NOAA Eastern Region Computer Programs
and Problems NWS ERCP - No. 35

ROTODRAW

Thomas Niziol
National Weather Service Forecast Office
Buffalo, New York

Scientific Services Division
Eastern Region Headquarters
November 1985

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / National Weather Service

NOAA TECHNICAL MEMORANDUM

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) (Revised June 1985, PB85-220580/AS)

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)

(Continued on Inside Rear Cover)

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I. Introduction

A. Purpose

This program will draw a graphic product from a set of data points that are easily entered into an AFOS product from an ADM. The user has the ability to zoom, offset, and rotate the object on the GDM screen. The zoom feature of the program is much more precise than the standard AFOS zoom. Up to 700 sets of x-y data points can be plotted. The program uses the AFOS Graphics Library, AG.LB (MacDonald 1981),extensively. Drawing graphics is relatively straightforward, via the AFOS data product.

B. Motivation

There are many map backgrounds that are available on a national and regional scale, both from NMC and the Hydrology Offices. But many weather offices also may have the need to develop their own local map backgrounds that suit their own needs. Both operational forecasters and those working on local research projects can benefit from this program, limited only by their imagination.

C. Benefits to the User

The program gives the user complete control over the generation of graphics. It allows the user to draw objects, and move them around in a variety of ways on the GDM screen without having to create a program.

II. Methodology and Structure

A.

ROTODRAW generates the graphic product from a set of x-y points stored in an AFOS product called ROTODATA. The user first plots the object to be drawn by hand on linear graph paper to obtain these points. The format of ROTODATA restricts the range of x and y from 0 to 998, so scale the x and y axes on the graph paper accordingly. Since ROTODRAW plots the data at 400 units to an inch on the final graphic, any image produced at a zoom of 1.0 will be rather small. It can be enlarged, however, by adjusting the zoom factor in ROTODATA and rerunning ROTODRAW. A point to keep in mind is that the GDM screen is shorter than it is wide (a ratio of .75) and that ROTODRAW will halt if any portion of the object it is drawing goes off the screen. You may want to reorient and/or rescale the object, either on the original

paper drawing or by using the zoom and rotation features. Also, ROTODRAW will automatically center the object in the GDM screen unless you supply offset values. By repeated trial and error adjustments of zoom, rotation and offsets, the basic shape in ROTODATA can be manipulated into the final graphic.

ROTODATA must be set up in a certain prescribed format so ROTODRAW can read it (an initial ROTODATA is provided with the ROTODRAW package--see Figure 1). The header is located on the second line below the TTAA header. The zoom ratio occupies positions 12-16, corresponding to tens, units, decimal point, tenths and hundreths. The x and y offsets occupy positions 30-34 and 50-54. (These are the number of units to move the drawn object from the center of the screen in the x and y directions.) The first character of each offset must be either a plus or minus sign. The rotation angle occupies positions 65-67. Each position in the header must be occupied by a number or sign for the program to run correctly!

The data points begin three lines below the header, and seven sets of x-y values occupy each line. The x-y data sets occupy the following positions: 2-4,6-8 12-14,16-18 22-24,26-28 32-34,36-38 42-44,46-48 52-54,56-58 62-64,66-68. To create a blank line, i. e. "lift the pen" to move from one point to another without connecting them, place a minus sign in front of the x value of the destination point in positions 1, 11, 21, 31, 41, 51 or 61. Otherwise these positions can remain empty.

Following the last set of points, the value "999" must be entered into the next x-value position to indicate the end of the data set.

B.

After filling out ROTODATA, the program is run at the ADM with the following command:

RUN:ROTODRAW

The two basic equations that are used for the rotation scheme are standard equations for the rotation of axes in a two dimensional system. They are:

$$x=x'\cos(\theta) - y'\sin(\theta)$$

$$y=x'\sin(\theta) + y'\cos(\theta)$$

The program accesses ROTODATA and dumps the numbers into a two-dimensional array. After number crunching to zoom, offset and rotate the data, the plotting routine begins.

The subroutines from AG.LB (MacDonald, 1981) are used to draw the object and transfer it to a graphic product.

The output plot is stored in test graphic NMCGPHTXX...and the RDOS file ROTO.Ø1. You must add NMCGPHTXX to your wish list if it is not already in your database!

III. EXAMPLES OF INTERACTIVE USE

The ability to draw any type of object leaves a lot of room for interactive use on AFOS. Map backgrounds, graphs, spotter networks, etc., that may not be available from AFOS sources can be created for use at the local office. Both the operational forecaster and those involved in local research may find this program of value.

A couple of examples are shown in Figure 2. A county map and zone map were drawn for the upstate portion of New York State. These maps were eventually zoomed, rotated, and offset so they could be overlayed on regional map background B31.

IV. Cautions and Restrictions

If there are any problems opening the data file, or reading any of the information, the program will abort and return an error message at the ADM console.

If the plotted object goes off the limits of the GDM screen, then the program will abort, and an error message will be returned to the ADM console.

The AFOS test graphic NMCGPHTXX must be added to the wish list or database to properly store the graphic. The user must eventually transfer the graphic to another filename if it is to be a permanent file in AFOS. In other words, many graphic products can be originated for on-station use, temporarily stored in NMCGPHTXX, and later be transferred to a permanent graphic products file.

The AFOS data product ROTODATA must also be added to your wish list or database.

V. References

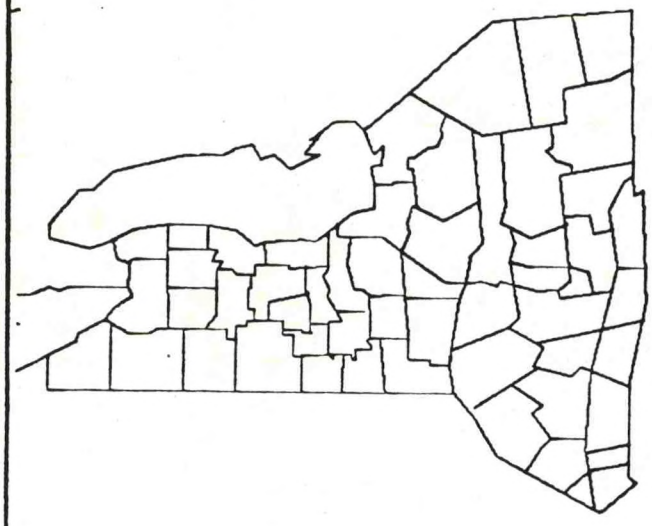
Brehem, F., 1975: FORTRAN Utility Library - UTIL.LB AFOS Systems Programming Note No. 16.

MacDonald, A.E., 1981: AFOS Graphics Creation from FORTRAN. NWS Western Region Computer Programs and Problems No. 18, NOAA, U.S. Dept. of Commerce.

Peroutka, M., 1981: Accessing the AFOS Database. NWS Western Region Computer Programs and Problems No. 23, NOAA, U.S. Dept. of Commerce.


```
WOUS00 KBUF 180200
.....INITIAL DATA FILE..X-VALUE BEGINS AT FIRST DASH.....
ZOOM RATIO=01.00    X-OFFSET=+0000      Y-OFFSET=+0000   ROTATE=000
                          TITLE OF GRAPHIC
1XXX.YYY  2XXX.YYY  3XXX.YYY  4XXX.YYY  5XXX.YYY  6XXX.YYY  7XXX.YYY
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 1
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 2
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 3
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 4
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 5
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 6
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 7
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 8
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 9
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 10
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 11
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 12
 ---.---   ---.---   ---.---   ---.---   ---.---   ---.---   ---.--- 13
```

Fig 1. The initial AFOS product "ROTODATA. User first defines the zoom, offsets, and rotation angle in the header of the file. The x-y coordinate pairs are entered beginning on data line 1, at the first set of dashes.



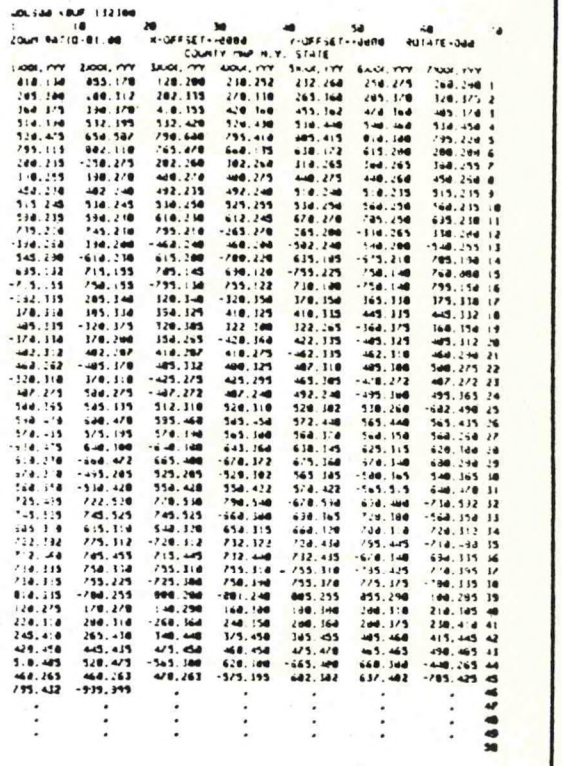
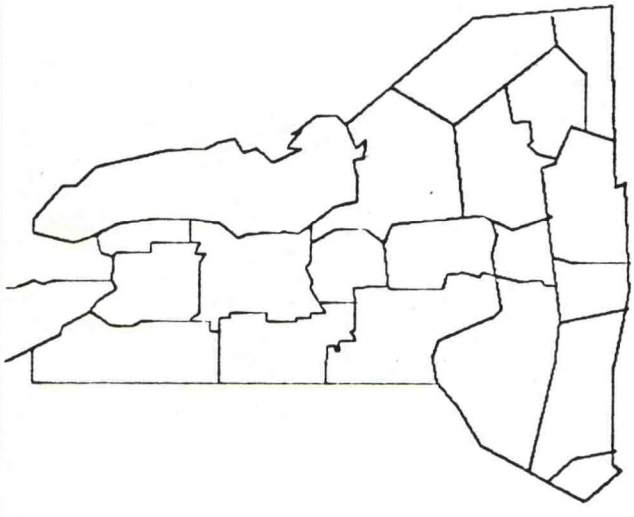


Fig 2a. New York State county map and corresponding data file.



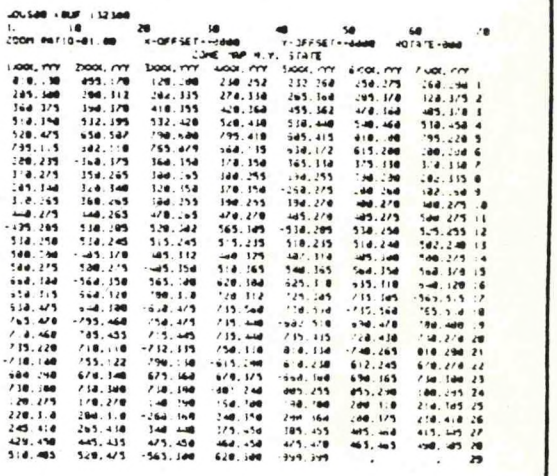


Fig 2b. New York State zone map and corresponding data file.

Fig 2. Examples of graphic products that were developed for on-station use. These maps were eventually offset and rotated to overlay onto the regional AFOS map backgrounds.

VI.

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ROTODRAW

PART A: PROGRAM INFORMATION AND INSTALLATION PROCEDURE

PROGRAM NAME: ROTODRAW.SV

AAL ID:
Revision No.: 1.00

PURPOSE: ROTODRAW will draw an object from a set of data points stored in an AFOS file. The programmer can very precisely zoom, offset and rotate the object in any manner on the screen.

PROGRAM INFORMATION

Development Programmer:
T. Niziol
Location: WSFO Buffalo, NY
Phone: FTS 437-4800
Language: DG FORTRAN IV/5.20
Date: 04/17/85

Maintenance Programmer:
T. Niziol
Location: WSFO Buffalo, NY
Phone: FTS 437-4800
Type: Standard
Revision Date: NA

Running Time: 30-60 Seconds

Disk Space: Program Files 37 Blocks
Data Files NA

PROGRAM REQUIREMENTS

PROGRAM FILES:

Name	COMMENTS
ROTODRAW.SV	

DATA FILES:

NAME	DP LOCATION	READ/WRITE	COMMENTS
ROTO.01	DP0	Write	RDOS file of graphic (left on disk)

AFOS PRODUCTS:

ID	ACTION	COMMENTS
ROTODATA	Read	Holds input data
NMCGPHTXX	Created	Output graphic

LOAD LINE

RLDR ROTODRAW <AG AFREAD BG UTIL FORT>.LB

PROGRAM INSTALLATION

1-Put ROTODRAW.SV on DPØF and link from DPØ.

2-Put NMCGPHTXX into the database but do not assign it a map background.

3-Put the AFOS data product, ROTODATA, on the wish list or in the database and store the initial file ROTODATA (supplied with program) into it.

ROTODRAW

PART B: PROGRAM EXECUTION AND ERROR CONDITIONS

PROGRAM NAME: ROTODRAW.SV

AAL ID:
REVISION NO.: 1.ØØ

PROGRAM EXECUTION

1. The run line for ROTODRAW is RUN:ROTODRAW.

2. An ADM alert "JOB ROTO COMPLETED: OUTPUT IN ROTODRAW.Ø1" will signal routine program completion.

ERROR CONDITIONS

	ADM MESSAGES	MEANING
1.	ERROR CONDITION: CANT OPEN	ROTODRAW cannot open ROTODATA. Check this product--it may be bad.
2.	ERROR CONDITION: CANT READ	ROTODRAW cannot read a line from ROTODATA. Check for bad data.
3.	ERROR CONDITION: OUT OF BOUNDS	ROTODRAW tries to draw to a point that is off the GDM screen; change zoom, offset or rotate attributes as necessary.

VII.

```
C     PROGRAM ROTODRAW                                  REV 01.00
C     MAR 1985              NIZIOL, THOMAS              WSFO BUFFALO/FTS 437-480
C     FORTRAN IV/ REV 5.20  DG ECLIPSE (S230)           6.18
C     LOAD LINE:  RLDR ROTODRAW AG.LB AFREAD.LB OUT.RB BG.LB UTIL.LB
C                 FORT.LB AFOSE.LB
C     PURPOSE
C         THIS PROGRAM WILL DRAW AN OBJECT FROM A SET OF X-Y DATA
C         POINTS.  USER HAS OPTION OF ZOOMING, OFFSETTING, AND ROTATING
C         THE OBJECT TO THEIR OWN SPECIFICATIONS.
C     EXTERNALS
C         AFREAD
C         UNPACK
C         LINES AG.LB
C         UTF - AG.LB
C         FORKO - BG.LB
C         FORKE - BG.LB
C     VARIABLES
C         MX    NEGATIVE (PEN UP) COUNTER
C         LX    X-COORDINATE
C         LY    Y-COORDINATE
C         XMIN  MINIMUM X-COORDINATE
C         YMIN  MINIMUM Y-COORDINATE
C         XMAX  MAXIMUM X-COORDINATE
C         YMAX  MAXIMUM Y-COORDINATE
C         AVGX  CENTER POINT OF OBJECT ON X-AXIS
C         AVGY  CENTER POINT OF OBJECT ON Y-AXIS
C         XCOR  X PIXEL CORRECTION TO CENTER
C         YCOR  Y PIXEL CORRECTION TO CENTER
C         R1    ROTATION (IN RADIANS)
C         S     SINE OF ROTATION ANGLE
C         C     COSINE OF ROTATION ANGLE
C         IXOFF X-OFFSET
C         IYOFF Y-OFFSET
C         ZOOM  ZOOM RATIO
C     EXITS
C         STOP 'STOP'
C              HALTS IF YOU CANT OPEN DATA FILE
C
C         STOP 'STOP CANT READ'
C              HALTS IF YOU CANT READ DATA FROM FILE
C
C         STOP 'STOP OUT OF BOUNDS'
C              HALTS IF ANY PORTION OF THE PLOOTED OBJECT
C              GOES OFF THE GDM SCREEN
C
C..........
C..........ROTODRAW   BY TOM NIZIOL WSFO BUFFALO N.Y.
C..........           THIS PROGRAM WILL DRAW AN OBJECT FROM A SET OF
C..........           X-Y DATA POINTS ENTERED INTO AFOS FILE ROTODATA.
C..........           THE OBJECT CAN BE RELOCATED, ZOOMED, OR ROTATED
C.........            ANYWHERE ON THE AFOS GDM SCREEN.
C..........
      DIMENSION IOUT(40),IUP(80),MX(636),LX(700),LY(700)
      INTEGER XMIN,XMAX,YMIN,YMAX,AVGX,AVGY,XCOR,YCOR
C............
      DO 5 I=1,700                        ;SET ALL DATA POINTS TO -1
      LX(I)=-1
      LY(I)=-1
5     CONTINUE
C..........OPEN DATA FILE FOR READING
```

```
      CALL AFREAD (1,"ROTODATA ",$100)
      DO 10 N5=1,2
      CALL AFREAD(2,IOUT,$900,$110)
   10 CONTINUE
      CALL UNPACK(IOUT,80,IUP)
C.....READ ZOOM RATIO..OFFSETS IN X-Y..AND ROTATION ANGLE
      ZOOM= ((IUP(12)-48)*10)+(IUP(13)-48)+((IUP(15)-48)*.1)
     1+((IUP(16)-48)*.01)
      IXOFF=((IUP(31)-48)*1000)+((IUP(32)-48)*100)+((IUP(33)-48)*10)
     1+(IUP(34)-48)
      IYOFF=((IUP(51)-48)*1000)+((IUP(52)-48)*100)+((IUP(53)-48)*10)
     1+(IUP(54)-48)
      ROT=((IUP(65)-48)*100)+((IUP(66)-48)*10)+(IUP(67)-48)
      R1=(ROT/180)*3.14                    ;CHANGE DEGREES TO RADIANS
C.................
      IF(IUP(30).EQ.45)IXOFF=-IXOFF
      IF(IUP(50).EQ.45)IYOFF=-IYOFF
      CALL AFREAD(2,IOUT,$900,$110)
      CALL AFREAD(2,IOUT,$900,$110)
C.................
      DO 15 K=1,100                        ;READ EACH LINE OF DATA
      CALL AFREAD (2,IOUT,$900,$110)
      CALL UNPACK(IOUT,80,IUP)
      DO 20 J=1,7                          ;READ EACH DATA POINT
      J1=(J-1)*10
      L1=((K-1)*7)+J
      LX(L1)=((IUP(J1+2)-48)*100)+((IUP(J1+3)-48)*10)+(IUP(J1+4)-48)
      LY(L1)=((IUP(J1+6)-48)*100)+((IUP(J1+7)-48)*10)+(IUP(J1+8)-48)
      IF(LX(L1).NE.999)GOTO 290
      GOTO 300
C............
290   IF(L1.GT.1)GOTO 25
      XMIN=LX(L1)
      YMIN=LX(L1)
      XMAX=LY(L1)
      YMAX=LY(L1)
C.....FIND XMAX,XMIN,YMAX,YMIN
25    IF(LX(L1).LT.XMIN)XMIN=LX(L1)
      IF(LY(L1).LT.YMIN)YMIN=LY(L1)
      IF(LX(L1).GT.XMAX)XMAX=LX(L1)
      IF(LY(L1).GT.YMAX)YMAX=LY(L1)
C.....SET COUNTER FOR NEGATIVE OR PEN-UP LOCATIONS
      MX(L1)=0
      IF(IUP(J1+1).EQ.45)MX(L1)=1
20    CONTINUE
15    CONTINUE
C..........
C.....FIND CENTER LOCATION FOR OBJECT THEN CENTER ON SCREEN
300   AVGX=((XMAX-XMIN)/2)+XMIN
      AVGY=((YMAX-YMIN)/2)+YMIN
      XCOR=2050-AVGX
      YCOR=1535-AVGY
      DO 60 IK=1,636
      IF(LX(IK).NE.999)GOTO 330
      LX(IK)=-LX(IK)
      GOTO 320
330   LX(IK)=LX(IK)-AVGX
      LY(IK)=LY(IK)-AVGY
C.....ZOOM OBJECT
      LX(IK)=LX(IK)*ZOOM
```

```
      LX(IK)=LX(IK)*ZOOM
      LY(IK)=LY(IK)*ZOOM
C.....ROTATE THE OBJECT
      S=SIN(R1)
      C=COS(R1)
      NX=LX(IK)
      NY=LY(IK)
      LX(IK)=(NX*C)-(NY*S)
      LY(IK)=(NX*S)+(NY*C)
C.....CENTER OBJECT
      LX(IK)=LX(IK)+XCOR
      LY(IK)=LY(IK)+YCOR
C.....OFFSET THE ZOOMED AND ROTATED OBJECT
      LX(IK)=LX(IK)+IXOFF
      LY(IK)=LY(IK)+IYOFF
C.....
C.....IF DATA POINT GOES OFF SCREEN ALERT PROGRAMMER AND STOP
      IF(LX(IK).LT.0.OR.LY(IK).LT.0.OR.LX(IK).GT.4095.OR.LY(IK).GT.3071)
     2GOTO 120
C.....MAKE ADJUSTED X LOCATIONS NEGATIVE OR PEN-UP WHERE NECESSARY
      IF(MX(IK).EQ.1)LX(IK)=-LX(IK)
60    CONTINUE
C.....DRAW THE OBJECT
320   CALL LINES(LX,LY,700,1,0)
C.....TRANSFER OBJECT WITH UTF SUBROUTINE
      CALL UTF("NMCGPHTXX","ROTO.01",IER)
C.....ALERT PROGRAMMER ON ADM WHEN FINISHED
      CALL FORKO("ROTO","ROTO.01",IER)
900   STOP
C.....ERROR MESSAGES IF DATA FILE CANT BE OPEN OR READ
100   CALL FORKE("DRAW","CANT OPEN",IER)
      STOP
110   CALL FORKE("DRAW","CANT READ",IER)
      STOP
120   CALL FORKE("DRAW","OUT OF BOUNDS",IER)
      STOP
      END
```

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PART A: PROGRAM INFORMATION AND INSTALLATION PROCEDURE

PROGRAM NAME: ROTODRAW.SV

AAL ID:
Revision No.: 1.00

PURPOSE: ROTODRAW will draw an object from a set of data points stored in an AFOS file. The programmer can very precisely zoom, offset and rotate the object in any manner on the screen.

PROGRAM INFORMATION

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T. Niziol
Location: WSFO Buffalo, NY
Phone: FTS 437-4800
Language: DG FORTRAN IV/5.20
Date: 04/17/85

Maintenance Programmer:
T. Niziol
Location: WSFO Buffalo, NY
Phone: FTS 437-4800
Type: Standard
Revision Date: NA

Running Time: 30-60 Seconds

Disk Space: Program Files 37 Blocks
Data Files NA

PROGRAM REQUIREMENTS

PROGRAM FILES:

Name	COMMENTS
ROTODRAW.SV	

DATA FILES:

NAME	DP LOCATION	READ/WRITE	COMMENTS
ROTO.01	DP0	Write	RDOS file of graphic (left on disk)

AFOS PRODUCTS:

ID	ACTION	COMMENTS
ROTODATA	Read	Holds input data
NMCGPHTXX	Created	Output graphic

LOAD LINE

RLDR ROTODRAW <AG AFREAD BG UTIL FORT>.LB

PROGRAM INSTALLATION

1-Put ROTODRAW.SV on DPØF and link from DPØ.

2-Put NMCGPHTXX into the database but do not assign it a map background.

3-Put the AFOS data product, ROTODATA, on the wish list or in the database and store the initial file ROTODATA (supplied with program) into it.

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ROTODRAW

PART B: PROGRAM EXECUTION AND ERROR CONDITIONS

PROGRAM NAME: ROTODRAW.SV

AAL ID:
REVISION NO.: 1.ØØ

PROGRAM EXECUTION

1. The run line for ROTODRAW is RUN:ROTODRAW.

2. An ADM alert "JOB ROTO COMPLETED: OUTPUT IN ROTODRAW.Ø1" will signal routine program completion.

ERROR CONDITIONS

	ADM MESSAGES		MEANING
1.	ERROR CONDITION:	CANT OPEN	ROTODRAW cannot open ROTODATA. Check this product--it may be bad.
2.	ERROR CONDITION:	CANT READ	ROTODRAW cannot read a line from ROTODATA. Check for bad data.
3.	ERROR CONDITION:	OUT OF BOUNDS	ROTODRAW tries to draw to a point that is off the GDM screen; change zoom, offset or rotate attributes as necessary.

Eastern Region Computer Programs and Problems (Continued)

19 Verification of Asynchronous Transmissions. Lawrence Cedrone, March 1984. (PB84 189885)

20 AFOS Hurricane Plotter. Charles Little, May 1984. (PB84 199629)

21 WARN - A Warning Formatter. Gerald G. Rigdon, June 1984. (PB84 204551)

22 Plotting TDL Coastal Wind Forecasts, Paula Severe, June 1984 (Revised) (PB84-220789)

23 Severe Weather Statistics STADTS Decoder (SWX) and Plotter (SWY), Hugh M. Stone, June 1984. (PB84-213693)

24 WXR, Harold Opitz, August 1984. (PB84-23722)(Revised August 1985, PB86 100815/AS)

25 FTASUM: Aviation Forecast Summaries, Matthew Peroutka, August 1984. (PB85-112977)

26 SAOSUM: A Short Summary of Observations. Matthew Peroutka, October 1984. (PB85-120384)

27 TRAJ - Single Station Trajectory Plot, Tom Niziol, December 1984. (PB85-135002)

28 VIDTEX, Gerald G. Rigdon, February 1985 (PB85-175669/AS)

29 ISENTROPIC PLOTTER, Charles D. Little, February 1985 (PB85-175651/AS)

30 CERR: An Aviation Verification Program, M. Peroutka, April 1985. (PB85-204824/AS)

31 Correlation and Regression Equation Program - REGRS, H. Stone, May 1985. (PB85-213353/AS)

32 Scatter Diagram and Histogram Program - SCATR, H. Stone, May 1985.(PB85-213346/AS)

33 TIMCHEK, Gerald G. Rigdon, June 1985. (PB85-221257/AS)

34 A MOS Temperature - PoP Forecast Plot, William C. Randel, October 1985 (PB86-120029/AS).

NOAA SCIENTIFIC AND TECHNICAL PUBLICATIONS

The National Oceanic and Atmospheric Administration was established as part of the Department of Commerce on October 3, 1970. The mission responsibilities of NOAA are to assess the socioeconomic impact of natural and technological changes in the environment and to monitor and predict the state of the solid Earth, the oceans and their living resources, the atmosphere, and the space environment of the Earth.

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TECHNICAL SERVICE PUBLICATIONS — Reports containing data, observations, instructions, etc. A partial listing includes data serials; prediction and outlook periodicals; technical manuals, training papers, planning reports, and information serials; and miscellaneous technical publications.

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