AN ENHANCED PLOTTER FOR SURFACE AIRWAYS OBSERVATIONS

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Western Region Headquarters
Salt Lake City, Utah
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AN ENHANCED PLOTTER FOR SURFACE AIRWAYS OBSERVATIONS

Andrew J. Spry*
Jeffrey L. Anderson*

I. General Information

A. Summary:

The enhanced plotter consists of two programs, PLTGEN and PLTSELECT, which are used to generate plot files from surface airways observations. These two programs, along with some modifications to the SAO decoder, provide the following enhancements over previous plotting programs.

1) Plotting on either the United States or North America map background.
2) Plotting most parameters in their correct station model positions.
3) Plotting single parameters.
4) Highlighting significant weather using the GDM zoom capabilities.
5) Producing additional plots from an SAODATA file quickly.
6) Running the SAO decoder and plotter in a procedure.
7) Using an edited station directory file to reduce clutter.

B. Environment:

The program runs in less than 9K in the background of a Data General Eclipse 230. It interfaces with AFOS using the FSTORE and FORK subroutines (BGLB).

The main programs, PLTGEN and PLTSELECT, and the subroutines, BNSCH, CC, VV, and OUTPUT, are written in Data General Fortran IV. Three subroutines, MSND, MASC, and WW, are written in assembly language.

C. References:

1) Generalized Plot File Format for Stations Model Graphics

2) Surface Airways Observation Decoder. Rich Thomas, NMC.

3) Master Station ID Directory File. Rich Thomas, NMC.

*SSD Student Employees - Summer 1981.
II. Application

A. Complete Program Description:

PLTGEN, the intermediate program in the decoding and plotting sequence, is designed to give the user control over the appearance of the surface map generated from surface airways observations. It uses the data file SAODATA and the switch file SAOXXX, both produced by the SAO decoder, to generate a plot file NMCPLTSAO. This file is then turned into an AFOS graphic using the program MODELUGF.

PLTGEN uses two switches from the SAO decoder. The /B switch is used to choose between the United States and North America map backgrounds. The /P switch is used to choose which parameter or combination of parameters to plot. A list of the options for these two switches is given in Table 1.

PLTGEN plots most parameters in their correct location in the station model (see Figure 1). Weather symbols are generated for rain, sleet, hail, shower, freezing precipitation, thunderstorms, haze, and fog. All symbols except fog show the intensity of the precipitation. The comment field of the station model is used to plot three parameters on a priority basis: precipitation, wind gusts, and visibility.

Plots of all the single parameters listed in Table 1 can be produced (Figure 2). These parameters are put in their respective station model locations. To aid in hand analysis, all single parameter plots include weather, cloud cover, and wind flags.

The enhanced plotter uses the AFOS GDM zoom levels to highlight significant weather (Figure 3). All stations reporting significant weather (any obstruction to vision except haze and fog) appear at 1 to 1 zoom. On the U.S. map background, the stations with haze and fog are added at 4 to 1 and all the remaining stations are added at 9 to 1 zoom. On the North American map background, all stations are visible from 4 to 1 zoom and higher. To reduce clutter on the North American map background, the station IDs, which would appear at 9 to 1, are omitted.

PLTSELECT, the other new program in the enhanced plotter, is used to produce additional plots from a pre-existing SAODATA file. It changes the background (/B) and plotting (/P) switches in the SAOXXX file, then chains to PLTGEN to produce the plot file. Once an SAODATA file for the desired observations exists, new plots can be generated in about 45 seconds, a considerable time savings over the six to eight minutes needed to generate the first plot using the SAO decoder.

In addition to the background and plot switch changes referred to above, the SAO decoder's time switch has been altered so the program can be run in a procedure. The program now defaults to the most recent hour rather than the current time. The time window has also been changed.
to extend from 30 minutes before, to 15 minutes after the given
time. The /T switch can now be omitted when running on current
data. When plotting a previous hour's data, the time should be
entered as HH00/T where HH is the hour desired. A sample Procedure
plotting the default parameters in product NMCGPHSAO and altimeter
setting only in product NMCGPH561 is given in Table 2.

Because of the high density of observations in populous areas such
as the Los Angeles basin, the plotter now reads the necessary file
size parameters directly from the station direction file STDIR.MS.
This allows the user to reduce the number of stations plotted in
these areas by editing them out of the STDIR.MS file. The file can
be edited using the SEDIT.SV program found in the station directory
file documentation. A backup copy of the unedited STDIR.MS file
should be made before editing.

B. Machine Requirements:

The program PLTGEN requires less than 9K of core and approximately 40
seconds to execute. It requires a maximum of three channels at one
time. Using PLTSELECT to produce an additional plot of a single
parameter requires about 45 seconds.

C. Software Structure:

The subroutines MASC, MSND, and OUTPUT are simple functions repeated
many times. MASC converts a string of two-digit integers into
packed ASCII for output to the plot file. MSND converts any length
signed integer into packed ASCII for output to the plot file. OUTPUT
does a write sequential of a string of ASCII characters to the output
file GP, adding a trailing comma or semicolon if desired.

The subroutines VV, WW, and CT are complicated functions called once
for each station. VV converts the visibility into an ASCII string. WW
generates the synoptic code for present weather, in ASCII, and the
correct code word (PSOWD) needed by the plot file to control the zoom
threshold. CT generates the packed ASCII could type for output.

D. Database:

Three files are accessed by PLTGEN and one file is created for output.
SAOXXX is used for the background and plot switch information.
SAODATA is read for the surface observations. STDIR.MS, the station
information file, is searched by BNSCH to locate a station's X and Y
coordinates on the GDM screen. GP, the file created by PLTGEN, contain
the output plot file that is stored in the database under NMCPLTSAO.

The formats of all files except SAOXXX remain unchanged from the
documentation listed in the references. Words 9-13 of the SAOXXX file,
originally unused, now contain the plotting switch array. The values
of this array for the various switch options are shown in Table 3.
The rest of SAOXXX remains the same as documented previously.
III. Procedures

A. Initiation of Program:

The plotter can be run in three ways from the AFOS ADM.

A new surface plot on current data can be produced by the commands:

RUN:@SAO@  
RUN:@SAO@ 02/B  
or
RUN:@LCLSFC@  
RUN:@LCLNAM@

The indirect @SAO@ runs the SAO decoder which chains to PLTGEN to create a plot file of current observations. The indirects @LCLSFC@ and @LCLNAM@ run MODELUGF to produce a graphic from the plot file on the United States and North America map backgrounds respectively.

The type of plot produced is determined by the /B and /P switches (see Table 1). The choice of @LCLSFC@ or @LCLNAM@ depends on the background switch used. For example, the following commands would produce a map of wind barbs only on the North America map background.

RUN:PLTSELECT 2/B W/P  
RUN:@LCLNAM@

A procedure, like the one shown in Table 2, can be set up to run the decoder once each hour. A basic graphic is produced which can be displayed on the GDM. If additional graphics of single parameter plots are desired they can be produced quickly by PLTSELECT.

B. Output:

The output from PLTGEN is the plot file NMCPLTSAO. Examples of the first pages of two plot files are shown in Figure 4. The exact appearance of the plot file varies as the plotting switch is changed. The plot file format is given in the referenced documentation.

C. Cautions and Restrictions:

1) Fog is always shown as = regardless of actual reported intensity. The visibility, in the comment field, can be used to tell the intensity of fog.

2) PLTSELECT can only be run if an SAODATA file exists from the decoder.

3) A bug in MODELUGF results in a misrepresentation of the thunderstorm symbol as a thunder snowstorm when certain single parameter plots are produced.

4) The indirect @LCLNAM@ should only be used when the 02 or 2 option is used for the background switch.
Table 1: Background and plotting switches for the SAO decoder and PLTSELECT.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/B</td>
<td>02</td>
<td>United States map background for PLTGEN</td>
</tr>
<tr>
<td>/B</td>
<td>03</td>
<td>North America map background for PLTGEN</td>
</tr>
<tr>
<td>/P</td>
<td>Q</td>
<td>All parameters including pressure (default)</td>
</tr>
<tr>
<td>/P</td>
<td>B</td>
<td>All parameters including altimeter</td>
</tr>
<tr>
<td>/P</td>
<td>A</td>
<td>Altimeter setting only</td>
</tr>
<tr>
<td>/P</td>
<td>P</td>
<td>Sea level pressure only</td>
</tr>
<tr>
<td>/P</td>
<td>T</td>
<td>Temperature only</td>
</tr>
<tr>
<td>/P</td>
<td>D</td>
<td>Dew point only</td>
</tr>
<tr>
<td>/P</td>
<td>C</td>
<td>Pressure tendency (valid on synoptic times only)</td>
</tr>
<tr>
<td>/P</td>
<td>W</td>
<td>Wind direction and speed barbs only</td>
</tr>
</tbody>
</table>

Table 2: Sample procedure "SAO" for running the SAO decoder. The output will consist of a map of all parameters and altimeter setting on the North America map background and a map of pressure only on the U.S. map background.

INIT:DP0F:APL
RUN:@SAO@ 02/B B/P
RUN:@LCLNAM@
WAIT 60
RUN:PLTSELECT 3/B P/P
RUN:@LCLSFC@

Table 3: Configuration of words 9-13 of the file SAOXXX for the various plot switches.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Words 9-13 of SAOXXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>1 1 1 0 1</td>
</tr>
<tr>
<td>B</td>
<td>0 1 1 0 1</td>
</tr>
<tr>
<td>A</td>
<td>0 0 0 0 0</td>
</tr>
<tr>
<td>P</td>
<td>1 0 0 0 0</td>
</tr>
<tr>
<td>T</td>
<td>-1 1 0 0 0</td>
</tr>
<tr>
<td>D</td>
<td>-1 0 1 0 0</td>
</tr>
<tr>
<td>C</td>
<td>-1 0 0 0 1</td>
</tr>
<tr>
<td>W</td>
<td>-1 0 0 1 0</td>
</tr>
</tbody>
</table>
Figure 1: Surface Aviation Observation plot produced by the enhanced plotter. All parameters except visibility are in their correct locations. The comment field of the station model is used to plot precipitation, wind gusts, and visibility on a priority basis.
Examples of the single parameter plots available using the data. 

a) Altimeter setting 
b) Sea level pressure 
c) Temperature 
d) Dew point temperature 
e) Pressure tendency 
f) Wind direction and speed
Figure 3: Highlighting of significant weather by the enhanced plotter for the U.S. map background.

a) Significant weather only at 1 to 1 zoom
b) Haze and fog added at 4 to 1 zoom
c) All stations shown at 9 to 1 zoom
Figure 4: Examples of the plot files output by the enhanced plotter.
WESTERN REGION SAO PLOT-FILE GENERATOR. THIS PROGRAM READS THE SAODATA FILE GENERATED BY THE SAO-DECODER AND THE SAOXXX FILE CONTAINING THE SWITCH INFORMATION. AN OUTPUT PLOT FILE NMCPLL SAO IS GENERATED.

NECESSARY SUBROUTINES.
- BNSCH - BINARY SEARCH ROUTINE TO LOCATE STATIONS IN STATION DIRECTORY FILE.
- WW - WEATHER SYMBOL GENERATING SUBROUTINE. GENERATES SYNOPTIC CODE AND THE CORRECT CODE WORD IN ASCII.
- CT - CLOUD TYPE SUBROUTINE CREATES PACKED ASCII CLOUD TYPE CODE WITH A TRAILING COMMA.
- VV - VISIBILITY GENERATOR. CONVERTS INTEGER TO ASCII WITH TRAILING COMMA.
- MASC - CONVERTS ANY POS INTEGER LESS THAN 100 TO ASCII.
- MSND - CONVERTS ANY SIGNED INTEGER INTO AN ASCII STRING WITH A TRAILING COMMA.
- OUTPUT - OUTPUT AN ASCII STRING WITH THE SELECTED TRAILER. OPTIONS ARE ',', ';' OR NOTHING.

DATA SET USAGE.
- SAOXXX - SWITCH FILE GENERATED BY EITHER SAODEC OR PLTSELECT.
- SAODATA - FORMATTED SURFACE DATA FILE GENERATED BY THE SAO-DECODER.
- STDIR.MS - STATION INFORMATION FILE.

SWITCHES USED BY PLTGEN, ENTERED IN EITHER PLTSELECT OR SAO-DECODER.
- /B - BACKGROUND SWITCH.
  LOCATION: WORD SIX IN SAOXXX.
  POSSIBLE VALUES:
  2 - NORTH AMERICAN BACKGROUND.
  3 - UNITED STATES BACKGROUND.
- /P - PLOTTING SWITCH.
  LOCATION: WORDS 9-13 IN SAOXXX.
  POSSIBLE VALUES:
  Q - ALL PARAMETERS WITH PRESSURE (DEFAULT).
  B - ALL PARAMETERS WITH ALTIMETER.
  A - ALTIMETER ONLY.
  P - PRESSURE ONLY.
  T - TEMPERATURE ONLY.
  D - DEWPOINT ONLY.
  C - PRESSURE TENDENCY ONLY.
  W - WIND DIRECTION AND SPEED BARBS.

NOTE: ALL SINGLE PARAMETER PLOTS INCLUDE THE WIND DIRECTION AND SPEED BARBS AND SKY COVER.

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WESTERN REGION SSD
6/23/81

PARAMETERS NECESSARY FOR USE OF STATION DIRECTORY FILE STDIR.MS
- PARAMETER NR; NUMBER OF RECORDS IN STDIR.MS
- PARAMETER LR; LENGTH OF EACH RECORD IN BYTES.
- PARAMETER IS; STARTING POINT OF FIRST RECORD.
- PARAMETER IFLDP=1; POINTER TO FIELD IN EACH RECORD.
- PARAMETER IFLD=6; SIZE IN BYTES OF THE TARGET FIELD.
INTEGER BS, SW(8), IBUF(48), ITEST(3), IC1(33), FLAG, IPAR(3)
INTEGER IAD(2), MP(5), IEND(4), PSOWD(4), INA(10)

COMMON /OUT/ INA, IPAR
COMMON /ONE/ IBUF, IC1, IEND, PSOWD
COMMON /SWTC/ SW

EQUIVALENCE (IPAR, NR), (IPAR(2), LR), (IPAR(3), IS)

DATA IBUF/*WMCPLTS0000", 177777K, 177777K, 2400K, 142600K/
DATA IBUF(11)/*WMCPLTS0001010002048153640501800+0750+3000 "/
DATA IBUF(33)/0:0:0:0:0:0000", 6412K,"119, 290, 10000Z, SA0"/
DATA IC1/* W. RGN. SURFACE OBS.", 6412K/
DATA IC1(13)/"119, 270, 10000Z, Z "; 6412K/
DATA INA/*6285014250097501688 */
DATA IEND/5105K,"ND", 142400K, 203K/
DATA PSOWD/* 02," */

C OPEN THE SWITCH FILE SAOXXX AND READ IN THE SWITCH INFORMATION.
CALL GCHN(ICHAN, IER)
CALL OPENN(ICHAN, "SAOXXX", 0, IER)
N=16
CALL RDS(ICHAN, SW, N, IER)
BS=SW(6); SAVE THE BACKGROUND NUMBER.
CALL RDS(ICHAN, SW, N, IER)
CALL KLOSE(ICHAN, IER)

C DETERMINE IF THIS IS A SINGLE PARAMETER PLOT. IF SO "FLAG" IS GREATER THAN
C TWO.
FLAG=0
DO 99 MM=1,5
IF(SW(MM).GT.0) FLAG=FLAG+1
99 CONTINUE

C OPEN THE FILES GP., SAODATA, AND STDIR.
CALL DFILW("GP.", IER)
CALL CFILW("GP.", 2, IER)
CALL GCHN(ICHAN, IER)
CALL OPENN(ICHAN, "GP.", 0, IER)
CALL GCHN(ICHAN, IER)
CALL OPENN(ICHAN, "SAODATA", 0, IER)
CALL GCHN(KCHAN, IER)
CALL OPENN(KCHAN, "STDIR.MS", 0, IER)

C READ IN THE FIRST THREE PARAMETERS FOR THE STDIR.MC FILES.
NBYTES=6
CALL RDS(KCHAN, IPAR, NBYTES, IER)
IAD(1)=0
IAD(2)=0
CALL SPOS(KCHAN, IAD, IER) ; RESET POINTER TO START.

C READ IN TIME, COMPLETE HEADER (AFDS) AND LEGEND.
NBYTES=8
CALL RDS(ICHAN, MP, NBYTES, IER)
CALL ERROR(IER, "S")
C MOVE THE TIME AND DATE TO IBUF AND CONVERT TO ASCII (NOTE: THIS PUTS IT DIRECTLY IN THE AFOS HEADER).

IBUF(33) = MP(4)/100
IBUF(34) = MP(2)
IBUF(35) = MP(1)
IBUF(36) = MP(3)

IF(IBUF(33).EQ.24) IBUF(33) = 0
CALL MASC(IBUF(33),4)

C COPY TIME TO PRODUCT LEGEND.

IC1(22) = IBUF(33)
IC1(25) = IBUF(34)
IC1(27) = IBUF(35)
IC1(29) = IBUF(36)

C USE SWITCH TO SELECT THE CORRECT BACKGROUND.

MB = 10
IF(BS.EQ.3) GO TO 3

C FOR NORTH AMERICAN BACKGROUND THE IBUF NEEDS TO BE UPDATED WITH INA.

MB = 8

DO 2 M = 1, 10
    IBUF(M+22) = INA(M)
    CONTINUE

3 CALL WRS(LCHN+IBUF(63),IER)
   CALL WRS(LCHN+IBUF(33),94,IER)

C DO EACH LINE OF GP FILE IN A LOOP.

DO 1 I = 1, 300
   NBYTES = 96

C READ IN A RECORD FROM SAODATA (LENGTH IS 48 WORDS.)

CALL RDS(LCHN, IBUF, NBYTES, IER)
   IF(IER.NE.1) GO TO 50
   CALL ERROR(IER, "6")

   IF(IBUF(3).EQ.1) GO TO 4
   IF(IBUF(3).LT.5.OR.IBUF(3).EQ.7) GO TO 1

   C ENCODE THE CURRENT WEATHER NOW AND GET THE PROPER PSOWD.

   C*****************************************************************
   C******************************************************I*********
   C*****************************************************************
   IF(IBUF(3),EQ,6) IBUF(27) = 20040K WEATHER IS BAD,
   4 IF(IBUF(27).EQ."LR".AND.IBUF(26).EQ."C") IBUF(27) = "*" ;FIX FOR DEC.
   IF(IBUF(27).EQ."CT".AND.IBUF(26).EQ."S") IBUF(27) = "*" ;FIX FOR DEC.

   C********** NOTE: NO FIX IS NEEDED FOR OVC SINCE WW WILL NOT INTERPRET IT
   C********** AS WEATHER,******************************************************************************
   C*****************************************************************
   CALL WW(IBUF(23),MM,PSOWD)

   C******************************************************************** CHANGES NECESSARY FOR MODELUGF IN SINGLE PARAMETER
   C******************************************************************** MODE AND BACKGROUND CHANGES.******************************************************************************
   IF(IBUF(23).NE."05")   GOTO 5
   IBUF(23) = "5,"     ; CHANGE THE HAZE.
   MM = MM - 1
   PSOWD(1) = "10"
   PSOWD(2) = "01"

5 IF(BS-3) = 7, 8, 7 ; CHECK FOR LOWER THRES. FOR N.AM.
7 IF(FLAG.LT.3.AND.PSOWD(1).NE."00") PSOWD(1) = "10" ; FOR N.
   ; AM, DEFAULT ZOOM IS 1 TO 1.

***********************************************************************
C***************************************************************************
C USE BNSH TO LOCATE THE X,Y COORDINATES OF STATION, LOCATE THEM, 
C CONVERT TO ASCII THEN WRITE THEM TO CP.
C
IBUF(3)=20040K
CALL BNSCH(KCHN,NR,LR,IS,IFLD,IFLD,IBUF,IAD,IC1,IC1(12),IC1(23),IC)
IF(IC.EQ.0)GO TO 1
IC=(IC-1)*11+MB
MP(1)=IC1(IC)
MP(3)=IC1(IC+1)
CALL MSND(MP,N)
CALL OUTPUT(LCHN,MP,N,0,Ier)
CALL MSND(MP(3),N)
CALL OUTPUT(LCHN,MP(3),N,0,Ier)

C PUT FLAG/INDICATOR GROUP AND STATION NAME IN GP.
CALL OUTPUT(LCHN,PSOWD,B,0,Ier)
N=3
IF(BS.EQ.2) N=0 ; FOR N. AM. NO ID IS INCLUDED.
CALL OUTPUT(LCHN,IBUF,N,1,Ier)

C FIND CLOUD COVER AMOUNT AND PUT IN GP.
N=115K
IF(IBUF(9).EQ.103K) N=60K
IF(IBUF(9).EQ.123K) N=63K
IF(IBUF(9).EQ.102K) N=66K
IF(IBUF(9).EQ.117K) N=70K
IF(IBUF(9).EQ.130K) N=71K
N=ISHF(N*8)+54K
CALL OUTPUT(LCHN,N,2,0,Ier)

C GENERATE WIND SPEED AND DIRECTION GROUP, PUT INTO GP.
IND=1
IF((IBUF(32).GE.0).AND.(IBUF(33).GE.0)) GO TO 13
N=0
GO TO 12
13 IDIR=IBUF(32)
ISPD=IBUF(33)*10
MP(1)=IDIR/10
MP(2)=ISPD/100
MP(3)=ISPD-MP(2)*100
N=5
CALL MASC(MP,3)
CALL OUTPUT(LCHN,MP,N,IND,Ier)

C GENERATE LAST THREE DIGITS OF PRESSURE IN ASCII AND PUT IN GP.
IF(SW(1)) 54,53,52
MP(1)=9000 ; PRESSURE.
N=28
GO TO 14
53 MP(1)=2000 ; ALTIMETER.
N=35
14 IF(IBUF(N).GT.0) GO TO 55
54 N=0 ; NONE.
GO TO 56
55 MP(3)=IBUF(N)-MP(1)
   IF(MP(3),GE,1000)MP(3)=MP(3)-1000
   MP(1)=MP(3)/10
   MP(2)=(MP(3)-MP(1)*10)*10
   CALL MASC(MP,2)
   N=3
56 CALL OUTPUT(LCHN,MP,N,IND,IER)
C
C GET TEMPERATURE AND DEWPOINT IN ASCII AND PUT IN GP.
IND=0
   IF(IBM(29),NE,-99.AND.SW(2),NE,0) GO TO 57
   MP(1)="","
   N=1
   GO TO 59
57 MP(1)=IBM(29)
   CALL MSND(MP,N)
59 CALL OUTPUT(LCHN,MP,N,IND,IER)
   IF(IBM(30),NE,-99.AND.SW(3),NE,0) GO TO 58
   MP(1)=26000K
   N=1
   GO TO 60
58 MP(1)=IBM(30)
   CALL MSND(MP,N)
60 CALL OUTPUT(LCHN,MP,N,IND,IER)
C
C WRITE THE WEATHER NOW, INCLUDES A ',' FOR VISIBILITY.
   CALL OUTPUT(LCHN,IBM(23),MM,IND,IER)
   IF(SW(4),EQ,1) GO TO 100
C
C GET TENDENCY AND TRACE.
   IF(SW(5),EQ,0) GO TO 69
   IF((IBM(42),NE,-99),AND,(IBM(41),NE,-99)) GO TO 70
69 IBM(41)="","
   N=2
   GO TO 76
70 MP(1)=IBM(42)
   CALL MSND(MP(1),N)
   CALL OUTPUT(LCHN,MP(1),N,IND,IER)
   IBM(41)=(IBM(41)*400K)+30054K
76 CALL OUTPUT(LCHN,IBM(41),2,IND,IER)
C
C ENCODE THE CLOUD TYPE WITH CT.
   IF(FLAG,LT,3) GO TO 100
   CALL CT(IBM(44),N)
   CALL OUTPUT(LCHN,IBM(44),N,IND,IER)
C
C PRECIP AMOUNT.
   IND=-1
   INDICATES A <CR><LF>.
   IF(IBM(43),LT,0) GO TO 79
   MP(1)=IBM(43)
   CALL MSND(MP,N)
   CALL OUTPUT(LCHN,MP,N,IND,IER)
   GO TO 1
C PUT THE VISIBILITY IN THE COMMENT FIELD.
79    CALL OUTPUT(LCHN, MP, 0, 1, IER)
     IF(IBUF(34), GT, 0) GO TO 71 ; GUSTS HAVE PRIORITY
     CALL VV(IBUF(21), MP, N)
     CALL OUTPUT(LCHN, MP, N, IND, IER)
     GO TO 1

C PUT GUSTS IN COMMENT FIELD (IF AVAILABLE).
71    MP(1)=43400K
     CALL HSND(IBUF(34), N)
     MP(1)=MP(1)+ISHFT(IBUF(34),-8)
     MP(2)=ISHFT(IBUF(34),8)
     N=3
     CALL OUTPUT(LCHN, MP, N, IND, IER)
     GO TO 1

C END LINE WITH 
     GO TO 1

C WRITE THE END OF FILE AND CLOSE THE FILES,
100   CALL OUTPUT (LCHN, MP, 0, -1, IER)
C
C CONTINUE
50    CONTINUE
C
C PROGRAM: PLTSELECT 6/26/81 ANDERSON WRH/SSD
C ALLOWS THE INPUT OF SWITCHES TO PLOTGEN WITHOUT THE RUNNING
C OF THE SAODECORDER.
C
B SWITCH (MAP BACKGROUND):
  2- N. AMERICAN
  3- U.S. (DEFAULT)
P SWITCH
  Q- ALL WITH PRESSURE (DEFAULT)
  B- ALL WITH ALTIMETER SETTING
  A- ALTIMETER SETTING
  P- PRESSURE
  C- PRESSURE TENDENCY
  W- WINDS
  D- DEW POINT
  T- TEMPERATURE
C
VARIABLES:
  IBUF- INPUT--OUTPUT ARRAY
  IPS- SWITCH P VALUE ARRAY
  KPS- ASCII VALUES FOR SWITCH P SEARCH
DIMENSION IBUF(15), IDAT(7), JBUF(14), ISW(2), IPS(5), KPS(5)
EXTERNAL ISWSET
COMMON/FOUR/KPS, IPS
DATA KPS/80,84,68,87,67/
DATA IPS/1,1,1,0,1/
N=30
CALL GCHN(ICHN,IER)
CALL ERROR(IER,"ERROR GETTING CHANNEL")
CALL OPENN(ICHN,'SAOXXX',0;IER)
IF(IER.EQ.13)GO TO 10
CALL ERROR(IER,"ERR OPENNING FILE")
CALL RDS(ICHN,IBUF,N,IER)
CALL ERROR(IER,"ERR READING SAOXXX")
CALL KLOSE(ICHN,IER)
CALL ERROR(IER,"ERR KLOOSING ICHN")
GO TO 20
C CREATING SAOXXX FOR NONEXISTENT FILE
10 CALL CREATE('SAOXXX',IER)
CALL ERROR(IER,"ERR CREATING SAOXXX")
C READ SWITCHES
20 CALL FCOM(IC,IER)
40 CALL COMCM(IC,IDAT,NN,ISW,IER)
IF(IER.EQ.9)GO TO 50
CALL UNPACK(IDAT,NN,IBUF)
IF(ISWSET(ISW,"B")GO TO 60
IF(ISWSET(ISW,"P"))GO TO 70
GO TO 40
C P SWITCH DECISIONS
70 IF(JBUF(1).EQ.0)GO TO 40
IF(JBUF(1).NE.66)GO TO 80
IPS(1)=0
GO TO 40
80 DO 90 LJI=2,5
IPS(LJI)=0
90 CONTINUE
IPS(1)=-1
IF(JBUF(1).EQ.65)IPS(1)=0
DO 100 MM=1,5
IF(JBUF(1).EQ.KPS(MM))IPS(MM)=1
100 CONTINUE
GO TO 40
C B SWITCH
60 IF(IBUF(6).NE.0)IBUF(6)=JBUF(1)-43
GO TO 40
50 IF(IBUF(6).NE.2)IBUF(6)=3
DO 110 LJI=1,5
110 IBUF(LJI+8)=IPS(LJI)
C OUTPUT
CALL DELETE('SAOXXX',IER)
CALL CREATE('SAOXXX',IER)
CALL GCHN(ICHN,IER)
CALL ERROR(IER,"ERROR GETTING CHANNEL")
CALL OPENN(ICHN,'SAOXXX',0;IER)
CALL ERROR(IER,"ERR OPENNING SAOXXX")
CALL WRs(ICHN,IBUF,N,IER)
CALL ERROR(IER,"WRs ERR")
CALL KLOSE(ICHN,IER)
CALL ERROR(IER,"ERR KLOSING SAOXXX")
CALL FCHAN("PLTREN.SV")
STOP
END
SUBROUTINE VV,FR
SUBROUTINE VV(IVV,MP,N)
DIMENSION MP(3)

C GET THE VISIBILITY IN TENTHS OF MILES.
IF(IVV.EQ.-99) GO TO 100 ; MISSING.
IF(IVV.GT.0) GO TO 3
IDIS=-1*IVV/100 ; NEG IS IN THOUSANDS OF MILES.
GO TO 4
3
IDIS=IVV*10
C DETERMINE IF THE VISIBILITY EXCEEDS 10 KM.
4
IF(IDIS.GE.800) IDIS=990
M=IDIS/10
IF(M.LT.10) GO TO 7 ; VISIBILITY IN TENTHS OF KM.
M=IDIS/100 ; THE TENS DIGIT.
N=3
MP(1)=(IDIS-M*100)/10 ; THE ONES DIGIT.
MP(1)=MP(1)+ISHFT(M,8)+30060K ; CONVERT TO ASCII.
MP(2)=20000K ; ADD THE SPACE.
RETURN
C THE VISIBILITY IS LESS THAN TEN KM.
7
MP(1)=IDIS
CALL HSND(MP(1),N)
MP(2)=ISHFT(MP(1),8)+40K
MP(1)=MP(1)-ISHFT(MP(2),-8)+56K
N=4
RETURN
100
N=0
RETURN
END

SUBROUTINE CT(MNT,N)
DIMENSION MNT(3)

IF(MNT(1).NE.40K) GO TO 3
IF(AND(MNT(2),NE.40K),OR.(MNT(3),NE.40K)) GO TO 3
MNT(1)=26000K
N=1
RETURN
MNT(1)=ISHFT(MNT(1),8)+MNT(2)
MNT(2)=ISHFT(MNT(3),8)+54K
N=4
RETURN
END
SUBROUTINE BNSCH(ICHN,NREC,LREC,ISTAR,IFLDP,IFLD,ITEST,
I IAD,IC1,IC2,IC3,IC)

C

C PROGRAMMER - RICH THOMAS SXI, ISL, SDO 11/79
C
C ICHN=CHANNEL WHICH FILE HAS BEEN OPENNED TO
C NREC=NUMBER OF RECORDS
C LREC=LENGTH OF EACH RECORD (BYTES)
C ISTAR=BYTE OF FIRST RECORD (0=BEGINNING)
C IFLDP=WORD POINTER TO FIELD IN RECORD
C IFLD=LENGTH OF FIELD IN BYTES
C ITEST=ARRAY CONTAINING TEST FIELD
C IAD=RETURNED TWO WORD ARRAY CONTAINING ADDRESS ITEST RECORD
C SHOULD BEGIN AT-
C IC = 1; 2; 3 IN SECOND WORD INDICATING RECORD WAS FOUND AND
C IS IN ARRAY IC1, IC2, OR IC3
C THOSE THREE ARRAYS SHOULD BE DIMENSIONED LREC/2 WORK;
C DIMENSION ITEST(1), IC1(1), IC2(1), IC3(1), IAD(2)
C DIMENSION IAD1(2), IAD2(2), IAD3(2)
C DIMENSION D1(2), D2(2)
C INTEGER D1, D2
C IC=0
C IAD1(1)=0
C IAD1(2)=ISTAR
C CALL SPOS(ICHN, IAD1, IER)
C CALL ERROR(IER, 'I1')
C CALL RDS(ICHN, IC1, LREC, IER)
C CALL ERROR(IER, 'RDS-IC1')
C D2(1)=0
C D2(2)=LREC
C CALL DSMB(D2, D2, IAD1)
C CALL DMPY(D1, NREC, LREC)
C CALL DSMB(IAD2, D1, D2)
C CALL SPOS(ICHN, IAD2, IER)
C CALL ERROR(IER, 'I2')
C CALL RDS(ICHN, IC2, LREC, IER)
C CALL ERROR(IER, 'RDS-IC2')
C CALL BCOMP(ICHN, IFLDP, ITEST, IFLD, IER1)
C IF(IER1, GT, 1) GO TO 100
C CALL BCOMP(ICHN, IFLDP, ITEST, IFLD, IER2)
C IF(IER2, NE, 2) GO TO 125

100 CONTINUE

125 CONTINUE
CALL DSUB(D1,IAD2,IAD1)
CALL DDVD(INC,IR,D1,LREC)
IF(INC.GE.32767) GO TO 900
IF(INC.LT.1) GO TO 150
INC=(INC-1)/2
CALL DMPY(D1,INC,LREC)
CALL DADD(IAD3,IAD1,D1)
CALL SPOS(ICHN,IAD3,IER)
CALL ERROR(IER,'I5')
CALL RDS(ICHN,IC3,LREC,IER)
CALL ERROR(IER,'I6')
CALL BCOMP(IC3(IFLDP),ITEST,IFLD,IER3)
IF(IER3.EQ.1) GO TO 50
IF(IER3.EQ.2) GO TO 60
IF(IER3.NE.3) GO TO 900
IAD(1)=IAD3(1)
IAD(2)=IAD3(2)
IC=3
RETURN
50 IAD1(1)=IAD3(1)
IAD1(2)=IAD3(2)
GO TO 5
60 IAD2(1)=IAD3(1)
IAD2(2)=IAD3(2)
IF(INC.EQ.1) GO TO 150
GO TO 5
100 IAD(1)=IAD1(1)
IAD(2)=IAD1(2)
IF(IER1.NE.3) GO TO 101
IC=1
IAD(1)=IAD1(1)
IAD(2)=IAD1(2)
101 RETURN
125 D1(1)=0
D1(2)=LREC
CALL DADD(IAD,D1,IAD2)
IF(IER2.NE.3) GO TO 126
IAD(1)=IAD2(1)
IAD(2)=IAD2(2)
IC=2
126 RETURN
150 IAD(1)=IAD3(1)
IAD(2)=IAD3(2)
RETURN
900 CALL ERROR(IER3,'IER3')
IER=2
CALL ERROR(IER,'TOO MANY RECORDS IN FILE')
STOP
END
OUTPUT.FR

OUTPUT IS A UTILITY SUBROUTINE FOR USE BY PLOTGEN. IT OUTPUTS THE
INDIVIDUAL ASCII FIELDS TO THE FILE WITH THE DESIRED TRAILING CHARACTER.
THE CHOICE OF ',', ';', OR NOTHING IS SELECTED BY AN INDICATOR FLAG.

ARGUMENTS
ICHN - CHANNEL NUMBER TO OUTPUT FILE.
IBUF - ARRAY CONTAINING THE STRING.
N - LENGTH OF STRING IN BYTES,
IND - INDICATOR FLAG.
IER - ERROR RETURN.

FLAG VALUES
IND = -1  - ADD A SEMI COLON ';
          - ADD NOTHING,
IND = 0  - ADD A COMMA ',',

SUBROUTINE OUTPUT(ICHN,IBUF,N,IND,IER)

DIMENSION IBUF(1),ISEMI(2)
COMMON /ENDOF/ ISEMI
DATA ISEMI/35415K,5000K/

CHECK THE TRAILER AFTER OUTPUTING STRING.
IF(N.EQ.0) GO TO 5
M=N
CALL WRS(ICHN,IBUF,M,IER)
5 IF(IND) 10 ,30,20
10 M=3
CALL WRS(ICHN,ISEMI,M,IER)
GO TO 30
20 M=1
CALL WRS(ICHN,' ',M,IER)
30 RETURN
END
TYPE WW.SR

.TITL  WW
.ENT  WW
.EXTD  .CPYL,FRET
.TXTM  1
.NREL

; IB=-167
N=-166
PSOWD=-165
FS.=3
FS.

; GET ADDRESS OF STRING.
WW: JSR 0,CPYL
SUB 0,0
ESTA 0,TMP
ADI 2,0
STA 0,8N,3
ESTA 0,CNT
LDA 2,PSOWD,3
LDA 0,A20
STA 0,0,2
LDA 0,A00
STA 0,1,2
LDA 0,IB,3
ADI 4,0
MOVOL 0,3
ELDA 2,1,10
ESTA 2,CNT

ENC: LDB 3,2
SBI 1,3
ELDA 0,SPACE
SUB$ 2,0,SNR
JMP 0,ADRFT
LDA 1,3
ELDA 0,MINUS
SUB$ 0,2,SNR
JMP PLUS
LDA 1,1
JMP STUP

ADRFT: FINI
PLUS: SBI 2,0
SUB$ 0,2,SNR
JMP MAIN
LDA 1,5
STUP: DSZ CNT
LDB 3,2
SBI 1,3
MAIN: LDA 0,HAZE
SUB$ 0,2,SNR
JMP HZE
LDA 0,FOG
SUB$ 0,2,SNR
JMP FILL
LDA 0,50
ADD 0,1 ; SUM ON THE OR -.  
LDA 0,DRZL ; CHECK FOR DRIZZLE.  
SUB# 0,2,SNR  
JMP CHKZ ; CHECK FOR FREEZING.  
ADD# 10,1  
LDA 0,RAIN ; VALUE FOR RAIN.  
SUB# 0,2,SNR  
JMP CHKZ ; CHECK FOR FREEZING.  
LDA 0,RAIN ; CHECK FOR RAIN.  
SUB# 0,2,SNR  
JMP CHKZ ; CHECK FOR FREEZING.  
LDA 0,SHW ; CHECK FOR SHOWERS.  
SUB# 0,2,SNR  
JMP TRC ; GO TO SHOWER TREATMENT.  
LDA 0,TRW ; CHECK FOR THUNDER.  
SUB# 0,2,SNR  
JMP TRC ; THUNDER TREATMENT.  
DSZ CNT  
JMP ENC  
JMP FILE  
DSZ CNT ; LAST ONE GO COMPARE.  
JMP COMP ; GET THE CHARACTER TO SEI.  
LDB 3,2 ; GET A Z FOR COMPARISON.  
LDA 0,FZN  
SUB# 0,2,SNR  
JMP CHKZ ; CHECK FOR FREEZING.  
LDA 0,SHW ; CHECK FOR SHOWERS.  
JMP TRC ; GO TO SHOWER TREATMENT.  
SBI 1,3 ; NEXT CHARACTER.  
SUB 0,0  
LDA 2,10 ; SAVE THE "OR-".  
DIV  
STA 0,HOLD ; OFFSET OF FROZEN.  
LDA 0,6  
MUL  
LDA 0,HOLD ; GET THE "OR-".  
LDA 2,1 ; VALUEFOR LIGHT.  
SUB# 0,2,SNR ; DON'T INCREMENT IF LIGHT.  
INC 1,1  
JMP COMP ; GO COMPARE.  
LDA 1,45 ; THUNDERSTORM HANDLER.  
JMP COMP  
HZE: LDA 1,5  
JMP COMP  
TRC: SUB 0,0 ; FIND INTENSITY.  
SUB 0,0  
LDA 2,10  
DIV  
LDA 1,5  
SUB# 0,1,SNR  
JMP LT  
LDA 1,97  
JMP CHKZ  
LT: LDA 1,95  
JMP COMP
W:      DSZ CNT
        JMP NXT
        JMP COMP

NXT:    LDA 2.10
        SUB 0.0
        DIV
        LDA 1.1
        LDA 2.0
        SUB# 0.1, SZR
        INC 2.2
        MOV 2.1
        LDB 3.2
        SBI 1.3
        LDA 0;SNOW
        SUB# 0.2, SZR
        JMP COMP
        ADDI 5.1
        JMP COMP

COMP:   LDA 0;TMP
        SUBZ# 0.1, SIZC
        STA 1;TMP
        DSZ CNT
        JMP ENC
        JMP FINI

; DATA AREA.
A00: .TXT "00"
A20: .TXT "20"

CNT:  0
 .1:  1
 .2:  2
 .3:  3
 .4:  4
 .5:  5
 .6:  6.
 .10: 10.
 .45: .45.
 .25: 25.
 .50: 50.
 .80: 80.
 .95: 95.
 .97: 97.
SPACE: 40
MINUS: 55
HAZE: 110
FOG: 106
DRZL: 114
RAIN: 122
SNOW: 133
TRW: 124
FZN: 132
SHW: 127
CON: 30060
COMMA: 26054
HOLD: 0
TMP: 0
OWP: )
FINI:
LDA 3, USP
LDA 2, TB, 3
LDA 1, COMMA
STA 1, 0, 2
LDA 1, TMP
SUB 0, 0
SUB 1, 0, SNR
JMP DONE
LDA 2, 10
LDA 0, 50
SUBZ 0, 1, SNR
JMP C1
LDA 0, 80
SUBZ 0, 1, SNR
JMP C2
L3:
LDA 0, 3
JMP PS
C1:
LDA 0, 25
SUBZ 0, 1, SNR
JMP L3
LDA 0, 45
SUBZ 0, 1, SNR
JMP L3
ADI 3, 1
SUB 0, 0
DIV
MOV 1, 0
JMP PS

; USE QUOTIENT FOR OW.
C2: SUB 0,0
DIV
LDA 3,OWP
ADD 0,3
LDA 0,0,3

PS!
LDA 1,CON
ADD 1,0
STA 0,HOLD
LDA 1,TMP
LDA 0,.1
LDA 2,.10
SUBZ 2,1,SNC
LDA 0,.2
LDA 2,.50
SUBZ 1,2,SNC
SUB 0,0
LDA 2,CON
ADD 2,0
ADD 3,USP
LDA 2,PSOWD,3
STA 0,0,2
LDA 0,HOLD
STA 0,1,2
LDA 1,TMP
SUB 0,0
LDA 2,.10
DIV
LDA 2,CON
ADD 2,1
ADD 1,0
LDA 2,.4
STA 2,EN,3
LDA 2,IB,3
STA 0,0,2
LDA 1,COMMA
STA 0,1,2

DONE: JSR 0,FRET
.END
; CONVERT A STRING OF INTEGER NUMBERS (<100 EACH) INTO A
; PACKED ASCII STRING.
MASC:  JSR  @.CPYL
       LDA  1,@LEN,3   ; GET # OF NUMBERS.
       STA  1,CNT     ; PUT IT IN LOCAL MEMORY.
       LDA  1,BUF,3   ; GET BUFFER ADDRESS.
       MOV  1,3       ; PUT IT IN AC3.
LOOP:  LDA  1,0,3    ; GET A VALUE.
       SUB  0,0       ; BE SURE AC0=0.
       LDA  2,.10     ; DIVISOR = 10.
       DIV
       ADDI 60,0      ; CONVERT TO ASCII.
       ADDI 60,1
       MOVZL 3,2      ; GET BYTE POINTER.
       STB  2,1       ; BUT BYTE IN BUFFER.
       INC  2,2       ; INCREMENT POINTER.
       STB  2,0       ; BUT SECOND BYTE IN BUFFER.
       INC  3,3       ; INCREMENT WORD POINTER.
       D SZ  CNT      ; DECREMENT COUNTER.
       JMP  LOOP
       JSR  @.FRET
;
; DATA AREA.
.10:  10.
CNT:  0

; CONVERT A SIGNED INTEGER INTO A SIGNED ASCII STRING.
MSND:  JSR  @.CPYL
       LDA  1,@IBUF,3  ; GET ADDRESS OF BUFFER.
       LDA  0,IBUF,3   ; CLEAR AC2.
       SUB  2,2        ; PUT INTO COUNTER.
       STA  2,CNT     ; SKIP COUNTER.
       STA  2,IS      ; MAKE AC3 A BYTE POINTER.
       MOVZL 0,3      ; PUT IN LOCAL MEMORY.
       STA  3,STAP    ; CHECK AC1 FOR SIGN, SKIP IF
       MOVL# 1,1,SNC
       JMP  POS       ; MAKE IT POSITIVE.
       NEG  1,1       ; GET THE SIGN IN AC2
       STB  3,MINUS   ; PUT SIGN IN BUFFER.
       ISZ  STAP      ; INCREMENT THE BYTE POINTER.
       ISZ  CNT       ; INCREMENT COUNTER.
       POS:  LDA  3, WBUF 26 ; SPACE FOR WORKING.
LOOP1:  LDA 0,0,3  ADD 2,0  STB 1,0  INC 1,1  SBI 1,3  ISZ CNT  DSZ IS  JMP LOOP1  LDA 3,COMMA  STB 1,3  LDA 2,CNT  INC 2,2  LDA 3,USP  STA 2,@N+3  JSR 0,FRET  

; CLEAR ACO.  
; INCREMENT IT FOR EACH DIGIT.  
; DIVISOR IS 10.  
; STORE REMAINDER.  
; INCREMENT POINTER.  
; IS VALUE < 10?  
; SAVE FINAL DIGIT.  
; INCREMENT THE COUNTER.  
; DESTINATION BYTE POINTER.  
; GET CONVERSION.  
; GET WORD.  
; MAKE IT ASCII.  
; STORE THE CHARACTER.  
; INCREMENT POINTER.  
; DECREMENT SOURCE.  
; INCREMENT COUNTER.  
; NOW DECREMENT IT!!!.  
; ADD A TRAILING COMMA.  
; GET COUNT IN AC2.  
; COUNT THE COMMA.  
; RESTORE STACK POINTER.  
; PUT VALUE IN ARGUMENT LIST.

; DATA AREA.  
.10:  10.  
.60:  60  
.COMMA:  54  
.MINUS:  55  
.STAP:  0  
.CNT:  0  
.IS:  0  
.WBUF: *.+1  
.BLK 5  
.END  
.TITL WW  
.ENT WW  
.EXTD ,CPYL,FRET  
.TXMT 1  
.NREL  

IB=-167  
N=-166  
PSOWD=-165  
FS,+3  
FS.
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