

NOAA Technical Memorandum NWS WR-170



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AN ENHANCED PLOTTER FOR SURFACE AIRWAYS OBSERVATIONS

Salt Lake City, Utah  
October 1981

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**U.S. DEPARTMENT OF  
COMMERCE**

/ National Oceanic and  
Atmospheric Administration

/ National Weather  
Service



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National Weather Service  
Western Region Headquarters  
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October 1981

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DEPARTMENT OF COMMERCE  
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Atmospheric Administration  
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Service  
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This publication has been reviewed  
and is approved for publication  
by Scientific Services Division,  
Western Region.

A handwritten signature in black ink, appearing to read "L. W. Snellman". The signature is written in a cursive style with a large, sweeping initial "L".

L. W. Snellman, Chief  
Scientific Services Division  
Western Region Headquarters  
Salt Lake City, Utah

## CONTENTS

	<u>Page</u>
List of Figures and Tables . . . . .	iv
I. General Information . . . . .	1
II. Application . . . . .	2
III. Procedures . . . . .	4

## FIGURES AND TABLES

	<u>Page</u>
Figure 1. Surface Aviation Observation plot produced by the enhanced plotter . . . . .	6
Figure 2. Examples of the single parameter plots available using the enhanced plotter . . . . .	7
Figure 3. Highlighting of significant weather by the enhanced plotter for the U.S. map background . . . . .	8
Figure 4. Examples of the plot files output by the enhanced plotter . . . . .	9
Table 1. Background and plotting switches for the SAO decoder and PLTSELECT . . . . .	5
Table 2. Sample procedure "SAO" for running the SAO decoder . . . . .	5
Table 3. Configuration of words 9-13 of the file SAOXXX for the various plot switches . . . . .	5

# AN ENHANCED PLOTTER FOR SURFACE AIRWAYS OBSERVATIONS

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## 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  
APPENDIX V-5 AFOS User's Guide For Meteorological and Hydrologic Operations. U.S. Department of Commerce June 1978.
- 2) Surface Airways Observation Decoder. Rich Thomas, NMC.
- 3) Master Station ID Directory File. Rich Thomas, NMC.

## 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 product 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 NMCGRPHSAO and altimeter setting only in product NMCGRPH56I 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 SDEDIT.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, contains 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  $\equiv$  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.

<u>Switch</u>	<u>Option</u>	<u>Description</u>
/B	2	United States map background for PLTSELECT
	3	North America map background for PLTSELECT
	02	United States map background for PLTGEN
/P	03	North America map background for PLTGEN
	Q	All parameters including pressure (default)
	B	All parameters including altimeter
	A	Altimeter setting only
	P	Sea level pressure only
	T	Temperature only
	D	Dew point only
	C	Pressure tendency (valid on synoptic times only)
W	Wind direction and speed barbs only	

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:DPØF:APL
RUN:@SAO@ 02/B B/P
RUN:@LCLNAM@
WAIT 6Ø
RUN:PLTSELECT 3/B P/P
RUN:@LCLSFC@

```

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

<u>Switch</u>	<u>Words 9-13 of SAOXXX</u>
Q	1 1 1 0 1
B	0 1 1 0 1
A	0 0 0 0 0
P	1 0 0 0 0
T	-1 1 0 0 0
D	-1 0 1 0 0
C	-1 0 0 0 1
W	-1 0 0 1 0

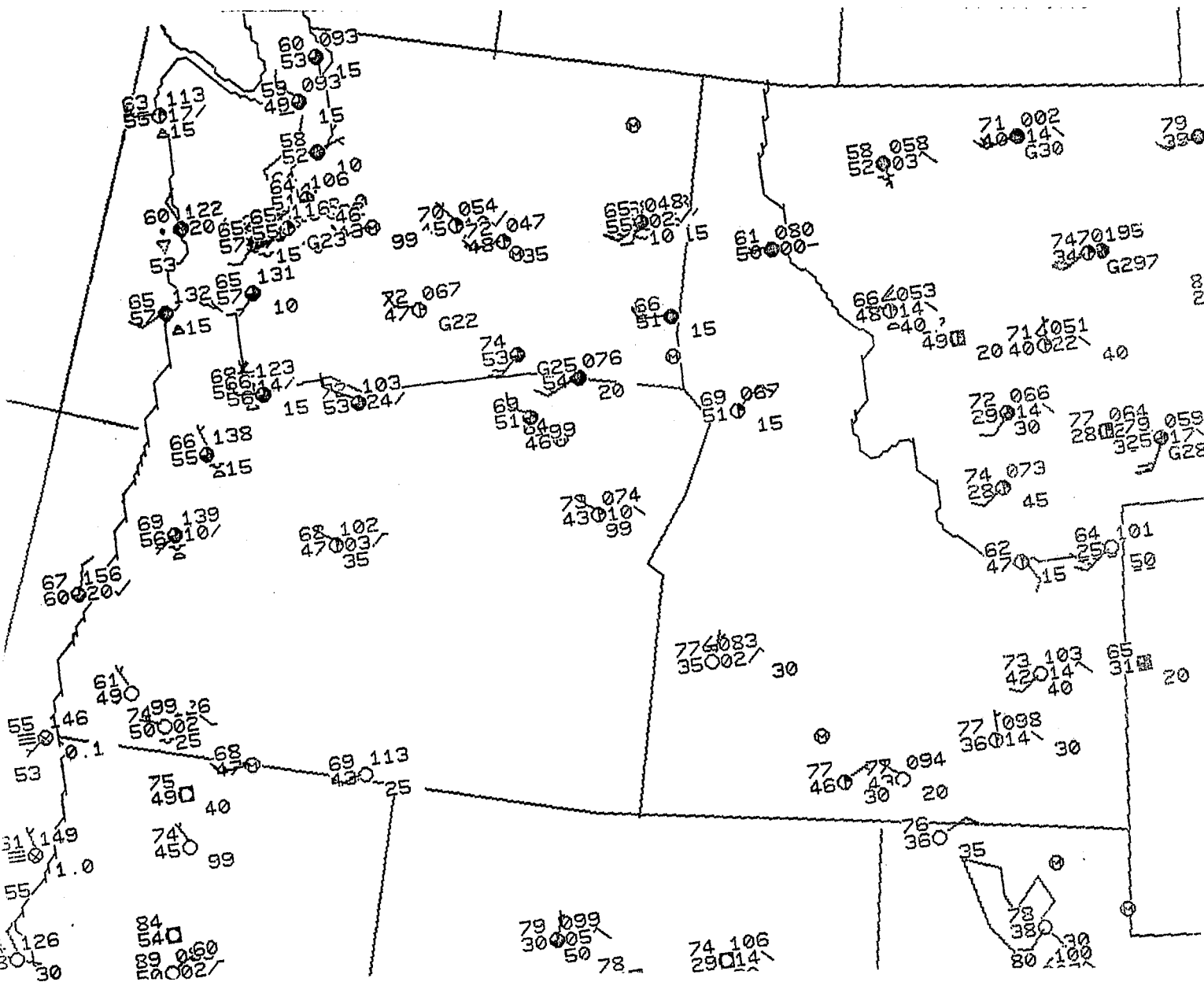


Figure 1: Surface Aviation Observation plot produced by the enhanced plotter. All parameters except visibility are in their correct locations. The comment field of the station model is used to plot precipitation, wind gusts, and visibility on a priority basis.

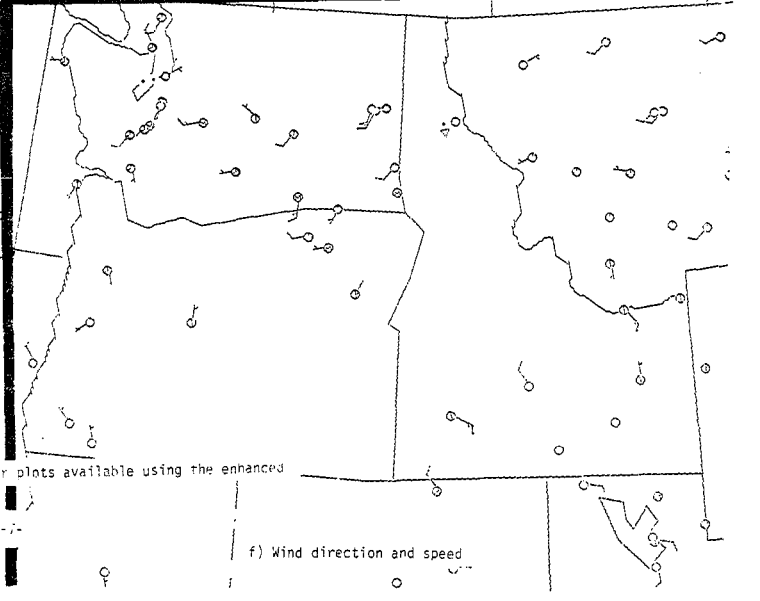
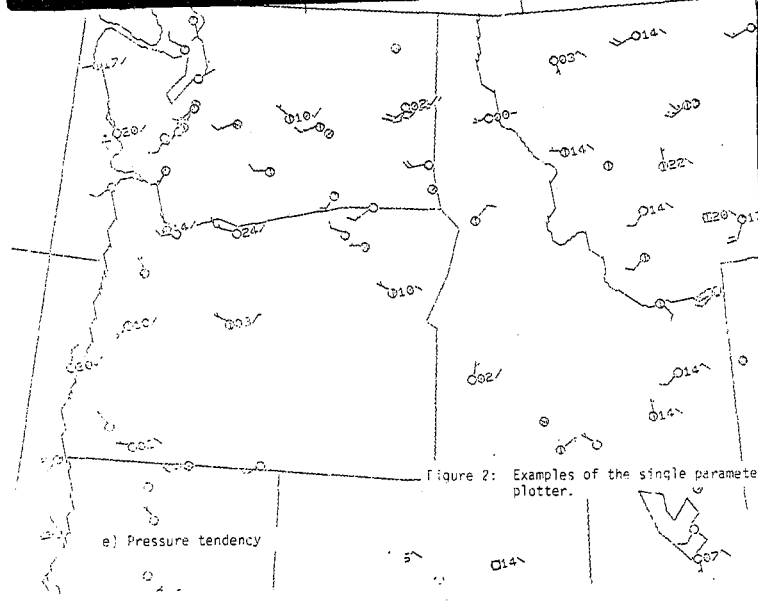
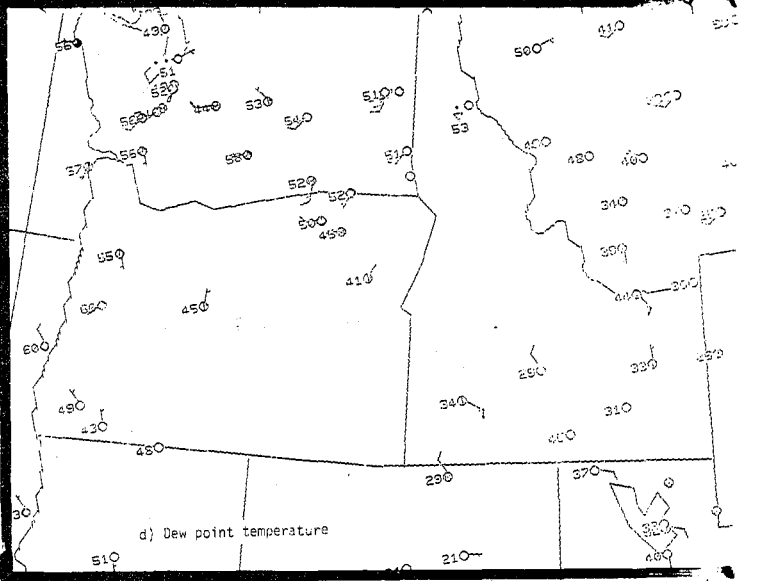
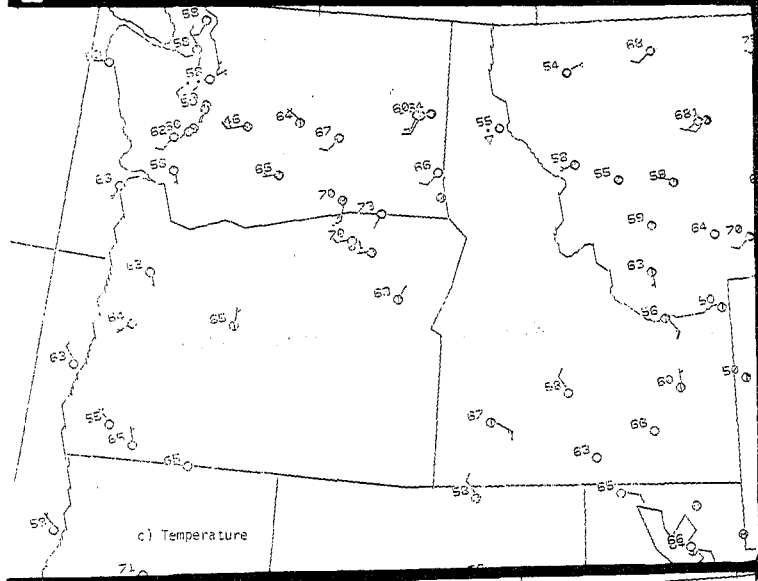
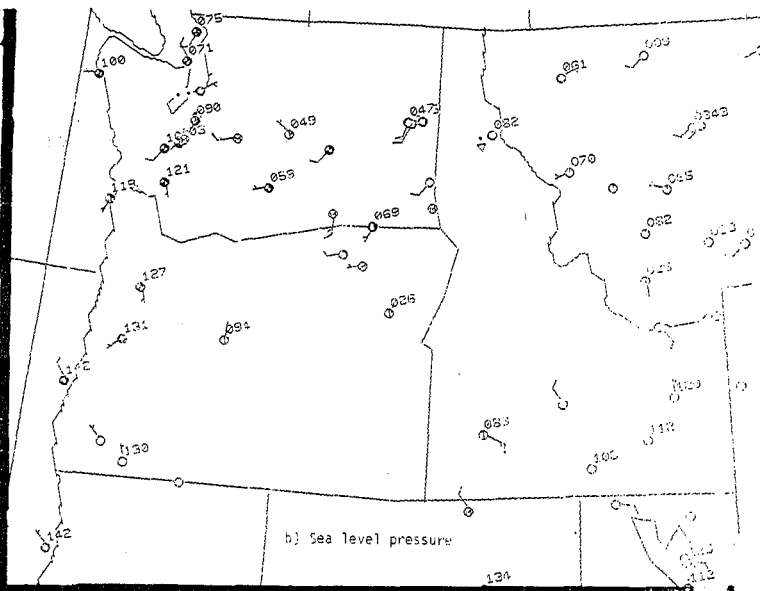
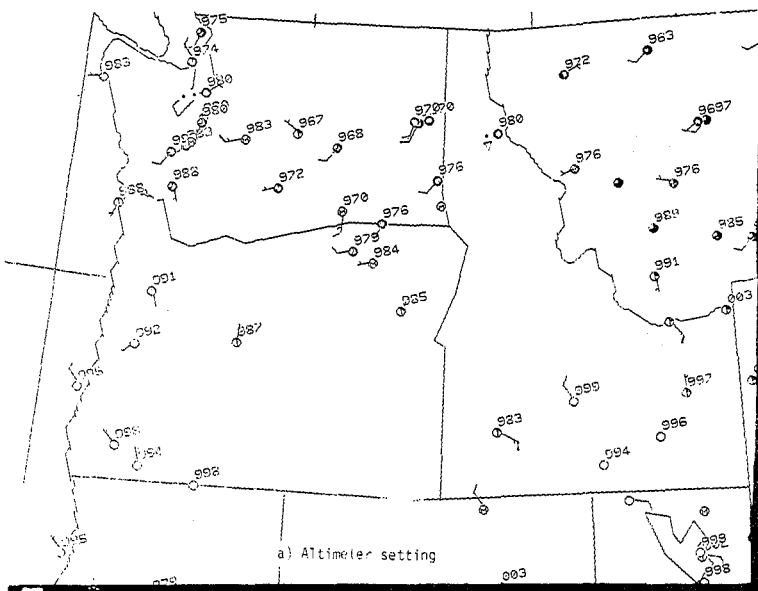


Figure 2: Examples of the single parameter plots available using the enhanced plotter.

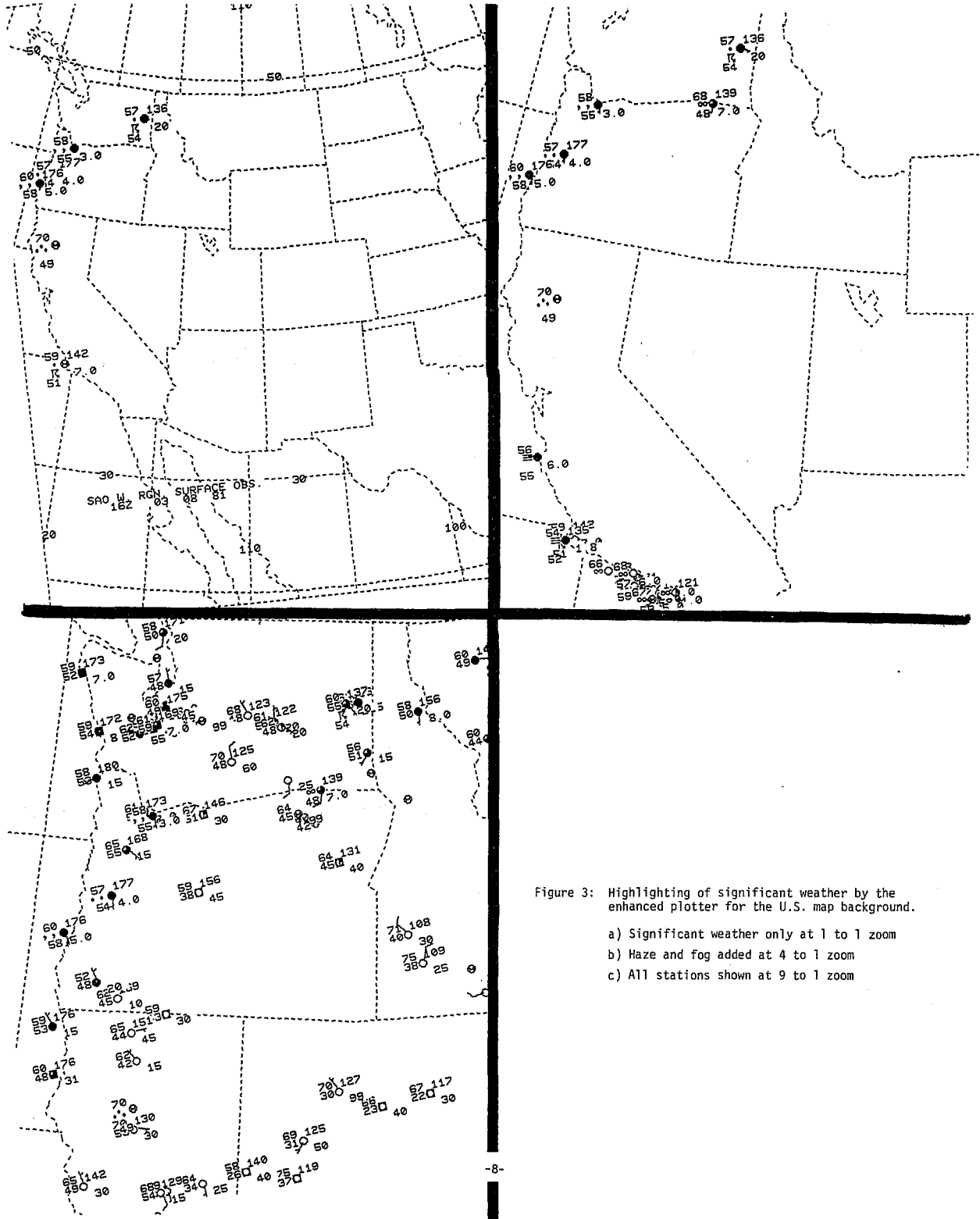


Figure 3: Highlighting of significant weather by the enhanced plotter for the U.S. map background.

- 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

```

NMCPLTSAO
NMCPLTSA0001010002048153640501800+0750+3000210208810000
119,290,10000Z,SAO W. RGN. SURFACE OBS.:
119,270,10000Z, 21Z 02 08 81 ;
450,938,200002,,4SV,0,32015,,84,40,,,,,35 ;
360,1030,200002,,B01,0,34011,126,83,33,,,12,8,100,,30 ;
437,966,200002,,BYI,0,30012,113,88,38,,,17,8,,30 ;
404,990,200002,,GNG,M,,,,,;
503,1005,200002,,IDA,0,20016,129,84,42,,,08,8,,40 ;
360,1168,200002,,LWS,M,,,,,;
486,941,200002,,MLD,0,23005,109,92,31,,,,,15 ;
367,1004,200002,,MUO,3,02003,118,90,29,,,14,0,,G14;
480,978,200002,,PIH,0,25011,122,87,37,,,12,7,100,,40 ;
409,1210,200002,,S06,6,23007,160,77,49,,,,,8,0 ;
305,1140,200002,,S80,M,,,,,;
411,968,200002,,TLF,3,30014,,,,,20 ;
736,953,200002,,4DG,0,24007,083,94,40,,,,,35 ;
567,952,200002,,BPI,M,25017,,83,25,,,,,;
613,1043,200002,,COD,3,02010,,85,45,,,,,75 ;
698,961,200002,,CPR,3,24012,076,95,24,,,19,7,200,,50 ;
757,874,200002,,CYS,3,14008,120,84,48,,,08,7,300,,60 ;
732,1030,200002,,GCC,3,12010,,89,47,,,,,20 ;
550,1004,200002,,JAC,3,25010,,81,35,,,,,20 ;

725,882,200002,,LAR,3,20008,110,86,25,,,17,7,,50 ;
617,960,200002,,LND,0,24012,078,93,17,,,10,7,200,,40 ;
628,971,200002,,RIW,3,20008,,93,22,,,,,40 ;
601,902,200002,,RKS,3,24010,122,83,27,,,17,7,,60 ;
670,908,200002,,RWL,3,23011,,86,35,,,,,60 ;
683,1051,200002,,SHR,3,01004,090,86,54,,,17,7,100,,60 ;
647,1014,200002,,WRL,3,01007,061,94,52,,,,,40 ;
810,826,200002,,AKO,0,20007,115,87,61,,,,,15 ;
715,699,200002,,ALS,6,24006,132,83,49,,,301,,50 ;
678,779,200002,,ASE,3,24008,,83,39,,,,,30 ;
760,802,200002,,BKF,3,09007,111,90,41,,,12,7,,70 ;
603,686,200002,,CEZ,3,00000,,88,,,,,60 ;
761,758,200002,,COS,6,08012,120,86,49,,,,,G17;
755,805,200002,,DEN,3,17010,096,92,39,,,14,8,101,,45 ;
638,677,200002,,DRO,3,00000,,87,59,,,,,75 ;
677,801,200002,,EGE,3,26005,106,90,44,,,29,7,,40 ;
613,777,200002,,GJT,3,20009,093,93,43,,,25,7,100,,99 ;
675,746,200002,,GUC,3,00000,,81,59,,,,,30 ;
809,720,200002,,LHX,6,10011,100,91,64,,,07,8,,35 ;
637,745,200002,,MTJ,3,22006,,89,51,,,,,40 ;
769,731,200002,,PUB,3,12016,092,95,59,,,14,8,,99 ;
777,679,200002,,TAD,3,13006,100,88,47,,,10,7,,40 ;
496,1159,200002,,3DU,3,29012,,70,46,,,,,20 ;

```

a) All parameters to be plotted.

```

NMCPLTSAO
NMCPLTSA000102000204815362050142500975016881
119,290,10000Z,SAO W. RGN. SURFACE OBS.:
119,270,10000Z, 16Z 03 08 81 ;
825,657,100002,,0,00000,,72,,,,,;
780,703,100002,,0,31008,,71,,,,,;
818,670,100002,,0,00000,,70,,,,,;
802,682,100002,,M,,,,,;
851,690,100002,,0,04005,,62,,,,,;
780,771,100002,,M,,,,,;
843,658,100002,,0,00000,,68,,,,,;
783,689,100002,,0,01011,,75,,,,,;
840,677,100002,,0,24004,,68,,,,,;
804,793,100002,,8,18004,,58,,,,,;
793,758,100002,,M,,,,,;
805,671,100002,,0,25012,,,,,;
960,664,100002,,0,10004,,70,,,,,;
804,663,100002,,M,23003,,63,,,,,;
906,709,100002,,0,27001,,71,,,,,;
949,668,100002,,3,29007,,70,,,,,;
979,625,100002,,0,35009,,71,,,,,;
966,703,100002,,0,14003,,77,,,,,;
875,689,100002,,0,00000,,62,,,,,;

962,629,100002,,0,11005,,73,,,,,;
909,667,100002,,0,33010,,69,,,,,;
914,673,100002,,0,00000,,72,,,,,;
901,638,100002,,6,29007,,72,,,,,;
935,641,100002,,0,12005,,72,,,,,;
942,713,100002,,3,06003,,72,,,,,;
924,694,100002,,0,00000,,73,,,,,;
954,560,100002,,0,36005,,69,,,,,;
921,586,100002,,M,,,,,;
937,561,100002,,M,,,,,;
1009,11353,100002,,0,18005,,81,,,,,;
958,532,100002,,0,00000,,68,,,,,;
939,577,100002,,3,32007,,77,,,,,;
980,589,100002,,3,33004,,82,,,,,;
981,566,100002,,0,18005,,75,,,,,;
978,598,100002,,0,01009,,82,,,,,;
919,526,100002,,0,00000,,73,,,,,;
938,588,100002,,0,00000,,70,,,,,;
973,611,100002,,0,07005,,81,,,,,;
980,563,100002,,3,00000,,77,,,,,;
906,576,100002,,3,13010,,81,,,,,;
937,561,100002,,3,00000,,65,,,,,;
933,609,100002,,0,00000,,72,,,,,;

```

b) Temperature only.

Figure 4: Examples of the plot files output by the enhanced plotter.

C \*\*\*\*\*

C  
C  
C

PLOTGEN.FR

C WESTERN REGION SAO PLOT-FILE GENERATOR. THIS PROGRAM READS THE SAODATA  
C FILE GENERZATED BY THE SAO-DECODER AND THE SAOXXX FILE CONTAINING  
C THE SWITCH INFORMATION. AN OUTPUT PLOT FILE NMCPLTSAO IS GENERATED.

C-----

NECESSARY SUBROUTINES.

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

C-----

DATA SET USAGE.

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

C-----

SWITCHES USED BY PLTGEN, ENTERED IN EITHER PLTSELECT OR SAO-DECODER.

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

C NOTE: ALL SINGLE PARAMETER PLOTS INCLUDE THE WIND DIRECTION AND SPEID  
C AND SKY COVER.

C-----

C ANDREW J. SPRY  
C WESTERN REGION SSD  
C 6/23/81

C-----

- C PARAMETERS NECESSARY FOR USE OF STATION DIRECTORY FILE STDIR.MS
- C PARAMETER NR ; NUMBER OF RECORDS IN STDIR.MS
- C PARAMETER LR ; LENGTH OF EACH RECORD IN BYTES.
- C PARAMETER IS ; STARTING POINT OF FIRST RECORD.
- C PARAMETER IFLDP=1 ; POINTER TO FIELD IN EACH RECORD.
- C PARAMETER IFLD=6 ; SIZE IN BYTES OF THE TARGET FIELD.

C \*\*\*\*\*



```
INTEGER BS,SW(8),IBUF(48),ITEST(3),IC1(33),FLAG,IPAR(3)
INTEGER IAD(2),MP(5),IEND(4),PSOWD(4),INA(10)
```

```
C
COMMON /OUT/ INA,IPAR
COMMON /ONE/ IBUF,IC1,IEND,PSOWD
COMMON /SWTCHS/ SW
```

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

```
C
DATA IBUF/"NMCPLTSAD000",177777K,177777K,2400K,142600K/
DATA IBUF(11)/"NMCPLTSAD001010002048153640501800+0750+3000 "/
DATA IBUF(33)/0,0,0,0,"0000",6412K,"119,290,10000Z,SAO"/
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
C OPEN THE SWITCH FILE SAOXXX AND READ IN THE SWITCH INFORMATION.
```

```
CALL GCHN(ICHN,IER)
CALL OPENN(ICHN,"SAOXXX",0,IER)
N=16
CALL RDS(ICHN,SW,N,IER)
BS=SW(6) ; SAVE THE BACKGROUND NUMBER.
CALL RDS(ICHN,SW,N,IER)
CALL KLOSE(ICHN,IER)
```

```
C
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
C OPEN THE FILES GP., SAODATA, AND STDIR.
```

```
CALL DFILW("GP.",IER)
CALL CFILW("GP.",2,IER)
CALL GCHN(LCHN,IER)
CALL OPENN(LCHN,"GP.",0,IER)
CALL GCHN(ICHN,IER)
CALL OPENN(ICHN,"SAODATA",0,IER)
CALL GCHN(KCHN,IER)
CALL OPENN(KCHN,"STDIR.MS",0,IER)
```

```
C
C READ IN THE FIRST THREE PARAMETERS FOR THE STDIR.MC FILES.
```

```
NBYTES=6
CALL RDS(KCHN,IPAR,NBYTES,IER)
IAD(1)=0
IAD(2)=0
CALL SPOS(KCHN,IAD,IER) ; RESET POINTER TO START.
```

```
C
C READ IN TIME, COMPLETE HEADER (AFDS) AND LEGEND.
```

```
NBYTES=8
CALL RDS(ICHN,MP,NBYTES,IER)
CALL ERROR(IER,"5")
```

```

C MOVE THE TIME AND DATE TO IBUF AND CONVERT TO ASCII ( NOTE: THIS PUTS
C 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
      IBUF(17)="02"
      DO 2 M=1,10
      IBUF(M+22)=INA(M)
2      CONTINUE
3      CALL WRS(LCHN,IBUF,63,IER)
      CALL WRS(LCHN,IBUF(33),94,IER)
C
C DO EACH LINE OF GP FILE IN A LOOP.
      DO 1 I=1,300
      NBYTES=96
C
C READ IN A RECORD FROM SAODATA (LENGTH IS 48 WORDS.)
      CALL RDS(ICHN,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          ; UNRECOVERABLE ERRORS.
C
C ENCODE THE CURRENT WEATHER NOW AND GET THE PROPER PSOWD.
C*****
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 INTERPERET IT
C***** AS WEATHER.*****
C*****
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*****
C
C USE BNSH TO LOCATE THE X,Y COORDINATES OF STATION, LOCATE THEM,
C CONVERT TO ASCII THEN WRITE THEM TO CP.
8      IBUF(3)=20040K
      CALL BNSCH(KCHN,NR,LR,IS,IFLDP,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
C PUT FLAG/INDICATOR GROUP AND STATION NAME IN GP.
      CALL OUTPUT(LCHN,PSOWD,8,0,IER)
      N=3
      IF(BS,EQ,2) N=0 ; FOR N. AM. NO ID IS INCLUDED.
      CALL OUTPUT(LCHN,IBUF,N,1,IER)

C
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=ISHFT(N,8)+54K
      CALL OUTPUT(LCHN,N,2,0,IER)

C
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)
12     CALL OUTPUT(LCHN,MP,N,IND,IER)

C
C GENERATE LAST THREE DIGITS OF PRESSURE IN ASCII AND PUT IN GP.
      IF(SW(1)) 54,53,52
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(IBUF(29).NE.-99.AND.SW(2).NE.0) GO TO 57
      MP(1)=',,'
      N=1
      GO TO 59
57     MP(1)=IBUF(29)
      CALL MSND(MP,N)
59     CALL OUTPUT(LCHN,MP,N,IND,IER)
      IF(IBUF(30).NE.-99.AND.SW(3).NE.0) GO TO 58
      MP(1)=26000K
      N=1
      GO TO 60
58     MP(1)=IBUF(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,IBUF(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((IBUF(42).NE.-99).AND.(IBUF(41).NE.-99)) GO TO 70
69     IBUF(41)=',,'
      N=2
      GO TO 76
70     MP(1)=IBUF(42)
      CALL MSND(MP(1),N)
      CALL OUTPUT(LCHN,MP(1),N,IND,IER)
      IBUF(41)=(IBUF(41)*400K)+30054K
76     CALL OUTPUT(LCHN,IBUF(41),2,IND,IER)
      C
      C ENCODE THE CLOUD TYPE WITH CT.
      IF(FLAG.LT.3) GO TO 100
      CALL CT(IBUF(44),N)
      CALL OUTPUT(LCHN,IBUF(44),N,IND,IER)
      C
      C PRECIP AMOUNT.
      IND=-1           ; INDICATES A ;<CR><LF>.
      IF(IBUF(43).LT.0) GO TO 79
      MP(1)=IBUF(43)
      CALL MSND(MP,N)
      CALL OUTPUT(LCHN,MP,N,IND,IER)
      GO TO 1
      C

```

```

C PUT THE VISIBILITY IN THE COMMENT FEILD.
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
C PUT GUSTS IN COMMENT FIELD (IF AVAILABLE).
71   MP(1)=43400K
      CALL MSND(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
C END LINE WITH ;<CR><LF>.
100  CALL OUTPUT (LCHN,MP,0,-1,IER)
C
C
1    CONTINUE
50   CONTINUE
C
C WRITE THE END OF FILE AND CLOSE THE FILES.
      CALL WRS(LCHN,IEND,8,IER)
      CALL KLOSE(LCHN,IER)
      CALL KLOSE(ICHN,IER)
      CALL KLOSE(KCHN,IER)
      CALL FSTORE('GP',0,IER)
      CALL FORKP('SAO','NMCPLTSAO',IER)
      STOP
      END

```

```

C   PROGRAM: PLTSELECT 6/26/81 ANDERSON WRH/SSD
C   ALLOWS THE INPUT OF SWITCHES TO PLOTGEN WITHOUT THE RUNNING
C   OF THE SAODECODER.

```

```

C   B SWITCH (MAP BACKGROUND):

```

```

C       2- N. AMERICAN
C       3- U.S. (DEFAULT)

```

```

C   P SWITCH

```

```

C       Q- ALL WITH PRESSURE (DEFAULT)
C       B- ALL WITH ALTIMETER SETTING
C       A- ALTIMETER SETTING
C       P- PRESSURE
C       C- PRESSURE TENDENCY
C       W- WINDS
C       D- DEW POINT
C       T- TEMPERATURE

```

```

C   VARIABLES:

```

```

C       IBUF- INPUT--OUTPUT ARRAY
C       IPS- SWITCH P VALUE ARRAY
C       KPS- ASCII VALUES FOR SWITCH P SEARCH
C       DIMENSION IBUF(15),IDAT(7),JBUF(14),ISW(2),IPS(5),KPS(5)
C       EXTERNAL ISWSET
C       COMMON/FOUR/KPS,IPS
C       DATA KPS/80,84,68,87,67/
C       DATA IPS/1,1,1,0,1/

```

```

C
    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 KLOSING ICHN")
    GO TO 20
C
    CREATING SAOXXX FOR NONEXISTENT FILE
10    CALL CREAT('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,JBUF)
    IF(ISWSET(ISW,'R'))GO TO 60
    IF(ISWSET(ISW,'P'))GO TO 70
    GO TO 40
C
    P SWITCH DECISIONS
70    IF(JBUF(1).EQ.81)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,"ERR 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('PLTGEN.SV')
    STOP
    END

```

```

C      SUBROUTINE VV.FR
      SUBROUTINE VV(IVV,MP,N)
      DIMENSION MP(3)

C
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 10KM.
4     IF(IDIS.GE.800) IDIS=990
      M=IDIS/10
      IF(M.LT.10) GO TO 7          ; VISIBILITY IN TENTHS OF KM.
C THE VISIBILITY IS GREATER THAN TEN 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 MSND(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((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,
1 IAD,IC1,IC2,IC3,IC)
C
C BINARY SEARCH ROUTINE:
C
C PROGRAMMER - RICH THOMAS SXE,ISL,SDO 11/79
C
C ICHN=CHANNEL WHICH FILE HAS BEEN OPENPED 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 WORDS
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 DSUB(D2,D2,IAD1)
C CALL DMPY(D1,NREC,LREC)
C CALL DSUB(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(IC1(IFLDP),ITEST,IFLD,IER1)
C IF(IER1.GT.1)GO TO 100
C CALL BCOMP(IC2(IFLDP),ITEST,IFLD,IER2)
C IF(IER2.NE.2)GO TO 125

```



```

5 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+1
  CALL DMPY(D1,INC,LREC)
  CALL DADD(IAD3,IAD1,D1)
  CALL SPOS(ICHN,IAD3,IEP)
  CALL ERROR(IEP,'I5')
  CALL RDS(ICHN,IC3,LREC,IER)
  CALL ERROR(IEP,'I6')
  CALL BCOMP(IC3(IFLDP),ITEST,IFLD,IER3)
  IF(IEP3.EQ.1)GO TO 50
  IF(IEP3.EQ.2)GO TO 60
  IF(IEP3.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(IEP1.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(IEP2.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(IEP3,'IER3')
  IEP=2
  CALL ERROR(IEP,'TOO MANY RECORDS IN FILE')
  STOP
  END

```

```

C*****
C
C      OUTPUT.FR
C
C OUTPUT IS A UTILITY SUBROUTINE FOR USE BY PLOTGEN.  IT OUTPUTS THE
C INDIVIDUAL ASCII FIELDS TO THE FILE WITH THE DESIRED TRAILING CHARACTER.
C THE CHOICE OF ",", ";", OR NOTHING IS SELECTED BY AN INDICATOR FLAG.
C-----
C
C              ARGUMENTS
C      ICHN  - CHANNEL NUMBER TO OUTPUT FILE.
C      IBUF  - ARRAY CONTAINING THE STRING.
C      N     - LENGTH OF STRING IN BYTES.
C      IND   - INDICATOR FLAG.
C      IER   - ERROR RETURN.
C-----
C
C              FLAG VALUES
C      IND = -1 - ADD A SEMI COLON ";".
C           = 0 - ADD NOTHING.
C           = 1 - ADD A COMMA ",".
C-----
C      ANDREW J. SPRY
C      WESTERN REGION SSD
C      6/23/81
C*****
C      SUBROUTINE OUTPUT(ICHN,IBUF,N,IND,IER)
C
C      DIMENSION IBUF(1),ISEMI(2)
C
C      COMMON /ENDOF/ ISEMI
C
C      DATA ISEMI/35415K,5000K/
C
C CHECK THE TRAILER AFTER OUTPUTTING 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 @CPYL
SUB 0,0
ESTA 0,TMP ; GET RID OF OLD VALUE.
ADI 2,0
STA 0,@N,3
ESTA 0,CNT

LDA 2,PSOWD,3
LDA 0,A20 ; PUT IN DEFAULT VALUES FOR NO WX.
STA 0,0,2
LDA 0,A00
STA 0,1,2
LDA 0,IB,3 ; GET ADDRESS.
ADI 4,0 ; ADDRESS OF END OF STRING.
MOVOL 0,3 ; MAKE IT A BYTE POINTER.
ELDA 2,.10 ; SIZE OF STRING.

ESTA 2,CNT ; SET UP COUNTER.

ENC: LDB 3,2 ; GET A CHARACTER.
SBI 1,3 ; MOVE POINTER.
ELDA 0,SPACE ; IS IT A SPACE???
```

```
SUB# 2,0,SNR
JMP @ADRF
LDA 1,.3 ; MODERATE DEFAULT.
ELDA 0,MINUS ; CHECK FOR LIGHT.

SUB# 0,2,SZR
JMP PLUS ; NO MATCH.
LDA 1,.1 ; VALUE FOR LIGHT.
JMP STUP
```

```
ADRF: FINI
PLUS: SBI 2,0 ; CHECK FOR HEAVY.
SUB# 0,2,SZR
JMP MAIN ; NO MATCH
LDA 1,.5 ; VALUE FOR HEAVY.

STUP: DSZ CNT
LDB 3,2
SBI 1,3 ; MOVE POINTER.

MAIN: LDA 0,HAZE ; HAZE CHECK.
SUB# 0,2,SNR
JMP HZE ; GO TO HAZE TREATMENT.
LDA 0,FOG ; CHECK FOR FOG.
SUB# 0,2,SNR
JMP FILL ; TREATMENT FOR FOG.
LDA 0,.50 ; VALUE FOR DRIZZLE.
```

```

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

```

```

W:      DSZ      CNT
        JMP      NXT
        JMP      COMP
NXT:    LDA      2,.10
        SUB      0,0
        DIV
        LDA      1,.1           ; IS IT LIGHT.
        LDA      2,.80
        SUB#     0,1,SZR       ; IF NOT MODIFY.
        INC      2,2
        MOV      2,1
        LDB      3,2           ; IS IT SNOW OR RAIN.
        SBI      1,3           ; MOVE POINTER.
        LDA      0,SNOW        ; CHECK FOR SNOW.
        SUB#     0,2,SZR
        JMP      COMP
        ADDI     5,1           ; MODIFY.

        JMP      COMP
COMP:    LDA      0,TMP
        SUBZ#    0,1,SZC
        STA      1,TMP         ; HOLD IT
        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: 123  
 TRW: 124  
 FZN: 132  
 SHW: 127  
 CON: 30060  
 COMMA: 26054  
 HOLD: 0  
 TMP: 0  
 QWF: .

2  
 0  
 3  
 0  
 4  
 2  
 2

```

FINI: LDA 3,USP
      LDA 2,IB,3
      LDA 1,COMMA
      STA 1,0,2
      LDA 1,TMP
      SUB 0,0
      SUB# 1,0,SNR
      JMP DONE
      LDA 2,.10 ; VALUE FOR DIVIDE.
      LDA 0,.50
      SUBZ# 0,1,SNC
      JMP C1 ; LESS THAN 50 IS EASY.
      LDA 0,.80
      SUBZ# 0,1,SNC
      JMP C2 ; BETWEEN 50 AND 80 USE TABLE.
L3: LDA 0,.3 ; THIS VALUE FOR >80.
    JMP PS
C1: LDA 0,.25
    SUB# 0,1,SNR ; 25 IS ONLY STAND OUT.
    JMP L3
    LDA 0,.45
    SUB# 0,1,SNR
    JMP L3
    ADI 3,1
    SUB 0,0
    DIV
    MOV 1,0 ; USE QUOTENT FOR QW.
    JMP PS
  
```

```

C2:   SUB    0,0
      DIV
      LDA    3,OWP          ; POINTER FOR OW.
      ADD    0,3
      LDA    0,0,3
PS:   LDA    1,CON
      ADD    1,0
      STA    0,HOLD
      LDA    1,TMP          ; GET VALUE AND FIND PS OF PSOWD.
      LDA    0,.1
      LDA    2,.10
      SUBZ#  2,1,SNC        ; IS IT LESS THAN 10?
      LDA    0,.2
      LDA    2,.50
      SUBZ#  1,2,SNC        ; IS IT GREATER THAN 50?
      SUB    0,0
      LDA    2,CON          ; CONVERSION.
      ADDS   2,0
      LDA    3,USP          ; GET STACK POINTER.
      LDA    2,PSOWD,3     ; ADDRESS OF ARRAY.
      STA    0,0,2
      LDA    0,HOLD
      STA    0,1,2
      LDA    1,TMP
      SUB    0,0
      LDA    2,.10          ; DIVIDE FOR CONVERSION.
      DIV
      LDA    2,CON
      ADDS   2,1            ; CONVERT AND SWAP BYTES.
      ADD    1,0
      LDA    2,.4           ; NUMBER OF BYTES RETURNED.
      STA    2,@N,3
      LDA    2,IB,3
      STA    0,0,2
      LDA    1,COMMA
      STA    1,1,2
DONE: JSR    @.FRET
      .END

```

```

.TITL MASC
.ENT MASC
.EXTD .CPYL,.FRET
.NREL

```

```

;
BUF=-167
LEN=-166
FS.=2
FS.

```

```

; 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 ; PUT BYTE IN BUFFER.
      INC 2,2 ; INCREMENT POINTER.
      STB 2,0 ; PUT SECOND BYTE IN BUFFER.
      INC 3,3 ; INCREMENT WORD POINTER.
      DSZ CNT ; DECREMENT COUNTER.
      JMP LOOP
      JSR @,FRET

```

```

; DATA AREA.

```

```

.10: 10.
CNT: 0
      .END
      .TITL MSND
      .ENT MSND
      .EXTD .CPYL,.FRET
      .NREL

```

```

;
IBUF=-167
N=-166
FS.=2
FS.

```

```

; 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 N.
      MOVL# 1,1,SNC ; MAKE IT POSITIVE.
      JMP POS ; GET THE SIGN IN AC2
      NEG 1,1 ; PUT SIGN IN BUFFER.
      LDA 2,MINUS ; INCREMENT THE BYTE POINTER.
      STB 3,2 ; INCREMENT COUNTER.
      ISZ STAP ; SPACE FOR WORKING.
      ISZ CNT
POS: LDA 3,WBUF

```



```

LOOP1:  SUB      0,0          ; CLEAR ACO.
        ISZ      IS          ; INCREMENT IT FOR EACH DIGIT.
        LDA      2,.10       ; DIVISOR IS 10.
        DIV
        STA      0,0,3       ; STORE REMAINDER.
        INC      3,3         ; INCREMENT POINTER.
        SUBL#    2,1,SNC     ; IS VALUE < 10?
        JMP      LOOP
        STA      1,0,3       ; SAVE FINAL DIGIT.
        ISZ      IS          ; INCREMENT THE COUNTER.
        LDA      1,STAP      ; DESTINATION BYTE POINTER.
        LDA      2,.60       ; GET CONVERSION.
LOOP1:  LDA      0,0,3       ; GET WORD.
        ADD      2,0         ; MAKE IT ASCII.
        STB      1,0         ; STORE THE CHARACTER.
        INC      1,1         ; INCREMENT POINTER.
        SBI      1,3         ; DECREMENT SOURCE.
        ISZ      CNT         ; INCREMENT COUNTER.
        DSZ      IS         ; NOW DECREMENT IT!!!.
        JMP      LOOP1
        LDA      3,COMMA     ; ADD A TRAILING COMMA.
        STB      1,3
        LDA      2,CNT       ; GET COUNT IN AC2.
        INC      2,2         ; COUNT THE COMMA.
        LDA      3,USP       ; RESTORE STACK POINTER.
        STA      2,@N,3     ; PUT VALUE IN ARGUMENT LIST.
        JSR      @.FRET

```

```

;
; 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
        .TXTM   1
        .NREL

```

```

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

```

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