NOAA Eastern Region Computer Programs
and Problems NWS ERCP -   No. 20

AFOS HURRICANE PLOTTER

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SCIENTIFIC SERVICES DIVISION
Eastern Region Headquarters
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**U.S. DEPARTMENT OF
COMMERCE** / National Oceanic and
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Service

National Weather Service, Eastern Region Computer Programs and Problems

The Eastern Region Computer Programs and Problems (ERCP) series is a subset of the Eastern Region Technical Memorandum series. It will serve as the vehicle for the transfer of information about fully documented AFOS application programs. The format ERCP - No. 1 will serve as the model for future issuances in this series.

1   An AFOS version of the Flash Flood Checklist. Cynthia M. Scott, March 1981.   (PB81 211252).

2   An AFOS Applications Program to Compute Three-Hourly Stream Stages. Alan P. Blackburn, September 1981. (PB82 156886).

3   PUPPY (AFOS Hydrologic Data Reporting Program). Daniel P. Provost, December 1981. (PB82 199720).

4   Special Search Computer Program. Alan P. Blackburn, April 1982. (PB83 175455).

5   Conversion of ALEMBIC$ Workbins. Alan P. Blackburn, October 1982. (PB83 138313).

6   Real-Time Quality Control of SAOs. John A. Billet, January 1983. (PB83 166082).

7   Automated Hourly Weather Collective from HRR Data Input. Lawrence Cedrone, January 1983   (PB83 167122).

8   Decoders for FRH, FTJ and FD Products. Cynthia M. Scott, February 1983. (PB83 176057).

9   Stability Analysis Program. Hugh M. Stone, March 1983. (PB83 197947).

10   Help for AFOS Message Comp. Alan P. Blackburn, May 1983. (PB83 213561).

11   Stability and Other Parameters from the First Transmission RAOB Data. Charles D. Little, May 1983. (PB83 220475).

12   TERR, PERR, and BIGC: Three Programs to Compute Verification Statistics. Matthew R. Peroutka, August 1983. (PB84 127521).

13   Decoder for Manually Digitized Radar Observations. Matthew R. Peroutka, June 1983. (PB84 127539).

14   Slick and Quick Data Entry for AFOS Era Verification (AEV) Program. Alan P. Blackburn, December 1983. (PB84 138726).

15   MDR--Processing Manually Digitized Radar Observations. Matthew R. Peroutka, November 1983. (PB84 161462)

16   RANP: Stability Analysis Program. Hugh M. Stone, February 1984.(PB84 16144

17   ZONES. Gerald G. Rigdon, March 1984. (PB84 174325)

18   Automated Analysis of Upper Air Soundings to Specify Precipitation Type. Joseph R. Bocchieri and Gerald G. Rigdon, March 1984. (PB84 174333)

NOAA EASTERN REGION COMPUTER PROGRAMS AND PROBLEMS - No. 20

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I. General Information

A. Summary

This program was developed to aid Weather Service personnel in the rapid and accurate plotting of tropical storm positions. The program will plot the past, present, and forecast positions of tropical storms on a GDM.

B. Environment

The program is AFOS compatible and is written in Data General FORTRAN IV.

C. References

Egger, Thomas J., 1983: Assembly Language Graphics Library (EGR1.LB) with FORTRAN Interfacing. NWS Central Region Computer Programs and Problems NWS CRCP - No. 9, National Weather Service, Kansas City, MO.

Peroutka, Matthew, 1981: Accessing the AFOS Database. NWS Western Region Computer Programs and Problems NWS WRCP - No. 23, National Weather Service, Salt Lake City, UT.

Sunkel, Warren E., 1983: The Topeka Library (TOP.LB). NWS Central Region Computer Programs and Problems NWS CRCP - No. 7, National Weather Service, Kansas City, MO.

II. Application

A. Program Description

The program plots the track of tropical storms by reading the data from an AFOS product via the subroutine AFREAD (Peroutka, 1981). This input product is designed to be edited every 6 hours as position updates and forecasts are issued by NHC. Interactive graphic routines (Egger, 1983) are used to plot the data so no AFOS graphic product is generated.

The subroutine FLTCVT (Peroutka, 1981) is used for data conversion. A minor change was made to FLTCVT to allow error processing. If an error is detected, the variable is given the value of 999999 instead of halting the program. PLTA is a subroutine used for reading the command line to obtain the desired console and screen on which the data will be plotted. If the switches are not used, the program will default to console 0 and screen 1.

1

Subroutine KFILL (Sunkel, 1983) is used to complete the CCC part of the AFOS header. The NNNXXX is WRKHUR.

Special library files used were EGRI.LB, AG.LB, TOP.LB, BG.LB, UTIL.LB and AFOSE.LB.

B. Machine Requirements

The disk storage space is about 26 blocks and the program runs in about 20 seconds.

C. Data Base

One AFOS product, CCCWRKHUR, is required to run the program. This is used to input the storm positions to be plotted.

III. Procedures

A. Initiation of Program

After the input product, CCCWRKHUR, is completed (see III B.) and entered on the ADM, call up the map background (BØ1, BØ2, BØ3) on which the storm track is to be plotted. The map background should be displayed on the GDM where the program will be instructed to plot the storm track. The program may then be executed by one of the following commands:

a. RUN:HUR
b. RUN:HUR/D
c. RUN:HUR N/C M/S

With no switches used the program will produce a plot of the storm path with each position labeled with the line number in WRKHUR. The forecast positions have a letter before the hour group (Figure 1).

With the /D switch used the program will produce a plot of the storm path with each position labeled with the date and time. The forecast positions have a letter following the time (Figure 2).

With the /C and /S switches used the plotting will occur at the GDM indicated by N and M. N is the console number and M is the screen number you want the data to be plotted on. It should be the same console and screen on which the map background is displayed. If switches are not used, the program will default to console Ø, screen 1. The /C and /S switches may be used with or without the /D switch.

2

B. Input Required

The format of the input (Figure 3) is fixed and must be followed very closely. The first line following the WOUS∅∅ line has the following format:

NNN XX,M

NNN is the name of the storm, up to 20 characters.

XX is the type of storm--HU (hurricane), TS (tropical storm), TD (tropical depression), LO (low pressure) at the current time.

M is the map background 1, 2, or 3 (B∅1, B∅2, B∅3).

The following lines will contain information about the past and present positions of the storm. The earliest position should be on the first line and the most current position should be in the last line. Format for these lines is:

nn-dd/ttZ xx,lala.lala,lololo.lolo where

nn is the number of positions that have been reported for the storm. The first line would be the first reported position, and the second line would be the second reported position and so on. Numbers 1-9 __must__ be entered as ∅1, ∅2, etc.

dd/ttZ is the Zulu date and time.

xx is the type of storm--HU, TS, TD, LO at the time of dd/ttZ. If TS, TD or LO is not entered the program will plot the hurricane symbol by default.

lala.lala is the latitude in hundredths of degrees (34.1∅).

lololo.lolo is the longitude in hundredths of degrees (∅75.25).

__NOTE__--leading and trailing zeros must be inserted when entering latitude and longitude.

After the current position has been entered, type END on the next line. This is the end of the observed data.

On the next line after END, begin entering data on the forecast track of the storm. The earliest forecast position should be on the first line after the END. The format for the data is:

Fhh-dd/ttZ xx,lala.lala,lololo.lolo   where

hh is the number of hours the forecast position is for. For example, a 12 would be entered for a 12 hour forecast position. The program is capable of plotting more than one forecast track. To plot multiple forecast tracks, replace the F with any other letter to identify the different storm tracks.

dd/ttZ is the valid time of the forecast.

xx is the same as above

lala.lala and lololo.lolo are the same as above.

After the last forecast position has been entered, type END on the next line and enter the product into the AFOS database.

As position updates and new forecasts are issued, the CCCWRKHUR product should be edited to include the new data for updated plots.

C. Output

The output will be directly on the GDM (not stored in the database) contained in the command line. The easiest way to obtain a hard copy of the data is to print the input product (CCCWRKHUR) and directly below that print the graphic.

D. Cautions and Restrictions

If the program runs with no detected errors the error message JOB HUR PLOT - BØX COMPLETED will flash at the originating ADM. X is the map background the data was plotted on.

If the program detects an error, the error message JOB HUR PLOT ABORTED - ERROR CONDITION -SEE DASHER- will flash at the originating ADM. This condition halts processing and causes one of the following error messages to be printed on the Dasher.

1. BAD KEY-AFREAD -- A bad key, re-enter the input product and try again.

2. ERROR FROM AFREAD -- E: the input product and try again.

3. IMPROPER FORMAT -- Latitude or longitude are not entered correctly. Correct the errors and try again.

4. ILLEGAL MAP BACKGROUND -- Map backgrounds must be either 1, 2, or 3. Correct the errors and try again.

5. ILLEGAL LAT/LON -- Probably latitude or longitude out of bounds for the map background used. Correct the errors and try again.
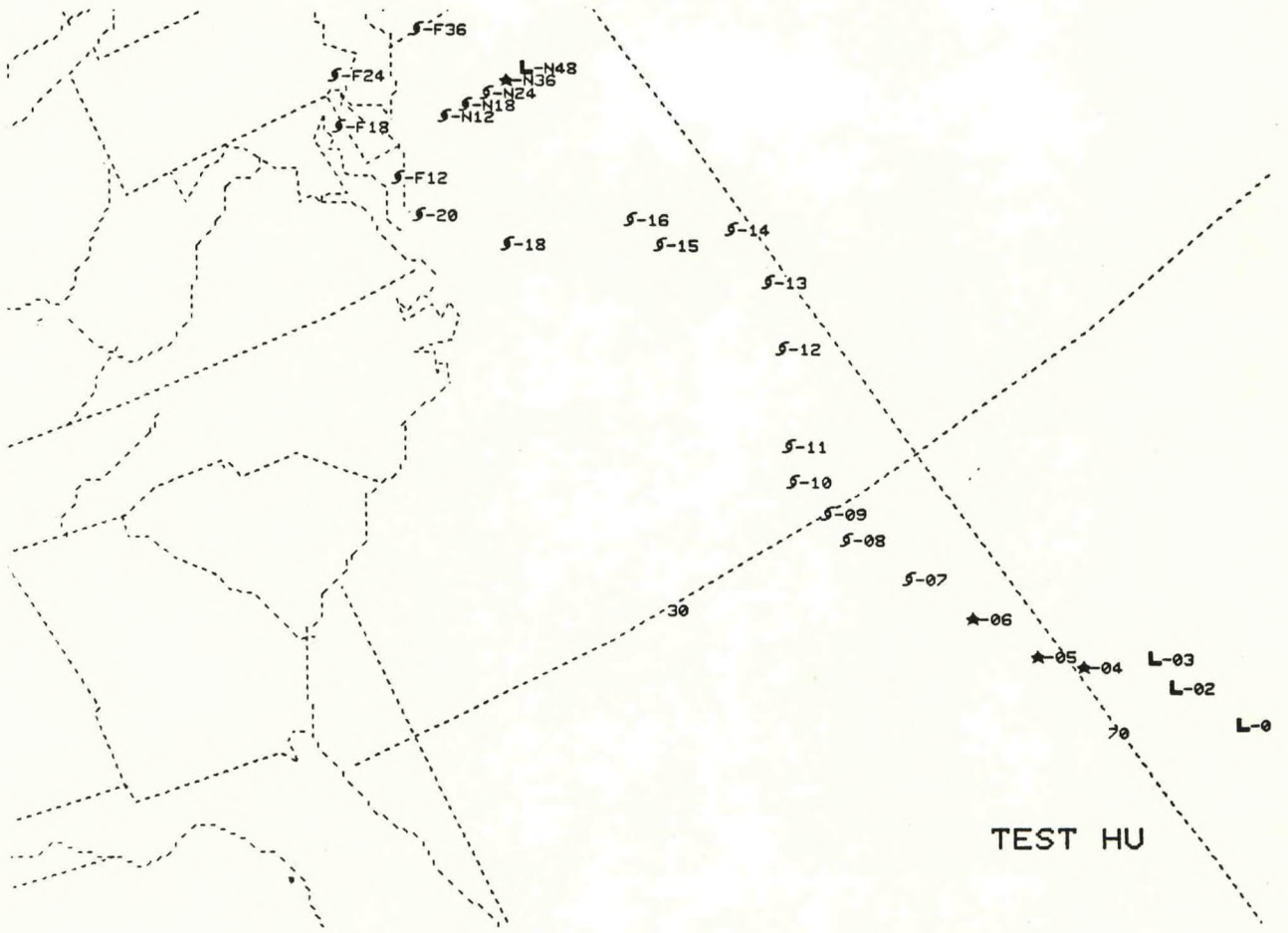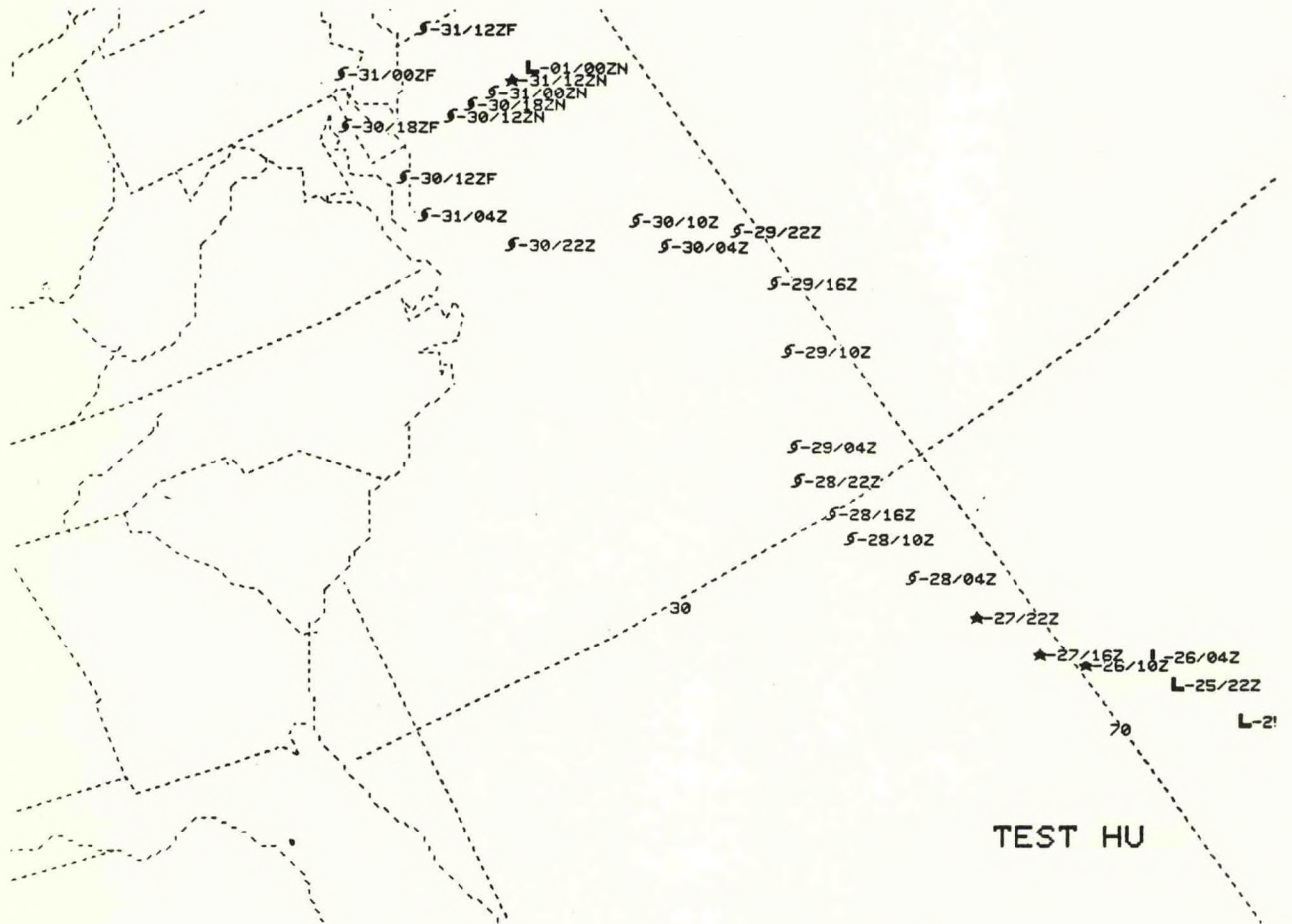
Figure 1.

5

Figure 2.

6

```
ERHWRKHUR
WOUS00 KCAE 272300
TEST HU.2
01-25/16Z LO.24.00.068.50
02-25/22Z LO.25.00.069.00
03-26/04Z LO.25.50.069.00
04-26/10Z TD.26.00.070.00
05-27/16Z TD.26.50.070.50
06-27/22Z TD.27.50.071.00
07-28/04Z TS.28.50.071.50
08-28/10Z TS.29.50.072.00
09-28/16Z TS.30.00.072.00
10-28/22Z TS.30.70.072.20
11-29/04Z TS.31.20.071.90
12-29/10Z TS.32.50.071.00
13-29/16Z TS.33.50.070.50
14-29/22Z TS.34.50.070.50
15-30/04Z TS.34.90.071.80
16-30/10Z TS.35.50.072.00
17-30/16Z HU.36.20.074.30
18-30/22Z HU.36.20.074.30
20-31/04Z HU.37.30.075.50
END
F12-30/12Z FC.38.00.075.50
F18-30/18Z FC.39.20.076.00
F24-31/00Z FC.40.00.075.50
F36-31/12Z FC.40.00.073.50
F48-01/00Z FC.40.50.072.50
N12-30/12Z HU.38.50.074.00
N18-30/18Z HU.38.50.073.50
N24-31/00Z TS.38.50.073.00
N36-31/12Z TD.38.50.072.50
N48-01/00Z LO.38.50.072.00
END
```

Figure 3.

```
C
C
C    PROGRAM TO PLOT TROPICAL STORM POSITIONS PAST--PRESENT--FORECAST
C    RLDR HUR AFREAD CFLTCVT PLTA ERG1.LB AG.LB TOP.LB BG.LB UTIL.LB FORT.LB
C    AFOSE.LB
C
        INTEGER XX,YY
        DIMENSION NAME(30),ISCR(20),IOUT(40)
        COMMON/CDL/KEY(10)
        COMMON/QARDQ/IOUTU(80),I,IBFU(257),KREC(20)
        DATA KEY/"WRKHUR"/
C    READ COMMAND LINE--SET VARIABLES--OPEN CHANNEL TO GDM
        CALL PLTA (ICN,ISC,IDATE)
        NAM=0
        IEND=0
        LA=14
        LO=20
        IST=12
        IWD=6
        CALL GCHN (IC,IER)
        CALL OPENN (IC,"$GDM",0,IER)
C
C    FIND CCC PART OF KEY--OPEN KEY--READ 1ST LINE--PACK NAME--GET MAP BKGND.
C
        CALL KFILL (KEY,IER)
        CALL AFREAD (1,KEY,$901)
        CALL AFREAD (2,IOUT,$903,$902)
        DO 10 J=1,30
        IF(IOUTU(J).EQ.000054K) GOTO 15
   10   CONTINUE
   15   MAP=CFLTCVT (J+1,1)
        IOUTU(J)=000040K
        NO=J/2
        NO1=NO*2
        IF(NO1.EQ.J) GOTO 20
        IOUTU(J+1)=000000K
        J=J+1
   20   CALL PACK (IOUTU,J,NAME)
        ISCR(1)=22K
        ISCR(3)=21K
        ISCR(4)=55K
        J=J/2
C
C    READ STORM POSITIONS--CONVERT LAT/LON TO PIXELS--SET STORM TYPE
C
   30   CALL AFREAD (2,IOUT,$903,$902)
        IF(IOUTU(1).EQ.000105K.AND.IOUTU(2).EQ.000116K) GOTO 70
        Y=CFLTCVT(LA,5)                                   ;LAT
        X=CFLTCVT(LO,6)                                   ;LON
        IF(X.EQ.999999..OR.Y.EQ.999999.) GOTO 903
        CALL CART (Y,X,MAP,XX,YY,IER)
        IF(IER.EQ.2) GOTO 904
        IF(IER.EQ.3.OR.IER.EQ.4) GOTO 905
        ISCR(2)=121                                      ;HU
        IF(IOUTU(IST).EQ.000104K) ISCR(2)=007            ;TD
```

```
            IF(IOUTU(IST).EQ.000123K) ISCR(2)=120        ;TS
            IF(IOUTU(IST).EQ.000117K) ISCR(2)=91         ;LO
            IF(IDATE.EQ.1) GOTO 40              ;PLOT DATE/TIME
            ISCR(5)=IOUTU(1)
            ISCR(6)=IOUTU(2)
            IF(IEND.EQ.1) ISCR(7)=IOUTU(3)
            GOTO 65
     40     IZ=3
            IF(IEND.EQ.1) IZ=4
            DO 45 K0=1,6
            ISCR(4+K0)=IOUTU(IZ+K0)
     45     CONTINUE
            IF(IEND.EQ.1) ISCR(11)=IOUTU(1)
            IF(IEND.EQ.0) IWD=10
            IF(IEND.EQ.1) IDW=11
C
C  PLOT SYMBOL AND LINE NO/DATE AT DESIRED MAP LOCATION--PLOT NAME ON 1ST PASS
C
     65     CALL EFSTXT (ISCR,IC,XX,YY,0,0,0,ICN,ISC,1,IWD)
            IF(NAM.NE.0) GOTO 30
            ITX=XX-200
            ITY=YY-100
            CALL EFSTXT (NAME,IC,ITX,ITY,3,0,0,ICN,ISC,1,J)
            NAM=1
            GOTO 30
     70     IEND=IEND+1
            LA=LA+1
            LO=LO+1
            IST=IST+1
            IWD=IWD+1
            IF(IEND.EQ.2) GOTO (81,82,83),MAP
            GOTO 30
C
C  NOTIFY ADM OF PLOT AND MAP BACKGROUND TYPE
C
     81     CALL FORK ("HUR PLOT-B01",IER)
            GOTO 84
     82     CALL FORK ("HUR PLOT-B02",IER)
            GOTO 84
     83     CALL FORK ("HUR PLOT-B03",IER)
     84     CALL KLOSE (IC,IER)
            STOP
C
C  BELOW ERROR MESSAGES HALT THE PROGRAM
C
    901     CALL SPCHR (" *** BAD KEY - AFREAD ***<15>",IER)
            GOTO 910
    902     CALL SPCHR (" *** ERROR FROM AFREAD ***<15>",IER)
            GOTO 910
    903     CALL SPCHR (" *** IMPROPER FORMAT ***<15>",IER)
            GOTO 910
    904     CALL SPCHR (" *** ILLEGAL MAP BACKGROUND ***<15>",IER)
            GOTO 910
    905     CALL SPCHR (" *** ILLEGAL LAT/LON ***<15>",IER)
    910     CALL FORKE (" HUR PLOT"," -SEE DASHER-",IER)
            STOP
            END
```

```
        SUBROUTINE PLTA (ICN,ISC,IDATE)
C
C   READ COMMAND LINE-IF NO SWITCHES- DEFALT TO ICN=0--ISC=1--IDATE=0
C
        DIMENSION IDA(20),IDB(20),ISW(2),ISW1(2)
        COMMON/QARDQ/IOUTU(80)
        ICN=0
        ISC=1
        IDATE=0
        CALL FCOM(II,IER)
        CALL COMCM (II,IDA,N,ISW,IER)
        IF(ISWSET(ISW,"D")) IDATE=1
        CALL COMCM (II,IDA,N,ISW,IER)
        CALL COMCM (II,IDB,N,ISW1,IER)
        IF(ISWSET(ISW,"C").OR.ISWSET(ISW1,"C")) GOTO 15
        GOTO 30
   15   CALL UNPACK (IDA,1,IOUTU)
        IF(ISWSET(ISW,"S")) GOTO 20
        ICN=CFLTCVT(1,1)
        CALL UNPACK (IDB,1,IOUTU)
        ISC=CFLTCVT(1,1)
        GOTO 30
   20   ISC=CFLTCVT(1,1)
        CALL PACK (IDB,1,IOUTU)
        ICN=CFLTCVT(1,1)
   30   RETURN
        END
```

```fortran
      REAL FUNCTION CFLTCVT (IBGN,N)
      COMMON/QARDQ/IOUTU(80)
C     THIS FUNCTION IS USED WITH THE SUBROUTINE AFREAD. ASCII CHARACTERS IN
C     THE CURRENT LINE ARE SCANNED AND INTERPRETED AS REAL NUMBERS. IF NO
C     DECIMAL POINT IS DETECTED, IT IS ASSUMED TO FOLLOW THE LAST NUMERAL IN
C     THE FIELD. THE SCAN BEGINS WITH CHARACTER IBGN. N CHARACTERS ARE
C     SCANNED.
C     ------------------------FLTCVT CHANGED TO CFLTCVT--------------------
C     STATEMENT NUMBER 800 AND THE FOLLOWING STATEMENT WERE CHANGED TO ALLOW
C     ERROR PROCESSING.
C
      LOGICAL NEG
      CFLTCVT=0.
      NEG=.FALSE.
      IEND=IBGN+N-1
  100 IF(IOUTU(IEND).NE.32) GOTO 200
      IF(IEND.EQ.IBGN) RETURN
      IEND=IEND-1
      GOTO 100
  200 DO 250 I=IBGN,IEND
      IF(IOUTU(I).NE.32) GOTO 300
  250 CONTINUE
      RETURN
  300 IF(IOUTU(I).EQ.43) GOTO 400
      IF(IOUTU(I).NE.45) GOTO 500
      NEG=.TRUE.
  400 I=I+1
  500 J=I
      DO 600 I=J,IEND
      IF(IOUTU(I).EQ.32) IOUTU(I)=48
      IF(IOUTU(I).LT.48.OR.IOUTU(I).GT.57) GOTO 700
      CFLTCVT=CFLTCVT*10+IOUTU(I)-48
  600 CONTINUE
      IF(NEG)CFLTCVT=-CFLTCVT
      RETURN
  700 IF(IOUTU(I).NE.46) GOTO 800
      J=I+1
      DIV=10.
      DO 750 I=J,IEND
      IF(IOUTU(I).EQ.32) IOUTU(I)=48
      IF(IOUTU(I).LT.48.OR.IOUTU(I).GT.57) GOTO 800
      CFLTCVT=CFLTCVT+(IOUTU(I)-48)/DIV
      DIV=DIV*10
  750 CONTINUE
      IF(NEG)CFLTCVT=-CFLTCVT
      RETURN
  800 CFLTCVT=999999.
      RETURN
      END
```

11

AFOS HURRICANE PLOTTER

PART A: PROGRAM INFORMATION AND INSTALLATION PROCEDURE

PROGRAM NAME: HUR.SV   AAL ID:
                                               REVISION NO.: 01.00

PURPOSE: Plots the past, present and forecast positions of tropical
              storms on a GDM.

PROGRAM INFORMATION

    Development Programmer: Maintenance Programmer:
      C. Little   C. Little
    Location: WSFO Columbia, SC
    Phone: FTS 677-5501
    Language: FORTRAN IV 5.20
    Save File Creation Dates:
      Original Release/REV 01.00   -   5/24/84
      Second Release/REV   -
    Running Time: 20 to 30 Seconds

    Disk Space:
      Program Files   -   26 RDOS Blocks
      Data Files   -   0 RDOS Blocks

PROGRAM REQUIREMENTS

    Program Files:

    Name   Comments

    HUR.SV   Must be on or linked
                                               to DPØ

    Data Files:

    Name   DP Location   Read/Write   Comments

    None

    AFOS Products:

    ID   Action   Comments

    CCCWRKHUR   Input   Product must be updated
                                                   for each new position.

A-1

LOAD LINE

```
RLDR HUR AFREAD FLTCVT PLTA EGR1.LB AF.LB TOP.LB BG.LB
UTIL.LB AFOSE.LB
```

PROGRAM INSTALLATION

1 - Place Program on or Link to DPØ.

2 - Add the AFOS Key CCCWRKHUR to your Database or Wish List.

AFOS HURRICANE PLOTTER

PART B: PROGRAM EXECUTION AND ERROR CONDITIONS

PROGRAM NAME: HUR.SV   AAL ID:
                                                    REVISION NO.: 01.00

PROGRAM EXECUTION

1. Complete the AFOS product CCCWRKHUR (see ERCP No. 20, Part III B. for
    format) and store to database. Display the map background specified
    in CCCWRKHUR on the GDM where the data will be plotted. With no
    switches used, the program will plot the positions using the line number
    in CCCWRKHUR and default to console Ø, screen 1. The /D switch will
    plot the date and time.

2. To change consoles and/or screens, the switches N/C M/S are used--N and
    M are the console and screen numbers. "JOB HUR PLOT BOX COMPLETED"
    will alarm after completion with no errors. The X denotes the map
    background used.

3. The data is displayed on the GDM indicated in the command line and no
    file or AFOS product is created. If a record is desired, you will need
    to print a copy or save the CCCWRKHUR.

ERROR CONDITIONS

ADM MESSAGES	MEANING
1. JOB HUR PLOT - BOX COMPLETED	Program ran with no errors Box is the map background X is 1, 2 or 3.
2. JOB HUR PLOT ABORTED - ERROR CONDITION -SEE DASHER-	Program encountered an error and halted.

DASHER MESSAGES	MEANING
1. BAD KEY - AFREAD	A bad key, reenter the product and try again.
2. ERROR FROM AFREAD	Edit the product and try again.
3. IMPROPER FORMAT	Latitude or longitude are not entered correctly.
4. ILLEGAL MAP BACKGROUND	Map Backgrounds must be 1, 2 or 3.
5. ILLEGAL LAT/LON	Latitude or Longitude out of bounds.

19 Verification of Asynchronous Transmissions. Lawrence Cedrone, March 1984

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