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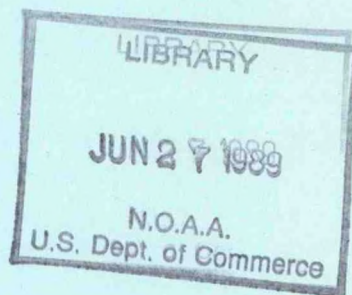
NOAA Eastern Region Computer Programs
and Problems NWS ERCP - 46



Series analyzed

Hydrologic Data Decoding and Plotting Programs (RVR/RVRA)

Samuel Baker and Charles D. Little
National Weather Service Forecast Office
Columbia, SC



Scientific Services Division
Eastern Region Headquarters
May 1989

**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 sub-set 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 ALEMBICS Workbins. Alan P. Blackburn, October 1982. (PB83 138313).
- 6 Real-Time Quality Control of SAOs. John A. Billee, 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).
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- 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 RAMP: Stability Analysis Program. Hugh M. Stone, February 1984. (PB84 161447)
- 17 ZONES. Gerald G. Rigdon, March 1984. (PB84 174325)
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- 23 Severe Weather Statistics STADTS Decoder (SWX) and Plotter (SWY). Hugh M. Stone, June 1984. (PB84 213693)
- 24 HXR. Harold Opitz, August 1984. (PB84 23722) (Revised August 1985, PB84 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 - REGRS. Hugh M. Stone, May 1985. (PB85 213353/AS)
- 32 Scatter Diagram and Histogram Program - SCATR. Hugh M. 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)
- 35 ROTODRAM. Thomas Niziol, November 1985 (PB86 131828/AS)
- 36 LAHEB: Data Processing for the Great Lakes. William C. Randel and Matthew R. Peroutka, March 1986. (PB86 176658/AS)
- 37 Convective Parameters & Hodograph Program - Convect. Hugh M. Stone, April 1986. (PB86-197225/AS)
- 38 DMXR - SHEF Product Compression Program. Harold H. Opitz, September 1986.
- 39 CRASHQ: Listing Products Being Transmitted At the Time of a Crash. William C. Randel, January 1987 (PB87-151890/AS)
- 40 AVGPLOT and AVGCLIM. Alan Blackburn, March 1987 (PB87-180626/AS)
- 41 Severe Weather Potential (SPOT) Profile Generator. Ken LaPenta, July 1987. (PB87 217717/AS)
- 42 COARS Family of Programs. Lawrence Cedrone, November 1987 (PB88-131602)

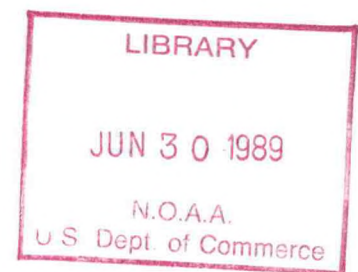
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EASTERN REGION COMPUTER PROGRAMS AND PROBLEMS - No. 46

Hydrologic Data Decoding and Plotting Programs (RVR/RVRA)

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National Weather Service Forecast Office
Columbia, SC

Scientific Services Division
Eastern Region Headquarters
May 1989



Hydrologic Data Decoding and Plotting Programs - (RVR/RVRA)

Samuel Baker and Charles D. Little
WSFO Columbia, South Carolina

I. Introduction

This program creates stage hydrographs using 6 hourly data from NMCRRAXX and the various locally entered river data report products available on AFOS.

The program was developed to answer the need for a way to quickly look at river stage conditions. For many years, we received one river stage report each 24 hours. It was not too hard to look over this data each morning and determine the river stage trends on several rivers. With the availability of 6 hourly stage data via satellite, it has become increasingly time consuming to determine whether rivers are falling or rising each morning. The extra data makes our determinations more accurate, but also requires more time to find out what is really going on. There is a need to display the available river stage data in a hydrograph format.

This program allows stage data to be displayed as hydrographs. The time period of the hydrograph can be chosen to display from 1 to 15 days worth of data. Using these hydrograph displays, a person can quickly see what the stage at a particular river gage has been doing for the past few days. Crest stages and times can be quickly determined. In many cases, the trend of the river stage for the next 24 hours can be determined from the hydrograph. Another advantage of this program is that hard copies of the hydrograph can be made on the printer and saved for later use in reports.

II. Methodology and Software Structure

A. RVR

The RVR program decodes the AFOS products listed in the first section of IDFILE.DT (see Appendix I). All data must be in SHEF code (Pasteris, 1982). The program begins by initializing the subdirectory USER2 and checking for any command line switches. If any switches were set, then the corresponding utility subroutine will be called. Next, the program opens RVRDATA.DT in USER2 (see Appendix II) to read record zero. If an error is encountered on this attempt to read, it is assumed that the file RVRDATA.DT is bad and another data file is created via RVR0. If no error occurs, then a check is made for a new year. When a change in the year has occurred since the last time the program was run, there are two paths that may be taken. If the new year is equal to the old year + 1, then the old datafile is renamed and

a new datafile is created in USER2. When the new year is not equal to the old year + 1, then the program prints an error message and halts.

Next, the program opens IDFILE.DT and reads the first key to be decoded. The subroutines OPENP and READP (Sunkel, 1983) are used to access the AFOS database. The decoding routines consist of RVR1, RVR2, RVR3 and JDATE (Peroutka, 1983). These routines work through a product by finding the .B line. The month, date and time are decoded along with the location on the line of the desired data, HP and HG. Next, the Julian date is computed from the date information just decoded. The record number is computed by

$$\text{RECORD NUMBER} = ((\text{JULIAN DATE} - 1) * 4) + \text{IH}$$

where IH = 1 for 00Z, 2 for 06Z, 3 for 12Z, and 4 for 18Z.

The record number is computed for every .B line in a product. The first record number of the first product decoded will be used to test the currentness of subsequent data. If a record number is smaller than the first record number, then the data is considered old and is not decoded any further. If the record number is equal to the first, then the data is accepted. If it is larger than the first, then data in the first record number is older than the data in question and the program will halt. You will have to get current data into the first product before the program will run. All decoded data is put into a array for sorting. The program can decode up to 1000 stations from the product keys listed in IDFILE.DT. If more than 1000 stations are decoded, the program will print an error on the Dasher and halt.

After all the decoding has been completed, RVR5 is called to sort out the stations to be saved. The list of stations to be saved is read from the second section of IDFILE.DT. RVR5 begins by reading the call letters of the first station in the second section of IDFILE.DT. The subroutine then compares the call letters from IDFILE.DT to the list of decoded call letters. If a match is found, then the data for this station is saved. If a match of the call letters is not made, the station is considered missing and a -9999.00 is entered.

Since a station may be sent in several different messages, the RVR5 subroutine will scan the entire array containing the decoded data, checking for another entry for the current station. The last entry found with data will be the one saved to RVRDATA.DT. Data can be saved for up to 100 stations.

When all the stations in IDFILE.DT have been checked, the data will be written to the computed record number in the file RVRDATA.DT. Record zero will be updated and the program will halt.

RVR subroutines:

RVR7 This subroutine is invoked when global /L is used. Interactive at the Dasher, it will allow you to print any record or group of records to the printer. The two record numbers input must be between 0 and 1464.

RVR8 This routine is invoked by global /C. Also interactive at the Dasher, it allows you to change one station's data in any record. It requires three inputs: the record number, the station call letters (as listed in IDFILE.DT) and the new data.

(NOTE -- when typing the station call letters at the Dasher, the characters will not be echoed back.)

RVR9 Invoked by global /L, this subroutine will list all missing records from the smallest valid record number to the most current record number. This data is found in record zero of RVRDATA.DT.

RVR0 This is invoked by global /I, which is used only on the first execution of RVR to create the datafile RVRDATA.DT (see Appendix II). It is also invoked under normal use to create the datafile RVRDATA.DT in USER2 at the start of each new year or if the program determines the current RVRDATA.DT cannot be accessed.

The subroutine begins by deleting the file OLDRVRDATA.DT (if it exists). Next, the file RVRDATA.DT is renamed OLDRVRDATA.DT and a new RVRDATA.DT is created. The new file will be initialized with the following values in each record:

Value 1 - the negative of the record number

Values 2 through 100 - 99999.00

This process uses about 2300 blocks of USER2 and takes about 8 minutes. The OLDRVRDATA.DT file may be saved to a removable disk or deleted, depending on your needs.

See Cautions in Section IIII

JDATE (Peroutka, 1983) Computes the Julian date.

CFLTCVT (Peroutka, 1981) - CFLTCVT is a modified version of FLTCVT that allows the main program to continue even if an error is detected in data conversion. If an error is detected, a value of 999999 is returned.

The structure of RVR is shown in Figure 7.

B. RVRA

The program RVRA will plot a hydrograph for the past 15 days using data from the file RVRDATA.DT. The program begins by reading the command line via RVRG. Next, the menu is read from the file RVRMENU.DT (see Appendix III) and displayed on the selected GDM. The status line will appear immediately below the menu. Error messages and prompts from the

program will be displayed on this line. The subroutine RVRC will read IDFILE.DT to obtain a list of station call letters and their flood stages. RVRC will also generate the labels for the plotted data. The subroutine RVRE will read the desired data from the RVRDATA.DT file.

RVRA is now ready to interpret your selections from the displayed menu. To select a station, move the cursor to the box next to the desired station and press ENTER CURSOR. A plot of the data should appear on the next GDM in a few seconds. If the plot of the data does not appear in a few seconds, check the status line for possible errors.

Other subroutines used by RVRA:

CURSR, RDCUR	(Fors, et al, 1981) - These two subroutines read the current location of the cursor and return the X and Y values in pixels.
RVRB	Used to decode the menu selections - computes a row number of the cursor.
RVRD	Computes and plots graph background.
RVRF	Plots the data on the graph.

The structure of RVRA is illustrated in Figure 7.

The plot of the data (see Figure 1) defaults to the past 15 days. Any number of days from 1 to 15 may be selected and plotted via the menu. Figure 1a shows the same data as Figure 1, but the plot in Figure 1a is only for 7 days. Figure 1b is a plot of a station reporting once every 24 hours.

The vertical lines on the graph mark 24 hour intervals and are labeled with the Julian date. The right-hand-most vertical line represents the most current data. The graph labels START DATE and START TIME give the date and time of the most current data. Each vertical line represents a 24 hour change from the previous line.

The horizontal lines represent the height of the river/lake in 1 foot increments. The height lines are labeled every 5 feet. The flood stage, if entered in IDFILE.DT, is shown by a heavy height line.

Missing data will be plotted as an M.

III. Cautions and Restrictions - RVR/RVRA

1. The two files created by RVR (RVRDATA.DT and OLDRVRDATA.DT) require about 2300 blocks on USER2. However, RVR does not check for sufficient space before attempting to create the files. It is up to the user to check this before running RVR.

2. You should backup RVRDATA.DT every week or so (on a Phoenix disk) to prevent a large loss of data if the Winchester disks are lost.
3. The graph of the data is not written to the GDM's CLS memory, therefore, any zooming will delete the plotted data.

IV. References

Egger, Thomas J., 1983. Assembly Language Graphics Library with FORTRAN Interfacing. NOAA Central Region Computer Programs and Problems NWS CRCP - No. 9, NWS, Kansas City, MO.

Fors, Jim; Don Laurine and Sandy MacDonald. 1981. AFOS Interactive Graphics, NOAA Western Region Computer Programs and Problems NWS WRCP - No. 28, NWS, Salt Lake City, UT.

Pasteris, Phillip A., 1982. Standard Hydrologic Exchange Format (SHEF), NOAA NWS Northwest River Forecast Center, Portland, OR.

Peroutka, M. 1983. MDR--Processing Manually Digitized Radar Observations, NOAA Eastern Region Computer Programs and Problems NWS ERCP - No. 15, NWS, Garden City, NY.

Peroutka, M. 1981. Accessing the AFOS Database, NOAA Western Region Computer Programs and Problems NWS WRCP - No. 23, NWS, Salt Lake City, UT.

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

Hydrological Data Decoding and Plotting Program - RVR

PART A: INFORMATION AND INSTALLATIONPROGRAM NAME: RVR.SVAAL ID:REVISION NO.: 1.00

PURPOSE: This program decodes hydrological data (pool height and gage height: SHEF HP and HG) from various products (NMCRRAXX, CCCRR<1 2 3>XXX). Data for up to 100 stations is stored in the file RVRDATA.DT. The program is designed to be run every six hours. RVRDATA.DT is large enough to store 6-hourly data for 100 stations for up to a year.

PROGRAM INFORMATION:

Development Programmer:
Sam Baker and Chuck Little
Location: WSFO CAE
Phone: (FTS) 677-5501
Language: FORTRAN IV/5.57

Maintenance Programmer:
Chuck Little
Location: WSFO CAE
Phone: (FTS) 677-5501
Type: Standard

Save File Creation Date(s):
Original Release/Version 1.00 12/19/88

Running Time: About 1 minute for 6 products containing data for 300 stations

Disk Space:
Program 50 RDOS blocks
Data 2300 RDOS blocks

PROGRAM REQUIREMENTS

Program Files:

<u>Name</u>	<u>Disk Location</u>	<u>Comments</u>
RVR.SV	APPL1	Link to SYSZ

Data Files:

<u>Name</u>	<u>Disk Location</u>	<u>R/W</u>	<u>Comments</u>
IDFILE.DT	APPL1	R	Link to SYSZ
RVRDATA.DT	USER2	R/W	Link to SYSZ
OLDRVRDATA.DT	USER2	R	Old datafile - may be deleted

AFOS Products:

<u>ID</u>	<u>Action</u>	<u>Comments</u>
NMCRRAXX(x)	Input	xx=state id, xxx=state id plus one digit
cccRRnxxx	Input	n=1,2, or 3

LOAD LINE

RLDR/P RVR RVR<1 2 3 4 5 7 8 9 0> JDATE CFLTCVT RVRREV <TOP BG UTIL FORT>.LB RVR.LM/L

PROGRAM INSTALLATION

1. Move RVR.SV to APPL1 and create a link to it from SYSZ.
2. At least 2300 blocks in partition USER2 will be required, 1145 for RVRDATA.DT and 1145 for OLDRVRDATA.DT. The program will create these files. See ERCP #46, Appendix II for more information and a description of the file structure.
3. Create a link in SYSZ to RVRDATA.DT in USER2.
4. Make sure the desired input products are in your AFOS database.
5. Use M:F/APPL1:IDFILE.DT to create IDFILE.DT in APPL1. See ERCP #46, Appendix I for additional information on the contents and structure of this file.
6. Create a link in SYSZ to IDFILE.DT in APPL1.

Hydrological Data Decoding and Plotting Program - RVR

PART B: EXECUTION AND ERROR CONDITIONS

PROGRAM NAME: RVR.SV

AAL ID:
REVISION NO.: 1.00

PROGRAM EXECUTION:

1. The ADM command line for RVR is

RUN:RVR[/L, /C, /V, /I]

where the optional switches are shown in the brackets. When run without switches, RVR will save the data indicated by IDFILE.DT. The program is designed to run every six hours. It may be run whenever a new version of any of the products listed in IDFILE.DT is stored, or when all of them are current. Any product not current will not be decoded.

2. The optional switches have the following effects:

/L	RVR will run interactively at the Dasher to print selected data records from RVRDATA.DT.
/C	RVR will run interactively at the Dasher to allow corrections to selected data records for one station per run. (Station ID will not be echoed back to the Dasher when it is entered.)
/V	Lists all records with missing data to the PPM. (The program will only check back to when the program was first run, not the beginning of the year.)
/I	This switch is used only when the program is being installed for the first time. It creates RVRDATA.DT in partition USER2.

Sample PPM output for the /V option and Dasher dialogs for the interactive options (/L, /C) appear in ERCPC #46 Figures 5 and 6.

3. Please see the Cautions section in ERCPC #46 before using this program.

ERROR CONDITIONS

<u>Messages from ADM</u>	<u>Meaning</u>
JOB RVR ABORTED! ERROR CONDITION: SEE DASHER	See Dasher messages

<u>Dasher Messages</u>	<u>Meaning</u>
The following messages indicate fatal errors	
1. ERROR - OPENN IDFILE.DT	Trouble opening IDIFLE.DT - most likely the file is missing.
2. ERROR - CHECK YOUR DATE - YEAR	The program found a change in the value for year other than the last year + 1 (next new year). Check the system date.
3. ERROR - CANNOT INIT USER2	The subdirectory USER2 cannot be initialized. The most common error is too many directories already in the system. Release one directory that is not required.
4. ERROR3 - 1ST PRODUCT TOO OLD - (key)	The computed record number of the 1st key is less than the computed record number of the listed key. The first product is older than the listed key; wait for the first AFOS key in IDFILE.DT to be updated or request it.
5. ERROR4 - NUMBER DECODED STATIONS - (key)	The number of decoded stations (data points) has exceeded 1000 in the listed key. Reduce the number of keys being decoded.
6. ERROR5 - TOO MANY STATIONS IN IDFILE.DT	The number of stations in IDFILE.DT is larger than 100. Reduce the number of stations to 100 in IDFILE.DT.
7. ERROR7 - RECORD NUMBER OUT OF BOUNDS	Repeat RVR/L and enter the correct record numbers 0 - 1464.
8. ERROR0 - CANNOT ACCESS USER2	This error is much the same as number 3 above.

The following errors are non-fatal

1. ERROR - TROUBLE OPENP --> (key) The subroutine OPENP had trouble opening this key. Check IDFILE.DT for correct spelling or product missing from the database.
2. ERROR - EOF ON 1ST READ RVRDATA.DT An error occurred while trying to read the first eight values of RVRDATA.DT. The program will assume a bad or missing file and call RVR0.
3. ERROR1 - TROUBLE READING --> (key) An error occurred in the subroutine READP other than an end of file. Check the listed key.
4. ERROR2 - UNKNOWN FORMAT ON .B -->(key) Could not find the day/hour indicator (DH) on the .B line of the listed key. Check the listed key for a valid .B line.
5. ERROR2 - DATE/TIME CONVERSION ERROR --> (key) An error occurred converting the ASCII data to binary for the listed key. Check the date/time on the .B line of the listed key.
6. ERROR3 - RECORD OUT OF BOUNDS --> (key) Computed record number less than 0 or greater than 1464. The .B line has an error, usually in the date.
7. ERROR4 - TROUBLE READING --> (key) The same as number 3.
8. ERROR4 - UNEXPECTED EOF --> (key) An end of file occurred while looking for a .END. The listed key is most likely incomplete.

These messages are printed on the Dasher only - no ADM alert

1. FINISHED --> (key) All decoding completed for the listed key.
2. ERROR3 - RECORD MISMATCH --> (key) The record number computed for this key did not match the computed record number from the first decoded key. Current data for the listed key not available.

3. ERROR8 - NUMBER OF CHARACTERS INCORRECT - TRY AGAIN

The program is looking for 5 characters that make up the station call letters.

4. ERROR8 - NO STATION IN IDFILE.DT -- (stn)

The listed station was not found in IDFILE.DT. Enter the correct station.

5. ERROR8 - RECORD NUMBER OUT OF BOUNDS - TRY AGAIN

The entered record number was less than 0 or greater than 1464. A valid record number is 0 - 1464.

NOTE - the number next to ERROR denotes the subroutine generating the error. ERROR by itself denotes MAIN.

HYDROLOGICAL DATA DECODING AND PLOTTING PROGRAM - RVRA

PART A: INFORMATION AND INSTALLATION

PROGRAM NAME: RVRA.SV

AAL ID:

REVISION NO.: 1.00

PURPOSE: This is an interactive program which uses a menu displayed on a GDM. It plots hydrological data (pool height or gage height; SHEF HP or HG) for the stations listed in IDFILE.DT. The graph of the data for up to 15 days will be plotted on a second GDM. The program defaults to the latest data but allows plotting of old data via switches.

PROGRAM INFORMATION:

Development Programmer:
Sam Baker and Chuck Little
Location: WSFO CAE
Phone: (FTS) 677-5501
Language: DG FORTRAN IV/5.57

Maintenance Programmer:
Chuck Little
Location: WSFO CAE
Phone: (FTS) 677-5501
Type: Standard

Save File Creation Date(s):
Original Release/Version 1.0 - 12/19/88

Running Time: About 40 seconds to display the menu and read the data,
then 5 seconds to generate each data plot.

Disk Space:
Program 41 RDOS blocks
Data 1145 RDOS blocks

PROGRAM REQUIREMENTS

Program Files:

<u>Name</u>	<u>Disk Location</u>	<u>Comments</u>
RVRA.SV	APPL1	

Data Files:

<u>Name</u>	<u>Disk Location</u>	<u>R/W</u>	<u>Comments</u>
IDFILE.DT	APPL1	R	link to SYSZ
RVRMENU.DT	APPL1	R	link to SYSZ
RVRDATA.DT	USER2	R	link to SYSZ

AFOS Products:

<u>ID</u>	<u>Action</u>	<u>Comments</u>
none		

LOAD LINE

RLDR/P RVR<A B C D E F G> JDATE CLFTCVT CURSR RDCUR RVRAREV <EGR2 UTIL
FORT>.LB RVRA.LM/L

PROGRAM INSTALLATION

1. Move RVRA.SV and RVRMENU.DT to APPL1. Create links to these files from SYSZ.
2. Edit RVRMENU.DT (E:F/APPL1:RVRMENU.DT) and change the station call letters to those in your IDFILE.DT. The first 25 stations in IDFILE.DT should go in column 1 of RVRMENU.DT, the second 25 in column 2, and so on. The spacing of the brackets should not be changed. See ERCP #46, Appendix III.

HYDROLOGICAL DATA DECODING AND PLOTTING PROGRAM - RVRA

PART B: EXECUTION AND ERROR CONDITIONS

PROGRAM NAME: RVRA.SV

AAL ID:
REVISION NO.: 1.00

PROGRAM EXECUTION:

1. From an ADM, enter:

RUN:RVRA [# /C, yy/M xx/D]

where the optional arguments and local switches are in brackets.

With no switches the program defaults to console 0. Once the program has been run, the 1st GDM at that console will have the menu displayed on it. The zoom should be set to 1:1. The message "READING DATA - PLEASE WAIT" will appear beneath the list of stations on the menu. Reading the data will usually take 20 to 30 seconds and when completed the message "ENTER YOUR DATA - CORRECTLY PLEASE" will replace the "PLEASE WAIT" message. All error messages from the program will appear on this line. At this time there are three options:

- OPTION 1 Place the cursor in the box next to the station you wish to plot and press the ENTER CURSOR button. The plotted data will appear on the 2nd GDM in a few seconds. To plot another station, repeat the above procedure.
 - OPTION 2 This allows you to change the number of days that will be plotted. The default value is the past 15 days. To change the default value, move the cursor to the box next to the desired number of days and press the ENTER CURSOR button. Now you are able to return to option 1 and plot data for only the number of days you selected.
 - OPTION 3 To exit the program, move the cursor to the box next to EXIT THE PROGRAM and press the ENTER CURSOR button.
2. Use #/C to change the console number from the default (0) to console #.
3. yy/M and xx/D are used to plot old data. yy is the month and xx is the day of the initial point desired. For example, 03/M 04/D will start the plot on March 4 of the current year. These two switches must be used together and may be combined with #/C above.

ERROR CONDITIONS

Messages from ADM

Meaning

none

Dasher Messages

Meaning

none

GDM Messages

Meaning

Errors 1-5 will appear just below the menu on GDM # 1.
Errors 6 and 7 will replace the menu and halt the program.

1. ERROR - CURSOR MUST BE IN A BOX
The cursor is not in a box, move the cursor to a box and depress the ENTER CURSOR button again.
2. ENTER YOUR DATA CORRECTLY PLEASE
Appears after all data from the file RVRDATA.DT has been read. The program is ready to plot the data on the second GDM.
3. NORMAL PROGRAM EXIT
Appears when the cursor has been placed in the exit program box and the ENTER CURSOR button has been pressed.
4. READING DATA - PLEASE WAIT
Appears while the program is reading data from the file RVRDATA.DT.
5. ERROR - YOU CAN'T DO THAT - NO SUCH STATION
There is no data for this station. Select another station.
6. COMMAND LINE ERROR - /C
An error was found in the command line. Enter the command again.
7. RVRMENU.DT NOT FOUND
The file that contains the menu was not available for the program to use. Check the link from SYSZ and the file in APPL1.

VI. Figures

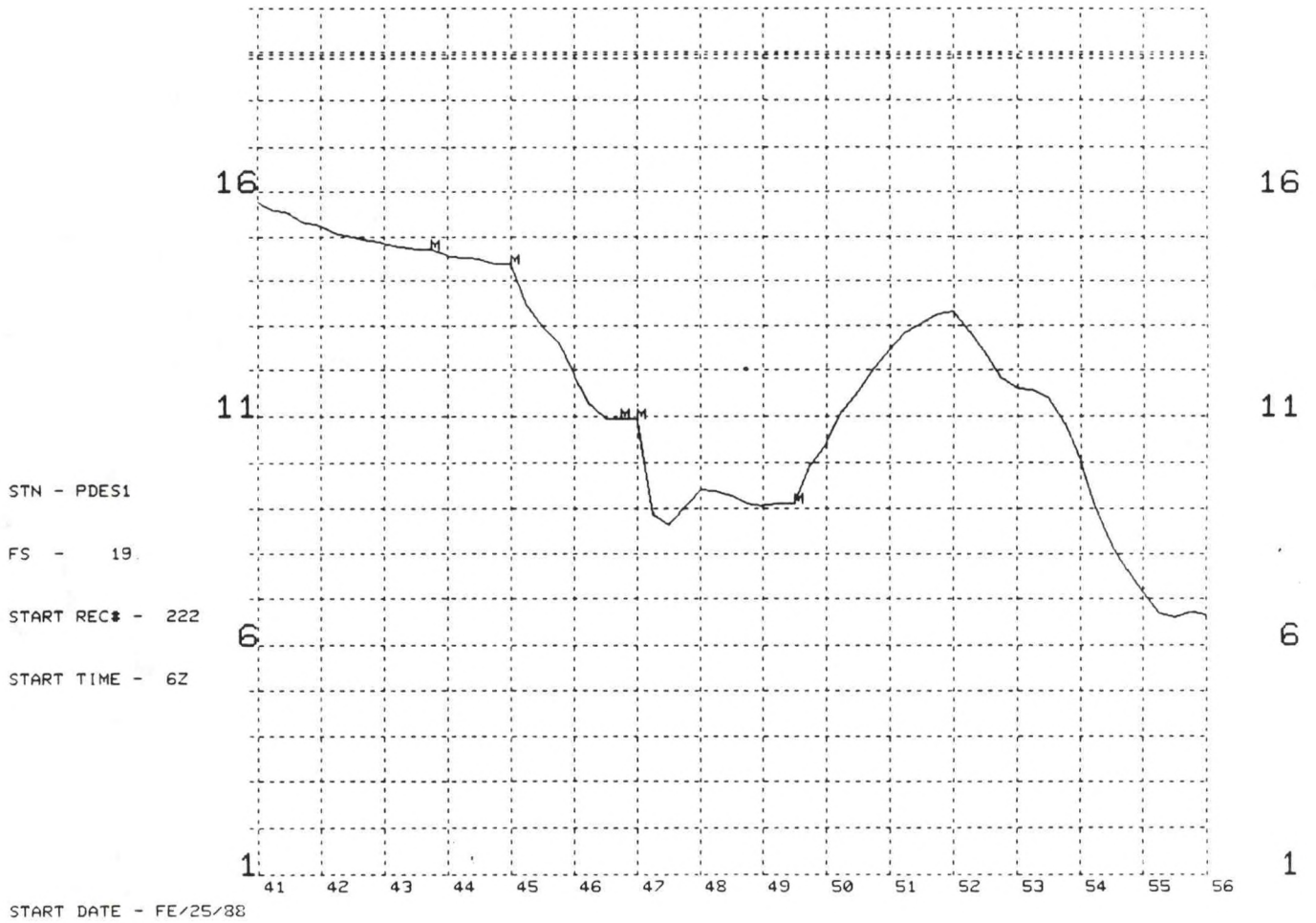


Figure 1. Plotted hydrograph (15 days' data)

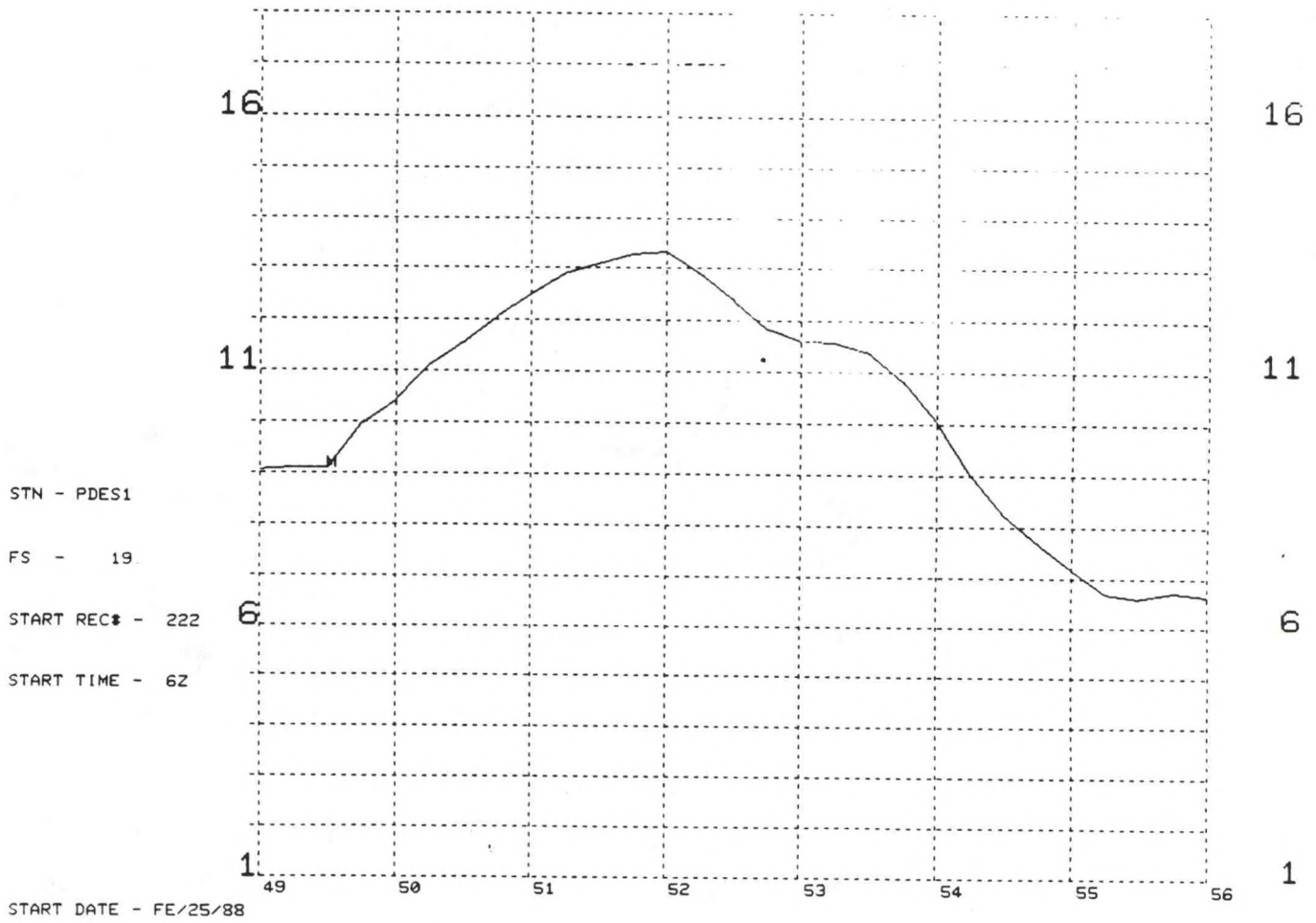


Figure 1a. Same as Figure 1 but for the last 7 days

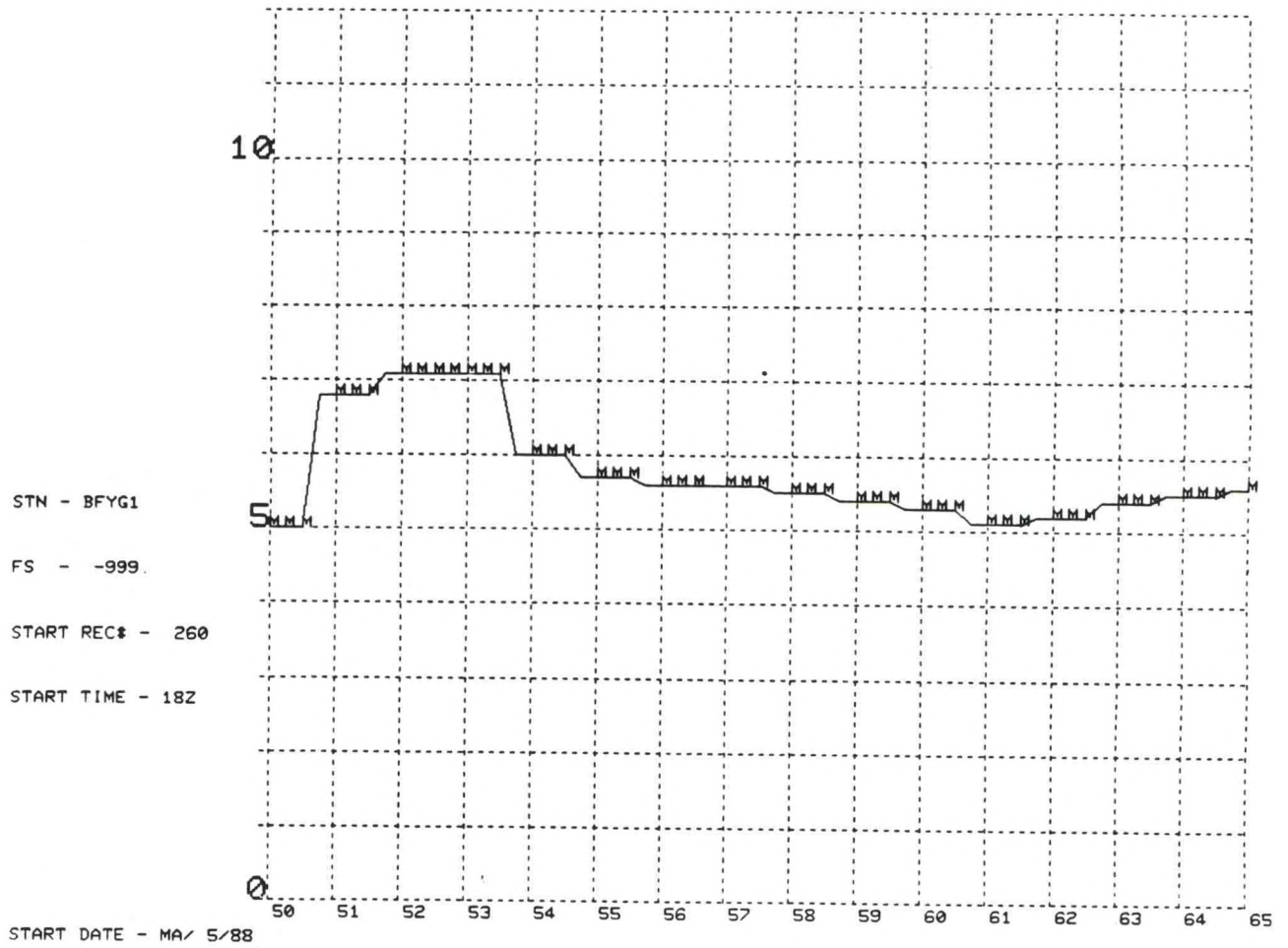


Figure 1b. Plot for station reporting once every 24 hours

RIVER AND LAKE PLOTTING PROGRAM
 ----- MENU -----

EXIT THE PROGRAM []

2
3
4
5
6
7

ALTS1	[]	KINS1	[]	GRNS1	[]	STN76	[]	1-DAY	[]
COLS1	[]	EFFS1	[]	IRMS1	[]	STN77	[]	2-DAY	[]
RBRS1	[]	BRAS1	[]	JCSS1	[]	STN78	[]	3-DAY	[]
CMDS1	[]	WSHS1	[]	KEOS1	[]	STN79	[]	4-DAY	[]
PNVS1	[]	JMSS1	[]	NELS1	[]	STN80	[]	5-DAY	[]
DTAS1	[]	ALVS1	[]	PASS1	[]	STN81	[]	6-DAY	[]
CARS1	[]	RUSS1	[]	WATS1	[]	STN82	[]	7-DAY	[]
WHMS1	[]	JAMS1	[]	NEUN7	[]	STN83	[]	8-DAY	[]
ESTS1	[]	STPS1	[]	NUDN7	[]	STN84	[]	9-DAY	[]
MODS1	[]	GVLS1	[]	WLKN7	[]	STN85	[]	10-DAY	[]
JACS1	[]	CCKS1	[]	CWAN7	[]	STN86	[]	11-DAY	[]
GADS1	[]	BCRS1	[]	HGRN7	[]	STN87	[]	12-DAY	[]
FTMS1	[]	BKLS1	[]	LBRN7	[]	STN88	[]	13-DAY	[]
LNGS1	[]	BLRS1	[]	WYLN7	[]	STN89	[]	14-DAY	[]
MILS1	[]	CHES1	[]	RKYN7	[]	STN90	[]	15-DAY	[]
RKYS1	[]	CNWS1	[]	AUGG1	[]	STN91	[]		
MTCS1	[]	GAFS1	[]	CLYG1	[]	STN92	[]		
WLLS1	[]	GIVS1	[]	HRTG1	[]	STN93	[]		
GALS1	[]	GRES1	[]	BRYG1	[]	STN94	[]		
PDES1	[]	STMS1	[]	STN70	[]	STN95	[]		
SLUS1	[]	WEPS1	[]	STN71	[]	STN96	[]		
ORBS1	[]	CHDS1	[]	STN72	[]	STN97	[]		
BBCS1	[]	CHPS1	[]	STN73	[]	STN98	[]		
CTBS1	[]	CNES1	[]	STN74	[]	STN99	[]		
CHAS1	[]	FOMS1	[]	STN75	[]	ST100	[]		

ERROR - N O N E - - N O N E

Figure 2. The RVRA menu as it appears on the AFOS GDM

```

RIVER AND LAKE PLOTTING PROGRAM
----- MENU -----
EXIT THE PROGRAM [ ]

ALTS1 [ ] KINS1 [ ] GRNS1 [ ] STN76 [ ] 1-DAY [ ]
COLS1 [ ] EFFS1 [ ] IRMS1 [ ] STN77 [ ] 2-DAY [ ]
RBR1 [ ] BRAS1 [ ] JCSS1 [ ] STN78 [ ] 3-DAY [ ]
CMDS1 [ ] WSHS1 [ ] KEOS1 [ ] STN79 [ ] 4-DAY [ ]
PNVS1 [ ] JMSS1 [ ] NEL1 [ ] STN80 [ ] 5-DAY [ ]
DTAS1 [ ] ALVS1 [ ] PASS1 [ ] STN81 [ ] 6-DAY [ ]
CARS1 [ ] RUSS1 [ ] WATS1 [ ] STN82 [ ] 7-DAY [ ]
WHMS1 [ ] JAMS1 [ ] NEUN7 [ ] STN83 [ ] 8-DAY [ ]
ESTS1 [ ] STPS1 [ ] NUDN7 [ ] STN84 [ ] 9-DAY [ ]
MODS1 [ ] GVLS1 [ ] WLKN7 [ ] STN85 [ ] 10-DAY [ ]
JACS1 [ ] CCKS1 [ ] CWAN7 [ ] STN86 [ ] 11-DAY [ ]
GADS1 [ ] BCRS1 [ ] HGRN7 [ ] STN87 [ ] 12-DAY [ ]
FTMS1 [ ] BKLS1 [ ] LBRN7 [ ] STN88 [ ] 13-DAY [ ]
LNGS1 [ ] BLRS1 [ ] WYLN7 [ ] STN89 [ ] 14-DAY [ ]
MILS1 [ ] CHES1 [ ] RKYN7 [ ] STN90 [ ] 15-DAY [ ]
RKYS1 [ ] CNWS1 [ ] AUGG1 [ ] STN91 [ ]
MTCS1 [ ] GAFS1 [ ] CLYG1 [ ] STN92 [ ]
WLLS1 [ ] GIVS1 [ ] HRTG1 [ ] STN93 [ ]
GALS1 [ ] GRES1 [ ] BRYG1 [ ] STN94 [ ]
PDES1 [ ] STMS1 [ ] STN70 [ ] STN95 [ ]
SLUS1 [ ] WEPS1 [ ] STN71 [ ] STN96 [ ]
ORBS1 [ ] CHDS1 [ ] STN72 [ ] STN97 [ ]
BBCS1 [ ] CHPS1 [ ] STN73 [ ] STN98 [ ]
CTBS1 [ ] CNES1 [ ] STN74 [ ] STN99 [ ]
CHAS1 [ ] FOMS1 [ ] STN75 [ ] ST100 [ ]
END

```

Figure 2a. File RVRMENU.DT

NMCRRASC A.
NMCRRANC A.
NMCRRAGA A.
CAERRICAE A.
RDURRIRDU A.
ATLRR2ATL A.
ATLRR3ATL A.
.END
ALTS1 10.00
COLS1 19.00
RERS1 470.00
CMDS1 23.00
PNVS1 76.80
DTAS1 13.00
CARS1 18.00
WHMS1 25.00
ESTS1-999.00
MODS1 18.00
JACS1-999.00
GADS1 17.00
GALS1 9.00
PDES1 19.00
SLUS1-999.00
ORBS1 8.00
BBCS1-999.00
CTBS1-999.00
CHAS1 14.00
KINS1 12.00
EFFS1 14.00
BRAS1-999.00
WSHS1-999.00
JMSS1-999.00
ALVS1-999.00
RUSS1-999.00
JAMS1 10.00
STPS1-999.00
NUDN7-999.00
WLKN7-999.00
CWAN7-999.00
HGRN7-999.00
LBRN7-999.00
WYLN7-999.00
RKYN7-999.00
AUGG1-999.00
CLYG1-999.00
HRTG1-999.00
BFYG1-999.00
.END

Figure 3. File IDFILE.DT

DATA READ FROM RECORD NO		8								
222.00	56.00	6.00	2.00	25.00	1988.00	69.00	1.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	

DATA READ FROM RECORD NO		222								
4.69	4.60	472.58	2.41	73.66	4.80	3.80	15.45	10.70	-9999.00	
5.80	6.39	6.99	7.97	-9999.00	1.57	1.33	1.25	7.86	6.65	
3.63	5.87	1.05	4.65	1.11	8.82	6.69	4.89	-9999.00	11.88	
-9999.00	7.80	5.82	16.24	8.80	8.80	-9999.00	-9999.00	-9999.00	2.09	
-9999.00	3.73	6.72	2.64	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	
-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	4.87	250.29	
-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	5.00	2.83	6.49	-9999.00	-9999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	

DATA READ FROM RECORD NO		223								
-223.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	
99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	99999.00	

Figure 4. Sample RVRDATA.DT records
Top: record zero
Middle: record with data
Bottom: record without data

LISTING OF MISSING RECORDS FROM THE FILE RVRDATA.DT

CHECK RECORD * 17 FOR MISSING DATA
CHECK RECORD * 133 FOR MISSING DATA
CHECK RECORD * 134 FOR MISSING DATA
CHECK RECORD * 135 FOR MISSING DATA
CHECK RECORD * 136 FOR MISSING DATA
CHECK RECORD * 137 FOR MISSING DATA
CHECK RECORD * 138 FOR MISSING DATA
CHECK RECORD * 139 FOR MISSING DATA
CHECK RECORD * 140 FOR MISSING DATA
CHECK RECORD * 141 FOR MISSING DATA
CHECK RECORD * 142 FOR MISSING DATA
CHECK RECORD * 173 FOR MISSING DATA
CHECK RECORD * 178 FOR MISSING DATA
CHECK RECORD * 185 FOR MISSING DATA
CHECK RECORD * 186 FOR MISSING DATA
CHECK RECORD * 196 FOR MISSING DATA

FINISHED CHECKING RECORDS 1 THROUGH 222

Figure 5. List of missing records (RVR/V)

RUR/L

ENTER FIRST RECORD NO. TO LIST 0
ENTER LAST RECORD NO TO LIST 0
R (A)
RUR/L

ENTER FIRST RECORD NO. TO LIST 220
ENTER LAST RECORD NO TO LIST 223
R (A)

RUR/C

DATA CORRECTING ROUTINE
YOU MUST KNOW THE RECORD NUMBER AND STN ID
YOU WISH TO CORRECT.

ENTER THE RECORD # OF THE INCORRECT DATA 225

ENTER THE ID OF THE INCORRECT STN FOLLOWED BY A CR

ENTER THE CORRECT DATA FOLLOWED BY CR FOR STN COLS1
20.14

IS THIS THE CORRECT DATA ? (Y/N) 20.14

R (A)

Figure 6. Samples of the interactive routines
(Operator input is underlined)

<u>Main</u>		<u>Subroutines</u>			
RVR	----	RVR7			
	----	RVR8			
	----	RVR9			
	----	RVR0			
	----	RVR1	----	RVR2	----
			----	RVR3	----
			----	RVR4	
	----	RVR5	----	CFLTCVT	
				JDATE	

RLDR/P RVR RVR1 RVR2 RVR3 RVR4 RVR5 RVR7 RVR8 RVR9 RVR0 JDATE CFLTCVT
 RVRREV <TOP BG UTIL FORT>.LB RVR.LM/L

<u>Main</u>		<u>Subroutines</u>			
RVRA	----	RVRG	----	CFLTCVT	
			----	JDATE	
	----	RVRC			
	----	RVRE			
	----	CURSR	----	RDCUR	
	----	RVRB			
	----	RVRD	----	CFLTCVT	
			----	RVRF	

RLDR/P RVRA RVRB RVRC RVRD RVRE RVRF RVRG JDATE CFLTCVT CURSR RDCUR
 RVRAREV <EGR2 UTIL FORT>.LB RVRA.LM/L

Figure 7. Program flow and load lines for RVR (top) and RVRA.

VII. Appendices

APPENDIX I: IDFILE.DT FORMAT

IDFILE.DT (see Figure 3) can be divided into two sections. The first section contains a list of the AFOS keys to be decoded. The record number computed from the first .B portion of the first key will be used to check all other computed record numbers. The first key to be decoded should be a key that is updated every 6 hours, such as NMCRRAXX. There is no limit on the number of keys that may be decoded, but the number of stations that may be decoded is limited to 1000. If the eleventh character of the line is an "A" the program will decode the entire product. If there is no "A" in the eleventh position the program will decode only the first portion (only those stations in the first .B section). This section of IDFILE.DT is terminated with a .END.

The second section of IDFILE.DT is a list of the station call letters and flood stage. The list may be in any order and is limited to 100 stations. The data in the file RVRDATA.DT will be in the same order as the station list in the current IDFILE.DT. Changing the order of IDFILE.DT once the program has been run will mix data for different stations. If new stations are to be added, they should be put at the end of the list. Each line of this section consists of 12 characters. The first 5 characters are the station call letters as they appear in the various products to be decoded. Characters 6 - 12 are the flood stage. A -999.00 can be used if the flood stage is missing or nonexistent. This section is also terminated with a .END.

APPENDIX II: RVRDATA.DT FORMAT

All of the decoded data is stored into the RVRDATA.DT file. This file is located in USER2. RVRDATA.DT is a random file 1145 blocks (586,000 bytes) long. The file consists of 1465 records - 0 to 1464 with the length of each record 400 bytes. Each record will store 100 real numbers. Record numbers 1 through 1464 are used to store data. The record number for any data set is computed from the Julian date by

$$\text{RECORD NUMBER} = ((\text{JULIAN DATE} - 1) * 4) + \text{IH where}$$

IH = 1 for 00z data between 2100z and 0259z
2 for 06z data between 0300z and 0859z
3 for 12z data between 0900z and 1459z
4 for 18z data between 1500z and 2059z

Record zero is used to store housekeeping information in the first 8 values as listed below:

1. Record number of the most current data
2. Julian date for the most current data

3. UTC time for the most current data
4. Month for the most current data
5. Day for the most current data
6. Year for the most current data
7. Number of stations in IDFILE.DT for the most current data
8. The record number of the first valid entry in the file.

Records 1 through 1464 are initialized with a value of 99999.00 for all data, except the first value in each record is the negative of the record number. A -9999.00 will indicate missing data (see Figure 4).

APPENDIX III: RVRMENU.DT FORMAT

The RVRMENU.DT file is a copy of the menu as it will be displayed on the GDM. The file will need to be edited to put in local information. To edit the file use the AFOS command E:F/APPL1:RVRMENU.DT. Care must be taken to ensure the location and spacing of all brackets remain the same. If the spacing of the brackets is changed, the menu selection portion of the program will not function properly. The file contains a list of stations that are being decoded by RVR. RVRMENU.DT should contain the same stations as those listed in IDFILE.DT. The first column of RVRMENU.DT should be the same as the first 25 stations in IDFILE.DT. The second column of the file should be the same as the next 25 stations in IDFILE.DT and so on.

Column 5 allows the user to change the number of days of data that will be plotted. The values range from 1 to 15. The default value is 15 (see Figure 2 and Figure 2a).

VIII. Source Code

Source code is available on request from the authors or Eastern Region SSD.

Eastern Region Computer Programs and Problems (Continued)

- 43 AEX - Automatic Program Execution. Harold H. Opitz,
June 1988. (PB 88 231121/AS)
- 44 TURB: Turbulence Forecasting for Small/Medium and Large
Aircraft. Steven J. Naglic, July 1988. (PB 88 246368/AS)
- 45 SLOS: Displaying Time Histories of Storm Surge Data
from SLOSH Output. Charles D. Little, April 1989

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