NEW SPACE SENSOR AND MESOSCALE DATA ANALYSIS

FINAL REPORT

Prepared For:
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Attention:
AP29-F

Under Contract:
NAS8-36181

Prepared By:
John S. Hickey
President, ACI

Date:
July 20, 1987
This is the Final Report prepared by Atsuko Computing International (ACI), under Contract NAS8-36181, entitled "New Space Sensor and Meso-scale Data Analysis", for the Earth Science & Applications Division of the Structures and Dynamics Laboratory at the Marshall Space Flight Center. The technical monitor for this contract is Mr. Claude Green.

Prepared by:

John S. Hickey, President
Atsuko Computing International

7-20-97
Date
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1.0 INTRODUCTION

Atsuko Computing International (ACI), is very pleased to submit this Final Report under Contract NAS8-36181, entitled "New Space Sensor and Meso-scale Data Analysis, to the Earth Science & Applications Division (ESAD) of the Structures and Dynamics Laboratory at the Marshall Space Flight Center.

The ESAD is currently involved in the interactive information processing for the Mesoscale Analysis and Space Sensor (MASS) program. Specifically, the ESAD is concerned with the development and implementation of new space-borne remote sensing technology to observe and measure atmospheric processes. These space measurements and conventional observational data are being processed together to gain an improved understanding of the mesoscale structure and dynamical evolution of the atmosphere relative to cloud development and precipitation processes.

To satisfy the ESAD’s vast data processing requirements, a Research Computer System consisting of three primary computers was developed (HP-1000, Harris/6, and Perkin-Elmer 3250) which provides over thirty scientists with a wide range of capabilities for processing and displaying interactively large volumes of remote sensing data. This Research Computer System has now been expanded to include access to a Class 6 super computer via a Local Area Network utilizing Apple III and IBM PC workstations.

ACI personnel have been directly involved in the design, development, and integration of both the software and hardware for the ESAD’s Research Computer System. ACI’s major effort has been to develop a graphics data analysis system and data base management on the HP-1000 computer and then to extend these capabilities by integration with the other computers using the ESAD’s Apple III and IBM PC microcomputer workstations.

The following sequence of tasks have been completed by ACI under this contract (in accordance with Option B-2, Statement of Work dated March 4, 1986) to accomplish the required objectives:

- Updated and implemented the required software to modify the existing data base archiving utilities on the ESAD’s HP-1000 computer system to provide for additional data type/format archiving and to accommodate larger files on the HP-7933 (400 mb) disc as the data sets were identified and available.

- Established the requirements and put into effect the necessary modifications and improvements to the existing Apple III copy and image storage capabilities to incorporate the 5mb file storage devices into the Apple III workstations and enhanced the animation and graphics capabilities to utilize the storage devices.

- Extended the Apple III workstation capabilities to include graphics and imaging capabilities in connection with the ESAD’s Harris/6 and Perkin-Elmer 3250 computer systems.

- Determined the requirements necessary to convert the AVE80 Series HP-1000 programs from Graphics 1000 to Graphics II and developed a Graphics II to Apple III graphics translator library for the AVE80 Series Apple III programs.
o - Implemented a standardized data file naming convention and formatting structure on the Harris/6 and Perkin-Elmer computers.

o - Determined the interface requirements and provided the capabilities necessary to establish future required access to the MSFC Class 6 computer network for the ESAD computer system incorporating the "patch panel" communication system developed by ACI.

o - Continued to update/enhance the 3-D graphics capabilities using the Advanced Graphics Package software for the AVE80 Series programs and implemented on the ESAD's HP-1000 and Apple III computers.

o - Restructured the existing HP-1000F data base management system and naming convention to utilize the RTE-6 Command Interpreter (CI) file system for the disc structure currently being developed.

o - Developed the capabilities currently existing on the Apple III workstations for the IBM PC's, so that the IBM PC's can be used in the same capacity as the Apple III's.

o - Provided system software updates and applications software computer code improvements for the ESAD computer system as required.

o - Provided software computer code updates and user guidance as to the operations and capabilities developed.

o - Provided description and operation procedures for computer code developed under this contract (Reference AVE Series Programs User's Reference Manuals Volume I, II, and III dated June 15, 1987).

1.1 OVERVIEW

The remainder of this report documents and summarizes the results of the entire contract work effort, including recommendations and conclusions based on experience and results obtained. In the Appendix of this report, a description of the AVE80 Series Programs along with several output examples are provided. A detailed description of the AVE80 Programs, and all computer codes developed under this contract are documented in the "AVE80 Series Programs User's Reference Manual" Volume I, II, and III dated June 15, 1987.
2.0 OVERALL RESULTS

During this research study entitled "New Space Sensor for Mesoscale Data Analysis", ACI has performed all tasks as defined within the contract and details the results of each task in the following subsections.

2.1 DATA BASE ARCHIVING FOR HP-1000 COMPUTER SYSTEM

ACI has been responsible for the development of various software utilities which provide for the archiving of numerous large data sets that have been stored in different formats and file types. ACI has updated these archiving utilities as was required to satisfy the database archiving needs. The current utility that is being utilized, which seems to best meet all the requirements for archiving all types and sizes of data sets is the "TF" utility program which archives data sets on an individual basis or a disc logical unit basis. Currently, all HP-1000 data sets are being archived on a bi-weekly period, using the HP-1000 1600 bpi magnetic tape drive and seven 9-track tapes to perform a total back-up of all active files.

2.2 5MB DISC STORAGE DEVICE TO ENHANCE APPLE III WORKSTATIONS

ACI established that it was necessary to incorporate to the APPLE III workstations a 5mb storage device to improve the existing imaging and hard copying capability. With the addition of the 5mb storage devices, ACI was able to improve the graphics capabilities and enhance animation and image storage capabilities.

2.3 EXTEND APPLE III WORKSTATION CAPABILITIES WITH HARRIS/6 AND PERKIN-ELMER

ACI designed and developed a "patch panel" for integrating the Apple III workstations with the HP-1000, Harris/6, and Perkin-Elmer 3250 computers. This extended the user's graphics and imaging capabilities via the communication link between the Apple III workstation and the other computers. ACI later provided this same capability by communicating through the Local Area Network which links the Apple III workstations through the BIU's.

2.4 HP-1000 AVE80 PROGRAM GRAPHICS TRANSLATOR TO APPLE III GRAPHICS

ACI developed the AVE80 Series Programs which operate on the HP-1000 computer system utilizing the HP-1000 graphics plotting package. It was required to make the same AVE80 plotting capabilities on the Apple III workstations. ACI thus developed a graphics translator library which allows the AVE80 programs to execute on the APPLE III's and generate the same graphics outputs. A complete description of the AVE80 programs and the APPLE III graphics library translator is provided in the "AVE80 Series Program User's Reference Manual" Volume I, II, and III dated June 15, 1987.
2.5 STANDARDIZED FILE STRUCTURE AND NAMING CONVENTION

ACI has developed a data base management package to convert various data types into a standard format for storing "random access" data sets on the HP-1000, thus making them readily available to various general purpose plotting and analysis software packages. All data sets have been converted into a predefined format based upon data type and named according to "six character" naming convention. The data is then stored according to its data type to a specially dedicated area on disc. This file structure and naming convention has proven successful on the HP-1000 computer system and has been documented (AVE80 Series Program User's Reference Manual). The same naming convention and data structure has been made available for the Harris/6 and Perkin-Elmer 3250 computer systems.

2.6 INTERFACE ESAD'S COMPUTER SYSTEM WITH MSFC'S CLASS 6 COMPUTER

ACI determined the interface requirements for linking the ESAD's computer system with the MSFC's Class 6 computer via the ACI developed "patch panel" and the Local Area Network. Once the MFSC's Class 6 computer became available ACI successfully implemented and tested the computer-to-computer communications between the ESAD's computers and workstations and the Class 6 computer network via the "patch panel" and Local Area Network.

2.7 ENHANCE AVE80 PROGRAM GRAPHICS CAPABILITIES

ACI continued to improve the overall graphics capabilities of the AVE80 Series Programs. Both the HP-1000 and the APPLE III AVE80 program graphics were updated and enhanced to provide for faster execution and additional capabilities. Again refer to the "AVE80 Series Program User's Reference Manual" for a complete detail of the graphics capabilities.

2.8 RTE-6 COMMAND INTERPRETER FOR HP-1000 COMPUTER

Due to the vast amount of data residing on the HP-1000 computer system, it has been necessary to restructure the existing data base management system and naming convention to utilize the HP-1000 RTE-6 Command Interpreter (CI) file system. Under the old "file manager" system, the user was limited to six character file names (16 characters with CI), and could only assign the data files to a specific disc logical unit (CI allows for directories and subdirectories within a logical unit). Currently, only the HP-7933 (400mb) disc has been restructured to utilize the CI file system, while the other discs still remain under the "file manager" format.
2.9 PROVIDE APPLE III CAPABILITIES ON THE IBM PC WORKSTATIONS

ACI developed the APPLE III workstation to provide for numerous capabilities by the user to communicate to the ESAD's computer system (HP-1000, Harris/6, and Perkin-Elmer 3250), and to the MSFC's Class 6 computer via the Local Area Network. After the ESAD acquired several IBM PC's, ACI installed the IBM's and installed or developed software to provide basically the same capabilities that were provided by the APPLE III workstations. The IBM PC workstations can be utilized as stand-alone or as graphics terminals linked to the ESAD computers or the Class 6 computer via the Local Area Network. The IBM's also have Laserjet printing capabilities which provides for enhanced graphics and imaging.

A graphics software package "Reflection 3" was installed on the IBM's by ACI to emulate the HP-1000 graphics package. This allows all the existing HP-1000 graphics programs including the AVE80 programs to execute on the IBM PC workstations without modifications.

2.10 UPDATE HP-1000 SYSTEM SOFTWARE

ACI has provided system software enhancements and modifications for the HP-1000 computer system as HP updates were made available. In addition, all Operating System and System Generations were performed as the conditions dictated.

2.11 PROVIDE USER UPDATE ASSISTANCE AND GUIDANCE

ACI has assisted the ESAD Scientists in providing software and User guidance as to the operations and capabilities developed by ACI on the ESAD's computers and workstations.

2.12 PROVIDE SUMMARY REPORTS

ACI has provided Monthly summary reports describing the computer codes developed and system improvements/capabilities for the ESAD computer system. In addition ACI has written a three Volume document that details most of the codes developed and implemented by ACI (Reference "AVE80 Series Program User's Reference Manual" dated June 15, 1987).
3.0 CONCLUSIONS & RECOMMENDATIONS

In summary, the ESAD's system/software developed by ACI provides the research scientist with the following capabilities:

- An extensive data base management capability to convert various experiment data types into a standard format for accessing by the general purpose plotting and data analysis packages.

- An interactive analysis and display package (AVE80) to graphically display and analyze large volumes of conventional and satellite derived meteorological data.

- An interactive imaging/color graphics capability utilizing the APPLE III and IBM PC worksations integrated into the ESAD computer system and MSFC's Class 6 computer via the Local Area Network.

- Local and remote smart-terminal capability which provides color video, graphics, and Laserjet output.

To meet the growing requirements of the ESAD's computer system and the scientists utilizing the system, ACI believes that the ESAD computer system must continue to be enhanced and updated. ACI recommends the following tasks should be performed to keep the ESAD computer system up to date:

A) Applications Software

- Finalize the existing HP-1000 AVE80 Series Programs as Operational Version 1.0.

- Finalize the existing HP-1000 AVE80 Series Programs User's Manual as Operational Version 1.0.

- Create a developmental version of the HP-1000 AVE80 Series Programs and continue to update and implement the required software changes to provide for processing additional data types and formats, and for providing enhanced graphics capabilities.

- Finalize the developmental HP-1000 AVE80 Series Programs at the end of the Contract Continuation as Operational Version 2.0.


- Study the feasibility to transfer the HP-1000 AVE80 Series Programs to EADS or in-house VAX computer system.

B) Data Base Management

- Complete the restructuring of the HP-1000 Disc Lu's, including the reformatting of all HP disc drives to be under the RTE-6 Command Interpreter (CI Volume) file system for all program and data files.
B) Data Base Management

- Complete the restructuring of the HP-1000 Disc Lu's, including the reformatting of all HP disc drives to be under the RTE-6 Command Interpreter (CI Volume) file system for all program and data files.

- Perform feasibility study of utilizing the HP-1000 Image 1000 data base management software package for enhancing the capabilities of handling various data types/formats and to accommodate larger data files on the HP-7933 CI Volume as the data sets are generated.

- Continue to update and implement the required software to provide for data transfer between the HP-1000 and IBM PC's utilizing the XMODEM 1000 and REFLECTION 3 software packages.

- Develop utility software to transfer the AVE80 Series Program data base (Soundings, Single Level, Grids, Images) to the McIDAS MD FILE on EADS or VAX computer.

- Develop interactive utility software to allow User to reformat a data set into a standard and acceptable format that is directly usable by the Operational AVE80 Series Programs.

- Continue to survey the CS/1000 HP "user programs" for utilities that provide helpful tools in data base management, file manipulation, file archiving and format conversions.

C) System Operations

- Continue to perform HP-1000 System generations as needed to incorporate the latest software revisions and system requirements.

- Continue to update/support the ACI developed "Patch Panel" communication system to provide access to the ESAD computer network.

- Continue to provide modifications and improvements to the IBM PC workstations with respect to graphics, data storage, data transfer, and hardcopy capabilities.

- Continue to provide support for the BIU data communications capabilities as required between the Workstations and the Host computers.

- Continue to support the EADS computer system via the Local Area Network utilizing the IBM PC workstations.

- Continue to perform Bi-monthly HP-1000 Computer System disc file "backup" for all on-line active data and program files utilizing the "TF" utility and stored on 1600 bpi magnetic tape.
D) ESAD User Assistance

- Provide software updates and user guidance as to the operations and capabilities developed by ACI for the ESAD scientists.

- Provide assistance to ESAD users for learning the operations and capabilities of the AVE80 Series Programs.

- Provide assistance to ESAD users for developing "utility" software that is tailored for one's individual requirements.

E) Documentation

- Provide Monthly Reports describing all work accomplished during the reporting period, including any problems encountered as well as an updated milestone chart to show current status of all tasks.

- Provide documentation for all "utility" software developed and User's Manuals for all "applications" software developed or updated under this Contract.

- Provide a Final Report which provides a summary description of all the tasks performs as well as computer codes developed and modified under this Contract.
APPENDIX A

This Appendix contains a portion of the "AVE80 Series Programs User's Reference Manual, Volume I, dated June 15, 1987. A subset of the first four sections is provided to give an overview of the AVE80 programs developed by ACI and the capabilities that exist. The completed AVE80 User's Manual contains over 1200 pages and contains the source listings of all the AVE80 programs and graphics libraries that were developed by ACI, along with complete data file formats and other utilities required to generate and maintain the various data sets.
June 15, 1987

National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Attention: AP29-F

Subject: Reference Manual prepared for Contract NAS8-36181

Dear Sir:

Atsuko Computing International (ACI) is pleased to submit the enclosed Reference Manual prepared under Contract NAS8-36181 and entitled "AVE80 Series Programs User's Reference Manual."

The enclosed Reference Manual is divided into two (2) volumes, with Volume I describing the overall AVE80 Series Programs capabilities and User interactive operations. Volume II is actually an Appendix with contains the actual source code listings of the AVE80 Series Programs along with the various command files and data files required to operate and maintain the entire package.

If you have any questions concerning this Reference Manual, please contact me at (205) 881-5608 (ACI's Office) or (205) 544-1667 (NASA Work Area).

Sincerely,

ATSUKO COMPUTING INTERNATIONAL

John S. Hickey
President, ACI

jsh/jh


Copies of Enclosure:
- AS24-D (0) + Letter
- AT01 (0) + Letter
- EM13A-15 (0) + Letter
- CC01/Wofford (0) + Letter
- ED44/Claude Green (1) + Repro Copy
- NASA Scientific & Technical Information Facility (0) + Letter

This manual provides the User with a complete description of the AVE80 Series Programs which includes the various graphical outputs generated, the different data types processed, the data file structures and formats, and a step-by-step detailed example of the interactive User operations for executing any of the AVE80 programs.

It is the intent of this document to be the primary reference source for all User's who will be utilizing the interactive AVE80 Series Program via the HP-1000, IBM PC's, and APPLE III computer workstations.

The NASA technical monitor for this Contract is Mr. Claude Green/ED44.

Prepared by:

John S. Hickey, President
Atsuko Computing International

Date

6-15-87
This Reference Manual describes the AVE80 Series Programs developed by Atsuko Computing International (ACI), for the Atmospheric Sciences Division at NASA's Marshall Space Flight Center.

The AVE80 Series Programs is an interactive analysis and display software package developed on the ASD's HP-1000 computer system and is written in FORTRAN and utilizes the HP Graphics 1000 plotting library. ACI also made the AVE80 Series Programs operational on the IBM PC's and APPLE III computer workstations via the HP-1000 as host computer.

The AVE80 Series Programs has been successfully implemented and utilized daily by the atmospheric scientists to graphically display and analyze large volumes of conventional and satellite derived meteorological data. Multiple User's can process simultaneously and interactively various selected data (Soundings, Single Level, Grid, Image) by using the AVE80 Task Scheduler which links numerous software programs allowing each User to share common data and generate both printed and graphical outputs as desired.

Volume I describes the overall AVE80 Series Programs capabilities and User interactive operations. Volume II is actually an Appendix which contains the source code listings of the AVE80 Series Programs along with the various command files and data files required to operate and maintain the entire package.
1.0 GENERAL DESCRIPTION

The Atmospheric Sciences Division at Marshall Space Flight Center has a Data Management and Analysis Display System developed on the HP-1000 computer system by Atsuko Computing International (ACI) which has been successfully implemented and utilized daily by atmospheric scientists to graphically display and analyze large volumes of conventional and satellite derived meteorological data. This software developed by ACI has been incorporated into a series of programs called the AVE80 Series Programs. The AVE80 Series Programs consist of four major divisions of programs which process four various types of atmospheric data (Sounding, Single Level, Grid, and Image), as shown in Figure 1-1.

**AVE80 -- Task Scheduler**

<table>
<thead>
<tr>
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<th>CASES:</th>
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<tr>
<td>1. 25-mb Data</td>
<td>1. AVE/AVESS</td>
</tr>
<tr>
<td>2. Single Level</td>
<td>2. AVE/SESAME</td>
</tr>
<tr>
<td>3. Grid Data</td>
<td>3. AVE/VAS</td>
</tr>
<tr>
<td>4. Image Data</td>
<td>4. Other</td>
</tr>
</tbody>
</table>

![Figure 1-1 AVE80 Task Scheduler](image)

The AVE80 Series Programs link over 30 software programs together allowing each to share common data and User inputs and to process in a multi-user environment simultaneously. The AVE80 programs (see Figure 1-2) allow the user to display atmospheric data in various forms such as station and parameter base map plots, Skew T plots, vertical profile of selected parameters, displayed grids, contoured grids, images, parameter value printouts, and etc. The User selects the desired data parameters such as data type, set, category, group, and data base. Further, the User must select output type, output device, time period, pressure level, batch or non-batch mode, station number, latitude, longitude, and several additional options depending on the output desired.

Output devices available to the User include: HP plotters, HP graphics terminals, IBM PC AT/XT graphics terminal, Laserjet printer, Apple III graphics monitors, and Apple Silentype printer, and HP lineprinter/plotter.
Figure 1-2 AVE80 Program Modules
The HP-1000 data management software converts various meteorological experiment data into a standard format, thus making the data readily accessible to the AVE80 Series Programs. The four specific data types currently processed utilizing the AVE80 programs are listed below:

1) Soundings (Rawinsonde/Satellite)
2) Single Level (Surface, Cloud Winds, LLP, Precipitation, etc.)
3) Grids (from 1 and 2 above)
4) Images (Satellite, Radar)

All data sets are initially converted into a "standard" format and a "random access" disk file created and named according to a defined data file naming convention. The data is stored on the HP-7933 400MB disk which has been structured to provide simple file management. Each data set type is assigned to a specific logical unit:

1) Logical Unit#40 -- 200 MB for Image Data
2) Logical Unit#41 -- 100 MB for Grid Data
3) Logical Unit#42 -- 50 MB for Single Level Data
4) Logical Unit#43 -- 50 MB for Sounding Data

The AVE80 Series Programs expect the specific data types to exist on the assigned disk, along with a documentation file which describes the data base (number of times, stations, parameters, etc.) and a latitude/longitude file which provides the information for graphically plotting the station location, thus allowing for faster access while minimizing data housekeeping/archiving functions.

The four data types each have a dedicated "directory file" that contains the file names and parameter information for indexing into the "random access" data base. The number of stations, time periods, and data parameters are all provided in the directory file. The directory contains all data sets currently existing online or archived. Only the frequently accessed data files are kept on-line on disk while the others are archived bi-monthly.

In summary the HP-1000 data base management provides numerous utility programs which provide for the following with respect to the AVE80 Series Programs:

-- Convert/create random access data sets
-- Create/update directory files
-- Create documentation files
-- Create latitude/longitude files
-- Archive/restore data sets.
1.1 OVERVIEW

The remainder of this Reference Manual details four major areas with regards to the AVE80 Series Program. The following provides a brief overview of what is contained in each of the following Sections:

Section 2.0 — AVE80 SERIES PROGRAMS GRAPHICAL OUTPUTS

- AVE80 Graphical Outputs
  - Soundings
  - Single Level
  - Grids
  - Images

Section 3.0 — DATA BASE AND FILE MANAGEMENT

- Data Types and File Naming
- Date Structure and Format
- Data Base Directory Files
- Data Base Documentation Files
- Data Base Latitude/Longitude Files

Section 4.0 — AVE80 SERIES PROGRAMS OPERATIONS

- AVE80 Interactive Software
- Operational Procedures

Section 5.0 — UTILITIES AND COMMAND FILES

- Special AVE80 software utility programs
- Special AVE80 libraries
- Special AVE80 compile/link command files

VOLUME II — AVE80 SERIES PROGRAMS REFERENCE MANUAL

Appendix — Source Code Listings & Data Files
2. AVE80 SERIES PROGRAMS GRAPHICAL OUTPUTS

The AVE80 Series Programs is comprised of over thirty programs linked together by a task scheduler to provide the User with a sophisticated means for processing the four data types and generating various graphical outputs. A detailed functional flowchart (see Figure 2-1) shows the relationship of the different programs with respect to the data types and output types.

The User's interactive inputs are passed from one program to another via a common data file. The four data type may be accessed randomly by multiple User's at the same time. Outputs are then generated based upon User inputs and device/output selection parameters.

In this section examples of various outputs generated by the AVE80 Series Programs are presented. The following graphical outputs are included:

- SND80 Programs (Sounding Data)
  -- Skew T Plot
  -- Parameter Value Plot
  -- Parameter Vector Plot
  -- Parameter Profile
  -- Print Sounding Data
  -- 25-mb Station Base Map Plot

- SGL80 Programs (Single Level Data)
  -- Station Base Map Plot
  -- Station Parameter Printout
  -- Station Parameter Plot

- GRD80 Programs (Grid Data)
  -- Printed Grid Data
  -- Contoured Grid Data Plot

- IMG80 Programs (Image Data)
  -- Display Image Data
  -- Print Image Data

In the remainder of this Section each of the AVE80 Series Programs described above are further defined with respect to logical flow, data types, data sets, inputs, and outputs. Actual output samples are provided that were generated on the IBM PC with Laserjet printer.
** ANALYSIS & DISPLAY SOFTWARE **
** (HP-1000F S/W VERSION) **

Figure 2-1 — AVE80 Flow Diagram
Below is a Logical Flow Diagram of the "AVE80" Task Scheduler along with the associated input/outputs:

**PROGRAM AVE80** ("AVE S/W" TASK SCHEDULER) HP-1000F VERSION

C******************************************************************************C
C** DESCRIPTION: Program 'AVE80' schedules the following AVE programs according to the "user selected" data type to be processed:
C**
C** LOGICAL FLOW:
------------- **
| AVE80 |
------------- **
| **
| **
| **
| **
| SND80  SGL80  GRD80  IMG80 |
| (25-mb) (S Lev) (Grid) (Image) |
C**
C** DATA Type: Description
C**
| **
| 1. 25-mb Data
| 2. Single Level Data
| 3. Grid Data
| 4. Image Data
C**
C** DATA SETS: Description
C**
| **
| 1. AVE/AVESS
| 2. AVE/SESAME
| 3. AVE/VAS
| 4. OTHER
C**
C** INPUTS: Data Type (1-4)
| **
| Data Set (1-4)
C**
C** OUTPUTS: Generated from the Scheduled Programs:
| **
| o -- Skew T Profile Plot
| o -- Parameter Value Plot
| o -- Parameter Profile Plot
| o -- Wind Vector Plot
| o -- Wind Profile Plot
| o -- Wind Barb Plot
| o -- Printed Contour Profile
| o -- Contour Plot
| o -- Printed Grid Profile
| o -- Color Image Display
| o -- Shaded Printed Image
C**
C*************************************************************************************

In the remainder of this section detailed examples generated by the "SND80", "SGL80", "GRD80", and "IMG80" programs are provided.

ATSUKO COMPUTING INTERNATIONAL
HUNTSVILLE, ALABAMA • USA
Figure 2-2. Skew T Plot from SN180 Program
Figure 2-3. Skew T Plot from SN180 Program

ORIGINAL PAGE IS
OF POOR QUALITY.
Data: AVE-SESAME I  From: APR 10-11 1979 CENTERVILLE, ALABAMA

PARAMETER VALUE PLOT: WIND SPD: M/S

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P-98 858 700 500 300 200

13 21 24 30 28 28 36 31 29 24 33 30 28 28 36 39 35 34 28 19 19 31 24 33 30 28 28 36 39 35 34 28 19

TIME(Z)


Figure 2-4. Parameter Value Plot from SN280 Program
Figure 2-5. Parameter Wind Vector Plot from SN380 Program (Barb)
Figure 2-6. Parameter Wind Vector Plot from SN380 Program
Data: AUE-SESMME I  From: APR 18-11 1979 CENTEVILLE, ALABAMA

PARAMETER WIND VECTOR PLOT

Figure 2-7. Parameter Wind Vector Plot from SN380 Program
Figure 2-8. Parameter Profile Plot from SN480 Program
Figure 2-8. Parameter Profile Plot from SN480 Program
Figure 2-9. Wind Vector Base Map Plot from SN680 Program
(Barb)
Figure 2-10. Station Base Map Plot from SN680 Program
Figure 2-11. Wind Vector/Station Base Map Plot from SN680 Program
The following details the "SGL80" programs which operate on the HP-1000 computer using the HP Graphics 1000 plot package and on the IBM PC AT/XT using the Reflections software package and the HP as the host computer. Below is a logical flow diagram along with the required inputs and available outputs.

In the following pages examples generated on the IBM PC AT laserjet printer are provided.
Figure 2-12. Station Wind Barb Base Map Plot from SG180 Program
Figure 2-13. Station Wind Vector Base Map Plot from SG180 Program
Figure 2-14. Station Parameter Plot from SG380 Program
The following details the "GRD80" programs which operate on the HP-1000 computer using the HP Graphics 1000 plot package and on the IBM PC AT/XT using the Reflections software package and the HP as the host computer. Below is a logical flow diagram along with the required inputs and available outputs.

PROGRAM GRD80 ("AVE S/W" GRID DATA PROGRAM) HP-1000F VERSION
C**********************************************************C
C** DESCRIPTION: Program 'GRD80' processes a user selected **
C** Basic or Derived data group and generates a **
C** printed output. **
C**
C** LOGICAL FLOW: ----------
C** | GRD80 | ----------
C** |     |     |
C** | GR180 | GR280 |
C** | (Print) | (Plot) |
C**
C** DATA GROUPS: 1. Basic **
C** 2. Derived **
C**
C** INPUTS: Array Filenm Description **
C** ------- ------ ---------------- **********
C** IQFIL ?GRD80 GRD80 Question File **
C** IDFIL *GRDHR Directory File **
C** IRFIL RGBSIL Random Access Data File **
C** IBFIL RGLSIL Random Lat/Lon Data File **
C** ISFIL SGDSIL Seq. Documentation File **
C** IMFIL SGLSIL Sequential Lat/Lon File **
C**
C** OUTPUTS: 1. PRINT -- GRID Data (GR180) **
C** 2. PLOT -- Contour GRID Data (GR280) **
C****
C**********************************************************C

In the following pages examples generated on the IBM PC AT Laserjet printer are provided as well as HP printer outputs.

ATSUKO COMPUTING INTERNATIONAL
HUNTSVILLE, ALABAMA • USA
Figure 2-15. Contoured Grid Plot from GR280 Program
Figure 2-16. Contoured Plot from GR280 Program
Figure 2-17. Contoured Base Map Plot from GR280 Program
Figure 2-19 Printed Contoured Grid from GR180 Program

ATSUKO COMPUTING INTERNATIONAL
HUNTSVILLE, ALABAMA • USA
The following details the "IMG80" programs which operate on the HP-1000 computer using the HP Graphics 1000 plot package and on the IBM PC AT/XT using the Reflections software package and the HP as the host computer. Below is a logical flow diagram along with the required inputs and available outputs.

PROGRAM IMG80 ("AVE S/V" IMAGE PROGRAM) HP-1000F
C***********************************************************************************************
C** DESCRIPTION: Program 'IMG80' processes a user selected Satellite or Radar data group and generates a color Image Display.
C** LOGICAL FLOW: ---------------

| IMG80 |
-----   
| IM180  IMG280 |
       |
_______ |_______
|       |       |
|       |       |
|       |       |
|       |       |

C** DATA GROUPS: 1. Satellite  
2. Radar  
3. TBD  
C** INPUTS: Array Filenn Description  
IQFIL ?IMG80 IMG80 Question File  
IDFIL *IMGDR Directory File  
IRFIL RIGA41 Random Access Data File  
ISFIL SIQA42 Seq. Documentation File  
C** OUTPUTS: 1. DISPLAY -- Color Image (BARCO) (IM180)  
2. PRINT -- B/W Image (APPLE)

C***********************************************************************************************

In the following pages examples generated on the IBM PC AT Laserjet printer are provided as well as printouts from the HP 1000 system.
Figure 2-20. Displayed Image from DM180 Program
ACI has developed a Data Base Management package to convert various experiment data into a standard format for storing in "random access" disc files, thus making the data readily accessible to the Analysis and Display Software (AVE80 Series) and other general purpose plotting and analysis software.

The four specific data types currently processed utilizing the MASS data base management software are:

1) -- Sounding Data
2) -- Single Level Data
3) -- Grid Data
4) -- Image Data

All data sets are initially converted into a standard format and a "random access" disc file created and named accordingly to a defined MASS Data File naming convention as shown on Page 3-2.

All data sets can be accessed by the Analysis and Display (AVE80 Series) programs via retrieving information from a data base Directory File.

The data base Directory File contains the "random access" data file name, Lat&Lon File names, Documentation File name, along with the associated parameter indexes.

ACI has structured the MASS HP-7925 120mb disc to store the four data types and provide for simple file management. Each data set type is assigned to a specific LU as follows:

LU#44 -- Assigned only for Image Data
LU#45 -- Assigned only for Sounding Data
LU#46 -- Assigned only for Single Level Data
LU#47 -- Assigned only for Grid Data
LU#48 -- Assigned only for Temporary Data

The AVE80 Series code expects the specific data type to be already existing on the appropriate LU, thus allows for faster accessing and minimizes the data housekeeping/archiving functions.

ACI has developed numerous utility programs which are included in the Data Base Management package to provide functions such as:

- Create Random Access Data Base
- Create Documentation File
- Create Latitude/Longitude File
- Archive/Restore Data Base
3.1 DATA TYPES & FILE NAMING CONVENTION

ACI has developed the MASS Analysis and Display Software to process four types of experiment data:

1) -- Sounding Data
2) -- Single Level Data
3) -- Grid Data
4) -- Image Data

A standard file naming convention has been adopted for these data types as shown below:

<table>
<thead>
<tr>
<th>MASS Data File Naming Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Six character format)</td>
</tr>
<tr>
<td>File Name:</td>
</tr>
</tbody>
</table>

Where:

- **X1**: 'R' for Random Access Data Set
  = 'S' for Sequential Access Data Set

- **X2**: 'I' for Image Data
  = 'G' for Grid Data
  = 'M' for 25-mb Data
  = 'S' for Single Level Data

- **X3**: 'R' for Rawinsonde Data
  = 'T' for TIROS OS Sounding Data
  = 'A' for TIROS AVHRR Image Data
  = 'Y' for GOES VAS Sounding Data
  = 'G' for GOES VISSR Image Data
  = 'S' for Surface-ground Data
  = 'C' for Cloud Motion Data
  = 'P' for Precipitation Data
  = 'M' for MDR Data
  = 'N' for NOAA Satellite Data
  = 'X' for Digitized Radar Data
  = 'D' for Documentation Data (Raw)
  = 'L' for Latitude/Longitude Data (Raw)
  = 'Q' for Documentation Data (Sat)
  = 'Z' for Latitude/Longitude Data (Sat)
  = 'n' for Data File Version
  = 'other' determined as needed

- **XX4**: 'An' for AVE/AVESS Group
  = 'Sn' for AVE/SESAME Group
  = 'Vn' for AVE/VAS Group
  = 'On' for Other Group (undefined)

Note: n = 1-9 for Numbering Data Types

- **X5**: 'n' for Data File Version
  Note: n = 1-9, A-Z Data Version Numbers

Example: File Name = RMRS11

Implies: R = Random Data Set
         M = 25-mb Sounding Data
         R = Rawinsonde Data
         S1 = AVE/SESAME 1 Data Group
         1 = Version 1
3.2 DATA STRUCTURE & FORMAT

The four data types each have a dedicated Directory File that contains the file names and parameter information for indexing into the "random access" data base. The number of stations, time periods, and data parameters are all provided in the Directory File.

A description of the Directory File structure and format is given below:

```
01 RMRA41 RMLA41 16 042 09 SMDA41 SMLA41 AVE IV Raw APR 24-25 75
```

Where:

- **#n** -- Indicates entry number from 1 to 30 entries
- **R-Data** -- Random Access Data File Name
- **R-L/L** -- Random Access Lat/Lon File Name
- **PR** -- Indicates Number of Data Parameters
- **STA** -- Indicates number of Stations
- **TM** -- Indicates Number of Time Periods
- **S-Docu** -- Sequential Documentation File Name
- **S-L/L** -- Sequential Lat/Lon File Name
- **Group** -- Indicates 1 of 4 Data Groups (AYE, SESAME, VAS, OTH)
- **(Typ)** -- Indicates Data Type (Raw, Sat, Radr, Clid, Bas, Der, Etc.)
- **Time P** -- Indicates Time & Date of Data Base

The Directory File parameters (time periods, stations) are used to compute the indexing scheme used to access various data records in the "random access" data base. An example Directory File for each of the four data types is shown in Section 3.3.
3.3 DIRECTORY FILES

Associated with the MASS Analysis and Display Software, four Directory Files exist, one for each data type:

1) *IMGDR -- Directory File for Image Data on LU#44
2) *SNNDR -- Directory File for Sounding Data on LU#45
3) *SGLDR -- Directory File for Single Level Data on LU#46
4) *GRDDR -- Directory File for Grid Data on LU#47

The Directory Files are each in a fixed format and entries are indexed according to four defined data cases:

1) -- AVE/AVESS
2) -- AVE/SESAME
3) -- AVE/VAS
4) -- Other

Each entry contains the "random access" data file and Lat/Lon File names, the Documentation File name, along with the number of data parameters, time periods, and number of stations. An actual example of each of the four Directory Files is shown on the following pages.
**EXAMPLE of Sounding Directory File:** *SNDDR*

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<th>R-Data</th>
<th>R-L/L</th>
<th>PR</th>
<th>STA</th>
<th>TM</th>
<th>S-Docu</th>
<th>S-L/L</th>
<th>AVE/AVESS (Raw)</th>
<th>Time Per.</th>
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<td>0038</td>
<td>02</td>
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<td>0039</td>
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<td>0040</td>
<td>02</td>
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<tr>
<td>0041</td>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*End of Directory File*
Another file is the Documentation File which details the contents of each "random access" data base, thus for each "data base" there exists an associated "Documentation File". The Documentation File contains the following information:

- Detailed Station Names
- Specific Time/Date Information
- All available Pressure Levels
- All defined Data Parameters and Data Units
- Comment Information

An example of a Documentation File for each of the four types of data is given in the following pages.

Note that the formats are fixed and must adhere to that shown in the examples and defined below:

<table>
<thead>
<tr>
<th>LINE#</th>
<th>FORMAT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-23</td>
<td>Free</td>
<td>Displayed to Terminal Only</td>
</tr>
<tr>
<td>24</td>
<td>Fixed</td>
<td>Starting Index for Time Periods</td>
</tr>
<tr>
<td>25-35</td>
<td>Fixed</td>
<td>Labels for Plotting and Questions</td>
</tr>
<tr>
<td>36</td>
<td>Fixed</td>
<td>Starting Index for Pressure Levels</td>
</tr>
<tr>
<td>37-47</td>
<td>Fixed</td>
<td>Labels for Plotting and Questions</td>
</tr>
<tr>
<td>48</td>
<td>Fixed</td>
<td>Starting Index for Parameter Values</td>
</tr>
<tr>
<td>49-59</td>
<td>Fixed</td>
<td>Labels for Plotting and Questions</td>
</tr>
<tr>
<td>60</td>
<td>Fixed</td>
<td>Starting Index for Documentation Page</td>
</tr>
<tr>
<td>61-83</td>
<td>Free</td>
<td>Displayed to Terminal Only</td>
</tr>
</tbody>
</table>
EXAMPLE of Documentation File for Sounding Rawinsonde Data

```
SMDV31 T=00004 IS ON CR00045 USING 00034 BLKS R=0000

<table>
<thead>
<tr>
<th>Station</th>
<th>State</th>
<th>Time</th>
<th>Pressure</th>
<th>Temperature</th>
<th>Wind Speed</th>
<th>Wind Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Madrid</td>
<td>TX</td>
<td>11-2100GMT</td>
<td>3/27/82</td>
<td>2-1500GMT</td>
<td>3/27/82</td>
<td>3-1800GMT</td>
</tr>
<tr>
<td>El Paso</td>
<td>TX</td>
<td>4-2100GMT</td>
<td>3/27/82</td>
<td>4-1000GMT</td>
<td>3/28/82</td>
<td>6-0300GMT</td>
</tr>
<tr>
<td>Amarillo</td>
<td>TX</td>
<td>7-0600GMT</td>
<td>3/28/82</td>
<td>7-1200GMT</td>
<td>3/28/82</td>
<td></td>
</tr>
</tbody>
</table>

Note: (-) Special Network (SN), (+) National Weather Service (NWS)

Eight Soundings were taken at each of the above Stations:

- New Madrid
- El Paso
- Amarillo

TIMES: nn-dd/hhmmsz
nn-dd/hhmmsz
nn-dd/hhmmsz
nn-dd/hhmmsz
nn-dd/hhmmsz

LEVEL: nn-aaahaaa
nn-aaaaaaa
nn-aaaaaaa
nn-aaaaaaa
nn-aaaaaaa
nn-aaaaaaa
nn-aaaaaaa

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HUNTSVILLE, ALABAMA • USA
### PARAM

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>TIME</td>
<td>Min.</td>
</tr>
<tr>
<td>02</td>
<td>CONTACT</td>
<td>+00:</td>
</tr>
<tr>
<td>03</td>
<td>HEIGHT</td>
<td>GPM</td>
</tr>
<tr>
<td>04</td>
<td>PRESSURE</td>
<td>MB</td>
</tr>
<tr>
<td>05</td>
<td>TEMP</td>
<td>Deg C</td>
</tr>
<tr>
<td>06</td>
<td>DEW PT</td>
<td>Deg C</td>
</tr>
<tr>
<td>07</td>
<td>WIND DIR</td>
<td>Deg</td>
</tr>
<tr>
<td>08</td>
<td>WIND SPD</td>
<td>M/S</td>
</tr>
<tr>
<td>09</td>
<td>U-COMP</td>
<td>M/S</td>
</tr>
<tr>
<td>10</td>
<td>V-COMP</td>
<td>M/S</td>
</tr>
<tr>
<td>11</td>
<td>POT TEMP</td>
<td>Deg K</td>
</tr>
<tr>
<td>12</td>
<td>E POT T</td>
<td>Deg K</td>
</tr>
<tr>
<td>13</td>
<td>MX RATIO</td>
<td>GM/Kg</td>
</tr>
<tr>
<td>14</td>
<td>REL HUM</td>
<td>%</td>
</tr>
<tr>
<td>15</td>
<td>BAL RNGE</td>
<td>KM</td>
</tr>
<tr>
<td>16</td>
<td>BAL AZ</td>
<td>Deg</td>
</tr>
</tbody>
</table>

### USER

- **USER DATA-SET DOCUMENTATION PAGE FOR CRT DISPLAY (23 LINES)***

Raw 25-mb Data From Tape

---

**END-OF-DATA**
3.5 LAT/LON FILES

Also associated with the Directory File and Documentation File is the Lat/Lon File. This file contains for each station in the data base a specific latitude and longitude. The Analysis and Display Software uses the Lat/Lon File to plot data on a Base Map at the actual station or recording location.

A standard format has been defined for all Lat/Lon files and is shown below:

```
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HUNTSVILLE, ALABAMA • USA
```

Although the format is fixed and the Lat/Lon values are required, the User may choose other parameters in place of the STAT#, TPER, or STID. In addition, it should be noted that the Image Data does not require Lat/Lon Files.
### EXAMPLE of LAT/ION File Formats

<table>
<thead>
<tr>
<th>SMLY31 T=00004 IS ON CR00045 USING 0006 BLKS</th>
<th>SMLY22 T=00004 IS ON CR00045 USING 00221 BLKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 0001 33.98 99.71 01 CRO</td>
<td>0001 0001 43.06 102.60 01 1100</td>
</tr>
<tr>
<td>0002 0002 33.93 98.22 01 HEN</td>
<td>0002 0002 42.95 100.73 01 1100</td>
</tr>
<tr>
<td>0003 0003 33.94 96.40 01 LIA</td>
<td>0003 0003 42.84 98.91 01 1100</td>
</tr>
<tr>
<td>0004 0004 33.19 99.18 01 TRK</td>
<td>0004 0004 42.74 97.13 01 1100</td>
</tr>
<tr>
<td>0005 0005 33.20 97.19 01 DTM</td>
<td>0005 0005 42.66 95.40 01 1100</td>
</tr>
<tr>
<td>0006 0006 32.43 99.69 01 ABI</td>
<td>0006 0006 42.58 93.70 01 1100</td>
</tr>
<tr>
<td>0007 0007 32.33 96.66 01 EHN</td>
<td>0007 0007 42.16 103.92 01 1100</td>
</tr>
<tr>
<td>0008 0008 31.71 92.10 01 BUD</td>
<td>0008 0008 42.04 102.04 01 1100</td>
</tr>
<tr>
<td>0009 0009 31.48 97.20 01 HEW</td>
<td>0009 0009 41.93 101.22 01 1100</td>
</tr>
<tr>
<td>0010 0010 30.74 99.81 01 BUR</td>
<td>0010 0010 41.83 98.44 01 1100</td>
</tr>
<tr>
<td>0011 0011 30.64 96.47 01 CLL</td>
<td>0011 0011 41.74 96.71 01 1100</td>
</tr>
<tr>
<td>0012 0012 30.08 93.18 01 LCH</td>
<td>0012 0012 41.27 105.24 01 1100</td>
</tr>
<tr>
<td>0013 0013 34.67 98.41 01 PSI</td>
<td>0013 0013 41.15 103.35 01 1100</td>
</tr>
<tr>
<td>0014 0014 33.19 101.39 01 POS</td>
<td>0014 0014 41.04 101.52 01 1100</td>
</tr>
<tr>
<td>0015 0015 32.93 89.41 01 BVE</td>
<td>0015 0015 40.94 99.75 01 1100</td>
</tr>
<tr>
<td>0016 0016 32.33 90.08 01 JAN</td>
<td>0016 0016 40.84 98.91 01 1100</td>
</tr>
<tr>
<td>0017 0017 32.40 94.80 01 GGG</td>
<td>0017 0017 40.76 96.32 01 1100</td>
</tr>
<tr>
<td>0018 0018 29.83 96.92 01 VCT</td>
<td>0018 0018 40.68 94.66 01 1100</td>
</tr>
<tr>
<td>0019 0019 32.33 98.25 01 SEP</td>
<td>0019 0019 40.62 109.56 01 1100</td>
</tr>
<tr>
<td>0020 0020 32.33 98.25 01 SEP</td>
<td>0020 0020 40.28 104.67 01 1100</td>
</tr>
<tr>
<td>0021 0021 29.33 100.92 01 DRT</td>
<td>0021 0021 40.17 102.83 01 1100</td>
</tr>
<tr>
<td>0022 0022 31.93 102.19 01 MAI</td>
<td>0022 0022 40.06 101.05 01 1100</td>
</tr>
<tr>
<td>0023 0023 31.90 106.40 01 ELP</td>
<td>0023 0023 39.88 97.62 01 1100</td>
</tr>
<tr>
<td>0024 0024 31.71 110.66 01 LTP</td>
<td>0024 0024 39.80 97.62 01 1100</td>
</tr>
<tr>
<td>0025 0025 34.78 92.24 01 LIT</td>
<td>0025 0025 39.70 109.91 01 1100</td>
</tr>
<tr>
<td>0026 0026 36.90 93.91 01 UMN</td>
<td>0026 0026 39.32 104.14 01 1100</td>
</tr>
<tr>
<td>0027 0027 35.30 97.70 01 OKC</td>
<td>0027 0027 39.21 102.35 01 1100</td>
</tr>
<tr>
<td>0028 0028 35.24 101.69 01 AMA</td>
<td>0028 0028 39.11 100.61 01 1100</td>
</tr>
<tr>
<td>0029 0029 35.00 106.70 01 ABG</td>
<td>0029 0029 39.02 98.91 01 1100</td>
</tr>
<tr>
<td>0030 0030 35.05 110.76 01 INWO</td>
<td>0030 0030 38.94 97.25 01 1100</td>
</tr>
<tr>
<td>0031 0031 38.66 88.98 01 SLO</td>
<td>0031 0031 38.86 96.22 01 1100</td>
</tr>
<tr>
<td>0032 0032 37.76 99.98 01 DDC</td>
<td>0032 0032 38.80 110.27 01 1100</td>
</tr>
<tr>
<td>0033 0033 39.07 95.62 01 TJP</td>
<td>0033 0033 38.43 104.55 01 1100</td>
</tr>
<tr>
<td>0034 0034 39.80 104.90 01 DEN</td>
<td>0034 0034 38.32 102.77 01 1100</td>
</tr>
<tr>
<td>0035 0035 39.10 108.53 01 CJT</td>
<td>0035 0035 38.25 101.94 01 1100</td>
</tr>
<tr>
<td>0036 0036 40.67 99.60 01 FIR</td>
<td>0036 0036 38.15 99.36 01 1100</td>
</tr>
<tr>
<td>0037 0037 41.09 96.01 01 DMA</td>
<td>0037 0037 38.05 97.71 01 1100</td>
</tr>
<tr>
<td>0038 0038 41.14 100.68 01 LBF</td>
<td>0038 0038 37.85 109.65 01 1100</td>
</tr>
</tbody>
</table>
4.0 AVE80 SERIES PROGRAMS OPERATIONS

The AVE80 Series Programs run on the HP-1000 using Graphics 1000 plot library, or run on the IBM PC AT/XT with the Reflection software package to emulate an HP graphics terminal. In addition, there exists another version of the AVE80 programs which run on the APPLE III computers. The APPLE III version is now non-supportive and non-updated and therefore will not be discussed in the remainder of this section.

To operate the AVE80 Series Programs the User simply runs the AVE80 task scheduler "command file" program from the File Manager Mode:

Example To Run AVE80 "Command File" ::*AVE80::26

A detailed discussion of the command files used by the AVE80 programs is given in Section 5, with a complete listing of all command files provided in Volume II.

The AVE80 task scheduler will ask the user if the HP-1000 graphics software or the IBM PC Reflection software is being used. Then the User must decide which of the four data types is to be processed. Once the User selects the desired data type, the task scheduler will load the appropriate programs needed to process the selected data type, (loading all AVE80 Series programs requires to much space in the loader area).

The AVE80 Series Programs will then prompt the user for various interactive inputs for qualifying the desired data options. The User may choose to process data on an individual single case basis or select a batch mode where one can set up start/stop boundaries to process multiple data cases (production mode of operation).

Finally the User must select the graphical output type and the output device to display the data. Upon completion, the User can at that time modify the inputs and continue processing or simply terminate, at which time the task scheduler removes all programs from the loader area and releases all devices and data sets.

In the following sections a detailed example is provided for the User to follow in order to become familiar with Operating the AVE80 Series Programs. In most cases there is a "default" value in which the User simply presses "Return" to go to the next question. Sections 4-1 through 4-5 provide an actual execution of the AVE80 programs with each question and answer that is seen on the terminal. The User should be able to walk through the Examples provided in Sections 4-6 through 4-18, and then have a comprehensive understanding on the overall Operational Procedures.
4.1 INTERACTIVE AVE80 TASK SCHEDULER -- "AVE80" (HP-1000F VERSION)

Below is a Logical Flow Diagram of the "AVE80" Interactive Task Scheduler along with the associated input/outputs:

---

**FTN4X,L**

**PROGRAM AVE80** ("AVE S/W" TASK SCHEDULER) HP-1000F VERSION

C******************************************************************************
C** DESCRIPTION: Program 'AVE80' schedules the following AVE programs according to the "user selected" "data type" to be processed:
C**
C******************************************************************************
C** LOGICAL FLOW:
C**
C**
C**
C**
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C**
C**

---
4.2 SOUNDING DATA SOFTWARE -- "SND80" (HP-1000F VERSION)

This section details the "SND80" Sounding Data Software. This program operates on the HP-1000F Computer and generates graphical outputs to HP devices utilizing HP "Graphics 1000" Software Package. Below is a logical flow diagram of the "SND80" program along with the required input files and available outputs.

In the remainder of this section detailed examples generated by the "SND80" software along with complete "Operational Procedures" are provided.
**AVE80 Series Programs -- Using HP-1000 & IBM PC/AT Graphics**

---

**Helpful Instructions for Running the AVE80 Interactive Programs**

A) To Use the Default Values for any Question, simply hit Return.  
B) To Quit or Restart, Answer '999' for any Numeric Question.

---

**PLEASE WAIT SOUNDING PROGRAMS ARE BEING LOADED!!**

ENTER To Proceed Enter (P): P

---

**AVE80 -- Task Scheduler**

| PROJECTDATASETS |
ENTER Desired Data Set? (1 to 4) (Default=2): 2

<table>
<thead>
<tr>
<th>1- AVE/AVESS</th>
<th>2- AVE/SESAME</th>
<th>3- AVE/VAS</th>
<th>4- Other</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SOUNDING DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories:</td>
</tr>
<tr>
<td>1-Rawinsonde</td>
</tr>
<tr>
<td>2-Satellite</td>
</tr>
</tbody>
</table>

ENTER Desired Data Category? (1 to 2) (Default=1): 1

<table>
<thead>
<tr>
<th>n</th>
<th>R-Data R-L/L</th>
<th>PR</th>
<th>STA</th>
<th>TM</th>
<th>S-Docu</th>
<th>S-L/L</th>
<th>AVE/SESAME (Raw)</th>
<th>Time Per. YR</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RMRS11</td>
<td>RLMS11</td>
<td>16</td>
<td>039</td>
<td>09</td>
<td>SMDS11</td>
<td>SMLS11</td>
<td>APR 10-11 79</td>
</tr>
<tr>
<td>02</td>
<td>RMRS21</td>
<td>RLMS21</td>
<td>16</td>
<td>040</td>
<td>09</td>
<td>SMDS21</td>
<td>SMLS21</td>
<td>APR 19-20 79</td>
</tr>
<tr>
<td>03</td>
<td>RMRS31</td>
<td>RLMS31</td>
<td>16</td>
<td>041</td>
<td>09</td>
<td>SMDS31</td>
<td>SMLS31</td>
<td>APR 25-26 79</td>
</tr>
<tr>
<td>04</td>
<td>RMRS41</td>
<td>RLMS41</td>
<td>16</td>
<td>042</td>
<td>09</td>
<td>SMDS41</td>
<td>SMLS41</td>
<td>MAY 09-10 75</td>
</tr>
<tr>
<td>05</td>
<td>RMRS51</td>
<td>RLMS51</td>
<td>16</td>
<td>042</td>
<td>09</td>
<td>SMDS51</td>
<td>SMLS51</td>
<td>MAY 20-21 79</td>
</tr>
<tr>
<td>06</td>
<td>RMRS61</td>
<td>RLMS61</td>
<td>16</td>
<td>038</td>
<td>09</td>
<td>SMDS61</td>
<td>SMLS61</td>
<td>JUN 07-08 79</td>
</tr>
<tr>
<td>07</td>
<td>RMRS12</td>
<td>RLMS11</td>
<td>16</td>
<td>039</td>
<td>09</td>
<td>SMDS12</td>
<td>SMLS11</td>
<td>APR 10-11 79</td>
</tr>
<tr>
<td>08</td>
<td>RMRS52</td>
<td>RLMS51</td>
<td>16</td>
<td>042</td>
<td>10</td>
<td>SMDS52</td>
<td>SMLS51</td>
<td>MAY 20-21 79</td>
</tr>
</tbody>
</table>

ENTER Desired Data Base? (1 to 8) (Default=1): 1

ENTER Display Documentation Page? (Y/N) (Default=N): N

******************************************************
***** SND80 SERIES -- SOUNDING GRAPHICS PACKAGE *****
******************************************************

Available Output Types:
1- Plot -- Skew T Profiles  (SN180)
2- Plot -- Parameter Values  (SN280)
3- Plot -- Parameter Vectors  (SN380)
4- Plot -- Parameter Profiles  (SN480)
5- Print -- Sounding Data  (SN580)
6- Plot -- Base Map Sounding Data  (SN680)

ENTER Desired Output Type? (1 to 6) (Default=1): 1

Available Output Devices:
1- IBM Graphics Terminal
2- HP 2623A Graphics Terminal
3- 4-Pen Plotter  (LU#20)
4- 8-Pen Plotter  (LU#18)

ENTER Desired Device Type? (1 to 4) (Default=1): 1
ENTER Multiple Plots Desired (Batch Mode)? (Y/N) (Default=N): N

The Rawinsonde Stations participating in the (AVE-SESAME I) Experiment are:

01+ Centerville , AL 15+ Amarillo , TX 29- Concordia , KS
02+ Boothville , LA 16+ Albuquerque , NM 30- Durant , OK
03+ Jackson , MS 17+ Salem , IL 31- Fort Smith , AR
04+ Lake Charles , LA 18+ Dodge City , KS 32- Gage , OK
05+ Longview , TX 19+ Topeka , KS 33- Goodland , TX
06+ Victoria , TX 20+ Denver , CO 34- Junction , TX
07+ Stephenville , TX 21+ Peoria , IL 35- Monroe , LA
08+ Del Rio , TX 22+Omaha , NE 36- Marfa , TX
09+ Midland , TX 23+ North Platte , NE 37- Morton , TX
10+ El Paso , TX 24- Abilene , TX 38- Raton , NM
11+ Nashville , TN 25- Bartlesville , OK 39- Oxford , MS
12+ Little Rock , AR 26- Columbia , MO 40- xxxxxxxxxxxxxxxxxxx, xx
13+ Monett , MO 27- Childress , TX 41- xxxxxxxxxxxxxxxxxxx, xx
14+ Oklahoma City , OK 28- College Station, TX 42- xxxxxxxxxxxxxxxxxxx, xx

Note: (-) Special Network (SN), (+) National Weather Service (NWS)

Nine Soundings were taken at each of the above Stations:
1-1200GMT 4/10/79 4-2100GMT 4/10/79 7--0600GMT 4/11/79
2-1500GMT 4/10/79 5-0000GMT 4/11/79 8--0900GMT 4/11/79

ENTER Print Detailed Station List To LU #6? (Y/N) (Default=N): N

ENTER Station Number & Time? (n,n) (Default= 1,1): 1,1

ENTER Use Default Color & Linestyle? (Y/N) (Default=Y): Y

ENTER Select Time & Date Label Positions? (Y/N) (Default=N): N

ENTER Wind Barbs Desired? (Y/N) (Default=Y): Y

ENTER Wind Barb Interval? (1-25mb,2-50mb,3-100mb) (Default=1): 1

ENTER Draw SKEW T Chart? (Y/N) (Default=Y): Y

ENTER Default SKEW T Chart Desired? (Y/N) (Default=Y): Y
ENTER Hard Copy of Plot Desired? (Y/N) (Default=N): Y

User: HICKEY
Program: SN180
Date: 14 MAY, 1987

ATSUKO COMPUTING INTERNATIONAL
HUNTSVILLE, ALABAMA • USA
ENTER Another SKEW T Plot Desired? (Y/N) (Default=N):

ENTER Continue AVE/SESAME Data Sets? (Y/N) (Default-N): N

ENTER Another Data Set or Category? (Y/N) (Default-N): N

PLEASE WAIT SOUNDOING PROGRAMS ARE BEING UNLOADED!!

:PA,, ENTER Another Data Type Desired? (TR,,Y or TR,,N)
:TR,,N

:*:* AVE80 Series Programs Completed!!
:*:*