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QUANTITATIVE GEOMORPHOLOGY OF DRAINAGE BASINS IN SUMTER NATIONAL FOREST, SOUTH CAROLINA

By Glenn G. Patterson

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CONTENTS

	Page
Factors for converting inch-pound units to International System Units (SI)	IV
Abstract	1
Introduction	1
Procedures	2
Mapping	2
Digitizing	6
Data retrieval	7
Time required	8
References	8
Appendixes	
A. Sample map	9
B. Program listings	10
C. Generalized flow chart	34
D. List of variables	40
E. Diskette storage format	45
F. Sample outputs	49
G. Adapting this program to other areas	53
Index	55

FIGURE

1. Map showing location of the three divisions of Sumter National Forest	3

FACTORS FOR CONVERTING INCH-POUND UNITS
TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). Computer printouts produced by the program described herein express values in both inch-pound and SI units.

Multiply inch-pound units	by	to obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
square feet (ft^2)	9.290×10^{-2}	square meters (m^2)
acres	4.047×10^{3}	square meters
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)

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ABSTRACT

This report describes a computer program, written in Basic, that facilitates quantitative analysis of drainage basins and channel networks. The program was used to inventory 2,000 small watersheds in Sumter National Forest, South Carolina during 1980 and 1981. Drainage basins and stream segments were delineated in color on mylar overlays over U.S. Geological Survey 1:24,000 scale maps. Drainage basin characteristics were quantified and stored on eight-inch diskettes. The program can produce printouts and plots that summarize geomorphic data for each watershed. The program is adaptable to other locations.

INTRODUCTION

Quantitative geomorphology of drainage basins and channel networks involves measurement of geometric dimensions of watersheds and stream systems. Stream systems can be divided into segments of various orders. First order segments are the smallest, unbranched tributaries. Where two first order segments join, they form a second order segment. Two second order segments join to make a third order segment, and so on.

Measurements commonly made on stream systems include numbers and lengths of stream segments of each order, basin area, basin length, basin perimeter, and land surface gradient. These measurements can be combined into parameters such as drainage density, bifurcation ratio, and relief ratio. Statistical comparisons can determine similarities and differences among measured basins.

Geomorphic parameters, together with characteristics of climate and soil, are closely related to hydrologic parameters such as total stream discharge, peak discharge, hydrograph shape, erosion rate, and sediment yield (Strahler, 1964). The U.S. Forest Service, Southeast Region, is using these relationships to help predict the effect of various land management practices on hydrology, erosion, and fish

habitat (McLaughlin, 1980). The Forest Service is identifying groups of similar small watersheds, or drainage basin response units (DBRUs). Working with statistically similar groups, rather than with single watersheds, saves much valuable time and effort and increases the transfer value of data that are collected.

This study was undertaken in cooperation with Francis Marion and Sumter National Forests as a part of their management effort.

The purpose of this study was twofold: (1) develop a computer program, written in Basic, that would facilitate collection, storage, and analysis of geomorphic data from large numbers of small watersheds, and (2) use the program to inventory about 2,000 small watersheds in Sumter National Forest, South Carolina.

The scope of the study was limited to writing the computer program, delineating basins and channel networks on maps, and using the program to convert information from the maps into digital records on diskettes. Statistical analyses more involved than basic descriptive summaries were not a part of this study.

The study area consists of Sumter National Forest, which covers 370,000 acres in three divisions, all in the northwest portion of South Carolina (fig. 1). The Long Cane Division (Edgefield and Long Cane Districts) and the Enoree Division (Enoree and Tyger Districts) are in the gently rolling Piedmont province, whereas the Pickens Division (Andrew Pickens District) is in the Blue Ridge province.

PROCEDURES

The method used in this study to inventory small watersheds (drainage basin response units or DBRUs) consists of two main processes: (1) delineating drainage basins and stream segments on maps, and (2) using a digitizer and a minicomputer to store and analyze data from the maps.

Mapping

Information was obtained from four kinds of maps:

1. USGS hydrologic unit map of South Carolina,
2. USFS 1:24,000 maps showing land owned by the Forest Service,
3. USFS 1:125,000 administrative maps marked with administrative watersheds, and

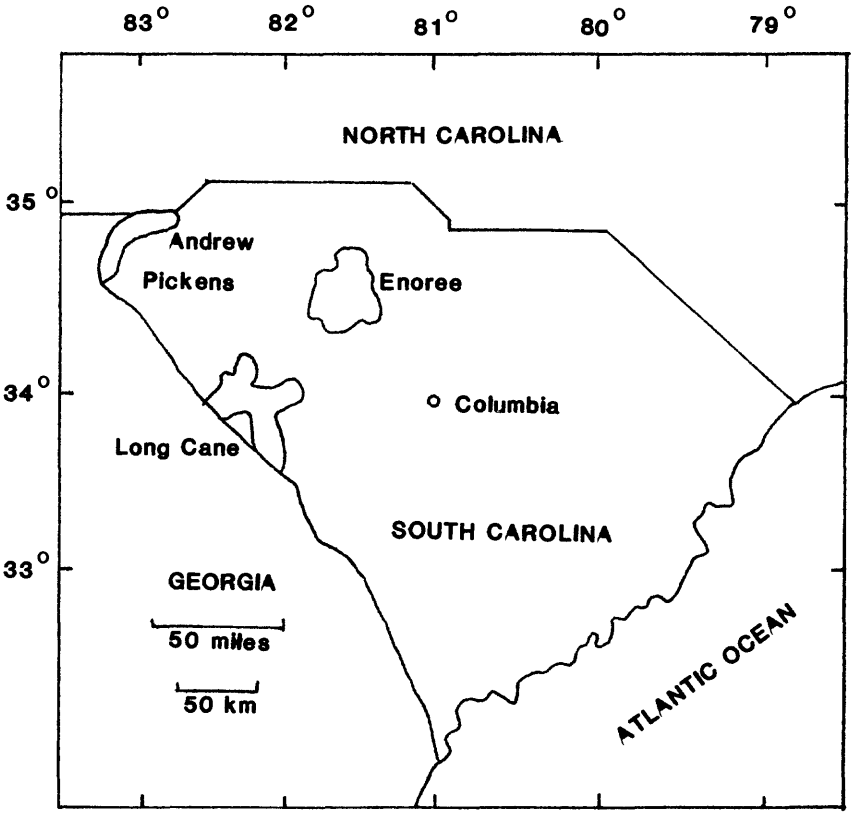


Figure 1.--Location of the three divisions of Sumter National Forest.

4. USGS 1:24,000 topographic maps.

The product of the mapping procedure was a mylar overlay for each USGS 1:24,000 map. A black and white representation of a completed map is included in Appendix A.

The mapping procedure was as follows: Forest Service land ownership boundaries were traced onto the USGS 1:24,000 map. All identifiable stream channels were delineated, using broken lines for intermittent and solid lines for perennial, with blue pencil on the base map. Stream orders were assigned to the delineated stream segments. A mylar overlay was attached to each base map. Permanent felt tip markers with fine tips were used to draw on the overlay. Intermittent and perennial stream segments were traced on the overlay using this color key:

Stream order	Color
1	brown
2	orange
3	red
4	green
5	blue
6	olive green

Watershed boundaries for third, fourth, fifth, and sixth order streams were delineated. These watersheds constituted DBRUs. An arbitrary criterion of 40 percent Forest Service ownership, approximated by eye, was set for determining which DBRUs to include in the analysis. This followed the practice established on Jefferson National Forest, Virginia (Marburger and others, 1979). This color key was used for basin boundaries:

Stream order	Color
3	pink
4	purple
5	gray
6	gray

Forest Service administrative watersheds were delineated in black.

A unique, 12-digit number was assigned to each DBRU. The DBRU number begins with a large geographic unit (hydrologic region) and specifies progressively smaller pieces of that unit, down to the third order DBRU.

The numbering convention for Sumter National Forest is:

5 0 1 0 8	2 3 A	0 3	0 1
H	A	F	T

where:

H = last five digits of USGS hydrologic unit number (first three digits for all of Sumter National Forest are 030).

A = USFS administrative watershed number.

F = fourth, fifth, or sixth order watershed number. These two digits are:

00 for third order DBRUs,
01-50 for fourth order,
51-60 for fifth order, and
61-70 for sixth order.

T = third order watershed number (00 if order is greater than three).

This numbering convention indicates which, if any, large DBRU contains a given third-order DBRU. A small DBRU that drains directly into the highest order stream segment of a larger DBRU is called a sub-DBRU.

In general, DBRUs were numbered starting at the mouth of a large stream and proceeding counterclockwise around the large watershed.

A list of DBRUs was prepared for each map quadrangle. Listed for each DBRU were DBRU number, maximum and minimum basin elevations, numbers of intermittent and perennial stream segments of each order, and any remark to be included in the record. Lakes and ponds were treated as stream segments; those greater than about one acre in size were considered perennial. A stream segment containing both intermittent and perennial reaches within the same stream order was counted as 0.5 intermittent segment and 0.5 perennial segment. Adjacent quadrangles were checked to insure consistent mapping across map borders.

Some DBRUs were selected for hypsometric, or area-elevation, analysis, which is discussed below. When the hypsometric contour interval differed from the map contour interval, hypsometric contour lines were delineated in yellow to facilitate digitizing incremental areas.

Digitizing

Equipment used for converting mapped information to digital form included:[1]

1. GTCO model T4 digitizer with 30- by 36-inch, 0.01 inch resolution tablet;

2. Wang model 2200VP computational system, with:

   model 2270-2 dual diskette drive,
   model 2221W line printer,
   model 2207A I/O interface controller, and
   model 2232B flatbed plotter.

The programs used to input, retrieve, and update data are listed in Appendix B. Appendix C is a generalized flow chart for the programs. Appendix D lists and defines all the variables used, and Appendix E explains the diskette storage format.

The programs use a conversational format to request information one step at a time from the user. Ample opportunities are provided for correcting mistakes. Prior to storing data on a fresh diskette, the diskette must be scratched by using this command: SCRATCH DISK R LS=1, END=1023. Scratch a diskette only once, as this command deactivates any data already stored. The procedure to use the programs is as follows: The computational system is initialized. The program diskette is inserted in the "F" slot and a data diskette in the "R" slot.

The program is started by keying LOAD RUN RETURN and following directions as they appear on the screen.

First a list of DBRU identification information is entered. If the DBRU contains sub-DBRUs, their numbers are entered so the program can accumulate data from them. This avoids having to digitize stream segments more than once.

The program will print out instructions for using the digitizer, if desired.

The numbers of intermittent and perennial stream segments of each order are entered, and their lengths are digitized.

---

[1]The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

A blue line is drawn from the mouth of the DBRU to the most distant point on the perimeter. The line may bend if necessary to generally follow the stream. This line is the basin length, and its presence on the map indicates that the DBRU has been digitized.

After digitizing the basin length, the perimeter and area of the DBRU are digitized. This is a single operation. Finally, a remark is entered if desired.

If no hypsometric analysis is to be performed, the next step stores the data from the DBRU as one logical record in a diskette data file called DBRU.

The optional hypsometric, or area-elevation analysis, may be used to measure the portion of a basin's area that falls within each of as many as 17 elevation increments. This information can be useful in studying erosional status and estimating elevation-specific parameters over the basin (Strahler, 1964).

The first 100 DBRUs measured on Sumter National Forest were selected to represent the range of topography in the Forest. Hypsometric analyses were run on them to determine area-weighted mean basin elevation for each DBRU. A regression equation was calculated for each division of the Forest to relate mean basin elevation to the arithmetic average of the maximum and minimum basin elevations. Subsequently, all mean basin elevations were automatically estimated using the regression equations.

Data are stored on diskettes as described in Appendix E. An update program facilitates review and correction of stored data. To obtain printed or plotted output, the retrieval option on the initial program menu is used.

Data Retrieval

Output may be produced for a single DBRU or for each of a group of DBRUs. A group may be defined by fourth-order DBRU number, administrative watershed number, map quadrangle name, district name, or national forest name.

Output options, examples of which are included in Appendix F, include a summary printout of data for each DBRU, two plots to check Hortons laws of stream numbers and of stream lengths (Horton, 1945), and, if available, a hypsometric plot of relative height versus relative area.

A short program called LISTDBRU prints a list of the DBRUs stored on a diskette. A programmer may perform any desired statistical analysis by writing a new program that retrieves the stored data.

Appendix G lists some modifications that must be made to the existing programs before using them to inventory new areas.

Time Required

Mapping the 370,000 acres of Sumter National Forest required 27 man-weeks. Twenty-seven more man-weeks were required for digitizing the maps.

REFERENCES

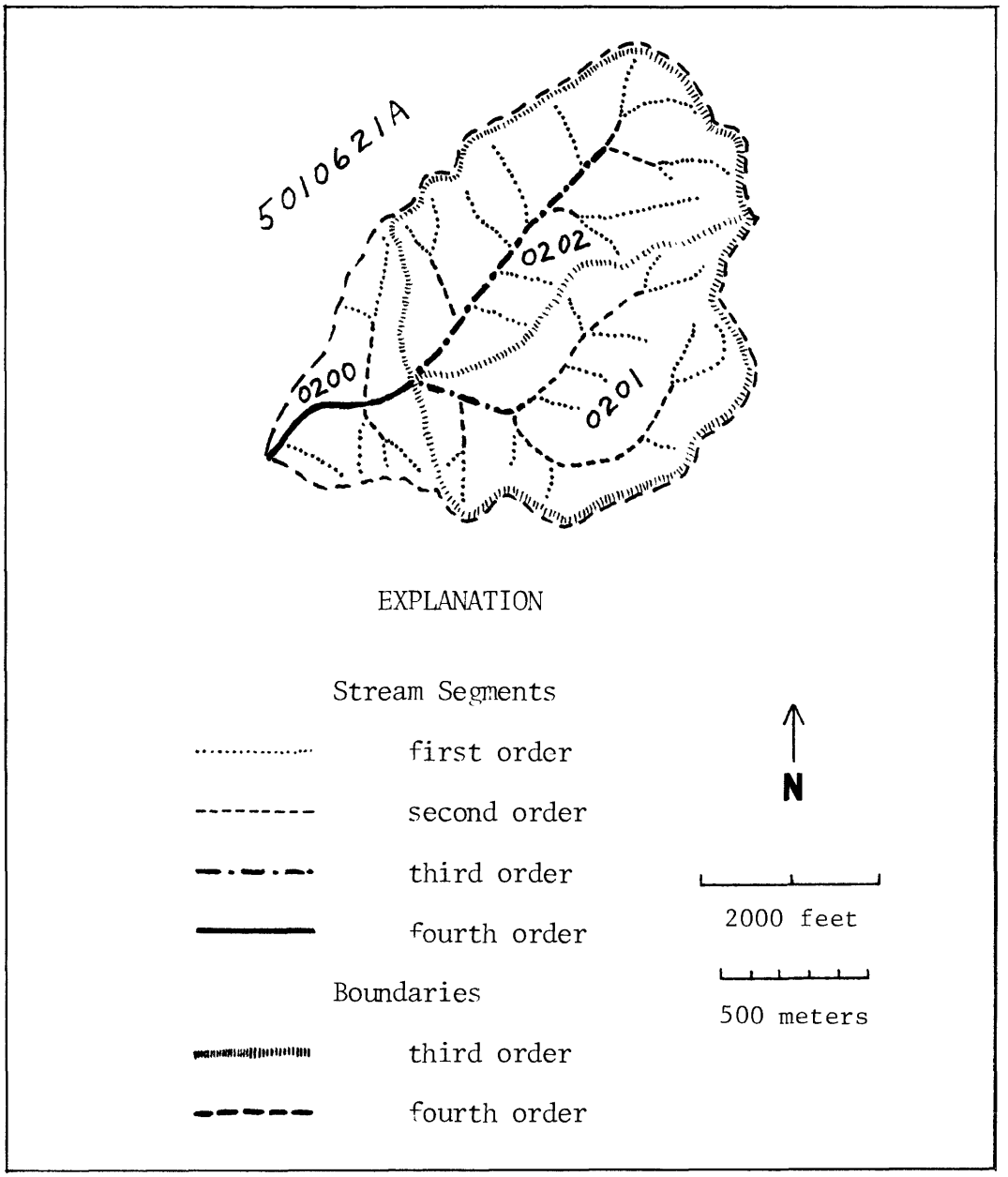
Horton, R. E., 1945, Erosional development of streams and their drainage basins: hydrophysical approach to quantitative morphology: Geological Society of America Bulletin, V. 56, p. 275-380.

Marburger, Leslie C., Allen, James A., and Giles, Robert H. Jr., 1979, Procedures for analyzing the watershed characteristics of large areas (version 1): Agricultural Systems Laboratory, Virginia Polytechnic Institute and State University, Blacksburg, 27 p.

McLaughlin, Keith, 1980, Water resources inventory handbook, Chapter 6: U.S. Forest Service, Southeast Region, Atlanta, 37 p.

Strahler, Arthur N., 1964, Quantitative geomorphology of drainage basins and channel networks: Handbook of applied hydrology, Ven Te Chow, editor, McGraw-Hill, New York, pp. 4-39 to 4-76.

APPENDIX A



This is a black and white representation of a portion of a map overlay showing two third-order DBRUs (5010621A0201, 5010621A0202) and one fourth-order DBRU (5010621A0200).

APPENDIX B. Program listings

START Program

```
10 REM              **********  START  **********
20 SELECT INPUT 001: SELECT PRINT 005: PRINT HEX(03)
30 PRINT "************************************************************
***********"
40 PRINT "*** USGS-USFS DRAINAGE BASIN RESPONSE UNIT INVENTORY
PROGRAM ***"
50 PRINT "************************************************************
***********"
60 PRINT
70 PRINT "      WRITTEN BY GLENN G. PATTERSON, U.S. GEOLOGICAL S
URVEY"
80 PRINT "                      COLUMBIA, SOUTH CAROLINA"
90 PRINT "                           FEBRUARY, 1980"
100 PRINT "                        IN COOPERATION WITH"
110 PRINT "      FRANCIS MARION-SUMTER NATIONAL FORESTS, COLUMBI
A, S. C."
120 PRINT : PRINT "      FOR INFORMATION CONCERNING THIS PROGRAM
 CALL GLENN AT:"
130 PRINT "                  (803)765-5966 OR FTS 677-5966"
140 PRINT : PRINT "                    TO BEGIN PROGRAM, KEY 'RETURN
'."
150 INPUT X: PRINT HEX(03)
160 PRINT
170 PRINT "WELCOME TO THE DBRU PROGRAM.  THE PROGRAM HAS THREE
PARTS:"
180 PRINT : PRINT "       1.  INPUT DATA AND STORE IT ON DISK"
190 PRINT
200 PRINT "       2.  RETREIVE DATA ALREADY STORED"
210 PRINT : PRINT "       3.  CHECK OR UPDATE DATA ALREADY STORE
D."
220 PRINT
230 INPUT "WHICH PART DO YOU WISH TO USE NOW", X
240 PRINT HEX(03)
250 IF X=1 THEN 300
260 IF X=2 THEN 310
265 IF X=3 THEN 320
270 PRINT "KEY 1,2, OR 3 TO INDICATE YOUR CHOICE."
280 PRINT
290 GOTO 180
300 LOAD F"INPUT "
310 LOAD F"GET"
320 LOAD F"UPDATE"
```

```
10 PRINT HEX(03): SELECT INPUT 001: SELECT PRINT 005
20 DIM B$1,B1$12,B5$1,B9$12,C1$12,C7(6),C8(6),D4$6,D5$9,D7(6),D
8(6),E7(6),E8(6),F7(6),F8(6),L7(6),L8(6),M6$1,N6$64,N7(6),N8(6)
,B8$6,G5(17),E5(17),Q5(17),S1$4
30 PRINT "                    *** PART 1:  INPUT ***"
40 PRINT : PRINT : PRINT
50 PRINT "ENTER DBRU NUMBER FOR WHICH YOU ARE ENTERING DATA."
60 PRINT "  ------------": PRINT HEX(0C)
70 INPUT B1$: PRINT HEX(03)
80 PRINT "ENTER NATIONAL FOREST NAME.  IF 'SUMTER', YOU MAY ENT
ER 'S'."
90 INPUT B5$
100 IF B5$="S" THEN 130
110 B4$=B5$
120 GOTO 140
130 B4$="SUMTER"
140 PRINT HEX(03)
150 PRINT "ENTER NATIONAL FOREST DISTRICT NAME."
160 INPUT B2$
170 PRINT HEX(03)
180 PRINT "ENTER NAME OF TOPO MAP QUAD."
190 INPUT B3$
200 PRINT HEX(03)
210 PRINT "ENTER YOUR NAME."
220 INPUT B7$
230 PRINT HEX(03)
240 PRINT "ENTER TODAY'S DATE (MODAYR)."
250 INPUT B8$
260 PRINT HEX(03)
270 INPUT "WHAT IS THE HIGHEST STREAM ORDER IN THIS DBRU", K
280 PRINT HEX(03): REM TESTING STREAM ORDER OF DBRU
290 IF STR(B1$,11,2)="00" THEN 350
300 IF K=3 THEN 320
310 B$="F"
320 B0=0
330 GOTO 420
340 GOTO 370
350 IF K>3 THEN 370
360 B$="F"
370 PRINT : PRINT "A SUB-DBRU IS A DBRU CONTAINED WITHIN A LARG
ER DBRU, AND"
380 PRINT "DRAINING DIRECTLY INTO THE HIGHEST ORDER STREAM SEGM
ENT IN THE"
390 PRINT "LARGER DBRU."
400 PRINT
410 INPUT "HOW MANY SUB-DBRUS DOES THIS DBRU CONTAIN",B0
420 PRINT HEX(03)
430 PRINT "                     *** TIME TO CHECK INPUT ***"
440 PRINTUSING 450,B1$,B4$
450 %DBRU NO. ############ (B1$), IN ################ N.F. (B4$
),
460 PRINTUSING 470,B2$,B3$
```

```
470 %################ DISTRICT (B2$), ################ QUAD (B3
$),
480 PRINTUSING 490,B7$,STR(B8$,1,2),STR(B8$,3,2),STR(B8$,5,2)
490 %FILED BY ################ (B7$) ON ##/##/## (B8$), HAS A M
AXIMUM
500 PRINTUSING 510, K,B0
510 %STREAM ORDER OF # (K) AND CONTAINS ## SUB-DBRUS (B0).
520 IF B$<>"F" THEN 560
530 PRINT "** EITHER B1$ OR K IS INCORRECT **"
540 GOTO 580
550 PRINT
560 INPUT "ARE THERE ANY ERRORS (Y OR N)", B$
570 IF B$="N" THEN 630
580 PRINT "TO CORRECT, KEY <VARIABLE NAME>=<CORRECT VALUE>, 'RE
TURN'.": B$=" "
590 PRINT "VARIABLE NAME IS IN ().  PUT QUOTES AROUND VALUE IF
NAME ENDS"
600 PRINT "WITH $."
610 STOP "NOW MAKE CORRECTIONS.  WHEN THROUGH, KEY 'CONTINUE, R
ETURN'."
620 GOTO 280
630 PRINT HEX(03)
640  PRINT "ENTER MAXIMUM AND MINIMUM BASIN ELEVATIONS IN FEET.
"
650  PRINT
660  INPUT "MAXIMUM", L4
670  PRINT
680  INPUT "MINIMUM", L5
690  PRINT
700  IF L5<L4 THEN 730
710  PRINT "IMPOSSIBLE!  RE-ENTER ELEVATIONS."
720  GOTO 640
730  INPUT "ARE THESE VALUES CORRECT", B$
740  IF B$="N" THEN 630
750 PRINT HEX(03)
760 IF B0=0 THEN 1710
770 REM THIS SECTION GATHERS STREAM SEGMENT DATA FROM SUB-DBRUS
780 INPUT "WILL YOU BE DOING A HYPSOMETRIC ANALYSIS ON THIS DBR
U",M6$
790 IF M6$="N" THEN 820
800 PRINT HEX(0A);"
           FEET."
810 PRINT HEX(0C): INPUT "WHAT CONTOUR INTERVAL WILL YOU USE IN
 THE ANALYSIS",E2
820 PRINT HEX(03)
830 FOR I=1 TO B0
840 PRINT "THE DBRU YOU ARE WORKING ON IS NUMBER ";B1$;"."
850 PRINT "ENTER LAST FOUR DIGITS OF A SUB-DBRU."
860 PRINTUSING 870,B1$
870 %########  ----
880 PRINT HEX(0C)
890 PRINT HEX(0909090909090909): INPUT S1$
900 STR(B9$,1,8)=STR(B1$,1,8)
910 STR(B9$,9,4)=STR(S1$,1)
920 PRINT HEX(03)
930 REM TEST SUB-DBRU NUMBER
940 IF STR(B1$,6,3)<>STR(B9$,6,3) THEN 1010
950 CONVERT STR(B1$,9,2) TO A5
960 CONVERT STR(B1$,11,2) TO A6
970 CONVERT STR(B9$,9,2) TO A7
```

```
980 CONVERT STR(B9$,11,2) TO A8
990 IF (A7-A5)*(A8-A6)<>0 THEN 1010
1000 GOTO 1040
1010 PRINT "DBRU NO.";B1$;" CANNOT CONTAIN SUBDBRU NO.";B9$;"."
1020 PRINT "CHECK NUMBERS AND TRY AGAIN."
1030 GOTO 430
1040 PRINT HEX(03)
1050 PRINT "WHEN DATA DISK CONTAINING DBRU NO.";B9$;" IS": PRIN
T "LOADED IN R SLOT, KEY 'RETURN'."
1060 INPUT X: PRINT HEX(03): PRINT AT(7,20);"SEARCHING FILE"
1070 DATA LOAD DC OPEN R "DBRU"
1080 DSKIP END
1090 DBACKSPACE 80
1100 DATA LOAD DC C1$
1110 IF END THEN 1150
1120 IF C1$<>B9$ THEN 1100
1130 REM SUB-DBRU NOW LOCATED: Z0=0
1140 GOTO 1230
1150 Z0=Z0+1
1160 IF Z0>1 THEN 1190
1170 DBACKSPACE BEG
1180 GOTO 1100
1190 PRINT HEX(03)
1200 PRINT "SUB-DBRU NO.";B9$;" NOT FOUND ON THIS DISK.  CHECK
NUMBERS AND"
1210 PRINT "TRY AGAIN.": Z0=0
1220 PRINT : GOTO 840
1230 DBACKSPACE 1
1240 DATA LOAD DC C1$,C2$,C3$,C4$,C6,C7(),D7(),C8(),D8(),Q2,Q3,
Q5(),H4,H5,A,C5
1250 REM DATA LOADED FROM SUB-DBRU
1260 A3=A3+A
1270 IF M6$="N" THEN 1580
1280 Q7=E2/Q2
1290 H2=INT(L4/E2)-INT(H4/E2)
1300 IF E2=Q2 THEN 1440
1310 REM CORRECT FOR DIFFERENT HYPSOMETRIC CONTOUR INTERVALS.:
H6=INT(H4/Q2)
1320 IF INT(H6/2)=H6/2 THEN 1360
1330 REM H6 IS ODD: Q6=1
1340 E5(1)=Q5(1)+Q5(2)
1350 GOTO 1380
1360 REM H6 IS EVEN: Q6=2
1370 E5(1)=Q5(1)
1380 FOR Z=2 TO INT(Q3/2)+1
1390 E5(Z)=Q5(2*Z-Q6)+Q5(2*Z-Q6+1)
1400 NEXT Z
1410 REM NOW CORRECT FOR ELEV. DIFF. BETWEEN TOP OF DBRU AND TO
P OF
1420 REM SUB-DBRU.
1430 GOTO 1470
1440 FOR Z=1 TO Q3
1450 E5(Z)=Q5(Z)
1460 NEXT Z
1470 FOR Z=H2+1 TO H2+INT(Q3/Q7)+1
1480 IF Z=18 THEN 1520
1490 G5(Z)=G5(Z)+E5(Z-H2)
1500 NEXT Z
1510 GOTO 1580
1520 PRINT HEX(03): PRINT "USING A CONTOUR INTERVAL OF";E2;" FE
```

```
ET WILL RESULT IN TOO MANY"
1530 PRINT "INCREMENTS.  YOU MUST USE AN INTERVAL OF";2*E2;" FE
ET."
1540 FOR Z=1 TO Q3
1550 G5(Z)=0
1560 NEXT Z: A3=0
1570 PRINT : PRINT : GOTO 800
1580 REM CONVERT LISTS TO TABLES
1590 FOR U=1 TO K
1600 E7(U)=E7(U)+C7(U): F7(U)=F7(U)+D7(U): E8(U)=E8(U)+C8(U): F
8(U)=F8(U)+D8(U)
1610 NEXT U
1620 IF I=B0 THEN 1670
1630 PRINT HEX(03): PRINT "DATA FROM SUB-DBRU NO.";B9$;" LOADED
."
1640 PRINT "READY FOR NEXT SUB-DBRU."
1650 PRINT : PRINT : Z0=0
1660 NEXT I
1670 REM TOTALS ACCUMULATED: PRINT HEX(03)
1680 PRINT "DATA FROM ALL SUB-DBRUS LOADED.  NOW OBTAIN DATA FR
OM THAT"
1690 PRINT "PORTION OF THE DBRU NOT COVERED BY SUB-DBRUS."
1700 PRINT : PRINT : REM GATHER STREAM SEGMENT DATA
1710 PRINT "CHECK TO SEE THAT PRINTER IS ON."
1720 SELECT PRINT 215
1730 PRINT HEX(07)
1740 SELECT PRINT 005
1750 PRINT : PRINT "DO YOU WANT INSTRUCTIONS ON SETTING UP THE
DATATIZER? (Y OR N)"
1760 INPUT B$
1770 IF B$="N" THEN 2020
1780 PRINT HEX(03): PRINT "TURN ON PRINTER AND PRESS PRINTER 'S
ELECT' BUTTON."
1790 SELECT PRINT 215(132)
1800 PRINT "                                *** INSTRUCTIONS FOR SETTI
NG UP DATATIZER ***"
1810 PRINT : PRINT
1820 PRINT "1.  TURN ON UNIT -- PRESS WHITE BUTTON ON CONTROLLE
R, FLIP SWITCH ON BACK OF KEYBOARD."
1830 PRINT
1840 PRINT "2.  KEY 'SM RETURN, C RETURN'."
1850 PRINT : PRINT "3.  KEY 'IN RETURN, 02 RETURN'."
1860 PRINT : PRINT "4.  KEY 'FM1 RETURN, ID1 M6.3: HERE IS'."
1870 PRINT : PRINT "5.  KEY 'FM2 RETURN, ID2 B8.4: HERE IS'."
1880 REM FM1 IS LENGTH ACCUMULATOR, FM2 IS AREA ACCUMULATOR
1890 REM LENGTHS REPORTED ARE IN INCHES.  LENGTHS ARE MULTIPLIE
D BY 2000 BEFORE BEING ASSIGNED TO A VARIABLE.
1900 REM AREAS REPORTED ARE IN SQUARE INCHES.  AREAS ARE MULTIP
LIED BY (2000↑2) BEFORE BEING ASSIGNED TO A VARIABLE.
1910 PRINT
1920 PRINT "6.  KEY 'PB2 RETURN, 2 RETURN'."
1930 PRINT : PRINT "7.  KEY 'ID1 RETURN, 1 RETURN, ID2 RETURN,
2 RETURN'."
1940 PRINT : PRINT "8.  PRESS 'ALT MODE' KEY.  NOW YOU ARE READ
Y TO DIGITIZE.  CHECK TO SEE THAT YOUR DBRU IS WITHIN THE ACTIV
EAREA OF THE TADLET."
1950 PRINT : PRINT "TO MEASURE LENGTH, KEY 'BL RETURN'.  HOLD D
OWN BUTTON 3 WHILE TRACING LENGTH.  THEN KEY 'AL RETURN' TO ADD
 LENGTH TO LENGTH"
1960 PRINT "ACCUMULATOR.  PRESS BUTTON 1, WHEN ASKED TO, TO SEN
```

```
D ACCUMULATED LENGTH TO WANG.  RESET ACCUMULATOR BY KEYING 'CL
RETURN'."
1970 PRINT : PRINT "TO MEASURE AREA, KEY 'BA RETURN'.  HOLD DOW
N BUTTON 3 WHILE TRACING PERIMETER OF AREA CLOCKWISE.  THEN KEY
 'EA RETURN.  KEY"
1980 PRINT "'AA RETURN TO ADD AREA TO AREA ACCUMULATOR.  PRESS
BUTTON 2 TO SEND ACCUMULATED AREA TO WANG.  RESET ACCUMULATOR B
Y KEYING": PRINT "'CA RETURN'."
1990 PRINT : PRINT "IF YOU MAKE A MISTAKE, RESET ACCUMULATOR AN
D START OVER.  DO NOT SEND DIGITIZED DATA TO WANG UNLESS YOU AR
E SATISFIED WITH IT."
2000 SELECT PRINT 005
2010 REM END OF DATATIZER INSTRUCTIONS **********************
2020 PRINT HEX(03): FOR U=1 TO K
2030 PRINTUSING 2040,U
2040 %                    *** STREAM ORDER # ***
2050 PRINT
2060 PRINT "COUNT ALL STREAM SEGMENTS EXCEPT THOSE IN SUB-DBRUS
."
2070 PRINT "IF A SEGMENT CHANGES FROM INTERMITTENT TO PERENNIAL
 WITHOUT"
2080 PRINT "CHANGING STREAM ORDER, COUNT .5 INTERMITTENT AND .5
 PERENNIAL."
2090 PRINT : PRINT HEX(0A0A);"            ------------"
2100 PRINT HEX(0C0C)
2110 INPUT "NUMBER OF INTERMITTENT STREAM SEGMENTS", N7(U)
2120 PRINT : PRINT HEX(0A0A);"            ---------"
2130 PRINT HEX(0C0C)
2140 INPUT "NUMBER OF PERENNIAL STREAM SEGMENTS", N8(U)
2150 IF U=K THEN 2220
2160 SELECT P6
2170 PRINT HEX(03)
2180 PRINT AT(7,22);"NEXT STREAM ORDER"
2190 PRINT HEX(03)
2200 SELECT P
2210 NEXT U
2220 PRINT HEX(03)
2230 PRINT "                    *** TIME TO CHECK INPUT ***"
2240 PRINT
2250 PRINT "              NUMBER OF STREAM SEGMENTS"
2260 PRINT "STREAM        INTERMITTENT        PERENNIAL"
2270 PRINT "ORDER         VARIABLE=    NO.   VARIABLE=    NO."
2280 FOR U=1 TO K
2290 PRINTUSING 2310, U,U,N7(U),U,N8(U)
2300 NEXT U
2310 %  #              N7(#)=####.#      N8(#)=####.#
2320 PRINT
2330 INPUT "ANY ERRORS", B$
2340 IF B$="N" THEN 2390
2350 PRINT "TO CORRECT, KEY '<VARIABLE NAME>=<CORRECT VALUE>, R
ETURN'."
2360 STOP "MAKE CORRECTIONS NOW.  WHEN THROUGH, KEY 'CONTINUE,
RETURN'."
2370 PRINT HEX(03)
2380 GOTO 2230
2390 IF B0=0 THEN 2400
2400 REM INPUT SEGMENT LENGTHS
2410 PRINT HEX(03)
2420 PRINT "READY TO INPUT SEGMENT LENGTHS"
2430 PRINT
```

```
2440 FOR U=1 TO K
2450 IF N7(U)=0 THEN 2690
2460 PRINT "DIGITIZE LENGTH OF ALL ORDER";U;" INTERMITTENT STRE
AM SEGMENTS"
2470 PRINT "NOT COUNTING ANY IN SUB-DBRUS.  ------------"
2480 SELECT PRINT 215: PRINT HEX(07): SELECT PRINT 005
2490 PRINT "REMEMBER TO KEY 'CL RETURN'."
2500 PRINT "WHEN THROUGH DIGITIZING, KEY 'RETURN' ON WANG.": PR
INT AT(10,1);"***<BUT DON'T KEY 'RETURN' UNTIL THIS MESSAGE DIS
APPEARS>***": IF U>1 THEN 2590
2510 DATA LOAD DC OPEN R "DBRU"
2520 DATA LOAD DC C1$: IF END THEN 2590
2530 IF C1$<>B1$ THEN 2520
2540 SELECT PRINT 215: PRINT HEX(070707): SELECT PRINT 005
2550 PRINT HEX(03): PRINT AT(6,1);"THIS DBRU <";B1$;"> HAS ALRE
ADY BEEN DIGITIZED."
2560 PRINT AT(7,1);"TO CHECK OR UPDATE, USE THE UPDATE PROGRAM.
"
2570 PRINT AT(9,1);"TO START OVER, KEY 'RETURN'.": INPUT X
2580 LOAD F"INPUT "
2590 PRINT AT(10,1);"
                    ": SELECT INPUT 001: INPUT X
2600 PRINT "NOW PRESS CURSOR BUTTON 1."
2610 SELECT INPUT 019
2620 INPUT D4$
2630 IF STR(D4$,1,1)="1" THEN 2660
2640 PRINT "YOU PRESSED THE WRONG CURSOR BUTTON -- PRESS BUTTON
 1 NOW."
2650 GOTO 2620
2660 SELECT INPUT 001: PRINT HEX(03)
2670 CONVERT STR(D4$,2,5) TO L7(U)
2680 L7(U)=L7(U)*2000
2690 PRINT
2700 IF N8(U)=0 THEN 2760
2710 PRINT "DIGITIZE LENGTH OF ALL ORDER";U;" PERENNIAL STREAM
SEGMENTS"
2720 PRINT "NOT COUNTING ANY IN SUB-DBRUS.  ---------"
2730 GOSUB 4630
2740 CONVERT STR(D4$,2,5) TO L8(U)
2750 L8(U)=L8(U)*2000
2760 IF U=K THEN 2830
2770 SELECT P6
2780 PRINT HEX(03)
2790 PRINT AT(7,22);"NEXT STREAM ORDER"
2800 PRINT HEX(03)
2810 SELECT P
2820 NEXT U
2830 PRINT HEX(03)
2840 PRINT "                *** TIME TO CHECK INPUT ***"
2850 PRINT
2860 PRINT "                   LENGTH OF STREAM SEGMENTS"
2870 PRINT "STREAM          INTERMITTENT        PERENNIAL"
2880 PRINT "ORDER         VARIABLE=  FEET   VARIABLE=  FEET"
2890 FOR U=1 TO K
2900 PRINTUSING 2910, U,U,L7(U),U,L8(U)
2910 %  #              L7(#)=###,###     L8(#)=###,###
2920 NEXT U
2930 INPUT "ANY ERRORS", B$
2940 IF B$="N" THEN 2990
2950 PRINT "TO CORRECT, KEY '<VARIABLE NAME>=<CORRECT VALUE>, R
```

```
ETURN'.  OMIT COMMAS."
2960 STOP "MAKE CORRECTIONS NOW.  WHEN THROUGH, KEY 'CONTINUE,
RETURN'."
2970 PRINT HEX(03)
2980 GOTO 2840
2990 IF B0=0 THEN 3050
3000 REM ADD SUB-DBRU SEGMENTS
3010 FOR U=1 TO K
3020 L7(U)=L7(U)+F7(U): N7(U)=N7(U)+E7(U)
3030 L8(U)=L8(U)+F8(U): N8(U)=N8(U)+E8(U)
3040 NEXT U
3050 REM NOW INPUT BASIN LENGTH AND AREA
3060 PRINT HEX(03)
3070 PRINT "DIGITIZE BASIN LENGTH."
3080 GOSUB 4630
3090 CONVERT STR(D4$,2,5) TO L
3100 L=L*2000: B$=" "
3110 PRINT : INPUT "DOES THIS DBRU EXTEND ONTO THE NEXT MAP QUA
D TO THE EAST OR WEST",B$
3120 PRINT HEX(03): PRINT "READY TO MEASURE PERIMETER AND AREA
OF DBRU.": PRINT
3130 PRINT "ON DIGITIZER, KEY 'CA RETURN, CL RETURN, BA RETURN,
 BL RETURN'."
3140 IF B$="N" THEN 3190: IF B$<>"Y" THEN 3110
3150 PRINT : PRINT "STARTING AT THE EAST OR WEST EDGE OF A MAP,
 DIGITIZE CLOCKWISE THAT PORTION"
3160 PRINT "OF THE DBRU PERIMETER ON THE MAP. DO NOT DIGITIZE T
HE MAP BOUNDARY."
3170 PRINT : PRINT "KEY EA RETURN, AA RETURN, AL RETURN, BA RET
URN, BL RETURN ON DIGITIZER."
3180 PRINT : PRINT "THEN DIGITIZE THE REMAINING PORTION OF THE
DBRU PERIMETER ON THE OTHER MAP.": GOTO 3200
3190 PRINT : PRINT "DIGITIZE PERIMETER OF DBRU CLOCKWISE.  WHEN
 THROUGH DIGITIZING,"
3200 PRINT "KEY 'EA RETURN, AA RETURN, AL RETURN' ON DIGITIZER
AND 'RETURN'"
3210 PRINT "ON WANG."
3220 SELECT INPUT 001: INPUT X: PRINT HEX(03)
3230 PRINT "NOW PRESS CURSOR BUTTON 1."
3240 SELECT INPUT 019
3250 INPUT D4$
3260 IF STR(D4$,1,1)="1" THEN 3290
3270 PRINT "YOU MASHED THE WRONG BUTTON -- TRY BUTTON 1."
3280 GOTO 3250
3290 CONVERT STR(D4$,2,5) TO P
3300 P=P*2000
3310 IF P> L THEN 3340
3320 PRINT "BASIN LENGTH EXCEEDS PERIMETER, SO CHECK BOTH.  KEY
 RETURN.": SELECT INPUT 001: INPUT X
3330 GOTO 3060
3340 PRINT : PRINT "NOW PRESS CURSOR BUTTON 2."
3350 INPUT D5$
3360 IF STR(D5$,1,1)="2" THEN 3390
3370 PRINT "YOU PRESSED THE WRONG BUTTON -- PRESS BUTTON 2."
3380 GOTO 3350
3390 PRINT HEX(03): SELECT INPUT 001
3400 CONVERT STR(D5$,2,8) TO A
3410 A=A*(2000↑2)
3420 PRINT "                    *** TIME TO CHECK INPUT ***"
3430 PRINT : PRINT "BASIN LENGTH", L
```

```
3440 PRINT : PRINT "PERIMETER", P
3450 PRINT : PRINT "AREA", A
3460 PRINT "ARE YOU SATISFIED THAT BASIN LENGTH, PERIMETER, AND
 AREA WERE"
3470 INPUT "DIGITIZED ACCURATELY", B$
3480 IF B$="N" THEN 3060
3490 PRINT HEX(03)
3500 PRINT "ENTER ANY REMARK YOU MAY WISH TO APPEAR ON THE PRIN
TOUT FOR THIS"
3510 PRINT "DBRU.  REMARKS MIGHT CONCERN LAKES, OTHER QUADS, ST
REAM NAMES, ETC."
3520 PRINT "USE ONE LINE ONLY."
3530 PRINT "-----------------------------------------------------
-------------"
3540 PRINT HEX(0C): INPUT N6$
3550 PRINT HEX(03)
3560 PRINT "DO YOU WISH TO PERFORM AN AREA-ELEVATION ANALYSIS?"
3570 INPUT "KEY Y OR N", M6$
3580 IF M6$="N" THEN 4240
3590 PRINT HEX(03)
3600 PRINT "                *** AREA-ELEVATION ANALYSIS ***"
3610 PRINT
3620 DIM E4(17)
3630 PRINT "FOR CONVENIENCE YOUR CONTOUR INTERVAL SHOULD BE EQU
AL TO OR"
3640 PRINT "AN EVEN MULTIPLE OF THE MAP CONTOUR INTERVAL."
3650 PRINT "THE INTERVAL FOR A LARGE DBRU MUST BE EQUAL TO OR D
OUBLE THE"
3660 PRINT "INTERVAL FOR A SUB-DBRU CONTAINED IN IT."
3670 PRINT "THE PROGRAM CAN HANDLE UP TO 17 ELEVATION INCREMENT
S."
3680 PRINT HEX(0A);"                                          F
EET"
3690 PRINT HEX(0C): INPUT "WHAT CONTOUR INTERVAL WILL YOU USE",
 E2
3700 PRINT "CONTOUR INTERVAL WILL BE";E2;" FEET, OK?"
3710 INPUT B$: PRINT HEX(03)
3720 IF B$="N" THEN 3690
3730 F4=INT(L4/E2)+1
3740 F5=INT(L5/E2)
3750 E3=F4-F5: IF E3<18 THEN 3760: PRINT "CHOOSE A GREATER CONT
OUR INTERVAL.": GOTO 3670
3760 REM ENTERING LOOP FOR SUCCESSIVE ELEVATION INCREMENTS
3770 FOR Z=1 TO E3
3780 E4(Z)=(F4-Z)*E2: PRINT HEX(03)
3790 PRINT "DIGITIZE AREA WITHIN DBRU THAT IS HIGHER THAN";E4(Z
);" FEET"
3800 PRINT "BUT LOWER THAN";E4(Z)+E2;" FEET, NOT COUNTING SUB-D
BRUS."
3810 PRINT "WHEN THROUGH DIGITIZING, KEY 'RETURN' ON WANG."
3820 SELECT INPUT 001: INPUT X
3830 PRINT "NOW PRESS CURSOR BUTTON 2."
3840 SELECT INPUT 019
3850 INPUT D5$
3860 IF STR(D5$,1,1)="2" THEN 3890
3870 PRINT "YOU MASHED THE WRONG BUTTON -- TRY BUTTON 2."
3880 GOTO 3850
3890 SELECT INPUT 001: PRINT HEX(03)
3900 CONVERT STR(D5$,2,8) TO E5(Z)
3910 E5(Z)=E5(Z)*(2000↑2)
```

```
3920 NEXT Z
3930 PRINT HEX(03)
3940 PRINT "                *** TIME TO CHECK INPUT***"
3950 PRINT "                CONTOUR INTERVAL =";E2;" FEET"
3960 PRINT
3970 PRINT "                                        AREA, SQUARE FEET"
3980 PRINT "     ELEVATION INCREMENT      NOT COUNTING SUB-DBRUS
"
3990 FOR Z=1 TO E3
4000 IF INT(Z/10)=Z/10 THEN 4040
4010 PRINTUSING 4030, E4(Z),E4(Z)+E2,E5(Z),Z
4020 NEXT Z
4030 %       #### TO #### FEET      ###,###,###   (E5(##))
4040 INPUT "ANY ERRORS", B$
4050 IF B$="N" THEN 4080
4060 B$=" ": STOP "CORRECT BY KEYING <VAR. NAME>=<CORRECT VALUE
>, 'RETURN, CONTINUE, RETURN'.  OMIT COMMAS."
4070 GOTO 3930
4080 PRINT HEX(03): B$=" ": IF Q=1 THEN 4160
4090 IF Z=E3 THEN 4110
4100 GOTO 4010
4110 IF Z<>10 THEN 4160
4120 PRINT "                                        AREA, SQUARE FEET"
4130 PRINT "     ELEVATION INCREMENT      NOT COUNTING SUB-DBRUS
"
4140 PRINTUSING 4030,E4(Z),E4(Z)+E2,E5(Z),Z: Q=1
4150 GOTO 4040
4160 Q=0: R3=(E5(1)+E5(2)+E5(3)+E5(4)+E5(5)+E5(6)+E5(7)+E5(8)+E
5(9)+E5(10)+E5(11)+E5(12)+E5(13)+E5(14)+E5(15)+E5(16)+E5(17)+A3
)/A
4170 PRINTUSING 4180, R3
4180 %THE RATIO OF THE TOTAL AREA DIGITIZED IN THE HYPSOMETRIC
       ANALYSIS TO THE TOTAL AREA DIGITIZED PREVIOUSLY IS ##.##
#.
4190 PRINT : PRINT "IF THIS VALUE DIFFERS VERY MUCH FROM 1.00,
YOU'D BETTER REPEAT"
4200 PRINT "THE HYPSOMETRIC ANALYSIS."
4210 PRINT
4220 INPUT "DO YOU WANT TO RE-DO THE AREA-ELEVATION ANALYSIS",
B$
4230 IF B$="Y" THEN 3590
4240 PRINT HEX(03)
4250 FOR Z=1 TO E3
4260 E5(Z)=E5(Z)+G5(Z)
4270 NEXT Z
4280 PRINT "WHEN DATA DISK WHICH IS TO CONTAIN THIS DBRU IS LOA
DED IN R SLOT"
4290 PRINT "KEY 'RETURN'.": INPUT X
4300 PRINT : PRINT "IS THIS THE FIRST DBRU TO BE STORED ON THIS
 DISK? (Y OR N)"
4310 INPUT B$
4320 IF B$="N" THEN 4360
4330 PRINT HEX(03)
4340 DATA SAVE DC OPEN R (1022), "DBRU"
4350 B6=1: GOTO 4450
4360 DATA LOAD DC OPEN R "DBRU"
4370 DSKIP END
4380 DBACKSPACE 1
4390 DATA LOAD DC C1$,C2$,C3$,C4$,C6
4400 IF C6<340 THEN 4430
```

```
4410 PRINT "THIS DISK HAS 340 DBRUS ON IT AND IS FULL.  MOUNT A
 NEW DISK IN THE R SLOT."
4420 GOTO 4280
4430 PRINT "THERE ARE ";C6;" DBRUS ON THIS DISK.  THIS DBRU MAK
ES";C6+1;"."
4440 B6=C6+1
4450 STOP "LAST CHANCE TO CHANGE ANY INPUT VALUES.  TO LOAD DAT
A ONTO DISK, KEY 'CONTINUE, RETURN'."
4460 DATA SAVE DC B1$,B2$,B3$,B4$,B6,N7(),L7(),N8(),L8(),E2,E3,
E5(),L4,L5,A,K,L,B7$,B8$,P,E4(),M6$,N6$
4470 DATA SAVE DC END
4480 PRINT HEX(03)
4490 PRINT "DATA LOADED ONTO DISK."
4500 PRINT
4510 PRINT "DO YOU HAVE ANOTHER DBRU TO EVALUATE NOW? (Y OR N)"
4520 INPUT B$: PRINT HEX(03)
4530 IF B$="Y" THEN 4780
4540 PRINT HEX(03)
4550 DATA SAVE DC CLOSE
4560 PRINT "DO YOU WISH TO RETREIVE DATA FOR ANY DBRU NOW? (KEY
  Y OR N)"
4570 INPUT B$
4580 IF B$="N" THEN 4600
4590 LOAD F "GET"
4600 PRINT HEX(03)
4610 PRINT AT(7,22);"THAT'S ALL -- SO LONG!"
4620 END
4630 REM SUBROUTINE FOR INPUTTING LENGTH FROM DIGITIZER TO WANG
4640 SELECT PRINT 215
4650 PRINT HEX(07)
4660 SELECT PRINT 005
4670 PRINT "REMEMBER TO KEY 'CL RETURN'."
4680 PRINT "WHEN THROUGH DIGITIZING, KEY 'RETURN' ON WANG."
4690 SELECT INPUT 001: INPUT X
4700 PRINT "NOW PRESS CURSOR BUTTON 1."
4710 SELECT INPUT 019
4720 INPUT D4$
4730 IF STR(D4$,1,1)="1" THEN 4760
4740 PRINT "YOU PRESSED THE WRONG CURSOR BUTTON -- PRESS BUTTON
 1 NOW."
4750 GOTO 4720
4760 SELECT INPUT 001: PRINT HEX(03)
4770 RETURN
4780 LOAD F"INPUT "
```

```
10 PRINT HEX(03): SELECT INPUT 001: SELECT PRINT 005
20 PRINT "              *** PART 2:  DATA RETREIVAL ***"
30 DIM B$1,B1$12,B8$6,C1$12,E4(17),E5(17),F2(17),F3(17),J1(6),J
2(6),J7(6),J8(6),K1(6),K2(6),L1(6),L2(6),L7(6),L8(6),M1(6),M2(6
),M6$1,M7(6),M8(6),N1(6),N6$64,N7(6),N8(6),R(6),F1(17),BO$12
40 PRINT
50 PRINT "CHOOSE FROM THIS LIST OF OPTIONS"
60 PRINT
70 PRINT "1.  RETREIVE DATA FOR ONE DBRU AT A TIME"
80 PRINT
90 PRINT "2.  RETREIVE DATA FOR MORE THAN ONE DBRU AT A TIME"
100 PRINT
110 PRINT "3.  END PROGRAM"
120 PRINT
130 INPUT "WHICH OPTION DO YOU CHOOSE", G
140 PRINT HEX(03)
150 IF G=1 THEN 200
160 IF G=2 THEN 340
170 IF G=3 THEN 4040
180 PRINT "CHOOSE AGAIN"
190 GOTO 40
200 REM GET DATA FOR ONE DBRU AT A TIME ***********************
210 PRINT "ENTER DBRU NUMBER FOR WHICH YOU WANT DATA."
220 PRINT "  ------------"
230 PRINT HEX(0C)
240 INPUT B1$
250 GOSUB 1070
260 DATA LOAD DC C1$
270 IF END THEN 320
280 IF B1$<>C1$ THEN 260
290 GOSUB 1300
300 PRINT HEX(03)
310 GOTO 50
320 GOSUB 1140
330 GOTO 260
340 REM GET DATA FOR MORE THAN ONE DBRU AT A TIME **************
350 PRINT "OPTIONS FOR IDENTIFYING THOSE DBRUS TO BE INCLUDED I
N OUTPUT"
360 PRINT
370 PRINT "1.  BY NATIONAL FOREST NAME"
380 PRINT : PRINT "2.  BY NATIONAL FOREST DISTRICT NAME"
390 PRINT : PRINT "3.  BY TOPO MAP QUAD NAME"
400 PRINT : PRINT "4.  BY N.F. ADMINISTRATIVE WATERSHED NUMBER"
410 PRINT : PRINT "5.  BY FOURTH ORDER WATERSHED NUMBER"
420 PRINT : INPUT "WHICH OPTION DO YOU CHOOSE", GO
430 PRINT HEX(03)
440 IF GO=1 THEN 510
450 IF GO=2 THEN 620
460 IF GO=3 THEN 730
470 IF GO=4 THEN 840
480 IF GO=5 THEN 950
490 PRINT "CHOOSE AGAIN."
```

```
500 GOTO 350
510 REM SORT BY NF NAME ********************
520 PRINT "ENTER NATIONAL FOREST NAME FOR WHICH YOU WANT DATA."
530 INPUT B4$
540 GOSUB 1070
550 DATA LOAD DC C1$,C2$,C3$,C4$
560 IF END THEN 600
570 IF C4$<>B4$ THEN 550
580 GOSUB 1300
590 GOTO 550
600 GOSUB 1140
610 GOTO 550
620 REM SORT BY NF DISTRICT NAME ************
630 PRINT "ENTER NATIONAL FOREST DISTRICT NAME FOR WHICH YOU WA
NT DATA."
640 INPUT B2$
650 GOSUB 1070
660 DATA LOAD DC C1$,C2$
670 IF END THEN 710
680 IF C2$<>B2$ THEN 660
690 GOSUB 1300
700 GOTO 660
710 GOSUB 1140
720 GOTO 660
730 REM SORT BY MAP QUAD NAME ***************
740 PRINT "ENTER MAP QUAD NAME FOR WHICH YOU WANT DATA."
750 INPUT B3$
760 GOSUB 1070
770 DATA LOAD DC C1$,C2$,C3$
780 IF END THEN 820
790 IF C3$<>B3$ THEN 770
800 GOSUB 1300
810 GOTO 770
820 GOSUB 1140
830 GOTO 770
840 REM SORT BY NF ADMIN. WATERSHED NUMBER ********
850 PRINT "ENTER ADMINISTRATIVE WATERSHED NUMBER FOR WHICH YOU
WANT DATA."
860 INPUT B0$
870 GOSUB 1070
880 DATA LOAD DC C1$
890 IF END THEN 930
900 IF STR(C1$,6,3)<>STR(B0$,1,3) THEN 880
910 GOSUB 1300
920 GOTO 880
930 GOSUB 1140
940 GOTO 880
950 REM SORT BY 4TH ORDER WATERSHED NUMBER *********
960 PRINT "ENTER FOURTH ORDER WATERSHED NUMBER FOR WHICH YOU WA
NT DATA."
970 PRINT "(THAT IS, A DBRU NUMBER THAT ENDS IN 00)."
980 INPUT B0$
990 GOSUB 1070
1000 DATA LOAD DC C1$
1010 IF END THEN 1050
1020 IF STR(C1$,1,10)<>STR(B0$,1,10) THEN 1000
1030 GOSUB 1300
1040 GOTO 1000
1050 GOSUB 1140
1060 GOTO 1000
```

```
1070 REM SUBROUTINE 1 --  SEARCH ********************************
1080 PRINT HEX(03)
1090 PRINT "LOAD DATA DISK THAT CONTAINS THE DBRU(S) YOU WANT I
NTO R SLOT."
1100 PRINT "THEN KEY RETURN."
1110 INPUT X: PRINT HEX(03): PRINT AT(7,20);"SEARCHING FILE"
1120 DATA LOAD DC OPEN R "DBRU"
1130 RETURN
1140 REM SUBROUTINE 2 -- IF END ********************************
1150 PRINT HEX(03)
1160 PRINT "NO DBRU LEFT ON THIS DISK MEETS YOUR SEARCH CRITERI
ON.  YOU MAY:"
1170 PRINT "1.  LOAD ANOTHER DISK"
1180 PRINT "2.  RESTATE SEARCH CRITERION"
1190 PRINT "3.  HAVE FOUND ALL THE DBRUS YOU WANTED."
1200 PRINT
1210 INPUT "WHICH OPTION DO YOU CHOOSE", G1
1220 PRINT HEX(03)
1230 IF G1=2 THEN 1260
1240 IF G1=1 THEN 1280
1250 GOTO 50
1260 IF G=2 THEN 340
1270 GOTO 200
1280 GOSUB 1070
1290 RETURN
1300 REM SUBROUTINE 3 -- OUTPUT *********************************
1310 PRINT HEX(03): DBACKSPACE 1
1320 DATA LOAD DC B1$,B2$,B3$,B4$,B6,N7(),L7(),N8(),L8(),E2,E3,
E5(),L4,L5,A,K,L,B7$,B8$,P,E4(),M6$,N6$
1330 REM CALCULATE PARAMETERS ************************
1340 REM FNS(X) ROUNDS X TO 2 DECIMAL PLACES
1350 DEFFN S(X)=SGN(X)*INT(ABS(X)*100+.5)/100
1360 A0=FNS(A/2.788E7)
1370 A1=FNS(A/43560)
1380 A2=INT(A/10.76)
1390 FOR U=1 TO 6
1400 N1(U)=N7(U)+N8(U)
1410 L1(U)=L7(U)+L8(U)
1420 J1(U)=FNS(L1(U)/5280)
1430 M1(U)=INT(L1(U)/3.28)
1440 K1(U)=LOG(N1(U)+.001)/2.3025851
1450 IF N1(U)>0 THEN 1470
1460 L2(U)=0: GOTO 1480
1470 L2(U)=INT(L1(U)/N1(U))
1480 J2(U)=FNS(L2(U)/5280)
1490 M2(U)=INT(L2(U)/3.28)
1500 K2(U)=LOG(L2(U)+.001)/2.3025851
1510 J7(U)=FNS(L7(U)/5280)
1520 J8(U)=FNS(L8(U)/5280)
1530 M7(U)=INT(L7(U)/3.28)
1540 M8(U)=INT(L8(U)/3.28)
1550 NEXT U
1560 FOR U=1 TO 5: IF N1(U+1)>0 THEN 1570: R(U)=0: GOTO 1580
1570 R(U)=FNS(N1(U)/N1(U+1))
1580 NEXT U
1590 L3=L1(1)+L1(2)+L1(3)+L1(4)+L1(5)+L1(6)
1600 M3=INT(L3/3.28)
1610 J3=FNS(L3/5280)
1620 N3=N1(1)+N1(2)+N1(3)+N1(4)+N1(5)+N1(6)
1630 D=L3/A
```

```
1640 D0=5280*D
1650 D1=43560*D
1660 D2=3.28*D
1670 C=INT(1/D)
1680 C0=INT(1/D2)
1690 M4=INT(L4/3.28)
1700 M5=INT(L5/3.28)
1710 H=L4-L5
1720 H0=INT(H/3.28)
1730 H1=FNS(H*D)
1740 J=FNS(L/5280)
1750 M=INT(L/3.28)
1760 L0=INT(1/(2*D))
1770 M0=INT(L0/3.28)
1780 P0=FNS(P/5280)
1790 P1=INT(P/3.28)
1800 R0=FNS(A/L↑2)
1810 R1=FNS(H/L)
1820 R2=FNS((100*H)/P)
1830 E1=INT((L4+L5)/2)
1840 IF B2$="PICKENS" THEN 1890
1850 IF B2$="EDGEFIELD" THEN 1900
1860 IF B2$="LONG CANE" THEN 1900
1870 IF B2$="ENOREE" THEN 1910
1880 IF B2$="TYGER" THEN 1910
1890 E=.976*E1-38: GOTO 1920
1900 E=1.092*E1-43: GOTO 1920
1910 E=1.136*E1-52
1920 F=INT(E/3.28)
1930 IF M6$="N" THEN 2080
1940 REM CALCULATIONS FOR HYPSOMETRIC ANALYSIS *****
1950 FOR Z=1 TO E3
1960 F1(Z)=E5(Z)
1970 F3(Z)=E5(Z)*(E4(Z)+E2/2)
1980 IF E4(Z)<L5 THEN 2010
1990 F2(Z)=(E4(Z)-L5)/H
2000 NEXT Z
2010 REM SUM OVER ELEV INCREMENTS
2020 FOR Z=1 TO E3-1
2030 F3(Z+1)=F3(Z+1)+F3(Z)
2040 F1(Z+1)=F1(Z+1)+F1(Z)
2050 NEXT Z
2060 E0=INT(F3(E3)/A)
2070 F0=INT(E0/3.28)
2080 REM ALL CALCULATIONS DONE ****************************
2090 IF G<>2 THEN 2110
2100 IF G1=1 THEN 2290
2110 PRINT "               *** OUTPUT OPTIONS ***"
2120 PRINT
2130 PRINT "1.  PRINTOUT OF DBRU DATA SUMMARY"
2140 PRINT "2.  PLOTS TO CHECK HORTON'S LAWS"
2150 IF M6$="N" THEN 2190
2160 PRINT "3.  HYPSOMETRIC ANALYSIS PLOT"
2170 PRINT : PRINT "KEY 1, 2, OR 3."
2180 GOTO 2210
2190 PRINT : PRINT "KEY 1 OR 2."
2200 PRINT : PRINT "KEY 1, 2, OR 4."
2210 INPUT G1: PRINT HEX(03)
2220 IF G1=1 THEN 2270
2230 IF G1=2 THEN 2930
```

```
2240 IF G1=3 THEN 3440
2250 PRINT "CHOOSE AGAIN"
2260 GOTO 2110
2270 REM OUTPUT=PRINTOUT ************************************
2280 PRINT "TURN ON PRINTER AND PRESS 'SELECT' BUTTON."
2290 SELECT PRINT 215(132)
2300 PRINT HEX(0C)
2310 PRINT HEX(0E); "                DRAINAGE BASIN RESPONSE UNIT
DATA SUMMARY"
2320 PRINT
2330 PRINT B4$;" NATIONAL FOREST, SOUTH CAROLINA -- ";B2$;" DIS
TRICT", TAB(86); "QUAD:  ";B3$
2340 PRINT : PRINT "DBRU NUMBER:  (030)";B1$,TAB(102);"FILED BY
 ";B7$
2350 PRINTUSING 2360, STR(B8$,1,2),STR(B8$,3,2),STR(B8$,5,2)
2360 %                  HHH HHHHHAAAAFTT
                                                        ##/##/##
2370 PRINT "     H = USGS HYDROLOGIC UNIT NO. (FIRST THREE DIGI
TS NOT STORED ON DISK)",TAB(95);"HIGHEST STREAM ORDER IN DBRU:
 ";K
2380 PRINT "     A = USFS ADMINISTRATIVE WATERSHED NUMBER"
2390 PRINT "     F = FOURTH ORDER WATERSHED NUMBER"
2400 PRINT "     T = THIRD ORDER WATERSHED NUMBER"
2410 PRINT
2420 PRINT "STREAM     INTERMITTENT SEGMENTS     PERENNIAL SEGM
ENTS        TOTAL      TOTAL              MEAN              BIFURCA
TION"
2430 PRINT "ORDER      NUMBER     LENGTH          NUMBER     LEN
GTH         NUMBER     LENGTH          LENGTH               RATI
O"
2440 FOR U=1 TO K
2450 PRINTUSING 2460, U,N7(U),L7(U),N8(U),L8(U),N1(U),L1(U),L2(
U),R(U)
2460 %  #        ####.#  ###,### Ft        ####.#  ###,### Ft
     ####    ###,### Ft       ##,### Ft              ##.##
2470 PRINTUSING 2480, J7(U),J8(U),J1(U),J2(U)
2480 %                     ##.## Mi                    ##.## Mi
               ##.## Mi        ##.## Mi
2490 PRINTUSING 2500, M7(U),M8(U),M1(U),M2(U)
2500 %                    ###,### M                   ###,### M
            ###,### M        ##,### M
2510 PRINT
2520 NEXT U
2530 PRINTUSING 2540, N3,L3
2540 %                                    TOTAL FOR ALL ORDERS
     ####    ###,### Ft
2550 PRINTUSING 2560, J3
2560 %
             ###.## Mi
2570 PRINTUSING 2580, M3
2580 %
            ###,### Meters
2590 PRINT
2600 PRINTUSING 2610,L,J,M,RO
2610 %BASIN LENGTH:      ###,### Ft    ##.## Mi   ###,### M
                   FORM FACTOR:              ##.##
2620 PRINT
2630 PRINTUSING 2640, P,P0,P1,L4,M4
2640 %PERIMETER:         ###,### Ft    ##.## Mi   ###,### M
                  MAXIMUM ELEVATION:    #### Ft    #### Meters
```

```
2650 PRINTUSING 2660, L5,M5
2660 %
                    MINIMUM ELEVATION:     #### Ft    #### Meters
2670 PRINTUSING 2680, A,A0,A2,A1,H,H0
2680 %BASIN AREA:     ###,###,###        ##.##  ###,###,###    ##
,###                MAXIMUM RELIEF:        #### Ft    #### Meters
2690 PRINT TAB(15);"Square Feet        Sq Mi    Sq Meters     Ac
res"
2700 PRINTUSING 2710, R1
2710 %
                    RELIEF RATIO:                ##.##
2720 PRINTUSING 2730, D,D0,D2,D1
2730 %DRAINAGE          #.######        ##.##       #.#####    ##
#.##
2740 PRINTUSING 2750, R2
2750 %DENSITY:          Ft/Sq Ft    Mi/Sq Mi        M/Sq M    Ft
/Acre               RELATIVE RELIEF:            ##.##%
2760 PRINT : PRINTUSING 2770, C,C0,H1
2770 %CONST. OF CHANNEL   ##,###                      ##,###
                    RUGGEDNESS NUMBER:          ##.##
2780 PRINT "MAINTENANCE:      Sq Ft/Ft                      Sq M/M
"
2790 PRINT TAB(76);"HYPSOMETRIC ANALYSIS AVAILABLE?  ";M6$
2800 PRINTUSING 2810, L0,M0
2810 %EST. LENGTH OF      ##,###                      #,###

2820 PRINT "OVERLAND FLOW:        Feet                      Meters
                        MEAN ELEVATION"
2830 PRINT "
                          ESTIMATED BY"
2840 PRINTUSING 2850,N6$,E,F
2850 %REMARKS:  ##################################################
##################    REGRESSION:          #### Ft    #### Meters
2860 IF M6$="N" THEN 2890
2870 PRINTUSING 2880, E0,F0
2880 %
                    AREA-WEIGHTED:       #### Ft    #### Meters
2890 SELECT PRINT 005
2900 FOR U=1 TO 6: N7(U)=0: N8(U)=0: L7(U)=0: L8(U)=0: NEXT U
2910 FOR Z=1 TO 17: E4(Z)=0: E5(Z)=0: NEXT Z
2920 GOTO 4030
2930 REM PLOTS TO CHECK HORTON'S LAWS **************************
2940 PRINT "TURN ON PRINTER.": SELECT PRINT 215(132): PRINT HEX
(0C)
2950 PRINT HEX(0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A): PRI
NT TAB(18);HEX(0E);"PLOTS TO CHECK HORTON'S LAWS"
2960 PRINT : PRINT TAB(50);"DBRU NUMBER:  ";B1$
2970 PRINT HEX(0A0A0A0A0A0A0A0A0A0A0A0A0A0A)
2980 PRINT TAB(10);"LOG";TAB(20);"3.0";TAB(75);"LOG OF";TAB(85)
;"7": PRINT HEX(0A0A)
2990 PRINT TAB(10);"NUMBER";TAB(20);"2.5";TAB(75);"MEAN";TAB(85
);"6": PRINT HEX(0A0A)
3000 PRINT TAB(10);"OF";TAB(20);"2.0";TAB(75);"STREAM";TAB(85);
"5": PRINT HEX(0A0A)
3010 PRINT TAB(10);"STREAM";TAB(20);"1.5";TAB(75);"SEGMENT";TAB
(85);"4": PRINT HEX(0A0A)
3020 PRINT TAB(10);"SEGMENTS";TAB(20);"1.0";TAB(75);"LENGTH,";T
AB(85);"3": PRINT HEX(0A0A)
3030 PRINT TAB(20);"0.5";TAB(75);"FEET";TAB(85);"2": PRINT HEX(
0A0A)
```

```
3040 PRINT TAB(20);"0.0+";TAB(85);"1+"
3050 PRINT TAB(23);"     1    2    3    4    5    6",TAB(86);"
    1    2    3    4    5    6"
3060 PRINT : PRINT TAB(32);"STREAM ORDER",TAB(95);"STREAM ORDER
"
3070 PRINT HEX(0C): SELECT PRINT 005
3080 PRINT "TURN ON PLOTTER (SWITCH IS UNDER TABLE) AND LOAD WI
TH PAPER"
3090 PRINT "FROM PRINTER.  THEN KEY 'RETURN'."
3100 INPUT X: PRINT HEX(03)
3110 GOSUB 3310
3120 PLOT 2<100,K1(1)*200,U>
3130 FOR U=2 TO K
3140 PLOT <200,(K1(U)-K1(U-1))*400,D>
3150 NEXT U
3160 PLOT < , ,R>
3170 PRINT "PREPARE PAPER FOR SECOND GRAPH.  THEN KEY 'RETURN'.
"
3180 INPUT X
3190 PRINT HEX(03)
3200 GOSUB 3310
3210 PLOT < , ,R>
3220 PLOT 10<20,(K2(1)-1)*20,U>
3230 FOR U=2 TO K
3240 PLOT <200,(K2(U)-K2(U-1))*200,D>
3250 NEXT U
3260 PLOT < , ,R>
3270 PRINT
3280 INPUT "DID THE GRAPHS COME OUT OK", B$
3290 IF B$="Y" THEN 4030
3300 GOTO 2930
3310 REM SUBROUTINE FOR PLOTTING HORTON AXES ****************
3320 PLOT < , ,R>,< , ,D>
3330 FOR Y=1 TO 6
3340 PLOT <200,0,D>,<0,25,D>,<0,-25,D>
3350 NEXT Y
3360 PLOT < , ,R>,< , ,D>
3370 FOR Y=1 TO 6
3380 PLOT <0,200,D>,<25,0,D>,<-25,0,D>
3390 NEXT Y
3400 PLOT < , ,R>
3410 REM END SUBROUTINE AND END HORTPLOT ***********************
3420 RETURN
3430 PRINT HEX(03)
3440 REM HYPSOMETRIC ANALYSIS PLOT ******************************
3450 PRINT "TURN PRINTER ON AND PRESS 'SELECT' BUTTON."
3460 SELECT PRINT 215(132)
3470 PRINT "DATA POINTS FOR HYPSOMETRIC PLOT -- DBRU NO. ";B1$,
"AREAS AGREE WITHIN ";FNS((F1(E3)/A-1)*100);"%."
3480 PRINT "INCREMENT   LOWER CONTOUR   AREA, Sq Ft.   RELATIVE
 HEIGHT   RELATIVE AREA"
3490 PRINTUSING 3500, E4(1)+E2
3500 %    0          ####                  0          1.000
       0.000
3510 FOR Z=1 TO E3
3520 PRINTUSING 3540, Z,E4(Z),E5(Z),F2(Z),F1(Z)/F1(E3)
3530 NEXT Z
3540 %   ##          ####        ###,###,###          #.###
       #.###
3550 PRINT HEX(0C)
```

```
3560 PRINT HEX(0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A0A)
3570 PRINT TAB(18);HEX(0E);"HYPSOMETRIC ANALYSIS PLOT"
3580 PRINT : PRINT TAB(50);"DBRU NUMBER:  ";B1$: PRINT
3590 PRINT HEX(0A0A)
3600 PRINT TAB(35);"1.0": PRINT HEX(0A0A)
3610 PRINT TAB(35);"0.9": PRINT HEX(0A0A)
3620 PRINT TAB(30);"R";TAB(35);"0.8"
3630 PRINT TAB(30);"E": PRINT TAB(30);"L"
3640 PRINT TAB(30);"A";TAB(35);"0.7"
3650 PRINT TAB(30);"T": PRINT TAB(30);"I"
3660 PRINT TAB(30);"V";TAB(35);"0.6"
3670 PRINT TAB(30);"E": PRINT
3680 PRINT TAB(30);"H";TAB(35);"0.5"
3690 PRINT TAB(30);"E": PRINT TAB(30);"I"
3700 PRINT TAB(30);"G";TAB(35);"0.4"
3710 PRINT TAB(30);"H": PRINT TAB(30);"T"
3720 PRINT TAB(35);"0.3": PRINT HEX(0A0A)
3730 PRINT TAB(35);"0.2": PRINT HEX(0A0A)
3740 PRINT TAB(35);"0.1": PRINT HEX(0A0A)
3750 PRINT TAB(35);"0.0+"
3760 PRINT TAB(37);"0.0  0.1  0.2  0.3  0.4  0.5  0.6  0.7  0.8
  0.9  1.0"
3770 PRINT HEX(0A0A): PRINT TAB(58);"RELATIVE AREA"
3780 PRINT HEX(0C)
3790 SELECT PRINT 005
3800 PRINT HEX(03)
3810 PRINT "TURN PLOTTER ON (SWITCH IS UNDER TABLE) AND LOAD PA
PER FROM"
3820 PRINT "PRINTER.  THEN KEY RETURN."
3830 INPUT X: PRINT HEX(03)
3840 PLOT < , ,R>,< , ,D>
3850 FOR Y=1 TO 10
3860 PLOT <200,0,D>,<0,25,D>,<0,-25,D>
3870 NEXT Y
3880 PLOT < , ,R>,< , ,D>
3890 FOR Y=1 TO 10
3900 PLOT <0,200,D>,<25,0,D>,<-25,0,D>
3910 NEXT Y
3920 PLOT <(F1(1)/F1(E3))*2000,(F2(1)-1)*2000,D>
3930 FOR Z=2 TO E3-1
3940 PLOT <E5(Z)*2000/F1(E3),-E2*2000/H,D>
3950 NEXT Z
3960 PLOT <(F1(E3)-F1(Z))*2000/F1(E3),-ABS(E4(Z)-L5)*2000/H,D>
3970 PLOT < , ,R>
3980 PRINT : PRINT "WHEN FINISHED, KEY 'RETURN'."
3990 INPUT X: PRINT HEX(03)
4000 INPUT "DID GRAPH COME OUT ALL RIGHT", B$
4010 IF B$="Y" THEN 4030
4020 GOTO 3810
4030 RETURN
4040 PRINT  "THAT'S ALL -- SO LONG!": END
```

```
10 SELECT INPUT 001: SELECT PRINT 005: PRINT HEX(03)
20 PRINT "       *** PART 3 -- UPDATING DATA STORED ON DISK ***
"
30 DIM B1$12,C1$12,B$1,N7(6),N8(6),L7(6),L8(6),E5(17),B8$6,E4(1
7),M6$1,N6$64,Q(57),Q1(57),Q$(57),A$45,C$64,Q1$(5),D1$24,C2$45,
C3$50,C4$51,C5$38,C6$61,C7$20,W(57)
40 PRINT : PRINT "YOU MAY USE THIS PART OF THE PROGRAM TO CHECK
 THE CONTENTS OF"
50 PRINT "A DBRU FILE RECORD AND/OR TO CORRECT A MISTAKE IN A R
ECORD"
60 PRINT "THAT HAS BEEN SAVED ON DISK."
70 Q$(1)="DBRU NUMBER:  "
80 Q$(2)="NATIONAL FOREST:  "
90 Q$(3)="DISTRICT:  "
100 Q$(4)="MAP QUAD:  "
110 Q$(5)="FILED BY:  "
120 Q$(6)="DATE FILED:  "
130 Q$(7)="REMARK:  "
140 Q$(8)="HYPS. ANALYSIS:  "
150 Q$(9)="NO. OF ORDERS:  "
160 Q$(10)="MAX. ELEVATION:  "
170 Q$(11)="MIN. ELEVATION:  "
180 Q$(12)="BASIN LENGTH:  "
190 Q$(13)="PERIMETER:  "
200 Q$(14)="BASIN AREA:  "
210 Q$(15)="CONTOUR INTERVAL:  "
220 Q$(16)="# OF INCREMENTS:"
230 FOR X=1 TO 6
240 Q$(X+16)="# INT SEGS ORDER"
250 Q$(X+22)="# PRN SEGS ORDER"
260 Q$(X+28)="L INT SEGS ORDER"
270 Q$(X+34)="L PRN SEGS ORDER"
280 NEXT X
290 FOR X=1 TO 17
300 Q$(X+40)="AREA INCR. ABOVE"
310 NEXT X
320 PRINT : PRINT "ENTER DBRU NUMBER OF THE RECORD YOU WISH TO
UPDATE."
330 PRINT "  ------------"
340 PRINT HEX(0C)
350 INPUT B1$
360 PRINT
370 PRINT "WHEN DATA DISK CONTAINING THIS DBRU IS LOADED IN R S
LOT, KEY"
380 PRINT "'RETURN'."
390 INPUT X: PRINT HEX(03): PRINT AT(7,20);"SEARCHING FILE"
410 DATA LOAD DC OPEN R "DBRU"
420 DATA LOAD DC C1$
430 IF END THEN 460
440 IF B1$<>C1$ THEN 420
450 GOTO 480
460 PRINT HEX(03): PRINT "YOUR DBRU IS NOT ON THIS DISK.  TRY A
```

```
GAIN."
470 GOTO 260
480 REM DBRU LOCATED
490 DBACKSPACE 1
500 DATA LOAD DC B1$,Q1$(3),Q1$(4),Q1$(2),B6,N7(),L7(),N8(),L8(
),Q1(15),Q1(16),E5(),Q1(10),Q1(11),Q1(14),Q1(9),Q1(12),Q1$(5),B
8$,Q1(13),E4(),M6$,N6$
510 FOR X=1 TO 6
520 Q1(X+16)=N7(X)
530 Q1(X+22)=N8(X)
540 Q1(X+28)=L7(X)
550 Q1(X+34)=L8(X)
560 NEXT X
570 FOR X=1 TO 17
580 Q1(X+40)=E5(X)
590 NEXT X
600 A$="       *** CURRENT CONTENTS OF THIS RECORD ***"
610 PRINT HEX(03): PRINT A$
620 PRINT " 1 .  ";Q$(1),TAB(33);B1$
630 FOR X=2 TO 5
640 PRINT X;".  ";Q$(X),TAB(33);Q1$(X)
650 NEXT X
660 PRINT " 6 .  ";Q$(6),TAB(33);B8$
670 PRINT " 7 .  ";Q$(7),TAB(33);N6$
680 PRINT " 8 .  ";Q$(8),TAB(33);M6$
690 C$="LIST PARAMETER NUMBERS (AT LEFT ABOVE) YOU WANT TO CORR
ECT."
700 D1$="KEY 'RETURN' AFTER EACH."
710 PRINT C$: PRINT D1$
720 FOR X=1 TO 8
730 INPUT Q(X)
740 IF Q(X)=0 THEN 760
750 NEXT X
760 PRINT HEX(03)
770 PRINT A$
780 PRINT
790 FOR X=9 TO 14
800 PRINT X;".  ";Q$(X),TAB(33);Q1(X)
810 NEXT X
820 C5$="** HYPSOMETRIC ANALYSIS PARAMETERS **"
830 PRINT C5$
840 FOR X=15 TO 16
850 PRINT X;".  ";Q$(X),TAB(33);Q1(X)
860 NEXT X
870 PRINT C$
880 PRINT D1$
890 FOR X=9 TO 16
900 INPUT Q(X)
910 IF Q(X)=0 THEN 930
920 NEXT X
930 PRINT HEX(03)
940 PRINT A$: PRINT
950 C2$=  "              INTERMITTENT              PERENNIAL"
960 C3$=  "STREAM   PARAMETER   NO. OF     PARAMETER   NO. OF"
970 C4$=  "ORDER     NUMBER    SEGMENTS     NUMBER    SEGMENTS"
980 PRINT "                    NUMBER OF STREAM SEGMENTS"
990 PRINT C2$: PRINT C3$
1000 PRINT C4$
1010 FOR U=1 TO 6
1020 PRINTUSING 1040,U,U+16,Q1(U+16),U+22,Q1(U+22)
```

```
1030 NEXT U
1040 %  #          ##.       ####.#          ##.       ####.#
1050 PRINT C$
1060 PRINT D1$
1070 FOR X=17 TO 28
1080 INPUT Q(X)
1090 IF Q(X)=0 THEN 1110
1100 NEXT X
1110 PRINT HEX(03)
1120 PRINT A$: PRINT
1130 PRINT "                    LENGTH OF STREAM SEGMENTS"
1140 PRINT C2$
1150 PRINT "STREAM   PARAMETER   L.  OF     PARAMETER   L.  OF"
1160 PRINT C4$
1170 FOR U=1 TO 6
1180 PRINTUSING 1200,U,U+28,Q1(U+28),U+34,Q1(U+34)
1190 NEXT U
1200 %  #          ##.      ###,###          ##.      ###,###
1210 PRINT C$
1220 PRINT D1$
1230 FOR X=29 TO 40
1240 INPUT Q(X)
1250 IF Q(X)=0 THEN 1270
1260 NEXT X
1270 PRINT HEX(03)
1280 PRINT A$: PRINT
1290 PRINT TAB(10);C5$
1300 C6$="INCREMENT    LOWER CONTOUR    PARAMETER NO.          AR
EA"
1310 PRINT C6$
1320 %   ##              ####               ##.          ###,###,###
1330 FOR Z=1 TO 9
1340 PRINTUSING 1320,Z,E4(Z),Z+40,Q1(Z+40)
1350 NEXT Z
1360 PRINT C$
1370 PRINT D1$
1380 FOR X=41 TO 49
1390 INPUT Q(X)
1400 IF Q(X)=0 THEN 1420
1410 NEXT X
1420 PRINT HEX(03)
1430 PRINT A$: PRINT
1440 PRINT TAB(10);C5$
1450 PRINT C6$
1460 FOR Z=10 TO 17
1470 PRINTUSING 1320,Z,E4(Z),Z+40,Q1(Z+40)
1480 NEXT Z
1490 PRINT C$
1500 PRINT D1$
1510 FOR X=50 TO 57
1520 INPUT Q(X)
1530 IF Q(X)=0 THEN 1550
1540 NEXT X
1550 PRINT HEX(03)
1560 PRINT "NOW MAKE CORRECTIONS.": SELECT P6: PRINT : SELECT P
1570 C7$="PARAMETER NO.  "
1580 FOR X=1 TO 57
1590 IF Q(X)=0 THEN 2260
1600 IF Q(X)>8 THEN 1990
1610 IF Q(X)=1 THEN 1740
```

```
1620 IF Q(X)<6 THEN 1670
1630 REM Q(X)=6,7,8=A DIMENSIONED ALPHA VARIABLE.
1640 IF Q(X)=6 THEN 1810
1650 IF Q(X)=7 THEN 1870
1660 IF Q(X)=8 THEN 1930
1670 REM Q(X)=2,3,4,5=A 16-SPACE ALPHA VARIABLE.
1680 PRINT HEX(03)
1690 PRINT
1700 PRINT C7$,TAB(33);Q(X)
1710 PRINT Q$(Q(X)),TAB(33);Q1$(Q(X))
1720 INPUT "CORRECT VALUE:                    ",Q1$(Q(X))
1730 GOTO 2260
1740 REM Q(X)=1
1750 PRINT HEX(03)
1760 PRINT
1770 PRINT C7$,TAB(33);Q(X)
1780 PRINT Q$(Q(X)),TAB(33);B1$
1790 INPUT "CORRECT VALUE:                    ",B1$
1800 GOTO 2260
1810 REM Q(X)=6
1820 PRINT HEX(03): PRINT
1830 PRINT C7$,TAB(33);Q(X)
1840 PRINT Q$(Q(X)),TAB(33);B8$
1850 INPUT "CORRECT VALUE:                    ",B8$
1860 GOTO 2260
1870 REM Q(X)=7
1880 PRINT HEX(03): PRINT
1890 PRINT C7$,TAB(33);Q(X)
1900 PRINT Q$(Q(X)),TAB(33);N6$
1910 INPUT "CORRECT VALUE:                    ",N6$
1920 GOTO 2260
1930 REM Q(X)=8
1940 PRINT HEX(03): PRINT
1950 PRINT C7$,TAB(33);Q(X)
1960 PRINT Q$(Q(X)),TAB(33);M6$
1970 INPUT "CORRECT VALUE:                    ",M6$
1980 GOTO 2260
1990 REM Q(X) IS A NUMERIC VARIABLE.
2000 IF Q(X)>16 THEN 2070
2010 REM Q(X) IS A NON-ARRAY NUMERIC VARIABLE.
2020 PRINT HEX(03): PRINT
2030 PRINT C7$,TAB(33);Q(X)
2040 PRINT Q$(Q(X)),TAB(33);Q1(Q(X))
2050 INPUT "CORRECT VALUE:                    ",Q1(Q(X))
2060 GOTO 2260
2070 REM Q(X) IS AN ARRAY.
2080 IF Q(X)>40 THEN 2200
2090 REM Q(X) IS A SEG. NO. OR LENGTH.
2100 PRINT HEX(03): PRINT
2110 PRINT C7$,TAB(33);Q(X)
2120 PRINT Q$(Q(X))
2130 W(X)=Q(X)
2140 IF W(X)-16<7 THEN 2170
2150 W(X)=W(X)-6
2160 GOTO 2140
2170 PRINT AT(2,18);W(X)-16;":",TAB(33);Q1(Q(X))
2180 INPUT "CORRECT VALUE:                    ",Q1(Q(X))
2190 GOTO 2260
2200 REM Q(X) IS A HYPS AREA
2210 PRINT HEX(03): PRINT
```

```
2220 PRINT C7$,TAB(33);Q(X)
2230 PRINT Q$(Q(X));E4(Q(X)-40);":",TAB(33);Q1(Q(X))
2240 INPUT "CORRECT VALUE:                    ",Q1(Q(X))
2250 GOTO 2260
2260 NEXT X
2270 PRINT HEX(03)
2280 INPUT "DO YOU WANT TO SEE CORRECTED VALUES", B$
2290 IF B$="Y" THEN 2450
2300 FOR U=1 TO 6
2310 N7(U)=Q1(U+16)
2320 N8(U)=Q1(U+22)
2330 L7(U)=Q1(U+28)
2340 L8(U)=Q1(U+34)
2350 NEXT U
2360 FOR Z=1 TO 17
2370 E5(Z)=Q1(Z+40)
2380 NEXT Z
2390 DBACKSPACE 1
2400 DATA SAVE DC B1$,Q1$(3),Q1$(4),Q1$(2),B6,N7(),L7(),N8(),L8
(),Q1(15),Q1(16),E5(),Q1(10),Q1(11),Q1(14),Q1(9),Q1(12),Q1$(5),
B8$,Q1(13),E4(),M6$,N6$
2410 DATA SAVE DC CLOSE
2420 PRINT HEX(03)
2430 PRINT AT(7,22);"FILE UPDATED.  SO LONG!"
2440 END
2450 FOR X=1 TO 57
2460 Q(X)=0
2470 NEXT X
2480 GOTO 610
```

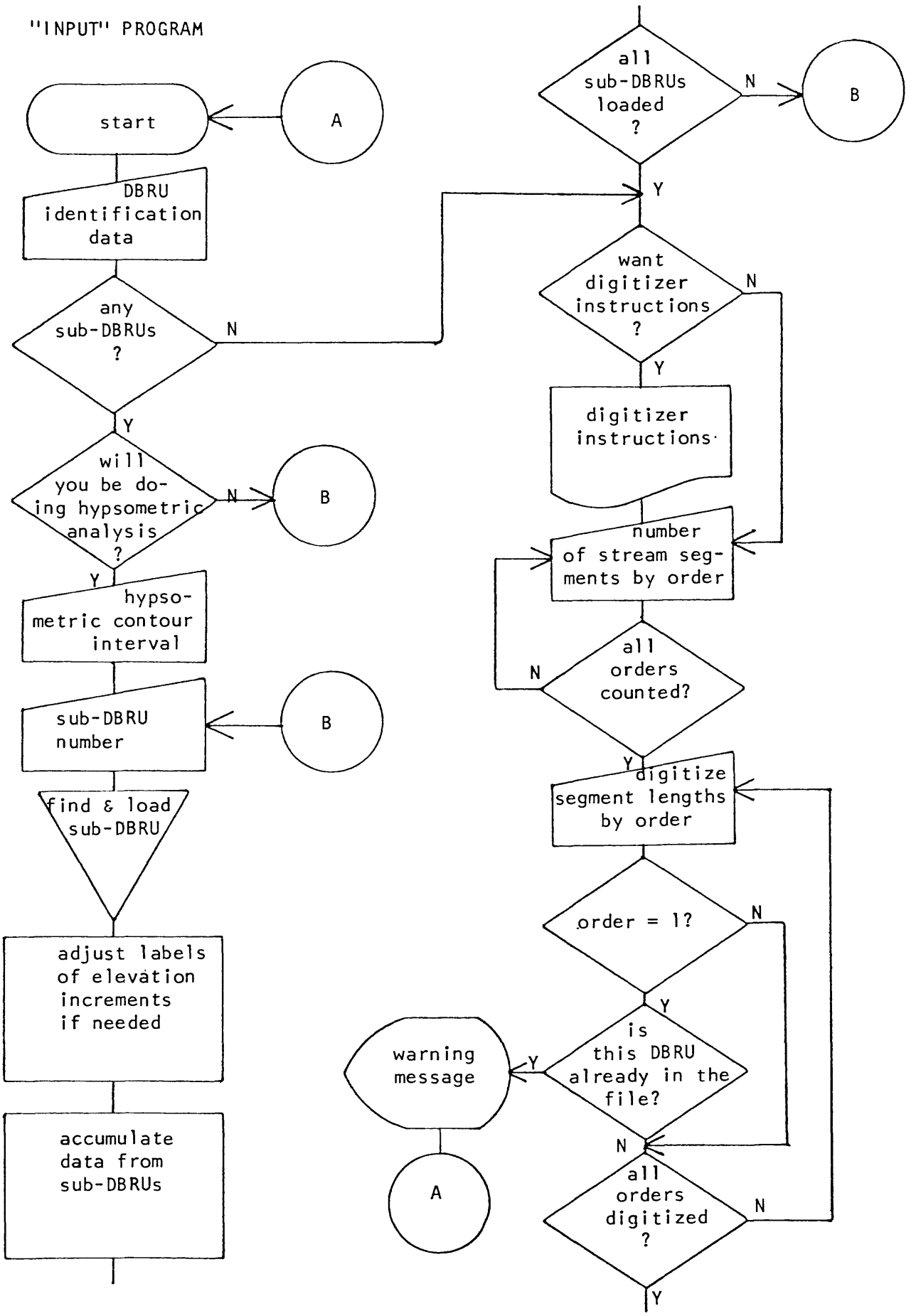
Appendix C

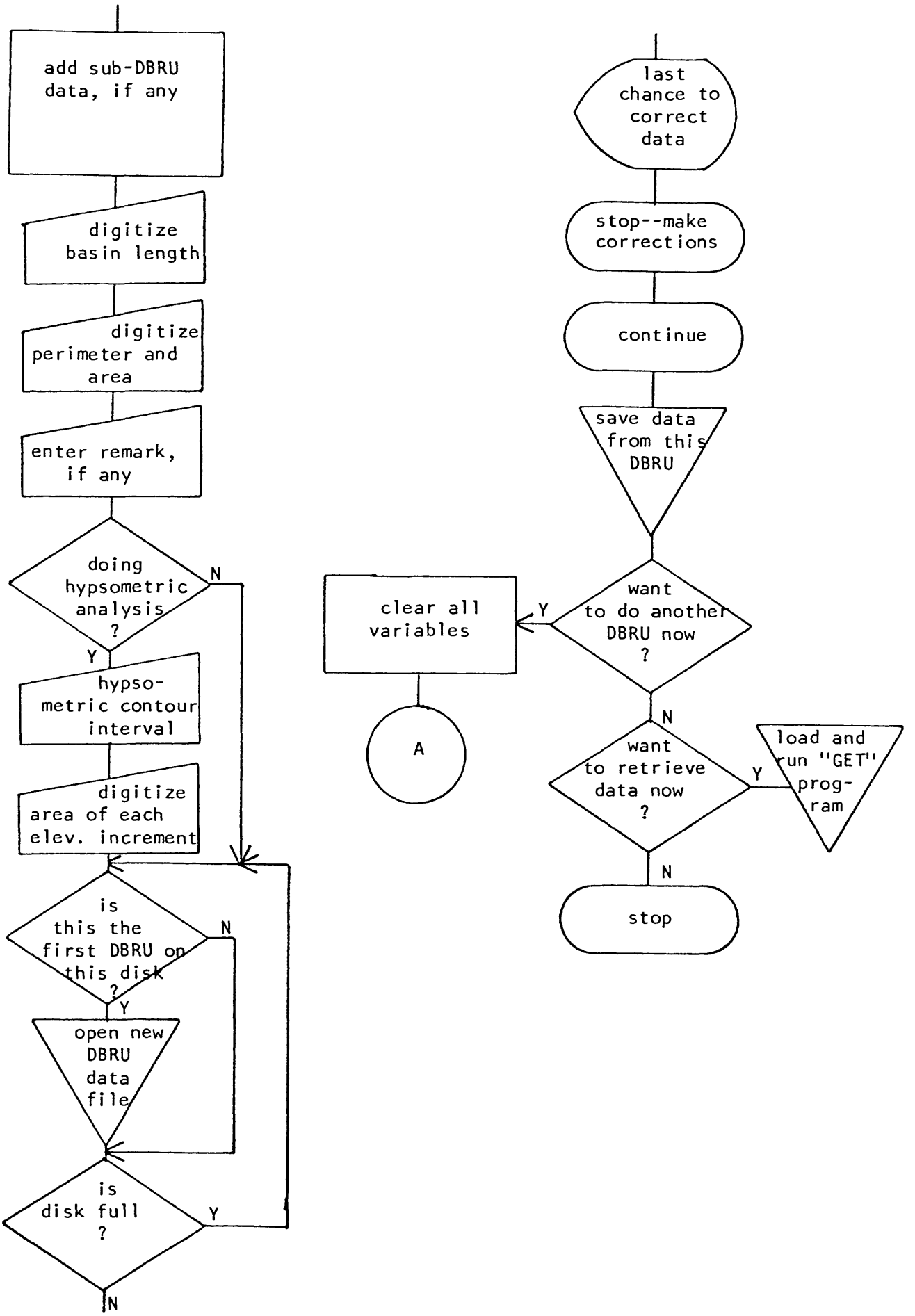
Generalized program flow charts

"INPUT" program

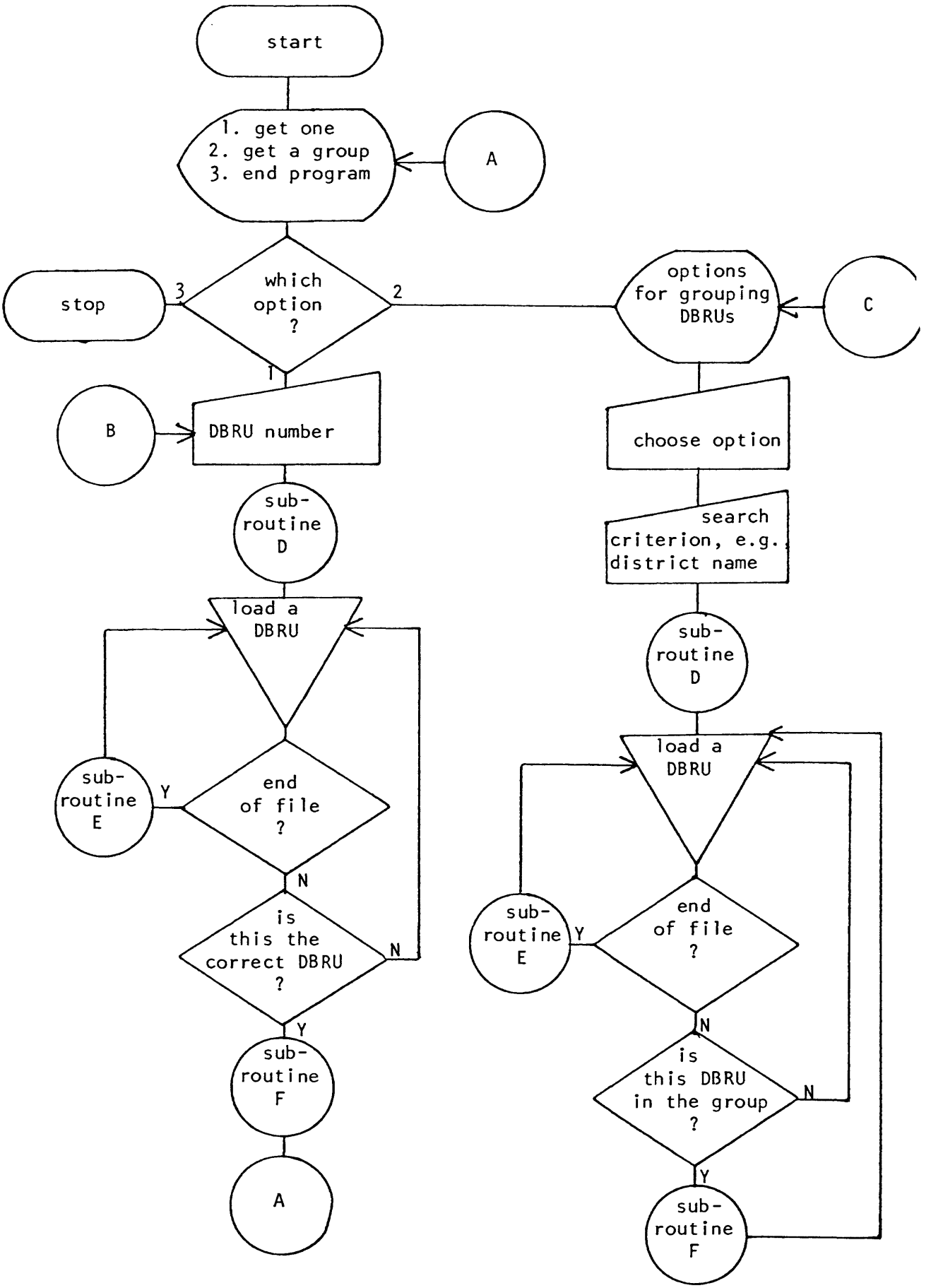
"GET" program

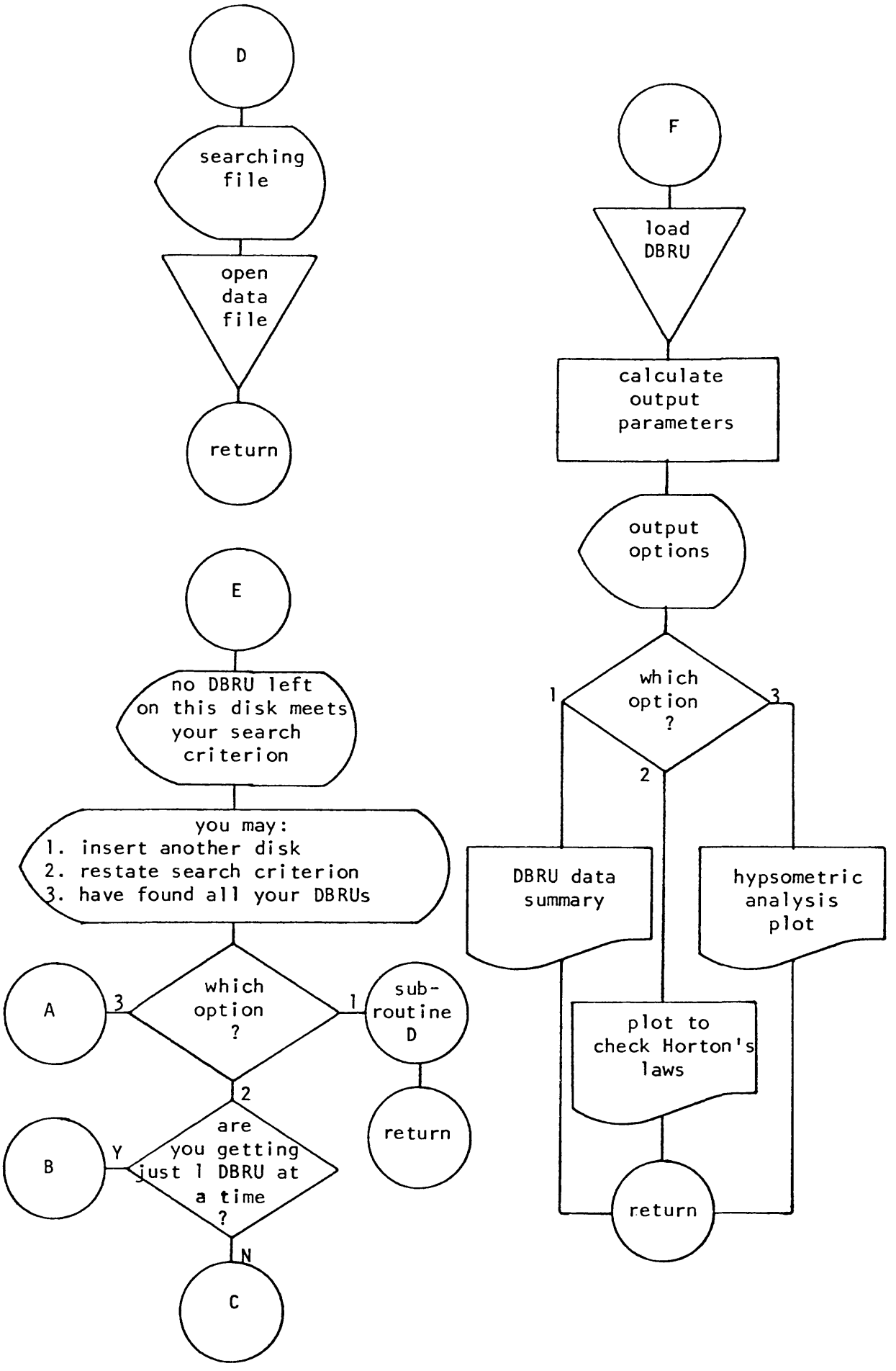
"UPDATE" program


"INPUT" PROGRAM
start
A
DBRU identification data
any sub-DBRUs ?
N
Y
will you be doing hypsometric analysis ?
N
B
Y
hypsometric contour interval
sub-DBRU number
B
find & load sub-DBRU
adjust labels of elevation increments if needed
accumulate data from sub-DBRUs
all sub-DBRUs loaded ?
N
B
Y
want digitizer instructions ?
N
Y
digitizer instructions
number of stream segments by order
all orders counted?
N
Y
digitize segment lengths by order
order = 1?
N
Y
is this DBRU already in the file?
Y
warning message
A
N
all orders digitized ?
N
Y

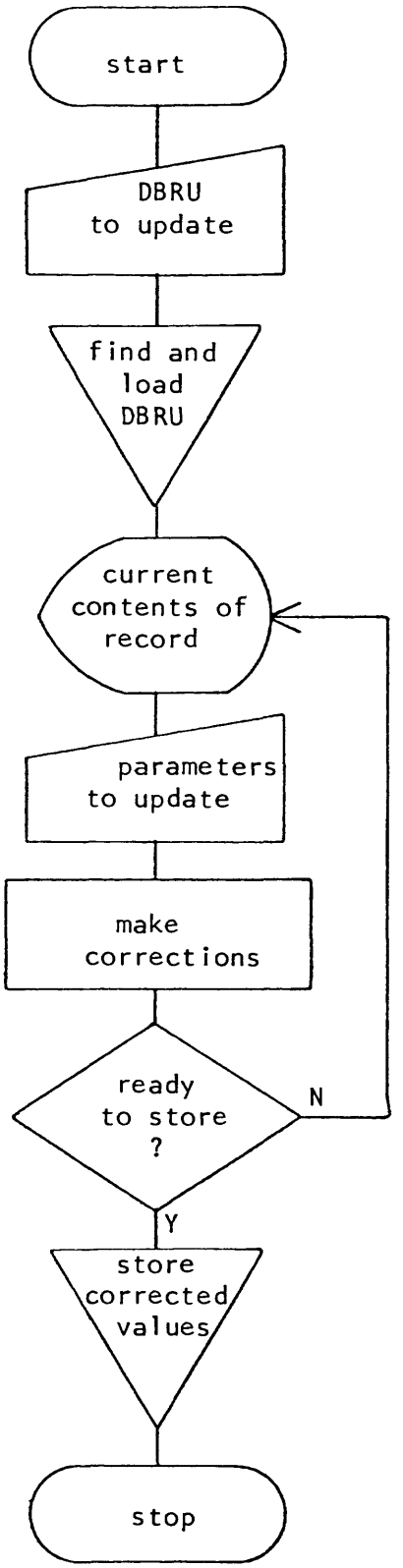

add sub-DBRU data, if any
digitize basin length
digitize perimeter and area
enter remark, if any
doing hypsometric analysis ?
N
Y
hypso-metric contour interval
digitize area of each elev. increment
is this the first DBRU on this disk ?
N
Y
open new DBRU data file
is disk full ?
Y
N
last chance to correct data
stop--make corrections
continue
save data from this DBRU
want to do another DBRU now ?
Y
clear all variables
A
N
want to retrieve data now ?
Y
load and run "GET" prog-ram
N
stop

"GET" PROGRAM


start
1. get one
2. get a group
3. end program
A
which option ?
3
stop
2
options for grouping DBRUs
C
1
B
DBRU number
choose option
sub-routine D
search criterion, e.g. district name
load a DBRU
sub-routine D
sub-routine E
Y
end of file ?
load a DBRU
N
is this the correct DBRU ?
N
sub-routine E
Y
end of file ?
Y
sub-routine F
N
is this DBRU in the group ?
N
A
Y
sub-routine F


D
searching file
open data file
return
E
no DBRU left on this disk meets your search criterion
you may:
1. insert another disk
2. restate search criterion
3. have found all your DBRUs
A
3
which option ?
1
sub-routine D
return
2
B
Y
are you getting just 1 DBRU at a time ?
N
C
F
load DBRU
calculate output parameters
output options
1
which option ?
3
2
DBRU data summary
hypsometric analysis plot
plot to check Horton's laws
return

"UPDATE PROGRAM"



APPENDIX D.--LIST OF VARIABLES

Explanation

A1$N means A1$ is an alphanumeric variable with N characters.
A1$ means A1$ is an alphanumeric variable with 16 characters.
A1 means A1 is a numeric variable (9 bytes).
A1(N) means A1 is a vector or list numeric variable with N elements.

Variable & Dimension	Explanation	Units	Input	Get	Update
A$45	character string for display				X
A	basin area	ft^2	X	X	X
A0	basin area	mi^2		X	
A1	basin area	acres		X	
A2	basin area	m^2		X	
A3	accumulator for areas of sub-DBRUs	ft^2	X		
A5	2 digits identifying 4th order DBRU number	--	X		
A6	2 digits identifying 3rd order DBRU number	--	X		
A7	2 digits identifying 4th order DBRU number of a sub-DBRU	--	X		
A8	2 digits identifying 3rd order DBRU number of a sub-DBRU	--	X		
B$1	Y or N for various questions	--	X	X	
B0$12	watershed number for retrieval	--		X	
B0	number of sub-DBRUs in DBRU	--	X		
B1$12	DBRU number	--	X	X	X
B2$	national forest district	--	X	X	
B3$	topo map quad name	--	X	X	
B4$	national forest name	--	X	X	
B5$1	S for Sumter national forest	--	X		
B6	number of DBRUs on diskette up to and including this one	--	X	X	X
B7$	name of person filing DBRU	--	X	X	
B8$6	date DBRU was filed	MMDDYY	X	X	X
B9$12	sub-DBRU DBRU number	--	X		
C$64	character string for display	--			X
C	constant of channel maintenance	ft^2/ft		X	
C0	constant of channel maintenance	m^2/m		X	
C1$12	DBRU number from disk	--	X	X	X
C2$	n.f. district from disk	--	X	X	X
C3$	topo map quad name from disk	--	X	X	X
C4$	national forest name from disk	--	X	X	X
C5$38	character string for display	--			X
C5	highest stream order in sub-DBRU	--	X		
C6$61	character string for display	--			X

Variable & Dimension	Explanation	Units	Input	Get	Update
C6	number of DBRUs, from disk	--	X		
C7$20	character string for display	--			X
C7(6)	number of intermittent segments of each order, from disk	--	X		
C8(6)	number of perennial segments of each order, from disk	--	X		
D	drainage density	ft/ft^2		X	
D0	drainage density	mi/mi^2		X	
D1$24	character string for display	--			X
D1	drainage density	ft/acre		X	
D2	drainage density	m/m^2		X	
D4$6	length, input from digitizer	in.	X		
D5$9	area, input from digitizer	in^2	X		
D7(6)	length of intermittent segments of each order, from disk	ft	X		
D8(6)	length of perennial segments of each order, from disk	ft	X		
E	estimated mean basin elevation	ft		X	
E0	actual area-weighted mean elev.	ft		X	
E1	unadjusted mean elevation estimate	ft		X	
E2	contour interval for hypsometric analysis	ft	X	X	
E3	number of elevation increments in hypsometric analysis	--	X	X	
E4(17)	lower contour elevation of each elevation increment in hypsometric analysis	ft	X	X	X
E5(17)	area of each elevation increment in hypsometric analysis	ft^2	X	X	X
E7(6)	accumulator for C7() from sub-DBRUs	--	X		
E8(6)	accumulator for C8() from sub-DBRUs	--	X		
F	estimated mean elevation	m		X	
F0	area-weighted mean elevation	m		X	
F1(17)	accumulator for E5() in hypsometric analysis	ft^2		X	
F2(17)	relative height of each elev. increment in hypsometric analysis	ft		X	
F3(17)	elevation x area for each elevation increment	ft^3		X	
F4	L4/E2 rounded to next higher integer	ft/ft	X		
F5	L5/E2 rounded to next lower integer	ft/ft	X		
F7(6)	accumulator for D7() from sub-DBRUs	ft	X		

Variable & Dimension	Explanation	Units	Input	Get	Update
F8(6)	accumulator for D8() from sub-DBRUs	ft	X		
G	1, 2, or 3 for retrieval option	--		X	
G0	1 to 5 for retrieval option	--		X	
G1	1 to 3 for retrieval option	--		X	
G5(17)	E5() adjusted so all sub-DBRU's have the same 17 increments	ft^2	X		
H	maximum relief	ft		X	
H0	maximum relief	m		X	
H1	ruggedness number	ft^2/ft^2		X	
H2	correction factor to make all sub-DBRU elevation increments mesh	--	X		
H4	max. elevation from sub-DBRU	ft	X		
H5	min. elevation from sub-DBRU	ft	X		
H6	H4/Q2, rounded to next higher integer, used to correct for different hypsometric contour intervals	ft	X		
I	1 to 30 for ordering sub-DBRUs	--	X		
J	basin length	mi		X	
J1(6)	total length of stream segments of each order	mi		X	
J2(6)	mean length of stream segments of each order	mi		X	
J3	total length of stream segments	mi		X	
J7(6)	total length of intermittent segments of each order	mi		X	
J8(6)	total length of perennial segments of each order	mi		X	
K	highest stream order in DBRU	--	X	X	
K1(6)	log of number of stream segments of each order	--		X	
K2(6)	log of mean stream segment length, by order	ft		X	
L	basin length	ft	X	X	
L0	estimated length of overland flow	ft		X	
L1(6)	total length of stream segments of each order	ft		X	
L2(6)	mean length of stream segments of each order	ft		X	
L3	total length of stream segments	ft		X	
L4	maximum basin elevation	ft	X	X	
L5	minimum basin elevation	ft	X	X	
L7(6)	total length of intermittent stream segments of each order	ft	X	X	X
L8(6)	total length of perennial stream segments of each order	ft	X	X	X

Variable & Dimension	Explanation	Units	Input	Get	Update
M	basin length	m		X	
M0	estimated length of overland flow	m		X	
M1(6)	total length of stream segments of each order	m		X	
M2(6)	mean length of stream segments of each order	m		X	
M3	total length of stream segments	m		X	
M4	maximum basin elevation	m		X	
M5	minimum basin elevation	m		X	
M6$1	Y or N for hypsometric analysis	--	X	X	X
M7(6)	total length of intermittent stream segments of each order	m		X	
M8(6)	total length of perennial stream segments of each order	m		X	
M9	1 if DBRU extends to other quads; otherwise 0	--	X		
N1(6)	number of stream segments of each order	--		X	
N3	total number of stream segments	--		X	
N6$64	remark	--	X	X	X
N7(6)	number of intermittent stream segments of each order	--	X	X	X
N8(6)	number of perennial stream segments of each order	--	X	X	X
P	basin perimeter	ft	X	X	
P0	basin perimeter	mi		X	
P1	basin perimeter	m		X	
Q$(57)	variable names	--			X
Q	1 if E3=10, otherwise 0	--	X		
Q(57)	parameter numbers to be updated	--			X
Q1$(5)	alphanumeric variables	--			X
Q1(57)	numeric variables	--			X
Q2	hypsometric contour interval of sub-DBRU	ft	X		
Q3	number of elevation increments in sub-DBRU	--	X		
Q5(17)	area of each elevation increment in sub-DBRU	ft^2	X		
Q6	1 if H6 is odd, 2 if H6 is even	--	X		
Q7	E2/Q2	ft/ft	X		
R(6)	bifurcation ratio for each stream order	--		X	
R0	form factor	ft^2/ft^2		X	
R1	relief ratio	ft/ft		X	
R2	relative relief	ft/ft		X	
R3	total hypsometric area/A	ft^2/ft^2	X		
S1$4	last 4 digits of sub-DBRU number	--	X		
U	stream order number (1 to 6)	--	X	X	X

Variable & Dimension	Explanation	Units	Input	Get	Update
W(57)	variable number minus multiples of six	--			X
X	dummy variable--used to resume program execution	--	X	X	X
Y	1 to 6 for plotting segments of graph axes	--		X	
Z	elevation increment number (1 to 17)	--	X	X	X
Z0	0, 1, or 2 for number of times end of disk has been reached	--	X		

APPENDIX E.--DISKETTE STORAGE FORMAT

Data are stored in unpacked form on eight diskettes. The data file is also available on a single 5 megabyte platter.

Each diskette is formatted to contain 1,024 sectors. Each sector contains 256 2-bit bytes. Sector zero is reserved for the disk catalog index. The data are contained in a cataloged file named "DBRU," which occupies the remainder of the diskette. On the 5 megabyte platter, all the data are contained in a single cataloged file named "DBRU."

One logical record, or observation, contains data for one DBRU. Each logical record occupies three sectors, for a total of 340 DBRUs per diskette. Alphanumeric variables ($ in variable name) occupy a number of bytes equal to the number of dimensioned characters plus one (default dimension is 16 characters). Numeric variables (no $ in variable name) occupy 9 bytes. Missing alphanumeric values are blanks (Hex 20); missing numeric values are zeros. Each logical record contains values for the following 23 variables, in the order indicated:

Variable & Dimension	Explanation	Units
B1$12	DBRU number	--
B2$	national forest district	--
B3$	topo map quad name	--
B4$	national forest name	--
B6	number of DBRUs on this diskette up to and including this one	--
N7(6)	number of intermittent stream segments, orders 1-6	--
L7(6)	total length of intermittent stream segments, orders 1-6	feet
N8(6)	number of perennial stream segments, orders 1-6	--
L8(6)	total length of perennial stream segments, orders 1-6	feet
E2	contour interval for hypsometric analysis	feet
E3	number of elevation increments in hypsometric analysis	--
E5(17)	area of each of up to 17 elevation increments	ft^2
L4	maximum elevation	feet
L5	minimum elevation	feet
A	basin area	ft^2
K	highest stream order in DBRU	--
L	basin length	feet
B7$	name of person filing this DBRU	--

Variable & Dimension	Explanation	Units
B8$6	date of filing	MMDDYY
P	basin perimeter	feet
E4(17)	lower contour elevation of each elevation increment for hypsometric analysis	feet
M6$1	Y or N for optional hypsometric analysis	--
N6$64	remark	--

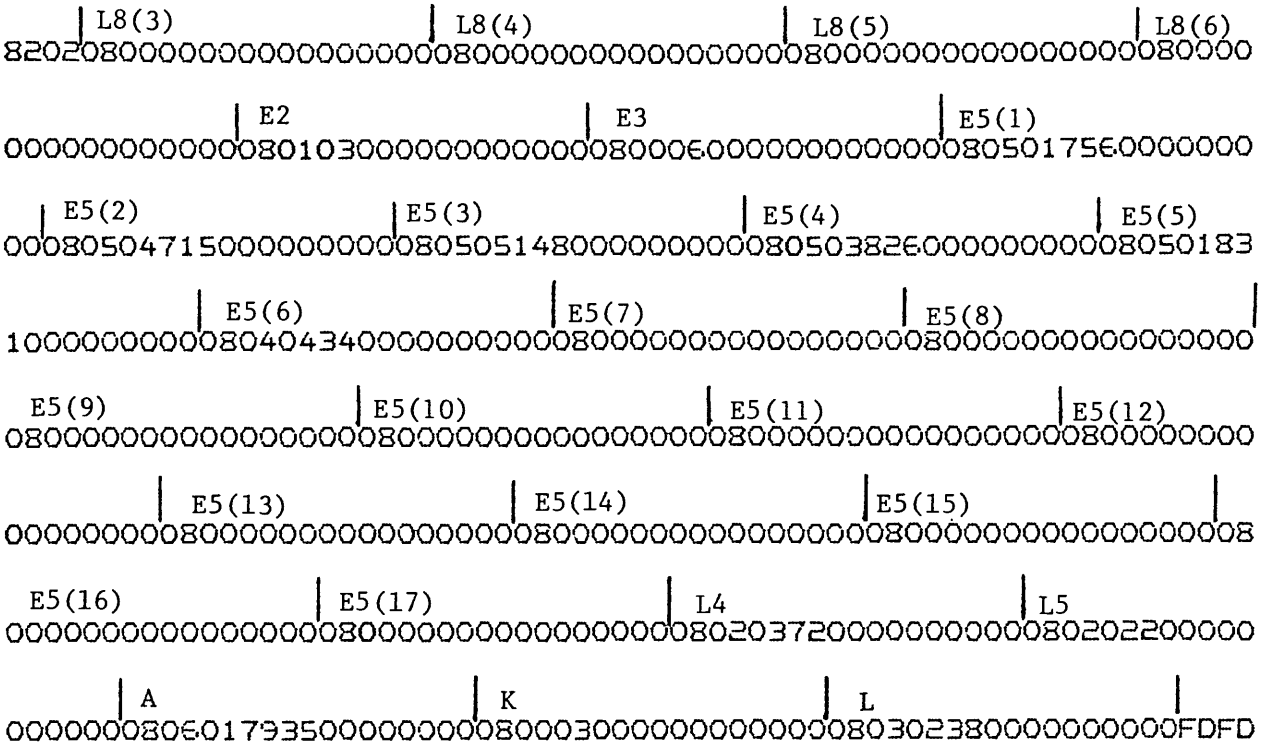
Data may be retrieved from the file by using this basic statement:
DATALOAD DC B1$, B2$, B3$, B4$, B6, N7(), L7(), N8(), L8(), E2, E3, E5(), L4, L5, A, K, L, B7$, B8$, P, E4(), M6$, N6$

These two pages represent three 256-byte sectors containing one logical record made up of the variables listed above in this appendix.

SECTOR 1

```
    | B1$                                   | B2$                                                   |
82018C3630313036343941303130319045444745464945 4420202020202020

 B3$                                                 | B4$
904D41525443 4E455A2020202020202020 9053554D5445522020202020202020

    | B6                    |N7(1)                  | N7(2)                  | N7(3)
2020080001000000000000800050000000000008000200000000000080001

               |N7(4)                  | N7(5)                  | N7(6)
000000000000080000000000000000800000000000000080000000000000

  |L7(1)                  | L7(2)                  | L7(3)                  | L7(4)
000803027600000000000802094000000000000802079000000000000800000

           | L7(5)                  | L7(6)                  | N8(1)                  |
000000000008000000000000000800000000000000008000000000000000

N8(2)                  |N8(3)                  | N8(4)                  | N8(5)
080000000000000000800000000000000008000000000000000800000000

         | N8(6)                  | L8(1)                  | L8(2)                  |
000000008000000000000000800000000000000008000000000000FD
```

SECTOR 2



SECTOR 3

DRAINAGE BASIN RESPONSE UNIT DATA SUMMARY

SUMTER NATIONAL FOREST, SOUTH CAROLINA -- PICKENS DISTRICT

QUAD: TAMASSEE

DBRU NUMBER: (030)6010103A1100
HHH HHHHHAAAFFTT
H = USGS HYDROLOGIC UNIT NO. (FIRST THREE DIGITS NOT STORED ON DISK)
A = USFS ADMINISTRATIVE WATERSHED NUMBER
F = FOURTH ORDER WATERSHED NUMBER
T = THIRD ORDER WATERSHED NUMBER

FILED BY GLENN PATTERSON
03/20/80
HIGHEST STREAM ORDER IN DBRU: 4

STREAM ORDER	INTERMITTENT SEGMENTS NUMBER	INTERMITTENT SEGMENTS LENGTH	PERENNIAL SEGMENTS NUMBER	PERENNIAL SEGMENTS LENGTH	TOTAL NUMBER	TOTAL LENGTH	MEAN LENGTH	BIFURCATION RATIO
1	29.0	15,090 Ft 2.86 Mi 4,600 M	0.0	0 Ft 0.00 Mi 0 M	29	15,090 Ft 2.86 Mi 4,600 M	520 Ft 0.10 Mi 158 M	4.14
2	6.5	5,580 Ft 1.06 Mi 1,701 M	0.5	2,820 Ft 0.53 Mi 859 M	7	8,400 Ft 1.59 Mi 2,560 M	1,200 Ft 0.23 Mi 365 M	3.50
3	1.0	310 Ft 0.06 Mi 94 M	1.0	1,950 Ft 0.37 Mi 594 M	2	2,260 Ft 0.43 Mi 689 M	1,130 Ft 0.21 Mi 344 M	2.00
4	0.0	0 Ft 0.00 Mi 0 M	1.0	4,740 Ft 0.90 Mi 1,445 M	1	4,740 Ft 0.90 Mi 1,445 M	4,740 Ft 0.90 Mi 1,445 M	0.00
			TOTAL FOR ALL ORDERS		39	30,490 Ft 5.77 Mi 9,295 Meters		

BASIN LENGTH: 9,520 Ft 1.80 Mi 2,902 M

PERIMETER: 22,950 Ft 4.35 Mi 6,996 M

BASIN AREA:	16,184,300 Square Feet	0.58 Sq Mi	1,504,117 Sq Meters	371 Acres
DRAINAGE DENSITY:	0.001883 Ft/Sq Ft	3.94 Mi/Sq Mi	0.00617 M/Sq M	82.06 Ft/Acre
CONST. OF CHANNEL MAINTENANCE:	530 Sq Ft/Ft		161 Sq M/M	
EST. LENGTH OF OVERLAND FLOW:	265 Feet		80 Meters	

REMARKS: CROSSLAND CREEK.

FORM FACTOR: 0.18

MAXIMUM ELEVATION:	2382 Ft	726 Meters
MINIMUM ELEVATION:	1090 Ft	332 Meters
MAXIMUM RELIEF:	1292 Ft	393 Meters

RELIEF RATIO: 0.14

RELATIVE RELIEF: 5.63%

RUGGEDNESS NUMBER: 2.43

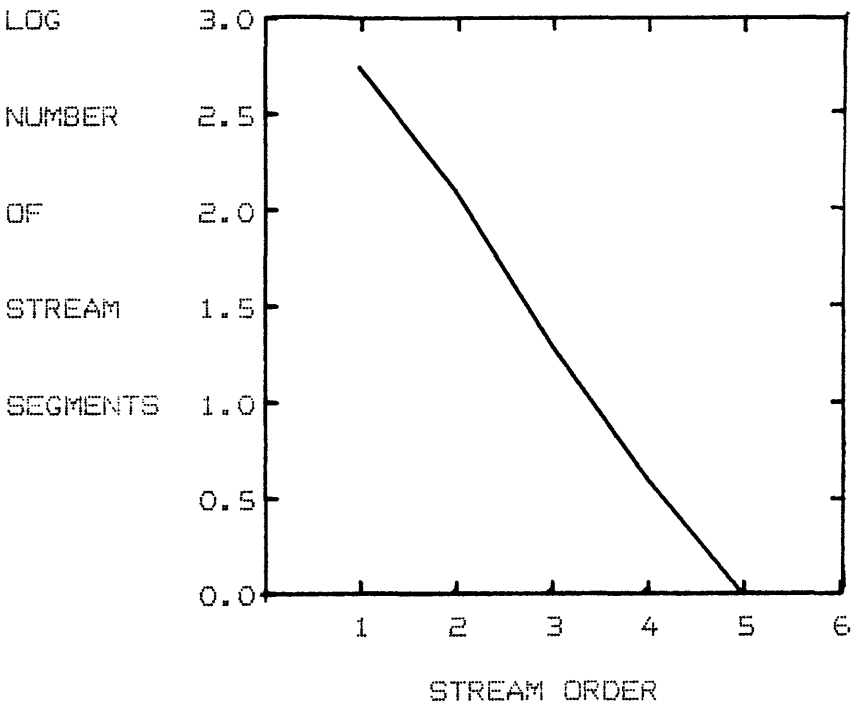
HYPSOMETRIC ANALYSIS AVAILABLE? Y

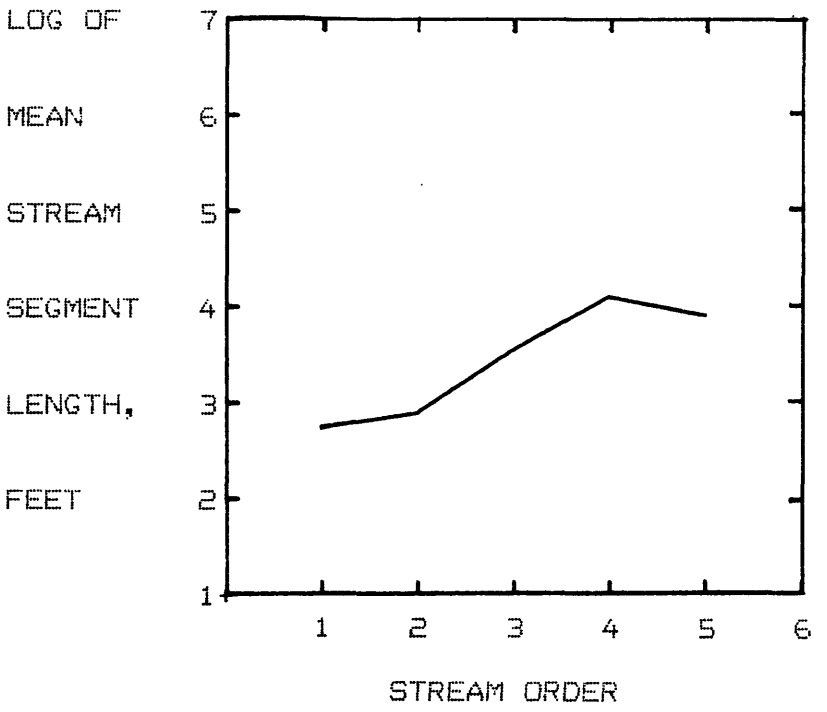
MEAN ELEVATION

ESTIMATED BY		
REGRESSION:	1656 Ft	504 Meters
AREA-WEIGHTED:	1618 Ft	493 Meters

PLOTS TO CHECK HORTON'S LAWS

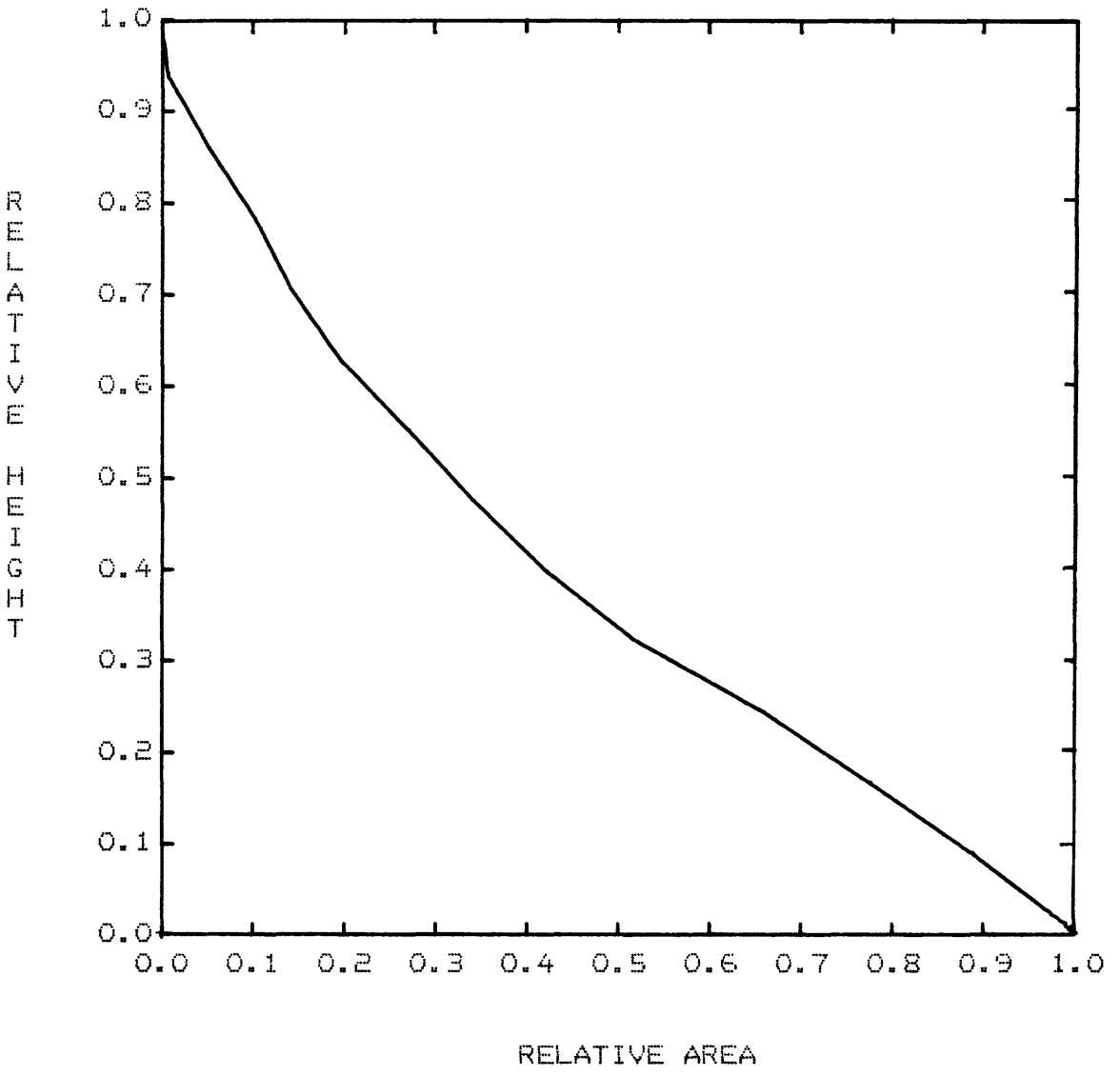
DBRU NUMBER: 6010103A5100





HYPSOMETRIC ANALYSIS PLOT

DBRU NUMBER: 6010103A1100



DATA POINTS FOR HYPSOMETRIC PLOT -- DBRU NO. 6010103A1100 AREAS AGREE WITHIN 1.78 %.

INCREMENT	LOWER CONTOUR	AREA, Sq Ft.	RELATIVE HEIGHT	RELATIVE AREA
0	2400	0	1.000	0.000
1	2300	144,000	0.936	0.008
2	2200	740,100	0.859	0.053
3	2100	843,300	0.781	0.104
4	2000	649,800	0.704	0.144
5	1900	888,100	0.626	0.198
6	1800	1,242,000	0.549	0.273
7	1700	1,186,900	0.472	0.345
8	1600	1,309,500	0.394	0.425
9	1500	1,632,200	0.317	0.524
10	1400	2,291,200	0.239	0.663
11	1300	1,910,600	0.162	0.779
12	1200	1,853,400	0.085	0.891
13	1100	1,671,300	0.007	0.993
14	1000	109,200	0.000	1.000

APPENDIX G

ADAPTING THIS PROGRAM TO OTHER AREAS

The following statements in the DBRU programs must be altered for use outside of South Carolina.

INPUT program

80: Change Sumter and letter S
100: Change letter S
130: Change Sumter

GET program

1840 through 1880: Change national forest district names
1890 through 1910: These regression equations are based on 100 hypsometric analyses in Sumter National Forest. Substitution based on local conditions is advisable.
2330: Change state name
2340: Change 030 to the first three digits of the USGS hydrologic region.

The DBRU numbering system may need to be altered to account for multiple hydrologic regions or a different administrative watershed numbering system.

Additional program changes may be required if computing or digitizing equipment differs from that listed above under Procedures.

INDEX

	Page
administrative watersheds	2, 5, 9
computational system	6
DBRU	2, 4, 5, 9
DBRU number	4, 5
digitizer	6
equipment	6
hypsometric analysis	5, 7, 51, 52
lakes	5
maps	2, 4, 9
mean basin elevation	7
modifications	8, 53
order	1, 3, 4, 9
output	7, 49-52
ponds	5
quantitative geomorphology	1
retrieval	7, 45-52
scratch disk	6
stream order	1, 4, 5, 9
sub-DBRU	5, 6
Sumter National Forest	2