NOAA Technical Memorandum NWS WR-167

ARAP USER'S GUIDE

Salt Lake City, Utah
July 1981

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

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ESSA Technical Memoranda (WRTM)

2 Climatological Precipitation Probabilities. Compiled by Lucianne Miller, December 1965.
3 Western Region Pre- and Post-FP-3 Program, December 1, 1965, to February 20, 1966. Edward D. Diemer, March 1966.
5 Station Descriptions of Local Effects on Synoptic Weather Patterns. Philip Williams, Jr., April 1966 (revised November 1967,October 1969). (PB-17800)
8 Interpreting the RAREP. Herbert P. Benner, May 1966 (revised January 1967).
11 Some Electrical Processes in the Atmosphere. J. Latham, June 1966.
17 A Digitalized Summary of Radar Echoes within 100 Miles of Sacramento, California. J. A. Youngberg and L. B. Overaas, December 1966.
21 An Objective Aid for Forecasting the End of East Winds in the Columbia Gorge, July through October. D. John Coparanis, April 1967.
22 Derivation of Radar Horizons in Mountainous Terrain. Roger G. Pappas, April 1967.

ESSA Technical Memoranda, Weather Bureau Technical Memoranda (WBTM)

25 Verification of Operational Probability of Precipitation Forecasts, April 1966-March 1967. W. W. Dickey, October 1967. (PB-176240)
26 A Study of Winds in the Lake Mead Recreation Area. R. P. Augulis, January 1968. (PB-177830)
28 Weather Extremes. R. J. Schmidli, April 1968 (revised February 1981).
29 Small-Scale Analysis and Prediction. Philip Williams, Jr., May 1968. (PB-178425)
30 Numerical Weather Prediction and Synoptic Meteorology. Capt. Thomas D. Murphy, U.S.A.F., May 1968. (AD-673365)
31 Precipitation Detection Probabilities by Salt Lake ARTC Radars. Robert K. Belesky, July 1968. (PB-179084)
32 Probability Forecasting--A Problem Analysis with Reference to the Portland Fire Weather District. Harold S. Ayer, July 1968. (PB-179289)
35 Joint ESSA/FAA ARTC Radar Weather Surveillance Program. Herbert P. Benner and DeVon B. Smith, December 1968 (revised June 1970). AD-681857)
36 Temperature Trends in Sacramento--Another Heat Island. Anthony D. Lentini, February 1969. (PB-183055)
37 Disposal of Logging Residues without Damage to Air Quality. Owen P. Cramer, March 1969. (PB-183057)
39 Upper-Air Lows over Northwestern United States. A. L. Jacobson, April 1969. (PB-184296)
40 The Man-Machine Mix in Applied Weather Forecasting in the 1970's. L. W. Snellman, August 1969. (PB-185068)
42 Analysis of the Southern California Santa Ana of January 15-17, 1966. Barry B. Aronovitch, August 1969. (PB-185670)
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49 Predicting Precipitation Type. Robert J. C. Burnash and Floyd E. Hug, March 1970. (PB-190962)
50 Statistical Report on Aeroallergens (Pollens and Molds) Fort Huachuca, Arizona, 1969. Wayne S. Johnson, April 1970. (PB-191743)
51 Western Region Sea State and Surf Forecaster's Manual. Gordon C. Shields and Gerald B. Burdwell, July 1970. (PB-193102)
52 Sacramento Weather Radar Climatology. R. G. Pappas and C. M. Veliquette, July 1970. (PB-193347)
54 A Refinement of the Vorticity Field to Delineate Areas of Significant Precipitation. Barry B. Aronovitch, August 1970.
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57 Preliminary Report on Agricultural Field Burning vs. Atmospheric Visibility in the Willamette Valley of Oregon. Earl M. Bates and David O. Chilcote, September 1970. (PB-194710)
58 Air Pollution by Jet Aircraft at Seattle-Tacoma Airport. Wallace R. Donaldson, October 1970. (COM-71-00017)
59 Application of PE Model Forecast Parameters to Local-Area Forecasting. Leonard W. Snellman, October 1970. (COM-71-00016)

NOAA Technical Memoranda (NWS WR)

60 An Aid for Forecasting the Minimum Temperature at Medford, Oregon. Arthur W. Fritz, October 1970. (COM-71-00120)
63 700-mb Warm Air Advection as a Forecasting Tool for Montana and Northern Idaho. Norris E. Woerner, February 1971. (COM-71-00349)
64 Wind and Weather Regimes at Great Falls, Montana. Warren B. Price, March 1971.
66 A Preliminary Report on Correlation of ARTCC Radar Echoes and Precipitation. Wilbur K. Hall, June 1971. (COM-71-00829)
69 National Weather Service Support to Soaring Activities. Ellis Burton, August 1971. (COM-71-00956)
71 Western Region Synoptic Analysis-Problems and Methods. Philip Williams, Jr., February 1972. (COM-72-10433)
74 Thunderstorms and Hail Days Probabilities in Nevada. Clarence M. Sakamoto, April 1972. (COM-72-10554)
75 A Study of the Low Level Jet Stream of the San Joaquin Valley. Ronald A. Willis and Philip Williams, Jr., May 1972. (COM-72-10707)
76 Monthly Climatological Charts of the Behavior of Fog and Low Stratus at Los Angeles International Airport. Donald M. Gales, July 1972. (COM-72-11140)
77 A Study of Radar Echo Distribution in Arizona During July and August. John E. Hales, Jr., July 1972. (COM-72-11136)
78 Forecasting Precipitation at Bakersfield, California, Using Pressure Gradient Vectors. Earl T. Riddiough, July 1972. (COM-72-11146)
79 Climate of Stockton, California. Robert C. Nelson, July 1972. (COM-72-10920)
80 Estimation of Number of Days Above or Below Selected Temperatures. Clarence M. Sakamoto, October 1972. (COM-72-10021)
81 An Aid for Forecasting Summer Maximum Temperatures at Seattle, Washington. Edgar G. Johnson, November 1972. (COM-73-10150)
82 Flash Flood Forecasting and Warning Program in the Western Region. Philip Williams, Jr., Chester L. Glenn, and Roland L. Raetz, December 1972, (revised March 1978). (COM-73-10251)
83 A Comparison of Manual and Semiautomatic Methods of Digitizing Analog Wind Records. Glenn E. Rasch, March 1973. (COM-73-10669)
86 Conditional Probabilities for Sequences of Wet Days at Phoenix, Arizona. Paul C. Kangieser, June 1973. (COM-73-11264)
87 A Refinement of the Use of K-Values in Forecasting Thunderstorms in Washington and Oregon. Robert Y. G. Lee, June 1973. (COM-73-11276)
89 Objective Forecast Precipitation over the Western Region of the United States. Julia N. Paegle and Larry P. Kierulff, Sept. 1973. (COM-73-11946/3AS)
91 Arizona "Eddy" Tornadoes. Robert S. Ingram, October 1973. (COM-73-10465)
92 Smoke Management in the Willamette Valley. Earl M. Bates, May 1974. (COM-74-11277/AS)
93 An Operational Evaluation of 500-mb Type Regression Equations. Alexander E. MacDonald, June 1974. (COM-74-11407/AS)
94 Conditional Probability of Visibility Less than One-Half Mile in Radiation Fog at Fresno, California. John D. Thomas, August 1974. (COM-74-11555/AS)
96 Map Type Precipitation Probabilities for the Western Region. Glenn E. Rasch and Alexander E. MacDonald, February 1975. (COM-75-10428/AS)
97 Eastern Pacific Cut-Off Low of April 21-28, 1974. William J. Alder and George R. Miller, January 1976. (PB-250-711/AS)
98 Study on a Significant Precipitation Episode in Western United States. Ira S. Brenner, April 1976. (COM-75-10719/AS)
99 A Study of Flash Flood Susceptibility--A Basin in Southern Arizona. Gerald Williams, August 1975. (COM-75-11360/AS)
102 A Set of Rules for Forecasting Temperatures in Napa and Sonoma Counties. Wesley L. Tuft, October 1975. (PB-246-902/AS)
103 Application of the National Weather Service Flash-Flood Program in the Western Region. Gerald Williams, January 1976. (PB-253-053/AS)
104 Objective Aids for Forecasting Minimum Temperatures at Reno, Nevada, During the Summer Months. Christopher D. Hill, January 1976. (PB-252-866/AS)
105 Forecasting the Mono Wind. Charles P. Ruscha, Jr., February 1976. (PB-254-650)
106 Use of MOS Forecast Parameters in Temperature Forecasting. John C. Plankinton, Jr., March 1976. (PB-254-649)
107 Map Types as Aids in Using MOS PoPs in Western United States. Ira S. Brenner, August 1976. (PB-259-594)
108 Other Kinds of Wind Shear. Christopher D. Hill, August 1976. (PB-260-437/AS)
109 Forecasting North Winds in the Upper Sacramento Valley and Adjoining Forests. Christopher E. Fontana, September 1976. (PB-273-677/AS)
110 Cool Inflow as a Weakening Influence on Eastern Pacific Tropical Cyclones. William J. Denney, November 1976. (PB-264-655/AS)
112 The MAN/MOS Program. Alexander E. MacDonald, February 1977. (PB-265-941/AS)
113 Winter Season Minimum Temperature Formula for Bakersfield, California, Using Multiple Regression. Michael J. Oard, February 1977. (PB-273-694/AS)
114 Tropical Cyclone Kathleen. James R. Fors, February 1977. (PB-273-676/AS)
116 A Study of Wind Gusts on Lake Mead. Bradley Colman, April 1977. (PB-268-847)
117 The Relative Frequency of Cumulonimbus Clouds at the Nevada Test Site as a Function of K-Value. R. F. Quiring, April 1977. (PB-272-831)
118 Moisture Distribution Modification by Upward Vertical Motion. Ira S. Brenner, April 1977. (PB-268-740)
119 Relative Frequency of Occurrence of Warm Season Echo Activity as a Function of Stability Indices Computed from the Yucca Flat, Nevada, Rawinsonde. Darryl Randerson, June 1977. (PB-271-290/AS)

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Mark Mathewson

National Weather Service Western Region Headquarters
Scientific Services Division
Salt Lake City, Utah
July 1981

UNITED STATES
DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
James F. Walsh, Acting Administrator

National Weather
Service
Richard E. Hallgren, Director

This Technical Memorandum has been reviewed and is approved for publication by Scientific Services Division, Western Region.

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

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ARAP USER'S GUIDE

Mark Mathewson
National Weather Service Western Region
Salt Lake City, Utah

I. INTRODUCTION TO ARAP

ARAP (AFOS Radar Processor) is designed to provide both local and remote users with high resolution, timely radar data that are normally not available by any other means.

A. Hardware

The ARAP computer system is a Data General NOVA 4/X computer with 64KW memory, a floppy disk drive (315KW capacity), and a Winchester disk (12.5MB capacity) see Figure I.1. It contains a communications interface (ULM-Universal Line Multiplexer) capable of full-duplex asynchronous communications for four lines. A video terminal is used for the console device. The only specialized hardware is a radar interface board and the antenna controller interface.

B. Software

The operating system is Data General Mapped RDOS model 3556 and runs off the Winchester disk. The ARAP program is a multi-tasking, overlayed program written in both FORTRAN (40%) and ASSEMBLER (60%) languages.

The program is divided into four subsystems: communications observational, product creation, and system maintenance.

The communication system can handle five bi-directional communication lines at speeds up to 9600 baud. It accepts commands from the lines, processes the commands, and sends the responses back to the user. The command structure has been designed to allow flexibility and ease of operation since the commands are similar in structure to AFOS commands. The communication system is also capable of archiving products either on floppy or the Winchester disk.

The observational subsystem takes the observation at the operator selectable time interval, performs ground-clutter suppression, and converts the polar data files to XY rectangular data files. The data are taken with 1-degree azimuthal resolution and 1-kilometer range resolution. The XY rectangular grid box is usually four kilometers by four kilometers in size.

The product creation subsystem uses the XY rectangular data files to calculate echo movements, areal coverage versus time, precipitation accumulations, and echo tops and vils. Product creation tasks use these calculations to generate the products.

The system maintenance subsystem monitors the system performance, keeps a system log, and updates parameter disk files.

C. ARAP Products

ARAP generates three types of products:

1) AFOS graphics.

2) Silent 700 full-grid alphanumeric (reduced resolution).

3) Silent 700 partial-grid alphanumeric (full resolution).

The information presented on these three types are:

1) Echo intensities.

2) Plot of areal coverage versus time.

3) Echo movements.

4) Precipitation accumulations.

5) Echo tops.

6) Echo VIL values.

In addition, an alarm/alert message can be generated if parameter thresholds are exceeded.

The AFOS graphics consist of a series of alphanumeric digits which represent the intensity of the parameter being displayed (Figure I.2). A title block (bottom center) describes the map type. An information block (upper left) depicts the station ID, date/time, and a legend used to equate the digits to the parameter value.

Four map backgrounds are available for display with the AFOS graphics:

1) State-County-Cities: Detailed map background containing solid state boundaries, dashed county boundaries, and labeled cities or other points. As the graphic is zoomed, additional detail is displayed (Figure I.3).

2) FAA airways: Detailed map background showing VORs, intersections, airways, and airports (Figure I.4). The following appear as the graphic is zoomed:

   1:1 or higher - VORs denoted as ⟨Δ⟩ with three-letter designators and airways shown as solid line (Figure I.4a).

   4:1 or higher - Intersections denoted as ▲ and labeled (Figure I.4b).

   9:1 or higher - Victor airways labeled (Figure I.4c).

   16:1 or higher - Airports denoted as ○ with three-letter designator (Figure I.4d).

3) Range Marks: Map background showing range marks at 50-km interval (Figure I.5).

4) MDR Grid: Map background depicting the manually digitized-radar code grid (Figure I.6).

In addition, the map backgrounds may be overlayed for any combination.

The other two types of products are the Silent 700 alphanumeric products. These are primarily made for users who do not have access to AFOS. The Silent 700 full-grid alphanumeric product does not contain any map backgrounds, but it does contain an east-west and north-south scale centered on the radar site (Figure I.7). Plastic transparent overlays are available. The data are in somewhat reduced resolution since the alphanumeric grid is smaller than the XY AFOS grid. The data are depicted as alphanumeric characters. A legend is provided to equate the digits to the parameter value. The Silent 700 partial grid alphanumeric product is similar to the full-grid alpahnumeric product (Figure I.8). It provides the same grid resolution as the XY AFOS products with the result that only a portion of the grid can be displayed. The center coordinates of the partial grid can be selected with a command before the observations are taken or a special product request can be made after the observation.

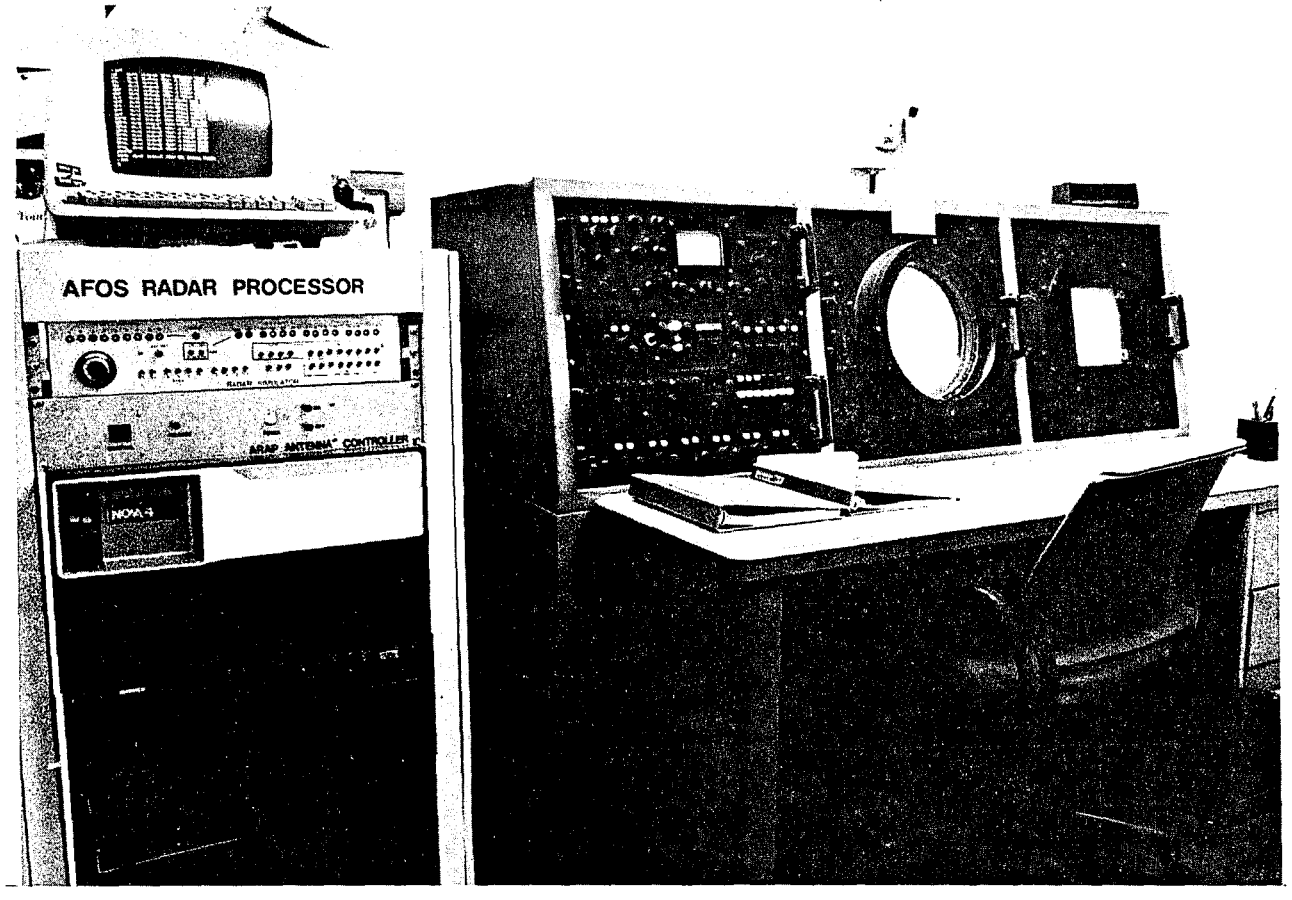


Figure I.1. ARAP System Installed next to WSR-74C.

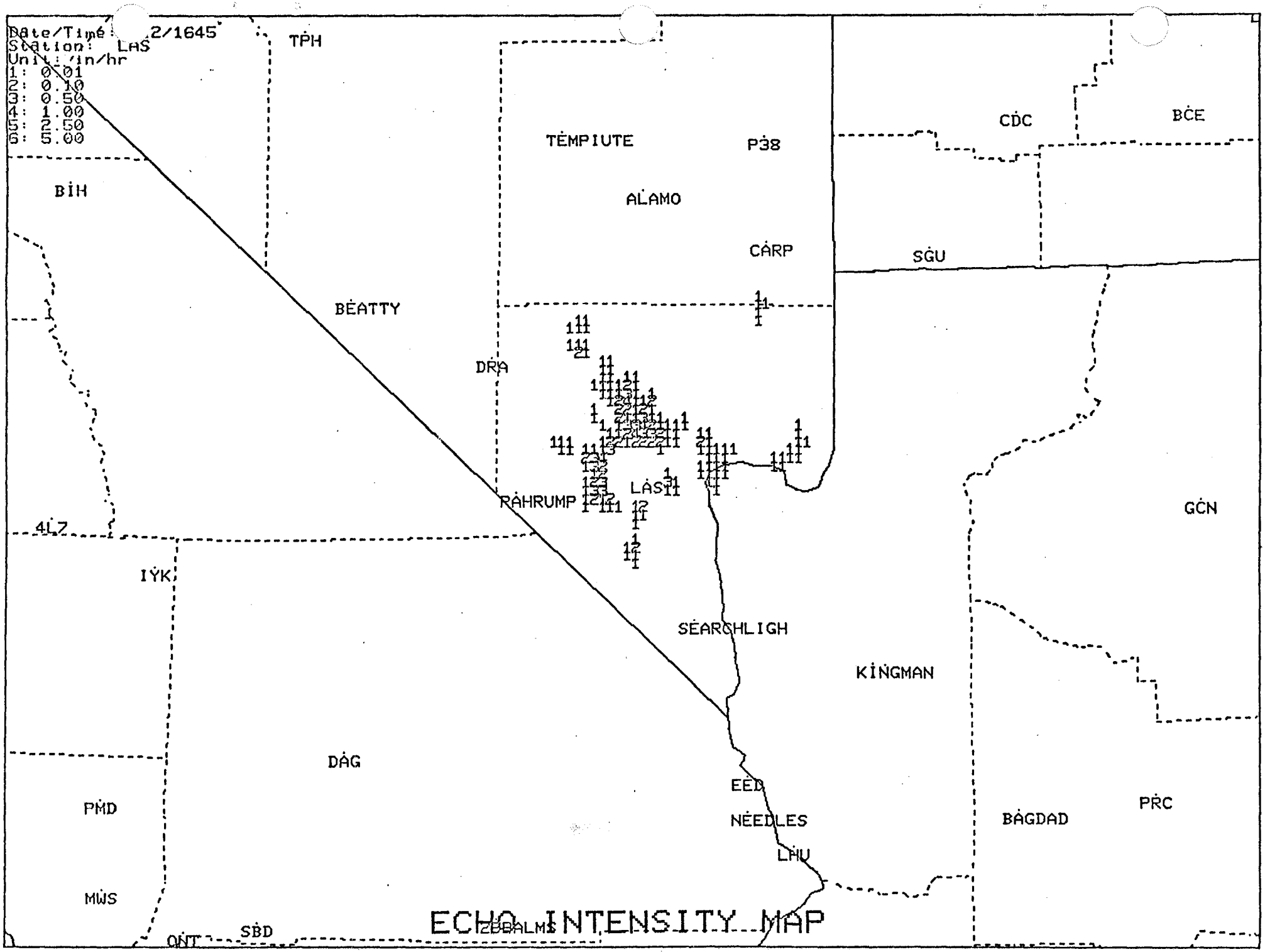


FIGURE I.2. Example of ARAP AFOS Graphic.

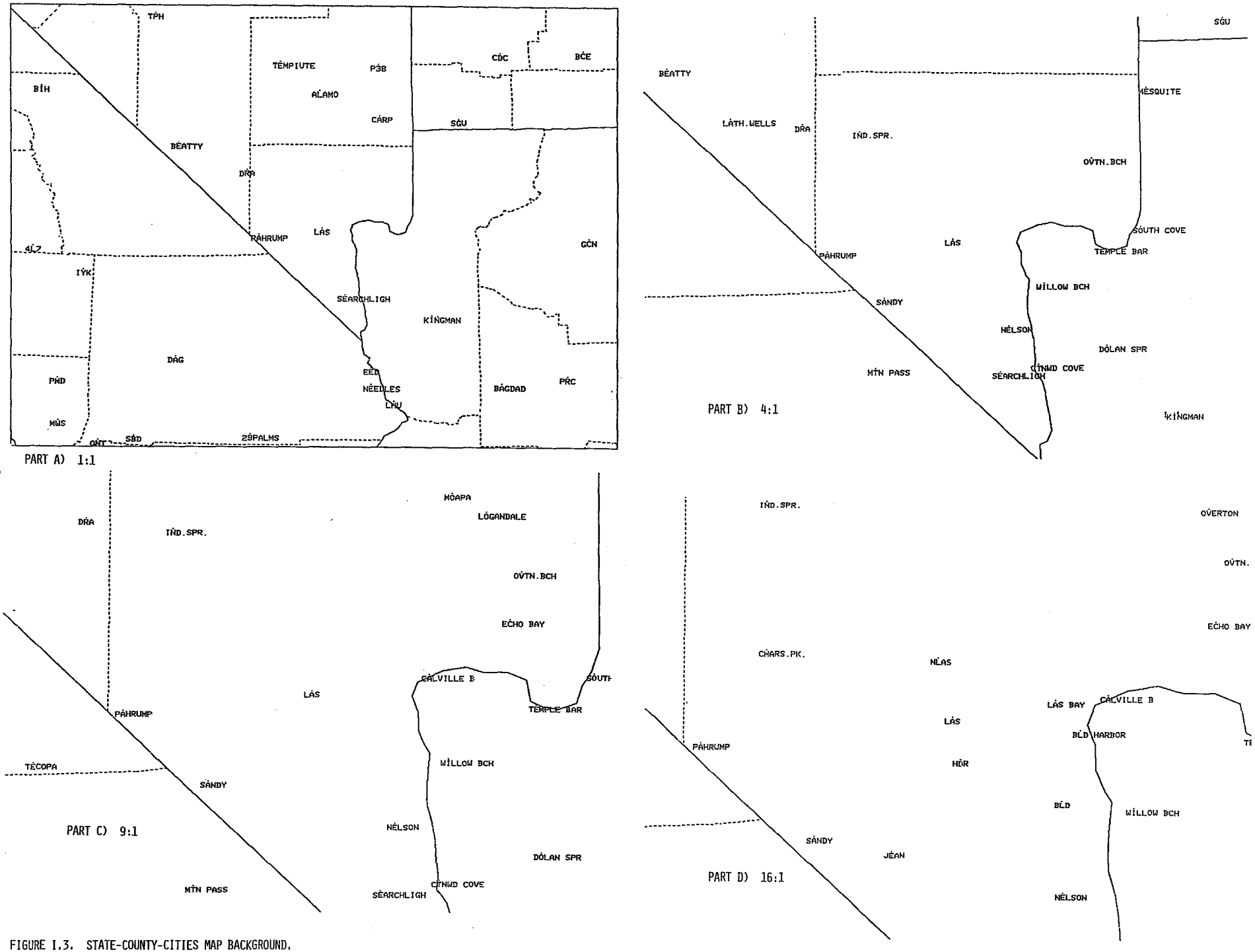
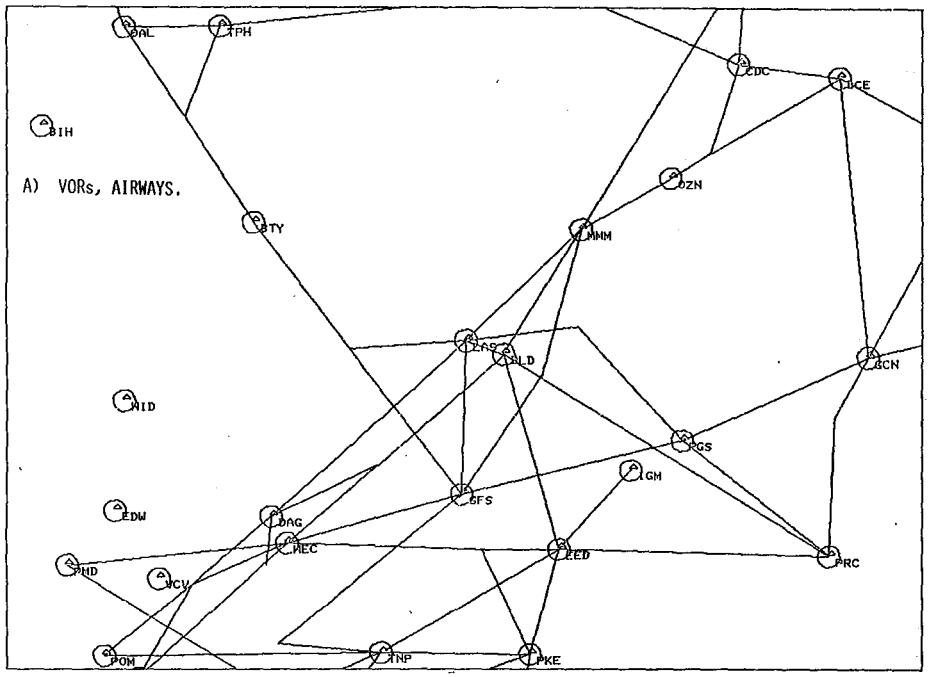
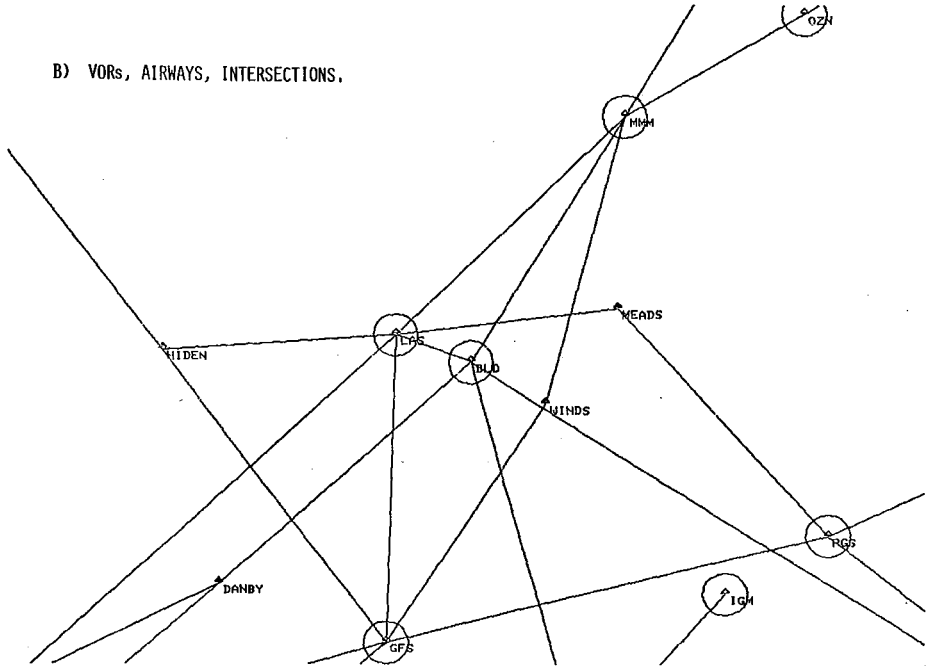
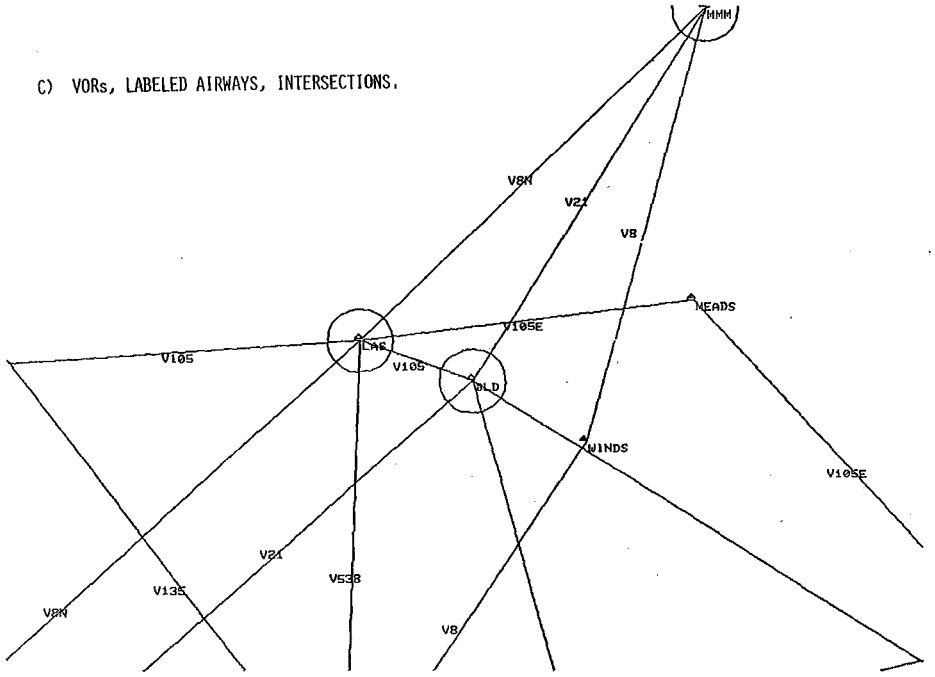


FIGURE I.3. STATE-COUNTY-CITIES MAP BACKGROUND.







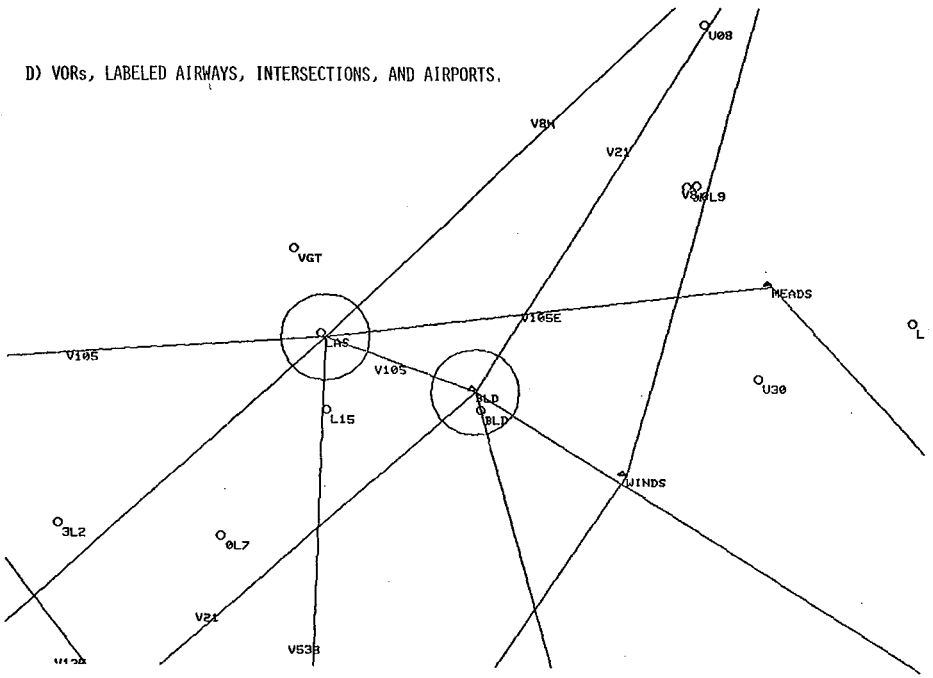


FIGURE I.4. FAA AIRWAYS MAP BACKGROUND.

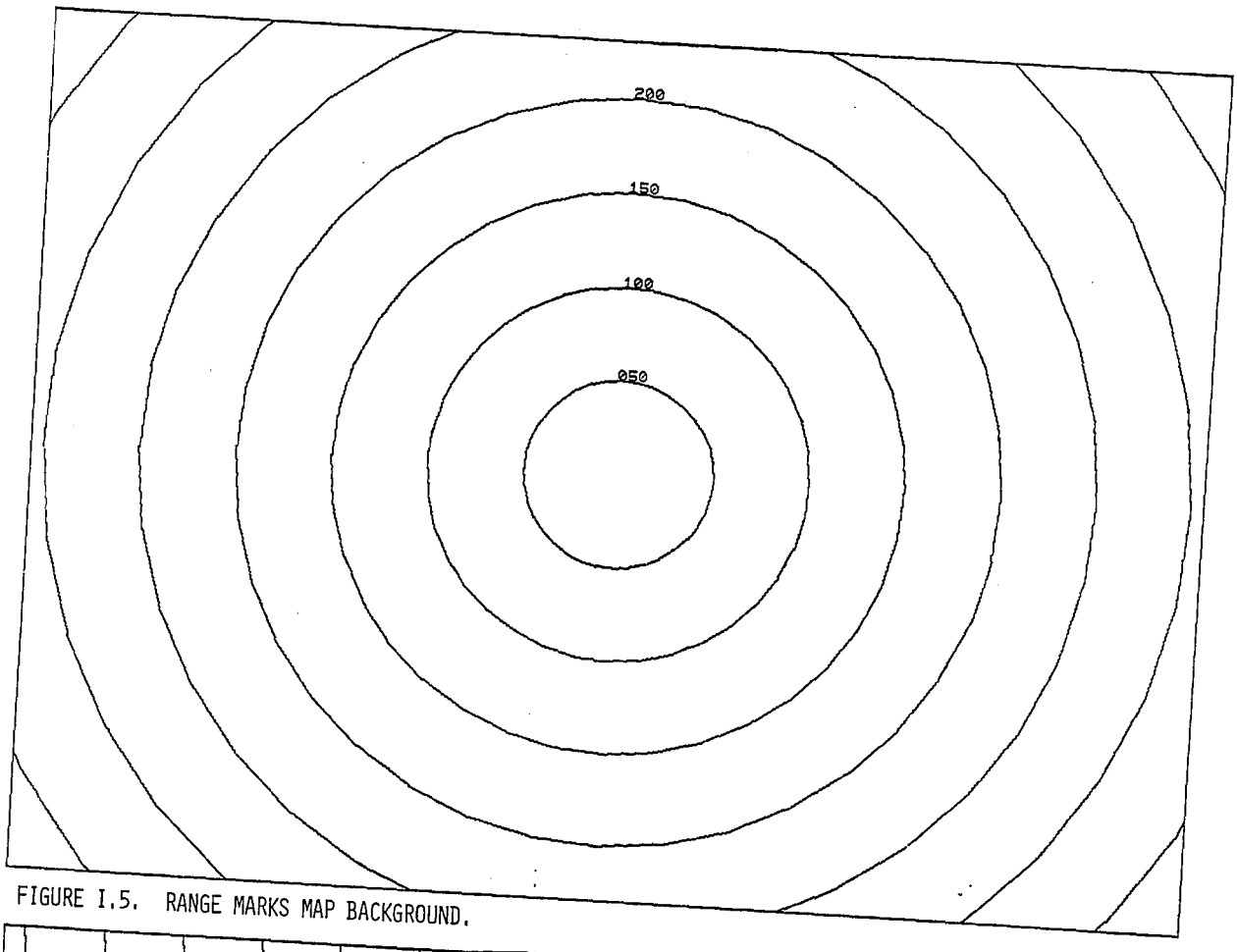


FIGURE I.5. RANGE MARKS MAP BACKGROUND.

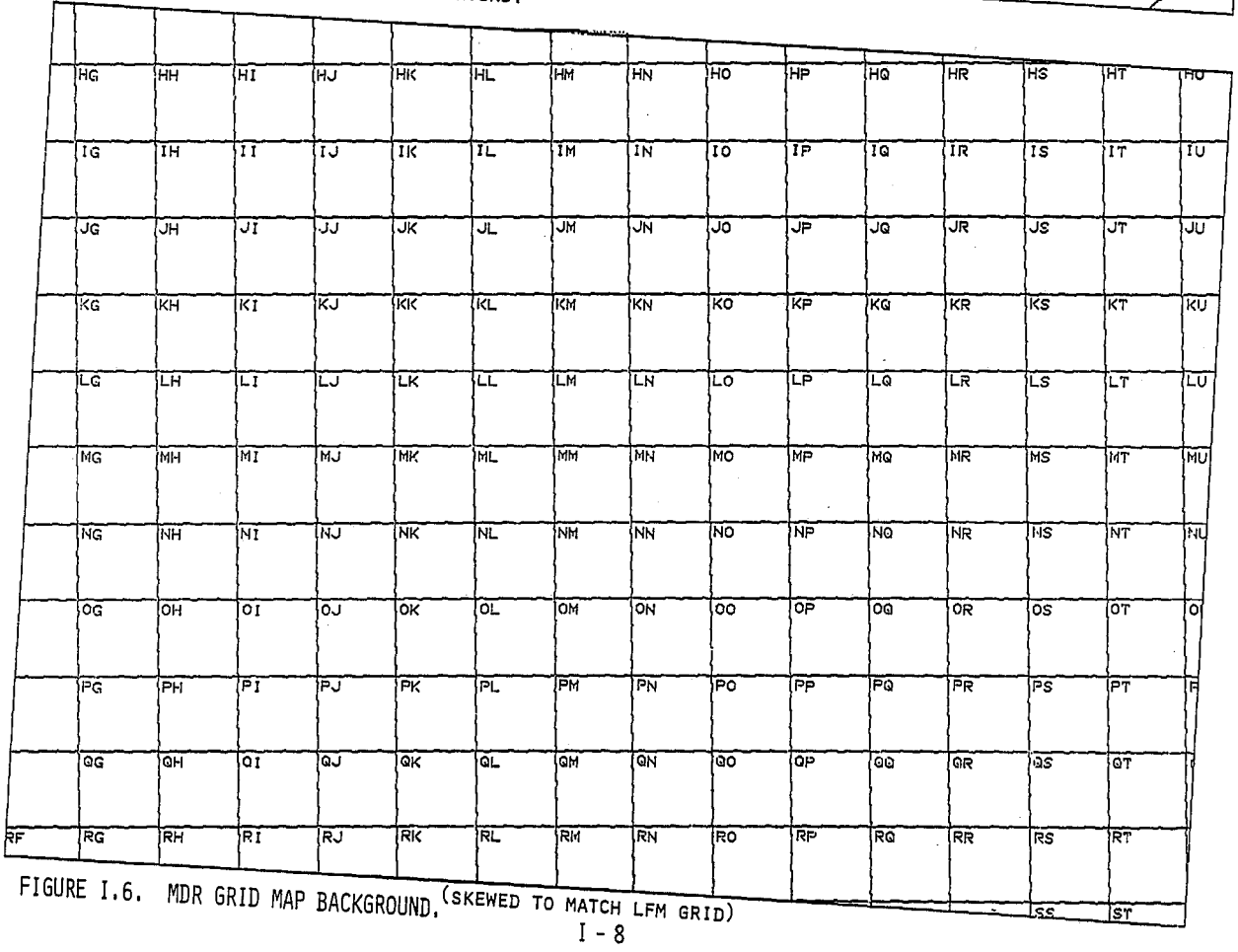


FIGURE I.6. MDR GRID MAP BACKGROUND. (SKEWED TO MATCH LFM GRID)

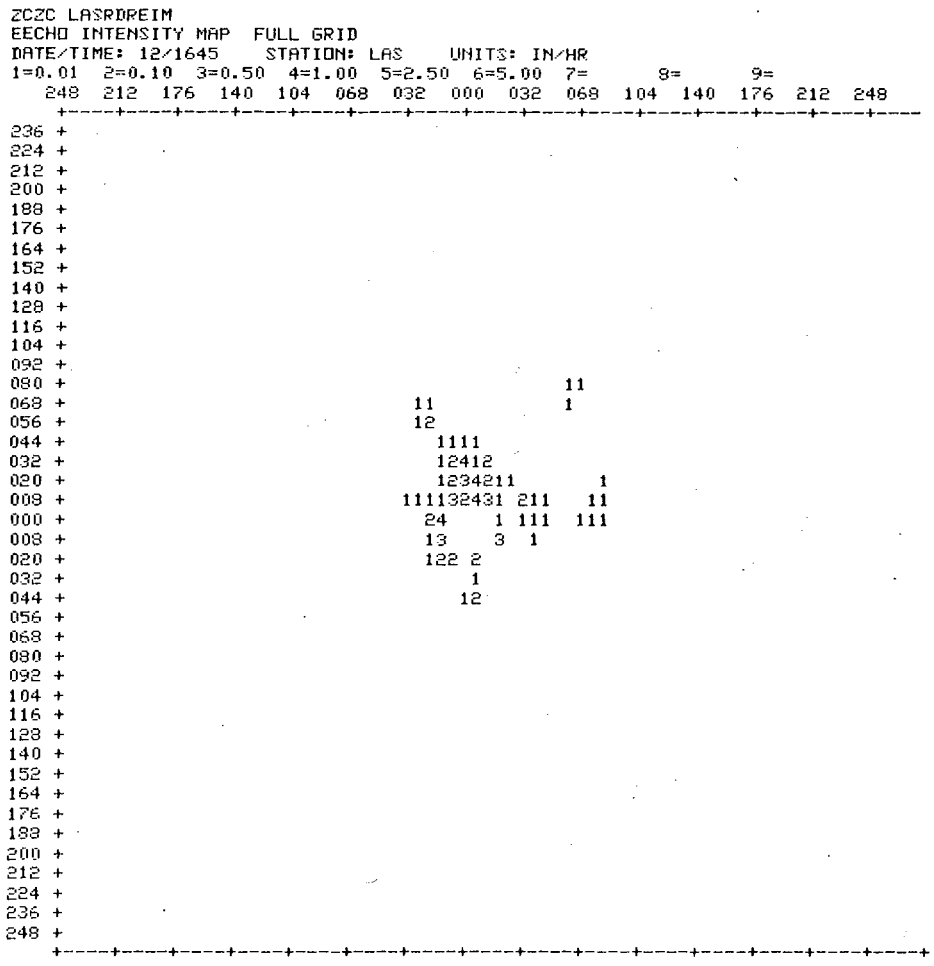


FIGURE I.7. EXAMPLE OF ARAP FULL-GRID ALPHANUMERIC PRODUCT.

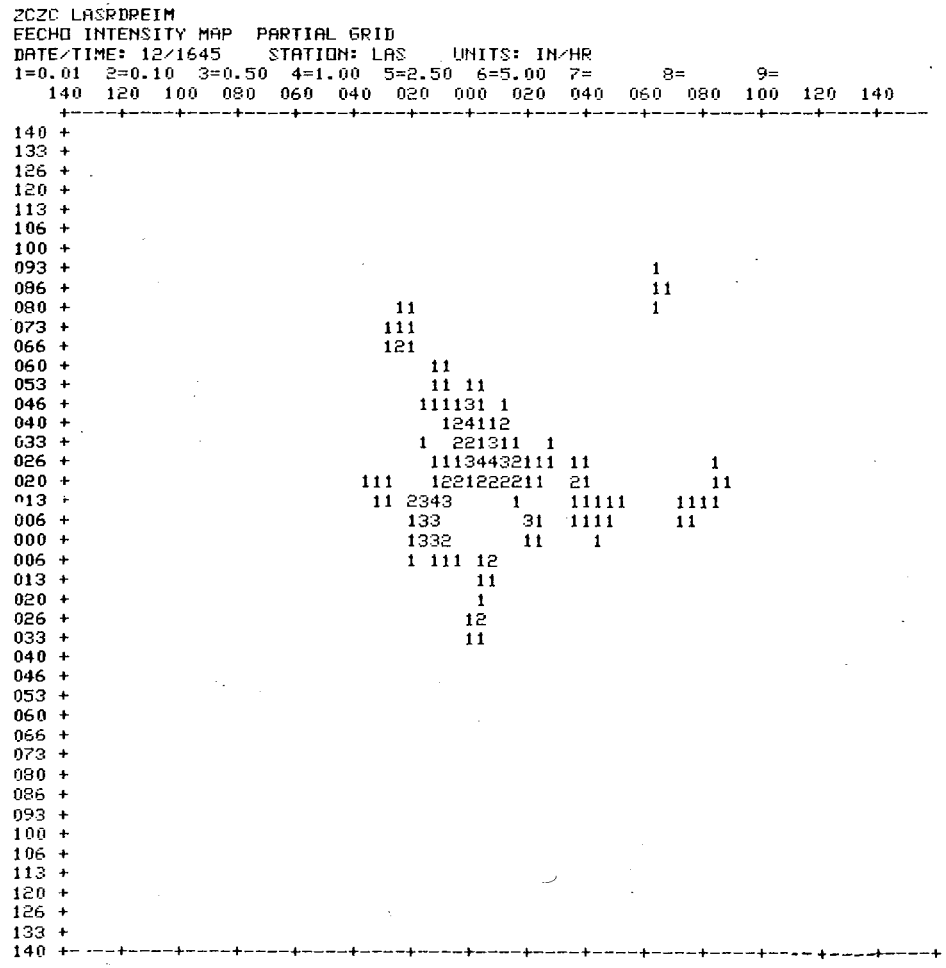


FIGURE I.8. EXAMPLE OF ARAP PARTIAL-GRID ALPHANUMERIC PRODUCT.

II. HARDWARE INSTALLATION

A. Inventory of Hardware

The complete ARAP system is comprised of the following modules:

1) Data General Nova 4/X computer chassis with the following interface boards (Figure II.1).

4/X CPU	-	Slot 1
64KW Memory	-	Slot 2
Radar Interface	-	Slot 3
6099 Disk Interface	-	Slot 4
ULM Interface	-	Slot 5
6031 Floppy Disk Interface	-	Slot 6

2) Data General 6031 Single diskette subsystem including paddle-board connector and interface cable.

3) Data General 6099 12.5MB nonremovable disk subsystem including paddleboard connector and interface cable.

4) ARAP Antenna Controller Module.

5) Radar Simulator Module with interface cable.

6) Thirty-two diskettes (dual-sided).

7) ARAP-WSR-74C interface cable.

8) Antenna controller - WSR-74C interface cable.

9) Video terminal with interface cable.

10) ARAP-AFOS interface cable.

11) Optional mounting rack.

12) Optional Silent 700 terminal with interface cable.

13) Optional modemphone with interface cable.

B. Installation Procedure

1) Mount the equipment in the rack in the following order (Figure II.2).

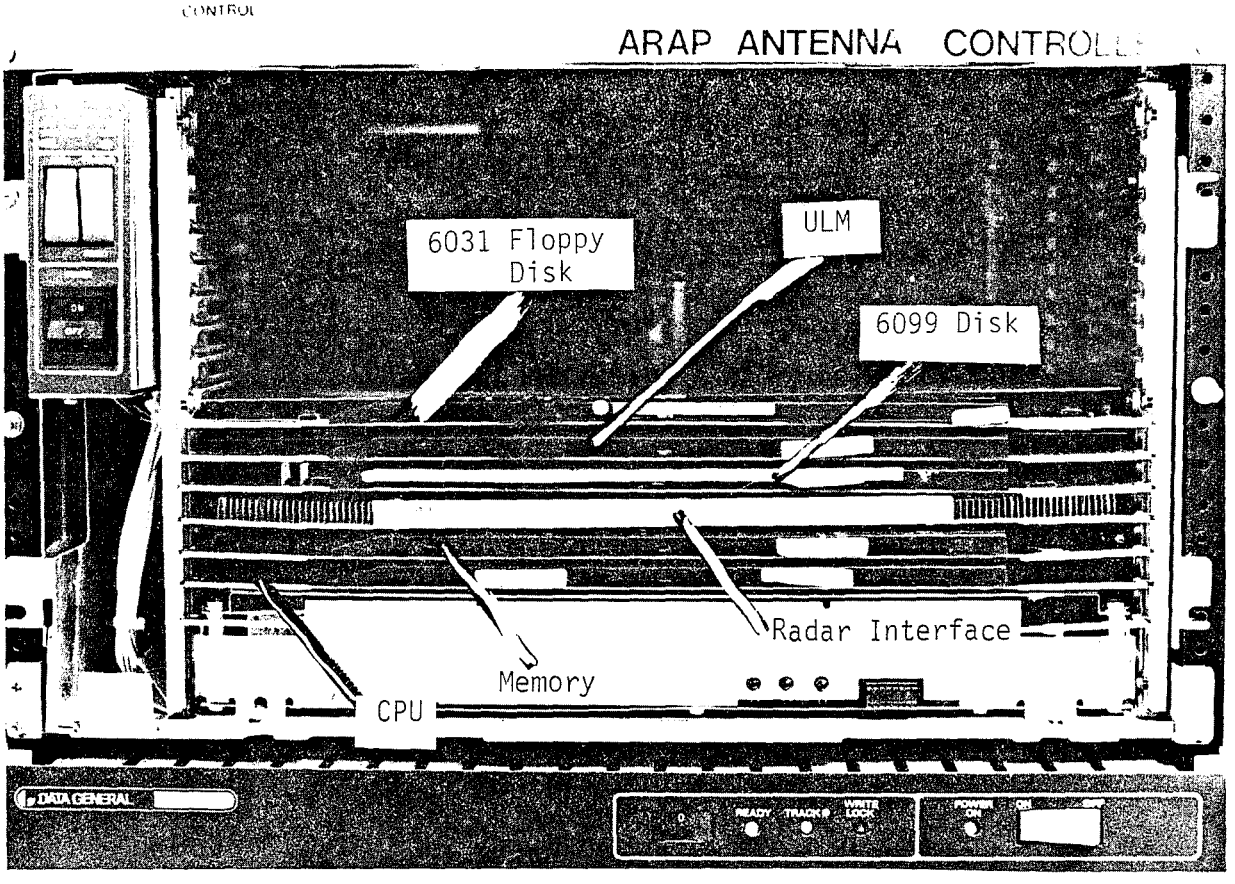


Figure II.1. Nova 4/X Computer Chassis.

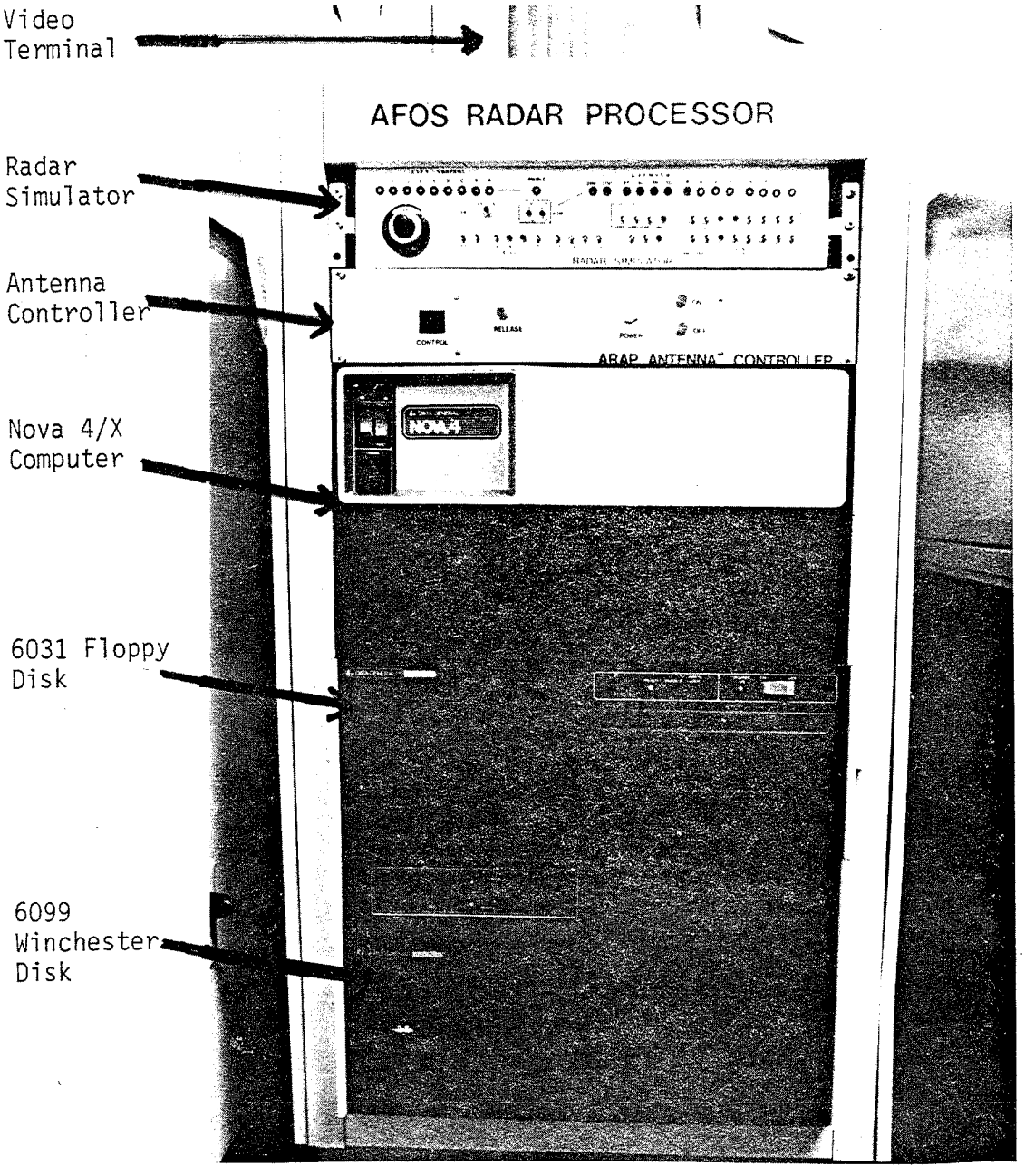


Figure II.2. ARAP System Mounted in Rack.

Radar Simulator
Antenna Controller
4/X Computer
6031 Floppy Disk
6099 Winchester Disk

2) Place the video terminal on top of rack or in another convenient location.

3) Connect the video terminal interface cable to the connector on the back of the 4/X chassis.

4) Connect the 6031 floppy disk interface cable to paddleboard connector P2 on the back of the 4/X chassis (red/blk on top).

5) Connect the 6099 Winchester disk interface cable to paddleboard connector P1 on the back of the 4/X chassis (concentration of wires on top).

6) Connect one end of the ARAP-AFOS interface cable to ULM paddleboard connector P6 (Port Ø) on the back of the 4/X chassis.

7) Connect the other end of the ARAP-AFOS interface cable to the ALM on AFOS. Attach to an unused port.

8) Connect the optional Silent 700 terminal interface cable to ULM paddleboard connector P6 (Port 1) on the back of the 4/X chassis.

9) Connect the optional modemphone cable to ULM paddleboard connector P6 (Port 2) on the back of the 4/X chassis.

10) Connect the ARAP-WSR-74C interface cable to the following points (Figure II.3).

    a) 1J2 on WSR-74C radar.

    b) Trigger out on WSR-74C radar.

    c) Paddleboard connector P7 on back of 4/X chassis.

    d) ARAP antenna controller.

11) Attach the antenna controller-WSR-74C interface cable to the antenna controller.

12) Attach the other end of the antenna controller interface cable to the WSR-74C:

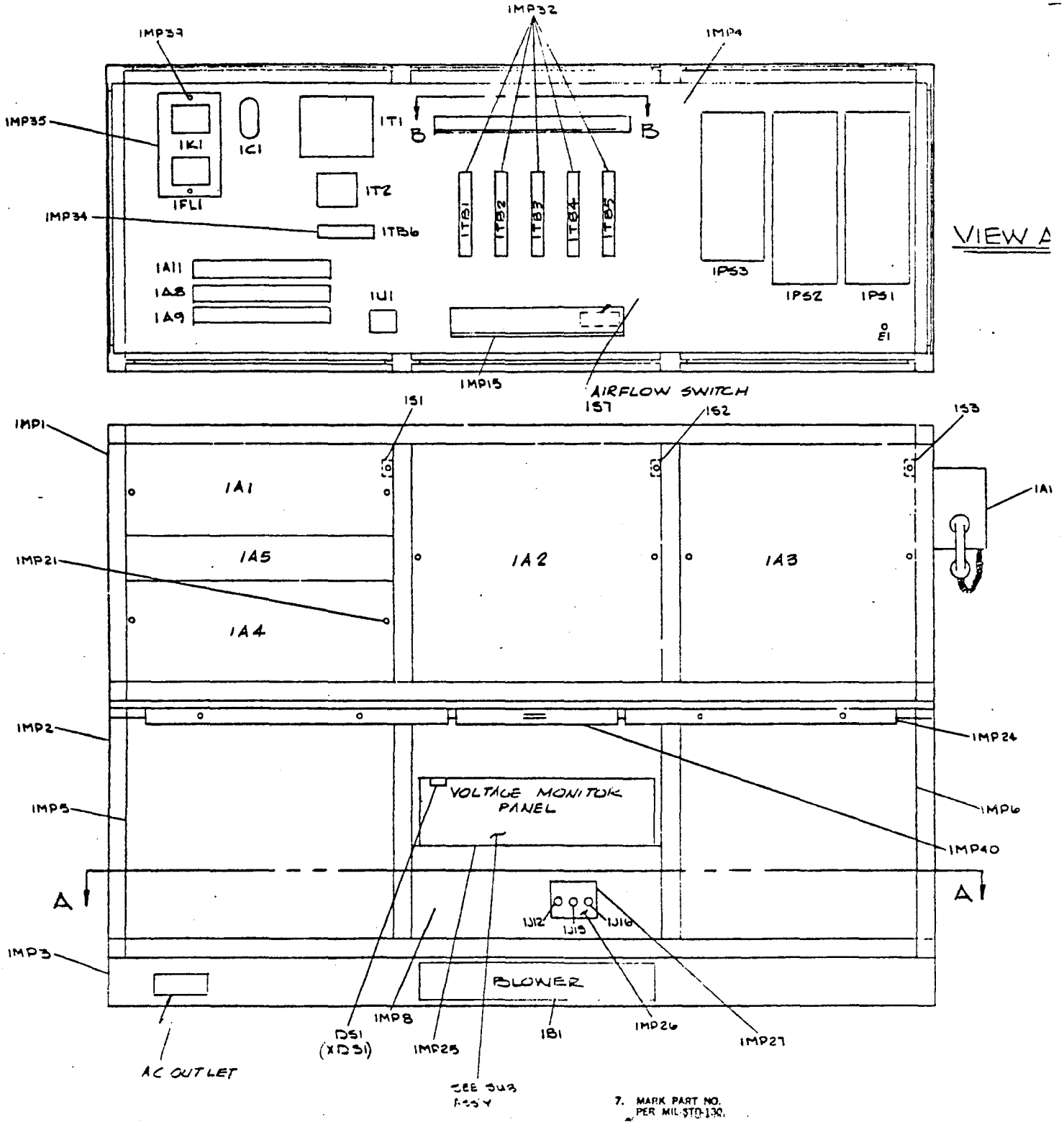


Figure II.3. WSR-74C Console Layout.

a) Red wire to 1TB4-8 (terminal strips on bottom of radar console).

b) Green wire to 1TB4-9.

c) White wire to 1TB4-10.

d) Disconnect wire from 1A3A9-22 and splice a 3-ft. piece of wire to it.

e) Connect this wire to the unused terminal strip 1TB5-14.

f) Orange wire to 1TB5-14.

g) Brown wire to unused terminal strip 1TB5-15.

h) Three-ft. wire from 1TB5-15 to 1A3A9-22.

i) Black wire to unused terminal strip 1TB5-16.

j) Three-ft. wire from 1TB5-16 to 1A3TB1-6, 7, 8, or 9.

13) Finish the modification of the radar:

a) Jumper between 1TB4-6 and 1TB5-1.

b) Jumper between 1TB4-7 and 1TB5-2.

14) Connect the antenna simulator interface cable to the spare paddleboard connector P8 on the back of the 4/X chassis.

15) Ensure all power switches are off and then connect the power cord to an AC outlet capable of supplying 115VAC at 15 amps.

C. Antenna Controller Calibration

Before the antenna controller and ARAP can be used operationally, the antenna controller must be calibrated. Perform the following steps:

1) Bring up the Nova 4/X system (RDOS) by following the instructions in "III A. Initial Start-up from Power Off Condition".

2) Boot up the diagnostic program "RDRTST" by following the instructions in "VII B. Diagnostic Program".

3) Invoke mode Four (antenna controller select) on the video terminal.

4) Turn off the radar transmitter power (on the T/R cabinet) to prevent radiation hazards (Figure II.4).

5) Move the antenna elevation to 45.0 degrees.

6) Turn the azimuth drive and elevation drive switches (on the radar servo cabinet) to the disable position (Figure II.5).

7) Enter the radar antenna dome. Remove the cover plate on the pedestal for elevation auxiliary synchro 3B6 (Figure II.6). Loosen the three mounting screws so that the synchro can be adjusted. Ensure that the gear mounted on the synchro shaft meshes with the elevation gear train.

8) Press the "ON" button and "RELEASE" button on the ARAP antenna controller chassis.

9) Enter Ø for the antenna control value. The control light on the antenna controller chassis should light.

10) Adjust the elevation 3B6 synchro until the error signal meter (on the servo cabinet) is nulled (Figure II.5). (One person should be in the radar dome and one person next to the servo cabinet.)

11) Stand clear of the antenna while the elevation drive switch is turned to the on position as the antenna may slew several degrees.

12) Enter the radar dome and move the synchro until the elevation is 45.0°. It may help to have someone at the radar console watching the digital elevation indicator.

13) Tighten the mounting screws on the synchro and replace the cover plate.

14) Type the series of numbers from 2000 to 32000 by 2000 increments on the video terminal. The antenna should slew downward by approximately 3 degrees for each increment. The elevation should be near zero degrees when the value "32000" is entered.

15) Exit the program by typing "-1".

16) If desired, a slow automatic slew sweep from 45 to 0 degrees can be activated by activating test mode 3.

17) Restore the radar to operating condition by enabling the azimuth drive and turning on the transmitter power.

18) Power off the ARAP system by turning off the power switches.

Figure II.4. WSR-74C Transmitter Console.

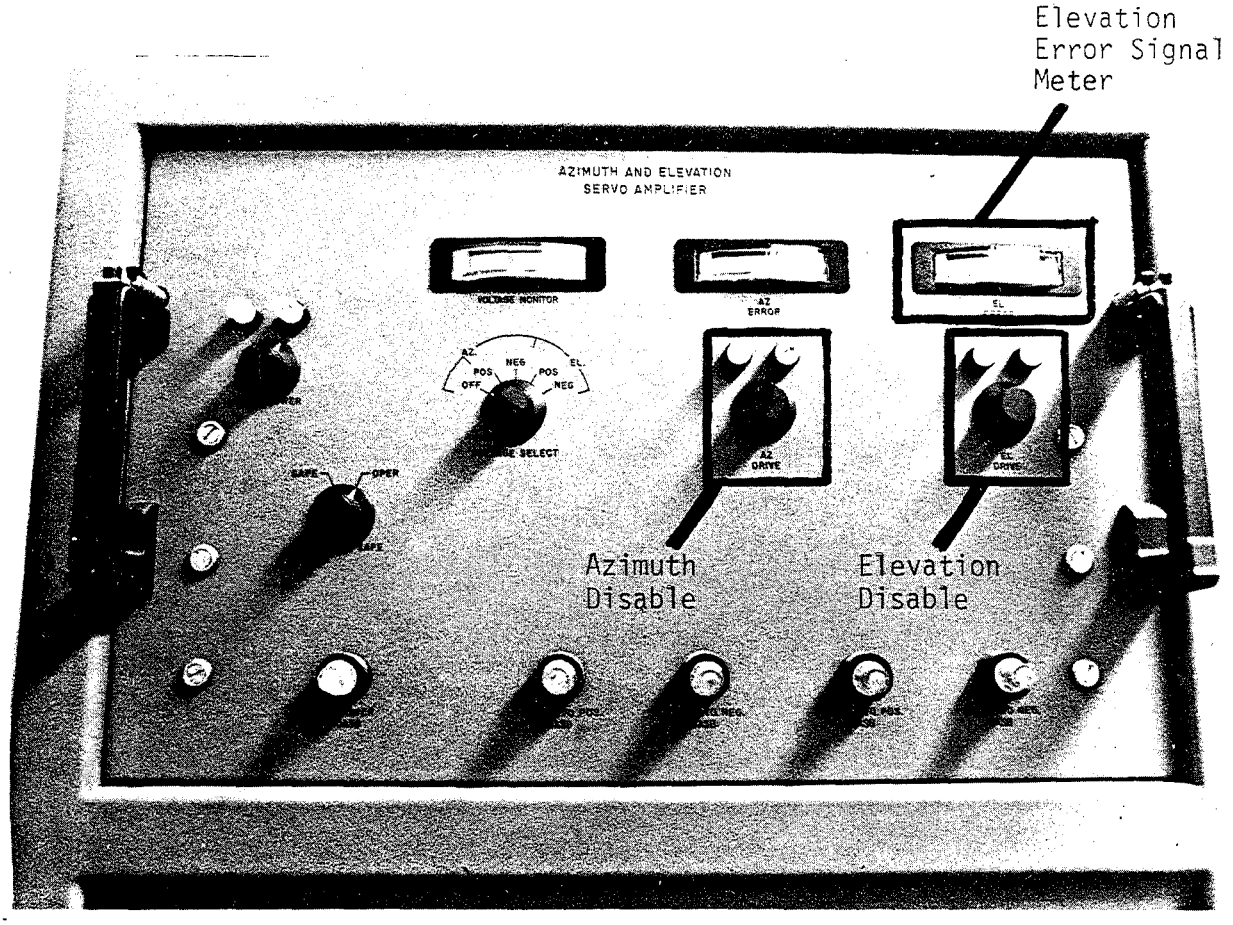


Figure II.5. WSR-74C Servo Console.

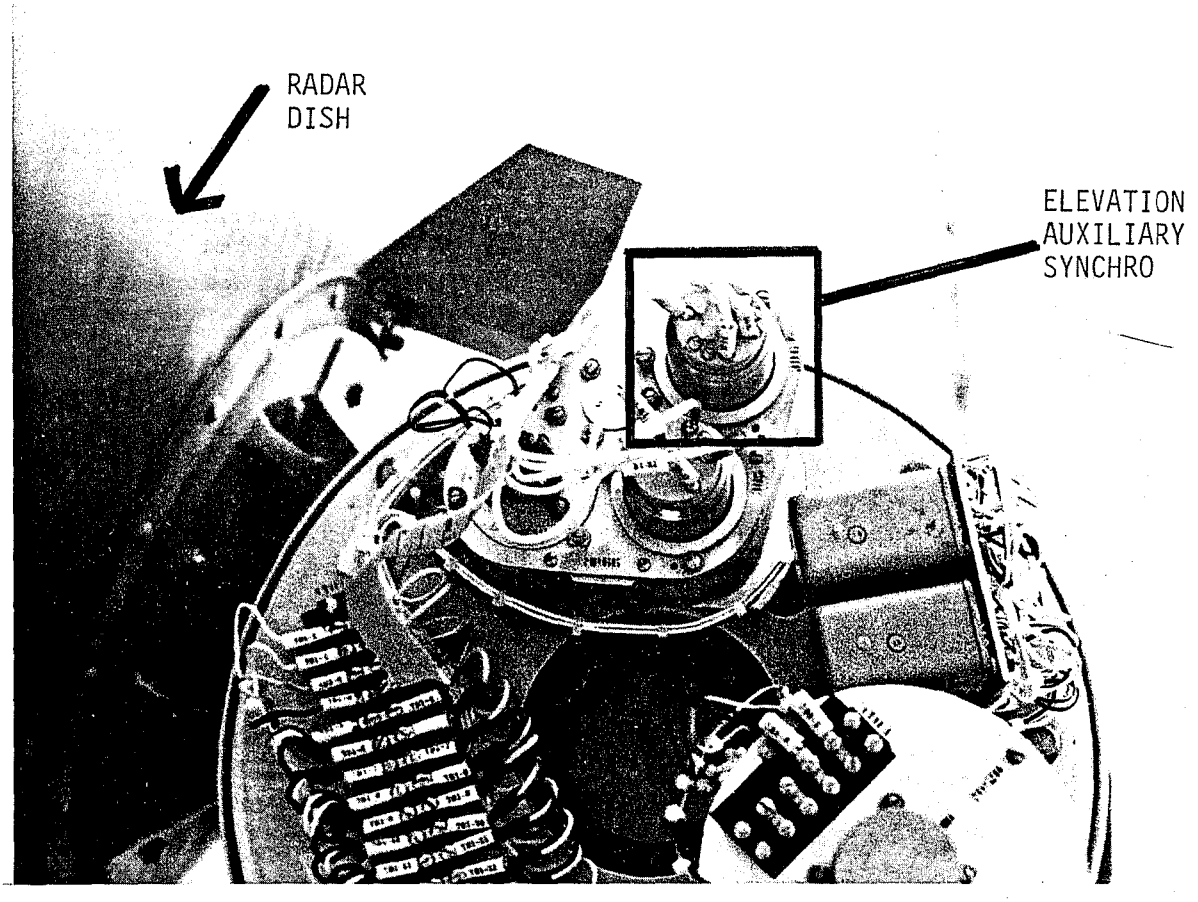


Figure II.6. WSR-74C Antenna Pedestal Elevation Section with Cover Removed.

III. SYSTEM START-UP/SHUTDOWN

A. Initial Start-Up from Power-Off Condition

Perform the following steps to bring RDOS up:

1) Turn on the video terminal power switch.

2) Turn on the floppy disk drive power switch.

3) Turn on the Winchester disk drive power switch.

4) Turn on the Nova 4/X computer power.

5) Type "100033L" on the video terminal or press the "PR LOAD" switch on the Nova 4/X chassis.

6) Press the return key in response to the "FILENAME?" prompt.

7) Fill in the Zulu time and date in response to the prompts.

8) The "R" prompt indicates that RDOS is up and running.

9) Turn the "LOCK" switch on the Nova 4/X computer to the lock position.

10) Execute the start macro by typing "START" followed by the return key.

B. ARAP Start-Up

The ARAP system can be started by typing ARAP followed by the return key. In addition, press the release switch and power-on switch on the antenna controller module.

Optionally, the following global switches may be used singly or in combination:

/F — Full initialization. The product files, work files, and accumulation files are purged. This switch should always be used when ARAP has been down for several hours.

/C — Initialize floppy archive. All files on the floppy archive device are purged. This switch should be used when inserting a new floppy for archiving before ARAP is brought up.

/G — Perform ground mapping. The ground-clutter suppression techniques uses data files that contain ground-clutter patterns. Periodic use of this switch is required when echoes begin to appear on a day without precipitation echoes.

By using combinations of /N and /B global switches with the /G switch, the three different types of ground-clutter suppression will be initialized:

/G - Subtraction mode

/G/N - No suppression mode

/G/B - Blanking mode

When the ARAP system is brought up and ground-clutter mapping is desired, the number of passes to map must be given to the program as in the following example:

ARAP/G 3Ø/P - Perform ground-clutter mapping subtraction mode with 3Ø passes.

Each pass takes approximately six minutes. The greater the number of passes, the better the ground-clutter rejection will work since the data sample will be larger. It is recommended that about half of the passes be taken counterclockwise and the other half clockwise. The rotation direction of the antenna may be changed any time the antenna control light is off (2 minutes out of every 6 minutes).

C. Recovery from a Hard Crash

Certain serious error conditions can either halt the entire system in a crash or cause the system to suspend processing and display an exceptional status message. The CPU is halted when the run light on the 4/X is off. In exceptional status, the system will output the contents of the accumulators and an error code on the console, for example:

:000015 177777 000016 042111 100004

These numbers should be recorded in the system log.

To reboot the system:

1) Turn off the "LOCK" switch on the 4/X chassis.

2) Press "RESET" on the 4/X chassis.

3) Type "100033L" on the video terminal or press the "LOAD" switch on the 4/X chassis.

4) Press the return key in response to the "FILENAME?" prompt.

5) Fill in the Zulu time and date in response to the prompts.

6) The "R" prompt indicates that RDOS is up and running.

7) Turn the "LOCK" switch to the lock position.

8) Execute the start macro by typing START followed by the return key.

9) To bring up ARAP, follow the instructions in part B of this chapter.

D. Recovery from a Soft Crash

Certain serious error conditions can cause ARAP to abnormally terminate. The console usually displays a message in this format:

TRAP = 011236 112777 177777 000326 142037

The numbers should be recorded in the system log. RDOS should still be running. Verify this by pressing the return key, you should get an "R" prompt. If you don't, follow the instructions in the previous section "Recovery from a Hard Crash".

To bring ARAP up after a soft crash, see Section B, "ARAP Start-Up".

E. Recovery from System Hang

The ARAP software contains a hang prevention module which monitors the system's performance. If the alarm beeper sounds and it is not due to a system error, the software has hung. Record the hang event in the system log. Type a CTRL A on the terminal. If an "R" prompt does not appear in one minute, follow the reboot system instructions in part A of this chapter to bring RDOS up, and part B of this chapter to bring ARAP up. If the console did respond with an "R" prompt, follow the procedure in part B of this chapter to bring ARAP up.

F. ARAP System Shutdown

1) Output a message to all users (MESS:) indicating the ARAP is going down.

2) Wait about two minutes to be sure the message has been transmitted.

3) Type SYS:STOP on the console, an "R" prompt should appear in less than fifteen seconds.

4) Log the reason for taking the system down in the system log.

5) Push the "OFF" switch on the antenna controller module.

G. Computer Shutdown

1) Perform the steps in part F of this chapter.

2) Type RELEASE DPØ on the video terminal.

3) The CPU has stopped when an exclamation point is printed.

4) Turn off all power switches.

5) Turn off the "LOCK" switch on the Nova 4/X chassis.

IV. TAILORING ARAP TO SPECIFIC SITES

The ARAP system must be tailored to each individual site in order for it to function correctly. The following steps to be taken are:

1) Initialization of system parameters.

2) Initialization of system error log.

3) Initialization of product status parameters.

4) Initialization of the AFOS site connected asynchronously to ARAP.

5) Ground-clutter mapping.

When ARAP is first installed at a site, the program ARAPGEN should be run. It initializes the system parameters, error log, and product parameters by an interactive question-answer interrogation. Sample dialogue is shown in Figure IV.1. Sections B, C. and D of this chapter may be skipped if ARAPGEN is executed, although the information may be useful in answering some of the ARAPGEN questions.

If some of the parameters need to be modified at a later date, the octal editor should be used. Some of the parameters can also be changed with ARAP commands.

A. Tailoring the System Parameters - RADARGEN.PM

The disk file RADARGEN.PM contains various system parameters that describe the operating characteristics of the ARAP system. The octal editor is used to make individual changes to this file. Some entries can also be changed by ARAP commands. All of the entries can be changed by executing the ARAPGEN program.

An FPRINT of a typical RADARGEN.PM file is provided in Figure IV.2.

The format of each entry in RADARGEN.PM follows:

The defined bits are referenced in the following order.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Ø

OFFSET	PARAMETER	EXAMPLE
Ø-1	ASCII Station Identification The ASCII station identifier is entered on all graphic and alphanumeric products to identify the radar site. The entry is three characters long.	"LAS"
2	Reserved	
3	Reserved	

```
ARAPGEN
ARAP SYSTEM GENERATION PROGRAM - V1.02
INIT RADARGEN.PM FILE [0=NO,1=YES]? 1

3 LETTER ASCII STATION IDENT: BIL
TOPS NOISE THRESHOLD: 2
STATION LATITUDE [DD,MM]: 45,48
STATION LONGITUDE [DD,MM]: 108,32
ECHO INTENSITY ALARM THRESHOLD [X.XX]: 0.50
ECHO INTENSITY ALARM AREAL COVERAGE [SQ.KM]: 100
1-HR. PRECIP. ACCUM. ALARM THRESHOLD [X.XX]: 0.50
1-HR. PRECIP. ACCUM. AREAL COVERY [SQ.KM]: 100
X-HR. PRECIP. ACCUM. ALARM THRESHOLD [X.XX]: 3.00
X-HR. PRECIP. ACCUM. AREAL COVERAGE [SQ.KM.]: 1
ECHO HEIGHTS ALARM THRESHOLD [KM.]: 12
ECHO HEIGHTS ALARM AREAL COVERAGE [SQ.KM]: 40
VIL ALARM THRESHOLD [KG./M2]: 30
VIL ALARM AREAL COVERAGE [SQ.KM.]: 1
GRID RESOLUTION [KM.]? 4
GRID SIZE? 125
MAXIMUM RANGE WILL BE: 250 KM.
IS THIS ACCEPTABLE [0=NO,1=YES]?1
ALPHANUMERIC GRID X WIDTH: 60
ALPHANUMERIC GRID Y WIDTH: 36
PARTIAL GRID CENTER COORDINATES [XKM,YKM]: 0,0
ECHO INTENSITY MAP THRESHOLD 1 [X.XX]: 0.01
ECHO INTENSITY MAP THRESHOLD 2 [X.XX]: 0.10
ECHO INTENSITY MAP THRESHOLD 3 [X.XX]: 0.50
ECHO INTENSITY MAP THRESHOLD 4 [X.XX]: 1.00
ECHO INTENSITY MAP THRESHOLD 5 [X.XX]: 2.00
ECHO INTENSITY MAP THRESHOLD 6 [X.XX]: 5.00
PRECIPITATION MAP THRESHOLD 1 [X.XX]: 0.01
PRECIPITATION MAP THRESHOLD 2 [X.XX]: 0.10
PRECIPITATION MAP THRESHOLD 3 [X.XX]: 0.20
PRECIPITATION MAP THRESHOLD 4 [X.XX]: 0.40
PRECIPITATION MAP THRESHOLD 5 [X.XX]: 0.80
PRECIPITATION MAP THRESHOLD 6 [X.XX]: 1.50
PRECIPITATION MAP THRESHOLD 7 [X.XX]: 2.50
PRECIPITATION MAP THRESHOLD 8 [X.XX]: 4.50
PRECIPITATION MAP THRESHOLD 9 [X.XX]: 6.00
ECHO TOPS MAP THRESHOLD 1 [KM.]: 1
ECHO TOPS MAP THRESHOLD 2 [KM.]: 6
ECHO TOPS MAP THRESHOLD 3 [KM.]: 8
ECHO TOPS MAP THRESHOLD 4 [KM.]: 10
ECHO TOPS MAP THRESHOLD 5 [KM.]: 12
ECHO TOPS MAP THRESHOLD 6 [KM.]: 14
ECHO TOPS MAP THRESHOLD 7 [KM.]: 16
ECHO TOPS MAP THRESHOLD 8 [KM.]: 18
ECHO TOPS MAP THRESHOLD 9 [KM.]: 20
```

Figure IV.1. Sample ARAPGEN Dialogue.

Figure IV.1. Sample ARAPGEN Dialogue (continued)

```
VIL MAP THRESHOLD 1 [KG/M2]: 1
VIL MAP THRESHOLD 2 [KG/M2]: 10
VIL MAP THRESHOLD 3 [KG/M2]: 15
VIL MAP THRESHOLD 4 [KG/M2]: 20
VIL MAP THRESHOLD 5 [KG/M2]: 25
VIL MAP THRESHOLD 6 [KG/M2]: 30
VIL MAP THRESHOLD 7 [KG/M2]: 35
VIL MAP THRESHOLD 8 [KG/M2]: 40
VIL MAP THRESHOLD 9 [KG/M2]: 45
NUMBER OF HOURS FOR XHA [2-24]: 24
PRODUCT PURGE PARAMETER IN HOURS: 5
OBSERVATION INTERVAL [5-60MIN.]: 10
TOPS OBSERVATION INTERVAL [15-60MIN.]: 20
ALARM ALERT SYSTEM ENABLE[0=NO,1=YES]: 1
AUTO-ALM THRESHOLD INCRE % [THRES,AREAL]: 0,100
ALLOWABLE ELEVATION ERROR [X.X DEG]: 0.2

ENTER 0 FOR NO,1 FOR YES - SUBSYSTEM ENABLE
AREAL COVERAGES PLOT? 1
MOVEMENT CALCULATIONS? 0
PRECIPITATION ACCUMULATION CALCULATIONS? 1
OBSERV. START AUDIBLE ALERT SUBYSTEM? 1
AUTOMATIC SYSTEM LOG TRANSFER? 1
AUTOMATIC ALARM THRESHOLD INCREASE? 1
AUTOMATIC ALARM AREAL COVERAGE INCREASE? 1
AUTOMATIC PURGING OF OLD PRODUCTS? 1
AUTOMATIC MESSAGE GENERATION WHEN OBS:STOP? 1
AUTOMATIC CHANGE FROM PRIV. TO NON-PRIV. STATUS? 1
AUTOMATIC CHANGE TO SYSLOG:UP CON? 1
PRIVILEGED ACCESS CODE: 6170
SYSTEM TEST VALUE [0=NORM,1=TEST]: 0
ALLOWABLE RADAR STATUS FOR LOGGING [0=NO,1=YES]
I.F. ATTN. ON? 0
I.F. ATTN. OFF? 1
RANGE INTERVAL 1 KM.? 1
RANGE INTERVAL 2 KM.? 0
TIME SAMPLE 31? 1
TIME SAMPLE 15? 1
ANT. CONTROLLER ON? 1
ANT. CONTROLLER OFF? 0
```

IV.1. Sample ARAPGEN Dialogue (continued)

```
ASYNC LINE ASSIGNMENT NAME 1: AFOS
ASYNC DEVICE ASSIGNMENT NAME 1: QTY:0
ENTER COMMUNICATION LINE STATUS FOR LINE 1
LINE UP WHEN ARAP INITIALIZES? 1
COMMAND CAPABILITY? 1
GRAPHICS CAPABILITY? 1
COMMAND RESPONSE? 0
SPOOLING? 1
ENTER ASYNC CHAR DEVICE MASK FOR LINE 1
CONSOLE INTERRUPTS [0=NO,1=YES]? 0
TAB EXPANSION [0=YES,1=NO]? 0
LINE TYPE [0=LOCAL,1=MODEM]? 0
RUBOUT CHARACTER [0=UNDERLINE,1=BACKSPACE]? 0
INPUT ECHOING [0=YES,1=NO]? 1
CARRIAGE RETURN ECHO [0=YES,1=NO]? 0
NULLS AFTER FORM FEED [0=NO,1=YES]? 0
RUBOUT AFTER TAB [0=NO,1=YES]? 0
PARITY CHECK [0=NO,1=YES]? 0
LINE FEEDS AFTER CARR. RET. [0=YES,1=NO]? 0
LOWER CASE TRANSLATE [0=YES,1=NO]? 0
80 COLUMN DEVICE [0=YES,1=NO]? 0
SPOOLING [0=YES IF PERMITTED,1=NO]? 0
```

•
•
•

```
ENTER ULM LINE CHARACTERISTIC FOR QTY:3
LOOPBACKMODE [0=OFF,1=ON]? 0
PARITY [0=NONE,1=ODD,2=EVEN]? 0
CODE LEVEL [0=5LVL,1=6LVL,2=7LVL,3=8LVL]? 3
STOP BITS [1=1STOP,2=2STOP]? 2
BAUD RATE [1=19200,2=50,3=75,4=134.5,5=200,6=600,7=2400,
8=9600,9=4800,10=1800,11=1200,12=2400,13=300,14=150,15=110]?2

# VERT. LEVELS FOR TOP SCANS [3-8]: 8
ELEVATION FOR LEVEL 1 [X.X]: 0.5
ELEVATION FOR LEVEL 2 [X.X]: 1.0
ELEVATION FOR LEVEL 3 [X.X]: 1.7
ELEVATION FOR LEVEL 4 [X.X]: 2.7
ELEVATION FOR LEVEL 5 [X.X]: 5.0
ELEVATION FOR LEVEL 6 [X.X]: 8.0
ELEVATION FOR LEVEL 7 [X.X]: 11.0
ELEVATION FOR LEVEL 8 [X.X]: 15.0
```

•
•
•

IV.1. Sample ARAPGEN Dialogue (continued)

```
INIT RADAR.ER FILE [0=NO,1=YES]? 1
ERROR CODES TO BE LOGGED ENTRY.
E000: ILLEGAL CHANNEL NUMBER      [0=NONE,1=LOG,2=ALERT]? 2
E001: ILLEGAL FILENAME            [0=NONE,1=LOG,2=ALERT]? 2
E002: ILLEGAL SYSTEM COMMAND      [0=NONE,1=LOG,2=ALERT]? 2
E003: ILLEGAL DEVICE COMMAND      [0=NONE,1=LOG,2=ALERT]? 2
E004: NOT A RAND/CONTIG FILE      [0=NONE,1=LOG,2=ALERT]? 2
E005:                             [0=NONE,1=LOG,2=ALERT]? 2
E006: END OF FILE                 [0=NONE,1=LOG,2=ALERT]? 2
```

•
•
•

```
INITIALIZE PRODUCT INFORMATION

PRODUCT: EIM.A        ECHO INTENSITY MAP  FULL GRID
AFOS CCCNNNXXX? BILRDREIM
TRANSMISSION PRIORITY [0-7]? 4
HOURLY CREATION TYPE [0=NO,1=YES]? 0
TOP SCANS CREATION TYPE [0=NO,1=YES]? 0
NORMAL SCANS CREATION TYPE [0=NO,1=YES]? 1
ARCHIVE THIS PRODUCT [0=NO,1=YES]? 1
ARCHIVE EVERY XTH VERSION [1-31]? 5
AUTO-QUEUE ON LINE 1 [0=NO,1=YES]? 0
AUTO-QUEUE ON LINE 2 [0=NO,1=YES]? 1
AUTO-QUEUE ON LINE 3 [0=NO,1=YES]? 0
AUTO-QUEUE ON LINE 4 [0=NO,1=YES]? 0
AUTO-QUEUE ON LINE 5 [0=NO,1=YES]? 1
```

```
R
FPRINT/Z DP1:RADARGEN.PM
     0 041111 046040 046101 051522 042122 046511 051440 000003 BIL LASRDRMIS ..
    10 010603 025203 000010 000010 000002 000002 000002 000002 ..♦.............
    20 000001 000001 000001 000001 000000 000000 000031 000017 ................
    30 001312 000006 000024 000024 000001 000012 000062 000144 .J...........2.D
    40 000310 000764 000001 000012 000031 000062 000144 000310 .H.T.......2.D.H
    50 000454 000620 000764 000001 000004 000007 000012 000015 .,...T..........
    60 000020 000023 000025 000030 000001 000012 000024 000036 ................
    70 000050 000062 000074 000106 000120 000004 000174 000404 .(.2.<.F.P......
   100 000430 000012 000024 062311 000001 000403 001003 000024 :.....DI........
   110 000050 000045 003777 014032 000001 000000 040506 047523 .(.%........AFOS
   120 020040 020040 040506 047523 020040 020040 046103 046067      AFOS     LCL7
   130 030060 020040 051115 052067 030060 020040 051520 040522 00   RMT700   SPAR
   140 042440 020040 041517 047123 047514 042440 042120 032072 E    CONSOLE  DP4:
   150 030040 020040 050524 054472 030040 020040 050524 054472 0    QTY:0    QTY:
   160 030440 020040 050524 054472 031040 020040 050524 054472 1    QTY:2    QTY:
   170 031440 020040 022124 052117 020040 020040 000036 000130 3    $TTD      ...X
   200 000153 000153 000000 000057 000040 000001 000001 000000 .K.K.../. ......
   210 000000 102630 103224 103224 100470 000010 000010 007722 .........8.....R
   220 007645 007512 007301 006735 006372 005751 005252 000005 .%.J.A.]...I.♦..
   230 000012 000024 000043 000074 000125 000163 000226 000000 .....#.<.U.S....
   240 000000 000000 000000 000000 000000 000000 000000 000000 ................
♦♦♦
```

Figure IV.2. Typical RADARGEN.PM Format.

OFFSET	PARAMETER	EXAMPLE

4 Reserved

5 Reserved

6 Reserved

7 Tops Noise Threshold

The tops noise threshold is used in the TOPS/VIL creation programs to determine the precipitation rate required to trigger the echo tops program. The precipitation rate equivalences are located in disk file "DBCONV.DT". The offset of the desired threshold precipitation rate located in "DBCONV.DT" is entered in location 7. If an echo is detected with an intensity greater than this value, the tops program will scan higher levels for the next observation.

1Ø Station Latitude

The latitude of the radar site is entered in 100ths of a degree. For example, 41°30' is equal to 41.50° and is entered as 4150.

11 Station Longitude

The longitude of the radar site is entered in 100ths of a degree. For example, 115°45' is equal to 115.75° and is entered as 11575.

12 Echo Intensity Alarm Threshold - Value

The precipitation rate alarm threshold value is entered in 100ths of an inch/hour. For example, 2.00 in/hr is entered as 200. When this value in conjunction with the value in offset 13 is exceeded, ARAP will generate an alarm message. This location can also be changed with the ARAP command ALARM:EIM X where "X" is the desired value.

13 Echo Intensity Alarm Threshold - Area

The areal coverage of intensities exceeding the intensity threshold in offset 12 required to generate an alarm message is entered in square kilometers. For example, an entry of 1000 denotes 1000 square kilometers. This location can also be changed with the ALARM:EIM X Y command

14 One-Hour Precipitation Accumulation Alarm Threshold - Value

The precipitation accumulation alarm threshold value is entered in 100ths of an inch. For example, 2.00 inches is entered as 200. When this value in conjunction with the value in offset 15 is exceeded, ARAP will generate an alarm message. This location can also be changed with the ARAP command ALARM:1HA X.

OFFSET	PARAMETER	EXAMPLE

15 One-Hour Precipitation Accumulation Alarm Threshold - Area

The areal coverage of one-hour accumulations exceeding the threshold value in offset 14 required to generate an alarm message is entered in square kilometers. For example, an entry of 5110 denotes 5110 square kilometers. This location can also be changed with the ALARM:1HA X Y command.

16 X-Hour Precipitation Accumulation Alarm Threshold - Value

The precipitation accumulation alarm threshold value is entered in 100ths of an inch. For example, 5.00 inches is entered as 500. When this value in conjunction with the value in offset 17 is exceeded, ARAP will generate an alarm message. This location can also be changed with the ARAP command ALARM:XHA X.

17 X-Hour Precipitation Accumulation Alarm Threshold - Area

The areal coverage of X-Hour accumulations exceeding the threshold value in offset 16 required to generate an alarm message is entered in square kilometers. For example, an entry of 10 denotes 10 square kilometers. This location can also be changed with the ARAP command ALARM:XHA X Y.

2Ø Echo Heights Alarm Threshold - Value

The echo heights alarm threshold value is entered in kilometers. For example, 5 km is entered as 5. When this value in conjunction with the value in offset 21 is exceeded, ARAP will generate an alarm message. This location can also be changed with the ARAP command ALARM:TOP X.

21 Echo Heights Alarm Threshold - Area

The areal coverage of echo heights exceeding the threshold value in offset 20 required to generate an alarm message is entered in square kilometers. For example, an entry of 10 denotes 10 square kilometers. This location can also be changed with the ARAP command ALARM:TOP X Y.

22 Vertically-Integrated Liquid Water Content Alarm Threshold - Value

The VIL alarm threshold value is entered in units of kg/m^2. For example, 30 kg/m^2 is entered as 30. When this value in conjunction with the value in offset 23 is exceeded, ARAP will generate an alarm message. This location can also be changed with the ARAP command ALARM:VIL X.

OFFSET	PARAMETER	EXAMPLE

23 Vertically-Integrated Liquid Water Content Alarm Threshold - Area

The areal coverage of vertically-integrated liquid water content values exceeding the threshold value in offset required to generate an alarm message is entered in square kilometers. For example, an entry of 5110 denotes 5110 square kilometers. This location can also be changed with the ALARM:VIL X Y command.

24 Ground-Clutter Threshold

The ground-clutter threshold is used in the ground-clutter suppression program. In order for precipitation to be detected, the following equation must be positive:

Intensity = Echo - Gnd - Threshold.

If a threshold of 1.0 db is used, and the long-term variance of ground clutter is less than 1.0 db, most of the ground clutter will be suppressed. The value entered is twice the desired db threshold. For example, a value of 32. indicates 16.0 db. This value is automatically initialized when ground-clutter rejection is initialized.

25 Radar Noise Threshold

The radar noise threshold relates the returned echo intensity (db) above ground clutter to the precipitation rate table in file "DBCONV.DT". For example, a value of 3 denotes 1.5 db above the noise level is the minimum detectable precipitation rate. The value entered is twice the desired db detection. For example, a value of 1 indicates 0.5 db. This value is automatically initialized when ground-clutter rejection is initialized.

26 X-Width of Alphanumeric Grid

The X-width of the Silent 700 alphanumeric products is entered in this offset. The X-width is not the width of the paper but is the width of the data area (Figure IV.3).

27 Y-Length of Alphanumeric Grid

The Y-length of the Silent 700 alphanumeric products is entered in this offset. The X-width and Y-length of the alphanumeric products are adjusted for a square grid representation (aspect ratio). The aspect ratio for the Silent 700 terminal is 3:5; therefore, the Y-length value should be 3/5 of the X-width value for proper aspect (Figure IV.3).

```
ZCZC CCCNNNXXX
E
DATE/TIME: XX/XXXX     STATION: XXX     UNITS:
1=       2=       3=       4=       5=       6=       7=       8=       9=
   248  196  148  096  048  000  048  096  148  196  248
    +----+----+----+----+----+----+----+----+----+----+
248 +
231 +
214 +
198 +
181 +
165 +
148 +
132 +
115 +
099 +
082 +
066 +
049 +
033 +
016 +
000 +
016 +
033 +
049 +
066 +
082 +
099 +
115 +
132 +
148 +
165 +
181 +
198 +
214 +
231 +
248 +
    +----+----+----+----+----+----+----+----+----+----+
```

Figure IV.3. ALPHA.FL Alphanumeric Grid.

OFFSET	PARAMETER	EXAMPLE

30 Starting Byte of the Alphanumeric Grid

This value is used when converting the X-Y grid to the alphanumeric grid (Figure IV.4). The value entered is the byte address of the location in the "ALPHA.FL" file that corresponds to alpha grid coordinate X=0, Y=0 or the lower left of the grid. Initialized when full initialization occurs.

31 Extra Width of Alphanumeric Grid

This value is used when converting the X-Y grid to the alphanumeric grid (Figure IV.5). The value is the value in offset 26 (RADARGEN.PM) subtracted from the number of bytes per line and is equal to the number of bytes in the CR, LF, nulls, and Y-scale. Initialized when full initialization occurs.

32 Partial Grid X Center Coordinate

The center East-West location of the partial grid alphanumeric products (".P") is entered in kilometers. For example, 50. denotes that the center of the grid is 50. kilometers east of the radar east. A negative entry denotes a center that is west of the radar site. This entry can be changed by the ARAP command PLOC:X Y.

33 Partial Grid Y Center Coordinate

The center North-South location of the partial grid alphanumeric products (".P") is entered in kilometers. For example, 100. denotes that the center of the grid is 100. kilometers north of the radar site. A negative entry denotes a center that is south of the radar site. This entry can be changed by the ARAP command PLOC:X Y.

34 Intensity Level 1 Product Threshold

35 Intensity Level 2 Product Threshold

36 Intensity Level 3 Product Threshold

37 Intensity Level 4 Product Threshold

40 Intensity Level 5 Product Threshold

41 Intensity Level 6 Product Threshold

The intensity product thresholds are used to convert the precipitation rates into six discrete levels for use in the echo intensity map, areal coverage calculations, and movement calculations. The values are entered in 100ths of in/hr. For example, the following tables illustrate the standard DVIP assignments.

```
R
FPRINT/Z ALPHA.FL 1670/F
  1670 020040 020040 020040 020040 020040 020040 020015 031063                .23
  1700 030440 025440 020040 020040 020040 020040 020040 020040 1 +
  1710 020040 020040 020040 020040 020040 020040 020040 020040
♦♦♦
  1730 020040 020040 020015 031064 034040 025440 020040 020040       .248 +
  1740 020040 020040 020040 020040 020040 020040 020040 020040
♦♦♦
  1760 020040 020040 020040 020040 020040 020040 020015 020040                .
  1770 020040 025455 026455 026453 026455 026455 025455 026455    +----+----+---
  2000 026453 026455 026455 025455 026455 026453 026455 026455 -+----+----+----
  2010 025455 026455 026453 026455 026455 025455 026455 026453 +----+----+----+
  2020 026455 026455 025415  ----   ----   ----   ----   ----  ----+.........
R
FPRINT/Z/B ALPHA.FL 1670/F
  1670   040 040  040 040  040 040  040 040  040 040  040 040  040 015  062 063
  1700   061 040  053 040  040 040  040 040  040 040  040 040  040 040  040 040
  1710   040 040  040 040  040 040  040 040  040 040  040 040  040 040  040 040
♦♦♦
  1730   040 040  040 040  040 015  062 064  070 040  053 040  040 040  040 040
  1740   040 040  040 040  040 040  040 040  040 040  040 040  040 040  040 040
♦♦♦
  1760   040 040  040 040  040 040  040 040  040 040  040 040  040 015  040 040
  1770   040 040  053 055  055 055  055 053  055 055  055 055  053 055  055 055
  2000   055 053  055 055  055 055  053 055  055 055  055 053  055 055  055 055
  2010   053 055  055 055  055 053  055 055  055 055  053 055  055 055  055 053
  2020   055 055  055 055  053 015    ----     ----     ----     ----     ----
R
```

Figure IV.4. FPRINT of Alphanumeric Grid (last two lines).

DVIP LEVEL	Precipitation Rate	Entry Value
1	0.01"/hr.	1
2	0.10"/hr.	10.
3	0.50"/hr.	50.
4	1.00"/hr.	100.
5	2.00"/hr.	200.
6	5.00"/hr.	500.

The command THRES:INT L XXX can be used to change the threshold levels.

42 Level 1 Precipitation Accumulation Product Threshold

43 Level 2 Precipitation Accumulation Product Threshold

44 Level 3 Precipitation Accumulation Product Threshold

45 Level 4 Precipitation Accumulation Product Threshold

46 Level 5 Precipitation Accumulation Product Threshold

47 Level 6 Precipitation Accumulation Product Threshold

5Ø Level 7 Precipitation Accumulation Product Threshold

51 Level 8 Precipitation Accumulation Product Threshold

52 Level 9 Precipitation Accumulation Product Threshold

The precipitation accumulation product thresholds are used to convert the accumulation values into nine discrete levels for use in the precipitation accumulation maps. The values are entered in 100ths of an inch. For example, an entry of 250. denotes 2.50 inches. The command THRES:ACC L XXX can be used to change the threshold levels.

53 Level 1 Echo Tops Product Threshold

54 Level 2 Echo Tops Product Threshold

55 Level 3 Echo Tops Product Threshold

56 Level 4 Echo Tops Product Threshold

57 Level 5 Echo Tops Product Threshold

6Ø Level 6 Echo Tops Product Threshold

61 Level 7 Echo Tops Product Threshold

OFFSET	PARAMETER	EXAMPLE

62 Level 8 Echo Tops Product Threshold

63 Level 9 Echo Tops Product Threshold

The echo tops product thresholds are used to convert the echo top values into nine discrete levels for use in the echo tops maps. The values are entered in kilometers. For example, a value of 10. denotes ten kilometers. The command THRES:TOP L XXX can be used to change threshold levels.

64 Level 1 VIL Product Threshold

65 Level 2 VIL Product Threshold

66 Level 3 VIL Product Threshold

67 Level 4 VIL Product Threshold

70 Level 5 VIL Product Threshold

71 Level 6 VIL Product Threshold

72 Level 7 VIL Product Threshold

73 Level 8 VIL Product Threshold

74 Level 9 VIL Product Threshold

The vertically integrated liquid water content product thresholds are used to convert the VIL values into nine discrete levels for use in the VIL maps. The values are entered in kg/m^2. The command THRES:VIL L XXX can be used to change the threshold levels.

75 Grid Resolution

The grid resolution is entered. A value between four and six is recommended.

76 Grid Size

This offset contains the size of one dimension of the X-Y grid. The maximum range contained in the grid is:

Range = Grid Size * Grid Resolution.

77 Y-Range for AFOS Graphics

This parameter sets the scaling parameter for AFOS graphics (".G" products). The value is in kilometers and is the range from the center of the AFOS

screen to either the top or bottom of the screen. The map background must use the same scale.

1ØØ Number of hours for XHA/Product Purge Parameter in Hours

Right Byte - This parameter defines the number of hours of precipitation accumulation to be used for the long-term precipitation accumulation products (XHA). Valid entries are 2-24.

Left Byte - This parameter defines the number of hours used for auto product purging. Any products older than this value will be purged.

1Ø1 Observation Interval

The normal observation interval has a valid range of 5-60 minutes and must be evenly divisible into one hour. This parameter can be changed by the OBS:INT X command. A value of zero disables observations.

1Ø2 Tops Observation Interval

The tops observation interval has a valid range of 15-60 minutes and must be a multiple of the observation interval. This parameter can be changed by the OBS:TOP X command.

1Ø3 Alarm/Alert Status/Auto-Threshold Increase Percentage

The alarm/alert subsystem produces an alarm/alert warning message if the alarm thresholds are exceeded.

Bit Ø: Alarm/Alert Status: Ø = disabled
1 = enabled

Bits 1-7: Auto-Threshold Increase Percentage

Bits 8-14: Auto-Areal Coverage Increase Percentage

If the automatic alarm threshold subsystem is enabled and the alarm thresholds are exceeded, the thresholds are increased by the percentage given in the range of 0-127%.

The alarm/alert status can be changed by the ALARM:ON and ALARM:OFF commands. The auto-increase percentages can be changed by the ALARM:TIP XXX and ALARM:AIP XXX commands.

1Ø4 Allowable Elevation Error

The antenna controller directs the antenna to a particular elevation. The logging program checks the actual elevation. The difference is the elevation error. If the error is less than the allowable error, the observation is taken. A recommended value is 1 which denotes .1 degree.

1Ø5 System Logging Status and Channel

This parameter contains the system logging status and channel number opened to the log file "$LOG".

Bit 0: 0 for logging disabled

1 for logging enabled

Bit 1: 0 for console logging disabled

1 for console logging enabled

Bits 7-15: $LOG channel

The $LOG channel is assigned by the system at runtime. The other bits can be assigned by the commands: SYSLOG:DOWN, SYSLOG:UP, and SYSLOG:UP CON. Upon system start-up, the system log is enabled (bits Ø and 1 are set).

1Ø6 Image Graphic Type/System Log Codes Channel

The upper order byte contains the channel opened to file "RADAR.ER". The system opens it at runtime. The lower order byte contains information used for creating the AFOS graphics (".G" products):

Bits 0 - 1 (LSB): Title block type

Bits 2 - 3: Legend block type

Bits 4 - 5: Data type

where the bit values are:

00 = normal size blocked

01 = reverse video

10 = normal size

11 = double size

The user can change the appearance of the AFOS graphic by changing the bit combination.

OFFSET	PARAMETER	EXAMPLE

1Ø7 Asynchronous Queue Positions

This parameter must match the value in the software codes. It denotes the maximum number of products that can be queued on one line simultaneously.

11Ø Number of Products

This parameter must match the value in the software codes. It denotes the number of displayable products in the system, including meteorological and system information products.

111 Number of Tasks

This parameter must match the value in the software codes. It denotes the number of tasks (separate program paths) in the system.

112 Subsystem Enable

The user can enable or disable certain ARAP subsystems by setting or clearing bits in the subsystem enable word. A bit value of one enables the system, and a value of zero disables the system.

Bit Ø (LSB): Areal Calculations
Bit 1: Movement Calculations
Bit 2: Precipitation Accumulation
Bit 3: Obs Start and Audible Alert
Bit 4: Auto System Log Transfer
Bit 5: Auto Alarm Threshold Increase
Bit 6: Auto Alarm Area Increase
Bit 7: Old Product Purge
Bit 8: Message when OBS:STOP
Bit 9: Auto Privileged to Nonprivileged Change
Bit 1Ø: Auto SYSLOG:UP CON
Bit 11: Reserved
Bit 12: Reserved
Bit 13: Reserved
Bit 14: Reserved
Bit 15: Reserved

113 Privileged Access Code

ARAP has two command sets, one for privileged users and one for nonprivileged users. A nonprivileged user can become a privileged user by entering the command SYS:PRIV XXXX, where XXX is the privileged access code. Any value may be used in this offset.

114 System Test Word

Setting bits in this offset will enable certain test functions. ARAP will only operate normally if this word is zero. The setting of the following bits denote a test state:

Bit Ø (LSB): Bypass LOG, GNDEL, and AVE tasks. Mainly used to debug product creation tasks.

OFFSET	PARAMETER	EXAMPLE

115 Allowable Radar Status for Logging

The bits set in this word indicate the acceptable radar status for logging. If the specified conditions aren't met, the radar is not ready for an observation to be taken. Warning messages are printed and the observation is aborted after several minutes.

Bit 15 (MSB): I.F. Attn. On

Bit 14: I.F. Attn. Off

Bit 13: Ranger Interval 1 km.

Bit 12: Ranger Interval 2 km.

Bit 11: Time Sample 31

Bit 10: Time Sample 15

Bit 9: Antenna Controller On

Bit 8: Antenna Controller Off

Bits 7-Ø: Reserved

An example bit pattern is:

0	1	1	0	1	1	1	0	X	X	X	X	X	X	X	X
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

1 = set

0 = clear

X = don't care

and is decoded as the radar is ready to take an observation if the followign conditions are met:

a) I.F. Attn. must be OFF.

b) Ranger Interval must be 1 kilometer.

c) Time Sample can either be 15 or 31.

d) Antenna Controller must be ON.

116-121 Asynchronous Line Assignment Name - Line Ø

122-125 Asynchronous Line Assignment Name - Line 1

OFFSET	PARAMETER	EXAMPLE

126-131 Asynchronous Line Assignment Name - Line 2

132-135 Asynchronous Line Assignment Name - Line 3

136-141 Asynchronous Line Assignment Name - Line 4

142-145 Asynchronous Line Assignment Name - Line 5

The asynchronous line assignment name table contains ASCII text strings (8 characters in length padded with spaces) that describe the destination of each line. The only use of this table is in the communication status product (COMMS:). For example, line 5 is the video terminal and the entry is "CONSOLE^".

146-151 Asynchronous Line Device Assignment - Line Ø

152-155 Asynchronous Line Device Assignment - Line 1

156-161 Asynchronous Line Device Assignment - Line 2

162-165 Asynchronous Line Device Assignment - Line 3

166-171 Asynchronous Line Device Assignment - Line 4

172-175 Asynchronous Line Device Assignment - Line 5

The asynchronous line device assignment table contains ASCII text strings (up to 7 characters followed by a space) that describe the device name to be opened to each line. For example, line 5 is the video terminal and its device name is "$TTO^^^". The ULM multiplexor ports are named "QTY:Ø^^^", "QTY:1^^^", "QTY:2^^^", "QTY:3^^^".

176 Communication Line Status - Line Ø

177 Communication Line Status - Line 1

2ØØ Communication Line Status - Line 2

2Ø1 Communication Line Status - Line 3

2Ø2 Communication Line Status - Line 4

2Ø3 Communication Line Status - Line 5

The communication line status table describes the status of each asynchronous line. Certain bits may be changed by the operator to denote graphics capability, command capability, etc.

Bit Ø (LSB): Line Status (set by software)

Ø - Line is down

1 - line is up

Bit 1: Line Up On Start

Ø - Line must be manually brought up

1 - Line is automatically brought up

Bit 2: Privileged Terminal (can be changed by software commands)

Ø - Not privileged

1 - Privileged

Bit 3: Command Capability

Ø - No commands allowed (receive only terminal)

1 - Commands allowed (receive and transmit terminal)

Bit 4: Graphics Capability

Ø - Cannot display AFOS graphics

1 - Can display AFOS graphics

Bit 5: Command Response

Ø - No response to command

1 - Response to each command

Bit 6: Spooling

Ø - Spooling is disabled

1 - Spooling is enabled

Bit 7: Queue Busy (set by software)

Ø - Queue not in use

1 - Don't manipulate queue

In general, most terminals will require command capability. If a teletype circuit is connected, it should be set to a receive-only (no commands) mode. Only AFOS graphic compatible displays and the archive device (line Ø) should have the graphics capability bit set. All terminals, except AFOS, should have command response enabled. Spooling should be enabled for all terminals except for the video terminal and other terminals capable of 9600 baud transmission (with control-S disabled).

2Ø4 Characteristic Device Mask - Line 1

2Ø5 Characteristic Device Mask - Line 2

2Ø6 Characteristic Device Mask - Line 3

2Ø7 Characteristic Device Mask - Line 4

21Ø Characteristic Device Mask - Line 5

The characteristic device masks permit the user to disable such parameters as input echoing, console interrupts, etc. The bit assignments for the ULM are:

Bit Ø (LSB): Console Interrupts
Ø - Disabled
1 - Enabled

Bit 1: Tab Expansion
Ø - Enabled
1 - Disabled

Bit 2: Modem/Local Line
Ø - Local
1 - Modem

Bit 4: Rubout
Ø - Underline
1 - Backspace

Bit 5: Input Echoing
Ø - Enabled
1 - Disabled

Bit 11: Carriage Return Echo
Ø - Enabled
1 - Disabled

For devices other than the ULM:

Bit 1: Tab Expansion
Ø - Enabled
1 - Disabled

Bit 5: Input Echoing
Ø - Enabled
1 - Disabled

Bit 6: Nulls after Form Feed
Ø - Disabled
1 - Enabled

Bit 7: Rubout after Tab
Ø - Disabled
1 - Enabled
Bit 8: Parity Check
Ø - Disabled
1 - Enabled
Bit 9: Line Feeds after Carriage Returns
Ø - Enabled
1 - Disabled
Bit 13: Lower Case Translated to Upper Case
Ø - Enabled
1 - Disabled
Bit 14: 80-Column Device
Ø - Enabled
1 - Disabled
Bit 15: Spooling
Ø - Enabled if permitted
1 - Disabled

In general, Silent 700 terminals should have console interrupts enabled and AFOS terminals should have input echoing disabled.

211 ULM Line Characteristic - Port Ø

212 ULM Line Characteristic - Port 1

213 ULM Line Characteristic - Port 2

214 ULM Line Characteristic - Port 3

The ULM line characteristic table is used to tailor each line to the connected device according to the following bit pattern:

Bit Ø: Loopback Mode
Ø - Off
1 - On
Bits 1-2: Parity
ØØ - None
Ø1 - Odd
1Ø - Even
11 - Reserved

Bits 3-4: Code Level
- ØØ - 5-level
- Ø1 - 6-level
- 1Ø - 7-level
- 11 - 8-level

Bits 5-6: Stop Bits
- ØØ - 1 stop bit
- Ø1 - 2 stop bit
- 1Ø - Reserved
- 11 - Reserved

Bits 7-10: Line Speed
- ØØØØ - Reserved
- ØØØ1 - 19,200 baud
- ØØ1Ø - 50 baud
- ØØ11 - 75 baud
- Ø1ØØ - 134.5 baud
- Ø1Ø1 - 200 baud
- Ø11Ø - 600 baud
- Ø111 - 2400 baud
- 1ØØØ - 9600 baud
- 1ØØ1 - 4800 baud
- 1Ø1Ø - 1800 baud
- 1Ø11 - 1200 baud
- 11ØØ - 2400 baud
- 11Ø1 - 300 baud
- 111Ø - 150 baud
- 1111 - 110 baud

Bits 11-13: Reserved

Bit 14: Must Be Zero

Bit 15: Must Be One

215 Number of Vertical Levels for Top Scans

This parameter is set by software and indicates the number of levels to be taken. The number will vary from 2-8 dependent upon the detection of echoes.

216 Maximum Number of Vertical Levels for Top Scans

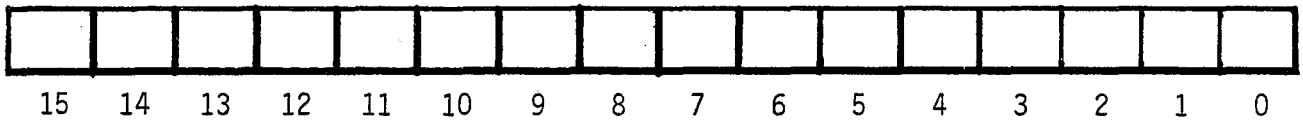
The maximum number of levels allowed for a Tops scan. Recommended values are 3-8 with 8 preferable.

OFFSET	PARAMETER	EXAMPLE
217	Level A Elevation in Antenna Control Units	
22Ø	Level B Elevation in Antenna Control Units	
221	Level C Elevation in Antenna Control Units	
222	Level D Elevation in Antenna Control Units	
223	Level E Elevation in Antenna Control Units	
224	Level F Elevation in Antenna Control Units	
225	Level G Elevation in Antenna Control Units	
226	Level H Elevation in Antenna Control Units	

The elevation in antenna control units table is used by the antenna controller to set the antenna elevation. Each value in the table is calculated by:

Desired Elevation = 45.0° - Value

The corresponding bit values are:



Bit 3: .0879°
Bit 4: .1758°
Bit 5: .3516°
Bit 6: .7031°
Bit 7: 1.4063°
Bit 8: 2.8125°
Bit 9: 5.6250°
Bit 10: 11.2500°
Bit 11: 22.5000°

For example, if an elevation of 30.0° is desired, the value is:

Value = 45.0° - 30.0° = 15.0°

The bit values for 15.0° are:

Bit 1Ø:	11.2500
Bit 8:	2.8125
Bit 6:	.7031
Bit 4:	.1758
Bit 3:	.0879
Sum:	15.0293

By coding the bit pattern 0|000|010|101|011|000 (2530 octal), the actual elevation would be 29.9707°.

227 Level A Elevation

23Ø Level B Elevation

231 Level C Elevation

232 Level D Elevation

233 Level E Elevation

234 Level F Elevation

235 Level G Elevation

236 Level H Elevation

The elevation table contains the desired elevation in 10ths of a degree. The values are cross-checked with the antenna elevation to verify the correct operation of the antenna controller. For example, 30.0° would be encoded 300. When changing these values, the program TVCONV must be run. The resulting CONV.TP and CONV.VL files must replace the files in the RDR partition.

B. Tailoring the System Error Log - RADAR.ER

The disk file RADAR.ER contains the ASCII error codes and a bit map containing the message numbers to be logged and alerted. The octal editor is used to make individual changes to this file. The commands ERR:ADD XXX, ERR:DEL XXX, ERR:ALM ADD XXX, and ERR:ALM DEL XXX can be used to change the bit map. The entire set of messages to be logged and alerted can be initialized by executing the ARAPGEN program.

The table of error codes to be logged starts at location Ø and ends at 17 octal offset. The error code alert table starts at location 2Ø and ends at 37 octal offset. Each bit in the table corresponds to one error code. The bits for each word are numbered right to left. To find the appropriate bit, split the error code number into a bit number and word number:

Example for error code 104

$104 = 001000100 \quad \underbrace{001000}_{\text{word } 10_8} \quad \underbrace{0100}_{\text{Bit 8.}}$

log word = 10_8

alert word = $10_8 + 20_8 = 30_8$

A sample bit map is provided in Figure IV.5. In this example, error codes Ø, 1, 22, 23, 24Ø, and 257 are to be logged, and codes Ø and 1 are to be alerted.

See Figure IV.6 for a list of all the error messages used in the ARAP system.

C. Tailoring the Product Status Parameters

The disk files PRODUCT.ST, PRODUCT.AR, and PRODUCT.AF contain information about each product such as transmission priority and AFOS PIL headers. The ARAPGEN program should be used to initialize all of the various product parameters. The octal editor or ARAP commands can then be used to change individual parameters later.

Decide what products you wish to have ARAP create (see Recommendations in Figure IV.7). For each product you must also decide the following:

1) Transmission Priority: This value can range from zero to seven with zero being the highest priority. The transmission priority is important when several products are on the queue waiting for transmission. The most important product could be delayed several minutes while less important products are transmitted unless the priorities are correctly set.

2) Product Creation Type: Not all of the products may be of sufficient interest to warrant the creation of a product. For example, the partial alphanumeric grid products are of no use unless a particular area is being observed. Select the possible combinations from the list below:

PRODUCT	CREATION TYPE NOR	TOP	HOURLY
Echo Intensity	*	*	*
Areal Coverage	*	*	*
Echo Movement	*	*	*
Precipitation Accumulation			*
Echo Tops		*	
Echo VILS		*	

```
:000000 0000000000000011 0000000000001100
:000002 0000000000000000 0000000000000000
:000004 0000000000000000 0000000000000000
:000006 0000000000000000 0000000000000000
:000010 0000000000000000 0000000000000000
:000012 1000000000000001 0000000000000000
:000014 0000000000000000 0000000000000000
:000016 0000000000000000 0000000000000000
:000020 0000000000000011 0000000000000000
:000022 0000000000000000 0000000000000000
:000024 0000000000000000 0000000000000000
:000026 0000000000000000 0000000000000000
:000030 0000000000000000 0000000000000000
:000032 0000000000000000 0000000000000000
:000034 0000000000000000 0000000000000000
:000036 0000000000000000 0000000000000000
```

Figure IV.5. Sample Bit Map in RADAR.ER.

Log Codes = 0, 1, 22, 23, 240, 257.
Alarm Codes = 0, 1.

```
E000: ILLEGAL CHANNEL NUMBER
E001: ILLEGAL FILENAME
E002: ILLEGAL SYSTEM COMMAND
E003: ILLEGAL DEVICE COMMAND
E004: NOT A RAND/CONTIG FILE
E005:
E006: END OF FILE
E007: FILE READ PROTECTED
E010: FILE WRITE PROTECTED
E011: FILE ALREADY EXISTS
E012: FILE DOES NOT EXIST
E013: PERMANENT FILE
E014: ATTRIBUTE PROTECTED
E015: FILE NOT OPEN
E016: FATAL UTILITY ERROR
E017:
E020:
E021: CHANNEL IN USE
E022: LINE LIMIT EXCEEDED
E023: SWAP RETURN ERROR
E024: PARITY ERROR
E025: PUSH ERROR
E026: INSUFFICIENT MEMORY
E027: OUT OF DISK SPACE
E030: FILE READ ERROR
E031: UNIT IMPROPERLY SELECTED
E032: MAPDF/REMAP ERROR
E033: SYSTEM OVERWRITE
E034: DIRECT I/O ON SEQ.FILE
E035: FILES ON DIFF. DIRECT
E036: ILLEGAL DEVICE CODE
E037: ILLEGAL OVERLAY NUMBER
E040: DIRECT I/O NOT PERMITTED
E041: ILLEGAL TIME OR DATE
E042: OUT OF TCBS
E043: MESSAGE ADDRESS IN USE
E044:
E045: INT. DEV. CODE IN USE
E046: INSUFF. CONTIGU. BLKS.
E047: DUPLICATE R/W TO MUX
E050: FQTASK ERROR
E051: TOO MANY DIREC. OPEN
E052: ILLEGAL DIRECTORY
E053: UNKNOWN DIRECTORY
E054: PARTITION TOO SMALL
E055: DIRECT. DEPTH EXCEEDED
E056: DIRECTORY IN USE
E057: LINK DEPTH EXCEEDED
```

Figure IV.6. ARAP Error Codes.

```
M150: COMMS LINE 2 UP
M151: COMMS LINE 3 UP
M152: COMMS LINE 4 UP
M153: COMMS LINE 5 UP
M154: ARCHIVE DOWN
M155: COMMS LINE 1 DOWN
M156: COMMS LINE 2 DOWN
M157: COMMS LINE 3 DOWN
M160: COMMS LINE 4 DOWN
M161: COMMS LINE 5 DOWN
E162: KEY ERROR COUNT EXCEEDED
E163: OBSERVATION ABORTED
E164: RADAR TIMEOUT
E165: ELEVATION NOT RESPONDING
E166: RNR-ANTENNA CONTROLLERS
E167: RNR-TIME SAMPLE
E170: RNR-RANGE INTERVAL
E171: RNR-I.F. ATTENUATORS
E172: ACCUM TASK START FAIL
E173: PROD GRA TSK START FAIL
M174: OBSERVATION START
M175: OBSERVATION FINISH
M176: TASK START
M177: TASK FINISH
W200: PRODUCT ALREADY QUEUED
E201: ANTENNA NOT ROTATING
E202: ANTENNA INTERRUPT BY OP.
E203: RADAR STATUS CHANGE
W204: LOGGING SYS BYPASSED-TST
M205: AFOS/RADAR SYS STOPPED
M206: BEGIN PRIVILEGED CMDS
M207: END PRIVILEGED CMDS
M210: LEVEL 1
M211: LEVEL 2
M212: LEVEL 3
M213: LEVEL 4
M214: LEVEL 5
M215: LEVEL 6
M216: LEVEL 7
M217: LEVEL 8
E220: BAD DATA DETECTED
M221: .G PRODUCT QUEUED
M222: .A PRODUCT QUEUED
M223: .P PRODUCT QUEUED
M224: ALARM THRESHOLD CHANGED
M225: AUTO-QUEUE CHANGE
M226: PRODUCT MANUALLY XMIT
M227: SYSLOG DISABLED
M230: SYSLOG ENABLED
M231: XMIT PRIORITY CHANGE
M232: $OBS STATUS REQUESTED
M233: PRODUCT REQUESTED
M234: OBS. INTERVAL CHANGED
M235: THRESHOLD LEVELS CHANGED
M236: EXPAND CTR COORD CHANGE
M237: SPEC. EXPAND PRODUCT REQ
```

Figure IV.6. ARAP Error Codes. (continued)

E060: FILE IN USE
E061: TASK ID ERROR
E062: COMMUN AREA SIZE ERROR
E063: COMMUN AREA USAGE ERROR
E064: FILE POSITION ERROR
E065: DATA CHANNEL MAP FULL
E066: DIRECTORY NOT INITIALIZE
E067: NO DEFAULT DIRECTORY
E070: FOREGROUND RUNNING
E071: ERROR IN PARTITION SET
E072: DIRECTORY IN USE
E073: NO ROOM FOR UFTS
E074: ADDRESS OUTSIDE ADDR SPC
E075: UNLINK A NON-LINK
E076: BG IS NOT CHECKPOINTABLE
E077: SYS.DR ERROR
E100: MAP.DR ERROR
E101: DEVICE TIMEOUT
E102: LINK NOT ALLOWED
E103: NO MCA COMPLEM. REQ.
E104: SHORT MCA RECEIVE REQ.
E105: SYSTEM DEADLOCK
E106: I/O TERM BY CHAN CLOSE
E107: SPOOL FILE ACTIVE
E110: TASK NOT ACTIVE
E111: MAG TAPE OPEN
E112: SYSTEM STACK OVERFLOW
E113: NO RECEIVE REQ. BY MCA
E114: FILE CURRENTLY OPEN
E115: ZERO WORD .XMT
E116: GROSS INPUT ERROR
E117: .TOVLD NOT LOADED
E120: NO OPERATOR MSG ALLOWED
E121: DISK FORMAT ERROR
E122: INVALID BAD BLOCK TABLE
E123: NO MEM FOR BAD BLOCK TAB
E124: CONTIG FILE OF ZERO LEN
E125: PGM NOT SWAPPABLE
E126: BLANK TAPE
E127: MUX LINE NOT READY
E130: CONSOLE INTERRUPT RECEIV
E131: OVERRUN ERROR ON MUX
E132: FRAMING ERROR ON MUX
E133: FRAMING ERRORS DETECTED
E134: .WCHAR OUTSTANDING
W135: ARCHIVE DEVICE INIT FAIL
W136: FQTASK FOR OBS FAIL
W137: QUEUE OVERFLOW
W140: SUBSYSTEM SUSPENDED
M141: SUBSYSTEM RESUMED
M142: AFOS/RADAR SYS STARTED
M143: FULL INIT STARTED
M144: FULL INIT FINISHED
M145: GROUND MAPPING STARTED
M146: ARCHIVE UP
M147: COMMS LINE 1 UP
M240: PROD CREAT TYPE CHANGE
M241: $ALARM STATUS REQUESTED
M242: $COMMS STATUS REQUESTED
M243: MESSAGE COMPOSITION REQ
M244: $PIL STATUS REQUESTED
M245: $HELP INFORMATION REQ
M246: $TASK STATUS REQUESTED
M247: $LOG REQUESTED
M250: $ARC STATUS REQUESTED
M251: $THRES STATUS REQUESTED
M252: $CHAN STATUS REQUESTED
W253: DATA TOO OLD
M254: ALARM THRESHOLD REACHED
M255: REDUCED RESOLUTION GRAPH
M256: AUTO $LOG TRANSFER
M257: ARCHIVE TRANSFER TO FLOP
M260: BLANK GROUND CLUTTER REJ
M261: SUBTRACT GROUND CLUTTER
M262: NO GROUND CLUTTER REJ.
M263: SYSTEM HANG DETECTED
M264: $ERR REQUESTED
M265: ERROR CODE CHANGE
M266: $LIST REQUESTED
M267: PRODUCT PURGED
M270:
M29:
M272:
M273:
M274:
M275:

PRODUCT	PRIORITY	ARCHIVE	CREATION NOR	CREATION TOP	CREATION HR	AUTOQUEUE 1	AUTOQUEUE 2	AUTOQUEUE 3	AUTOQUEUE 4	AUTOQUEUE 5
EIM.A	2	every 6 versions	*					*		*
EIM.G	2	every 2 versions	*			*				
EIM.P	3	none								
ARA.A	4	every 10 versions		*		*				
ARA.G	3	every 10 versions		*		*				
MOV.A	7	none								
1HA.A	3	none			*					
1HA.G	4	every version			*	*				
1HA.P	4	none			*					
XHA.A	6	every 6 versions			*					
XHA.P	7	none			*					
XHA.G	6	every 6 versions			*	*				
VIL.A	6	none		*						
VIL.G	5	every 2 versions		*		*				
VIL.P	7	none		*						
TOP.A	4	none		*						
TOP.G	4	every 2 versions		*						
TOP.P	5	none		*						
ALM.A	0	every version				*	*	*	*	*
$MESS	1	every version								
All Others	2	none								

Figure IV.7. Recommended Product Parameters.

```
  0 041111 046122 042122 042511 046440 041111 046107 050110 BILRDREIM BILGPH
 10 042511 046440 041111 046107 050110 042520 050040 041111 EIM BILGPHEPP BI
 20 046122 042122 040522 040440 041111 046107 050110 040522 LRDRARA BILGPHAR
 30 040440 041111 046122 042122 046517 053040 041111 046122 A BILRDRMOV BILR
 40 042122 030510 040440 041111 046107 050110 030510 040440 DR1HA BILGPH1HA
 50 041111 046122 042122 030510 040440 041111 046122 042122 BILRDR1HA BILRDR
 60 054110 040440 041111 046107 050110 054110 040440 041111 XHA BILGPHXHA BI
 70 046122 042122 054110 040440 041111 046122 042122 052117 LRDRXHA BILRDRTO
100 050040 041111 046107 050110 052117 050040 041111 046122 P BILGPHTOP BILR
110 042122 052117 050040 041111 046122 042122 053111 046040 DRTOP BILRDRVIL
120 041111 046107 050110 053111 046040 041111 046122 042122 BILGPHVIL BILRDR
130 053111 046040 041111 046122 042122 040514 046440 041111 VIL BILRDRALM BI
140 046122 042122 046511 051440 041111 046122 042122 046511 LRDRMIS BILRDRMI
150 051440 041111 046122 042122 046511 051440 041111 046122 S BILRDRMIS BILR
160 042122 046511 051440 041111 046122 042122 046511 051440 DRMIS BILRDRMIS
170 041111 046122 042122 046511 051440 041111 046122 042122 BILRDRMIS BILRDR
200 046511 051440 041111 046122 042122 046511 051440 041111 MIS BILRDRMIS BI
210 046122 042122 046511 051440 041111 046122 042122 046511 LRDRMIS BILRDRMI
220 051440 041111 046122 042122 046511 051440 041111 046122 S BILRDRMIS BILR
230 042122 046511 051440 041111 046122 042122 046511 051440 DRMIS BILRDRMIS
240 041111 046122 042122 046511 051440 041111 046122 042122 BILRDRMIS BILRDR
250 046511 051440 041111 046122 042122 046511 051440 041111 MIS BILRDRMIS BI
260 046122 042122 042522 051040 041111 046122 042122 046123 LRDRERR BILRDRLS
270 052040 000000 000000 000000 000000 000000 000000 000000 T ...............
300 000000 000000 000000 000000 000000 000000 000000 000000 ................
```

PRODUCT.AF

```
  0 042511 046456 040440 020040 042511 046456 043440 020040 EIM.A    EIM.G
 10 042511 046456 050040 020040 040522 040456 040440 020040 EIM.P    ARA.A
 20 040522 040456 043440 020040 046517 053056 040440 020040 ARA.G    MOV.A
 30 030510 040456 040440 020040 030510 040456 043440 020040 1HA.A    1HA.G
 40 030510 040456 050040 020040 054110 040456 040440 020040 1HA.P    XHA.A
 50 054110 040456 043440 020040 054110 040456 050040 020040 XHA.G    XHA.P
 60 052117 050056 040440 020040 052117 050056 043440 020040 TOP.A    TOP.G
 70 052117 050056 050040 020040 053111 046056 040440 020040 TOP.P    VIL.A
100 053111 046056 043440 020040 053111 046056 050040 020040 VIL.G    VIL.P
110 040514 046456 040440 020040 022101 046101 051115 020040 ALM.A    $ALARM
120 022103 047515 046523 020040 022120 044514 020040 020040 $COMMS   $PIL
130 022110 042514 050040 020040 022124 040523 045440 020040 $HELP    $TASK
140 022103 044101 047040 020040 022123 046117 043440 020040 $CHAN    $SLOG
150 022101 051103 020040 020040 022117 041123 020040 020040 $ARC     $OBS
160 022124 044122 042523 020040 022115 042523 051440 020040 $THRES   $MESS
170 022123 050105 041461 020040 022123 050105 041462 020040 $SPEC1   $SPEC2
200 022123 050105 041463 020040 022123 050105 041464 020040 $SPEC3   $SPEC4
210 022123 050105 041465 020040 022105 051122 020040 020040 $SPEC5   $ERR
220 022114 044523 052040 020040 000000 000000 000000 000000 $LIST    ........
230 000000 000000 000000 000000 000000 000000 000000 000000 ................
```

PRODUCT.ID

1) Find ARA.G in PRODUCT.ID file. Offset is 20_8.

2) Divide by 4 and multiply by 5: $20_8 / 4_8 * 5_8 = 24_8$.

3) Offset to PIL header in PRODUCT.AF is 24 octal.

Figure IV.8. Example of Changing AFOS PIL Headers.

3) Auto-Queue Status: If the auto-queue feature is enabled for a particular product and communications line, the product will automatically be transmitted upon creation. If the auto-queue function is not enabled, the user must request each product. Determine what device is connected to each line and what products should be automatically transmitted.

4) Archive Status: If the archive bit is set, every "X-th" version of the product will be archived. Determine if the product should be archived and if so, how frequently.

5) AFOS PIL Header: Every product in ARAP must have a corresponding AFOS PIL header. The graphic (.G) products must have "GPH" for their category. Determine what CCCNNNXXX is to be used for each ARAP product.

The ARAPGEN interactive question-answer program initializes all of the above parameters. The ARAP commands PIO:XXX P (transmission priority), PCT:XXX T (product creation type), COMQUE:XXX YYY L (auto-queue status), and ARCQUE:XXX YYY V (archive status) can also be used to initialize or change the status of each product. The AFOS PIL header can only be changed with the octal editor.

To edit the PIL header file, first find the octal location in PRODUCT.ID that contains the ASCII product ID you wish to change (Figure IV.8). Divide this number by four; multiply the result by five. The final result is the offset to the nine-character CCCNNNXXX in file PRODUCT.AF.

D. Tailoring the Local AFOS to Accept ARAP Products

AFOS must be set up to accept radar data from ARAP. The AWSO (Asynchronous WSO) or WSFO load must be run in order for the ARAP products to be received by AFOS. Add an asynchronous line to the AFOS asynchronous line directory using the DIRECTORY: command on any ADM. Set it up with the characteristics illustrated in Figure IV.9. Set the ALM port number to the port number that the ARAP-AFOS interface cable is connected. Set the line number to the lowest unused asynchronous line number.

Obtain an FPRINT of file PRODUCT.AF from the ARAP system. It contains a listing of all required AFOS PIL headers to be entered into the database. See Figure IV.10 for a list of recommended alarm/alert, map backgrounds, and purge parameters. Use the KEY: to initialize these parameters.

Add one version of product CCCRDRCMD (CCC = radar site ID) to the database. Using the SCHD: command on AFOS, schedule the product CCCRDRCMD with the following characteristics:

Line Number?	Number used in DIRECTORY: command
Line Priority?	3
Immediate Send?	Y
Headers?	None
Trailers?	None

```
  LINE NUMBER:     0      LINE NAME  [ARAP      ]  ALM PORT NUMBER (0-31)    [05]
STATE WEATHER WIRE  (Y-N)  [N]          LINE UP WHEN AFOS INITIALIZES  (Y-N)  [Y]
MESSAGE LOG REQUIRED  (Y-N)  [N]              IMPLEMENT BREAK RESTART  (Y-N)  [N]
RECEIVE ONLY LINE  (Y-N)   [N]               TRANSMIT ONLY LINE  (Y-N)        [N]
IF TRANSMIT ONLY, ALLOW RECEIVE TO DETERMINE BUSY  (Y-N)                      [ ]
CURRENT LOOP CIRCUIT (Y-N)  [N]     CONTROL INPUT HIGH IN BREAK STATE (Y-N)  [N]
NEED CONTROL OUTPUT (CO) HIGH  (Y-N)    [Y]    ASCII OR BAUDOT   (A OR B)    [A]
IF ASCII, 7 OR 8 BIT (7-8)   [8]          ENTER PARITY (1=ODD,2=EVEN,3=NONE)  [3]
CIRCUIT BAUD RATE (ENTER A-N)  [J]           NUMBER OF STOP BITS (1 OR 2)     [1]
A.   50  E. 134.5  I.  600  M. 4800
B. 56.9  F.   150  J. 1200  N. 9600       IF 8-BIT ASCII, IS THERE
C.   75  G.   200  K. 1800                BINARY DATA ON CIRCUIT   (Y-N)     [Y]
D.  110  H.   300  L. 2400
```

Figure IV.9. AFOS Asynchronous Directory for ARAP

PRODUCT ID	PURGE PARAMETER	ALARM/ALERT	MAP BACKGROUND
EIM.A	3 hours	as desired	---
EIM.G	15 versions	as desired	(see note 1)
EIM.P	3 hours	as desired	---
ARA.A	3 hours	as desired	---
ARA.G	5 versions	as desired	outline
MOV.A	3 hours	as desired	---
1HA.A	3 hours	as desired	---
1HA.G	3 versions	as desired	(see note 1)
1HA.P	3 hours	as desired	---
XHA.A	3 hours	as desired	---
XHA.G	3 versions	as desired	(see note 1)
TOP.A	3 hours	as desired	---
TOP.G	9 versions	as desired	(see note 1)
TOP.P	3 hours	as desired	---
VIL.A	3 hours	as desired	---
VIL.G	9 versions	as desired	(see note 1)
ALM.A	6 hours	Alarmed	---
$MESS	24 hours	Alarmed	---
all others	3 versions	Alerted	---

[1]User's choice of radar grid, range marks, FAA airways, or county map background.

Figure IV.10. Recommended AFOS PIL Characteristics. (For 3 hours of data.)

Transfer the map backgrounds from the ARAP system to AFOS by:

1) Starting the NOVA 4/X System.

2) Starting and stopping ARAP immediately with no switches (to initialize the asynchronous hardware).

3) XFER RDRMAP.ØØ QTY:ØØ

4) Boundary map appears in NMCGPHT6Ø. Save and store it in the appropriate CCCNNNXXX.

5) XFER RDRMAP.Ø1 QTY:ØØ

6) County map appears in NMCGPHT6Ø. Save and store it in the appropriate CCCNNNXXX.

7) XFER RDRMAP.Ø2 QTY:ØØ.

8) FAA airways map appears in NMCGPHT6Ø. Save and store it in the appropriate CCCNNNXXX.

9) XFER RDRMAP.Ø3 QTY:ØØ.

10) Range marks map appears in NMCGPHT6Ø. Save and store it in the appropriate CCCNNNXXX.

11) XFER RDRMAP.Ø4 QTY:ØØ.

12) MDR grid map appears in NMCGPHT6Ø. Save and store it in the appropriate CCCNNNXXX.

E. Ground-Clutter Initialization

The ground-clutter initialization step must be performed on a day without any precipitation echoes. Start the ARAP system using the full initialization and ground-mapping switches:

ARAP/F/G 3Ø/P - Subtraction Mode

ARAP/F/G/N 1/P - No-Suppression Mode

ARAP/F/G/B 3Ø/P - Blanking Mode

The ground-clutter pattern is being mapped. The no-suppression mode takes five minutes, the other modes take about three hours. Periodically, the antenna direction should be changed when the antenna controller light is off.

After the communication lines come up, ARAP is ready for use.

V. HOW TO USE ARAP

This chapter explains how the ARAP data can be accessed and how to use some of the ARAP features.

A. Access to ARAP from the Local AFOS

The communication link between AFOS and ARAP uses the AFOS asynchronous software. The AFOS site connected to the ARAP system must run their asynchronous load (AWSO). The line directory must be properly set up and the "XXXRDRCMD" (XXX = radar site) must be scheduled for immediate send. In addition, all ARAP product CCCNNNXXXs must be in the database.

If the desired products have the auto-queue status bit set, the products will automatically be transmitted to AFOS and stored in the AFOS database. If the AFOS "KEY:" command was used to alarm or alert the product upon receipt, the alarm or alert will be activated.

To request a product or to execute an ARAP command, the procedure is somewhat cumbersome from the AFOS ADM:

1) Enter AFOS message composition by either pressing the "MSG COMP" key or by "E:XXXRDRCMD" (XXX = radar site).

2) Fill in the header block:

WSFO ID	[XXX]	(XXX = radar site)
PRODUCT CATEGORY	[RDR]	
PRODUCT DESIGNATOR	[CMD]	
ADDRESSEE	[ALL]	

Press "NEXT PAGE"

3) Type in the commands you wish to transmit to ARAP. For example:

```
PIL:
REQ:ARA.G
MESS:5
HELLO, MSG CMP TEST
END OF TEST
$$
OBS:
```

You can enter as many commands as you like.

4) Press "ENTER" to exit message composition. The command file will be transmitted to the ARAP system asynchronously and the commands will be executed.

   All system product responses are normally stored in the AFOS database under "XXXRDRMIS" (XXX = radar site).

B. Access to ARAP from Remote AFOS Sites

Remote AFOS sites can access the ARAP data in any of three ways:

1) request/reply
2) database
3) ARAP commands

Request/reply can be used to obtain ARAP products by addressing the request to the local AFOS site. This will only work if the products are in the local AFOS database and are automatically queued for transmission upon creation.

Database access of ARAP products is the most common method of obtaining the ARAP data. Each site enters the desired PIL headers into their database. As the products are generated, they are transmitted throughout the AFOS loop and stored at each site that has the PIL header in their database.

The ARAP command processor permits a site to request specific products or to obtain information such as product availability and observation interval. To execute a command, follow the instructions in part A, "Access to ARAP from the local AFOS".

C. Access to ARAP from the Video Terminal

Type in the desired command and the ARAP system will process it. Since the video terminal also doubles as the system logging device, the logging message may interfere with your command responses. Use the command SYSLOG:UP to disable console logging (while retaining disk logging). When you are finished using the terminal, type the command SYSLOG:UP CON to re-enable system console logging. The video terminal is also used to alert the operator of an error condition. Pressing the alarm clear button will silence the alarm.

D. Access to ARAP from a Silent 700 User (Alphanumeric Terminals)

The Silent 700 user can execute all the commands (if it is privileged) and call up all products except AFOS-format products. Silent 700 terminals can be connected to ARAP in two different ways:

1) Dedicated

In this mode, the terminal is usually at the station and connected directly into ARAP. The terminal can be used like the video terminal. It is also possible to have a dedicated telephone line which would also operate like the video terminal.

2) Modemphone

In the mode, the terminal is portable and any telephone can be used to call into ARAP. On the ARAP side, a telephone line is reserved for ARAP use. A modemphone (direct-access-arrangement and auto-answer modem) is wired between the telephone line and ARAP. The remote user calls the telephone number, waits for the carrier tone, and sets the handset into the Silent 700's cradle. The user then types the desired commands. To disconnect the telephone, simply hang up the phone on the Silent 700.

E. System Integrity

For continued successful operation of ARAP, all users except the video terminal should be nonprivileged users. If one of these users needs to execute a privileged command, the command SYS:PRIV XXXX should be used to gain privileged status. After the user has finished, the line should be changed back to nonprivileged status with the command SYS:PRIV STOP.

ARAP contains a monitor system to restore all privileged users to nonprivileged users after a specified time interval. To invoke this system, the corresponding bit must be set in RADARGEN.PM.

ARAP also contains a software hang monitor. If the system detects a hang, the Sonalert beeper is activated.

F. Archiving

The decision of which products to be archived are made by each site and may vary day to day depending upon the meteorological conditions. The floppies used for ARAP are double-sided. One floppy should be used per day. Normally, AFOS graphics are the only products necessary to be archived. There are two archive devices on ARAP, the floppy disk and the main disk. The floppy archive should always be used unless a large amount of data is being archived. In this case, the main disk archive may be used, since the floppy disk may fill up quite quickly. When time permits, the files can be transferred to floppy by using the ARAP command ARC:TRANSFER.

Products may be archived either manually by using the XMIT:XXX Ø command where "XXX" = product ID or automatically every "N" version by using the ARCQUE:ADD XXX N command.

G. Available Products

There are many products available on ARAP. Normally, three products are generated for each parameter: an AFOS graphic, a Silent 700 full-grid alphanumeric, and a Silent 700 high-resolution partial-grid alphanumeric.

The type of product is determined by the last character in the product name:

G - AFOS graphic

A - Silent 700 full-grid alphanumeric

P - Silent 700 high-resolution partial-grid alphanumeric

The AFOS graphics can be displayed with various map backgrounds. The alphanumeric products do not contain a map background, but contain an East-West, North-South grid. Plastic overlays are available and should be used to locate the echo locations on the product.

The following describes each of the available products:

EIM - Echo Intensity Map (Figure V.1)

The echo intensity map is a depiction of echo intensities in a PPI-format. Six levels are shown as alphanumeric characters (1-6). Conversion of the characters to precipitation rate is obtained by using the legend provided on each graphic. The date/time and station ID are also provided on each graphic. The precipitation rates provided are based on either the stratiform Z-R relationship or convective Z-R relationship dependent on the predominant characteristics of the precipitation (seasonal).

The AFOS echo intensity map can be animated using the AFOS background programs LOOP and ANIMATE. The resulting loop will not only show cell movements and line movements, but also will show individual cells intensifying and dissipating.

ARA - Areal Coverage vs. Time Plot

The areal coverage versus time product is available in two formats: AFOS graphic (Figure V.2) and alphanumeric tables (Figure V.3). The areal coverage is the area covered by precipitation echoes over the entire range of the radar.

The X-axis on the AFOS graphic is the time axis and covers the last thirty-two observations. The Y-axis on the AFOS graphic is the areal coverage. The actual plot is the coverage versus time. If two lines appear on the graphic, the distance from the X-axis to first line is the areal coverage of level 1 echoes. The distance from the first line to the second line is the areal coverage of level 2 echoes. If a third line was present, it would indicate the coverage of level 3 echoes. The same six levels as in

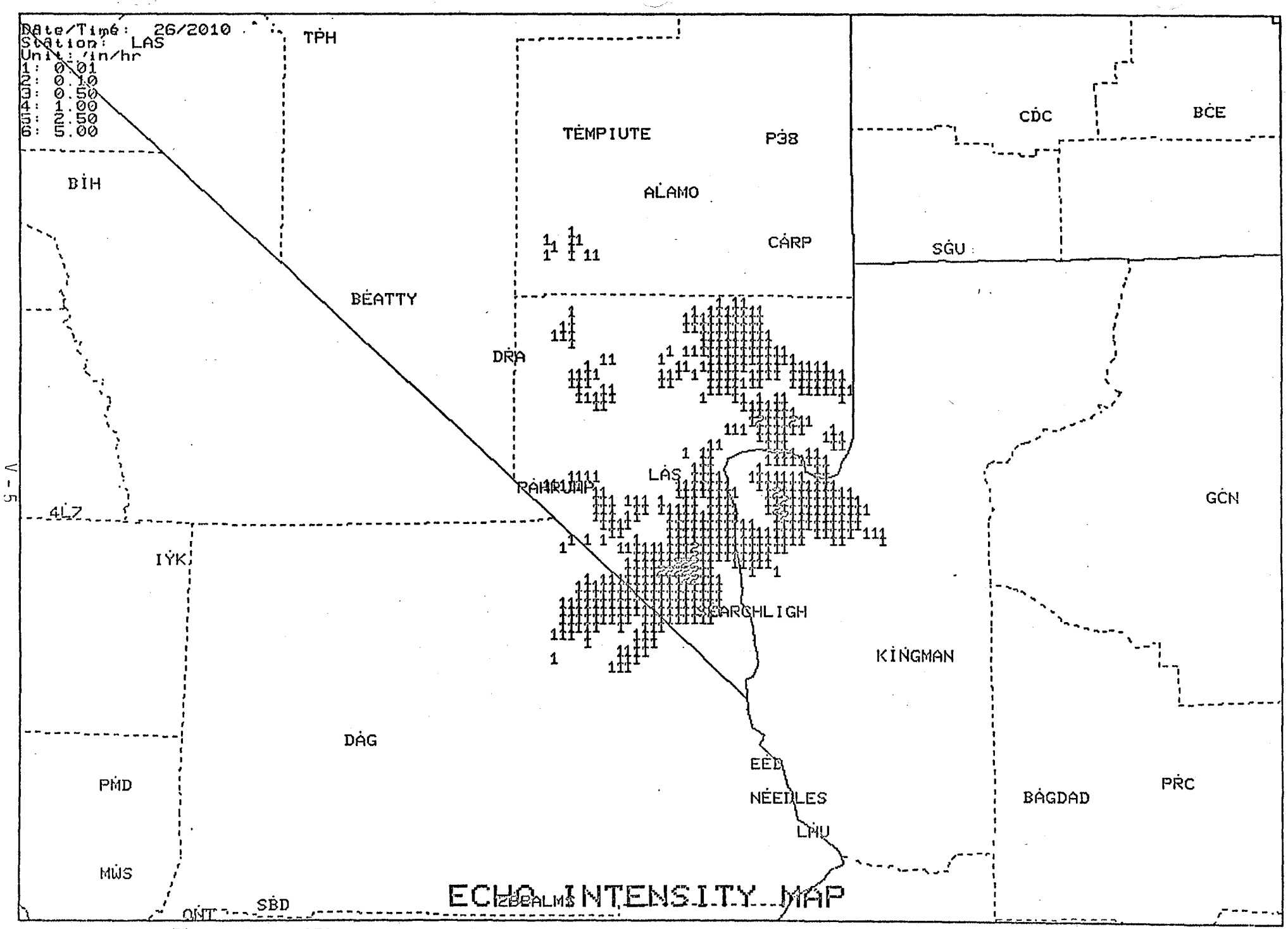


Figure V.1. AFOS Echo Intensity Map.

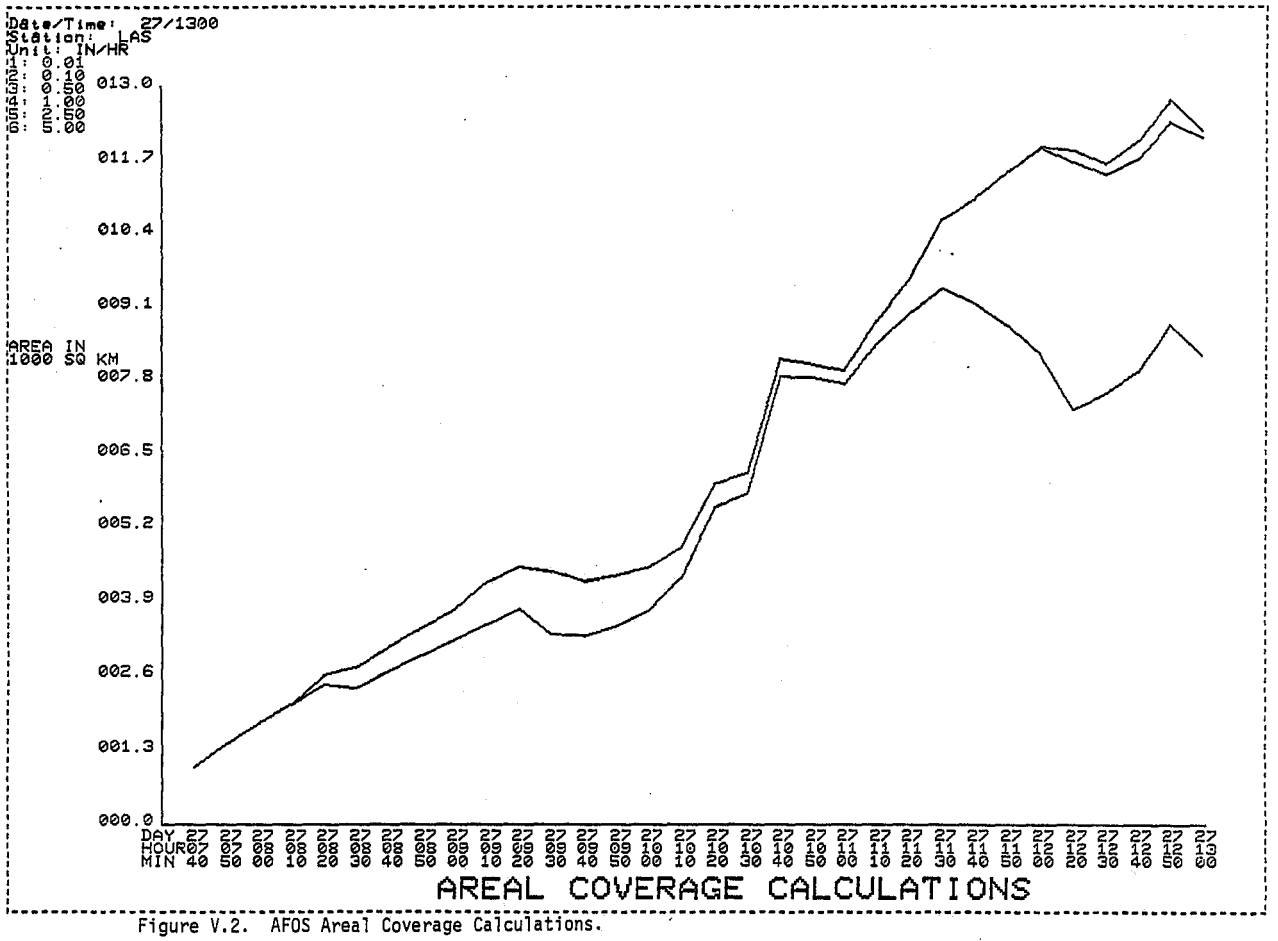


Figure V.2. AFOS Areal Coverage Calculations.

AREAL COVERAGE CALCULATIONS

DATE/TIME: 01/2220 STATION: LAS UNITS: IN/HR

1=0.01 2=0.10 3=0.50 4=1.00 5=2.50 6=5.00 7= 8= 9=

NUMBER OF GRID BOXES. (1 BOX = 16 SQ KM.)

DAY	TIME	LVL1	LVL2	LVL3	LVL4	LVL5	LVL6	TOTAL
01	1700	0004	0000	0000	0000	0000	0000	0004
01	1710	0004	0000	0000	0000	0000	0000	0004
01	1720	0001	0000	0000	0000	0000	0000	0001
01	1730	0003	0000	0000	0000	0000	0000	0003
01	1740	0001	0000	0000	0000	0000	0000	0001
01	1750	0000	0000	0000	0000	0000	0000	0000
01	1800	0000	0000	0000	0000	0000	0000	0000
01	1810	0000	0000	0000	0000	0000	0000	0000
01	1820	0000	0000	0000	0000	0000	0000	0000
01	1830	0003	0000	0000	0000	0000	0000	0003
01	1840	0005	0000	0000	0000	0000	0000	0005
01	1900	0008	0000	0000	0000	0000	0000	0008
01	1910	0008	0000	0000	0000	0000	0000	0008
01	1920	0011	0000	0000	0000	0000	0000	0011
01	1930	0015	0000	0000	0000	0000	0000	0015
01	1940	0027	0000	0000	0000	0000	0000	0027
01	1950	0031	0000	0000	0000	0000	0000	0031
01	2000	0038	0000	0000	0000	0000	0000	0038
01	2010	0038	0000	0000	0000	0000	0000	0038
01	2020	0040	0000	0000	0000	0000	0000	0040

Figure V.3. Alphanumeric Areal Coverage Calculations.

the EIM product are used. The Y-axis is automatically scaled to provide the greatest resolution available at all times.

The areal coverage versus time graph is a useful graph for determining the following five items at a glance:

1) areal coverage of echoes
2) maximum echo intensity
3) rate of change of echo coverage
4) rate of change of echo intensities
5) ratio of heavy-to-light precipitation.

The areal coverage versus time table (Figure V.3) is available to all users. It is a table of the number of grid boxes for each intensity level for each of the previous thirty-two observations. The same information obtained from the AFOS graphic is available from the alphanumeric table, although the information may not be as obvious.

1HA - One-Hour Precipitation Accumulation Map (Figure V.4)

The one-hour precipitation accumulation map depicts precipitation accumulations in a PPI-format. Nine levels are shown as alphanumeric characters (1-9). Conversion of the characters to precipitation amounts is obtained by using the legend provided on each product. The date/time and station ID are also provided on each product. The precipitation values displayed are based upon the echo intensity grid file which is based on the Z-R relationship.

XHA - Long-Term Precipitation Accumulation Map (Figure V.5)

The long-term precipitation accumulation map depicts precipitation accumulations in a PPI-format. The period covered by the long-term map ranges between 2 and 24 hours and is set by either executing ARAPGEN or using the octal editor. Nine levels are shown as alphanumeric characters (1-9). Conversion of the characters to precipitation amounts is obtained by using the legend provided on each product. The date/time and station ID are also provided on each product. The precipitation values displayed are based upon the echo intensity grid file.

MOV - Echo Movements

The echo movements product (Figure V.6) is a table showing the direction and speed of the precipitation centroids. The table has an entry for the current observation and thirty-one previous observations. The echo-centroids are given in (X,Y) coordinates for level

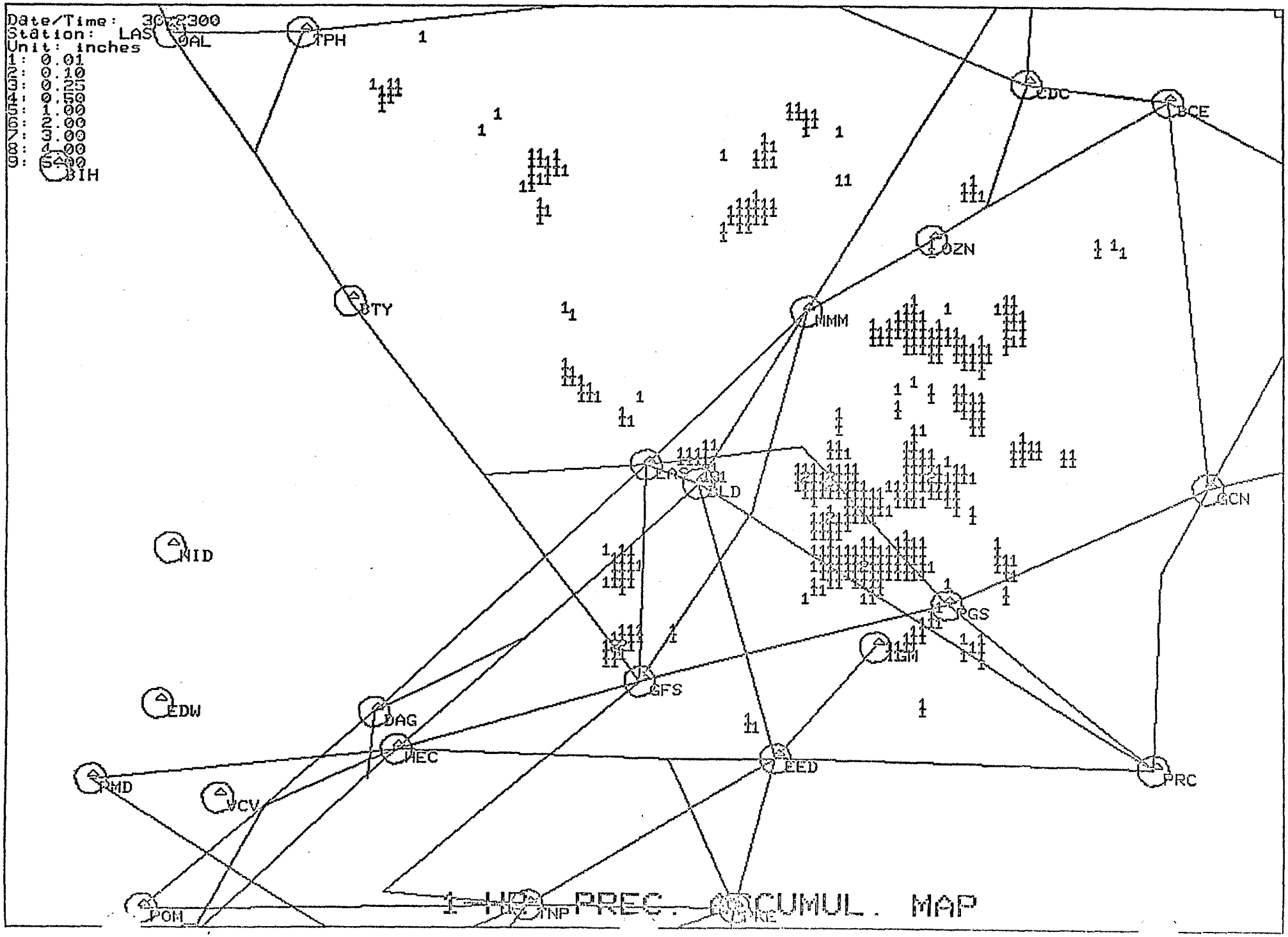


Figure V.4. AFOS 1-Hour Precipitation Accumulation Map.

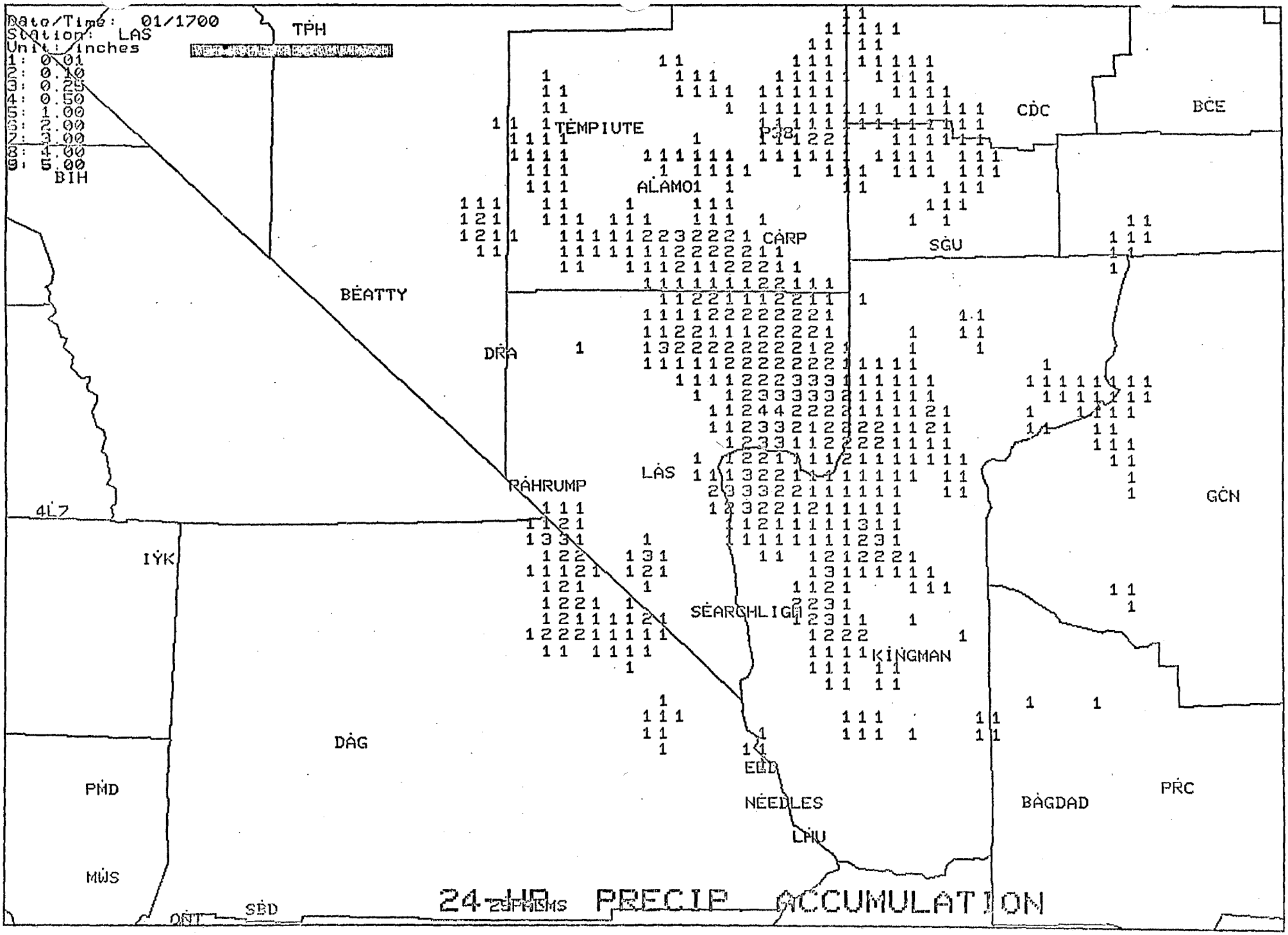


Figure V.5 AFOS Long-Term Precipitation Accumulation Map.

```
ZCZC GTFREXBIL
E ECHO MOVEMENT CALCULATIONS
DATE/TIME: 01/0300    STATION: BIL    UNITS: IN/HR.
1=0.01  2=0.10  3=0.50  4=      5=      6=      7=      8=      9=
DAY TIME   LV1 CENTER  LV2 CENTER  LV3 CENTER LEVEL1  LEVEL2  LEVEL3
             X     Y     X     Y     X     Y   FRM SP  FRM SP  FRM SP
01  0100  -168  -128  -168  -132  ----  ----  000 000 000 000 --- --
01  0200  -108  -128  -120  -124  -128  -128  270 060 260 048 245 000
01  0300  -048  -112  -068  -104  ----  ----  260 062 250 055 --- --
NNNN
```

Figure V.6. Echo Movements Product.

1, level 2, and level 3 intensity echoes. The calculated speed and direction are derived from the centroid locations.

The method used for calculating movements is not pattern recognition but centroid locations. Because of this, the echo movements only should be used for stratiform precipitation. The short lifetime of convective cells are not handled well with the centroid movements. Animation of the echo intensity map on AFOS will also provide visual echo movements.

TOP - Echo Tops

The echo tops map (Figure V.7) depicts echo tops in a PPI-format. Nine height levels are shown as alphanumeric characters (1-9).

The number displayed reflects the maximum echo height observed in each grid box and not the intensity of the echo. Use of this product in conjunction with the echo intensity map will give the user both intensity and height information. Conversion of the displayed characters to echo heights is obtained by using the legend provided on each product. The echo heights calculations have the radar beam width and earth's curvature corrections taken into account.

VIL - Vertically Integrated Liquid Water Content (Figure V.8)

The vertically integrated liquid water content map displays information on the vertical intensity structure of the echoes in a PPI-format. Nine levels of VIL values are shown as alphanumeric characters (1-9). Conversion of the characters to VIL values is obtained by using the legend provided on each product. VIL values of 20-30 kg/m^2 are considered moderate to high, values 30-50 kg/m^2 are considered high, and values greater than 50 kg/m^2 are considered very high. The higher values can help pinpoint potentially severe weather.

If a person looks only at the echo tops map and observes tops at 20 km, he/she may jump to the conclusion that it is a severe thunderstorm. The thunderstorm may be decaying and the radar is picking up ice crystals in the anvil. The wrong conclusion has,therefore, been made. If a person only looks at the echo intensity map and observes intensities of two inches/hour, he/she could jump to the conclusion that this could be a potentially severe storm. Again, there may not be any vertical support to the storm. In both of these cases, the VIL value would be low. The VIL value is high only when high tops are observed and heavy precipitation is occurring throughout the <u>entire</u> core of the storm.

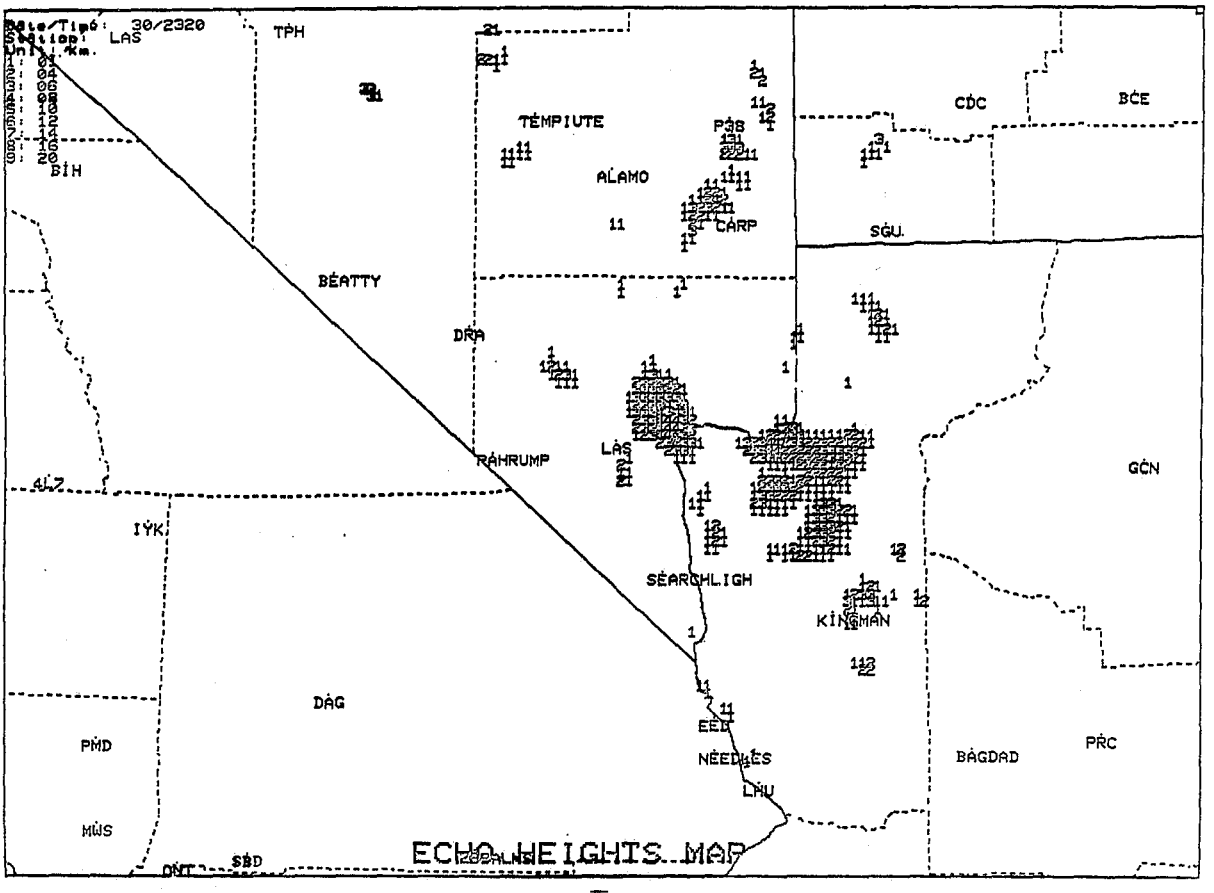


Figure V.7. AFOS Echo Heights Map.

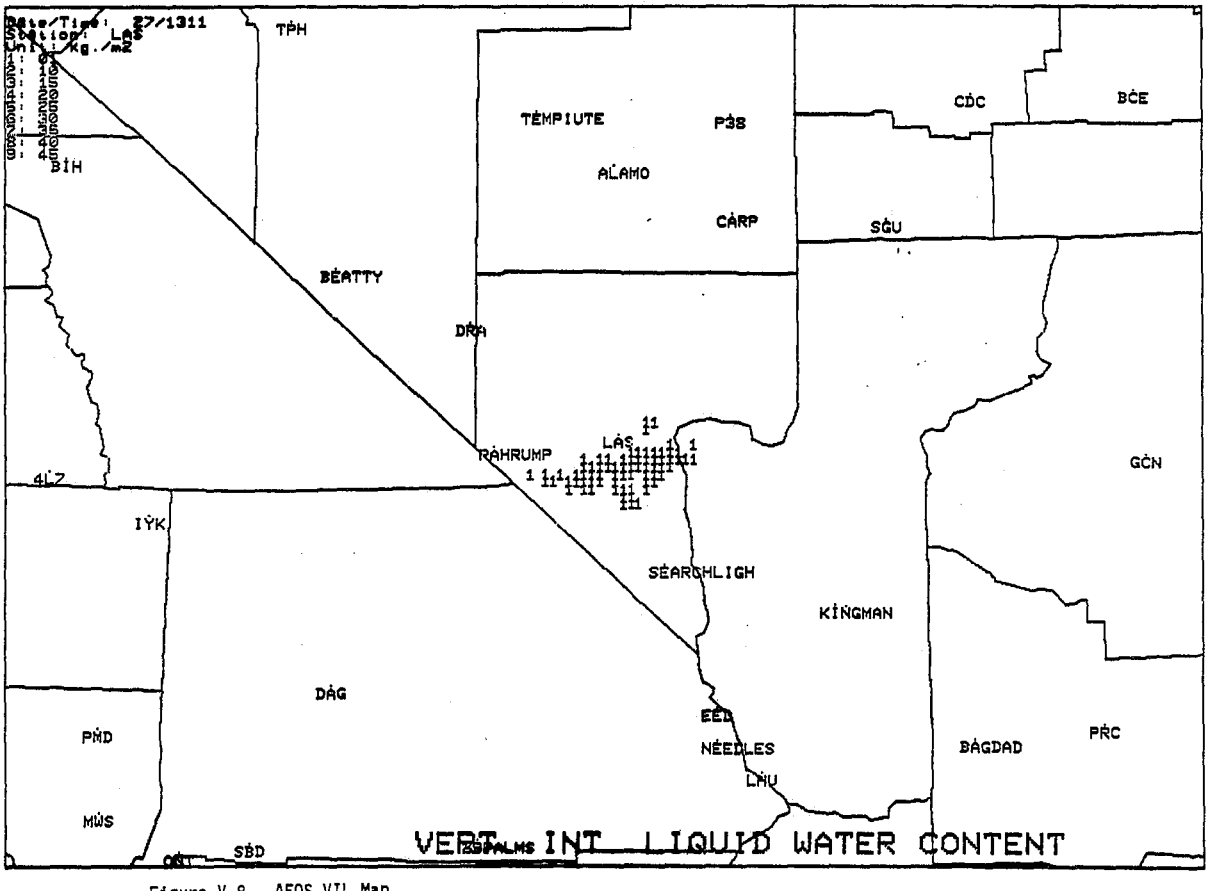


Figure V.8. AFOS VIL Map.

ALM - Alarm/Alert Warning Product

The alarm/alert warning product (Figure V.9) is created when user-set alarm thresholds are exceeded. Five categories are displayed:

1) echo intensities
2) 1-hour precipitation accumulation
3) long-term precipitation accumulation
4) echo tops
5) echo VIL values.

The product is designed to alert you of potentially severe conditions. It will display the threshold parameter exceeded which serves as a guide for which ARAP products should be displayed.

H. Ground-Clutter Suppression

For the ARAP data to be used extensively by nonradar meteorologists, the ground clutter should be reduced so that only precipitation appears on the graphic. Three methods of ground-clutter rejection are available on ARAP.

1) None - Precipitation and ground clutter both appear on output products. Ground-clutter files are zeroed and the radar noise threshold is set slightly above the background noise level. Initialization of this mode is by use of the /G and /N switches on start-up. It is only necessary to take one pass to initialize this mode.

2) Blanking - Any precipitation that occurs over ground clutter will not appear on the output products. Only precipitation that doesn't appear over ground clutter will show up. Initialization of this mode is by use of the /G and /B switches on start-up. A minimum of thirty passes are recommended to initialize the ground-clutter files.

3) Subtraction - Precipitation echoes will appear over ground clutter. The intensities depicted will be reduced somewhat as they move over the ground clutter. The ground-clutter file is subtracted from the radar observation to produce a precipitation-only file. Initialization of this mode is by use of the /G switch on start-up. A minimum of thirty passes are recommended to initialize the ground-clutter file.

The ground-clutter suppression mode must only be initialized when no precipitation is observed on the radarscope. The selected ground-clutter suppression mode will remain in effect until the next initialization (/G) is performed. Periodic ground-clutter suppression may be required when ground clutter begins to appear.

```
ZCZC BILRDRALM
E 07/19:07:11  ♦♦♦ ARAP RADAR ALARM/ALERT MESSAGE ♦♦♦
THE BIL ARAP SYSTEM HAS DETECTED:
INTENSITY  EXCEEDING 0.01  IN/HR AND 12864 SQ.KM. AT 07/19:04:54
 1HR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:05:05
XXHR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:07:12
ECHO TOPS  EXCEEDING 01    KM.    AND 00000 SQ.KM. AT 07/18:48:37
ECHO VILS  EXCEEDING 01    KG/M2 AND 17872 SQ.KM. AT 07/18:49:28
NNNN
ZCZC BILRDRALM
E 07/19:11:27  ♦♦♦ ARAP RADAR ALARM/ALERT MESSAGE ♦♦♦
THE BIL ARAP SYSTEM HAS DETECTED:
INTENSITY  EXCEEDING 0.01  IN/HR AND 12864 SQ.KM. AT 07/19:04:54
 1HR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:05:05
XXHR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:07:12
ECHO TOPS  EXCEEDING 01    KM.    AND 00000 SQ.KM. AT 07/19:11:28
ECHO VILS  EXCEEDING 01    KG/M2 AND 17872 SQ.KM. AT 07/18:49:28
NNNN
ZCZC GTFADABIL
E 07/20:28:16  ♦♦♦ ARAP RADAR ALARM/ALERT MESSAGE ♦♦♦
THE BIL ARAP SYSTEM HAS DETECTED:

 1HR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:05:05
XXHR ACCUM EXCEEDING 00.01 INCH. AND 10496 SQ.KM. AT 07/19:07:12
ECHO TOPS  EXCEEDING 01    KM.    AND 24176 SQ.KM. AT 07/20:28:16
ECHO VILS  EXCEEDING 01    KG/M2 AND 17872 SQ.KM. AT 07/18:49:28
NNNN
```

Figure V.9. Alarm/Alert Warning Product.

I. Operation of the Antenna Controller

The antenna controller accepts control signals from the ARAP computer and converts them to an error signal which is fed to the radar antenna servo system. The following controls are provided (Figure V.10):

1) ON — Turns the power on enabling computer control during observation time.

2) OFF — Turns the power off disabling computer control of the antenna.

3) RELEASE — Press to return elevation control to the user when computer has control.

The following indicators are provided:

1) POWER — Lit when AC power is provided and the system is on.

2) CONTROL — Lit when the computer is controlling the antenna.

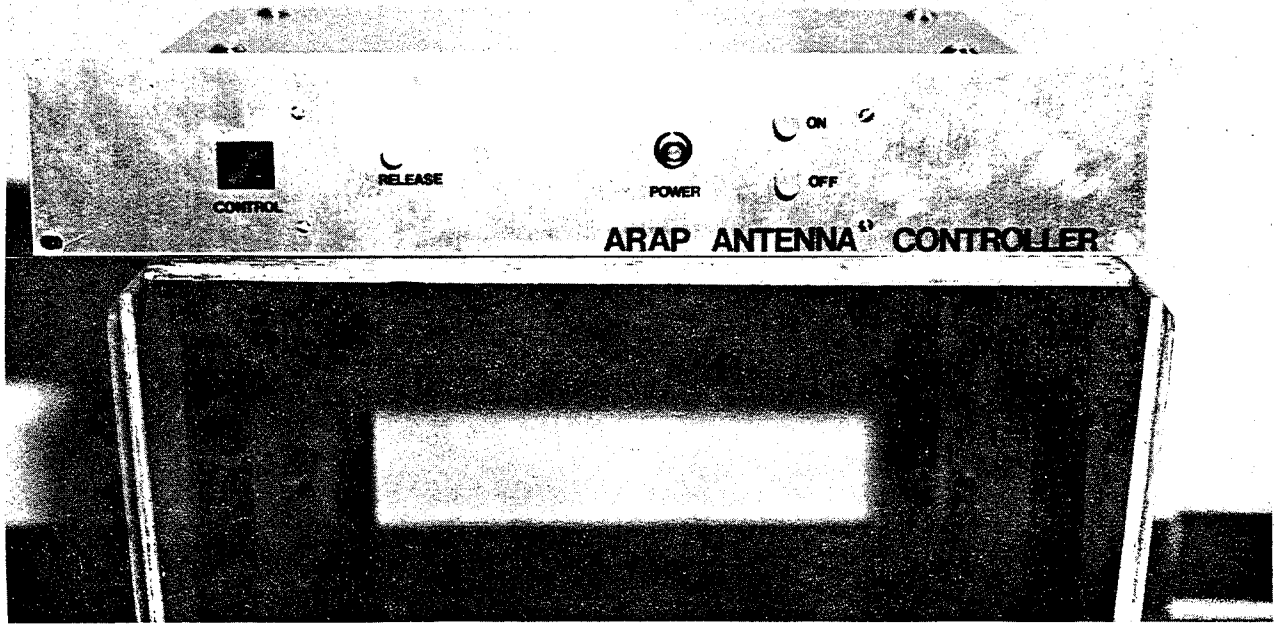


Figure V.10. Antenna Controller Panel.

J. Alarm/Alert Subsystem

ARAP contains an alarm/alert subsystem that monitors several precipitation parameters during each observation. If the user-set threshold are exceeded, a warning message is provided. The various parameters checked are echo intensities, echo tops, precipitation accumulation, and echo VIL values. The user can select the threshold values and the areal coverage value using the ALARM: commands. When no precipitation is occurring, it is recommended that the threshold levels be set to:

	THRESHOLD	COVERAGE
Echo Intensity	0.01 in./hr.	100 sq. km.
1-Hr. Accumulation	0.01 in.	30 sq. km.
X-Hr. Accumulation	0.10 in.	30 sq. km.
Echo TOPS	3 km.	60 sq. km.
Echo VILs	1 kg/m^2	1 sq. km.

The alarm message should be generated shortly after precipitation first occurs. Then the alarm thresholds should be changed to warning values such as:

	THRESHOLD	COVERAGE
Echo Intensity	0.50 in./hr.	30 sq. km.
1-Hr. Accumulation	0.25 in.	30 sq. km.
X-Hr. Accumulation	1.00 in.	1 sq. km.
Echo TOPS	10 km.	30 sq. km.
Echo VILs	5 kg/m^2	1 sq. km.

The thresholds and/or areal coverage values can be set to atuomatically increase upon triggering if the auto-increase subsystem is enabled.

K. Impact on the Normal Operation of the WSR-74C

There is no impact on the operation of the radar when the ARAP system is installed and it is not taking any observations. When observations are enabled, the radar should be left radiating and the antenna rotating in either direction at 3 RPM.

Other switches on the radar that must remain in one position are determined by the "radar status allowable for logging" word in RADARGEN.PM. In general, the I.F. ATTENUATORS must remain off and the RANGE INTERVAL switch must be in the 1-kilometer position. While the computer isn't taking observations, these may be changed but should be reset after the operator is finished with them.

The operator has full control of the radar except when ARAP is taking observations. The operator can tell when an observation is being taken either by checking the video terminal for a "OBSERVATION START" message or by examining the "CONTROL" light on the antenna controller subsystem.

It takes approximately 35 seconds to take a normal (one-scan) observation and not more than four minutes to take a TOPS or hourly (eight-scan) observation. The operator at any time can press the "RELEASE" button on the antenna controller subsystem to gain control of the radar. Of course, it is better to let the ARAP system finish taking an observation since it provides data to many users and provides information not easily available by other means.

VI. COMMANDS

This chapter describes in detail the various ARAP commands available to users.

A. Command Structure

The command structure is similar to the AFOS command structure. All commands must contain a colon (":"). The two types of commands are privileged and nonprivileged. Certain commands (privileged) should only be executed by authorized users since system integrity could suffer. For example, if all five users kept changing the observation interval, data reliability would suffer.

B. Command Summary

ARAP AFOS-RADAR SYSTEM COMMAND SUMMARY - V 1.02 6-25-81

NOTE: A STAR IN COLUMN ONE DENOTES A PRIVILEGED COMMAND.

ALARM FUNCTIONS:

	ALARM:	Display alarm subsystem status and thresholds
*	ALARM:OFF	Disable alarm subsystem
*	ALARM:ON	Enable alarm subsystem
*	ALARM:TIP XXX	Set the automatically alarm threshold increase percentage to XXX % [0-127]
*	ALARM:AIP XXX	Set the automatically alarm areal coverage increase percentage to XXX % [0-127]
*	ALARM:EIM XXX	Change echo intensity alarm threshold to X.XX inches/hour and 1 sq. kilometer area
*	ALARM:EIM XXX YYY	Change echo intensity alarm threshold to X.XX inches/hour and YYY sq. kilometer area
*	ALARM:1HA XXX	Change 1-hour precipitation accumulation alarm threshold to X.XX inches and 1 sq. kilometer
*	ALARM:1HA XXX YYY	Change 1-hour precipitation accumulation alarm threshold to X.XX inches and YYY square kilometers areal coverage
*	ALARM:XHA XXX	Change X-hour precipitation accumulation alarm threshold to X.XX inches and 1 sq. kilometer
*	ALARM:XHA XXX YYY	Change X-hour precipitation accumulation alarm threshold to X.XX inches and YYY square kilometers areal coverage
*	ALARM:TOP XXX	Change echo tops alarm threshold to XX kilometers and 1 sq. kilometer areal coverage
*	ALARM:TOP XXX YYY	Change echo tops alarm threshold to XX kilometers and YYY sq. kilometers areal coverage
*	ALARM:VIL XXX	Change vertically-integrated liquid water content alarm threshold to XXX kg/m2 and 1 sq. kilometer.
*	ALARM:VIL XXX YYY	Change vertically-integrated liquid water content alarm threshold to XXX kg/m2 and YYY square kilometers areal coverage

ARCHIVE

*	ARC:	Display archive status
*	ARC:DOWN	Deactivate archive subsystem
*	ARC:UP FLOPPY	Enable archive subsystem using floppy disk as archive device
*	ARC:INIT FLOPPY	Erase contents of floppy disk and enable archive subsystem using floppy as archive device
*	ARC:UP MAIN	Enable archive subsystem using main disk as archive device
*	ARCQUE:ADD XXX	Add product 'XXX' to automatically archived product list (archive every version)
*	ARCQUE:ADD XXX N	Add product 'XXX' to automatically archived product list (archive every N versions)[1-31]
*	ARCQUE:DEL XXX	Delete product 'XXX' from automatically archived product list
*	ARC:TRANSFER	Transfer archived files from main disk to floppy and delete moved files.
*	ARC:LIST	Produce listing of files on archive device

MESSAGE COMPOSITION

MESS:	Perform message composition and transmit it to all lines
MESS:L	Perform message composition and transmit it to line 'L'
subcommands:	?? - display buffer ++ - delete last line $$ - send product @@ - exit without sending product

TERMINAL COMMAND MODE

SYS:PRIV STOP	Remove calling terminal from privileged status
SYS:PRIV XXXX	Set calling terminal to privileged status provided that the 'XXXX' access code is correct

COMMUNICATION FUNCTIONS

	COMMS:	Display communication subsystem status
*	COMMS:START L	Start communication line 'L'
*	COMMS:STOP L	Stop communication line 'L'

PRODUCT STATUS

	PIL:	Display current status of all products
	PIL:ALL	Display current status of all products including system products.
	PIL:XXX	Display current status of product 'XXX'
	COMQUE:ADD YYY	Add product 'YYY' to list of automatically queued products for the calling line
	COMQUE:DEL YYY	Delete product 'YYY' from list of automatically queued products for the calling lne
*	COMQUE:ADD YYY L	Add product 'YYY' to list of automatically queued products for line 'L'
*	COMQUE:DEL YYY L	Delete product 'YYY' from list of automatically queued products for line 'L'
*	PIO:XXX P	Change transmission priority of product 'XXX' to 'P' (0-7)
*	PLOC:X Y	Change partial product center coordinates to 'X' km. and 'Y' km.
*	PCT:XXX Z	Change product creation type for product 'XXX' to 'Z' where 'Z' can be any combination of '0' (disable), 'T' (top scans), 'N' (normal scans), or 'H' (hourly scans)

PRODUCT ACCESS

XMIT:XXX L	Queue product 'XXX' on line 'L' for transmission
REQ:XXX	Display product 'XXX'
REQ:XXX X Y	Create and display expanded alphanumeric product 'XXX' with center coordinates at 'X' km. and 'Y' km.
DSP:XXXXXXXX	Display RDOS file XXXXXXXXXXXXXX

PRODUCT THRESHOLDS

	THRES:	Display the product display thresholds
*	THRES:INT L XXX	Change intensity display threshold level 'L' to 'X.XX' inches/hour
*	THRES:ACC L XXX	Change accumulation display threshold level 'L' to 'X.XX' inches
*	THRES:TOP L XXX	Change echo heights display threshold level 'L' to 'XX' kilometers
*	THRES:VIL L XXX	Change vertically-integrated liquid water content level 'L' to 'XXX' kg/m2

SYSTEM OPERATIONS

*	TASK:	Display system task status
*	SYS:STOP	Stop radar system in an orderly manner
*	CHAN:	Display system channel assignments
*	SYSLOG:	Display most current 30 system log enteries
*	SYSLOG:X	Display most current 'X' system log enteries
*	SYSLOG:ALM X	Display all alert messages in the most current 'X' system log enteries
*	SYSLOG:DOWN	Disable system logging
*	SYSLOG:UP	Enable system logging on disk
*	SYSLOG:UP CON	Enable system logging on disk and console
*	ERR:	Display list of message codes to be system logged
*	ERR:ADD XXX	Add error code 'XXX' to list of codes to be logged
*	ERR:DEL XXX	Delete error code 'XXX' from list of codes to be logged
*	ERR:ALM ADD XXX	Add error code 'XXX' to list of codes to be alarmed
*	ERR:ALM DEL XXX	Delete error code 'XXX' from list of codes to be alarmed

OBSERVATIONS

	OBS:	Display the current observational status
*	OBS:STOP	Disable further observations
*	OBS:INT XXX	Set the observational interval to 'XXX' minutes
*	OBS:TINT XXX	Set the tops scan observational interval to 'XXX' minutes

INFORMATION

	HELP:	Display list of available commands and instructions for system use

---

END OF COMMAND SUMMARY

NNNN

C. Alarm/Alert Commands

ARAP incorporates an alarm/alert subsystem to warn the users of potential hazardous meteorological conditions. The subsystem checks the echo intensities, precipitation accumulations, echo tops, and VIL values for exceedence of user-set thresholds. If the thresholds are exceeded, a warning product is generated (ALM.A). The following commands control the alarm subsystem (an asterisk denotes a privileged command):

ALARM:	Display the alarm subsystem thresholds and status (Figure VI.1).
* ALARM:OFF	Disable the alarm subsystem.
* ALARM:ON	Enable the alarm subsystem.
* ALARM:TIP XXX	Change the automatic threshold increase value when the alarm is triggered to "XXX"% [0-127%]. Example: ALARM:TIP 50 sets a 50% increase in the threshold value whenever the alarm is triggered.
* ALARM:AIP XXX	Change the automatic areal coverage increase value when the alarm is triggered to "XXX"% [0-127%]. Example: ALARM:AIP 100 sets a 100% increase in the areal coverage threshold value whenever the alarm is triggered.
* ALARM:EIM XXX	Change the echo intensity alarm threshold to "X.XX" inches/hour and an areal coverage of 1 sq. km. Example: ALARM:EIM 200 sets 2.00"/hr. threshold.
* ALARM:EIM XXX Y	Change the echo intensity alarm threshold to "X.XX" inches/hour and an areal coverage of "Y" square kilometer. Example: ALARM:EIM 200 1000 sets 2.00"/hr. and 1000 square kilometers threshold.
* ALARM:1HA XXX	Change the one-hour precipitation accumulation alarm threshold to "X.XX" inches and an areal coverage of 1 square kilometer. Example: ALARM:1HA 100 sets 1.00" threshold.
* ALARM:1HA XXX Y	Change the one-hour precipitation accumulation alarm threshold to "X.XX" inches and an areal coverage of "Y" square kilometers. Example: ALARM:1HA 100 600 sets 1.00" and 600 square kilometers threshold.
* ALARM:XHA XXX	Change the X-hour precipitation accumulation alarm threshold to "X.XX" inches and an areal coverage of 1-square kilometer. Example: ALARM:XHA 400 sets threshold of 4.00".

*	ALARM:XHA XXX Y	Change the X-hour precipitation accumulation alarm threshold to "X.XX" inches and an areal coverage of "Y" square kilometers. Example: ALARM:XHA 300 1000 sets threshold of 3.00" and 1000 square kilometers.
*	ALARM:TOP XXX	Change the echo tops alarm threshold to "XX" kilometers and an areal coverage of 1 square kilometer. Example: ALARM:TOP 1Ø sets threshold of 10 kilometers.
*	ALARM:TOP XXX Y	Change the echo tops alarm threshold to "XX" kilometers and an areal coverage of "Y" square kilometers. Example: ALARM:TOP 8 50 sets threshold to 8 kilometers and 50 square kilometers.
*	ALARM:VIL XXX	Change the VIL alarm threshold to "XX" kg/m^2 and an areal coverage of 1 square kilometer. Example: ALARM:VIL 30 sets threshold of 30 kg/m^2.
*	ALARM:VIL XXX Y	Change the VIL alarm threshold to "XX" kg/m^2 and an areal coverage of "Y" square kilometers. Example: ALARM:VIL 35 100 sets threshold of 35 kg/m^2 and 100 square kilometers.

The alarm subsystem can be used with the subtraction and blanking ground-clutter suppression techniques. If no ground-clutter suppression is being used, the alarm system should be disabled.

If the appropriate enable bit is set in the RADARGEN.PM file, upon generation of the alarm message, the thresholds are automatically increased by a user-set percentage.

D. Communication Commands

The communication subsystem commands are used to monitor the status of each asynchronous line, and to start and stop the lines. The following commands control the communication subsystem, an asterisk denotes a privileged command:

	COMMS:	Display the current communication subsystem status (Figure VI.2).
*	COMMS:START L	Start communication line "L". Example: COMMS:START 2 starts communication line 2.
*	COMMS:STOP L	Stop communication line "L". Example: COMMS:STOP 4 stops communication line 4.

```
ALARM:
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:49:20   ALARM SYSTEM STATUS
STATUS: ENABLED
THRES AUTO INCR %: 100
AREA AUTO INCR %:  100
                  EIM       1HA       XHA       TOP       VIL
                IN./HR.     IN.       IN.       KM.      KG./M2
THRESHOLDS:      00.50     00.10     03.00     10        35
AREAL COVERAGE   00100     00100     00001     00050     00001
NNNN
```

Figure VI.1. Alarm System Status Display.

```
COMMS:
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:49:42   COMMUNICATION STATUS
                 LINE1     LINE2     LINE3     LINE4     LINE5
STATUS:          DOWN      UP        UP        UP        UP
DESTINATION:     AFOS      LCL700    RMT700    SPARE     CONSOLE
TRANSMISSION QUEUE:
01               --------  --------  EIM.A     $MESS     --------
02               --------  --------  1HA.P     EIM.P     --------
03               --------  --------  --------  TOP.A     --------
04               --------  --------  --------  ARA.A     --------
05               --------  --------  --------  1HA.P     --------
06               --------  --------  --------  1HA.A     --------
07               --------  --------  --------  --------  --------
NNNN
```

Figure VI.2. Communication System Status Display.

E. Product Status Commands

The product status commands allow the user to automatically transmit products upon creation to specified lines, change the transmission priority, change the product creation type, and change the center coordinates of partial products. The following commands control the product status (an asterisk denotes a privileged command):

PIL:	Display the current status of all meteorological products. The product description, AFOS PIL header, transmission priority, automatic-queueing status, and product creation type are displayed (Figure VI.3a).
PIL:ALL	Display the current status of all products. The product description, AFOS PIL header, transmission priority, automatic-queueing status, and product creation type are displayed (Figure VI.3b).
PIL:XXX	Display the current status of product XXX. The product description, AFOS PIL header, transmission priority, automatic-queueing status, and product creation type are displayed (Figure VI.3c).

The COMQUE commands allow a user to program the automatic transmission of products as they are created. If the feature is not used, the manual REQ: command must be used for each product.

COMQUE:ADD YYY	Add product "YYY" to list of automatically queued products for the calling line. Example: COMQUE:ADD ARA.A typed from a terminal connected to line 3 will set a flag to send the product "ARA.A" on line 3 each time it is created.
COMQUE:DEL YYY	Delete product "YYY" from list of automatically queued products for the calling line. Example: COMQUE:DEL EIM.A typed from a terminal connected to line 5 will clear a flag stopping product "EIM.A" from being sent on line 5 each time it is created.
* COMQUE:ADD YYY L	Add product "YYY" to list of automatically queued products for line "L". Example: COMQUE:ADD XHA.P 3 will set a flag to send the product "XHA.P" on line 3 each time it is created.
* COMQUE:DEL YYY L	Delete product "YYY" from list of automatically queued products for line "L".

```
PIL:
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:50:13  PRODUCT INVENTORY LIST
PRODUCTID  AFOS ID   PRODUCT DESCRIPTION              TIME    PID NTH  AV  12345
EIM.A   BILRDREIM  ECHO INTENSITY MAP  FULL GRID    01/14:30 4  ◆◆◆  24  ◆—◆◆
EIM.G   BILGPHEIM  ECHO INTENSITY MAP               01/14:30 2  ◆◆◆  02  -----
EIM.P   BILGPHEPP  ECHO INTENSITY MAP  PARTIAL GRID 01/14:31 7  ◆◆◆  03  ◆—◆—◆
ARA.A   BILRDRARA  AREAL COVERAGE CALCULATIONS      01/14:31 6  ◆◆◆  --  ◆—◆—◆
ARA.G   BILGPHARA  AREAL COVERAGE CALCULATIONS      01/14:31 6  ◆◆◆  49  ◆-----
MOV.A   BILRDRMOV  ECHO MOVEMENT CALCULATIONS       PURGED  7  ---  63  -----
1HA.A   BILRDR1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 5  --◆  21  ----◆
1HA.G   BILGPH1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 4  --◆  03  ◆-----
1HA.P   BILRDR1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 4  --◆  --  -----
XHA.A   BILRDRXHA  24-HR. PRECIP. ACCUMULATION      01/14:03 6  --◆  --  ----◆
XHA.G   BILGPHXHA  24-HR. PRECIP. ACCUMULATION      01/14:02 4  --◆  25  ◆-----
XHA.P   BILRDRXHA  24-HR. PRECIP. ACCUMULATION      01/14:03 6  --◆  --  -----
TOP.A   BILRDRTOP  ECHO HEIGHTS MAP                 01/14:19 3  -◆-  01  --◆◆◆
TOP.G   BILGPHTOP  ECHO HEIGHTS MAP                 01/14:19 2  -◆-  01  -----
TOP.P   BILRDRTOP  ECHO HEIGHTS MAP                 PURGED  5  ---  03  ----◆
VIL.A   BILRDRVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 4  -◆-  --  ----◆
VIL.G   BILGPHVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 4  -◆-  --  -----
VIL.P   BILRDRVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 6  -◆-  --  ----◆
ALM.A   BILRDRALM  ALARM/ALERT WARNING PRODUCT      PURGED  0  ---  01  ◆◆◆◆◆
NNNN
```

Figure VI.3a. PIL: Status Display.

```
PIL:ALL
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:51:42  PRODUCT INVENTORY LIST
PRODUCTID  AFOS ID   PRODUCT DESCRIPTION              TIME    PID NTH  AV  12345
EIM.A   BILRDREIM  ECHO INTENSITY MAP  FULL GRID    01/14:30 4  ◆◆◆  24  ◆—◆◆
EIM.G   BILGPHEIM  ECHO INTENSITY MAP               01/14:30 2  ◆◆◆  02  -----
EIM.P   BILGPHEPP  ECHO INTENSITY MAP  PARTIAL GRID 01/14:31 7  ◆◆◆  03  ◆—◆—◆
ARA.A   BILRDRARA  AREAL COVERAGE CALCULATIONS      01/14:31 6  ◆◆◆  --  ◆—◆—◆
ARA.G   BILGPHARA  AREAL COVERAGE CALCULATIONS      01/14:31 6  ◆◆◆  49  ◆-----
MOV.A   BILRDRMOV  ECHO MOVEMENT CALCULATIONS       PURGED  7  ---  63  -----
1HA.A   BILRDR1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 5  --◆  21  ----◆
1HA.G   BILGPH1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 4  --◆  03  ◆-----
1HA.P   BILRDR1HA  1-HR. PREC. ACCUMUL. MAP         01/14:02 4  --◆  --  -----
XHA.A   BILRDRXHA  24-HR. PRECIP. ACCUMULATION      01/14:03 6  --◆  --  ----◆
XHA.G   BILGPHXHA  24-HR. PRECIP. ACCUMULATION      01/14:02 4  --◆  25  ◆-----
XHA.P   BILRDRXHA  24-HR. PRECIP. ACCUMULATION      01/14:03 6  --◆  --  -----
TOP.A   BILRDRTOP  ECHO HEIGHTS MAP                 01/14:19 3  -◆-  01  --◆◆◆
TOP.G   BILGPHTOP  ECHO HEIGHTS MAP                 01/14:19 2  -◆-  01  -----
TOP.P   BILRDRTOP  ECHO HEIGHTS MAP                 PURGED  5  ---  03  ----◆
VIL.A   BILRDRVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 4  -◆-  --  ----◆
VIL.G   BILGPHVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 4  -◆-  --  -----
VIL.P   BILRDRVIL  VERT. INT. LIQUID WATER CONTENT  01/14:20 6  -◆-  --  ----◆
ALM.A   BILRDRALM  ALARM/ALERT WARNING PRODUCT      PURGED  0  ---  01  ◆◆◆◆◆
$ALARM  BILRDRMIS  ALARM STATUS                     01/14:49 0  ---  --  -----
$COMMS  BILRDRMIS  COMMUNICATION STATUS             01/14:49 0  ---  --  -----
$PIL    BILRDRMIS  PRODUCT INVENTORY LIST           01/14:51 0  ---  --  -----
$HELP   BILRDRMIS  HELP INFOMATION FILE             25/17:36 0  ---  --  -----
$TASK   BILRDRMIS  SYSTEM TASK STATUS               PURGED  0  ---  --  -----
$CHAN   BILRDRMIS  SYSTEM FILE/CHANNEL ASSIGNMENT   PURGED  0  ---  --  -----
$SLOG   BILRDRMIS  SYSTEM LOG                      PURGED  0  ---  --  -----
$ARC    BILRDRMIS  ARCHIVE STATUS                   PURGED  0  ---  --  -----
$OBS    BILRDRMIS  OBSERVATION STATUS               01/14:14 0  ---  --  -----
$THRES  BILRDRMIS  MAP THRESHOLD STATUS             PURGED  0  ---  --  -----
$MESS   BILRDRMIS  MESSAGE COMPOSITION FILE         01/14:48 0  ---  --  ◆◆◆◆◆
$SPEC1  BILRDRMIS  SPECIAL PRODUCT 1                PURGED  0  ---  --  ◆-----
$SPEC2  BILRDRMIS  SPECIAL PRODUCT 2                PURGED  0  ---  --  -◆----
$SPEC3  BILRDRMIS  SPECIAL PRODUCT 3                PURGED  0  ---  --  --◆---
$SPEC4  BILRDRMIS  SPECIAL PRODUCT 4                PURGED  0  ---  --  ---◆--
$SPEC5  BILRDRMIS  SPECIAL PRODUCT 5                01/14:03 0  ---  --  ----◆
$ERR    BILRDRERR  ERROR CODE ACTIVE LISTING        PURGED  0  ---  --  -----
$LIST   BILRDRLST  ARCHIVE DIRECTORY LISTING        PURGED  0  ---  --  -----
NNNN
```

Figure VI.3b. PIL:ALL Status Display.

```
PIL:EIM.A
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:51:26  PRODUCT INVENTORY LIST
PRODUCTID  AFOS ID   PRODUCT DESCRIPTION              TIME    PID NTH  AV  12345
EIM.A   BILRDREIM  ECHO INTENSITY MAP  FULL GRID    01/14:30 4  ◆◆◆  24  ◆—◆◆
NNNN
```

Figure VI.3c. PIL:XXX Status Display.

Example: COMQUE:DEL ALM.A 1 will clear a flag stopping product "ALM.A" from being sent on line 1 each time it is created.

The PIO command allows a user to set transmission priorities for each product. If many products are on queue for transmission, the more important products will be transmitted before the less-important products. Priority Ø is the highest and priority 7 is the lowest.

* PIO:XXX P — Change transmission priority of product "XXX" to "P" (Ø - 7). Example: PIO:EIM.A 3 changes the transmission priority of product "EIM.A" to 3.

The PCT command allows a user to set the product creation type for each product. There are three different product creation types: hourly, top, and normal. The hourly scans is a top scans taken once an hour on the hour. The top scans take between three and eight levels and occur at the interval set by OBS:TINT XXX. Normal scans take only one scan and comprise of all the other observations. They occur at the interval set by OBS:INT XXX. Not all products can be created for all types of product creations. The list below are the valid entries (other entries may be made but results may be unpredictable):

PRODUCTS	NORM ACCEPTABLE	TOPS ACCEPTABLE	HOURLY ACCEPTABLE
EIM.A EIM.G EIM.P	*	*	*
ARA.A ARA.G	*	*	*
MOV.A	*	*	*
1HA.A 1HA.G 1HA.P			*
XHA.A XHA.G XHA.P			*
TOP.A TOP.G TOP.P		*	
VIL.A VIL.G VIL.P		*	

The command format is:

* PCT:XXX TP — Change the product creation type for product "XXX" to "TP" where "TP" is any combination of "H" (hourly), "T" (tops), "N" (normal), or "Ø" (none. Examples: PCT:EIM.A Ø stops the creation of product "EIM.A". PCT:EIM.A H sets the product "EIM.A" to be created only on the hour. PCT:EIM.A HTN sets the product "EIM.A" to be created on the hour, every tops scan, and all other observations.

F. Product Access Commands

The product access commands allow a user to request products. The commands are:

XMIT:XXX L	Transmit product "XXX" on line "L". Example: XMIT:EIM.A 3 will queue product "EIM.A" for transmission on line 3. If line Ø is used, the product will be sent to the archive device.
REQ:XXX	Queue product "XXX" on calling line (display product "XXX"). Example: REQ:MOV.A will display product "MOV.A" on the terminal that issued the command.
REQ:XXX X Y	Create and display expanded alphanumeric product "XXX" on calling line with center coordinates at "X" kilometers and "Y" kilometers. The product specified must be one of the following: EIM.A, 1HA.A, XHA.A, TOP.A, or VIL.A. Example: REQ:TOP.A 100 -30 will generate an echo tops map (partial grid) with the center coordinates 100 km. east and 30 km south of the radar site.
DSP:XXX	Display RDOS file "XXXX". No check is made for binary data (some files cannot be printed) and no headers or trailers are provided. Example: DSP:DP4:AB$MESS will display file AB$MESS in directory DP4 (floppy disk) on the calling terminal.

G. Archive Commands

The archive subsystem is used to store products for later reference. There are two archive devices on ARAP. The floppy disk (600 blocks capacity) and the main disk (1000 blocks capacity). The filenames each product is archived under is:

AA , EIM.A

Version Product

The version numbers range from "AA" to "ZZ".

The archive system commands (privileged status denoted by asterisks) are listed below:

* ARC:	Display the archive system status (Figure VI.4).

```
ZCZC BILRDRMIS
E 01/14:53:47 ARCHIVE STATUS
STATUS: UP
DEVICE: DP4
FREE BLOCKS: 320
NNNN
```

Figure VI.4. Archive Status Display.

```
ARC:LIST
◆ REQUEST QUEUED
ZCZC BILRDRLST
E 01/14:55:02 ARCHIVE DISK DIRECTORY
◆◆◆ FLOPPY DISK ◆◆◆
FILENAME     CREATION TIME      BLKS
SYS.DR          01/12:53        0005
EJALM.A         01/13:50        0001
BUEIM.G         01/13:50        0005
BQEIM.P         01/14:16        0002
GGTOP.G         01/14:19        0008
EOALM.A         01/14:20        0001
BRARA.G         01/14:31        0004
$TTR.           01/14:54        0001
BREIM.A         01/13:11        0002
BNTOP.A         01/13:14        0002
EKALM.A         01/13:50        0001
BVEIM.G         01/14:00        0005
BREIM.P         01/14:31        0002
MAP.DR          01/12:53        0001
$TTI.           01/14:54        0001
$LOG.           01/12:54        0148
EGALM.A         01/13:10        0001
```

Figure VI.5. ARC:LIST Display.

* ARC:DOWN	Deactivate the archive subsystem and release the archive device.
* ARC:INIT FLOPPY	Activate the archive subsystem using the floppy disk as the archive device. All files on the archive device are deleted on initialization.
* ARC:UP FLOPPY	Activate the archive subsystem using the floppy disk as the archive device.
* ARC:UP MAIN	Activate the archive subsystem using the main disk as the archive device.
* ARCQUE:ADD XXX	Add product "XXX" to list of automatically archived products. Example: ARCQUE:ADD EIM A will archive product EIM.A each time it is created.
* ARCQUE:ADD XXX N	Add product "XXX" to list of automatically archived products and archive every "N" versions where "N" can be 1-31. Example: ARCQUE:ADD EIM.G 3 will archive every third version of product EIM.G.
* ARCQUE:DEL XXX	Delete product "XXX" from list of automatically archived products. Example: ARCQUE:DEL MOV.A will disable product MOV.A from being archived.
* ARC:TRANSFER	Transfers archived products from main disk to floppy disk and deletes the moved files.
* ARC:LIST	Displays a list of files residing on the active archive device (Figure VI.5).

H. Message Composition

ARAP has a message composition feature which was primarily designed for the operator to alert users of radar outages, ARAP system problems, etc. Only one user can be in message composition simultaneously. An "IN USE" message will appear on other terminals if they attempt to invoke message composition while it is being used.

To enter message composition, type one of the following commands:

MESS:	Compose a message and send it to all users.
MESS:L	Compose a message and sent it to line "L". Example: MESS:5 will enable a user to compose a message and send it to line 5.

Once in message composition (and if command response is enabled), a prompt and instructions appear. The prompt denoting the system is in text entry mode is an #. Type in your message line by line. After each line is entered, the prompt (#) appears when ARAP is ready to accept another line of text.

Several editing modes are available. If the user wants to examine his/her editing buffer, the command is ?? in the first two characters after the # prompt. If the user wants to delete the last line in the buffer, the command is ++ in the first two characters after the # prompt.

To exit message composition and send the message to the specified users, use the command $$ after the # prompt. To exit message composition without sending the message, use the command @@ in the first two characters after the # prompt. See Figure VI.6 for sample dialogue.

The various subcommands (which must be entered in the first two character positions after the "#" prompt) are:

?? - Display buffer.

++ - Delete line.

@@ - Exit without sending.

$$ - Exit and send message.

I. Terminal Command Mode

The two terminal command mode commands allow a user to change his/her terminal's status from nonprivileged to privileged or from privileged to nonprivileged:

SYS:PRIV STOP	Remove the calling terminal from privileged status. All attempts to execute privileged commands will result in the command response "PRIV CMD".
SYS:PRIV XXXX	Set the calling terminal to privileged status if the "XXXX" privileged access code is correct. Example: SYS:PRIV 1234 will change the terminal to privileged status if 1234 is the privileged access code (stored in RADARGEN.PM).

The subsystem enable bit in RADARGEN.PM may be set for automatic change from privileged to nonprivileged status after a set time delay to preserve system integrity.

```
MESS:
--ARAP MESSAGE COMPOSITION--
THE MESSAGE COMPOSITION MODE IS DENOTED BY
A # PROMPT. THE COMMANDS MUST BE ENTERED
IMMEDIATELY AFTER THE # PROMPT OR A
CARRIAGE RETURN. TO EXIT MESSAGE COMP,
TYPE THE ABORT (@@) COMMAND OR ANSWER YES
TO THE SEND IT QUESTION ($$).
ENTER TEXT MODE ($$=SEND,@@=ABORT,++=DELELNE,??=PRINT:
#THIS IS A TEST MESSAGE TO DEMONSTRATE THE ARAP MESSAGE COMPOSITION.
#THIS IS THE SECOND LINE
#3RD LINE AND NOTICE THIRD IS SPEC LLED 333
#??
PRINT MODE:
THIS IS A TEST MESSAGE TO DEMONSTRATE THE ARAP MESSAGE COMPOSITION.
THIS IS THE SECOND LINE
3RD LINE AND NOTICE THIRD IS SPELLED 333
ENTER TEXT MODE ($$=SEND,@@=ABORT,++=DELELNE,??=PRINT:
#++
DELETED: 3RD LINE AND NOTICE THIRD IS SPELLED 333
ENTER TEXT MODE ($$=SEND,@@=ABORT,++=DELELNE,??=PRINT:
#??
PRINT MODE:
THIS IS A TEST MESSAGE TO DEMONSTRATE THE ARAP MESSAGE COMPOSITION.
THIS IS THE SECOND LINE
ENTER TEXT MODE ($$=SEND,@@=ABORT,++=DELELNE,??=PRINT:
#THIS IS THE NEW THIRD LINE SINCE I DELETED THE OLD ONE.
#I AM READY TO SEND IT, LETS TYPE THE SEND COMMAND.
#$$
PRINT MODE:
THIS IS A TEST MESSAGE TO DEMONSTRATE THE ARAP MESSAGE COMPOSITION.
THIS IS THE SECOND LINE
THIS IS THE NEW THIRD LINE SINCE I DELETED THE OLD ONE.
I AM READY TO SEND IT, LETS TYPE THE SEND COMMAND.
-- SEND IT [Y/N]? Y
--END MSG CMP--



ZCZC BILRDRMIS
E 01/15:00:11 2 -MESSAGE-
THIS IS A TEST MESSAGE TO DEMONSTRATE THE ARAP MESSAGE COMPOSITION.
THIS IS THE SECOND LINE
THIS IS THE NEW THIRD LINE SINCE I DELETED THE OLD ONE.
I AM READY TO SEND IT, LETS TYPE THE SEND COMMAND.

NNNN
```

Figure VI.6. Sample Message Composition Dialogue with Final Product (User-Entered Text is Underlined).

J. Product Threshold Commands

On most of the products, the actual meteorological data are converted into levels which is then displayed. The intensity maps use six levels and the other products use nine levels. These levels are arbitrary and can be set to the user's preference. The precipitation rates that are used and derived from the empirical Z-R relationships are approximations only. The commands to check the status and change the thresholds are (privileged commands denoted by an asterisk):

	THRES:	Display the product display thresholds (Figure VI.7).
*	THRES:INT L XXX	Change the intensity display threshold level "L" to "X.XX" inches/hour. Example: THRES:INT 6 500 will set level 6 intensity threshold to 5.00 inches/hour.
*	THRES:ACC L XXX	Change the accumulation display threshold level "L" to "X.XX" inches. Example: THRES:ACC 7 450 will set the level 7 precipitation accumulation threshold to 4.50 inches.
*	THRES:TOP L XXX	Change the echo tops display threshold level "L" to "XXX" kilometers. Example: THRES:TOP 1 5 will set the level 1 echo tops threshold to 5 kilometers.
*	THRES:VIL L XXX	Change the echo VIL values display threshold level "L" to "XXX" kg./m^2. Example: THRES:VIL 4 35 will set level 4 VIL threshold values to 35 kg./m^2.

K. Observation Commands

The observation subsystem commands allow the operator to change the observation interval. ARAP is programmed to take an observation on the hour and at even intervals throughout the hour. A tops scan may be taken at an even interval of time that coincides with the normal observation interval. The commands (privileged status denoted by an asterisk) are:

	OBS:	Display the current observational status (Figure VI.8).
*	OBS:STOP	Disable further observations.
*	OBS:INT X	Set the observation interval to "X" minutes. "X" must range from 5 to 60 and must be evenly divisible into an hour. Example: OBS:INT 12 sets the observation interval to twelve minutes.

```
THRES:
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:56:07 SIGNAL PROCESSING THRESHOLDS
LEVEL: 1       2       3       4       5       6       7       8       9
INT-   00.01   00.10   00.50   01.00   02.00   05.00
ACC-   00.01   00.10   00.25   00.50   01.00   02.00   03.00   04.00   05.00
TOP-   01      04      07      10      13      16      19      21      24
VIL-   01      10      20      30      40      50      60      70      80

INT=IN./HR.,ACC=IN.,TOP=KM.,VIL=KG/M2
NNNN
```

Figure VI.7. Threshold Status Display

```
OBS:
◆ REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:57:11 OBSERVATIONAL STATUS
OBS.INTERVAL:  10 MIN.
TOPS.INTERVAL: 20 MIN.
NEXT OBSERV.:  15:00
NNNN
```

Figure VI.8. Observational Status Display.

* OBS:TINT X	Set the top scan observation to "X" minutes. "X" must range from 15 to 60 and must be a multiple of the observation interval. Example: OBS:TINT 24 will take a tops scan at 24 and 48 minutes past the hour. OBS:TINT 60 will make ARAP take a top scan once an hour.

If the operator issued the following two commands:

OBS:INT 12

OBS:TINT 24

normal observations would be taken at 12 and 36 minutes past the hour, top scans at 24 and 48 minutes past the hour, and hourly scans on the hour.

L. System Operations Commands

The system operation commands permit a user to examine the internal status of ARAP. The commands (privileged commands denoted by an asterisk) are:

* TASK:	Display the internal tasking structure of ARAP (Figure VI.9).
* CHAN:	Display the system channel assignments (Figure VI.10).
* SYS:STOP	Bring ARAP down in an orderly manner. The system log file is automatically transferred to the floppy archive device if the archive is up

If insufficient disk space is available, the question appears:

```
$LOG TRANSFER - REPLACE FLOPPY DISK
ENTER Ø TO STOP, 1 TO CONTINUE...
```

If a zero is entered, the remainder of the system log file will be retained on the main disk. If a 1 is entered (after the disk has been changed), the file will continue to be transferred to the floppy disk.

M. System Log Commands

The system log commands enable a privileged user to access the system log and to set the error codes to be logged and/or alerted.

If the system error alarm sounds, press the alarm clear button.

* SYSLOG:	Display the most current 30 system log entries (Figure VI.11a).

```
ZCZC BILRDRMIS
E 01/14:57:24        RADAR SYSTEM TASK STATUS
TID       TASK DESCRIPTION                    PID     STATUS
KEY2      ASYNC PORT 2 KEYBOARD               050   XMT/REC SUSPEND
KEY3      ASYNC PORT 3 KEYBOARD               050   SYSTEM SUSPEND
KEY5      CONSOLE KEYBOARD                    050   SYSTEM SUSPEND
MQT3      ASYNC PORT 3 MESS. QUEUE            060   SYSTEM SUSPEND
MQT4      ASYNC PORT 4 MESS. QUEUE            060   SYSTEM SUSPEND
CCT       COMMUNICATION CONTROL TASK          059   SYSTEM SUSPEND
CMDPRO    KEYBOARD COMMAND PROCESSOR TASK     040   ACTIVE/READY
NNNN
```

Figure VI.9. Task Status Display.

```
CHAN:
* REQUEST QUEUED
ZCZC BILRDRMIS
E 01/14:57:52 SYSTEM CHANNEL ASSIGNMENTS
00--ARAP.DL       01--$LOG.         02--RADAR.ER      03--$TTO.
04--MUX PORT      05--MUX PORT      06--$TTI.         07--EIM.A
08--MUX PORT      09--3.            10--$CHAN.        11--MUX PORT

NNNN
```

Figure VI.10. Channel Status Display.

```
SYSLOG:
* REQUEST QUEUED
ZCZC BILRDRMIS
E 07/14:18:49   RADAR SYSTEM LOG
MQT5     07/07  14:11:12  M177: TASK FINISH
TOPVIL   07/07  14:11:20  M223: .P PRODUCT QUEUED
MQT5     07/07  14:11:21  M176: TASK START
MQT5     07/07  14:11:24  M177: TASK FINISH
TOPVIL   07/07  14:11:25  M177: TASK FINISH
AREA     07/07  14:11:29  M221: .G PRODUCT QUEUED
AREA     07/07  14:11:34  W200: PRODUCT ALREADY QUEUED
AREA     07/07  14:11:34  M222: .A PRODUCT QUEUED
MQT5     07/07  14:11:34  M176: TASK START
AREA     07/07  14:11:36  M177: TASK FINISH
MQT5     07/07  14:11:38  M177: TASK FINISH
MONITO   07/07  14:14:43  M176: TASK START
MONITO   07/07  14:14:46  M177: TASK FINISH
CMDPRO   07/07  14:16:28  M242: $COMMS STATUS REQUESTED
MQT5     07/07  14:16:29  M176: TASK START
MQT5     07/07  14:16:30  M177: TASK FINISH
CCT      07/07  14:17:06  M156: COMMS LINE 2 DOWN
KEY2     07/07  14:17:11  M176: TASK START
KEY2     07/07  14:17:12  M150: COMMS LINE 2 UP
CCT      07/07  14:17:12  M150: COMMS LINE 2 UP
CMDPRO   07/07  14:17:58  M247: $LOG REQUESTED
MQT2     07/07  14:18:02  M176: TASK START
MQT2     07/07  14:18:02  M177: TASK FINISH
MQT2     07/07  14:18:03  M176: TASK START
MQT2     07/07  14:18:22  M177: TASK FINISH
CMDPRO   07/07  14:18:28  M247: $LOG REQUESTED
MQT2     07/07  14:18:31  M176: TASK START
MQT2     07/07  14:18:31  M177: TASK FINISH
MQT2     07/07  14:18:32  M176: TASK START
MQT2     07/07  14:18:41  M177: TASK FINISH
```

Figure VI.11a. SYSLOG: Display.

* SYSLOG:XXX	Display the most current "XXX" system log entries. Example: SYSLOG:3 will display the 3 most current entries (Figure VI.11b).
* SYSLOG:ALM XXX	Display all of the alarmed system log entries contained in the most current "XXX" entries. Example: SYSLOG:ALM 300 will display all alerted messages in the 300 most recent log entries (Figure VI.11c).
* SYSLOG:DOWN	Disable system logging.
* SYSLOG:UP	Enable system logging on disk only. No messages (except alarm messages) will appear on the video terminal.
* SYSLOG:UP CON	Enable system logging both on disk and on video terminal.

The format of the system log messages are:

EIM	03/02 10:13:16	E001:	ILLEGAL CHANNEL
Task	date/time	message number	message

There are three types of messages. The message type is determined by the letter preceding the message nubmer:

M - routine information message

E - error condition message

W - warning message

Several commands are available to the user to add/delete and list the error message to be logged and alerted (privileged commands are denoted by an asterisk):

* ERR:	Display all messages to be logged and alerted (Figure VI.12).
* ERR:ADD XXX	Add error code "XXX" to list of codes to be logged. Example: ERR:ADD 00 will add octal code 6 (END OF FILE) to list of codes to be logged.
* ERR:DEL XXX	Remove error code "XXX" from list of codes to be logged. Example: ERR:DEL 176 deletes the message "TASK START" from list of codes to be logged.
* ERR:ALM ADD XXX	Add error code "XXX" to list of codes to be alerted. Example: ERR:ALM ADD 164 will add the "RADAR TIMEOUT" message to list of codes to be alerted.

```
SYSLOG:3
* REQUEST QUEUED
ZCZC BILRDRMIS
E 07/14:18:29   RADAR SYSTEM LOG
MQT2     07/07  14:18:02  M177: TASK FINISH
MQT2     07/07  14:18:03  M176: TASK START
MQT2     07/07  14:18:22  M177: TASK FINISH

NNNN
```

Figure VI.11b. SYSLOG:3 Display.

```
SYSLOG:ALM 200
* REQUEST QUEUED
ZCZC BILRDRMIS
E 07/14:17:59   RADAR SYSTEM LOG
---ALERT MESSAGES ONLY---
CCT      07/07  14:08:17  M156: COMMS LINE 2 DOWN
KEY2     07/07  14:08:20  M156: COMMS LINE 2 DOWN
CCT      07/07  14:08:34  M154: ARCHIVE DOWN
CCT      07/07  14:09:08  M154: ARCHIVE DOWN
CCT      07/07  14:09:13  M156: COMMS LINE 2 DOWN
KEY2     07/07  14:09:14  M156: COMMS LINE 2 DOWN
CCT      07/07  14:17:06  M156: COMMS LINE 2 DOWN

NNNN
```

Figure VI.11c. SYSLOG:ALM 200 Display.

```
ERR:
◆ REQUEST QUEUED
ZCZC BILRDRERR
E 07/14:30:33       RADAR SYSTEM ERROR CODES

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
MESSAGES TO BE LOGGED:
E001: ILLEGAL FILENAME              E002: ILLEGAL SYSTEM COMMAND
E003: ILLEGAL DEVICE COMMAND        E004: NOT A RAND/CONTIG FILE
E006: END OF FILE                   E033: SYSTEM OVERWRITE
E052: ILLEGAL DIRECTORY             M154: ARCHIVE DOWN

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆
MESSAGES TO BE ALERTED:
E006: END OF FILE                   M154: ARCHIVE DOWN

NNNN
```

Figure VI.12. Error Code Table Status Display.

*	ERR:ALM DEL XXX	Remove error code "XXX" from list of codes to be alerted. Example: ERR:ALM DEL 200 will remove the error "BAD DATA DETECTED" from list of codes to be alerted.

N. Help Commands

For a user who requires a quick-reference guide, the nonprivileged command HELP: will print a list of the ARAP commands.

NOAA Technical Memoranda NWS WR: (Continued)

121 Climatological Prediction of Cumulonimbus Clouds in the Vicinity of the Yucca Flat Weather Station. R. F. Quiring, June 1977. (PB-271-704/AS)
122 A Method for Transforming Temperature Distribution to Normality. Morris S. Webb, Jr., June 1977. (PB-271-742/AS)
124 Statistical Guidance for Prediction of Eastern North Pacific Tropical Cyclone Motion - Part I. Charles J. Neumann and Preston W. Leftwich, August 1977. (PB-272-661)
125 Statistical Guidance on the Prediction of Eastern North Pacific Tropical Cyclone Motion - Part II. Preston W. Leftwich and Charles J. Neumann, August 1977. (PB-273-155/AS)
127 Development of a Probability Equation for Winter-Type Precipitation Patterns in Great Falls, Montana. Kenneth B. Mielke, February 1978.(PB-281-387/AS)
128 Hand Calculator Program to Compute Parcel Thermal Dynamics. Dan Gudgel, April 1978. (PB-283-080/AS)
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131 Automated Fire-Weather Forecasts. Mark A. Mollner and David E. Olsen, September 1978. (PB-289-916/AS)
132 Estimates of the Effects of Terrain Blocking on the Los Angeles WSR-74C Weather Radar. R. G. Pappas, R. Y. Lee, B. W. Finke, October 1978.(PB289767/AS)
133 Spectral Techniques in Ocean Wave Forecasting. John A. Jannuzzi, October 1978. (PB291317/AS)
134 Solar Radiation. John A. Jannuzzi, November 1978. (PB291195/AS)
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138 A Simple Analysis/Diagnosis System for Real Time Evaluation of Vertical Motion. Scott Heflick and James R. Fors, February 1979. (PB294216/AS)
139 Aids for Forecasting Minimum Temperature in the Wenatchee Frost District. Robert S. Robinson, April 1979. (PB298339/AS)
140 Influence of Cloudiness on Summertime Temperatures in the Eastern Washington Fire Weather District. James Holcomb, April 1979. (PB298674/AS)
141 Comparison of LFM and MFM Precipitation Guidance for Nevada During Doreen. Christopher Hill, April 1979. (PB298613/AS)
142 The Usefulness of Data from Mountaintop Fire Lookout Stations in Determining Atmospheric Stability. Jonathan W. Corey, April 1979. (PB298899/AS)
143 The Depth of the Marine Layer at San Diego as Related to Subsequent Cool Season Precipitation Episodes in Arizona. Ira S. Brenner, May 1979. (PB298817/AS)
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145 On the Use of Solar Radiation and Temperature Models to Estimate the Snap Bean Maturity Date in the Willamette Valley. Earl M. Bates, August 1979. (PB80-160971)
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