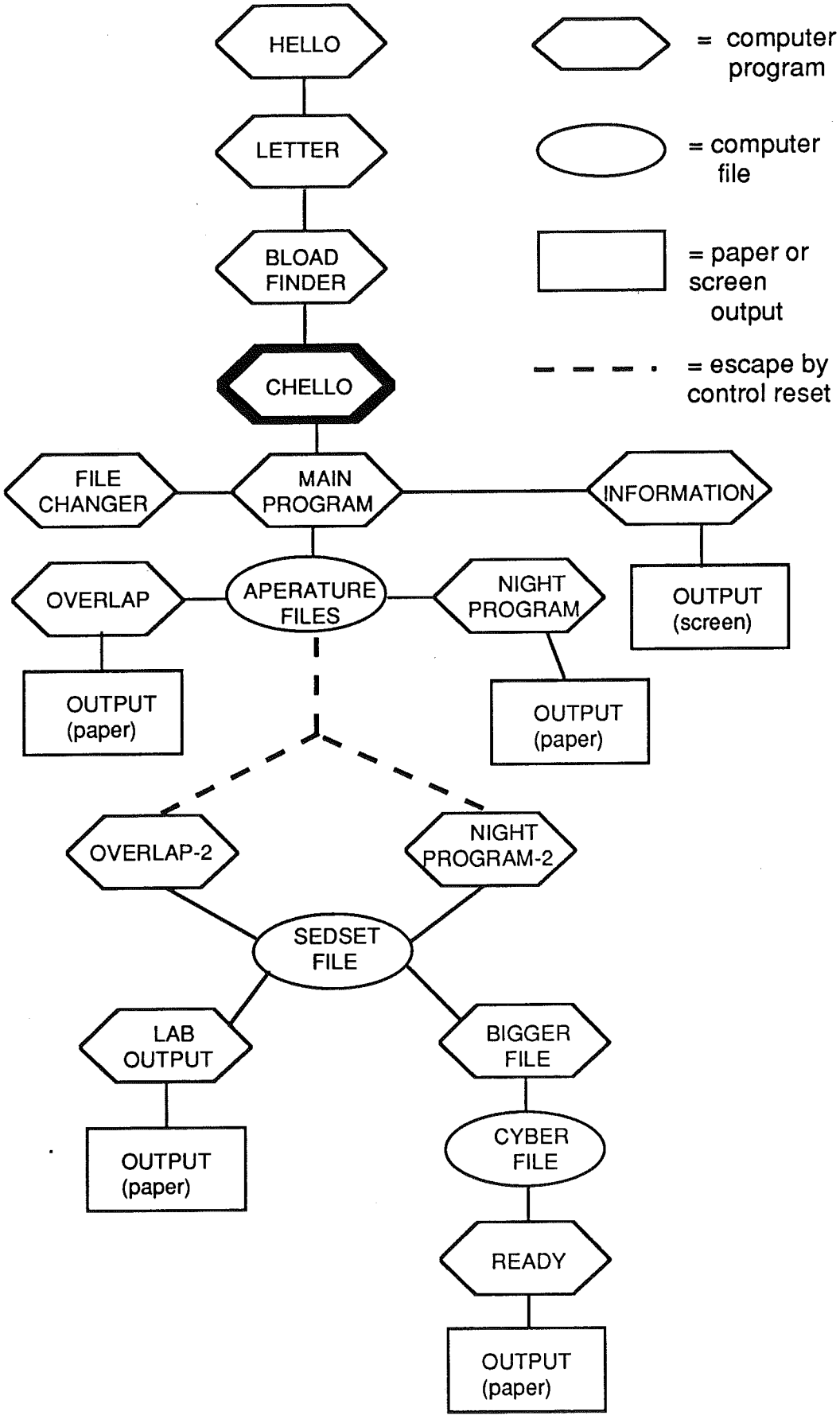
COULTER COUNTER



This is a binary file -

```
5 HOME
6 D$ = "": REM  CONTROL 'D'
8 INVERSE
10 HTAB 8: PRINT "*****************************"
20 HTAB 8: PRINT "**                         **"
30 HTAB 8: PRINT "**  COULTER ACCUCOMP/TAII  **"
40 HTAB 8: PRINT "**       SYSTEM            **"
50 HTAB 8: PRINT "**                         **"
60 HTAB 8: PRINT "**      REVISION B1        **"
70 HTAB 8: PRINT "**      AUG 31,1983        **"
80 HTAB 8: PRINT "**                         **"
90 HTAB 8: PRINT "*****************************"
95 NORMAL
100 VTAB 12: HTAB 10: PRINT "MAIN PROGRAM"
120 VTAB 14: HTAB 10: PRINT "NIGHT RUN"
140 VTAB 16: HTAB 10: PRINT "OVERLAP RUN"
150 VTAB 18: HTAB 10: PRINT "INFORMATION"
155 VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157 PRINT "ANY KEY + 'RETURN' TO RUN SELECTION": NORMAL
158 PRINT "NOTE: SPACE BAR HAS NO EFFECT": GOSUB 500: GOTO 164
159 POKE 103,1: POKE 104,64: POKE 16384,0
160 PRINT D$;"BLOAD LETTER,D1"
161 RETURN
164 VTAB 12: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 180
165 PRINT
166 GOSUB 159
170 PRINT D$;"RUN MAIN PROGRAM,D1"
180 VTAB 14: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 200
185 PRINT
188 GOSUB 159
190 PRINT D$;"RUN NIGHT PROGRAM,D1"
200 VTAB 16: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 220
210 GOSUB 159
212 PRINT D$;"RUN OVERLAP,D1"
214 PRINT
220 VTAB 18: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 164
222 GOSUB 159
225 PRINT D$;"RUN INFORMATION,D1"
230 PRINT
400 HOME
500 PRINT D$;"BLOAD PLAYER2"
510 POKE  - 16368,0
520 PRINT D$;"BLOAD M.SONATA,A24576": POKE 30,0: POKE 31,96: CALL  - 958
   : CALL 768
530 RETURN
```

COULTER COUNTER

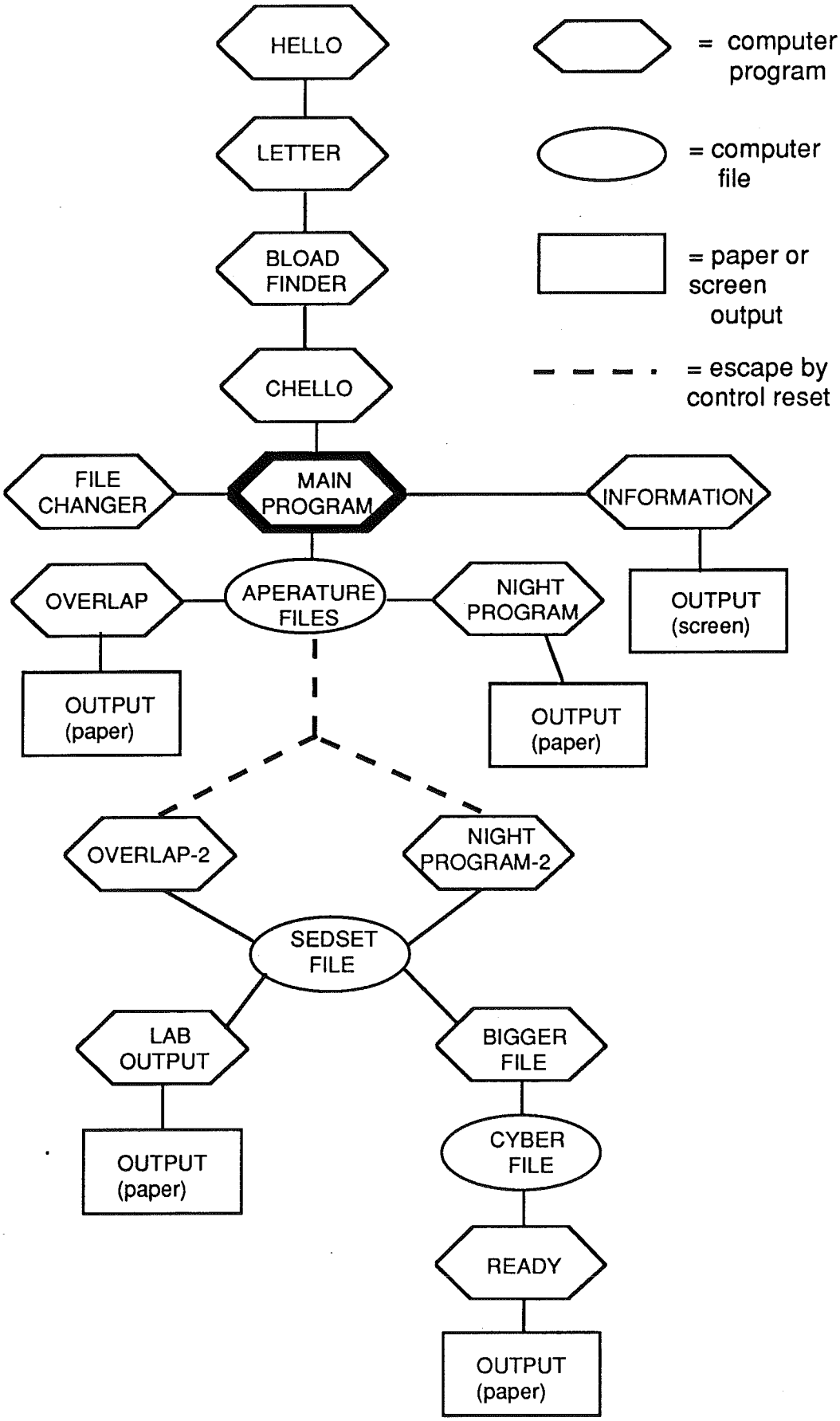


This is a menu driven program that allows the selection of various programs associated with the Coulter Counter, i.e. the MAIN Program, the NIGHT Program, The OVERLAP Program and the program INFORMATION. This program also loads a few entertaining programs which play music while the computer waits for you to make your program selection.

```
0 REM
5  HOME
6 D$ = "*": REM  CONTROL 'D'
8  INVERSE
10  HTAB 8: PRINT "******************************"
20  HTAB 8: PRINT "**                          **"
30  HTAB 8: PRINT "**  COULTER ACCUCOMP/TAII  **"
40  HTAB 8: PRINT "**        SYSTEM            **"
50  HTAB 8: PRINT "**                          **"
60  HTAB 8: PRINT "**      REVISION B1         **"
70  HTAB 8: PRINT "**      AUG 31,1983         **"
80  HTAB 8: PRINT "**                          **"
90  HTAB 8: PRINT "******************************"
95  NORMAL
100  VTAB 12: HTAB 10: PRINT "MAIN PROGRAM"
120  VTAB 14: HTAB 10: PRINT "NIGHT RUN"
140  VTAB 16: HTAB 10: PRINT "OVERLAP RUN"
150  VTAB 18: HTAB 10: PRINT "INFORMATION"
155  VTAB 20: INVERSE : PRINT "PRESS RETURN FOR NEXT SELECTION"
157  PRINT "ANY KEY + 'RETURN' TO RUN SELECTION": NORMAL
158  PRINT "NOTE: SPACE BAR HAS NO EFFECT": GOSUB 500: GOTO 164
159  POKE 103,1: POKE 104,64: POKE 16384,0
160  PRINT D$;"BLOAD LETTER,D1"
161  RETURN
164  VTAB 12: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 180
165  PRINT
166  GOSUB 159
```

```
170 PRINT D$;"RUN MAIN PROGRAM,D1"
180 VTAB 14: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 200
185 PRINT
188 GOSUB 159
190 PRINT D$;"RUN NIGHT PROGRAM,D1"
200 VTAB 16: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 220
210 GOSUB 159
212 PRINT D$;"RUN OVERLAP,D1"
214 PRINT
220 VTAB 18: HTAB 25: INPUT N$: IF N$ = "" THEN  GOTO 164
222 GOSUB 159
225 PRINT D$;"RUN INFORMATION,D1"
230 PRINT
400 HOME
500 PRINT D$;"BLOAD PLAYER2"
510 POKE  - 16368,0
520 PRINT D$;"BLOAD M.SONATA,A24576": POKE 30,0: POKE 31,96: CALL  - 958: CALL
768
530 RETURN
```

COULTER COUNTER



MAIN PROGRAM is loaded and run from a menu selection in the CHELLO Program. This program allows new data diskettes to be initilized from menu, data to be transfered from the Coulter Counter to the Apple, the printing out of data the selection of tubes, graphs, statistics, calibration, checks on overlaps, and choice of volume or population frequency distributions.

```
0 REM
20  DIM D(60,2),T(2),C(50),Z1$(3)
25 I$ =  CHR$ (9)
30 D$ =  CHR$ (4):Q$ =  CHR$ (17):Z1$(1) = " VOLUME %":Z1$(2) =
"POPULATION":Z1$(3) = "POPULATION %":DN$ = ",D2":P0 = 0
40 C1 =  LOG (2) / 6:C2 =  LOG (2) / 3:N = 16:I1 = 1:F(G) = 0:M$ = " UM":H$ =
"****************************************"
50  DEF  FN B(X) =  INT (X * 100 + .5) / 100: DEF  FN C(X) =  INT (X * 10 + .5) / 10: GOTO
21430
60  PRINT : PRINT  TAB( 10)"< ENTER SELECTION > ";: RETURN
70  PRINT : PRINT  TAB( 7)"PRESS RETURN TO CONTINUE ";: RETURN
80  PRINT : PRINT  TAB( 12)"PRINTOUT (Y/N) ";: RETURN
90 SZ = PS:PS = SZ * 2
(1 / 3): RETURN
100  FOR I1 = 1 TO 2:T(I1) = 0: FOR I = 1 TO N:T(I1) = T(I1) + D(I,I1): NEXT I: NEXT I1:I1
= 1: RETURN
120 DM = (D(I,I1) / T(I1)) * 100: RETURN
140 PC = CM:CM = CM - DM: IF CM < 0 THEN CM = 0
145  RETURN
150 PC = CM:CM = CM - D(I,2): RETURN
200  REM
210  REM  **********************************
220  REM   INPUT MISC. INFORMATION ROUTINE
230  REM  **********************************
240  REM
500  HOME
```

```
500 HOME
550 HOME
560 VTAB (6): HTAB 10: PRINT "SAMPLE # "
565 VTAB 8: HTAB 10: PRINT "APERTURES "
570 VTAB 16: HTAB 5: PRINT "INFORMATION "
580 VTAB 18: HTAB 10: PRINT ":"
590 VTAB 19: HTAB 10: PRINT ":"
600 VTAB 20: HTAB 10: PRINT ":"
610 VTAB 21: HTAB 10: PRINT ":"
615 VTAB 6: HTAB 20: INPUT F$: IF F$ = "" THEN  INVERSE : VTAB 6: HTAB 21: PRINT
ID$: NORMAL : GOTO 618
616 ID =  VAL (F$):ID$ =  STR$ (ID): IF ID = 0 THEN 615
618 VTAB 8: HTAB 20: INPUT A$: IF A$ = "" THEN  INVERSE : VTAB 8: HTAB 21: PRINT
AP$: NORMAL : GOTO 620
619 AP$ = A$
620 VTAB 18: HTAB 11: INPUT B$: IF B$ = "" THEN  INVERSE : VTAB 18: HTAB 12:
PRINT DI$: NORMAL : GOTO 622
621 DI$ = B$
622 VTAB 19: HTAB 11: INPUT C$: IF C$ = "" THEN  INVERSE : VTAB 19: HTAB 12:
PRINT EQ$: NORMAL : GOTO 624
623 EQ$ = C$
624 VTAB 20: HTAB 11: INPUT W$: IF W$ = "" THEN  INVERSE : VTAB 20: HTAB 12:
PRINT EL$: NORMAL : GOTO 626
625 EL$ = W$
626 VTAB 21: HTAB 11: INPUT E$: IF E$ = "" THEN  INVERSE : VTAB 21: HTAB 12:
PRINT O$: NORMAL : GOTO 630
627 O$ = E$
630 NORMAL : VTAB 2: PRINT "IS INFORMATION CORRECT (Y/N) ";
640 GET Z$: IF Z$ = "N" THEN  GOTO 560
650 IF Z$ = "Y" THEN  GOTO 660
655 GOTO 640
660 IF F = 1 THEN  RETURN
```

```
661 AP =  VAL (AP$): IF AP = 30 THEN LL = .397:S$ = "A": GOTO 669
662  IF AP = 50 THEN LL = .5:S$ = "B": GOTO 669
663  IF AP = 70 THEN LL = .794:S$ = "C": GOTO 669
664  IF AP = 140 THEN LL = 1.59:S$ = "D": GOTO 669
665  IF AP = 200 THEN LL = 2.00:S$ = "E": GOTO 669
666  IF AP = 280 THEN LL = 3.17:S$ = "F": GOTO 669
667  IF AP = 560 THEN LL = 6.35:S$ = "G": GOTO 669
668  GOTO 550
669 ID$ = S$ +  STR$ (ID)
670  HOME : PRINT "SAMPLE ";ID$:S$ = ID$
680  PRINT "LOWER LIMIT OF CHANNEL 1= ";LL
690  RETURN
1000  POKE 216,0: HOME : PRINT : PRINT "ENTER SIZE OF CALIBRATION MATERIAL":
INPUT "PARTICLES ";D1
1010  PRINT : PRINT "ENTER DIAMETER YOU WISH TO PLACE AT": INPUT "CHANNEL
EDGE ";D2: PRINT : INPUT "ENTER UPPER CHANNEL ";W1:W2 = W1: PRINT
1020  INPUT "ENTER SIZE CALIBRATION CONTROL SETTING  ";A1
1030  IF A1 =  > 100 AND A1 <  = 400 THEN 1050
1040  PRINT "INVALID CALIBRATION": GOTO 1020
1050 A2 = A1 * (D1 / D2) ^
3
1060  IF A2 >  = 100 THEN 1080
1070 A2 = A2 * 2:W2 = W1 + 1: GOTO 1060
1080  IF A2 <  = 200 THEN 1100
1090 A2 = A2 / 2:W2 = W1 - 1: GOTO 1060
1100  PRINT : PRINT H$: PRINT : PRINT "CALIBRATION SETTING "; TAB( 30); FN B(A2):
PRINT "LINED AT CHANNEL "; TAB( 30);W2: GOSUB 70
1110  GET Z$: IF Z$ =  CHR$ (13) THEN 1130
1120  GOTO 1110
1130  PRINT
1140  RETURN
1490  REM
```

```
1500 REM  ********************************
1510 REM      INSTRUMENT DATA ROUTINE
1520 REM  ********************************
1530 REM
2000 GOSUB 500: VTAB (8): HTAB (6): PRINT "APPLE READY TO ACCEPT DATA.":
HTAB (6): PRINT "PRESS PRINT  /  PLOT PUSHBUTTON": HTAB (6): PRINT " TO
TRANSFER DATA. PLEASE"
2010  HTAB (6): PRINT "MAKE SURE CONTROLS ARE SET ": HTAB (6): PRINT
"CORRECTLY. PRESS RETURN KEY": HTAB (6): PRINT "WHEN PRINT/PLOT
PUSHBUTTON": HTAB (6): PRINT "LIGHT GOES OFF.": PRINT : HTAB (17): FLASH :
PRINT "READY": NORMAL :X =  FRE (0):
2015  PRINT D$;"MON C,I,O"
2020  PRINT : PRINT D$;"PR#2"
2030  PRINT : PRINT D$;"IN#2"
2040  POKE 1786,223: INPUT C$
2050  PRINT : PRINT D$;"PR#0"
2060 X = 2: FOR I1 = 1 TO 2: FOR I = 1 TO 16:D(I,I1) =  VAL ( MID$ (C$,X,6)):X = X + 7:
NEXT I: NEXT I1: GOSUB 5000: GOSUB 100: PRINT : PRINT D$;"NOMON C,I,O":
RETURN
2460  REM
2480  REM  ************************************
2500  REM      FORMAT DATA DISKETTE ROUTINE
2510  REM  ************************************
2520  REM
3000  HOME : VTAB (8): PRINT "THIS PROCEDURE WILL ERASE ALL CONTENTS":
PRINT "STORED ON THE DISKETTE IN DRIVE #2": PRINT : PRINT "IF YOU WISH TO
CONTINUE, TYPE ";: FLASH : PRINT "YES": NORMAL
3010  INPUT Z$: IF Z$ < > "YES" THEN  RETURN
3020  HOME : VTAB (8): PRINT "PLACE NEW DISKETTE IN DRIVE #2 AND     ": PRINT
"PRESS RETURN": PRINT
3030  GET Z$: IF Z$ =  CHR$ (13) THEN 3050
3040  GOTO 3030
```

```
3050  PRINT : PRINT D$;"INIT";"HELLO";",D2"
3060  PRINT : PRINT D$;"DELETE";"HELLO";",D2"
3070  PRINT : PRINT D$;"CATALOG";",D2"
3080  RETURN
3500  REM
3510  REM  ************************************
3520  REM      SELECT NEW DISK DRIVE ROUTINE
3530  REM  ************************************
3540  REM
4000  HOME : VTAB (8): PRINT "(1) DRIVE #1": PRINT : PRINT "(2) DRIVE #2": PRINT :
GOSUB 60
4010  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 4010
4020  IF Z > 2 THEN 4010
4030  PRINT : ON Z GOTO 4040,4050
4040  VTAB (8): INVERSE : FLASH : PRINT "(1) DRIVE #1": NORMAL : PRINT : PRINT
"(2) DRIVE #2":DN$ = ",D1": GOTO 4060
4050  VTAB (8): PRINT "(1) DRIVE #1": PRINT : INVERSE : FLASH : PRINT "(2) DRIVE
#2": NORMAL :DN$ = ",D2"
4060  VTAB (15): PRINT  TAB( 12)"CORRECT  (Y/N) ";
4070  GET Z$: IF Z$ = "Y" THEN  RETURN
4080  IF Z$ = "N" THEN 4000
4090  GOTO 4070
4500  REM
4510  REM  ****************************************
4520  REM      SAVE SAMPLE TO DISKETTE ROUTINE
4530  REM  ****************************************
4540  REM
4900  HOME : PRINT "SAMPLE ";ID$: PRINT "DO YOU WANT TO CHANGE SAMPLE'S
NAME ";: GET Y$: PRINT : IF Y$ = "Y" THEN  INPUT "INPUT NEW SAMPLE NAME
";ID$: HOME :S$ = ID$: GOTO 4900
5000  HOME : VTAB (12): HTAB (8): FLASH : PRINT "< WRITING TO DISK >": NORMAL
5010 X =  FRE (0):X = 0
```

```
5015 S$ = ID$
5020  PRINT : PRINT D$;"OPEN"S$;DN$
5030  PRINT : PRINT D$;"DELETE"S$;DN$
5040  PRINT : PRINT D$;"OPEN"S$;DN$
5050  PRINT : PRINT D$;"WRITE"S$
5060  PRINT N: PRINT LL: PRINT Y$: PRINT ID$: PRINT EL$: PRINT DI$: PRINT EQ$:
PRINT AP$: PRINT O$
5070  FOR I1 = 1 TO 2: FOR I = 1 TO N: PRINT D(I,I1): NEXT I: NEXT I1
5080  PRINT : PRINT D$;"CLOSE"S$
5090  PRINT : PRINT D$;"PR#0"
5100  RETURN
5500  REM
5510  REM  ***************************************
5520  REM       READ SAMPLE FROM DISK ROUTINE
5530  REM  ***************************************
5540  REM
6000  HOME : PRINT "ENTER SAMPLE TO BE READ ";: INPUT S$:ID$ = S$
6010  HOME : VTAB (12): HTAB (8): FLASH : PRINT "< INPUTING DATA >": NORMAL
6020 X =  FRE (0):X = 0
6030  PRINT : PRINT D$;"OPEN"S$;DN$
6040  PRINT : PRINT D$;"READ"S$
6050  INPUT N: INPUT LL: INPUT Y$: INPUT ID$: INPUT EL$: INPUT DI$: INPUT EQ$:
INPUT AP$: INPUT O$
6060  FOR I1 = 1 TO 2: FOR I = 1 TO N: INPUT D(I,I1): NEXT I: NEXT I1
6070  PRINT : PRINT D$;"CLOSE"S$:I1 = 1: GOSUB 100: RETURN
6500  REM
6510  REM  ***************************************
6520  REM       DELETE FILE FROM DISK ROUTINE
6530  REM  ***************************************
6540  REM
7000  HOME : PRINT "ENTER SAMPLE TO BE DELETED";: INPUT S$: IF S$ = "" THEN
7000
```

```
7010 X =  FRE (0):X = 0: PRINT : PRINT D$;"DELETE"S$;DN$
7020  RETURN
7500  REM
7510  REM  ************************************
7520  REM        LIST SAMPLES ROUTINES
7530  REM  ************************************
7540  REM
8000  HOME
8005 X =  FRE (0):X = 0: PRINT : PRINT D$;"CATALOG";DN$: PRINT : IF P0 = 0 THEN
8020
8010  PRINT : PRINT D$;"PR#0":P0 = 0: RETURN
8020  GOSUB 80
8025  GET Z$: IF Z$ = "N" THEN  RETURN
8030  IF Z$ = "Y" THEN 8050
8040  GOTO 8025
8050  PRINT : PRINT D$;"PR#1":P0 = 1: GOTO 8005
8500  REM
8510  REM  ************************************
8520  REM        MANUAL ENTRY ROUTINE
8530  REM  ************************************
8540  REM
9000  GOSUB 500: PRINT : PRINT "(1) VOLUME ONLY": PRINT : PRINT "(2)
POPULATION ONLY": PRINT : PRINT "(3) BOTH": PRINT : GOSUB 60
9010  GET Z$:Z =  VAL (Z$): IF Z = 1 OR Z = 2 OR Z = 3 THEN 9030
9020  GOTO 9010
9030  POKE 216,0: ON Z GOTO 9040,9050,9060
9040  FOR I = 1 TO 16:D(I,2) = 0: NEXT I:I1 = 1: GOTO 9070
9050  FOR I = 1 TO 16:D(I,1) = 0: NEXT I:I1 = 2: GOTO 9070
9060  FOR I1 = 1 TO 2
9070  HOME : PRINT "ENTER ";Z1$(I1): FOR I = 1 TO 16: PRINT "CH # ";I;: INPUT D(I,I1):
NEXT I
9080  PRINT "ANY CHANGES? (Y/N) ";
```

```
9090  GET Z$: IF Z$ = "Y" THEN  GOTO 9120
9100  IF Z$ = "N" THEN  GOTO 9190
9110  GOTO 9090
9120  PRINT : INPUT "CHANNEL # ";I: IF I > 0 OR I < 17 THEN 9140
9130  GOTO 9120
9140  INPUT "ENTER NEW VALUE ";D(I,I1)
9150  PRINT "MORE CHANGES ? (Y/N) ";
9160  GET Z$: IF Z$ = "Y" THEN  GOTO 9120
9170  IF Z$ = "N" THEN  GOTO 9190
9180  GOTO 9160
9190  PRINT : PRINT "DATA TRANSFER IS COMPLETE"
9200  IF Z = 3 THEN  NEXT I1
9210  ONERR  GOTO 21000
9215  GOSUB 5000: GOSUB 100: RETURN
10000  HOME : PRINT "ENTER ML. OF ELECTROLYTE IN SAMPLE ": INPUT "ANALYSIS
BEAKER ";EL: PRINT : PRINT "ENTER GR. OF SAMPLE IN SAMPLE"
10010  INPUT "ANALYSIS BEAKER ";S: PRINT : INPUT "ENTER MANOMETER SETTING
IN ML.";M:DF = EL / (S * M):DF =  INT (DF + .5): RETURN
10500  REM
10510  REM  ***********************************
10520  REM        STATISTICS ROUTINE
10530  REM  ***********************************
10540  REM
11000 I1 = 1: IF T(1) = 0 THEN 21320
11010  GOTO 11030
11020 I1 = 2: IF T(2) = 0 THEN 21320
11030  HOME :XN = 0:XE = 0:XD = 0:SD = 0:SK = 0:KU = 0
11040  VTAB (12): HTAB (8): FLASH : PRINT "< CALCULATING STATISTICS >":
NORMAL
11050 PS = LL:PK = 0
11060  FOR I = 1 TO N: GOSUB 90:XI =  LOG (SZ) + C1:XN = XN + XI * D(I,I1): IF D(I,I1)
< PK THEN  GOTO 11080
```

```
11070 CK = I:PK = D(I,I1)
11080  NEXT I
11090 XN =  EXP (XN / T(I1)): IF CK - 1 > 1 GOTO 11110
11100 XD = 2^(1 / 6) * LL
11110 C(M) = 50:F = 1:CM = 100:PS = LL: GOSUB 12140:F = 0:XE = DN:PS = LL: FOR I = 1
TO N: GOSUB 90:XI =  LOG (SZ) + C1: IF XD = 0 AND CK = I THEN 11130
11120  GOTO 11140
11130 XD =  EXP ( LOG (SZ) + ((D(CK,I1) - D(CK - 1,I1)) / (2 * D(CK,I1) - D(CK - 1,I1) -
D(CK + 1,I1))) * C2)
11140 SD = SD + D(I,I1) * (XI -  LOG (XN))^
2:SK = SK + D(I,I1) * (XI -  LOG (XN)) ^
3:KU = KU + D(I,I1) * (XI -  LOG (XN))^
4: NEXT I:SD =  EXP ( SQR (SD / T(I1))):SK =  EXP (SK / T(I1)):KU =  EXP (KU / T(I1))
11150  IF XN > XD THEN Z1$ = " POSITIVE"
11160  IF XN < XD THEN Z1$ = " NEGATIVE"
11170  IF KU - 3 < 0 THEN Z2$ = " PLATYKURTIC"
11180  IF KU - 3 > 0 THEN Z2$ = " LEPTOKURTIC"
11190  IF KU - 3 = 0 THEN Z2$ = " MESOKURTIC"
11200 XN =  FN B(XN):XD =  FN B(XD):SD =  FN B(SD):SK =  FN B(SK):XE =  FN
B(XE):KU =  FN B(KU): HOME :X = 0
11210  POKE 36,0 + X: PRINT H$: POKE 36,8 + X: PRINT Z1$(I1);" STATISTICS": POKE
36,0 + X: PRINT H$: PRINT
11220  POKE 36,0 + X: PRINT "MEAN:";: POKE 36,22 + X: PRINT XN;M$
11230  POKE 36,0 + X: PRINT "MEDIAN:";: POKE 36,22 + X: PRINT XE;M$: POKE 36,0 +
X:: PRINT "MODE:";: POKE 36,22 + X: PRINT XD;M$
11240  POKE 36,0 + X: PRINT "STANDARD DEVIATION:";: POKE 36,22 + X: PRINT
SD;M$: POKE 36,0 + X: PRINT "SKEWNESS:";: POKE 36,22 + X: PRINT SK;Z1$: POKE
36,0 + X: PRINT "KURTOSIS:";: POKE 36,22 + X: PRINT KU;Z2$
11250  IF P0 = 0 THEN 11270
11260  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
11270  GOSUB 80
```

```
11275  GET Z$: IF Z$ = "N" THEN  RETURN
11280  IF Z$ = "Y" GOTO 11300
11290  GOTO 11275
11300  PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: GOTO 11210
12140  FOR I = 1 TO N: GOSUB 120: GOSUB 140: GOSUB 90
12150  IF  FN B(CM) > = C(M) THEN 12190
12160 DN = SZ *  EXP ((PC - C(M)) / (PC - CM) * C2): IF F > 0 THEN  RETURN
12170 C(M) =  FN B(C(M)):DN =  FN B(DN): POKE 36,5 + X: PRINT DN;: POKE 36,22 + X:
PRINT C(M): IF M = Z THEN 12200
12180 M = M + 1: GOTO 12150
12190  NEXT I
14000  HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z$
14010  IF Z$ = "V" THEN I1 = 1: GOTO 14040
14020  IF Z$ = "P" THEN I1 = 2: GOTO 14040
14030  GOTO 14000
14040  IF T(I1) = 0 THEN 21320
14050  IF I1 = 1 THEN 14070
14060  GOSUB 10000: GOTO 14080
14070  HOME : INPUT "ENTER DENSITY ";DS: PRINT
14080 X = 0:PS = LL: PRINT : INPUT "ENTER SHAPE FACTOR ";SF: HOME
14090  POKE 36,0 + X: PRINT H$: POKE 36,5 + X: PRINT "SIZE";: POKE 36,20 + X:
PRINT "SURFACE AREA": POKE 36,20 + X: PRINT "BY ";Z1$(I1): POKE 36,0 + X: PRINT
H$: PRINT
14100 PS = LL:L = 5:TS = 0: FOR I = 1 TO N: GOSUB 90:XI =  EXP ( LOG (SZ) + C1): IF I1
= 2 THEN 14120
14110  GOSUB 120:SA = (DM * SF) / (100 *  FN B(XI) * DS): GOTO 14130
14120 SA = 3.1416 * (XI^
2) / (10^
12) * D(I,2) * DF * (SF / 6)
14130 SZ =  FN B(SZ): IF P0 = 1 THEN 14160
14140  IF L < > 21 THEN 14160
14150  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Z$: POKE 34,5: CALL
```

```
- 936:L = 5
14160  POKE 36,5 + X: PRINT SZ;: POKE 36,20 + X: PRINT SA:L = L + 1
14170 TS = TS + SA: NEXT I
14180  POKE 36,5 + X: PRINT "TOTAL          ";: POKE 36,20 + X: PRINT TS;" M.SQ/GM":
IF P0 = 0 THEN 14200
14190  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
14200  IF  PEEK (34) > 0 THEN  POKE 34,0
14205  GOSUB 80
14210  GET Z$: IF Z$ = "N" THEN  RETURN
14220  IF Z$ = "Y" THEN 14240
14230  GOTO 14210
14240  PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: GOTO 14090
14500  REM
14510  REM   ******************************
14520  REM      AVERAGE SAMPLE ROUTINE
14530  REM   ******************************
14540  REM
15000  HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z$
15010  IF Z$ = "V" OR Z$ = "P" THEN 15030
15020  GOTO 15000
15030  HOME :X = 0
15040  PRINT "HOW MANY SAMPLES DO YOU WANT TO AVERAGE ";: GET Z
15050  FOR I = 1 TO 16:C(I) = 0: NEXT I: FOR M = 1 TO Z
15060  HOME : PRINT "ENTER SAMPLE   OF GROUP ";M;: INPUT S$: IF S$ = "" THEN
15060
15070  GOSUB 6020: HOME
15080  IF Z$ = "V" THEN I1 = 1
15090  IF Z$ = "P" THEN I1 = 2
15100  IF T(I1) = 0 THEN 21320
15110  IF M < 2 THEN 15160
15120  IF SL = LL THEN 15160
15130  HOME : VTAB (10): PRINT "RUNS ARE NOT CONSISTENT FOR AVERAGING":
```

```
PRINT : PRINT "LOWER LIMIT OF CHANNEL 1 SHOULD BE EQUAL": PRINT : GOSUB
70
15140  GET Z$: IF Z$ =  CHR$ (13) THEN  RETURN
15150  GOTO 15140
15160  FOR I = 1 TO N: GOSUB 120:C(I) = C(I) + DM: NEXT I:SL = LL: NEXT M
15170  POKE 36,0 + X: PRINT H$: POKE 36,5 + X: PRINT "CHANNEL #";: POKE 36,20 +
X: PRINT "AVERAGE": POKE 36,20 + X: PRINT "BY ";Z1$(I1): POKE 36,0 + X: PRINT H$:
PRINT :L = 5
15180  FOR I = 1 TO N: IF P0 = 1 THEN 15220
15190 C(I) = C(I) / Z:D(I,I1) = C(I): NEXT I: GOSUB 100: FOR I = 1 TO N: GOSUB 120:C(I)
= DM:C(I) =  FN B(C(I))
15200  IF L <  > 21 THEN 15220
15210  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Z$: POKE 34,5: CALL
- 936:L = 5
15220  POKE 36,7 + X: PRINT I;: POKE 36,21 + X: PRINT C(I):L = L + 1: NEXT I
15230  IF P0 = 0 THEN 15250
15240  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
15250  IF  PEEK (34) > 0 THEN  POKE 34,0
15255  GOSUB 80
15260  GET Z$: IF Z$ = "N" THEN  RETURN
15270  IF Z$ = "Y" THEN 15290
15280  GOTO 15260
15290  PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: GOTO 15170
15643  PRINT : PRINT D$;"PR #0":P0 = 0: RETURN
15800  REM
15810  REM  ************************************
15820  REM     COMPARE WITH STANDARD ROUTINE
15830  REM  ************************************
15840  REM
16000  HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z$: IF Z$ = "V" OR Z$ =
"P" THEN 16020
16010  GOTO 16000
```

```
16020  HOME : INPUT "ENTER RUN NAME WHERE STANDARD IS STORED ";S$: IF S$ =
"" THEN 16020
16030  GOSUB 6020
16040  IF Z$ = "V" THEN I1 = 1
16050  IF Z$ = "P" THEN I1 = 2
16060  IF T(I1) = 0 THEN 21320
16070  FOR I = 1 TO N: GOSUB 120:C(I) = DM: NEXT I:X = 0:SL = LL
16080  INPUT "ENTER RUN NAME WHERE COMPARISON GROUP ISSTORED ";S$: IF S$
= "" THEN 16080
16090  GOSUB 6020: HOME
16100  IF Z$ = "V" THEN I1 = 1
16110  IF Z$ = "P" THEN I1 = 2
16120  IF T(I1) = 0 THEN 21320
16130  IF SL = LL THEN 16170
16140  HOME : VTAB (10): PRINT "RUNS ARE NOT CONSISTENT FOR COMPARING":
PRINT "LOWER LIMIT OF CHANNEL 1 SHOULD BE EQUAL": PRINT : GOSUB 70
16150  GET Z$: IF Z$ =  CHR$ (13) THEN  RETURN
16160  GOTO 15140
16170  IF Z$ = "V" THEN I1 = 1
16180  IF Z$ = "P" THEN I1 = 2
16190  POKE 36,0 + X: PRINT H$: POKE 36,5 + X: PRINT "CHANNEL #";: POKE 36,20 +
X: PRINT "PERCENT ERROR": POKE 36,20 + X: PRINT "BY ";Z1$(I1): POKE 36,0 + X:
PRINT H$: PRINT
16200  IF P0 = 0 THEN 16220
16210  FOR I = 1 TO N: GOTO 16280
16220 L = 4: FOR I = 1 TO N: GOSUB 120: IF C(I) = 0 OR DM = 0 THEN 16240
16230 C(I) = ( ABS (DM - C(I)) / C(I)) * 90:C(I) =  FN B(C(I)): GOTO 16250
16240 C(I) = 0
16250  IF P0 = 1 THEN 16280
16260  IF L < > 21 THEN 16280
16270  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Z$: POKE 34,4: CALL
- 936:L = 4
```

```
16280 POKE 36,7 + X: PRINT I;: POKE 36,22 + X: PRINT C(I):L = L + 1: NEXT I
16290 IF P0 = 0 THEN 16310
16300 PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
16310 IF  PEEK (34) > 0 THEN  POKE 34,0
16315 GOSUB 80
16320 GET Z$: IF Z$ = "N" THEN  RETURN
16330 IF Z$ = "Y" THEN 16350
16340 GOTO 16320
16350 PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: GOTO 16190
16800 REM
16810 REM  ***************************
16820 REM       OVERLAP ROUTINE
16830 REM  ***************************
16840 REM
17000 F = 5:P = 10
17010 HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z1$
17020 IF Z1$ = "V" OR Z1$ = "P" THEN 17040
17030 GOTO 17000
17040 HOME : INPUT "ENTER SAMPLE  OF SMALLEST GROUP ";S$
17050 GOSUB 6020
17060 IF Z1$ = "V" THEN I1 = 1
17070 IF Z1$ = "P" THEN I1 = 2
17080 IF T(I1) = 0 THEN 21320
17090 SL = LL:OC = 0: FOR I = 1 TO N:C(I) = D(I,I1): NEXT I
17100 N = 16: INPUT "ENTER SAMPLE OF NEXT LARGER GROUP ";S$
17110 IF S$ = "0" THEN 17510
17120 GOSUB 6020
17130 IF Z1$ = "V" THEN I1 = 1
17140 IF Z1$ = "P" THEN I1 = 2
17150 IF T(I1) = 0 THEN 21320
17160 PS = SL: IF OC > 0 THEN N = OC
17170 FOR I = 1 TO N: GOSUB 90: IF  FN B(SZ) =  FN B(LL) THEN 17200
```

```
17180  NEXT I
17190  PRINT "OVERLAP ERROR": GOTO 21400
17200 I4 = I
17210 OF = 0:AF = 0:J = 1:X = 0: FOR I = I4 TO I4 + 10: IF D(J,I1) = 0 THEN 17280
17215  IF C(I) = 0 THEN F = X: GOTO 17270
17220 PF = OF:OF = D(J,I1) / C(I): IF PF = 0 THEN 17280
17230  IF OF <  = PF + P / 100 * PF THEN 17260
17240  IF OF >  = PF - P / 100 * PF THEN 17260
17250  PRINT "OVERLAP WARNING":AF = 0:X = 0: GOTO 17280
17260 AF = AF + OF:X = X + 1
17270  IF X = F THEN 17285
17280 J = J + 1: NEXT I
17285 AF = AF / X:YP = 0:XP = 0:Z = I: GOTO 17400
17290  IF F = 1 THEN 17310
17300 F = 1: GOTO 17210
17310  HOME : PRINT : PRINT : PRINT "THERE ARE NO TWO CONSECUTIVE
CHANNELS": PRINT "THAT HAVE OVERLAP FACTORS AT ";P;" PERCENT": PRINT "OF
EACH OTHER. YOU MAY:": PRINT : PRINT "(1)CHANGE THE PERCENTAGE"
17320  PRINT : PRINT "(2) ENTER THE OVERLAP CHANNEL": PRINT : PRINT "(3) EXIT
THE ROUTINE": PRINT : GOSUB 60
17330  GET Z$:Z =  VAL (Z$): IF Z = 1 OR Z = 2 OR Z = 3 THEN 17350
17340  GOTO 17330
17350  ON Z GOTO 17360,17370,17390
17360  HOME : PRINT "ENTER NEW PERCENTAGE ": INPUT P: GOTO 17210
17370  HOME : PRINT "ENTER CHANNEL IN LARGEST TUBE TO ": PRINT "OVERLAP
WITH NEXT SMALLEST TUBE ";: INPUT X
17380 Y = I4 + X - 1: GOTO 17470
17390  RETURN
17400  FOR I = 1 TO 16
17402  IF AF < 1 THEN C(I) = C(I) / AF
17404  IF AF > 1 THEN C(I) = C(I) * AF
17406  NEXT I
```

```
17410 J = 1: FOR I = I4 TO Z
17420  IF C(I) = 0 AND D(J,I1) = 0 THEN 17460
17430 XP =  ABS (C(I) - D(J,I1)): IF YP = 0 THEN 17450
17440  IF XP >  = YP THEN 17460
17450 X = J:Y = I:YP = XP
17460 J = J + 1: NEXT I
17470 N = Y + 16 - X
17480 X = X + 1:Y = Y + 1: FOR J = X TO 16
17490 C(Y) = D(J,I1):Y = Y + 1: NEXT J:OC = N
17500  GOTO 17100
17510 N = OC: FOR I = 1 TO N:D(I,I1) = C(I)
17515  IF I1 = 1 THEN D(I,I1) =  INT (D(I,I1) * 100 + .5) / 100
17520  IF I1 = 2 THEN D(I,I1) =  INT (D(I,I1))
17530  NEXT I: GOSUB 100:LL = SL: HOME
17540  PRINT
17542  REM       LINES 17550 TO 17630 ARE FOR
17543  REM      LATER USE IF OVERLAP FILE IS TO BE SAVED
17545  RETURN
17550  PRINT "SAMPLE #";ID$
17560  PRINT "APERTURES ";AP$
17565  PRINT "INFORMATION "
17570  PRINT "         ";DI$
17580  PRINT "         ";EQ$
17590  PRINT "         ";EL$
17600  PRINT "         ";O$
17620  PRINT : PRINT "IS INFORMATION FOR OVERLAPED DATA": PRINT : PRINT
"CORRECT (Y/N) ";
17625  GET Z$: IF Z$ = "Y" THEN  RETURN
17630  IF Z$ = "N" THEN  GOSUB 550: RETURN
17800  REM
17810  REM  **********************
17820  REM    COUNTS/GRAM ROUTINE
```

```
17830 REM  **********************
17840 REM
18030 I1 = 2: IF T(2) = 0 THEN 21320
18040  GOSUB 10000:X = 0: HOME
18060  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "SIZE";: POKE 36,10 + X::
PRINT "DIFFERENTIAL";: POKE 36,25 + X: PRINT "CUMULATIVE": POKE 36,0 + X:
PRINT H$: PRINT
18070 CM = T(2):PS = LL:L = 4: FOR I = 1 TO N: GOSUB 90:SZ =  FN B(SZ): IF P0 = 1
THEN 18100
18075  GOSUB 150:D(I,2) = D(I,2) * DF:C(I) = PC * DF
18080  IF L < > 21 THEN 18100
18090  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Z$: POKE 34,4: CALL
- 936:L = 4
18100  POKE 36,0 + X: PRINT SZ;: POKE 36,10 + X: PRINT D(I,2);: POKE 36,25 + X:
PRINT C(I):L = L + 1: NEXT I: IF P0 = 0 THEN 18120
18110  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
18120  IF  PEEK (34) > 0 THEN  POKE 34,0
18125  GOSUB 80
18130  GET Z$: IF Z$ = "N" THEN  RETURN
18132  IF Z$ = "Y" THEN 18136
18134  GOTO 18130
18136  PRINT : PRINT D$;"PR#1":P0 = 1:X = 2: GOTO 18060
18800  REM
18810  REM  **********************
18820  REM     GRAPHICS ROUTINE
18830  REM  **********************
18840  REM
19000  IF Z = 1 OR Z = 3 OR Z = 5 THEN I1 = 1
19010  IF Z = 2 OR Z = 4 OR Z = 6 THEN I1 = 2
19020  IF T(I1) = 0 THEN 21320
19030  HOME : CALL 6142: HGR : HCOLOR= 3: FOR X = 10 TO 279: HPLOT X,149: NEXT
X: FOR Y = 10 TO 149: HPLOT 10,Y: NEXT Y:X1 =  INT (269 / N)
```

```
19040  FOR X = 10 TO 279 STEP X1: FOR Y = 149 TO 8 STEP  - 7: HPLOT X,Y: NEXT Y:
HPLOT X,146 TO X,152: NEXT X
19050  FOR Y = 149 TO 8 STEP  - 14: HPLOT 7,Y TO 13,Y: FOR X = 10 + X1 / 2 TO 279
STEP X1: HPLOT X,Y: NEXT X: NEXT Y: IF I1 = 2 THEN 19080
19060  VTAB (7): PRINT "V": VTAB (8): PRINT "O": VTAB (9): PRINT "L": VTAB (10):
PRINT "U": VTAB (11): PRINT "M": VTAB (12): PRINT "E": VTAB (14): PRINT "%": GOTO
19095
19080  VTAB (5): PRINT "P": VTAB (6): PRINT "O": VTAB (7): PRINT "P": VTAB (8): PRINT
"U": VTAB (9): PRINT "L": VTAB (10): PRINT "A": VTAB (11): PRINT "T": VTAB (12):
PRINT "I": VTAB (13)
19090  PRINT "O": VTAB (14): PRINT "N": VTAB (16): PRINT "%"
19095 PS = LL:X = 10:X2 = 4: VTAB (20): HTAB (2): PRINT  FN C(LL);: FOR I = 1 TO N -
2:X = X + X1: GOSUB 90: IF I <  > X2 THEN 19110
19100 J = X / 7: HTAB (J): PRINT  FN C(SZ);:X2 = X2 + 4
19110  NEXT I
19120  VTAB (21): HTAB (15): PRINT "SIZE IN UM"
19130  IF Z = 3 OR Z = 4 THEN 19210
19140 XP = 10:YP = 149:X = 10: FOR I = 1 TO N: GOSUB 120:X = X + X1:Y = 149 - (DM *
139 / 100)
19150  IF Y < 10 THEN Y = 10
19160  IF Y > 149 THEN Y = 149
19170  IF X < 10 THEN X = 10
19180  IF X > 279 THEN X = 279
19190  HPLOT XP,YP TO XP,Y: HPLOT XP,Y TO X,Y:XP = X:YP = Y: NEXT I: HPLOT  TO
X,149: IF Z = 5 OR Z = 6 THEN 19210
19200  GOTO 19270
19210 YP = 10:CM = 100:XP = 10:X = 10: FOR I = 1 TO N:X = X + X1: GOSUB 120: GOSUB
140:Y = 149 - (CM * 139 / 100)
19220  IF Y < 10 THEN Y = 10
19230  IF Y > 149 THEN Y = 149
19240  IF X < 10 THEN X = 10
19250  IF X > 279 THEN X = 279
```

```
19260  HPLOT XP,YP TO X,Y:XP = X:YP = Y: NEXT I
19270  PRINT : PRINT D$;"PR#1"
19280  PRINT : PRINT D$;"PR#0": PRINT D$;"IN#0": GOSUB 80
19290  GET Z$: IF Z$ = "N" THEN 19340
19300  IF Z$ = "Y" THEN 19320
19310  GOTO 19290
19320  PRINT : PRINT D$;"PR#1"
19330  PRINT  CHR$ (9);"G"
19340  CALL 62454: TEXT : HOME
19350  PRINT : PRINT D$;"PR#1"
19360  PRINT : PRINT D$;"PR#0": RETURN
19800  REM
19810  REM  **********************
19820  REM     LISTING ROUTINES
19830  REM  **********************
19840  REM
20000  IF Z = 1 THEN I1 = 1
20010  IF Z = 2 OR Z = 3 THEN I1 = 2
20020  IF T(I1) = 0 THEN 21320
20030  HOME :X = 0
20040  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CHANNEL #";: POKE 36,15 +
X: PRINT "SIZE";: POKE 36,30 + X: PRINT "DIFF"
20050  IF Z = 2 GOTO 20130
20060  IF Z = 3 GOTO 20080
20070  POKE 36,30 + X: PRINT "VOLUME %": GOTO 20090
20080  POKE 36,30 + X: PRINT "POP %":I1 = 2
20090  POKE 36,0 + X: PRINT H$:PS = LL: PRINT :L = 5: FOR I = 1 TO N: GOSUB 90:
GOSUB 120:SZ =  FN B(SZ):DM =  FN C(DM): IF P0 = 1 THEN 20120
20100  IF L < > 21 THEN 20120
20110  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Y$: POKE 34,5: CALL
- 936:L = 5
20120  POKE 36,3 + X: PRINT I;: POKE 36,15 + X: PRINT SZ;: POKE 36,30 + X: PRINT
```

```
DM:L = L + 1: NEXT I: GOTO 20470
20130  POKE 36,30 + X: PRINT "POP": POKE 36,0 + X: PRINT H$:PS = LL: PRINT :L = 5:
FOR I = 1 TO N: GOSUB 90:SZ =  FN B(SZ): IF P0 = 1 THEN 20160
20140  IF L < > 21 THEN 20160
20150  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Y$: POKE 34,5: CALL
- 936:L = 5
20160  POKE 36,3 + X: PRINT I;: POKE 36,15 + X: PRINT SZ;: POKE 36,30 + X: PRINT
D(I,2):L = L + 1: NEXT I
20170  GOTO 20470
20180  REM
20190  HOME :X = 0
20200  IF Z = 4 THEN I1 = 1
20210  IF Z = 5 OR Z = 6 THEN I1 = 2
20220  IF T(I1) = 0 THEN 21320
20230  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH.#";: POKE 36,7 + X: PRINT
"SIZE";: POKE 36,20 + X: PRINT "DIFF";: POKE 36,30 + X: PRINT "CUM"
20240  IF Z = 5 THEN CM = T(2): GOTO 20380
20250 CM = 100: IF Z = 6 THEN  GOTO 20280
20260  POKE 36,20 + X: PRINT "VOL %";: POKE 36,30 + X: PRINT "VOL %"
20270  GOTO 20290
20280  POKE 36,20 + X: PRINT "POP %";: POKE 36,30 + X: PRINT "POP %"
20290  POKE 36,0 + X: PRINT H$:PS = LL: PRINT
20300 L = 5: FOR I = 1 TO N
20310  GOSUB 90: GOSUB 120: GOSUB 140
20320 SZ =  FN B(SZ):CM =  FN C(CM):DM =  FN C(DM)
20330  IF P0 = 1 THEN 20360
20340  IF L < > 21 THEN 20360
20350  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Y$: POKE 34,5: CALL
- 936:L = 5
20360  POKE 36,0 + X: PRINT I;: POKE 36,7 + X: PRINT SZ;: POKE 36,20 + X: PRINT DM;:
POKE 36,30 + X: PRINT PC:L = L + 1: NEXT I
20370  GOTO 20470
```

```
20380  POKE 36,20 + X: PRINT "POP";: POKE 36,30 + X: PRINT "POP"
20390  POKE 36,0 + X: PRINT H$:PS = LL: PRINT
20400 L = 5: FOR I = 1 TO N
20410  GOSUB 90: GOSUB 150
20420 SZ =  FN B(SZ):CM =  FN C(CM)
20430  IF P0 = 1 THEN 20460
20440  IF L < > 21 THEN 20460
20450  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Y$: POKE 34,5: CALL
- 936:L = 5
20460  POKE 36,0 + X: PRINT I;: POKE 36,5 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,2);: POKE 36,30 + X: PRINT PC:L = L + 1: NEXT I
20470  IF P0 = 0 THEN 20490
20480  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
20490  IF  PEEK (34) > 0 THEN  POKE 34,0
20495  GOSUB 80
20497  GET Z$: IF Z$ = "N" THEN  RETURN
20500  IF Z$ = "Y" THEN 20520
20510  GOTO 20497
20520  PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: IF F = 1 THEN  GOTO 20600
20530  PRINT
20535  POKE 36,20: PRINT "SAMPLE: ";: PRINT ID$
20540  POKE 36,20: PRINT "APERTURES :";: PRINT AP$
20545  POKE 36,20: PRINT "INFORMATION "
20550  POKE 36,20: PRINT "          ";DI$
20570  POKE 36,20: PRINT "          ";: PRINT EQ$
20575  POKE 36,20: PRINT "          ";: PRINT EL$
20580  POKE 36,20: PRINT "          ";: PRINT O$
20590 F = 1
20600  ON Z GOTO 20040,20040,20040,20230,20230,20230
20610  HOME :X = 0
20620  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH. #";: POKE 36,9 + X:
PRINT "SIZE";: POKE 36,18 + X: PRINT Z1$(1);: POKE 36,28 + X: PRINT Z1$(2)
```

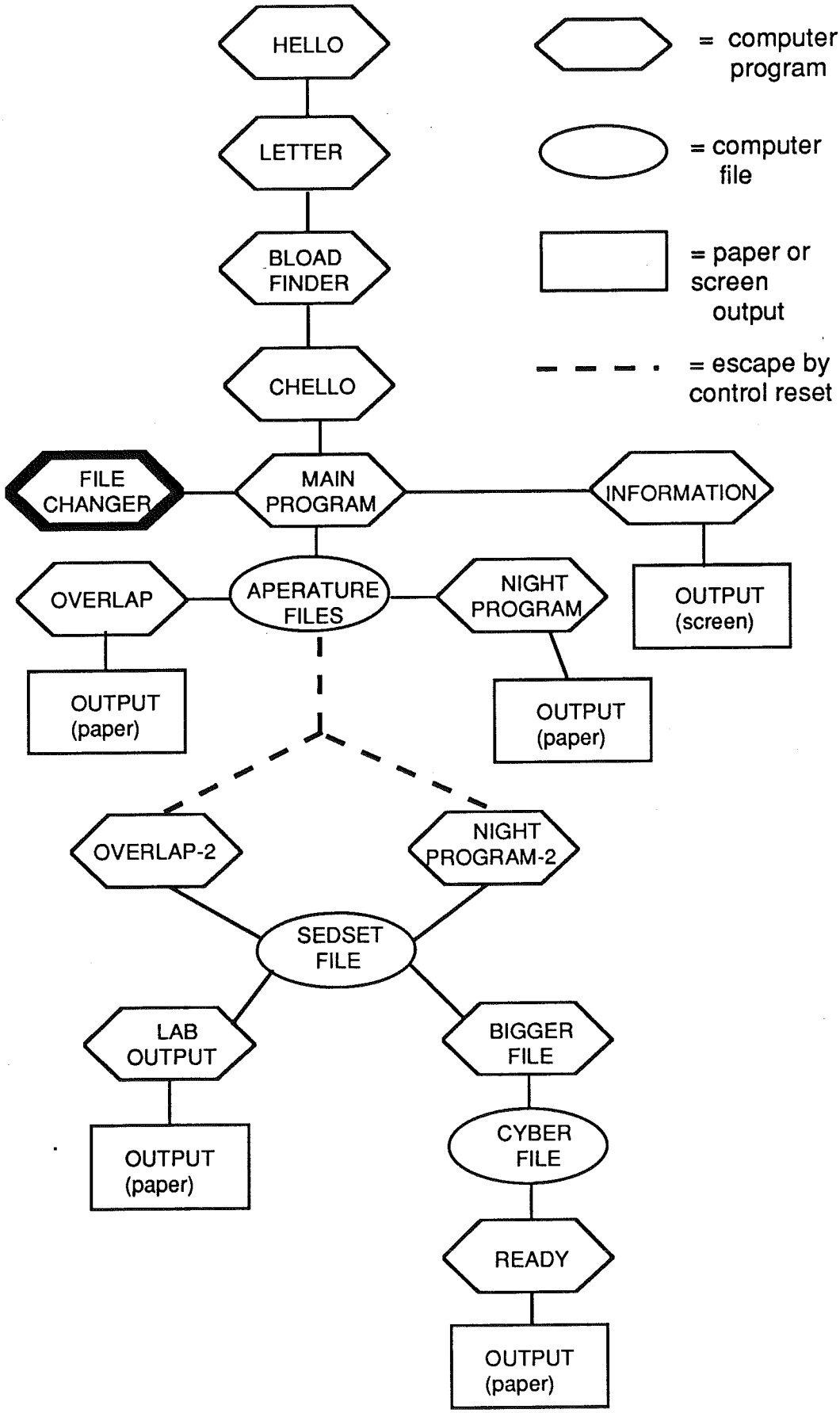
```
20630  POKE 36,0 + X: PRINT H$: PRINT :PS = LL:L = 4: FOR I = 1 TO N: GOSUB 90:SZ =
FN B(SZ): IF P0 = 1 THEN 20660
20640  IF L < > 21 THEN 20660
20650  PRINT : PRINT  TAB( 9)"HIT SPACE BAR FOR MORE": GET Y$: POKE 34,4: CALL
- 936:L = 4
20660  POKE 36,0 + X: PRINT I;: POKE 36,9 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,1);: POKE 36,30 + X: PRINT D(I,2): NEXT I: IF P0 = 0 THEN 20680
20670  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
20680  IF  PEEK (34) > 0 THEN  POKE 34,0
20683  GOSUB 80
20685  GET Z$: IF Z$ = "N" THEN  RETURN
20690  IF Z$ = "Y" THEN 20710
20700  GOTO 20685
20710  PRINT : PRINT D$;"PR#1":P0 = 1:X = 0: GOTO 20620
21010  PRINT
21320  HOME : VTAB (10): PRINT  TAB( 6)Z1$(I1);" DATA IS ALL ZEROS ": PRINT :
GOSUB 70
21400  GOSUB 70
21405  GET Z$: IF Z$ =  CHR$ (13) THEN 21430
21420  GOTO 21405
21430  GOTO 22000
21800  REM
21810  REM  ********************
21820  REM     MENU ROUTINES
21830  REM  ********************
21840  REM
22000  PRINT
22005  HOME : PRINT H$: PRINT : PRINT  TAB( 15)"MAIN MENU": PRINT : PRINT H$:
PRINT
22010  PRINT "(1) CALIBRATION": PRINT : PRINT "(2) DATA ACQUISITION": PRINT :
PRINT "(3) DISK FUNCTIONS"
22020  PRINT : PRINT "(4) STATISTICS": PRINT : PRINT "(5) SPECIALTY ROUTINES":
```

```
PRINT
22030  PRINT "(6) LISTINGS": PRINT : PRINT "(7) GRAPHICS": PRINT : PRINT "(8)
TERMINATE PROGRAM": GOSUB 60
22040  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 22040
22050  ON Z GOSUB 1000,23000,24000,25000,26000,27000,28000,30000
22060  GOTO 22000
23000  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"DATA ACQUISITION": PRINT :
PRINT H$: PRINT
23010  PRINT "(1) READ FROM DISK": PRINT : PRINT "(2) MANUAL ENTRY": PRINT :
PRINT "(3) INPUT FROM TA II": PRINT : PRINT "(4) EXIT ": PRINT : GOSUB 60
23020  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 23020
23030  IF Z > 4 THEN 23020
23040  IF Z = 4 THEN  RETURN
23050  ON Z GOSUB 6000,9000,2000
23060  GOTO 23000
24000  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"DISK FUNCTIONS": PRINT : PRINT
H$: PRINT : FLASH : HTAB (12): PRINT "DRIVE #"; MID$ (DN$,3);" IN USE": NORMAL :
PRINT : PRINT "(1) WRITE TO DISK (SAVE DATA)"
24010  PRINT : PRINT "(2) DELETE RUN": PRINT : PRINT "(3) LIST RUNS IN DISK":
PRINT : PRINT "(4) FORMAT A NEW DISKETTE": PRINT : PRINT "(5) SELECT DRIVE ":
PRINT : PRINT "(6) EXIT": GOSUB 60
24020  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 24020
24030  IF Z > 6 THEN 24020
24040  IF Z = 6 THEN  RETURN
24050  ON Z GOSUB 4900,7000,8000,3000,4000
24060  GOTO 24000
25000  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"STATISTICS MENU": PRINT : PRINT
H$: PRINT
25010  PRINT "(1) VOLUME STATISTICS": PRINT : PRINT "(2) POPULATION
STATISTICS": PRINT
25020  PRINT "(3) EXIT": GOSUB 60
25030  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 25030
```

```
25040  IF Z > 3 THEN 25030
25050  IF Z = 3 THEN  RETURN
25060  ON Z GOSUB 11000,11020
25070  GOTO 25000
26000  HOME : PRINT H$: PRINT : PRINT  TAB( 11)"SPECIALTY ROUTINES": PRINT :
PRINT H$: PRINT
26010  PRINT "(1) SURFACE AREA": PRINT : PRINT "(2) COMPARISON TO A
STANDARD": PRINT : PRINT "(3) AVERAGE DATAGROUPS": PRINT
26015  PRINT "(4) COUNTS PER GRAM<SINGLE TUBE ANALYSIS ONLY>": PRINT :
PRINT "(5) OVERLAP": PRINT : PRINT "(6) EXIT": GOSUB 60
26020  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 26020
26030  IF Z > 6 THEN 26020
26040  IF Z = 6 THEN  RETURN
26050  ON Z GOSUB  14000,16000,15000,18030,17000
26060  GOTO 26000
27000  REM
27010  HOME : PRINT H$: PRINT : PRINT  TAB( 14)"LISTING MENU": PRINT : PRINT
H$: PRINT
27020  PRINT "(1) DIFFERENTIAL VOLUME%": PRINT : PRINT "(2) DIFFERENTIAL
POPULATION": PRINT : PRINT "(3) DIFFERENTIAL POPULATION%": PRINT : PRINT
"(4) CUMULATIVE VOLUME%"
27030  PRINT : PRINT "(5) CUMULATIVE POPULATION": PRINT : PRINT "(6)
CUMULATIVE POPULATION%": PRINT : PRINT "(7) ORIGINAL DATA": PRINT : PRINT
"(8) EXIT": GOSUB 60
27040  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 27040
27050  IF Z = 8 THEN 27070
27060  IF Z < 9 THEN 27080
27070 F = 0: RETURN
27080  ON Z GOSUB  20000,20000,20000,20180,20180,20180,20610
27090  GOTO 27010
28000  HOME : PRINT H$: PRINT : PRINT  TAB( 13)"GRAPHICS MENU": PRINT : PRINT
H$
```

```
28020  PRINT : PRINT "(1) DIFFERENTIAL VOLUME HISTOGRAM"
28030  PRINT : PRINT "(2) DIFFERENTIAL POPULATION HISTOGRAM"
28040  PRINT : PRINT "(3) CUMULATIVE VOLUME CURVE"
28050  PRINT : PRINT "(4) CUMULATIVE POPULATION CURVE"
28060  PRINT : PRINT "(5) OVERLAY VOLUME GRAPHICS"
28070  PRINT : PRINT "(6) OVERLAY POPULATION GRAPHICS"
28080  PRINT : PRINT "(7) EXIT": GOSUB 60
28090  GET Z$:Z =  VAL (Z$): IF Z = 0 THEN 28090
28100  IF Z > 7 THEN 28090
28110  IF Z = 7 THEN  RETURN
28120  GOSUB 19000
28130  GOTO 28000
30000  HOME : VTAB 15: HTAB 10: PRINT "PLEASE WAIT"
30100  PRINT D$;"RUN CHELLO,D1"
```

COULTER COUNTER

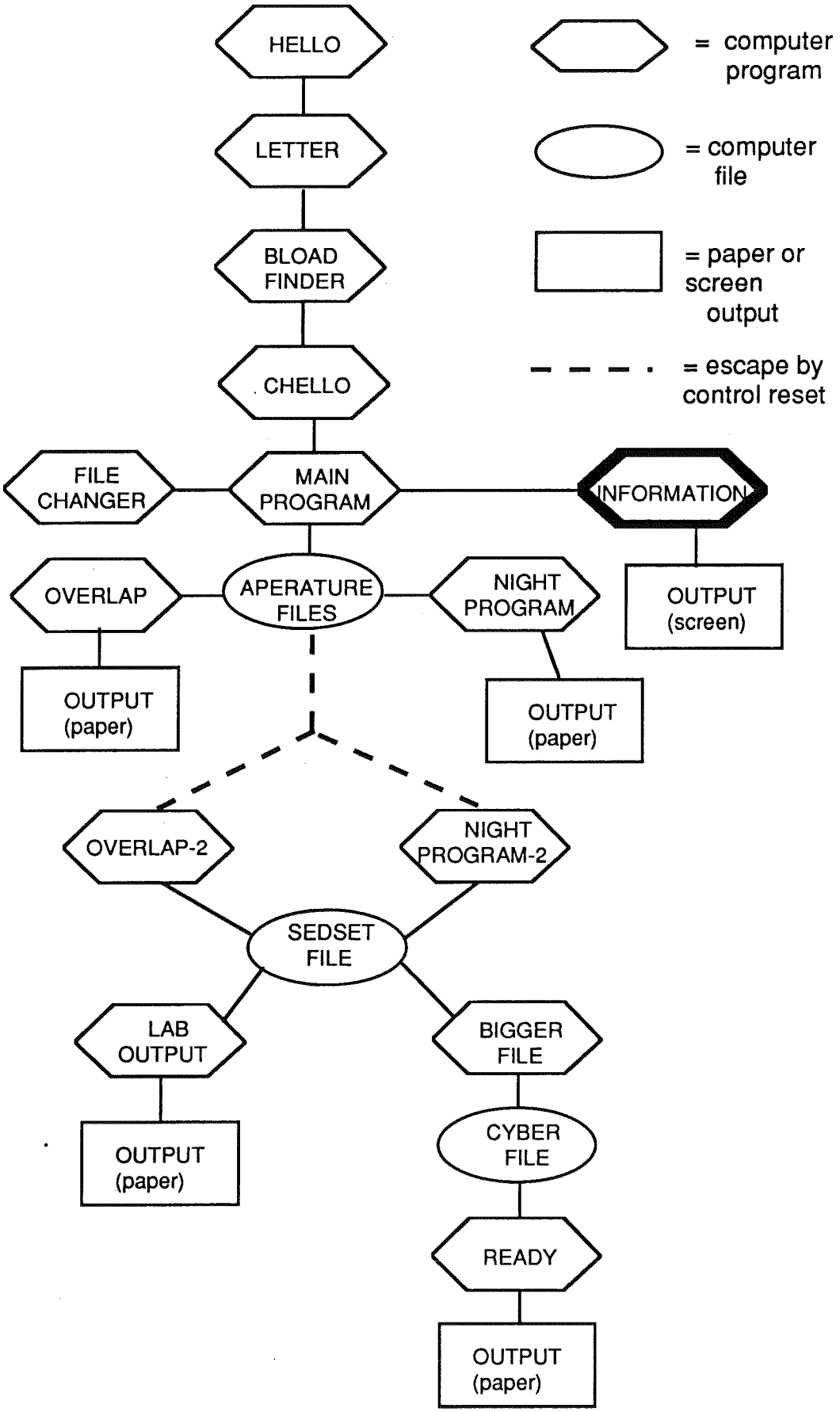


This program allows for the operator to make changes in the header information after a distribution has been saved. This is especially useful if there is only a small sample and the operator finds out that a typo. error has been made. Then a sample header can be changed without the need to rerun another sample.

```
0 REM
4  HOME
5  DIM V(50),P(50)
10 D$ =  CHR$ (4)
25  PRINT "INPUT YOUR FILE NAMES PLEASE";: INPUT NAME$
30  PRINT D$;"OPEN "NAME$;",D2"
40  PRINT D$;"READ "NAME$
50  INPUT N
60  INPUT S$
70  FOR X = 1 TO 7
80  INPUT INFRO$(X)
90  NEXT X
110  FOR X = 1 TO N
120  INPUT V(X)
130  NEXT X
140  FOR X = 1 TO N
150  INPUT P(X)
160  NEXT X
200  PRINT D$;"CLOSE "NAME$
300  HOME
310  PRINT "INFORMATION "
320  FOR X = 1 TO 7
330  PRINT X" : "INFRO$(X)
340  NEXT X
350  PRINT
355  PRINT X" :   REPLACE FILE": PRINT
```

```
360 PRINT "INPUT NUMBER TO BE CHANGED";: INPUT X
365 IF X = 8 THEN 500
366 IF X > 8 THEN 300
368 IF X = 6 THEN 300
370 HOME : VTAB 15: HTAB 10
380 PRINT INFRO$(X)
390 PRINT
400 INPUT "INPUT NEW INFORMATION ";INFRO$
410 PRINT INFRO$
420 INPUT "IS THIS CORRECT Y/N ";Y$
430 IF Y$ < > "Y" THEN 300
440 LET INFRO$(X) = INFRO$
450 GOTO 300
500 PRINT D$;"OPEN "NAME$
510 PRINT D$;"WRITE "NAME$
520 PRINT N
530 PRINT S$
540 FOR X = 1 TO 7
550 PRINT INFRO$(X)
560 NEXT X
570 FOR X = 1 TO N
580 PRINT V(X)
590 NEXT X
600 FOR X = 1 TO N
610 PRINT P(X)
620 NEXT X
630 PRINT D$;"CLOSE "NAME$
```

COULTER COUNTER

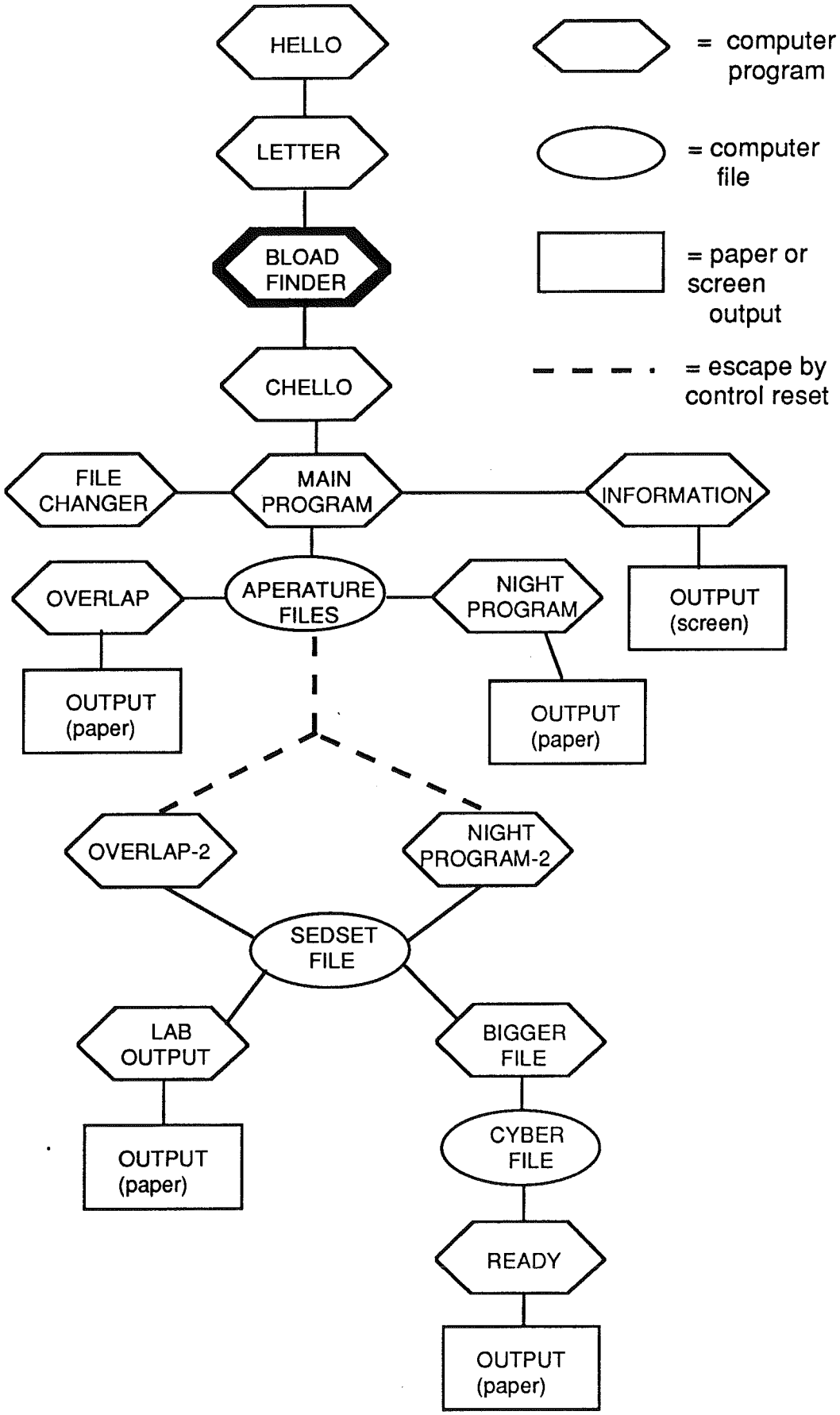


This program gives information dealing with the Coulter Counter program (revisions and modifications). This program also list the aperture openings of each tube and assigns a letter for each tube.

```
0 REM
1  HOME
5  PRINT "========================================="
6  PRINT
10  PRINT " 'COULTER ACCUCOMP / TA II L' PROGRAM"
12  PRINT
15  PRINT "          COPYRIGHT BY"
20  PRINT "   COULTER ELECTRONICS, INC., 1981.
25  PRINT
30  PRINT "========================================="
40  PRINT : PRINT
50  PRINT "  INITIAL ISSUE     JULY 1981"
55  PRINT
60  PRINT "  REVISION B        FEB. 1982"
65  PRINT
70  PRINT "  REVISION B1       AUG. 1983"
80  VTAB 22: PRINT "PRESS ANY KEY TO CONT. ";: GET A$: PRINT : HOME
90  PRINT "   THE DATA ACCUMULATED BY THE 'TA II'
95  PRINT
100  PRINT "CONSISTS OF DIFFERENTIAL VOLUME % AND"
105  PRINT
110  PRINT "DIFFERENTIAL POPULATION COUNTS.  VOLUME"
115  PRINT
120  PRINT "PERCENTAGES, AS RECEIVED FROM THE TA II"
125  PRINT
130  PRINT "MAY NOT BE ACCURATELY NORMALIZED.  "
135  PRINT
```

```
140 PRINT "HOWEVER, THIS POSSIBLE INACCURACY IN "
145 PRINT
150 PRINT "NORMALIZATION DOES NOT AFFECT THE "
155 PRINT
160 PRINT "ACCURACY OF COMPUTATION BY THE COMPUTER"
165 PRINT
170 PRINT : PRINT "TAKEN FROM:"
180 PRINT "       PARA. 3.6 OF USER'S MANUAL"
200 VTAB 22: PRINT "PRESS ANY KEY TO CONT. ";: GET A$: PRINT : HOME
210 PRINT "    LETTER FILE TABLE"
220  PRINT "============================="
230 PRINT "LETTER        APERTURES"
240 PRINT "-----------------------------"
250 PRINT " <A>           30"
260 PRINT " <B>           50"
270 PRINT " <C>           70"
280 PRINT " <D>          140"
290 PRINT " <E>          200"
300 PRINT " <F>          280"
310 PRINT " <G>          560"
500 VTAB 22: PRINT "PRESS ANY KEY TO CONT. ";: GET A$
505 PRINT
510 PRINT "*RUN CHELLO"
```

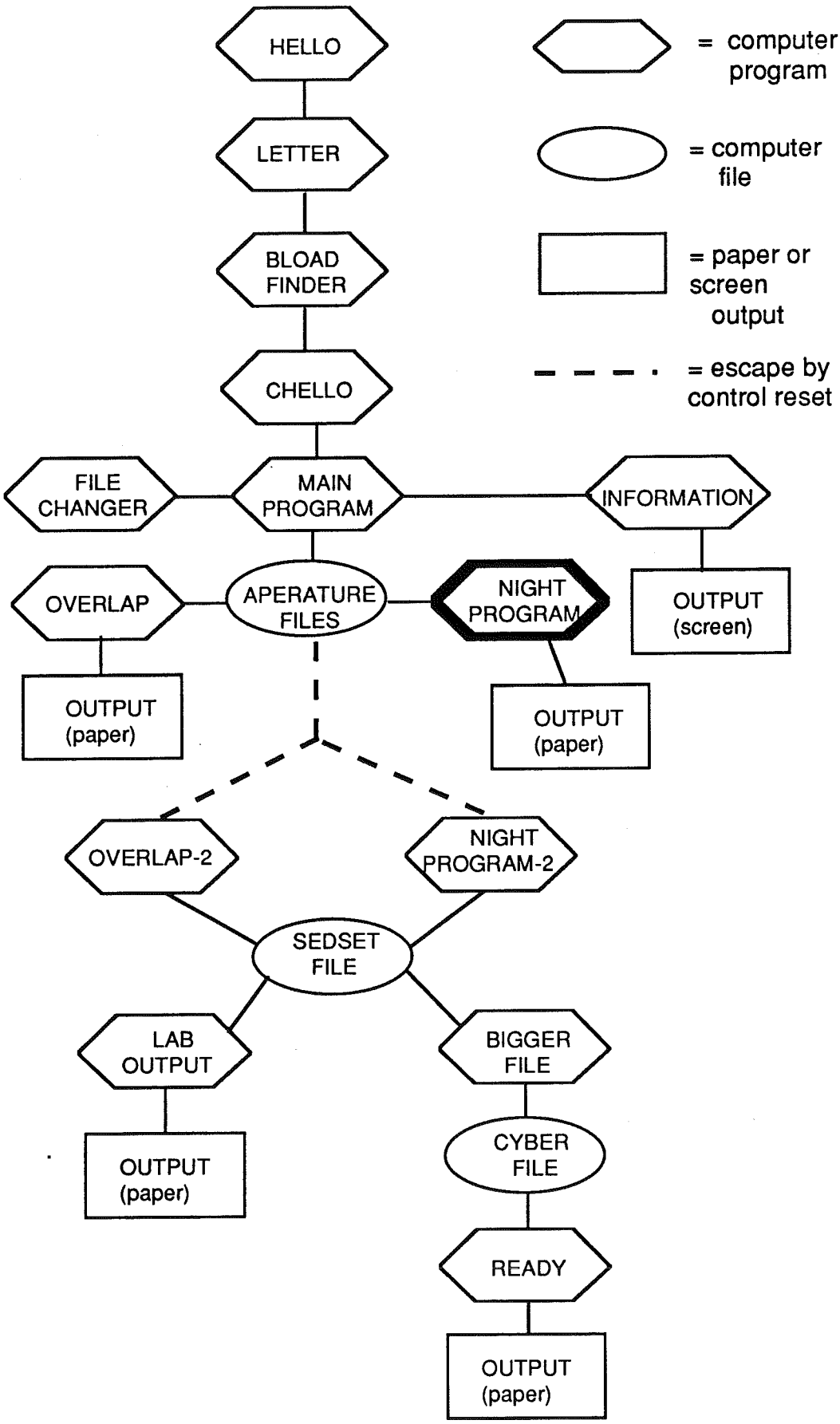
COULTER COUNTER



A small program which checks and clears memory locations to store data on the diskette.The program is loaded and run during the execution of the MAIN Program. If there is not enough memory space to store the sample, a message is given in the MAIN Program.

```
0 REM
5  REM  BLOAD FINDER
7 H = 38400: REM  DOS-BOOT HIMEM
8 T = 49152: REM  HIGHEST ADDRESS
10 D$ =  CHR$ (4): REM  CTRL-D
20  PRINT D$;"BSAVE FOO,A$7777,L$77
30  PRINT D$;"BLOAD FOO"
40  PRINT D$;"DELETE FOO"
50  FOR I = H + 1792 TO T
60  IF  PEEK (I) < > 119 OR  PEEK (I + 1) < > 119 THEN  NEXT I
70  PRINT "LOCATIONS OF START ADDRESS: ";I;",";I + 1
80  FOR I = H + 1792 TO T
90  IF  PEEK (I) < > 119 OR  PEEK (I + 1) < > 0 THEN  NEXT I
100  PRINT "LOCATIONS OF LENGTH:";I;",";I + 1
```

COULTER COUNTER



This program allows single tube samples which were run during the day to be printed out. It provides an output which lists a frequency table of millimetres-vs-percent total volume, moment statistics and a selection of different graph types.

```
0 REM
10 REM      THIS PROGRAM WILL CALCULATE STATISTICS ,LIST DATA AND PLOT
20 REM     GRAPHS WITHOUT THE USER BEING PRESENT AFTER THE INITAL
START.
30 REM
40 REM
90 QQ$ =  CHR$ (12)
92 REM
93 REM   *********************************
94 REM      GRAPHICS REQUEST ROUTINE
95 REM   *********************************
96 REM
100 HOME
110 PRINT "INPUT FILE LETTER ";: INPUT S$
120 PRINT "INPUT STARTING FILE # AND FINISH FILE #"
125 PRINT "        EX.   2,4 ";: INPUT START,FINISH
150 PRINT
151 PRINT "DO YOU WISH TO CREATE A CYBER FILE";: INPUT YU$: PRINT : PRINT :
PRINT :
152 IF YU$ = "Y" THEN 155
153 GOTO 159
155 PRINT "REMOVE PROGRAM DISK FROM DRIVE 1"
156 PRINT "   REPLACE WITH MERGE DISK"
157 PRINT
158 PRINT
159 PRINT
160 PRINT "DO YOU WANT GRAPHS PLOTTED ";: INPUT YY$
170 IF YY$ < > "Y" THEN 500
```

```
180 HOME
190 VTAB 4: PRINT "FOR EACH PLOTTED GRAPH TYPE 'Y/N' "
210 PRINT
215 BB = 7
220 VTAB 8: HTAB BB: PRINT "DIFFERENTIAL VOLUME HISTOGRAM"
230 VTAB 10: HTAB BB: PRINT "DIFFERENTIAL POPULATION HISTOGRAM"
240 VTAB 12: HTAB BB: PRINT "CUMULATIVE VOLUME CURVE"
250 VTAB 14: HTAB BB: PRINT "CUMULATIVE POPULATION CURVE"
260 VTAB 16: HTAB BB: PRINT "OVERLAY VOLUME GRAPHICS "
270 VTAB 18: HTAB BB: PRINT "OVERLAY POPULATION GRAPHICS"
280 VTAB 8: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(1) = 0
285 IF Y$ = "Y" THEN G(1) = 1
288 PRINT Y$
290 VTAB 10: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(2) = 0
295 IF Y$ = "Y" THEN G(2) = 2
297 PRINT Y$
300 VTAB 12: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(3) = 0
310 IF Y$ = "Y" THEN G(3) = 3
320 PRINT Y$
325 VTAB 14: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(4) = 0
330 IF Y$ = "Y" THEN G(4) = 4
340 PRINT Y$
345 VTAB 16: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(5) = 0
350 IF Y$ = "Y" THEN G(5) = 5
360 PRINT Y$
365 VTAB 18: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(6) = 0
370 IF Y$ = "Y" THEN G(6) = 6
380 PRINT Y$
390 PRINT
400 PRINT "ARE THESE CORRECT 'Y'/'N' ": INPUT Y$: IF Y$ < > "Y" THEN  GOTO 280
500  DIM D(60,2),T(2),C(50),Z1$(3),PPP(60),V(60),SZ(60),P1(60),D1(60),C1(60),P2(60)
505 DIM Q4(60)
```

```
510 I$ =  CHR$ (9)
520 D$ =  CHR$ (4):Q$ =  CHR$ (17):Z1$(1) = " VOLUME %":Z1$(2) =
"POPULATION":Z1$(3) = "POPULATION %":DN$ = ",D2":P0 = 0
525 P$ = "  PHI"
530 C1 =  LOG (2) / 6:C2 =  LOG (2) / 3:N = 16:I1 = 1:F(G) = 0:M$ = " UM":H$ =
"**************************************"
540  DEF  FN B(X) =  INT (X * 100 + .5) / 100: DEF  FN C(X) =  INT (X * 10 + .5) / 10:
GOTO 2390
550  PRINT : PRINT  TAB( 10)"< ENTER SELECTION > ";: RETURN
560  PRINT : PRINT  TAB( 7)"PRESS RETURN TO CONTINUE ";: RETURN
570  PRINT :Z$ = "Y": RETURN
580 SZ = PS:PS = SZ * 2 ^
(1 / 3): RETURN
590  FOR I1 = 1 TO 2:T(I1) = 0: FOR I = 1 TO N:T(I1) = T(I1) + D(I,I1): NEXT I: NEXT I1:I1
= 1: RETURN
600 DM = (D(I,I1) / T(I1)) * 100: RETURN
610 PC = CM:CM = CM - DM: IF CM < 0 THEN CM = 0
620  RETURN
630 PC = CM:CM = CM - D(I,2): RETURN
640  REM
642  REM   ***********************************
644  REM        RETRIEVING DATA ROUTINE
646  REM   ***********************************
648  REM
650  FOR Q = START TO FINISH
655  VTAB (12): HTAB (8): FLASH : PRINT "< INPUTING DATA >": NORMAL
660 X =  FRE (0):X = 0:N = 16
665 Z$ = S$ +  STR$ (Q)
670  PRINT : PRINT D$;"OPEN "Z$;,DN$
680  PRINT : PRINT D$;"READ "Z$
690  INPUT N: INPUT LL: INPUT Y$: INPUT ID$: INPUT EL$: INPUT DI$: INPUT EQ$:
INPUT AP$: INPUT O$
```

```
700 FOR I1 = 1 TO 2: FOR I = 1 TO N: INPUT D(I,I1):D(1,I1) = 0:D(2,I1) = 0:D(3,I1) = 0:
NEXT I: NEXT I1
710 PRINT : PRINT D$;"CLOSE"Z$:I1 = 1: GOSUB 590: GOTO 2440
712 REM
714 REM  ****************************************
716 REM      CALCULATING STATISTICS ROUTINE
717 REM  ****************************************
718 REM
720 I1 = 1: IF T(1) = 0 THEN 21320
730 GOTO 750
740 I1 = 2: IF T(2) = 0 THEN 21320
750 HOME :XN = 0:XE = 0:XD = 0:SD = 0:SK = 0:KU = 0
755 Q1 = 0:Q2 = 0:Q3 = 0:Q5 = 0:Q6 = 0:Q7 = 0:Q8 = 0:Q9 = 0
760 VTAB (12): HTAB (8): FLASH : PRINT "< CALCULATING STATISTICS >": NORMAL
770 PS = LL:PK = 0
780 FOR I = 1 TO N: GOSUB 580:
781 Q1 =  LOG (SZ(I) / 1000)
782 Q3 =  - (Q1 / .301) * .434294
784 Q4(I) = Q3 - 0.161
786 Q2 = (Q4(I) * D(I,I1)) + Q2
788 IF D(I,I1) < PK THEN  GOTO 800
790 CK = I:PK = D(I,I1)
800 NEXT I
802 Q5 = Q2 / T(I1)
804 XN = (10 ^( - Q5 * .301)) * 1000
810 IF CK - 1 > 1 GOTO 830
820 XD = 2^(1 / 6) * LL
830 C(M) = 50:F = 1:CM = 100:PS = LL: GOSUB 1040:F = 0:XE = DN:PS = LL: FOR I = 1 TO
N: GOSUB 580:XI =  LOG (SZ) + C1: IF XD = 0 AND CK = I THEN 850
840 GOTO 860
```

```
850 XD =  EXP ( LOG (SZ) + ((D(CK,I1) - D(CK - 1,I1)) / (2 * D(CK,I1) - D(CK - 1,I1) -
D(CK + 1,I1))) * C2)
860 Q6 = D(I,I1) * (Q4(I) - Q5)^
2 + Q6
861 Q7 = D(I,I1) * (Q4(I) - Q5) ^
3 + Q7
862 Q8 = D(I,I1) * (Q4(I) - Q5) ^
4 + Q8
863  NEXT I
864 Q9 = Q6 / T(I1)
865 SD = Q9 ^
.5
866 SK = (Q7 / T(I1)) / Q9 ^
1.5
867 KU = (Q8 / T(I1)) / Q9 ^
2
870  IF XN > XD THEN Z1$ = " POSITIVE"
880  IF XN < XD THEN Z1$ = " NEGATIVE"
890  IF KU - 3 < 0 THEN Z2$ = " PLATYKURTIC"
900  IF KU - 3 > 0 THEN Z2$ = " LEPTOKURTIC"
910  IF KU - 3 = 0 THEN Z2$ = " MESOKURTIC"
920 XN =  FN B(XN):XD =  FN B(XD):SD =  FN B(SD):SK =  FN B(SK):XE =  FN
B(XE):KU =  FN B(KU):Q5 =  FN B(Q5): HOME :X = 0
925  PRINT D$;"PR#1"
926  PRINT : PRINT
930  POKE 36,0 + X: PRINT H$: POKE 36,8 + X: PRINT Z1$(I1);" STATISTICS": POKE 36,0
+ X: PRINT H$: PRINT
940  PRINT "MEAN                ";XN;M$,"                ";Q5;P$
950  POKE 36,0 + X: PRINT "MEDIAN:";: POKE 36,22 + X: PRINT XE;M$: POKE 36,0 + X::
PRINT "MODE:";: POKE 36,22 + X: PRINT XD;M$
960  POKE 36,0 + X: PRINT "STANDARD DEVIATION:";: POKE 36,22 + X: PRINT SD;P$:
POKE 36,0 + X: PRINT "SKEWNESS:";: POKE 36,22 + X: PRINT SK;Z1$: POKE 36,0 + X:
```

```
P
970  PRINT D$;"PR#0"
980  RETURN
1040  FOR I = 1 TO N: GOSUB 600: GOSUB 610: GOSUB 580
1050  IF  FN B(CM) >  = C(M) THEN 1090
1060 DN = SZ *  EXP ((PC - C(M)) / (PC - CM) * C2): IF F > 0 THEN  RETURN
1070 C(M) =  FN B(C(M)):DN =  FN B(DN): POKE 36,5 + X: PRINT DN;: POKE 36,22 + X:
PRINT C(M): IF M = Z THEN 1100
1080 M = M + 1: GOTO 1050
1090  NEXT I
1100  IF P0 = 0 THEN 1120
1110  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
1120  GOSUB 570
1130  GET Z$: IF Z$ = "N" THEN  RETURN
1140  IF Z$ = "Y" THEN 1160
1150  GOTO 1130
1160  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 12120
1162  REM
1164  REM   **************************
1166  REM       GRAPHICS ROUTINE
1167  REM   **************************
1168  REM
1170  IF Z = 1 OR Z = 3 OR Z = 5 THEN I1 = 1
1180  IF Z = 2 OR Z = 4 OR Z = 6 THEN I1 = 2
1190  IF T(I1) = 0 THEN  PRINT : PRINT "NO DATA PRESENT": FOR X = 1 TO 1000: NEXT
X: RETURN
1200  HOME : CALL 6142: HGR : HCOLOR= 3: FOR X = 10 TO 279: HPLOT X,149: NEXT
X: FOR Y = 10 TO 149: HPLOT 10,Y: NEXT Y:X1 =  INT (269 / N)
1210  FOR X = 10 TO 279 STEP X1: FOR Y = 149 TO 8 STEP  - 7: HPLOT X,Y: NEXT Y:
HPLOT X,146 TO X,152: NEXT X
1220  FOR Y = 149 TO 8 STEP  - 14: HPLOT 7,Y TO 13,Y: FOR X = 10 + X1 / 2 TO 279 STEP
X1: HPLOT X,Y: NEXT X: NEXT Y: IF I1 = 2 THEN 1240
```

```
1230  VTAB (7): PRINT "V": VTAB (8): PRINT "O": VTAB (9): PRINT "L": VTAB (10): PRINT
"U": VTAB (11): PRINT "M": VTAB (12): PRINT "E": VTAB (14): PRINT "%": GOT
1240  VTAB (5): PRINT "P": VTAB (6): PRINT "O": VTAB (7): PRINT "P": VTAB (8): PRINT
"U": VTAB (9): PRINT "L": VTAB (10): PRINT "A": VTAB (11): PRINT "T": VTAB
1250  PRINT "O": VTAB (14): PRINT "N": VTAB (16): PRINT "%"
1260 PS = LL:X = 10:X2 = 4: VTAB (20): HTAB (2): PRINT  FN C(LL);: FOR I = 1 TO N - 2:X
= X + X1: GOSUB 580: IF I <  > X2 THEN 1280
1270 J = X / 7: HTAB (J): PRINT  FN C(SZ);:X2 = X2 + 4
1280  NEXT I
1290  VTAB (21): HTAB (15): PRINT "SIZE IN UM"
1300  IF Z = 3 OR Z = 4 THEN 1380
1310 XP = 10:YP = 149:X = 10: FOR I = 1 TO N: GOSUB 600:X = X + X1:Y = 149 - (DM *
139 / 100)
1320  IF Y < 10 THEN Y = 10
1330  IF Y > 149 THEN Y = 149
1340  IF X < 10 THEN X = 10
1350  IF X > 279 THEN X = 279
1360  HPLOT XP,YP TO XP,Y: HPLOT XP,Y TO X,Y:XP = X:YP = Y: NEXT I: HPLOT  TO
X,149: IF Z = 5 OR Z = 6 THEN 1380
1370  GOTO 1440
1380 YP = 10:CM = 100:XP = 10:X = 10: FOR I = 1 TO N:X = X + X1: GOSUB 600: GOSUB
610:Y = 149 - (CM * 139 / 100)
1390  IF Y < 10 THEN Y = 10
1400  IF Y > 149 THEN Y = 149
1410  IF X < 10 THEN X = 10
1420  IF X > 279 THEN X = 279
1430  HPLOT XP,YP TO X,Y:XP = X:YP = Y: NEXT I
1440  PRINT : PRINT D$;"PR#1"
1450  PRINT D$;"PR#0": PRINT D$;"IN#0": GOSUB 570
1490  PRINT : PRINT D$;"PR#1"
1491 QC = QC + 1: IF QC > 2 THEN QC = 1: PRINT  CHR$ (12)
1492  ON Z GOSUB 3000,3010,3020,3030,3040,3050
```

```
1494  PRINT "================================="
1500  PRINT  CHR$ (9);"G"
1510  CALL 62454: TEXT : HOME
1520  PRINT : PRINT D$;"PR#1"
1530  PRINT : PRINT D$;"PR#0": RETURN
1532  REM
1534  REM   ************************
1536  REM       LISTING ROUTINE
1537  REM   ************************
1538  REM
1540  FLASH : VTAB 10: HTAB 10: PRINT "STANDBY PLEASE": NORMAL
1550  FOR Z = 1 TO 3
1560  IF Z = 1 THEN I1 = 1
1570  IF Z = 2 OR Z = 3 THEN I1 = 2
1580  IF T(I1) = 0 THEN 21320
1590 X = 0
1600  PRINT
1610  IF Z = 2 GOTO 1710
1620  IF Z = 3 GOTO 1640
1630  GOTO 1650
1640 I1 = 2
1650 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 580: GOSUB 600:SZ =  FN B(SZ):DM =  FN
C(DM): IF P0 = 1 THEN 1660
1660 L = L + 1:SZ(I) = SZ
1670  IF Z = 3 THEN P1(I) = DM: GOTO 1690
1680 V(I) = DM
1690  NEXT I
1700  GOTO 1730
1710 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 580:SZ =  FN B(SZ): IF P0 = 1 THEN 1720
1720 L = L + 1:PPP(I) = D(I,2): NEXT I
1730  NEXT Z
1740  REM
```

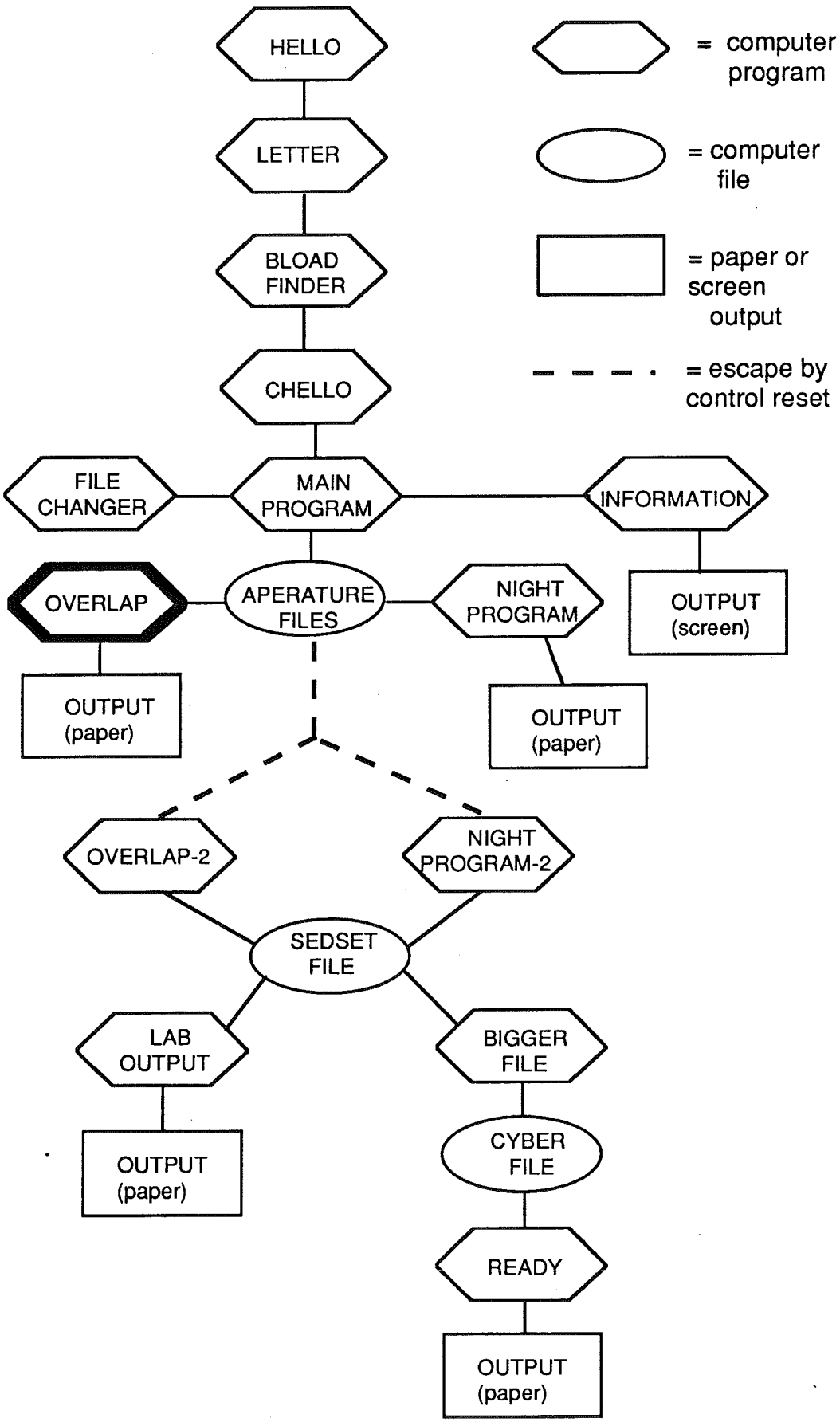
```
1750 X = 0
1760  FOR Z = 4 TO 6
1770  IF Z = 4 THEN I1 = 1
1780  IF Z = 5 OR Z = 6 THEN I1 = 2
1790  IF T(I1) = 0 THEN 21320
1800  PRINT
1810  IF Z = 5 THEN CM = T(2): GOTO 1950
1820 CM = 100: IF Z = 6 THEN  GOTO 1840
1830  GOTO 1850
1840  PRINT
1850 PS = LL: PRINT
1860 L = 5: FOR I = 1 TO N
1870  GOSUB 580: GOSUB 600: GOSUB 610
1880 SZ =  FN B(SZ):CM =  FN C(CM):DM =  FN C(DM)
1890  IF P0 = 1 THEN 1900
1900 L = L + 1
1910  IF Z = 6 THEN D1(I) = PC: GOTO 1930
1920 C1(I) = PC
1930  NEXT I
1940  GOTO 2080
1950  PRINT
1960 PS = LL
1970 L = 5: FOR I = 1 TO N
1980  GOSUB 580: GOSUB 630
1990 SZ =  FN B(SZ):CM =  FN C(CM)
2000  IF P0 = 1 THEN 2010
2010 L = L + 1:P2(I) = PC: NEXT I
2020  IF P0 = 0 THEN 2040
2030  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0:
2040  IF  PEEK (34) > 0 THEN  POKE 34,0
2050  GOTO 2080
2060  GET Z$: IF Z$ = "N" THEN  RETURN
```

```
2070 IF Z$ = "Y" THEN 2100
2080 NEXT Z
2090 Z = 7
2100 PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: IF F = 1 THEN GOTO 2190
2120 POKE 36,20: PRINT "SAMPLE: ";: PRINT ID$
2130 POKE 36,20: PRINT "APERTURES: ";: PRINT AP$
2133 PRINT
2135 POKE 36,20: PRINT "INFORMATION :"
2140 POKE 36,20: PRINT "          ";DI$
2150 POKE 36,20: PRINT "          ";: PRINT EQ$
2160 POKE 36,20: PRINT "          ";: PRINT EL$
2170 POKE 36,20: PRINT "          ";: PRINT O$
2190 PRINT : PRINT
2200 HOME :X = 0
2201 GOTO 2252
2202 PRINT "NOTE:     UNPROCESSED DATA"
2204 PRINT "-----": PRINT
2210 POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH. #";: POKE 36,9 + X: PRINT
"SIZE";: POKE 36,18 + X: PRINT Z1$(1);: POKE 36,28 + X: PRINT Z1$(2)
2220 POKE 36,0 + X: PRINT H$: PRINT :PS = LL:L = 4: FOR I = 1 TO N: GOSUB 580:SZ =
FN B(SZ): IF P0 = 1 THEN 2230
2230 POKE 36,0 + X: PRINT I;: POKE 36,9 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,1);: POKE 36,30 + X: PRINT D(I,2): NEXT I: IF P0 = 0 THEN 2250
2240 PRINT :P0 = 0:X = 0: PRINT
2245 PRINT QQ$
2250 IF PEEK (34) > 0 THEN POKE 34,0
2252 PRINT "NOTE:     PROCESSED DATA"
2254 PRINT "-----": PRINT
2260 PRINT "-------------------------------------------------------------------------"
2270 PRINT "CHANNEL : SIZE  :  DIFF  :  DIFF  : DIFF  :  CUM  :  CUM  : CUM "
2280 PRINT "      :      : VOL%  : POP  : POP%  : VOL%  :  POP  : POP%"
2290 PRINT " -------------------------------------------------------------------------"
```

```
2300  FOR I = 1 TO N
2310 S1 = 9 -  LEN ( STR$ (I)):S2 = 11 -  LEN ( STR$ (SZ(I))):S3 = 11 -  LEN ( STR$
(V(I))):S4 = 12 -  LEN ( STR$ (PPP(I))):S5 = 11 -  LEN ( STR$ (P1(I))):S6 =
2320  PRINT I; SPC( S1);SZ(I); SPC( S2);V(I); SPC( S3);PPP(I); SPC( S4);P1(I); SPC(
S5);C1(I); SPC( S6);P2(I); SPC( S7 - 4);D1(I)
2325  NEXT I: PRINT : PRINT : PRINT : PRINT D$;"PR#0"
2330 FU$ = "SAMPLE NO. = " + Z$ + "   " + DI$ + "   " + EQ$
2331 FK$ = EL$ + "   " + O$:Z8$ =  MID$ (Z$,2)
2332  IF YU$ = "Y" THEN  GOTO 2334
2333  GOTO 2350
2334  PRINT D$ =  CHR$ (4)
2335  PRINT D$;"OPEN SEDSET "Z8$;",D1"
2336  PRINT D$;"WRITE SEDSET "Z8$
2337  PRINT N
2338  PRINT FU$
2339  PRINT FK$
2340  FOR I = 1 TO N
2341  PRINT SZ(I) / 1000;",";V(I)
2348  NEXT I
2349  PRINT D$;"CLOSE SEDSET "Z8$
2350  PRINT D$;"PR#0": GOTO 2450: REM    GOTO STATISTICS
2360  IF Z$ = "Y" THEN  PRINT : PRINT D$;"PR#1": GOTO 2110
2370  GOTO 2340
2380  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 2210
2390  GOTO 2400
2400  PRINT
2410  HOME : PRINT H$: PRINT : PRINT  TAB( 15)"START UP": PRINT : PRINT H$:
PRINT
2420  PRINT
2430  GOTO 650
2440  GOTO 1540: REM     GOTO LI          STING
2450  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"STATISTICS MENU": PRINT : PRINT
```

```
H$: PRINT
2510  PRINT : PRINT : GOSUB 720
2515  PRINT : PRINT : GOSUB 740
2525  IF YY$ < > "Y" THEN 2655
2530  HOME : PRINT H$: PRINT : PRINT  TAB( 13)"  GRAPHICS  ": PRINT : PRINT H$
2535  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2540  FOR Z = 1 TO 6
2545  IF G(Z) = 0 THEN 2650
2620  IF Z > 7 THEN 2610
2630  IF Z = 7 THEN  RETURN
2640  GOSUB 1170
2650  NEXT Z
2651 QC = 0
2652  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2655  NEXT Q
2660  HOME : VTAB 15: HTAB 10: PRINT "PLEASE STAND BY"
2680  PRINT D$;"RUN CHELLO,D1"
3000  PRINT "DIFFERENTIAL VOLUME HISTOGRAM": RETURN
3010  PRINT "DIFFERENTIAL POPULATION HISTOGRAM": RETURN
3020  PRINT "CUMULATIVE VOLUME CURVE": RETURN
3030  PRINT "CUMULATIVE POPULATION CURVE": RETURN
3040  PRINT "OVERLAY VOLUME GRAPH": RETURN
3050  PRINT "OVERLAY POPULATION GRAPH": RETURN
21320  HOME : VTAB (10): PRINT  TAB( 6)Z1$(I1);" DATA IS ALL ZEROS "
21330  VTAB (12): HTAB (6): PRINT "PLEASE CHECK DATA FILES"
```

COULTER COUNTER



This program allows the overlap of up to four aperature tubes. The tubes are chosen by letters as discribed in the INFORMATION program.

```
0 REM
10  REM       THIS PROGRAM WILL OVERLAP UP TO FOUR TUBES TOGETHER
20  REM       ************************************************
30  REM
40  REM       ALSO LIST DATA, CALCULATE STATISTICS AND PLOT GRAPHS
50  REM    WITHOUT THE USER BEING PRESENT AFTER THE INITAL START UP.
60  REM
70  REM
100 QQ$ =  CHR$ (12)
110  HOME
120 KK = 26
150  GOTO 2720
151  PRINT "DO YOU WISH TO CREATE A CYBER FILE";: INPUT YU$: PRINT : PRINT :
PRINT :
152  IF YU$ = "Y" THEN 155
153  GOTO 159
155  PRINT "REMOVE PROGRAM DISK FROM DRIVE 1"
156  PRINT "   REPLACE WITH MERGE DISK"
157  PRINT
158  PRINT
159  PRINT
160  PRINT "DO YOU WANT GRAPHS PLOTTED ";: INPUT YY$
170  IF YY$ < > "Y" THEN 480
180  HOME
190  VTAB 4: PRINT "FOR EACH PLOTTED GRAPH TYPE 'Y/N' "
200  PRINT
210 BB = 7
215  IF I1 = 2 THEN 225
```

```
220 VTAB 8: HTAB BB: PRINT "DIFFERENTIAL VOLUME HISTOGRAM"
225 IF I1 = 1 THEN 235
230 VTAB 10: HTAB BB: PRINT "DIFFERENTIAL POPULATION HISTOGRAM"
235 IF I1 = 2 THEN 245
240 VTAB 12: HTAB BB: PRINT "CUMULATIVE VOLUME CURVE"
245 IF I1 = 1 THEN 255
250 VTAB 14: HTAB BB: PRINT "CUMULATIVE POPULATION CURVE"
255 IF I1 = 2 THEN 265
260 VTAB 16: HTAB BB: PRINT "OVERLAY VOLUME GRAPHICS "
265 IF I1 = 1 THEN 275
270 VTAB 18: HTAB BB: PRINT "OVERLAY POPULATION GRAPHICS"
275 IF I1 = 2 THEN 305
280 VTAB 8: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(1) = 0
290 IF Y$ = "Y" THEN G(1) = 1
300 PRINT Y$
305 IF I1 = 1 THEN 335
310 VTAB 10: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(2) = 0
320 IF Y$ = "Y" THEN G(2) = 2
330 PRINT Y$
335 IF I1 = 2 THEN 365
340 VTAB 12: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(3) = 0
350 IF Y$ = "Y" THEN G(3) = 3
360 PRINT Y$
365 IF I1 = 1 THEN 395
370 VTAB 14: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(4) = 0
380 IF Y$ = "Y" THEN G(4) = 4
390 PRINT Y$
395 IF I1 = 2 THEN 425
400 VTAB 16: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(5) = 0
410 IF Y$ = "Y" THEN G(5) = 5
420 PRINT Y$
425 IF I1 = 1 THEN 460
```

```
430  VTAB 18: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(6) = 0
440  IF Y$ = "Y" THEN G(6) = 6
450  PRINT Y$
460  PRINT
470  PRINT "ARE THESE CORRECT 'Y'/'N' ": INPUT Y$: IF Y$ < > "Y" THEN  GOTO 275
480  DIM D(60,2),T(2),C(50),Z1$(3),PPP(60),V(60),SZ(60),P1(60),D1(60),C1(60),P2(60)
490 I$ =  CHR$ (9)
500 D$ =  CHR$ (4):Q$ =  CHR$ (17):Z1$(1) = " VOLUME  ":Z1$(2) = "POPULATION
":Z1$(3) = "POPULATION %":DN$ = ",D2":P0 = 0
505  DIM Q4(60)
510 C1 =  LOG (2) / 6:C2 =  LOG (2) / 3:N = 16:I1 = 1:F(G) = 0:M$ = " UM":H$ =
"**************************************"
520  DEF  FN B(X) =  INT (X * 100 + .5) / 100: DEF  FN C(X) =  INT (X * 10 + .5) / 10:
GOTO 2840
525 P$ = "  PHI"
530  PRINT : PRINT  TAB( 10)"< ENTER SELECTION > ";: RETURN
540  PRINT : PRINT  TAB( 7)"PRESS RETURN TO CONTINUE ";: RETURN
550  PRINT :Z$ = "Y": RETURN
560 SZ = PS:PS = SZ * 2 ^
(1 / 3): RETURN
570  FOR I1 = 1 TO 2:T(I1) = 0: FOR I = 1 TO N:T(I1) = T(I1) + D(I,I1): NEXT I: NEXT I1:I1
= 1: RETURN
580 DM = (D(I,I1) / T(I1)) * 100: RETURN
590 PC = CM:CM = CM - DM: IF CM < 0 THEN CM = 0
600  RETURN
610 PC = CM:CM = CM - D(I,2): RETURN
613  REM
615  REM   **********************************
617  REM       RETRIEVING DATA ROUTINE
618  REM   **********************************
619  REM
620  PRINT
```

```
630  VTAB (12): HTAB (8): FLASH : PRINT "< INPUTING DATA >": NORMAL
640 X =  FRE (0):X = 0:N = 16
650 Z$ = S$
660  PRINT : PRINT D$;"OPEN "Z$;,DN$
670  PRINT : PRINT D$;"READ "Z$
680  INPUT N: INPUT LL: INPUT Y$: INPUT ID$: INPUT EL$: INPUT DI$: INPUT EQ$:
INPUT AP$: INPUT O$
690  FOR I1 = 1 TO 2: FOR I = 1 TO N: INPUT D(I,I1):D(1,I1) = 0:D(2,I1) = 0:D(3,I1) = 0:
NEXT I: NEXT I1
700  PRINT : PRINT D$;"CLOSE ";Z$:I1 = 1: GOSUB 570: RETURN
701  REM
702  REM   ****************************************
705  REM      CALCULATING STATISTICS ROUTINE
708  REM   ****************************************
709  REM
710 I1 = 1: IF T(1) = 0 THEN 2650
720  GOTO 740
730 I1 = 2: IF T(2) = 0 THEN 2650
740  HOME :XN = 0:XE = 0:XD = 0:SD = 0:SK = 0:KU = 0
745 Q1 = 0:Q2 = 0:Q3 = 0:Q4 = 0:Q5 = 0:Q6 = 0:Q7 = 0:Q8 = 0:Q9 = 0
750  VTAB (12): HTAB (8): FLASH : PRINT "< CALCULATING STATISTICS >": NORMAL
760 PS = LL:PK = 0
770  GOSUB 560
771  FOR I = 1 TO N
781 Q1 =  LOG (SZ(I) / 1000)
782 Q3 =  - (Q1 / .301) * .434294
784 Q4(I) = Q3 - 0.161
786 Q2 = (Q4(I) * D(I,I1)) + Q2
788  IF D(I,I1) < PK THEN  GOTO 790
789 CK = I:PK = D(I,I1)
790  NEXT I
793 Q5 = Q2 / T(I1)
```

```
797 XN = (10 ^
( - Q5 * .301)) * 1000
800  IF CK - 1 > 1 GOTO 820
810 XD = 2 ^
(1 / 6) * LL
820 C(M) = 50:F = 1:CM = 100:PS = LL: GOSUB 1000:F = 0:XE = DN:PS = LL: FOR I = 1 TO
N: GOSUB 560:XI =  LOG (SZ) + C1: IF XD = 0 AND CK = I THEN 840
830  GOTO 860
840 XD =  EXP ( LOG (SZ) + ((D(CK,I1) - D(CK - 1,I1)) / (2 * D(CK,I1) - D(CK - 1,I1) -
D(CK + 1,I1))) * C2)
860 Q6 = D(I,I1) * (Q4(I) - Q5)^
2 + Q6
861 Q7 = D(I,I1) * (Q4(I) - Q5) ^
3 + Q7
862 Q8 = D(I,I1) * (Q4(I) - Q5)^
4 + Q8
863  NEXT I
864 Q9 = Q6 / T(I1)
865 SD = Q9 ^
.5
866 SK = (Q7 / T(I1)) / Q9^
1.5
867 KU = (Q8 / T(I1)) / Q9 ^
2
869  IF XN > XD THEN Z7$ = " POSITIVE"
870  IF XN < XD THEN Z7$ = " NEGATIVE"
880  IF KU - 3 < 0 THEN Z2$ = " PLATYKURTIC"
890  IF KU - 3 > 0 THEN Z2$ = " LEPTOKURTIC"
900  IF KU - 3 = 0 THEN Z2$ = " MESOKURTIC"
910 XN =  FN B(XN):XD =  FN B(XD):SD =  FN B(SD):SK =  FN B(SK):XE =  FN
B(XE):KU =  FN B(KU):Q5 =  FN B(Q5): HOME :X = 0
920  PRINT D$;"PR#1"
```

```
930  PRINT : PRINT
940  POKE 36,0 + X: PRINT H$: POKE 36,8 + X: PRINT Z1$(I1);" STATISTICS": POKE 36,0
+ X: PRINT H$: PRINT
950  PRINT "MEAN              ";XN;M$,"              ";Q5;P$
960  POKE 36,0 + X: PRINT "MEDIAN:";: POKE 36,22 + X: PRINT XE;M$: POKE 36,0 + X::
PRINT "MODE:";: POKE 36,22 + X: PRINT XD;M$
970  POKE 36,0 + X: PRINT "STANDARD DEVIATION:";: POKE 36,22 + X: PRINT SD;M$:
POKE 36,0 + X: PRINT "SKEWNESS:";: POKE 36,22 + X: PRINT SK;Z7$: POKE 36,0 + X:
P
980  PRINT D$;"PR#0"
990  RETURN
1000  FOR I = 1 TO N: GOSUB 580: GOSUB 590: GOSUB 560
1010  IF  FN B(CM) >  = C(M) THEN 1050
1020 DN = SZ *  EXP ((PC - C(M)) / (PC - CM) * C2): IF F > 0 THEN  RETURN
1030 C(M) =  FN B(C(M)):DN =  FN B(DN): POKE 36,5 + X: PRINT DN;: POKE 36,22 + X:
PRINT C(M): IF M = Z THEN 1060
1040 M = M + 1: GOTO 1010
1050  NEXT I
1060  IF P0 = 0 THEN 1080
1070  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
1080  GOSUB 550
1090  GET Z$: IF Z$ = "N" THEN  RETURN
1100  IF Z$ = "Y" THEN 1120
1110  GOTO 1090
1120  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 12120
1122  REM
1123  REM  ******************************
1125  REM        GRAPHICS ROUTINE
1127  REM  ******************************
1128  REM
1130  IF Z = 1 OR Z = 3 OR Z = 5 THEN I1 = 1
1140  IF Z = 2 OR Z = 4 OR Z = 6 THEN I1 = 2
```

```
1150  IF T(I1) = 0 THEN  PRINT : PRINT "NO DATA PRESENT": FOR X = 1 TO 1000: NEXT
X: RETURN
1160  HOME : CALL 6142: HGR : HCOLOR= 3: FOR X = 10 TO 279: HPLOT X,149: NEXT
X: FOR Y = 10 TO 149: HPLOT 10,Y: NEXT Y:X1 =  INT (269 / N)
1170  FOR X = 10 TO 279 STEP X1: FOR Y = 149 TO 8 STEP  - 7: HPLOT X,Y: NEXT Y:
HPLOT X,146 TO X,152: NEXT X
1180  FOR Y = 149 TO 8 STEP  - 14: HPLOT 7,Y TO 13,Y: FOR X = 10 + X1 / 2 TO 279 STEP
X1: HPLOT X,Y: NEXT X: NEXT Y: IF I1 = 2 THEN 1200
1190  VTAB (7): PRINT "V": VTAB (8): PRINT "O": VTAB (9): PRINT "L": VTAB (10): PRINT
"U": VTAB (11): PRINT "M": VTAB (12): PRINT "E": VTAB (14): PRINT "%": GOT
1200  VTAB (5): PRINT "P": VTAB (6): PRINT "O": VTAB (7): PRINT "P": VTAB (8): PRINT
"U": VTAB (9): PRINT "L": VTAB (10): PRINT "A": VTAB (11): PRINT "T": VTAB
1210  PRINT "O": VTAB (14): PRINT "N": VTAB (16): PRINT "%"
1220 PS = LL:X = 10:X2 = 4: VTAB (20): HTAB (2): PRINT  FN C(LL);: FOR I = 1 TO N - 2:X
= X + X1: GOSUB 560: IF I <  > X2 THEN 1240
1230 J = X / 7: HTAB (J): PRINT  FN C(SZ);:X2 = X2 + 4
1240  NEXT I
1250  VTAB (21): HTAB (15): PRINT "SIZE IN UM"
1260  IF Z = 3 OR Z = 4 THEN 1340
1270 XP = 10:YP = 149:X = 10: FOR I = 1 TO N: GOSUB 580:X = X + X1:Y = 149 - (DM *
139 / 100)
1280  IF Y < 10 THEN Y = 10
1290  IF Y > 149 THEN Y = 149
1300  IF X < 10 THEN X = 10
1310  IF X > 279 THEN X = 279
1320  HPLOT XP,YP TO XP,Y: HPLOT XP,Y TO X,Y:XP = X:YP = Y: NEXT I: HPLOT  TO
X,149: IF Z = 5 OR Z = 6 THEN 1340
1330  GOTO 1400
1340 YP = 10:CM = 100:XP = 10:X = 10: FOR I = 1 TO N:X = X + X1: GOSUB 580: GOSUB
590:Y = 149 - (CM * 139 / 100)
1350  IF Y < 10 THEN Y = 10
1360  IF Y > 149 THEN Y = 149
```

```
1370  IF X < 10 THEN X = 10
1380  IF X > 279 THEN X = 279
1390  HPLOT XP,YP TO X,Y:XP = X:YP = Y: NEXT I
1400  PRINT : PRINT D$;"PR#1"
1410  PRINT D$;"PR#0": PRINT D$;"IN#0": GOSUB 550
1420  PRINT : PRINT D$;"PR#1"
1430 QC = QC + 1: IF QC > 2 THEN QC = 1: PRINT  CHR$ (12)
1440  ON Z GOSUB 2590,2600,2610,2620,2630,2640
1450  HTAB KK: PRINT "================================="
1460  PRINT  CHR$ (9);"G"
1470  CALL 62454: TEXT : HOME
1480  PRINT : PRINT D$;"PR#1"
1490  PRINT : PRINT D$;"PR#0": RETURN
1500  FLASH : VTAB 10: HTAB 10: PRINT "STANDBY PLEASE": NORMAL
1502  REM
1503  REM  ******************************
1505  REM        LISTING ROUTINE
1507  REM  ******************************
1508  REM
1510  FOR Z = 1 TO 3
1520  IF Z = 1 THEN I1 = 1
1530  IF Z = 2 OR Z = 3 THEN I1 = 2
1540  IF T(I1) = 0 THEN 2650
1550 X = 0
1560  PRINT
1570  IF Z = 2 GOTO 1670
1580  IF Z = 3 GOTO 1600
1590  GOTO 1610
1600 I1 = 2
1610 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 560: GOSUB 580:SZ =  FN B(SZ):DM =  FN
C(DM): IF P0 = 1 THEN 1620
1620 L = L + 1:SZ(I) = SZ
```

```
1630  IF Z = 3 THEN P1(I) = DM: GOTO 1650
1640 V(I) = DM
1650  NEXT I
1660  GOTO 1690
1670 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 560:SZ =  FN B(SZ): IF P0 = 1 THEN 1680
1680 L = L + 1:PPP(I) = D(I,2): NEXT I
1690  NEXT Z
1700  REM
1710 X = 0
1720  FOR Z = 4 TO 6
1730  IF Z = 4 THEN I1 = 1
1740  IF Z = 5 OR Z = 6 THEN I1 = 2
1750  IF T(I1) = 0 THEN 2650
1760  PRINT
1770  IF Z = 5 THEN CM = T(2): GOTO 1910
1780 CM = 100: IF Z = 6 THEN  GOTO 1800
1790  GOTO 1810
1800  PRINT
1810 PS = LL: PRINT
1820 L = 5: FOR I = 1 TO N
1830  GOSUB 560: GOSUB 580: GOSUB 590
1840 SZ =  FN B(SZ):CM =  FN C(CM):DM =  FN C(DM)
1850  IF P0 = 1 THEN 1860
1860 L = L + 1
1870  IF Z = 6 THEN D1(I) = PC: GOTO 1890
1880 C1(I) = PC
1890  NEXT I
1900  GOTO 2040
1910  PRINT
1920 PS = LL
1930 L = 5: FOR I = 1 TO N
1940  GOSUB 560: GOSUB 610
```

```
1950 SZ =  FN B(SZ):CM =  FN C(CM)
1960  IF P0 = 1 THEN 1970
1970 L = L + 1:P2(I) = PC: NEXT I
1980  IF P0 = 0 THEN 2000
1990  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
2000  IF  PEEK (34) > 0 THEN  POKE 34,0
2010  GOTO 2040
2020  GET Z$: IF Z$ = "N" THEN  RETURN
2030  IF Z$ = "Y" THEN 2060
2040  NEXT Z
2050 Z = 7
2060  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: IF F = 1 THEN  GOTO 2150
2065  PRINT  CHR$ (12)
2066  IF Z1$ = "P" THEN Q9 =  ABS (P1(I4) - P1(I4 + 1)): IF Q9 > P THEN V5 = 9999
2067  IF Z1$ = "V" THEN Q9 =  ABS (V(I4) - V(I4 + 1)): IF Q9 > P THEN V5 = 9999
2069  IF V5 = 9999 THEN  GOSUB 3140
2070  POKE 36,20: PRINT "SAMPLE: ";: PRINT ID$
2080  POKE 36,20: PRINT "APERTURES: ";: PRINT AP$
2090  PRINT
2100  POKE 36,20: PRINT "INFORMATION :"
2110  POKE 36,20: PRINT "          ";DI$
2120  POKE 36,20: PRINT "          ";: PRINT EQ$
2130  POKE 36,20: PRINT "          ";: PRINT EL$
2140  POKE 36,20: PRINT "          ";: PRINT O$
2150  PRINT : PRINT
2160  HOME :X = 0
2165  PRINT "NOTE:     UNPROCESSED DATA FROM TA II"
2166  PRINT "====="
2170  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH. #";: POKE 36,9 + X: PRINT
"SIZE";: POKE 36,18 + X: PRINT Z1$(1);: POKE 36,28 + X: PRINT Z1$(2)
2180  POKE 36,0 + X: PRINT H$: PRINT :PS = LL:L = 4: FOR I = 1 TO N: GOSUB 560:SZ =
FN B(SZ): IF P0 = 1 THEN 2182
```

```
2182  IF Z1$ = "V" THEN D(I,2) = 0
2184  IF Z1$ = "P" THEN D(I,1) = 0
2190  POKE 36,0 + X: PRINT I;: POKE 36,9 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,1);: POKE 36,30 + X: PRINT D(I,2): NEXT I: IF P0 = 0 THEN 2220
2200  PRINT :P0 = 0:X = 0: PRINT
2210  PRINT QQ$
2220  IF  PEEK (34) > 0 THEN  POKE 34,0
2223  PRINT "NOTE:     PROCESSED DATA
2224  PRINT "=====": PRINT
2225  PRINT ID$: PRINT
2230  PRINT "-------------------------------------------------------------------------------"
2240  PRINT "CHANNEL : SIZE  :  DIFF  :  DIFF  : DIFF  : CUM  :  CUM  : CUM "
2250  PRINT "      :      : VOL%  : POP  : POP%  : VOL%  :  POP  : POP%"
2260  PRINT " -------------------------------------------------------------------------------"
2270  FOR I = 1 TO N
2272  IF Z1$ = "V" THEN PPP(I) = 0:P1(I) = 0:P2(I) = 0:D1(I) = 0
2274  IF Z1$ = "P" THEN V(I) = 0:C1(I) = 0
2280 S1 = 9 -  LEN ( STR$ (I)):S2 = 11 -  LEN ( STR$ (SZ(I))):S3 = 11 -  LEN ( STR$
(V(I))):S4 = 12 -  LEN ( STR$ (PPP(I))):S5 = 11 -  LEN ( STR$ (P1(I))):S6 =
2290  PRINT I; SPC( S1);SZ(I); SPC( S2);V(I); SPC( S3);PPP(I); SPC( S4);P1(I); SPC(
S5);C1(I); SPC( S6);P2(I); SPC( S7 - 4);D1(I)
2299  NEXT I: PRINT : PRINT : PRINT : PRINT D$;"PR#0"
2300 FK$ = EL$ + "   " + O$:Z8$ =  MID$ (Z$,2)
2301 FU$ = "SAMPLE NO. = " + Z8$ + "   " + DI$ + "   " + EQ$
2302  IF YU$ = "Y" THEN  GOTO 2304
2303  GOTO 2330
2304  PRINT D$ =  CHR$ (4)
2305  PRINT D$;"OPEN SEDSET "Z8$;",D1"
2306  PRINT D$;"WRITE SEDSET "Z8$
2307  PRINT N
2308  PRINT FU$
2309  PRINT FK$
```

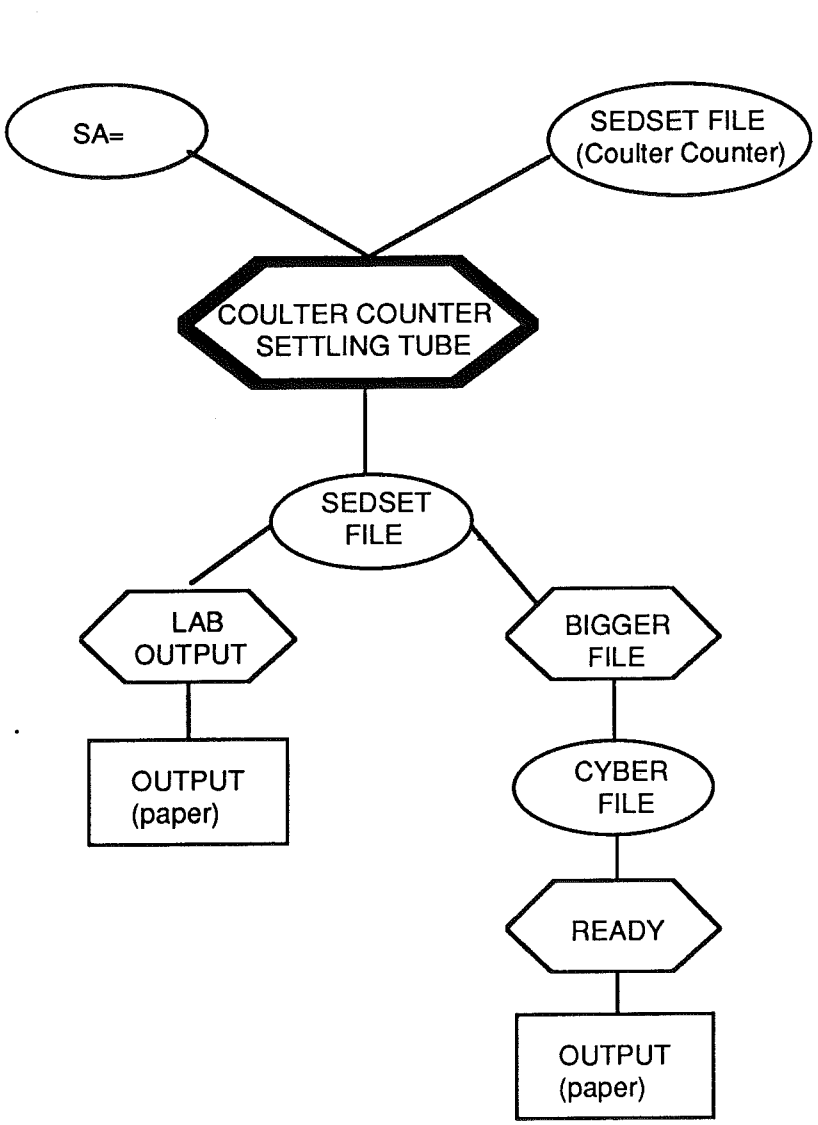
```
2310  FOR I = 1 TO N
2311  PRINT SZ(I) / 1000;",";V(I)
2318  NEXT I
2319  PRINT D$;"CLOSE SEDSET "Z8$
2320  PRINT
2325  PRINT D$;"PR#0": GOTO 2420
2330  IF Z$ = "Y" THEN  PRINT : PRINT D$;"PR#1": GOTO 2110
2340  GOTO 2320
2350  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 2170
2360  GOTO 2370
2370  PRINT
2380  HOME : PRINT H$: PRINT : PRINT  TAB( 15)"START UP": PRINT : PRINT H$:
PRINT
2390  PRINT
2400  GOTO 2840
2410  GOTO 1500
2420  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"STATISTICS MENU": PRINT : PRINT
H$: PRINT
2430  PRINT : PRINT : IF Z1$ = "V" THEN  GOSUB 710: GOTO 2450
2440  PRINT : PRINT : IF Z1$ = "P" THEN  GOSUB 730
2450  IF YY$ < > "Y" THEN 2560
2460  HOME : PRINT H$: PRINT : PRINT  TAB( 13)"  GRAPHICS  ": PRINT : PRINT H$
2470  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2480  FOR Z = 1 TO 6
2490  IF G(Z) = 0 THEN 2530
2500  IF Z > 7 THEN 2610
2510  IF Z = 7 THEN  RETURN
2520  GOSUB 1130
2530  NEXT Z
2540 QC = 0
2550  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2555 Q9 = 0:V5 = 0
```

```
2560 NEXT Z3
2570 HOME : VTAB 15: HTAB 10: PRINT "PLEASE STAND BY"
2580 PRINT D$;"RUN CHELLO,D1"
2590 HTAB KK: PRINT "DIFFERENTIAL VOLUME HISTOGRAM": RETURN
2600 HTAB KK: PRINT "DIFFERENTIAL POPULATION HISTOGRAM": RETURN
2610 HTAB KK: PRINT "CUMULATIVE VOLUME CURVE": RETURN
2620 HTAB KK: PRINT "CUMULATIVE POPULATION CURVE": RETURN
2630 HTAB KK: PRINT "OVERLAY VOLUME GRAPH": RETURN
2640 HTAB KK: PRINT "OVERLAY POPULATION GRAPH": RETURN
2650 HOME : VTAB (10): PRINT  TAB( 6)Z1$(I1);" DATA IS ALL ZEROS "
2660 VTAB (12): HTAB (6): PRINT "PLEASE CHECK DATA FILES"
2670 REM
2680 REM  ***************************
2690 REM       OVERLAP ROUTINE
2700 REM  ***************************
2710 REM
2720 INPUT "HOW MANY TUBES DO YOU WANT TO OVERLAP ";Z6
2730 IF Z6 > 4 THEN  PRINT "MAX OF 4 TUBES PLEASE ": GOTO 2720
2740 FOR Z1 = 1 TO Z6
2750 PRINT "INPUT TUBE # ";Z1;" LETTER ";: INPUT L$(Z1)
2760 IF Z1 = 1 THEN  GOTO 2780
2770 IF  ASC (L$(Z1)) <  ASC (L$(Z1 - 1)) THEN  PRINT "TUBES MUST BE IN
INCREASING ORDER ": GOTO 2740
2780 NEXT Z1
2790 PRINT "INPUT START FILE # AND FINISH FILE # ";: INPUT Z4,Z2
2800 F = 5:P = 10: REM      P=LIMIT PERCENT
2810 HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z1$
2812 PRINT
2814 IF Z1$ = "V" THEN I1 = 1
2816 IF Z1$ = "P" THEN I1 = 2
2820 IF Z1$ = "V" OR Z1$ = "P" THEN  GOTO 151
2830 GOTO 2800
```

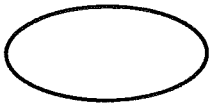
```
2840 FOR Z3 = Z4 TO Z2
2850 HOME : PRINT "SAMPLE OF SMALLEST GROUP IS ";:S$ = L$(1) + STR$ (Z3):
PRINT S$
2860 GOSUB 620
2870 IF Z1$ = "V" THEN I1 = 1
2880 IF Z1$ = "P" THEN I1 = 2
2890 IF T(I1) = 0 THEN 2650
2900 SL = LL:OC = 0: FOR I = 1 TO N:C(I) = D(I,I1): NEXT I
2910 FOR Z1 = 2 TO Z6
2920 PRINT "SAMPLE OF NEXT LARGEST TUBE IS ";:S$ = L$(Z1) + STR$ (Z3): PRINT
S$
2930 IF S$ = "0" THEN 3340
2940 GOSUB 620
2950 IF Z1$ = "V" THEN I1 = 1
2960 IF Z1$ = "P" THEN I1 = 2
2970 IF T(I1) = 0 THEN 2650
2980 PS = SL: IF OC > 0 THEN N = OC
2990 FOR I = 1 TO N: GOSUB 560: IF FN B(SZ) = FN B(LL) THEN 3020
3000 NEXT I
3010 PRINT "OVERLAP ERROR": GOTO 21400
3020 I4 = I
3025 F = 5
3030 OF = 0:PF = 0:AF = 0:J = 1:X = 0: FOR I = I4 TO I4 + 10: IF D(J,I1) = 0 THEN 3100
3035 IF C(I) = 0 THEN F = X: GOTO 3090
3040 PF = OF:OF = D(J,I1) / C(I): IF PF = 0 THEN 3100
3050 IF OF < = PF + P / 100 * PF THEN 3080
3060GOTO 3030
3140 Q9 = FN B(Q9): PRINT : PRINT "OVERLAP FACTORS FAIL AT ";Q9;" PERCENT":
PRINT "YOUR LIMIT IS ";P;" PERCENT": PRINT : PRINT
3220 RETURN
3225 REM      <><><><><><><>
3230 FOR I = 1 TO 16
```

```
3234 C(I) = C(I) * AF
3236  NEXT I
3240 J = 1: FOR I = I4 TO Z
3250  IF C(I) = 0 AND D(J,I1) = 0 THEN 3290
3260 XP =  ABS (C(I) - D(J,I1)): IF YP = 0 THEN 3280
3270  IF XP >  = YP THEN 3290
3280 X = J:Y = I:YP = XP
3290 J = J + 1: NEXT I
3300 N = Y + 16 - X
3310 X = X + 1:Y = Y + 1: FOR J = X TO 16
3320 C(Y) = D(J,I1):Y = Y + 1: NEXT J:OC = N
3330  NEXT Z1
3340 N = OC: FOR I = 1 TO N:D(I,I1) = C(I)
3350  IF I1 = 1 THEN D(I,I1) =  INT (D(I,I1) * 100 + .5) / 100
3360  IF I1 = 2 THEN D(I,I1) =  INT (D(I,I1))
3370  NEXT I: GOSUB 570:LL = SL: HOME
3380  PRINT
3385  IF Z1$ = "V" THEN DD$ = "VOLUME "
3387  IF Z1$ = "P" THEN DD$ = "POPULATION "
3390 ID$ = DD$ + "OVERLAP FOR SAMPLE # " +  STR$ (Z3): PRINT ID$
3400 AP$ = L$(1) + "  " + L$(2) + "  " + L$(3) + "  " + L$(4): PRINT AP$
3410  PRINT "INFORMATION "
3420  PRINT "        ";DI$
3430  PRINT "        ";EQ$
3440  PRINT "        ";EL$
3450  PRINT "        ";O$
3500  GOTO 2410
```

COULTER COUNTER & SETTLING TUBE



= computer program



= computer file

= paper or screen output

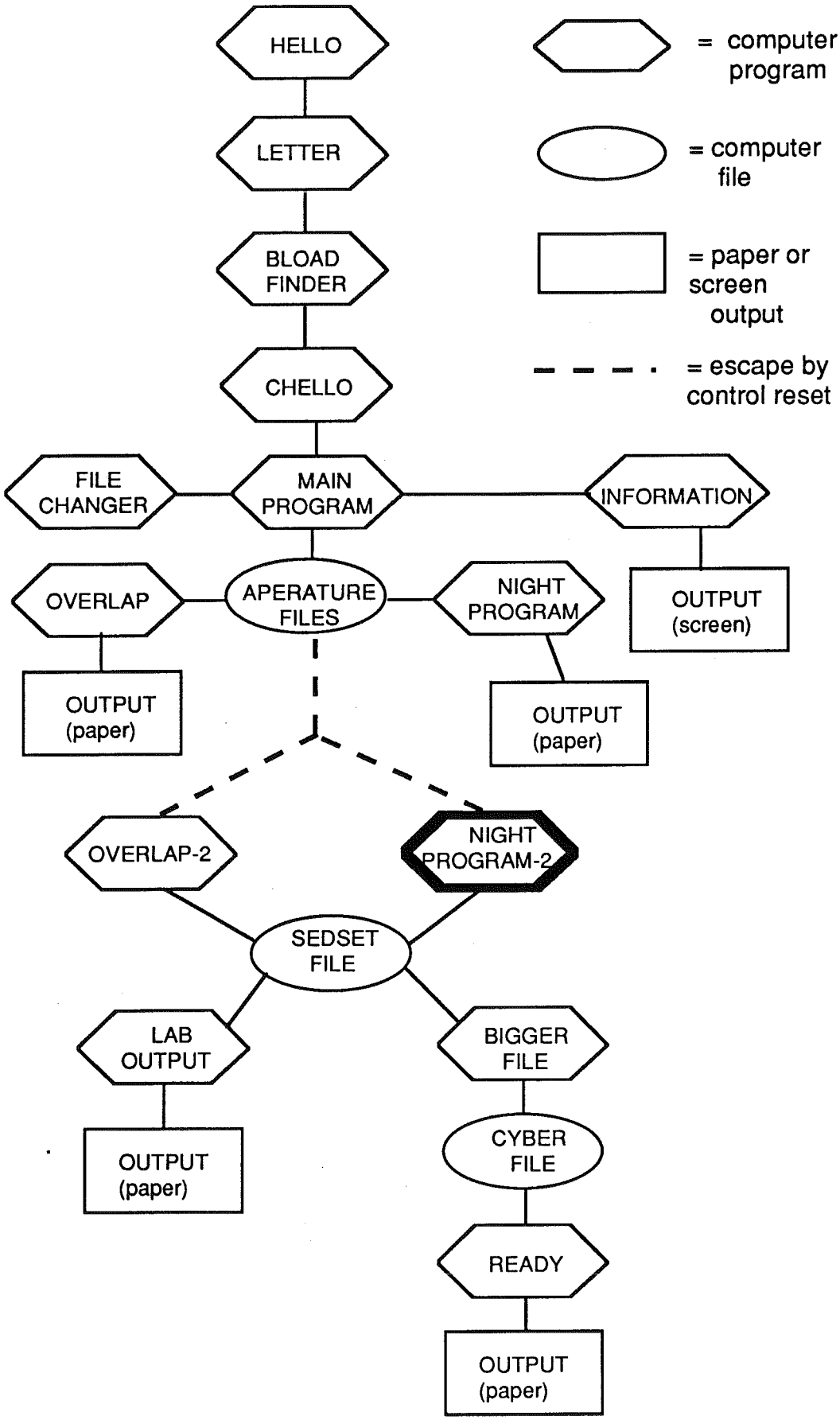
This program is a merge program. It merges settling tube data and merged Coulter Counter files (Sedset). An output file (Sedset) and used with the program READY.

```
0 REM
10 D$ = "*"
15  DIM E1(40),E2(40),V(40),SZ(40)
16  DIM C1(40),C2(40)
20  PRINT "ENTER SETTLING TUBE NUMBER"
30  INPUT "SEDSET ";SA
40  PRINT "ENTER COULTER COUNTER NUMBER"
50  INPUT "SEDSET ";Z8$
60  PRINT D$;"OPEN SEDSET ";SA;",S6,D2"
70  PRINT D$;"READ SEDSET ";SA
80  INPUT R7
90  INPUT S$: REM  FILE HEADER OF SETTLING TUBE
100  INPUT SA$
110  FOR I = 1 TO R7
120  INPUT E1(I),E2(I)
130 E1(I) =  INT (E1(I) * 1000 + .5) / 1000
150  NEXT I
160  PRINT D$;"CLOSE SEDSET ";SA
170  PRINT D$;"OPEN SEDSET ";Z8$;",S5,D1"
180  PRINT D$;"READ SEDSET ";Z8$
190  INPUT N
210  INPUT FU$: REM  FILE HEADER OF COULTER COUNTER
220  INPUT FK$
230  FOR I = 1 TO N
240  INPUT SZ(I),V(I)
245 LGD =  LOG (SZ(I))
247 SZ(I) =  - (LGD / .301) * 0.434294
250 SZ(I) =  INT (SZ(I) * 1000 + .5) / 1000
```

```
255 SZ(I) = SZ(I) - 0.133
270  NEXT I
275  PRINT D$;"CLOSE SEDSET ";Z8$
280 C1(1) = SZ(N)
281 C2(1) = V(N)
282  FOR I = 2 TO N
283 C1(I) = SZ(N + 1 - I)
284 C2(I) = V(N + 1 - I)
288  NEXT I
290 TROL = .00001
291  FOR I = 1 TO N: PRINT I,C1(I),C2(I): NEXT I
295 NQ = E2(R7)
300 R8 = R7 - 1
310  FOR I = 1 TO N
320 C1 = C1(I)
330  FOR M = 1 TO R8
340 MAC = ( ABS (E1(M) - C1))
350  IF MAC < TROL THEN  GOTO 400
360  NEXT M
370 R8 = R8 + 1
380 E1(R8) = C1
390 E2(R8) = C2(I) * NQ / 100
395  GOTO 410
400 E2(M) = C2(I) * NQ / 100 + E2(M)
410  NEXT I
420  PRINT D$;"OPEN SEDSET ";Z8$;",S6,D1"
430  PRINT D$;"WRITE SEDSET ";Z8$
440  PRINT R8
450  PRINT S$: REM  FILE HEADER OF SETTLING TUBE
460  PRINT SA$
470  FOR I = 1 TO R8
474 E1(I) =  INT (E1(I) * 100 + .5) / 100
```

```
477 E2(I) =  INT (E2(I) * 100 + .5) / 100
480  PRINT E1(I);",";E2(I)
490  NEXT I
500  PRINT D$;"CLOSE SEDSET ";Z8$
```

COULTER COUNTER



This program does the same as NIGHT Program except that it does not provide a hard copy of the data. It is used in cases where the data will be transfered to program READY.

```
0 REM
10 REM      THIS PROGRAM WILL CALCULATE STATISTICS ,LIST DATA AND PLOT
20 REM     GRAPHS WITHOUT THE USER BEING PRESENT AFTER THE INITAL
START.
30 REM
40 REM
90 QQ$ =  CHR$ (12)
92 REM
93 REM   ********************************
94 REM      GRAPHICS REQUEST ROUTINE
95 REM   ********************************
96 REM
100 HOME
110 PRINT "INPUT FILE LETTER ";: INPUT S$
120 PRINT "INPUT STARTING FILE # AND FINISH FILE #"
125 PRINT "        EX.   2,4 ";: INPUT START,FINISH
150 PRINT
151 PRINT "DO YOU WISH TO CREATE A CYBER FILE";: INPUT YU$: PRINT : PRINT :
PRINT :
152 IF YU$ = "Y" THEN 155
153 GOTO 159
155 PRINT "REMOVE PROGRAM DISK FROM DRIVE 1"
156 PRINT "   REPLACE WITH MERGE DISK"
157 PRINT
158 PRINT
159 PRINT
160 PRINT "DO YOU WANT GRAPHS PLOTTED ";: INPUT YY$
170 IF YY$ < > "Y" THEN 500
180 HOME
```

```
190  VTAB 4: PRINT "FOR EACH PLOTTED GRAPH TYPE 'Y/N' "
210  PRINT
215 BB = 7
220  VTAB 8: HTAB BB: PRINT "DIFFERENTIAL VOLUME HISTOGRAM"
230  VTAB 10: HTAB BB: PRINT "DIFFERENTIAL POPULATION HISTOGRAM"
240  VTAB 12: HTAB BB: PRINT "CUMULATIVE VOLUME CURVE"
250  VTAB 14: HTAB BB: PRINT "CUMULATIVE POPULATION CURVE"
260  VTAB 16: HTAB BB: PRINT "OVERLAY VOLUME GRAPHICS "
270  VTAB 18: HTAB BB: PRINT "OVERLAY POPULATION GRAPHICS"
280  VTAB 8: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(1) = 0
285  IF Y$ = "Y" THEN G(1) = 1
288  PRINT Y$
290  VTAB 10: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(2) = 0
295  IF Y$ = "Y" THEN G(2) = 2
297  PRINT Y$
300  VTAB 12: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(3) = 0
310  IF Y$ = "Y" THEN G(3) = 3
320  PRINT Y$
325  VTAB 14: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(4) = 0
330  IF Y$ = "Y" THEN G(4) = 4
340  PRINT Y$
345  VTAB 16: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(5) = 0
350  IF Y$ = "Y" THEN G(5) = 5
360  PRINT Y$
365  VTAB 18: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(6) = 0
370  IF Y$ = "Y" THEN G(6) = 6
380  PRINT Y$
390  PRINT
400  PRINT "ARE THESE CORRECT 'Y'/'N' ": INPUT Y$: IF Y$ < > "Y" THEN  GOTO 280
500  DIM D(60,2),T(2),C(50),Z1$(3),PPP(60),V(60),SZ(60),P1(60),D1(60),C1(60),P2(60)
505  DIM Q4(60)
510 I$ =  CHR$ (9)
```

```
520 D$ = CHR$ (4):Q$ = CHR$ (17):Z1$(1) = " VOLUME %":Z1$(2) =
"POPULATION":Z1$(3) = "POPULATION %":DN$ = ",D2":P0 = 0
525 P$ = "  PHI"
530 C1 = LOG (2) / 6:C2 = LOG (2) / 3:N = 16:I1 = 1:F(G) = 0:M$ = " UM":H$ =
"**************************************"
540 DEF FN B(X) = INT (X * 100 + .5) / 100: DEF FN C(X) = INT (X * 10 + .5) / 10:
GOTO 2390
550 PRINT : PRINT TAB( 10)"< ENTER SELECTION > ";: RETURN
560 PRINT : PRINT TAB( 7)"PRESS RETURN TO CONTINUE ";: RETURN
570 PRINT :Z$ = "Y": RETURN
580 SZ = PS:PS = SZ * 2
(1 / 3): RETURN
590 FOR I1 = 1 TO 2:T(I1) = 0: FOR I = 1 TO N:T(I1) = T(I1) + D(I,I1): NEXT I: NEXT I1:I1
= 1: RETURN
600 DM = (D(I,I1) / T(I1)) * 100: RETURN
610 PC = CM:CM = CM - DM: IF CM < 0 THEN CM = 0
620 RETURN
630 PC = CM:CM = CM - D(I,2): RETURN
640 REM
642 REM  **********************************
644 REM      RETRIEVING DATA ROUTINE
646 REM  **********************************
648 REM
650 FOR Q = START TO FINISH
655 VTAB (12): HTAB (8): FLASH : PRINT "< INPUTING DATA >": NORMAL
660 X = FRE (0):X = 0:N = 16
665 Z$ = S$ + STR$ (Q)
670 PRINT : PRINT D$;"OPEN "Z$;,DN$
680 PRINT : PRINT D$;"READ "Z$
690 INPUT N: INPUT LL: INPUT Y$: INPUT ID$: INPUT EL$: INPUT DI$: INPUT EQ$:
INPUT AP$: INPUT O$
700 FOR I1 = 1 TO 2: FOR I = 1 TO N: INPUT D(I,I1):D(1,I1) = 0:D(2,I1) = 0:D(3,I1) = 0:
```

```
NEXT I: NEXT I1
710 PRINT : PRINT D$;"CLOSE"Z$:I1 = 1: GOSUB 590: GOTO 2440
712 REM
714 REM   ****************************************
716 REM      CALCULATING STATISTICS ROUTINE
717 REM   ****************************************
718 REM
720 I1 = 1: IF T(1) = 0 THEN 21320
730 GOTO 750
740 I1 = 2: IF T(2) = 0 THEN 21320
750 HOME :XN = 0:XE = 0:XD = 0:SD = 0:SK = 0:KU = 0
755 Q1 = 0:Q2 = 0:Q3 = 0:Q5 = 0:Q6 = 0:Q7 = 0:Q8 = 0:Q9 = 0
760 VTAB (12): HTAB (8): FLASH : PRINT "< CALCULATING STATISTICS >": NORMAL
770 PS = LL:PK = 0
780 FOR I = 1 TO N: GOSUB 580:
781 Q1 =  LOG (SZ(I) / 1000)
782 Q3 =  - (Q1 / .301) * .434294
784 Q4(I) = Q3 - 0.161
786 Q2 = (Q4(I) * D(I,I1)) + Q2
788 IF D(I,I1) < PK THEN  GOTO 800
790 CK = I:PK = D(I,I1)
800 NEXT I
802 Q5 = Q2 / T(I1)
804 XN = (10 ^( - Q5 * .301)) * 1000
810 IF CK - 1 > 1 GOTO 830
820 XD = 2 ^(1 / 6) * LL
830 C(M) = 50:F = 1:CM = 100:PS = LL: GOSUB 1040:F = 0:XE = DN:PS = LL: FOR I = 1 TO
N: GOSUB 580:XI =  LOG (SZ) + C1: IF XD = 0 AND CK = I THEN 850
840 GOTO 860
850 XD =  EXP ( LOG (SZ) + ((D(CK,I1) - D(CK - 1,I1)) / (2 * D(CK,I1) - D(CK - 1,I1) -
D(CK + 1,I1))) * C2)
```

```
860 Q6 = D(I,I1) * (Q4(I) - Q5)^ 2 + Q6
861 Q7 = D(I,I1) * (Q4(I) - Q5)^ 3 + Q7
862 Q8 = D(I,I1) * (Q4(I) - Q5)^ 4 + Q8
863  NEXT I
864 Q9 = Q6 / T(I1)
865 SD = Q9^ .5
866 SK = (Q7 / T(I1)) / Q9 ^1.5
867 KU = (Q8 / T(I1)) / Q9^ 2
870  IF XN > XD THEN Z1$ = " POSITIVE"
880  IF XN < XD THEN Z1$ = " NEGATIVE"
890  IF KU - 3 < 0 THEN Z2$ = " PLATYKURTIC"
900  IF KU - 3 > 0 THEN Z2$ = " LEPTOKURTIC"
910  IF KU - 3 = 0 THEN Z2$ = " MESOKURTIC"
920 XN =  FN B(XN):XD =  FN B(XD):SD =  FN B(SD):SK =  FN B(SK):XE =  FN
B(XE):KU =  FN B(KU):Q5 =  FN B(Q5): HOME :X = 0
925  PRINT D$;"PR#0"
926  PRINT : PRINT
930  POKE 36,0 + X: PRINT H$: POKE 36,8 + X: PRINT Z1$(I1);" STATISTICS": POKE 36,0
+ X: PRINT H$: PRINT
940  PRINT "MEAN                ";XN;M$,"                ";Q5;P$
950  POKE 36,0 + X: PRINT "MEDIAN:";: POKE 36,22 + X: PRINT XE;M$: POKE 36,0 + X::
PRINT "MODE:";: POKE 36,22 + X: PRINT XD;M$
960  POKE 36,0 + X: PRINT "STANDARD DEVIATION:";: POKE 36,22 + X: PRINT SD;P$:
POKE 36,0 + X: PRINT "SKEWNESS:";: POKE 36,22 + X: PRINT SK;Z1$: POKE 36,0 + X:
P
```

```
970  PRINT D$;"PR#0"
980  RETURN
1040  FOR I = 1 TO N: GOSUB 600: GOSUB 610: GOSUB 580
1050  IF  FN B(CM) >  = C(M) THEN 1090
1060 DN = SZ *  EXP ((PC - C(M)) / (PC - CM) * C2): IF F > 0 THEN  RETURN
1070 C(M) =  FN B(C(M)):DN =  FN B(DN): POKE 36,5 + X: PRINT DN;: POKE 36,22 + X:
PRINT C(M): IF M = Z THEN 1100
1080 M = M + 1: GOTO 1050
1090  NEXT I
1100  IF P0 = 0 THEN 1120
1110  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
1120  GOSUB 570
1130  GET Z$: IF Z$ = "N" THEN  RETURN
1140  IF Z$ = "Y" THEN 1160
1150  GOTO 1130
1160  PRINT : PRINT D$;"PR#0":P0 = 1:X = 20: GOTO 12120
1162  REM
1164  REM   **************************
1166  REM       GRAPHICS ROUTINE
1167  REM   **************************
1168  REM
1170  IF Z = 1 OR Z = 3 OR Z = 5 THEN I1 = 1
1180  IF Z = 2 OR Z = 4 OR Z = 6 THEN I1 = 2
1190  IF T(I1) = 0 THEN  PRINT : PRINT "NO DATA PRESENT": FOR X = 1 TO 1000: NEXT
X: RETURN
1200  HOME : CALL 6142: HGR : HCOLOR= 3: FOR X = 10 TO 279: HPLOT X,149: NEXT
X: FOR Y = 10 TO 149: HPLOT 10,Y: NEXT Y:X1 =  INT (269 / N)
1210  FOR X = 10 TO 279 STEP X1: FOR Y = 149 TO 8 STEP  - 7: HPLOT X,Y: NEXT Y:
HPLOT X,146 TO X,152: NEXT X
1220  FOR Y = 149 TO 8 STEP  - 14: HPLOT 7,Y TO 13,Y: FOR X = 10 + X1 / 2 TO 279 STEP
X1: HPLOT X,Y: NEXT X: NEXT Y: IF I1 = 2 THEN 1240
1230  VTAB (7): PRINT "V": VTAB (8): PRINT "O": VTAB (9): PRINT "L": VTAB (10): PRINT
```

```
"U": VTAB (11): PRINT "M": VTAB (12): PRINT "E": VTAB (14): PRINT "%": GOT
1240  VTAB (5): PRINT "P": VTAB (6): PRINT "O": VTAB (7): PRINT "P": VTAB (8): PRINT
"U": VTAB (9): PRINT "L": VTAB (10): PRINT "A": VTAB (11): PRINT "T": VTAB
1250  PRINT "O": VTAB (14): PRINT "N": VTAB (16): PRINT "%"
1260 PS = LL:X = 10:X2 = 4: VTAB (20): HTAB (2): PRINT  FN C(LL);: FOR I = 1 TO N - 2:X
= X + X1: GOSUB 580: IF I < > X2 THEN 1280
1270 J = X / 7: HTAB (J): PRINT  FN C(SZ);:X2 = X2 + 4
1280  NEXT I
1290  VTAB (21): HTAB (15): PRINT "SIZE IN UM"
1300  IF Z = 3 OR Z = 4 THEN 1380
1310 XP = 10:YP = 149:X = 10: FOR I = 1 TO N: GOSUB 600:X = X + X1:Y = 149 - (DM *
139 / 100)
1320  IF Y < 10 THEN Y = 10
1330  IF Y > 149 THEN Y = 149
1340  IF X < 10 THEN X = 10
1350  IF X > 279 THEN X = 279
1360  HPLOT XP,YP TO XP,Y: HPLOT XP,Y TO X,Y:XP = X:YP = Y: NEXT I: HPLOT  TO
X,149: IF Z = 5 OR Z = 6 THEN 1380
1370  GOTO 1440
1380 YP = 10:CM = 100:XP = 10:X = 10: FOR I = 1 TO N:X = X + X1: GOSUB 600: GOSUB
610:Y = 149 - (CM * 139 / 100)
1390  IF Y < 10 THEN Y = 10
1400  IF Y > 149 THEN Y = 149
1410  IF X < 10 THEN X = 10
1420  IF X > 279 THEN X = 279
1430  HPLOT XP,YP TO X,Y:XP = X:YP = Y: NEXT I
1440  PRINT : PRINT D$;"PR#0"
1450  PRINT D$;"PR#0": PRINT D$;"IN#0": GOSUB 570
1490  PRINT : PRINT D$;"PR#0"
1491 QC = QC + 1: IF QC > 2 THEN QC = 1: PRINT  CHR$ (12)
1492  ON Z GOSUB 3000,3010,3020,3030,3040,3050
1494  PRINT "================================="
```

```
1500  PRINT  CHR$ (9);"G"
1510  CALL 62454: TEXT : HOME
1520  PRINT : PRINT D$;"PR#0"
1530  PRINT : PRINT D$;"PR#0": RETURN
1532  REM
1534  REM   ************************
1536  REM       LISTING ROUTINE
1537  REM   ************************
1538  REM
1540  FLASH : VTAB 10: HTAB 10: PRINT "STANDBY PLEASE": NORMAL
1550  FOR Z = 1 TO 3
1560  IF Z = 1 THEN I1 = 1
1570  IF Z = 2 OR Z = 3 THEN I1 = 2
1580  IF T(I1) = 0 THEN 21320
1590 X = 0
1600  PRINT
1610  IF Z = 2 GOTO 1710
1620  IF Z = 3 GOTO 1640
1630  GOTO 1650
1640 I1 = 2
1650 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 580: GOSUB 600:SZ =  FN B(SZ):DM =  FN
C(DM): IF P0 = 1 THEN 1660
1660 L = L + 1:SZ(I) = SZ
1670  IF Z = 3 THEN P1(I) = DM: GOTO 1690
1680 V(I) = DM
1690  NEXT I
1700  GOTO 1730
1710 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 580:SZ =  FN B(SZ): IF P0 = 1 THEN 1720
1720 L = L + 1:PPP(I) = D(I,2): NEXT I
1730  NEXT Z
1740  REM
1750 X = 0
```

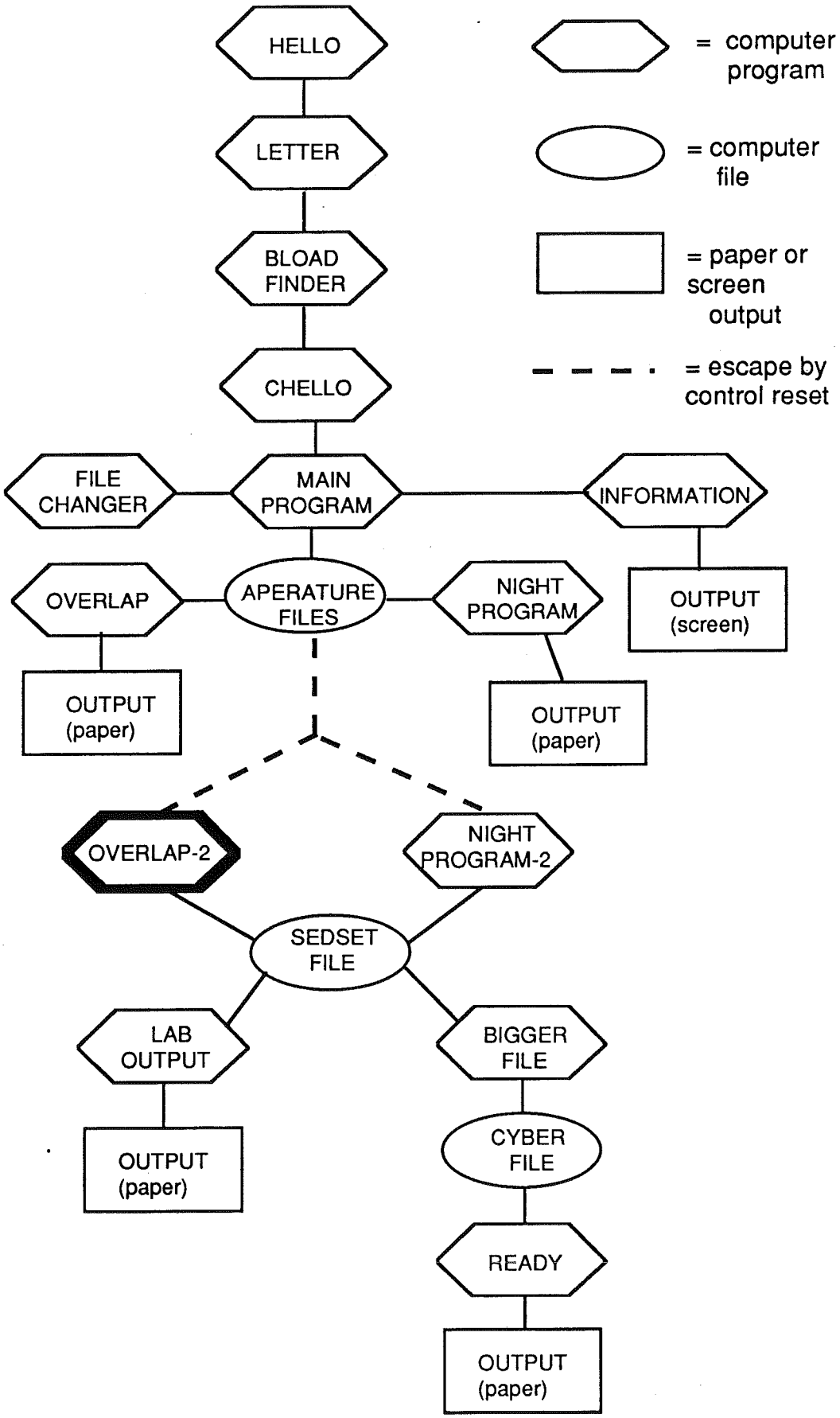
```
1760  FOR Z = 4 TO 6
1770  IF Z = 4 THEN I1 = 1
1780  IF Z = 5 OR Z = 6 THEN I1 = 2
1790  IF T(I1) = 0 THEN 21320
1800  PRINT
1810  IF Z = 5 THEN CM = T(2): GOTO 1950
1820 CM = 100: IF Z = 6 THEN  GOTO 1840
1830  GOTO 1850
1840  PRINT
1850 PS = LL: PRINT
1860 L = 5: FOR I = 1 TO N
1870  GOSUB 580: GOSUB 600: GOSUB 610
1880 SZ =  FN B(SZ):CM =  FN C(CM):DM =  FN C(DM)
1890  IF P0 = 1 THEN 1900
1900 L = L + 1
1910  IF Z = 6 THEN D1(I) = PC: GOTO 1930
1920 C1(I) = PC
1930  NEXT I
1940  GOTO 2080
1950  PRINT
1960 PS = LL
1970 L = 5: FOR I = 1 TO N
1980  GOSUB 580: GOSUB 630
1990 SZ =  FN B(SZ):CM =  FN C(CM)
2000  IF P0 = 1 THEN 2010
2010 L = L + 1:P2(I) = PC: NEXT I
2020  IF P0 = 0 THEN 2040
2030  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0:
2040  IF  PEEK (34) > 0 THEN  POKE 34,0
2050  GOTO 2080
2060  GET Z$: IF Z$ = "N" THEN  RETURN
2070  IF Z$ = "Y" THEN 2100
```

```
2080 NEXT Z
2090 Z = 7
2100 PRINT : PRINT D$;"PR#0":P0 = 1:X = 20: IF F = 1 THEN GOTO 2190
2120 POKE 36,20: PRINT "SAMPLE: ";: PRINT ID$
2130 POKE 36,20: PRINT "APERTURES: ";: PRINT AP$
2133 PRINT
2135 POKE 36,20: PRINT "INFORMATION :"
2140 POKE 36,20: PRINT "          ";DI$
2150 POKE 36,20: PRINT "          ";: PRINT EQ$
2160 POKE 36,20: PRINT "          ";: PRINT EL$
2170 POKE 36,20: PRINT "          ";: PRINT O$
2190 PRINT : PRINT
2200 HOME :X = 0
2201 GOTO 2252
2202 PRINT "NOTE:     UNPROCESSED DATA"
2204 PRINT "-----": PRINT
2210 POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH. #";: POKE 36,9 + X: PRINT
"SIZE";: POKE 36,18 + X: PRINT Z1$(1);: POKE 36,28 + X: PRINT Z1$(2)
2220 POKE 36,0 + X: PRINT H$: PRINT :PS = LL:L = 4: FOR I = 1 TO N: GOSUB 580:SZ =
FN B(SZ): IF P0 = 1 THEN 2230
2230 POKE 36,0 + X: PRINT I;: POKE 36,9 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,1);: POKE 36,30 + X: PRINT D(I,2): NEXT I: IF P0 = 0 THEN 2250
2240 PRINT :P0 = 0:X = 0: PRINT
2245 PRINT QQ$
2250 IF PEEK (34) > 0 THEN POKE 34,0
2252 PRINT "NOTE:     PROCESSED DATA"
2254 PRINT "-----": PRINT
2260 PRINT "-------------------------------------------------------------------------"
2270 PRINT "CHANNEL : SIZE  :  DIFF  :  DIFF  :  DIFF  :  CUM  :  CUM  : CUM "
2280 PRINT "      :      : VOL% : POP  : POP%  : VOL%  :  POP  : POP%"
2290 PRINT " -------------------------------------------------------------------------"
2300 FOR I = 1 TO N
```

```
2310 S1 = 9 -  LEN ( STR$ (I)):S2 = 11 -  LEN ( STR$ (SZ(I))):S3 = 11 -  LEN ( STR$
(V(I))):S4 = 12 -  LEN ( STR$ (PPP(I))):S5 = 11 -  LEN ( STR$ (P1(I))):S6 =
2320  PRINT I; SPC( S1);SZ(I); SPC( S2);V(I); SPC( S3);PPP(I); SPC( S4);P1(I); SPC(
S5);C1(I); SPC( S6);P2(I); SPC( S7 - 4);D1(I)
2325  NEXT I: PRINT : PRINT : PRINT : PRINT D$;"PR#0"
2330 FU$ = "SAMPLE NO. = " + Z$ + "   " + DI$ + "   " + EQ$
2331 FK$ = EL$ + "   " + O$:Z8$ =  MID$ (Z$,2)
2332  IF YU$ = "Y" THEN  GOTO 2334
2333  GOTO 2350
2334  PRINT D$ =  CHR$ (4)
2335  PRINT D$;"OPEN SEDSET "Z8$;",D1"
2336  PRINT D$;"WRITE SEDSET "Z8$
2337  PRINT N
2338  PRINT FU$
2339  PRINT FK$
2340  FOR I = 1 TO N
2341  PRINT SZ(I) / 1000;",";V(I)
2348  NEXT I
2349  PRINT D$;"CLOSE SEDSET "Z8$
2350  PRINT D$;"PR#0": GOTO 2450: REM   GOTO STATISTICS
2360  IF Z$ = "Y" THEN  PRINT : PRINT D$;"PR#0": GOTO 2110
2370  GOTO 2340
2380  PRINT : PRINT D$;"PR#0":P0 = 1:X = 20: GOTO 2210
2390  GOTO 2400
2400  PRINT
2410  HOME : PRINT H$: PRINT : PRINT  TAB( 15)"START UP": PRINT : PRINT H$:
PRINT
2420  PRINT
2430  GOTO 650
2440  GOTO 1540: REM     GOTO LI          STING
2450  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"STATISTICS MENU": PRINT : PRINT
H$: PRINT
```

```
2510  PRINT : PRINT : GOSUB 720
2515  PRINT : PRINT : GOSUB 740
2525  IF YY$ < > "Y" THEN 2655
2530  HOME : PRINT H$: PRINT : PRINT  TAB( 13)"  GRAPHICS  ": PRINT : PRINT H$
2535  PRINT D$;"PR#0": PRINT  CHR$ (12); PRINT D$;"PR#0"
2540  FOR Z = 1 TO 6
2545  IF G(Z) = 0 THEN 2650
2620  IF Z > 7 THEN 2610
2630  IF Z = 7 THEN  RETURN
2640  GOSUB 1170
2650  NEXT Z
2651 QC = 0
2652  PRINT D$;"PR#0": PRINT  CHR$ (12): PRINT D$;"PR#0"
2655  NEXT Q
2660  HOME : VTAB 15: HTAB 10: PRINT "PLEASE STAND BY"
2680  PRINT D$;"RUN CHELLO,D1"
3000  PRINT "DIFFERENTIAL VOLUME HISTOGRAM": RETURN
3010  PRINT "DIFFERENTIAL POPULATION HISTOGRAM": RETURN
3020  PRINT "CUMULATIVE VOLUME CURVE": RETURN
3030  PRINT "CUMULATIVE POPULATION CURVE": RETURN
3040  PRINT "OVERLAY VOLUME GRAPH": RETURN
3050  PRINT "OVERLAY POPULATION GRAPH": RETURN
21320  HOME : VTAB (10): PRINT  TAB( 6)Z1$(I1);" DATA IS ALL ZEROS "
21330  VTAB (12): HTAB (6): PRINT "PLEASE CHECK DATA FILES"
```

COULTER COUNTER



This program is the same as the OVERLAP program but it does not provide a hard copy. It is useful in cases where the data is going to be used with program READY.

```
0 REM
10  REM       THIS PROGRAM WILL OVERLAP UP TO FOUR TUBES TOGETHER
20  REM       ************************************************
30  REM
40  REM       ALSO LIST DATA, CALCULATE STATISTICS AND PLOT GRAPHS
50  REM    WITHOUT THE USER BEING PRESENT AFTER THE INITAL START UP.
60  REM
70  REM
100 QQ$ =  CHR$ (12)
110  HOME
120 KK = 26
150  GOTO 2720
151  PRINT "DO YOU WISH TO CREATE A CYBER FILE";: INPUT YU$: PRINT : PRINT :
PRINT :
152  IF YU$ = "Y" THEN 155
153  GOTO 159
155  PRINT "REMOVE PROGRAM DISK FROM DRIVE 1"
156  PRINT "   REPLACE WITH MERGE DISK"
157  PRINT
158  PRINT
159  PRINT
160  PRINT "DO YOU WANT GRAPHS PLOTTED ";: INPUT YY$
170  IF YY$ < > "Y" THEN 480
180  HOME
190  VTAB 4: PRINT "FOR EACH PLOTTED GRAPH TYPE 'Y/N' "
200  PRINT
210 BB = 7
215  IF I1 = 2 THEN 225
220  VTAB 8: HTAB BB: PRINT "DIFFERENTIAL VOLUME HISTOGRAM"
```

```
225 IF I1 = 1 THEN 235
230 VTAB 10: HTAB BB: PRINT "DIFFERENTIAL POPULATION HISTOGRAM"
235 IF I1 = 2 THEN 245
240 VTAB 12: HTAB BB: PRINT "CUMULATIVE VOLUME CURVE"
245 IF I1 = 1 THEN 255
250 VTAB 14: HTAB BB: PRINT "CUMULATIVE POPULATION CURVE"
255 IF I1 = 2 THEN 265
260 VTAB 16: HTAB BB: PRINT "OVERLAY VOLUME GRAPHICS "
265 IF I1 = 1 THEN 275
270 VTAB 18: HTAB BB: PRINT "OVERLAY POPULATION GRAPHICS"
275 IF I1 = 2 THEN 305
280 VTAB 8: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(1) = 0
290 IF Y$ = "Y" THEN G(1) = 1
300 PRINT Y$
305 IF I1 = 1 THEN 335
310 VTAB 10: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(2) = 0
320 IF Y$ = "Y" THEN G(2) = 2
330 PRINT Y$
335 IF I1 = 2 THEN 365
340 VTAB 12: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(3) = 0
350 IF Y$ = "Y" THEN G(3) = 3
360 PRINT Y$
365 IF I1 = 1 THEN 395
370 VTAB 14: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(4) = 0
380 IF Y$ = "Y" THEN G(4) = 4
390 PRINT Y$
395 IF I1 = 2 THEN 425
400 VTAB 16: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(5) = 0
410 IF Y$ = "Y" THEN G(5) = 5
420 PRINT Y$
425 IF I1 = 1 THEN 460
430 VTAB 18: HTAB 5: GET Y$: IF  ASC (Y$) = 13 THEN Y$ = "N":G(6) = 0
```

```
440  IF Y$ = "Y" THEN G(6) = 6
450  PRINT Y$
460  PRINT
470  PRINT "ARE THESE CORRECT 'Y'/'N' ": INPUT Y$: IF Y$ < > "Y" THEN  GOTO 275
480  DIM D(60,2),T(2),C(50),Z1$(3),PPP(60),V(60),SZ(60),P1(60),D1(60),C1(60),P2(60)
490 I$ =  CHR$ (9)
500 D$ =  CHR$ (4):Q$ =  CHR$ (17):Z1$(1) = " VOLUME  ":Z1$(2) = "POPULATION
":Z1$(3) = "POPULATION %":DN$ = ",D2":P0 = 0
505  DIM Q4(60)
510 C1 =  LOG (2) / 6:C2 =  LOG (2) / 3:N = 16:I1 = 1:F(G) = 0:M$ = " UM":H$ =
"****************************************"
520  DEF  FN B(X) =  INT (X * 100 + .5) / 100: DEF  FN C(X) =  INT (X * 10 + .5) / 10:
GOTO 2840
525 P$ = "  PHI"
530  PRINT : PRINT  TAB( 10)"< ENTER SELECTION > ";: RETURN
540  PRINT : PRINT  TAB( 7)"PRESS RETURN TO CONTINUE ";: RETURN
550  PRINT :Z$ = "Y": RETURN
560 SZ = PS:PS = SZ * 2^(1 / 3): RETURN
570  FOR I1 = 1 TO 2:T(I1) = 0: FOR I = 1 TO N:T(I1) = T(I1) + D(I,I1): NEXT I: NEXT I1:I1
= 1: RETURN
580 DM = (D(I,I1) / T(I1)) * 100: RETURN
590 PC = CM:CM = CM - DM: IF CM < 0 THEN CM = 0
600  RETURN
610 PC = CM:CM = CM - D(I,2): RETURN
613  REM
615  REM   **********************************
617  REM       RETRIEVING DATA ROUTINE
618  REM   **********************************
619  REM
620  PRINT
630  VTAB (12): HTAB (8): FLASH : PRINT "< INPUTING DATA >": NORMAL
```

```
640 X =  FRE (0):X = 0:N = 16
650 Z$ = S$
660  PRINT : PRINT D$;"OPEN "Z$;,DN$
670  PRINT : PRINT D$;"READ "Z$
680  INPUT N: INPUT LL: INPUT Y$: INPUT ID$: INPUT EL$: INPUT DI$: INPUT EQ$:
INPUT AP$: INPUT O$
690  FOR I1 = 1 TO 2: FOR I = 1 TO N: INPUT D(I,I1):D(1,I1) = 0:D(2,I1) = 0:D(3,I1) = 0:
NEXT I: NEXT I1
700  PRINT : PRINT D$;"CLOSE ";Z$:I1 = 1: GOSUB 570: RETURN
701  REM
702  REM   ****************************************
705  REM      CALCULATING STATISTICS ROUTINE
708  REM   ****************************************
709  REM
710 I1 = 1: IF T(1) = 0 THEN 2650
720  GOTO 740
730 I1 = 2: IF T(2) = 0 THEN 2650
740  HOME :XN = 0:XE = 0:XD = 0:SD = 0:SK = 0:KU = 0
745 Q1 = 0:Q2 = 0:Q3 = 0:Q4 = 0:Q5 = 0:Q6 = 0:Q7 = 0:Q8 = 0:Q9 = 0
750  VTAB (12): HTAB (8): FLASH : PRINT "< CALCULATING STATISTICS >": NORMAL
760 PS = LL:PK = 0
770  GOSUB 560
771  FOR I = 1 TO N
781 Q1 =  LOG (SZ(I) / 1000)
782 Q3 =  - (Q1 / .301) * .434294
784 Q4(I) = Q3 - 0.161
786 Q2 = (Q4(I) * D(I,I1)) + Q2
788  IF D(I,I1) < PK THEN  GOTO 790
789 CK = I:PK = D(I,I1)
790  NEXT I
793 Q5 = Q2 / T(I1)
797 XN = (10 ^( - Q5 * .301)) * 1000
```

```
800  IF CK - 1 > 1 GOTO 820
810 XD = 2^(1 / 6) * LL
820 C(M) = 50:F = 1:CM = 100:PS = LL: GOSUB 1000:F = 0:XE = DN:PS = LL: FOR I= 1 TO
N: GOSUB 560:XI =  LOG (SZ) + C1: IF XD = 0 AND CK = I THEN 840
830  GOTO 860
840 XD =  EXP ( LOG (SZ) + ((D(CK,I1) - D(CK - 1,I1)) / (2 * D(CK,I1) - D(CK - 1,I1) -
D(CK + 1,I1))) * C2)
860 Q6 = D(I,I1) * (Q4(I) - Q5)^2 + Q6
861 Q7 = D(I,I1) * (Q4(I) - Q5)^ 3 + Q7
862 Q8 = D(I,I1) * (Q4(I) - Q5)^4 + Q8
863  NEXT I
864 Q9 = Q6 / T(I1)
865 SD = Q9 ^.5
866 SK = (Q7 / T(I1)) / Q9 ^1.5
867 KU = (Q8 / T(I1)) / Q9 ^2
869  IF XN > XD THEN Z7$ = " POSITIVE"
870  IF XN < XD THEN Z7$ = " NEGATIVE"
880  IF KU - 3 < 0 THEN Z2$ = " PLATYKURTIC"
890  IF KU - 3 > 0 THEN Z2$ = " LEPTOKURTIC"
900  IF KU - 3 = 0 THEN Z2$ = " MESOKURTIC"
910 XN =  FN B(XN):XD =  FN B(XD):SD =  FN B(SD):SK =  FN B(SK):XE =  FN
B(XE):KU =  FN B(KU):Q5 =  FN B(Q5): HOME :X = 0
920  PRINT D$;"PR#1"
930  PRINT : PRINT
```

```
940  POKE 36,0 + X: PRINT H$: POKE 36,8 + X: PRINT Z1$(I1);" STATISTICS": POKE 36,0
+ X: PRINT H$: PRINT
950  PRINT "MEAN              ";XN;M$,"              ";Q5;P$
960  POKE 36,0 + X: PRINT "MEDIAN:";: POKE 36,22 + X: PRINT XE;M$: POKE 36,0 + X::
PRINT "MODE:";: POKE 36,22 + X: PRINT XD;M$
970  POKE 36,0 + X: PRINT "STANDARD DEVIATION:";: POKE 36,22 + X: PRINT SD;M$:
POKE 36,0 + X: PRINT "SKEWNESS:";: POKE 36,22 + X: PRINT SK;Z7$: POKE 36,0 + X:
P
980  PRINT D$;"PR#0"
990  RETURN
1000  FOR I = 1 TO N: GOSUB 580: GOSUB 590: GOSUB 560
1010  IF  FN B(CM) >  = C(M) THEN 1050
1020 DN = SZ *  EXP ((PC - C(M)) / (PC - CM) * C2): IF F > 0 THEN  RETURN
1030 C(M) =  FN B(C(M)):DN =  FN B(DN): POKE 36,5 + X: PRINT DN;: POKE 36,22 + X:
PRINT C(M): IF M = Z THEN 1060
1040 M = M + 1: GOTO 1010
1050  NEXT I
1060  IF P0 = 0 THEN 1080
1070  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
1080  GOSUB 550
1090  GET Z$: IF Z$ = "N" THEN  RETURN
1100  IF Z$ = "Y" THEN 1120
1110  GOTO 1090
1120  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 12120
1122  REM
1123  REM  ******************************
1125  REM        GRAPHICS ROUTINE
1127  REM  ******************************
1128  REM
1130  IF Z = 1 OR Z = 3 OR Z = 5 THEN I1 = 1
1140  IF Z = 2 OR Z = 4 OR Z = 6 THEN I1 = 2
1150  IF T(I1) = 0 THEN  PRINT : PRINT "NO DATA PRESENT": FOR X = 1 TO 1000: NEXT
```

```
X: RETURN
1160  HOME : CALL 6142: HGR : HCOLOR= 3: FOR X = 10 TO 279: HPLOT X,149: NEXT
X: FOR Y = 10 TO 149: HPLOT 10,Y: NEXT Y:X1 =  INT (269 / N)
1170  FOR X = 10 TO 279 STEP X1: FOR Y = 149 TO 8 STEP  - 7: HPLOT X,Y: NEXT Y:
HPLOT X,146 TO X,152: NEXT X
1180  FOR Y = 149 TO 8 STEP  - 14: HPLOT 7,Y TO 13,Y: FOR X = 10 + X1 / 2 TO 279 STEP
X1: HPLOT X,Y: NEXT X: NEXT Y: IF I1 = 2 THEN 1200
1190  VTAB (7): PRINT "V": VTAB (8): PRINT "O": VTAB (9): PRINT "L": VTAB (10): PRINT
"U": VTAB (11): PRINT "M": VTAB (12): PRINT "E": VTAB (14): PRINT "%": GOT
1200  VTAB (5): PRINT "P": VTAB (6): PRINT "O": VTAB (7): PRINT "P": VTAB (8): PRINT
"U": VTAB (9): PRINT "L": VTAB (10): PRINT "A": VTAB (11): PRINT "T": VTAB
1210  PRINT "O": VTAB (14): PRINT "N": VTAB (16): PRINT "%"
1220 PS = LL:X = 10:X2 = 4: VTAB (20): HTAB (2): PRINT  FN C(LL);: FOR I = 1 TO N - 2:X
= X + X1: GOSUB 560: IF I <  > X2 THEN 1240
1230 J = X / 7: HTAB (J): PRINT  FN C(SZ);:X2 = X2 + 4
1240  NEXT I
1250  VTAB (21): HTAB (15): PRINT "SIZE IN UM"
1260  IF Z = 3 OR Z = 4 THEN 1340
1270 XP = 10:YP = 149:X = 10: FOR I = 1 TO N: GOSUB 580:X = X + X1:Y = 149 - (DM *
139 / 100)
1280  IF Y < 10 THEN Y = 10
1290  IF Y > 149 THEN Y = 149
1300  IF X < 10 THEN X = 10
1310  IF X > 279 THEN X = 279
1320  HPLOT XP,YP TO XP,Y: HPLOT XP,Y TO X,Y:XP = X:YP = Y: NEXT I: HPLOT  TO
X,149: IF Z = 5 OR Z = 6 THEN 1340
1330  GOTO 1400
1340 YP = 10:CM = 100:XP = 10:X = 10: FOR I = 1 TO N:X = X + X1: GOSUB 580: GOSUB
590:Y = 149 - (CM * 139 / 100)
1350  IF Y < 10 THEN Y = 10
1360  IF Y > 149 THEN Y = 149
1370  IF X < 10 THEN X = 10
```

```
1380  IF X > 279 THEN X = 279
1390  HPLOT XP,YP TO X,Y:XP = X:YP = Y: NEXT I
1400  PRINT : PRINT D$;"PR#1"
1410  PRINT D$;"PR#0": PRINT D$;"IN#0": GOSUB 550
1420  PRINT : PRINT D$;"PR#1"
1430 QC = QC + 1: IF QC > 2 THEN QC = 1: PRINT  CHR$ (12)
1440  ON Z GOSUB 2590,2600,2610,2620,2630,2640
1450  HTAB KK: PRINT "================================="
1460  PRINT  CHR$ (9);"G"
1470  CALL 62454: TEXT : HOME
1480  PRINT : PRINT D$;"PR#1"
1490  PRINT : PRINT D$;"PR#0": RETURN
1500  FLASH : VTAB 10: HTAB 10: PRINT "STANDBY PLEASE": NORMAL
1502  REM
1503  REM  ******************************
1505  REM        LISTING ROUTINE
1507  REM  ******************************
1508  REM
1510  FOR Z = 1 TO 3
1520  IF Z = 1 THEN I1 = 1
1530  IF Z = 2 OR Z = 3 THEN I1 = 2
1540  IF T(I1) = 0 THEN 2650
1550 X = 0
1560  PRINT
1570  IF Z = 2 GOTO 1670
1580  IF Z = 3 GOTO 1600
1590  GOTO 1610
1600 I1 = 2
1610 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 560: GOSUB 580:SZ =  FN B(SZ):DM =  FN
C(DM): IF P0 = 1 THEN 1620
1620 L = L + 1:SZ(I) = SZ
1630  IF Z = 3 THEN P1(I) = DM: GOTO 1650
```

```
1640 V(I) = DM
1650  NEXT I
1660  GOTO 1690
1670 PS = LL:L = 5: FOR I = 1 TO N: GOSUB 560:SZ =  FN B(SZ): IF P0 = 1 THEN 1680
1680 L = L + 1:PPP(I) = D(I,2): NEXT I
1690  NEXT Z
1700  REM
1710 X = 0
1720  FOR Z = 4 TO 6
1730  IF Z = 4 THEN I1 = 1
1740  IF Z = 5 OR Z = 6 THEN I1 = 2
1750  IF T(I1) = 0 THEN 2650
1760  PRINT
1770  IF Z = 5 THEN CM = T(2): GOTO 1910
1780 CM = 100: IF Z = 6 THEN  GOTO 1800
1790  GOTO 1810
1800  PRINT
1810 PS = LL: PRINT
1820 L = 5: FOR I = 1 TO N
1830  GOSUB 560: GOSUB 580: GOSUB 590
1840 SZ =  FN B(SZ):CM =  FN C(CM):DM =  FN C(DM)
1850  IF P0 = 1 THEN 1860
1860 L = L + 1
1870  IF Z = 6 THEN D1(I) = PC: GOTO 1890
1880 C1(I) = PC
1890  NEXT I
1900  GOTO 2040
1910  PRINT
1920 PS = LL
1930 L = 5: FOR I = 1 TO N
1940  GOSUB 560: GOSUB 610
1950 SZ =  FN B(SZ):CM =  FN C(CM)
```

```
1960  IF P0 = 1 THEN 1970
1970 L = L + 1:P2(I) = PC: NEXT I
1980  IF P0 = 0 THEN 2000
1990  PRINT : PRINT D$;"PR#0":P0 = 0:X = 0: RETURN
2000  IF  PEEK (34) > 0 THEN  POKE 34,0
2010  GOTO 2040
2020  GET Z$: IF Z$ = "N" THEN  RETURN
2030  IF Z$ = "Y" THEN 2060
2040  NEXT Z
2050 Z = 7
2060  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: IF F = 1 THEN  GOTO 2150
2065  PRINT  CHR$ (12)
2066  IF Z1$ = "P" THEN Q9 =  ABS (P1(I4) - P1(I4 + 1)): IF Q9 > P THEN V5 = 9999
2067  IF Z1$ = "V" THEN Q9 =  ABS (V(I4) - V(I4 + 1)): IF Q9 > P THEN V5 = 9999
2069  IF V5 = 9999 THEN  GOSUB 3140
2070  POKE 36,20: PRINT "SAMPLE: ";: PRINT ID$
2080  POKE 36,20: PRINT "APERTURES: ";: PRINT AP$
2090  PRINT
2100  POKE 36,20: PRINT "INFORMATION :"
2110  POKE 36,20: PRINT "          ";DI$
2120  POKE 36,20: PRINT "          ";: PRINT EQ$
2130  POKE 36,20: PRINT "          ";: PRINT EL$
2140  POKE 36,20: PRINT "          ";: PRINT O$
2150  PRINT : PRINT
2160  HOME :X = 0
2165  PRINT "NOTE:     UNPROCESSED DATA FROM TA II"
2166  PRINT "====="
2170  POKE 36,0 + X: PRINT H$: POKE 36,0 + X: PRINT "CH. #";: POKE 36,9 + X: PRINT
"SIZE";: POKE 36,18 + X: PRINT Z1$(1);: POKE 36,28 + X: PRINT Z1$(2)
2180  POKE 36,0 + X: PRINT H$: PRINT :PS = LL:L = 4: FOR I = 1 TO N: GOSUB 560:SZ =
FN B(SZ): IF P0 = 1 THEN 2182
2182  IF Z1$ = "V" THEN D(I,2) = 0
```

```
2184  IF Z1$ = "P" THEN D(I,1) = 0
2190  POKE 36,0 + X: PRINT I;: POKE 36,9 + X: PRINT SZ;: POKE 36,20 + X: PRINT
D(I,1);: POKE 36,30 + X: PRINT D(I,2): NEXT I: IF P0 = 0 THEN 2220
2200  PRINT :P0 = 0:X = 0: PRINT
2210  PRINT QQ$
2220  IF  PEEK (34) > 0 THEN  POKE 34,0
2223  PRINT "NOTE:     PROCESSED DATA
2224  PRINT "=====": PRINT
2225  PRINT ID$: PRINT
2230  PRINT "-------------------------------------------------------------------------"
2240  PRINT "CHANNEL : SIZE  :  DIFF  :  DIFF  : DIFF  : CUM  :  CUM  : CUM "
2250  PRINT "      :      : VOL%  : POP  : POP%  : VOL%  : POP  : POP%"
2260  PRINT " -------------------------------------------------------------------------"
2270  FOR I = 1 TO N
2272  IF Z1$ = "V" THEN PPP(I) = 0:P1(I) = 0:P2(I) = 0:D1(I) = 0
2274  IF Z1$ = "P" THEN V(I) = 0:C1(I) = 0
2280 S1 = 9 -  LEN ( STR$ (I)):S2 = 11 -  LEN ( STR$ (SZ(I))):S3 = 11 -  LEN ( STR$
(V(I))):S4 = 12 -  LEN ( STR$ (PPP(I))):S5 = 11 -  LEN ( STR$ (P1(I))):S6 =
2290  PRINT I; SPC( S1);SZ(I); SPC( S2);V(I); SPC( S3);PPP(I); SPC( S4);P1(I); SPC(
S5);C1(I); SPC( S6);P2(I); SPC( S7 - 4);D1(I)
2299  NEXT I: PRINT : PRINT : PRINT : PRINT D$;"PR#0"
2300 FK$ = EL$ + "   " + O$:Z8$ =  MID$ (Z$,2)
2301 FU$ = "SAMPLE NO. = " + Z8$ + "   " + DI$ + "   " + EQ$
2302  IF YU$ = "Y" THEN  GOTO 2304
2303  GOTO 2330
2304  PRINT D$ =  CHR$ (4)
2305  PRINT D$;"OPEN SEDSET "Z8$;",D1"
2306  PRINT D$;"WRITE SEDSET "Z8$
2307  PRINT N
2308  PRINT FU$
2309  PRINT FK$
2310  FOR I = 1 TO N
```

```
2311  PRINT SZ(I) / 1000;",";V(I)
2318  NEXT I
2319  PRINT D$;"CLOSE SEDSET "Z8$
2320  PRINT
2325  PRINT D$;"PR#0": GOTO 2420
2330  IF Z$ = "Y" THEN  PRINT : PRINT D$;"PR#1": GOTO 2110
2340  GOTO 2320
2350  PRINT : PRINT D$;"PR#1":P0 = 1:X = 20: GOTO 2170
2360  GOTO 2370
2370  PRINT
2380  HOME : PRINT H$: PRINT : PRINT  TAB( 15)"START UP": PRINT : PRINT H$:
PRINT
2390  PRINT
2400  GOTO 2840
2410  GOTO 1500
2420  HOME : PRINT H$: PRINT : PRINT  TAB( 12)"STATISTICS MENU": PRINT : PRINT
H$: PRINT
2430  PRINT : PRINT : IF Z1$ = "V" THEN  GOSUB 710: GOTO 2450
2440  PRINT : PRINT : IF Z1$ = "P" THEN  GOSUB 730
2450  IF YY$ < > "Y" THEN 2560
2460  HOME : PRINT H$: PRINT : PRINT  TAB( 13)"  GRAPHICS  ": PRINT : PRINT H$
2470  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2480  FOR Z = 1 TO 6
2490  IF G(Z) = 0 THEN 2530
2500  IF Z > 7 THEN 2610
2510  IF Z = 7 THEN  RETURN
2520  GOSUB 1130
2530  NEXT Z
2540 QC = 0
2550  PRINT D$;"PR#1": PRINT  CHR$ (12): PRINT D$;"PR#0"
2555 Q9 = 0:V5 = 0
2560  NEXT Z3
```

```
2570 HOME : VTAB 15: HTAB 10: PRINT "PLEASE STAND BY"
2580 PRINT D$;"RUN CHELLO,D1"
2590 HTAB KK: PRINT "DIFFERENTIAL VOLUME HISTOGRAM": RETURN
2600 HTAB KK: PRINT "DIFFERENTIAL POPULATION HISTOGRAM": RETURN
2610 HTAB KK: PRINT "CUMULATIVE VOLUME CURVE": RETURN
2620 HTAB KK: PRINT "CUMULATIVE POPULATION CURVE": RETURN
2630 HTAB KK: PRINT "OVERLAY VOLUME GRAPH": RETURN
2640 HTAB KK: PRINT "OVERLAY POPULATION GRAPH": RETURN
2650 HOME : VTAB (10): PRINT  TAB( 6)Z1$(I1);" DATA IS ALL ZEROS "
2660 VTAB (12): HTAB (6): PRINT "PLEASE CHECK DATA FILES"
2670 REM
2680 REM  **************************
2690 REM       OVERLAP ROUTINE
2700 REM  **************************
2710 REM
2720 INPUT "HOW MANY TUBES DO YOU WANT TO OVERLAP ";Z6
2730 IF Z6 > 4 THEN  PRINT "MAX OF 4 TUBES PLEASE ": GOTO 2720
2740 FOR Z1 = 1 TO Z6
2750 PRINT "INPUT TUBE # ";Z1;" LETTER ";: INPUT L$(Z1)
2760 IF Z1 = 1 THEN  GOTO 2780
2770 IF  ASC (L$(Z1)) <  ASC (L$(Z1 - 1)) THEN  PRINT "TUBES MUST BE IN
INCREASING ORDER ": GOTO 2740
2780 NEXT Z1
2790 PRINT "INPUT START FILE # AND FINISH FILE # ";: INPUT Z4,Z2
2800 F = 5:P = 10: REM      P=LIMIT PERCENT
2810 HOME : PRINT "VOLUME OR POPULATION (V/P) ";: GET Z1$
2812 PRINT
2814 IF Z1$ = "V" THEN I1 = 1
2816 IF Z1$ = "P" THEN I1 = 2
2820 IF Z1$ = "V" OR Z1$ = "P" THEN  GOTO 151
2830 GOTO 2800
2840 FOR Z3 = Z4 TO Z2
```

```
2850 HOME : PRINT "SAMPLE  OF SMALLEST GROUP IS ";:S$ = L$(1) +  STR$ (Z3):
PRINT S$
2860 GOSUB 620
2870 IF Z1$ = "V" THEN I1 = 1
2880 IF Z1$ = "P" THEN I1 = 2
2890 IF T(I1) = 0 THEN 2650
2900 SL = LL:OC = 0: FOR I = 1 TO N:C(I) = D(I,I1): NEXT I
2910 FOR Z1 = 2 TO Z6
2920 PRINT "SAMPLE OF NEXT LARGEST TUBE IS ";:S$ = L$(Z1) +  STR$ (Z3): PRINT
S$
2930 IF S$ = "0" THEN 3340
2940 GOSUB 620
2950 IF Z1$ = "V" THEN I1 = 1
2960 IF Z1$ = "P" THEN I1 = 2
2970 IF T(I1) = 0 THEN 2650
2980 PS = SL: IF OC > 0 THEN N = OC
2990 FOR I = 1 TO N: GOSUB 560: IF  FN B(SZ) =  FN B(LL) THEN 3020
3000 NEXT I
3010 PRINT "OVERLAP ERROR": GOTO 21400
3020 I4 = I
3025 F = 5
3030 OF = 0:PF = 0:AF = 0:J = 1:X = 0: FOR I = I4 TO I4 + 10: IF D(J,I1) = 0 THEN 3100
3035  IF C(I) = 0 THEN F = X: GOTO 3090
3040 PF = OF:OF = D(J,I1) / C(I): IF PF = 0 THEN 3100
3050  IF OF <  = PF + P / 100 * PF THEN 3080
3060GOTO 3030
3140 Q9 =  FN B(Q9): PRINT : PRINT "OVERLAP FACTORS FAIL AT ";Q9;" PERCENT":
PRINT "YOUR LIMIT IS ";P;" PERCENT": PRINT : PRINT
3220  RETURN
3225  REM       <><><><><><><>
3230  FOR I = 1 TO 16
3234 C(I) = C(I) * AF
```

```
3236  NEXT I
3240 J = 1: FOR I = I4 TO Z
3250  IF C(I) = 0 AND D(J,I1) = 0 THEN 3290
3260 XP =  ABS (C(I) - D(J,I1)): IF YP = 0 THEN 3280
3270  IF XP >  = YP THEN 3290
3280 X = J:Y = I:YP = XP
3290 J = J + 1: NEXT I
3300 N = Y + 16 - X
3310 X = X + 1:Y = Y + 1: FOR J = X TO 16
3320 C(Y) = D(J,I1):Y = Y + 1: NEXT J:OC = N
3330  NEXT Z1
3340 N = OC: FOR I = 1 TO N:D(I,I1) = C(I)
3350  IF I1 = 1 THEN D(I,I1) =  INT (D(I,I1) * 100 + .5) / 100
3360  IF I1 = 2 THEN D(I,I1) =  INT (D(I,I1))
3370  NEXT I: GOSUB 570:LL = SL: HOME
3380  PRINT
3385  IF Z1$ = "V" THEN DD$ = "VOLUME "
3387  IF Z1$ = "P" THEN DD$ = "POPULATION "
3390 ID$ = DD$ + "OVERLAP FOR SAMPLE # " +  STR$ (Z3): PRINT ID$
3400 AP$ = L$(1) + "  " + L$(2) + "  " + L$(3) + "  " + L$(4): PRINT AP$
3410  PRINT "INFORMATION "
3420  PRINT "        ";DI$
3430  PRINT "        ";EQ$
3440  PRINT "        ";EL$
3450  PRINT "        ";O$
3500  GOTO 2410
```