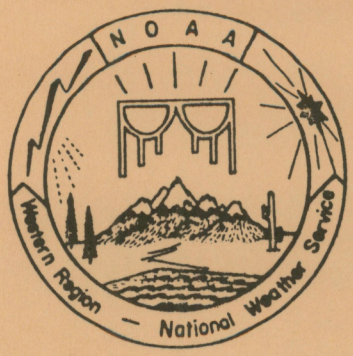
Western Region Computer Programs
Problems NWS WRCP - No. 5

UTAH RECREATIONAL TEMPERATURE PROGRAM

Kenneth M. Labas

National Weather Service Western Region
Salt Lake City, Utah
November 1979

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / National Weather Service



PREFACE

This Western Region publication series is considered as a subset of our Technical Memorandum series. This series will be devoted exclusively to the exchange of information on and documentation of computer programs and related subjects. This series was initiated because it did not seem appropriate to publish computer program papers as Technical Memoranda; yet, we wanted to share this type of information with all Western Region forecasters in a systematic way. Another reason was our concern that in the developing AFOS-era there will be unnecessary and wasteful duplication of effort in writing computer programs in National Weather Service (NWS). Documentation and exchange of ideas and programs envisioned in this series hopefully will reduce such duplication. We also believe that by publishing the programming work of our forecasters, we will stimulate others to use these programs or develop their own programs to take advantage of the computing capabilities AFOS makes available.

We solicit computer-oriented papers and computer programs from forecasters for us to publish in this series. Simple and short programs should not be prejudged as unsuitable.

The great potential of the AFOS-era is strongly related to local computer facilities permitting meteorologists to practice in a more scientific environment. It is our hope that this new series will help in developing this potential into reality.

NOAA Western Region Computer Programs and Problems NWS WRCP

1 Standard Format for Computer Series. June 1979
2 AFOS Crop and Soil Information Report Program. Ken Mielke, July 1979
3 Decoder for Significant Level Transmission of Raobs. John Jannuzzi, August 79
4 Precipitable Water Estimate. Elizabeth Morse, October 1979
5 Utah Recreational Temperature Program. Kenneth M. Labas, November 1979

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November 1979

UNITED STATES
DEPARTMENT OF COMMERCE
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NATIONAL OCEANIC AND
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National Weather
Service
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UTAH RECREATIONAL TEMPERATURE PROGRAM

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I. GENERAL INFORMATION

This program calculates the maximum and minimum temperatures for various Utah recreational areas based on the forecast at certain key stations. Regression equations were determined using a screening regression program. Dependent data is from the months of mid-May through mid-September for the years 1975-1977. The program is written in FORTRAN IV and is run on the Salt Lake City WSFO AFOS computer.

II. APPLICATION

A. Program Description

The Utah Recreational Temperature Program was developed to give reasonably accurate temperature predicitions for many of Utah's recreational areas during the summer months. Summer months were defined as from mid-May to mid-September.

This "program" is actually three separate programs for forecasting one, two or three periods. Developmental data was taken from the state Climatological Data series (from NCC) over a three-summer period 1975-1977 using temperatures from every fourth day. The technique is based on linear correlation between input stations (independent variables) and desired output stations (dependent variable). It is one used by the Florida Fruit/Frost Unit for predicting minimum temperatures on cold radiation nights and was successfully used by the author to forecast cool season night radiational temperatures in Arkansas.

Prediction equations are of the form:

$$y = b + a_1x_1 + a_2x_2 + a_3x_3$$

where y = dependent variable (output)

b = constant

$a_1, a_2, a_3,$ = coefficients (usually less than 1)

$x_1, x_2, x_3,$ = independent variables (input)*

* hereafter called "key stations"

Each dependent variable (with a few exceptions) is a function of 3 key stations from input. More than 3 key stations can be used but the improvement in accuracy is often miniscule. Individual regression equations were determined by using a canned screening regression routine. A copy of that program is listed at the end of this paper.

Key stations were taken as representative (geographically, elevation, climatologically etc.) stations in Utah and nearby border areas for which FP4, zone or hourly reports were available. There are 12 key stations and 45 (so far) output points. See Figure 1.

Our operational scheme is run in background on AFOS. Procedures (for one, two or three period forecasts), a storage file and preformats are stored in the system while programs and some storage files are inserted via the floppy disk.

Once all the regression equations were determined, three programs were composed to use them. REC1 forecasts for one period, REC2 for two periods and REC3 for three periods. Common subroutines of MINCALC (min temps) and MAXCALC (max temps) containing the forecast equations are referenced by all three programs. In REC2 and REC3 output data is suitably alternated (into array OUTT) for min-mix or max-min and min-max-min or max-min-max printout.

The reduction of variance and absolute error of the equations on the dependent data are shown in Table 1. The reduction of variance for all equations was approximately .86 and the absolute error was 2.2°F. It gives an indication of the theoretical accuracy of the temperature forecasts. Screening regression was run twice for each data set with 10% or less of the "bad cases" (worst errors from residuals table) deleted for the second run.

B. Machine Requirements

The forecast program requires less than 10K of memory. The screening regression program requires approximately 20K of memory and thus will not run in the background of AFOS. However, this program need only be run once to determine the regression coefficients.

The screening regression program shown here is designed to output to a line printer and read from a card reader. The program can be easily modified to read from an RDOS file and to output to the dasher.

III. PROCEDURES

A preformat (SLCMCPRC1) is stored in the AFOS data base (See Figure 2). The preformat is filled out and stored in AFOS under

ALLRECSLC. The Preformat is called upon the AFOS screen by entering "M:RC1".

Procedures to run the program were written for one period ("UTERC1"), two periods ("UTERC2") and three period ("UTERC3") forecasts. (See Figure 3) In each procedure ALLRECSLC is stored under filename INPUT on DP# for use by the forecast program. Output is under filename OUTPUT. Both INPUT and OUTPUT are created during execution of the main program. Finally, the results are displayed on the AK screen and printed out on the AFOS copier. Sample Input/Output are shown in Figure 4.

Table I

Number of stations output = 45 (max and min for each)

Maximum number of cases (samples) = 93

AVERAGES:

	Reduction of variance (R^2)	Absolute error (est-act)	# Cases for final equation
ALL	.86063	2.1941	84.3
MAX TEMP	.9039	1.99163	84.6
MIN TEMP	.81737	2.3967	83.9

B^2 ranged from: .81575 to .97268 for max temps

.72745 to .91330 for min temps

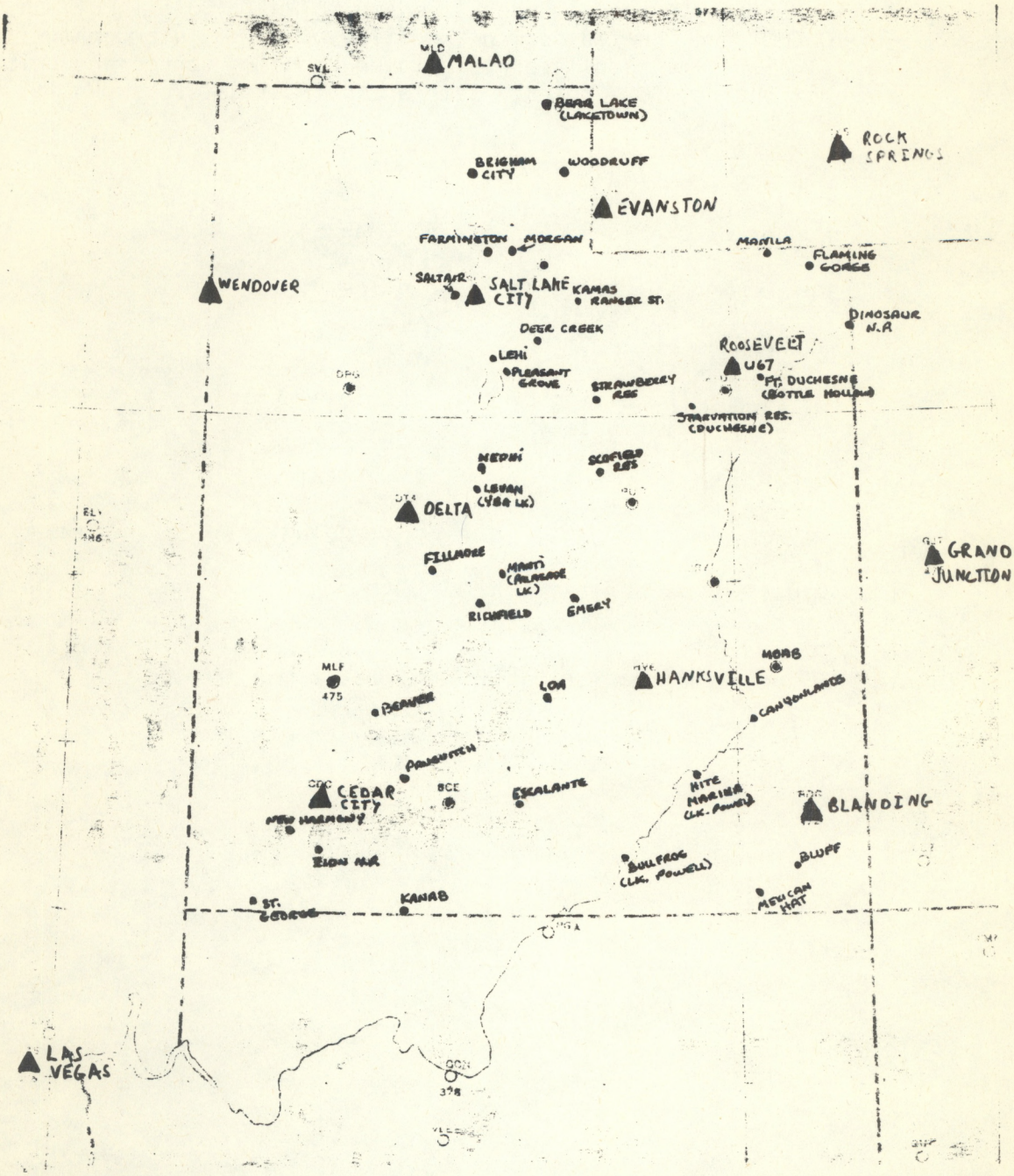

Figure 1. Key stations indicated by triangles and output stations indicated by dots

```
SLCMCPRC1
JOUS00 KSLC 051350
UTAH RECREATIONAL TEMPERATURE PROGRAM
...ENTER TEMPS FOR FIRST,FIRST AND SECOND OR ALL THREE PERIODS AS
REQIRED BY THE PROGRAM BEING RUN. RIGHT JUSTIFY DATA IN BRACKETS.

MONTH OF YEAR(NUMBER) [  ]   DAY[  ]   YEAR[    ]
IS THIS A MORNING (0) OR AFTERNOON (1) FORECAST? [ ]

  PERIOD      1       2       3

SLC(4226)= [    ] [    ] [    ]
RKS(6741)= [    ] [    ] [    ]
EVW(GO10)= [    ] [    ] [    ]
MLD(4467)= [    ] [    ] [    ]          *STATION ELEVATIONS
U67(5104)= [    ] [    ] [    ]           ARE DENOTED (XXXX)
GJT(4849)= [    ] [    ] [    ]
CDC(5620)= [    ] [    ] [    ]
4BL(6130)= [    ] [    ] [    ]
4HV(4308)= [    ] [    ] [    ]
U24(4623)= [    ] [    ] [    ]
LAS(2162)= [    ] [    ] [    ]
ENV(4237)= [    ] [    ] [    ]                                    [ ]
                                                          PAGE 01
```

Figure 2. Preformat to provide input for forecast programs.

```
WRHPCD025
WOUS00 KWRH 302231
  DISPLAY   MODE  ACC/OV    COMMAND
   (1-4)    (D/M) (R/A/O)   (ANY COMMAND; LAST LINE MUST BE END OR "NAME")
  -------   ----- -------   ---------------------------------------------
01   1              R        M:RC1
02                           PAUSE 03
03                           SAVE:ALLRECSLC DP3:INPUT
04                           PAUSE 04
05                           RUN:DP3:REC1.SV
06                           PAUSE 20
07   1         D     R       DSP:DP3:OUTPUT
08                           PAUSE 05
09                           PRINT:DP3:OUTPUT
10                           END
11
12
13
14
15
16
17
18
  DISPLAY   MODE  ACC/OV    COMMAND
   (1-4)    (D/M) (R/A/O)   (ANY COMMAND; LAST LINE MUST BE END OR "NAME")
  -------   ----- -------   ---------------------------------------------
01   1              R        M:RC1
02                           PAUSE 03
03                           SAVE:ALLRECSLC DP3:INPUT
04                           PAUSE 04
05                           RUN:DP3:REC2.SV
06                           PAUSE 25
07   1         D     R       DSP:DP3:OUTPUT
08                           PAUSE 04
09                           PRINT:DP3:OUTPUT
10                           END
11
12
13
14
15
16
17
18
  DISPLAY   MODE  ACC/OV    COMMAND
   (1-4)    (D/M) (R/A/O)   (ANY COMMAND; LAST LINE MUST BE END OR "NAME")
  -------   ----- -------   ---------------------------------------------
01   1              R        M:RC1
02                           PAUSE 03
03                           SAVE:ALLRECSLC DP3:INPUT
04                           PAUSE 04
05                           RUN:DP3:REC3.SV
06                           PAUSE 25
07   1         D     R       DSP:DP3:OUTPUT
08                           PAUSE 05
09                           PRINT:DP3:OUTPUT
10                           END
11
12
13
14
15
16
17
18
```

Figure 3. Procedures "REC1","REC2" an "REC3".

```
ALLRECSLC
WOUS00 KSLC 301237
UTAH RECREATIONAL TEMPERATURE PROGRAM
...ENTER TEMPS FOR FIRST,FIRST AND SECOND OR ALL THREE PERIODS AS
REQIRED BY THE PROGRAM BEING RUN. RIGHT JUSTIFY DATA IN BRACKETS.

MONTH OF YEAR(NUMBER)  07    DAY 30    YEAR 1979
IS THIS A MORNING (0) OR AFTERNOON (1) FORECAST?  0

  PERIOD       1        2        3

SLC(4226)=     94       60       95
RKS(6741)=     85       50       85
EVW(6810)=     84       46       84
MLD(4467)=     90       48       90              *STATION ELEVATIONS
U67(5104)=     96       53       97               ARE DENOTED (XXXX)
GJT(4849)=     96       63       97
CDC(5620)=     95       57       95
4BL(6130)=     93       57       93
4HV(4308)=    105       58      105
U24(4623)=     94       51       94
LAS(2162)=    111       80      112
ENV(4237)=     92       65       94

A)                                                          PAGE 01
```

Figure 4A. Sample Input

DATE 7/30/1979

UTAH RECREATIONAL TEMPERATURE FORECASTS
NATIONAL WEATHER SERVICE FORECAST OFFICE
SALT LAKE CITY UTAH

	MAX TDA	MIN TNGT	MAX TMRW
BEAR LAKE(5980)	84	46	84
BEAVER(5920)	91	47	91
BLUFF(4315)	100	58	100
BOTTLE HOLLOW(4990)	93	51	94
BRIGHAM CITY(4285)	91	52	92
BRYCE CANYON N.P.(7915)	84	42	84
BULLFROG MARINA(3822)	103	70	103
CANYONLANDS			
AT THE NEEDLE(5040)	98	61	99
COALVILLE(5555)	88	45	89
DEER CREEK RES(5270)	87	45	87
DINOSAUR N.P.(4770)	99	51	100
DUGWAY(4340)	95	55	96
EMERY(6100)	93	51	93
ESCALANTE(5010)	94	53	94
FARMINGTON(4340)	92	55	93
FILLMORE(5120)	95	55	95
FLAMING GORGE RES(6270)	86	47	87
GREEN RIVER(4070)	100	56	101
HITE MARINA(4000)	102	73	102
KANAB RANGER STA(6495)	87	43	87
KANAB(4905)	96	57	96
LEHI-UTAH LK(4497)	90	53	91
LOA(7050)	86	46	86
MANILA(6440)	86	50	86
MEXICAN HAT(4120)	101	63	101
MILFORD(5020)	94	50	94
MOAB(3965)	102	63	103
MORGAN(5060)	89	50	89
MYTON(5070)	92	52	93
NEPHI(5130)	94	55	94
NEW HARMONY(5290)	91	60	92
PALISADE LAKE(5740)	90	52	90
PANGUITCH(6720)	89	45	89
PLEASANT GROVE(4660)	92	56	92
PRICE(5700)	92	57	92
RICHFIELD(5270)	91	47	91
ST. GEORGE(2760)	105	70	105
SALTAIR(4210)	90	58	91
SCOFIELD RES(7630)	77	41	77
STARVATION RES(5815)	90	53	90
STRAWBERRY RES(7606)	78	40	78
VERNAL(5300)	93	51	95
WOODRUFF(6315)	83	44	83
YUBA LAKE-LEVAN(5315)	92	52	92
ZION N.P.(4050)	101	70	101

B)

Figure 4B. Sample Output

```
C     UTAH RECREATIONAL TEMPERATURE PROGRAM FOR ONE PERIOD ONLY
C     PROGRAM FOR USE MID MAY THROUGH MID SEPTEMBER
C     UP TO 50 OUTPUT STATIONS ARE POSSIBLE IF ADDITIONALLY FORMATTED
      EXTERNAL MAXCALC,MINCALC
      REAL IN,LOW
      INTEGER Z,OUTT
      DIMENSION IN(12,3),HIGH(50),LOW(50),OUTT(50)
      COMMON/ANAME/OUTT,HIGH,LOW
      DATA OUTT/50*0/HIGH/50*0.0/LOW/50*0.0/
      CALL OPEN(5,"INPUT",2,IER)
      CALL DFILW("OUTPUT",IER)
      CALL CFILW("OUTPUT",2,IER)
      CALL OPEN(6,"OUTPUT",2,IER)
      K=1
      READ(5,3)M,MM,MMM,Z
    3 FORMAT(/////,23X,I2,8X,I2,9X,I4,/,50X,I1)
      READ(5,5)(IN(I,1),I=1,12)
    5 FORMAT(//,12(/,13X,I3))
C     CALCULATE MAXS OR MINS
      IF(Z.EQ.0) CALL MAXCALC(IN,HIGH,K)
      IF(Z.EQ.1) CALL MINCALC(IN,LOW,K)
      WRITE(6,8)M,MM,MMM
    8 FORMAT(1H1,////,10X,"DATE...",2X,I2,"/",I2,"/",I4)
      IF(Z.EQ.1)GOTO 20
      WRITE(6,15)
   15 FORMAT(1H0,"  UTAH RECREATIONAL TEMPERATURE FORECASTS"/"   NATIONA
     *L WEATHER SERVICE FORECAST OFFICE"/"   SALT LAKE CITY UTAH"/)
      WRITE(6,17)
   17 FORMAT(1H ," ....HIGH TODAY....."/)
      GOTO 29
   20 WRITE(6,25)
   25 FORMAT(1H0,"  UTAH RECREATIONAL TEMPERATURE FORECASTS"/"   NATIONA
     *L WEATHER SERVICE FORECAST OFFICE"/"   SALT LAKE CITY UTAH"/)
      WRITE(6,27)
   27 FORMAT(1H ," ....LOW TONIGHT....."/)
C     PUT MAX OR MIN INTO COMMON ARRAY FOR PRINTOUT
      IF(Z.EQ.1)GOTO 31
   29 DO 30 I=1,50
      HIGH(I)=HIGH(I)+.51
      OUTT(I)=HIGH(I)
   30 CONTINUE
      GOTO 50
   31 DO 40 I=1,50
      LOW(I)=LOW(I)+.51
      OUTT(I)=LOW(I)
   40 CONTINUE
   50 WRITE(6,55)(OUTT(I),I=1,6)
   55 FORMAT(1H0," BEAR LAKE(5980)",10X,I3/"  BEAVER(5920)",13X,I3/"  BL
     *UFF(4315)",14X,I3/"  BOTTLE HOLLOW(4990)",6X,I3/"  BRIGHAM CITY(42
     *85)",7X,I3/"  BRYCE CANYON N.P.(7915)",2X,I3)
      WRITE(6,60) (OUTT(I),I=7,13)
   60 FORMAT(1H ," BULLFROG MARINA(3822)",4X,I3/"  CANYONLANDS"/"  AT TH
     *E NEEDLE(5040)",6X,I3/"  COALVILLE(5550)",10X,I3/"  DEER CREEK RES
     *(5270)",5X,I3/"  DINOSAUR N.P.(4770)",6X,I3/"  DUGWAY(4349)",13X,I
     *3/"  EMERY(6100)",14X,I3)
      WRITE(6,65)(OUTT(I),I=14,20)
```

```
65 FORMAT(1H ," ESCALANTE(5810)",10X,I3/"  FARMINGTON(4340)",9X,I3/"
  * FILLMORE(5120)",11X,I3/"  FLAMING GORGE RES(6270)",2X,I3/"  GREEN
  * RIVER(4070)",8X,I3/"  HITE MARINA(4000)",8X,I3/"  KAMAS RANGER ST
  *A(6495)",3X,I3)
   WRITE(6,70)(OUTT(I),I=21,26)
70 FORMAT(1H ," KANAB(4985)",14X,I3/"  LEHI-UTAH LK(4497)",7X,I3/"  L
  *OA(7080)",16X,I3/"  MANILA(6440)",13X,I3/"  MEXICAN HAT(4120)",8X,
  *I3/"  MILFORD(5020)",12X,I3)
   WRITE(6,75)(OUTT(I),I=27,33)
75 FORMAT(1H ," MOAB(3965)",15X,I3/"  MORGAN(5060)",13X,I3/"  MYTON(5
  *060)",14X,I3/"  NEPHI(5130)",14X,I3/"  NEW HARMONY(5290)",8X,I3/"
  * PALASADE LAKE(5740)",6X,I3/"  PANGUITCH(6720)",10X,I3)
   WRITE(6,80)(OUTT(I),I=34,39)
80 FORMAT(1H ," PLEASANT GROVE(4668)",5X,I3/"  PRICE(5700)",14X,I3/"
  * RICHFIELD(5270)",10X,I3/"  ST. GEORGE(2760)",9X,I3/"  SALTAIR(421
  *0)",12X,I3/"  SCOFIELD RES(7630)",7X,I3)
   WRITE(6,85)(OUTT(I),I=40,45)
85 FORMAT(1H ," STARVATION RES(5815)",5X,I3/"  STRAWBERRY RES(7606)",
  *5X,I3/"  VERNAL(5280)",13X,I3/"  WOODRUFF(6315)",11X,I3/"  YUBA LA
  *KE-LEVAN(5315)",4X,I3/"  ZION N.P.(4050)",10X,I3/////)
   CALL CLOSE(5,IER)
   CALL CLOSE(6,IER)
   END
```

```
C     UTAH RECREATIONAL TEMPERATURE PROGRAM FOR TWO PERIODS
C     PROGRAM IS FOR USE...MID MAY THROUGH MID SEPTEMBER
C     UP TO 50 OUTPUT STATIONS ARE POSSIBLE IF ADDITIONALLY FORMATTED
      EXTERNAL MAXCALC,MINCALC
      REAL IN,LOW
      INTEGER Z,OUTT
      DIMENSION IN(12,3),HIGH(50),LOW(50),OUTT(105)
      COMMON/ANAME/OUTT,HIGH,LOW
      DATA OUTT/105*0/HIGH/50*0./LOW/50*0./
      CALL OPEN(5,"INPUT",2,IER)
      CALL DFILW("OUTPUT",IER)
      CALL CFILW("OUTPUT",2,IER)
      CALL OPEN(6,"OUTPUT",2,IER)
      READ(5,1)M,MM,MMM,Z
    1 FORMAT(/////,23X,I2,8X,I2,9X,I4,/,50X,I1)
      READ(5,3)((IN(I,J),J=1,2),I=1,12)
    3 FORMAT(//,12(/,13X,I3,5X,I3))
      K=1
      IF(Z.EQ.1) GOTO 25
      CALL MAXCALC(IN,HIGH,K)
      K=2
      CALL MINCALC(IN,LOW,K)
C     MAX/MINS ALTERNATED AND INSERTED INTO ARRAY "OUTT"  FOR PRINTOUT
      J=1
      DO 15 I=1,50
      HIGH(I)=HIGH(I)+.51
      OUTT(J)=HIGH(I)
      J=J+2
   15 CONTINUE
      J=2
      DO 16 I=1,50
      LOW(I)=LOW(I)+.51
      OUTT(J)=LOW(I)
      J=J+2
   16 CONTINUE
      GOTO 35
   25 CALL MINCALC(IN,LOW,K)
      K=2
      CALL MAXCALC(IN,HIGH,K)
C     MIN/MAXS ALTERNATED IN ARRAY "OUTT" FOR PRINTOUT
      J=1
      DO 28 I=1,50
      LOW(I)=LOW(I)+.51
      OUTT(J)=LOW(I)
      J=J+2
   28 CONTINUE
      J=2
      DO 29 I=1,50
      HIGH(I)=HIGH(I)+.51
      OUTT(J)=HIGH(I)
      J=J+2
   29 CONTINUE
```

```
35 WRITE(6,36) M,MM,MMM
36 FORMAT(1H1,////,10X,"DATE...",2X,I2,"/",I2,"/",I4)
   IF(Z.EQ.1) GOTO 45
   WRITE(6,40)
40 FORMAT(1HO," UTAH RECREATIONAL TEMPERATURE FORECASTS",/,
  *" NATIONAL WEATHER SERVICE FORECAST OFFICE",/," SALT LAKE CITY U
  *TAH",//,24X,"MAX TDA",5X,"MIN TNGT")
   GOTO 49
45 WRITE(6,46)
46 FORMAT(1HO," UTAH RECREATIONAL TEMPERATURE FORECASTS",/,
  *" NATIONAL WEATHER SERVICE FORECAST OFFICE",/," SALT LAKE CITY U
  *TAH",//,24X,"MIN TNGT",5X,"MAX TMRW")
49 WRITE(6,50)
50 FORMAT(1HO)
   WRITE(6,51) (OUTT(I),I=1,12)
51 FORMAT(1HO," BEAR LAKE(5980)",10X,I3,09X,I3/" BEAVER(5920)",13X,
  *I3,09X,I3/" BLUFF(4315)",14X,I3,09X,I3/" BOTTLE HOLLOW(4990)",
  *5X,I3,09X,I3/" BRIGHAM CITY(4285)",7X,I3,09X,I3/" BRYCE CANYON N
  *.P.(7915)",2X,I3,09X,I3)
   WRITE(6,55) (OUTT(I),I=13,24)
55 FORMAT(1H ," DULLFROG MARINA(3822)",4X,I3,09X,I3/" CANYONLANDS"/
  *" AT THE NEEDLE(5040)",6X,I3,09X,I3/" COALVILLE(5550)",10X,
  *I3,09X,I3/" DEER CREEK RES(5270)",5X,I3,09X,I3/" DINOSAUR N.P.(4
  *770)",6X,I3,09X,I3/" DUGWAY(4340)",13X,I3,09X,I3)
   WRITE(6,60)(OUTT(I),I=25,36)
60 FORMAT(1H ," EMERY(6100)",14X,I3,09X,I3/" ESCALANTE(5810)",10X,
  *I3,09X,I3/" FARMINGTON(4340)", 9X,I3,09X,I3/" FILLMORE(5120)",
  *11X,I3,09X,I3/" FLAMING GORGE RES(6270)",2X,I3,09X,I3/
  *" GREEN RIVER(4070)",8X,I3,09X,I3)
   WRITE(6,65)(OUTT(I),I=37,48)
65 FORMAT(1H ," HITE MARINA(4000)",8X,I3,09X,I3/" KAMAS RANGER STA(6
  *490)",3X,I3,09X,I3/" KANAB(4985)",14X,I3,09X,I3/" LEHI-UTAH LK(4
  *407)",7X,I3,09X,I3/" LOA(7080)",16X,I3,09X,I3/" MANILA(6440)",
  *13X,I3,09X,I3)
   WRITE(6,70)(OUTT(I),I=49,60)
70 FORMAT(1H ," MEXICAN HAT(4120)",8X,I3,09X,I3/" MILFORD(5028)",
  *12X,I3,09X,I3/" MOAB(3965)",15X,I3,09X,I3/" MORGAN(5060)",
  *13X,I3,09X,I3/" MYTON(5080)",14X,I3,09X,I3/" NEPHI(5130)",
  *14X,I3,09X,I3)
   WRITE(6,75)(OUTT(I),I=61,72)
75 FORMAT(1H ," NEW HARMONY(5290)",8X,I3,09X,I3/" PALASADE LAKE(5740
  *)",6X,I3,09X,I3/" PANGUITCH(6720)",10X,I3,09X,I3/" PLEASANT GROV
  *E(4360)",5X,I3,09X,I3/" PRICE(5700)",14X,I3,09X,I3/
  *" RICHFIELD(5270)",10X,I3,09X,I3)
   WRITE(6,80)(OUTT(I),I=73,84)
80 FORMAT(1H ," ST. GEORGE(2760)",9X,I3,09X,I3/" SALTAIR(4210)",12X,
  *I3,09X,I3/" SCOFIELD RES(7630)",7X,I3,09X,I3/" STARVATION RES(58
  *10)",5X,I3,09X,I3/" STRAWBERRY RES(7606)",5X,I3,09X,
  *I3/" VERNAL(5280)",13X,I3,09X,I3)
   WRITE(6,85)(OUTT(I),I=85,90)
85 FORMAT(1H ," WOODRUFF(6315)",11X,I3,09X,I3/" YUBA LAKE-LEVAN(5315
  *)",4X,I3,09X,I3/" ZION N.P.(4050)",10X,I3,09X,I3/////)
   CALL CLOSE(5,IER)
   CALL CLOSE(6,IER)
   END
```

```
C     UTAH RECREATIONAL PROGRAM
C     UP TO 50 STATIONS ARE POSSIBLE FOR OUTPUT IF EQUATIONS ARE ADDED
C     TO SUBROUTINES "MAXCALC" AND "MINCALC" PLUS FORMAT STATEMENTS
C     ARE ADJUSTED
      EXTERNAL MAXCALC,MINCALC
      REAL IN, LOW
      INTEGER Z,OUTT
      DIMENSION IN(12,3),HIGH(50),LOW(50),OUTT(160),HOLD(50)
      COMMON/ANAME/OUTT,HOLD,HIGH,LOW
      DATA OUTT/160*0/HOLD/50*0.0/HIGH/50*0.0/LOW/50*0.0/
      CALL OPEN(5,"INPUT",2,IER)
      CALL DFILW("OUTPUT",IER)
      CALL CFILW("OUTPUT",2,IER)
      CALL OPEN(6,"OUTPUT",2,IER)
      READ(5,1)M,MM,MMM,Z
    1 FORMAT(/////,23X,I2,8X,I2,9X,I4,/,50X,I1)
      READ(5,3)((IN(I,J),J=1,3),I=1,12)
    3 FORMAT(//,12(/,13X,I3,5X,I3,5X,I3))
      K=1
      IF(Z.EQ.1) GOTO 30
      CALL MAXCALC(IN,HIGH,K)
      K=2
      CALL MINCALC(IN,LOW,K)
      DO 10 I=1,50
      HOLD(I)=HIGH(I)
   10 CONTINUE
      K=3
      CALL MAXCALC(IN,HIGH,K)
C     MAX/MIN/MAX ALTERNATED AND INSERTED INTO "OUTT" FOR PRINTOUT
      J=1
      DO 15 I=1,50
      HOLD(I)=HOLD(I)+.51
      OUTT(J)=HOLD(I)
      J=J+3
   15 CONTINUE
      J=2
      DO 20 I=1,50
      LOW(I)=LOW(I)+.51
      OUTT(J)=LOW(I)
      J=J+3
   20 CONTINUE
      J=3
      DO 25 I=1,50
      HIGH(I)=HIGH(I)+.51
      OUTT(J)=HIGH(I)
      J=J+3
   25 CONTINUE
      GOTO 55
   30 CALL MINCALC(IN,LOW,K)
      K=2
      CALL MAXCALC(IN,HIGH,K)
      DO 35 I=1,50
      HOLD(I)=LOW(I)
   35 CONTINUE
      K=3
      CALL MINCALC(IN,LOW,K)
```

```
C     MIN/MAX/MIN ALTERNATED AND INSERTED IN "OUTT" FOR PRINTOUT
      J=1
      DO 40 I=1,50
      HOLD(I)=HOLD(I)+.51
      OUTT(J)=HOLD(I)
      J=J+3
   40 CONTINUE
      J=2
      DO 45 I=1,50
      HIGH(I)=HIGH(I)+.51
      OUTT(J)=HIGH(I)
      J=J+3
   45 CONTINUE
      J=3
      DO 50 I=1,50
      LOW(I)=LOW(I)+.51
      OUTT(J)=LOW(I)
      J=J+3
   50 CONTINUE
   55 WRITE(06,56) M,MM,MMM
   56 FORMAT(1H1,////,10X,"DATE",2X,I2,"/",I2,"/",I4)
      IF(Z.EQ.1) GOTO 65
      WRITE(6,60)
   60 FORMAT(1H0," UTAH RECREATIONAL TEMPERATURE FORECASTS",/," NATIONA
     *L WEATHER SERVICE FORECAST OFFICE",/," SALT LAKE CITY UTAH",///,2
     *5X,"MAX TDA",5X,"MIN TNGT",5X,"MAX TMRW")
      GOTO 75
   65 WRITE(6,70)
   70 FORMAT(1H0," UTAH RECREATIONAL TEMPERATURE FORECASTS",/," NATIONA
     *L WEATHER SERVICE FORECAST OFFICE",/," SALT LAKE CITY UTAH",///,2
     *5X,"MIN TNGT",5X,"MAX TMRW",5X,"MIN TMRW NGT")
   75 WRITE(06,76) (OUTT(I),I=1,18)
   76 FORMAT(1H0," BEAR LAKE(5980)",10X,I3,9X,I3,10X,I3/" BEAVER(5920)"
     *,13X,I3,9X,I3,10X,I3/" BLUFF(4315)",14X,I3,9X,I3,10X,I3/" BOTTLE
     * HOLLOW(4990)",6X,I3,9X,I3,10X,I3/" BRIGHAM CITY(4285)",7X,I3,9X,
     *I3,10X,I3/" BRYCE CANYON N.P.(7915)",2X,I3,9X,I3,10X,I3)
      WRITE(6,80)(OUTT(I),I=19,36)
   80 FORMAT(1H ," BULLFROG MARINA(3822)",4X,I3,9X,I3,10X,I3/" CANYONLA
     *NDS"/" AT THE NEEDLE(5040)",6X,I3,9X,I3,10X,I3/" COALVILLE(5555)
     *",10X,I3,9X,I3,10X,I3/" DEER CREEK RES(5270)",5X,I3,9X,I3,10X,I3/
     *" DINOSAUR N.P.(4770)",6X,I3,9X,I3,10X,I3/" DUGWAY(4340)",13X,I3
     *,9X,I3,10X,I3)
      WRITE(6,85)(OUTT(I),I=37,54)
   85 FORMAT(1H ," EMERY(6100)",14X,I3,9X,I3,10X,I3/" ESCALANTE(5810)",
     *10X,I3,9X,I3,10X,I3/" FARMINGTON(4340)",9X,I3,9X,I3,10X,I3/" FIL
     *LMORE(5120)",11X,I3,9X,I3,10X,I3/" FLAMING GORGE RES(6270)",2X,I3
     *,9X,I3,10X,I3/" GREEN RIVER(4070)",8X,I3,9X,I3,10X,I3)
      WRITE(6,90)(OUTT(I),I=55,72)
   90 FORMAT(1H ," HITE MARINA(4000)",8X,I3,9X,I3,10X,I3/" KAMAS RANGER
     * STA(6495)",3X,I3,9X,I3,10X,I3/" KANAB(4985)",14X,I3,9X,I3,10X,I3
     */" LEHI-UTAH LK(4497)",7X,I3,9X,I3,10X,I3/" LOA(7080)",16X,I3,9X
     *,I3,10X,I3/" MANILA(6440)",13X,I3,9X,I3,10X,I3)
      WRITE(6,95)(OUTT(I),I=73,90)
```

```
 95 FORMAT(1H ," MEXICAN HAT(4120)",8X,I3,9X,I3,10X,I3/"  MILFORD(5028
    *)",12X,I3,9X,I3,10X,I3/"  MOAB(3965)",15X,I3,9X,I3,10X,I3/"  MORGA
    *N(5060)",13X,I3,9X,I3,10X,I3/"  MYTON(5080)",14X,I3,9X,I3,10X,I3/"
    *  NEPHI(5130)",14X,I3,9X,I3,10X,I3)
     WRITE(6,100)(OUTT(I),I=91,108)
100 FORMAT(1H ," NEW HARMONY(5290)",8X,I3,9X,I3,10X,I3/"  PALASADE LAK
    *E(5740)",6X,I3,9X,I3,10X,I3/"  PANGUITCH(6720)",10X,I3,9X,I3,10X,I
    *3/"  PLEASANT GROVE(4668)",5X,I3,9X,I3,10X,I3/"  PRICE(5700)",14X,
    *I3,9X,I3,10X,I3/"  RICHFIELD(5270)",10X,I3,9X,I3,10X,I3)
     WRITE(6,105)(OUTT(I),I=109,126)
105 FORMAT(1H ," ST. GEORGE(2760)",9X,I3,9X,I3,10X,I3/"  SALTAIR(4210)
    *",12X,I3,9X,I3,10X,I3/"  SCOFIELD RES(7630)",7X,I3,9X,I3,10X,I3/"
    * STARVATION RES(5815)",5X,I3,9X,I3,10X,I3/"  STRAWBERRY RES(7606)"
    *,5X,I3,9X,I3,10X,I3/"  VERNAL(5280)",13X,I3,9X,I3,10X,I3)
     WRITE(6,110)(OUTT(I),I=127,135)
110 FORMAT(1H ," WOODRUFF(6315)",11X,I3,9X,I3,10X,I3/"  YUBA LAKE-LEVA
    *N(5315)",4X,I3,9X,I3,10X,I3/"  ZION N.P.(4050)",10X,I3,9X,I3,10X,I
    *3)
     CALL CLOSE(5,IER)
     CALL CLOSE(6,IER)
     END
```

```
 SUBROUTINE MAXCALC(IN,HIGH,K)
 REAL IN
 DIMENSION IN(12,3),HIGH(50)
 HIGH(1)=8.87153+(.0474*IN(1,K))+(.2888*IN(2,K))+(.5516*IN(3,K))
 HIGH(2)=-.3001+.2794*IN(10,K)+.5532*IN(7,K)+.1179*IN(9,K)
 HIGH(3)=10.9689-.0858*IN(7,K)+.1342*IN(9,K)+.88999*IN(8,K)
 HIGH(4)=-8.49699-(.0166*IN(2,K))+(.5742*IN(5,K))+(.4925*IN(6,K))
 HIGH(5)=9.2534+.09526*IN(4,K)+.4383*IN(1,K)+.3481*IN(12,K)
 HIGH(6)=-9.7466+.0156*IN(10,K)+.3906*IN(7,K)+.5945*IN(8,K)
 HIGH(7)=6.88968+(.0361*IN(7,K))+(.1968*IN(9,K))+(.7728*IN(8,K))
 HIGH(8)=-2.88185+(.0519*IN(5,K))+(.438*IN(6,K))+(.5783*IN(8,K))+(.
10025*IN(9,K))
 HIGH(9)=11.2438+.3623*IN(4,K)+.1834*IN(1,K)+.0129*IN(2,K)+.3125*IN
*(3,K)
 HIGH(10)=11.5022-.0234*IN(1,K)+.7285*IN(3,K)+.176*IN(10,K)
 HIGH(11)=-5.32083+.0767*IN(2,K)+.5559*IN(5,K)+.4599*IN(6,K)
 HIGH(12)=-2.537+.1597*IN(12,K)+.5756*IN(1,K)+.3081*IN(10,K)
 HIGH(13)=-1.025+.4463*IN(5,K)+.0835*IN(6,K)+.4601*IN(8,K)
 HIGH(14)=-.6633+.3525*IN(7,K)+.261*IN(9,K)+.3616*IN(8,K)
 HIGH(15)=6.7861+.0814*IN(4,K)+.7084*IN(1,K)+.125*IN(12,K)
 HIGH(16)=-6.9176+.6251*IN(10,K)+.3455*IN(7,K)+.0999*IN(9,K)
 HIGH(17)=5.5856+.008*IN(1,K)+.3827*IN(2,K)+.1846*IN(5,K)+.3542*IN(
*3,K)
 HIGH(18)=2.4603+.2427*IN(5,K)+.6065*IN(6,K)+.1684*IN(8,K)
 HIGH(19)=4.0228+.16444*IN(7,K)-.0246*IN(9,K)+.9116*IN(8,K)
 HIGH(20)=9.69782+.0077*IN(1,K)+.0757*IN(2,K)+.2314*IN(5,K)+.567*IN
*(3,K)
 HIGH(21)=3.8645+.3179*IN(11,K)+.3715*IN(7,K)+.2021*IN(9,K)
 HIGH(22)=15.4238+.287*IN(1,K)+.332*IN(3,K)+.2147*IN(10,K)
 HIGH(23)=-1.6143+.0758*IN(10,K)+.2785*IN(7,K)+.5832*IN(8,K)
 HIGH(24)=2.0229-.05224*IN(1,K)+.4346*IN(2,K)+.3187*IN(5,K)+.253*IN
*(3,K)
 HIGH(25)=2.6357+.0283*IN(7,K)+.0058*IN(9,K)+1.027*IN(8,K)
 HIGH(26)=.5119+.49135*IN(10,K)+.4947*IN(7,K)+.0006*IN(9,K)
 HIGH(27)=8.98228+(.0294*IN(5,K))+(.1988*IN(6,K))+(.4649*IN(8,K))+(
1.269*IN(9,K))
 HIGH(28)=14.7533+.04274*IN(4,K)+.3974*IN(1,K)+.1077*IN(2,K)+.28512
**IN(3,K)
 HIGH(29)=-13.0604-(.015*IN(2,K))+(.5612*IN(5,K))+(.5446*IN(6,K))
 HIGH(30)=12.1825+.1813*IN(1,K)+.3908*IN(3,K)+.3351*IN(10,K)
 HIGH(31)=-2.4804+.2913*IN(11,K)+.56888*IN(7,K)+.0708*IN(9,K)
 HIGH(32)=-3.43434+(.0454*IN(10,K))+(.4184*IN(7,K))+(.4728*IN(9,K))
 HIGH(33)=-2.9366+.4904*IN(7,K)+.1271*IN(9,K)+.3427*IN(8,K)
 HIGH(34)=5.0726+.2882*IN(1,K)+.2687*IN(3,K)+.3967*IN(10,K)
 HIGH(35)=-9.36022+(.0861*IN(5,K))+(.4624*IN(6,K))+(.5219*IN(8,K))
 HIGH(36)=8.0128+.05495*IN(1,K)+.411*IN(10,K)+.4133*IN(7,K)
 HIGH(37)=10.8483+.371*IN(11,K)+.46995*IN(7,K)+.0771*IN(9,K)
 HIGH(38)=10.1098-.0754*IN(4,K)+.8146*IN(1,K)+.1146*IN(12,K)
 HIGH(39)=12.1259+.407*IN(3,K)+.2617*IN(1,K)+.0646*IN(10,K)
 HIGH(40)=-.19287+(.0601*IN(2,K))+(.6615*IN(5,K))+(.2206*IN(6,K))
 HIGH(41)=3.7313+.6448*IN(3,K)-.0195*IN(1,K)+.2326*IN(10,K)
 HIGH(42)=-4.99275+(.0046*IN(2,K))+(.6597*IN(5,K))+(.362*IN(5,K))
 HIGH(43)=6.243+.0438*IN(4,K)+.184*IN(1,K)+.09156*IN(2,K)+.5631*IN(
*3,K)
 HIGH(44)=4.71335+(.0223*IN(1,K))+(.3149*IN(3,K))+(.6228*IN(10,K))
 HIGH(45)=18.3226+(.0121*IN(11,K))+(.7599*IN(7,K))+(.0902*IN(9,K))
 RETURN
 END
```

```
      SUBROUTINE MINCALC(IN,LOW,K)
      REAL IN,LOW
      DIMENSION IN(12,3),LOW(50)
C     UP TO 50 STATIONS ARE DIMENSIONED FOR OUTPUT IN ARRAY "LOW".
      LOW(1)=4.2881+(.14821*IN(4,K))+(.28298*IN(2,K))+(.4405*IN(3,K))
      LOW(2)=2.4396+.0949*IN(10,K)+.4686*IN(7,K)+.2313*IN(9,K)
      LOW(3)=-5.1687-.1328*IN(7,K)+.6682*IN(9,K)+.5622*IN(8,K)
      LOW(4)=-.15832+(.0796*IN(2,K))+(.7312*IN(5,K))+(.1358*IN(6,K))
      LOW(5)=6.1875+.5504*IN(4,K)+.2023*IN(10,K)+.1413*IN(12,K)
      LOW(6)=-7.7476+.2706*IN(10,K)+.4453*IN(7,K)+.1938*IN(8,K)
      LOW(7)=17.2987+(.0107*IN(7,K))+(.1991*IN(9,K))+(.70487*IN(8,K))
      LOW(8)=-7.73134-(.0064*IN(5,K))+(.6755*IN(6,K))+(.0951*IN(8,K))+.3
     1601*IN(9,K)
      LOW(9)=5.6852+.0328*IN(4,K)+.0234*IN(1,K)+.0402*IN(2,K)+.7446*IN(3
     *,K)
      LOW(10)=5.91327-.0775*IN(1,K)+.6233*IN(3,K)+.2988*IN(10,K)
      LOW(11)=5.2534+.0728*IN(2,K)+.8886*IN(5,K)-.0826*IN(6,K)
      LOW(12)=-2.9611+.1482*IN(12,K)+.394*IN(1,K)+.47988*IN(10,K)
      LOW(13)=-2.738+.4446*IN(5,K)+.1496*IN(6,K)+.3709*IN(8,K)
      LOW(14)=-1.5156+.348*IN(7,K)+.2532*IN(9,K)+.3553*IN(8,K)
      LOW(15)=-2.105+.2961*IN(4,K)+.5118*IN(1,K)+.18899*IN(12,K)
      LOW(16)=-3.497+.5506*IN(10,K)+.5488*IN(7,K)-.0223*IN(9,K)
      LOW(17)=-1.6498+.0332*IN(1,K)+.4112*IN(2,K)+.458*IN(5,K)+.0293*IN(
     *3,K)
      LOW(18)=-4.3812+.8849*IN(5,K)+.1321*IN(6,K)+.0864*IN(8,K)
      LOW(19)=17.7973+.3448*IN(7,K)-.0461*IN(9,K)+.6699*IN(8,K)
      LOW(20)=-.3925+.2591*IN(1,K)+.1265*IN(2,K)+.0877*IN(5,K)+.4807*IN(
     *3,K)
      LOW(21)=1.0494+.37014*IN(11,K)+.3454*IN(7,K)+.1203*IN(9,K)
      LOW(22)=12.2127-.0849*IN(1,K)+.4627*IN(3,K)+.47598*IN(10,K)
      LOW(23)=3.2937+.4154*IN(10,K)+.1815*IN(7,K)+.1876*IN(8,K)
      LOW(24)=-1.531+.2885*IN(1,K)+.5872*IN(2,K)+.0476*IN(5,K)+.0575*IN(
     *3,K)
      LOW(25)=7.8201+.2882*IN(7,K)+.38899*IN(9,K)+.2768*IN(8,K)
      LOW(26)=-6.1985+.6949*IN(10,K)+.2404*IN(7,K)+.1229*IN(9,K)
      LOW(27)=5.621+(.1095*IN(5,K))+(.4077*IN(6,K))+(.054*IN(8,K))+(.385
     142*IN(9,K))
      LOW(28)=10.8674-.07144*IN(4,K)-.0296*IN(1,K)+.0795*IN(2,K)+.8787*I
     *N(3,K)
      LOW(29)=2.44307+(.02864*IN(2,K))+(.6315*IN(5,K))+(.2298*IN(6,K))
      LOW(30)=4.1063+.5256*IN(1,K)+.1583*IN(3,K)+.2338*IN(10,K)
      LOW(31)=-4.1351+.2784*IN(11,K)+.6474*IN(1,K)+.0488*IN(9,K)
      LOW(32)=4.26329+(.15968*IN(10,K))+(.4516*IN(7,K))+(.2376*IN(9,K))
      LOW(33)=-12.8755+.3442*IN(7,K)+.4441*IN(9,K)+.2133*IN(8,K)
      LOW(34)=6.7794+.35124*IN(1,K)+.2659*IN(3,K)+.3102*IN(10,K)
      LOW(35)=-.0199895+(.1443*IN(5,K))+(.2889*IN(6,K))+(.5371*IN(8,K))+
     1(.0118*IN(9,K))
      LOW(36)=4.0328-.0945*IN(1,K)+.8863*IN(10,K)+.0596*IN(7,K)
      LOW(37)=4.2043+.4594*IN(11,K)+.2974*IN(7,K)+.2076*IN(9,K)
      LOW(38)=6.8553+.3489*IN(4,K)+.1253*IN(1,K)+.4092*IN(12,K)
      LOW(39)=-3.7871+.4477*IN(3,K)+.0866*IN(1,K)+.36424*IN(10,K)
      LOW(40)=.634582+(.2157*IN(2,K))+(.483*IN(5,K))+(.32*IN(6,K))-(.067
     1*IN(9,K))
      LOW(41)=1.3037+.5032*IN(3,K)-.0323*IN(1,K)+.3431*IN(10,K)
      LOW(42)=1.04932+(.2227*IN(2,K))+(.4967*IN(5,K))+(.1964*IN(6,K))
      LOW(43)=.0287+.234*IN(4,K)-.0703*IN(1,K)+.0118*IN(2,K)+.78*IN(3,K)
      LOW(44)=6.27151+(.0535*IN(1,K))+(.2041*IN(3,K))+(.6497*IN(10,K))
      LOW(45)=6.6509+(.5945*IN(11,K))+(.3491*IN(7,K))-(.0785*IN(9,K))
      RETURN
      END
```

```
C     SCREENING REGRESSION PROGRAM
C     ADJUSTMENTS MAY BE NEEDED FOR INPUT DATA CARDS DEPENDING  UPON
C     DATA FORMAT (STMTS NO. 20 AND NO. 30)
      REAL M,M1,M2,M3
      INTEGER Y7,X9,O,W2,D1,E3
      DIMENSION DTWO(500,20),X(20),STWO(20),SONE(20),S(20),STHRE(20),
     *ITWO(20),RONE(20,20)
      COMMON/ANAME/X,RONE
      DATA RONE/400*0.0/
      DATA X/20*0.0/
      WRITE(10,10)
   10 FORMAT(1H ,//,10X,"SCREENING REGRESSION PROGRAM"//" ...UP TO 20 VA
     *RIABLES (INCLUDING DEPENDENT VARIABLE) AND 500 CASES MAXIMUM..."//
     *)
      ACCEPT"NUMBER OF VARIABLES INCLUDING DEPENDENT=  ",N8
      ACCEPT"IS RESIDUALS TABLE DESIRED YES(1) NO(0)?  ",Y7
      ACCEPT"NO. OF INDEPENDENT VARIABLES DESIRED IN FINAL EQUATION?  ",
     *X9
      WRITE(10,20)
   20 FORMAT(1H ,/," ENTER INPUT VARIABLES (DEPENDENT LAST) UNDER FORMAT
     * OF 4I4."/" **ON LAST DATA CARD...FIRST NUMBER SHOULD BE 999 REST
     * BLANK",/," TO ALLOW FOR DETERMINATION OF NUMBER OF CASES.",/,
     *" ***NOTE...FORMAT MUST BE CHANGED IN STMT NO. 30 TO ACCOMODATE
     * DIFFERENT",/," DATA SYNTAX."//)
      DO 35 I=1,500
      READ(9,30) (DTWO(I,J),J=1,N8)
   30 FORMAT(4I4)
      E3=I
      IF(DTWO(I,1).EQ.999) GOTO 37
   35 CONTINUE
   37 N5=E3-1
      N7=N8
      N2=N7-1
      DO 60 I=1,N5
      DO 50 J=1,N7
      X(J)=X(J)+DTWO(I,J)
      DO 40 K=1,N7
      RONE(J,K)=RONE(J,K)+DTWO(I,J)*DTWO(I,K)
   40 CONTINUE
   50 CONTINUE
   60 CONTINUE
      O=N5
      DO 70 I=1,N7
      STWO(I)=(RONE(I,I)-X(I)*X(I)/O)**.5
   70 CONTINUE
      DO 80 I=1,N7
      DO 90 J=1,N7
      RONE(I,J)=(RONE(I,J)-X(I)*X(J)/O)/(STWO(I)*STWO(J))
   90 CONTINUE
   80 CONTINUE
      DO 100 I=1,N7
      X(I)=X(I)/O
      STWO(I)=STWO(I)/(O-1)**.5
```

```
100 CONTINUE
    WRITE(12,105) N5
105 FORMAT (1H ,//," NUMBER OF CASES= ",I3)
    WRITE(12,110)
110 FORMAT(1H ,///,5X,"AVERAGES:")
    DO 120 I=1,N7
    WRITE(12,130) I,X(I)
130 FORMAT(1H ,"VARIABLE NO. ",I2,3X,"AVE= ",F7.3)
120 CONTINUE
    WRITE(12,140)
140 FORMAT(1H ,//,5X,"STANDARD DEVIATIONS")
    DO 160 I=1,N7
    WRITE(12,150) I,STWO(I)
150 FORMAT(1H ,"VARIABLE (",I2,")= ",F7.4)
160 CONTINUE
    WRITE(12,170)
170 FORMAT(1H ,//,5X," SIMPLE CORRELATION COEFFICIENTS")
    J1=0
    DO 180 I=1,N2
    J1=J1+1
    DO 190 J=J1,N7
    IF(I.EQ.J) RONE(I,J)=1.0000
    WRITE(12,200)I,J,RONE(I,J)
200 FORMAT(1H ,"VARS(",I2,",",I2,")= ",F7.5)
190 CONTINUE
180 CONTINUE
    DO 210 I=1,N7
    S(I)=0
    SONE(I)=0
210 CONTINUE
    N=0
    D1=0-1
    N6=-1
    DO 220 I=1,N7
    STWO(I)=STWO(I)*(0-1)**.5
220 CONTINUE
222 N6=N6+1
    S3=((RONE(N7,N7)/D1)**.5)*STWO(N7)
    D1=D1-1
    V2=0
    V1=0
    N1=0
    DO 230 I=1,N2
    IF((RONE(I,I)-.001).LE.0) GOTO 230
    V=RONE(I,N7)*RONE(N7,I)/RONE(I,I)
    IF(V.LT.0) GOTO 225
    IF(V.EQ.0) GOTO 230
    IF((V-V1).LE.0) GOTO 230
    V1=V
    N3=I
    GOTO 230
```

```
225 N1=N1+1
    ITWO(N1)=I
    S(N1)=RONE(I,N7)*STWO(N7)/STWO(I)
    SONE(N1)=(S3*RONE(I,I)**.5)/STWO(I)
    IF(V2.EQ.0) GOTO 227
    IF((V-V2).LE.0) GOTO 230
227 V2=V
    N4=I
230 CONTINUE
    IF(N1.EQ.0) GOTO 340
    B=X(N7)
    DO 240 I=1,N1
    J=ITWO(I)
    B=B-S(I)*X(J)
240 CONTINUE
    IF(N.EQ.0) GOTO 350
    WRITE(12,250)N6,K
250 FORMAT(1H ,//," STEP NUMBER ",I2,"  ENTER VAR. ",I2)
255 WRITE(12,260)S3
260 FORMAT(1H ," STANDARD ERROR OF ESTIMATE= ",F7.4)
    R=(1-RONE(N7,N7))**.5
    WRITE(12,270) R
270 FORMAT(1H ," MULTIPLE CORRELATION COEFFICIENT= ",F6.5)
    RZ=R*R
    WRITE(12,280)RZ
280 FORMAT(1H ," REDUCTION OF VARIANCE= ",F6.5)
    I4=O-D1-2
    I3=D1+1
    Q=(STWO(N7)**2-(S3**2)*(D1+1))/((O-D1-2)*S3**2)
    WRITE(12,290) I4,I3,Q
290 FORMAT(1H ," GOODNESS OF FIT, F(",I3,",",I3,")= ",F6.2)
    WRITE(12,300) B
300 FORMAT(1H ," CONSTANT TERM= ",F8.4)
    WRITE(12,310)
310 FORMAT(1H ,//," VAR     COEF     STD DEV COEF     T-VALUE    BETA COEF
   *"/)
    DO 320 I=1,N1
    J=ITWO(I)
    T=S(I)/SONE(I)
    WRITE(12,330) ITWO(I),S(I),SONE(I),T,RONE(J,N7)
330 FORMAT(1H ,1X,I2,2X,F8.5,5X,F6.5,6X,F8.4,4X,F6.5)
320 CONTINUE
    F2=V2*D1/RONE(N7,N7)
    IF((F3+F2).LE.0) GOTO 340
    K=N4
    N=0
    D1=D1+2
    GOTO 350
340 F2=V1+D1/(RONE(N7,N7)-V1)
    K=N3
    N=K
    GOTO 350
    GOTO 255
```

```
350 DO 360 I=1,N7
    IF((I-K).EQ.0) GOTO 360
    DO 370 J=1,N7
    IF((J-K).EQ.0) GOTO 370
    RONE(I,J)=RONE(I,J)-RONE(I,K)*RONE(K,J)/RONE(K,K)
370 CONTINUE
360 CONTINUE
    DO 380 J=1,N7
    IF((J-K).EQ.0) GOTO 380
    RONE(K,J)=RONE(K,J)/RONE(K,K)
380 CONTINUE
    DO 390 I=1,N7
    IF((I-K).EQ.0) GOTO 390
    RONE(I,K)=-RONE(I,K)/RONE(K,K)
390 CONTINUE
    RONE(K,K)=1/RONE(K,K)
    IF(X9.NE.N8) GOTO 395
    IF(N6.EQ.(N8-1)) GOTO 410
    GOTO 400
395 IF(N6.EQ.X9) GOTO 410
400 GOTO 222
410 IF(Y7.EQ.1) GOTO 430
    GOTO 455
430 WRITE(12,440)
440 FORMAT(1H ,///,14X," RESIDUALS TABLE")
    WRITE(12,450)
450 FORMAT(1H ," CASE NO.",3X,"ACTUAL",3X,"ESTIMATE",3X,"DIFF(EST-ACT)
   *")
455 N6=N8-1
    M=0
    M1=0
    W2=1
    DO 470 I=1,N5
    W=0
    DO 460 J=1,N6
    W=W+S(J)*DTWO(I,J)
460 CONTINUE
    W1=W+B
    W4=W1-DTWO(I,N8)
    M=M+W4
    M1=M1+ABS(W4)
    IF(Y7.EQ.0)GOTO 467
    WRITE(12,465) W2,DTWO(I,N8),W1,W4
465 FORMAT(1H ,2X,I3,8X,F4.0,4X,F7.3,5X,F7.3)
467 W2=W2+1
470 CONTINUE
    M2=M/N5
    M3=M1/N5
    WRITE(12,480) M2
480 FORMAT(1H ,//," AVE ALGEBRAIC DIFF IS  ",F9.6)
    WRITE(12,490) M3
490 FORMAT(1H ,/," AVE ABSOLUTE DIFF IS  ",F7.4)
    END
```

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