

McIDAS

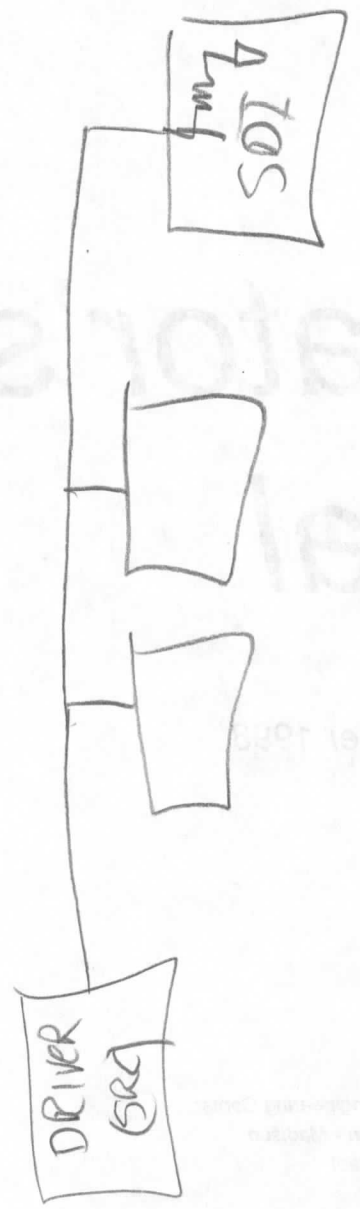
Man computer Interactive Data Access System

SDI Operator's Manual

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Preface

This manual provides installation and operating procedures for your SSEC Desktop Ingestor (SDI). The ingestor consists of a desktop PC with a pre-installed custom interface card and custom software for processing a specific type of satellite data. While the hardware is common to all current user satellite data streams as well as those currently under development, custom software is required for each data type.

Each SDI is ready for operation when it is shipped from SSEC. That is, it has custom software installed for ingesting a specific data type, and the SDI has been tested as a system. This simplifies the installation process to little more than installing a typical PC. Though many of the operating procedures are generic with respect to data type, a separate chapter containing complete procedures is provided for each data type.

How this Manual is Organized

This manual consists of these sections:

- Overview (Chapter 1)
- Installation and Initial Checkout (Chapter 2)
- Signal-specific procedures chapters (Chapters 3-n)
- appendices

Chapter 1 describes the ingest process and common file structures.

Chapter 2 provides environmental considerations, data and clock connections, power requirements and initial checkout procedures. After you have read and complied with Chapters 1 and 2, go to the procedures chapter for the data type your ingestor has been configured for.

Each procedures chapter assumes you are familiar with data characteristics of the data type you want to ingest. Data-specific appendices are provided at the back of this manual to provide you with additional information.

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Chapter 1 SDI Overview

The SSEC Desktop Ingestor (SDI) takes a simple approach to satellite data ingesting. A fast PC plus a modified third party interface card receives clock and data from a bit sync. For high data rate satellites, such as GVAR and POES, the entire serial data stream is ingested into memory, blocked into 1 Mbyte files, and written to disk. These files are called Stretched Data Format (SDF) files. An independent program analyzes the SDF files to build index files to the information in the SDFs. Data access is handled by an ADDE server running on the ingest processor without interfering with the ingest process. For low data rate satellites, such as METEOSAT PDUS, image files are built directly as the data is received. The image files contain the raw satellite transmission aligned on byte boundaries with sync removed.

The advantages to these approaches are:

- No frame synchronizer or SAS (Satellite Acquisition System) is required. The frame synchronization is done in software.
- For the high data rate approach, SDF files usually use less disk space than area files; therefore, more data can be stored on-line.
- The SDI runs without operator intervention, i.e., it is a black box. After attaching the clock and data cables to the card and booting up the PC, data ingestion begins.
- The same hardware works for multiple satellite families; i.e., the same hardware that handles GVAR handles POES, Meteosat, etc. Only the software running in the black box varies.

This chapter is divided into the following sections:

- SDI Data Processing Overview
- SDI File Descriptions
- SDI Event Handling System

SDI Data Processing Overview

Few meteorological satellites broadcast data directly to the user. Because of the satellite's complexity, the raw sensor data is usually downlinked to a ground station, which preprocesses and formats it into blocks. The data blocks are uplinked to a geostationary satellite (may be the originating satellite), which broadcasts the data to users.

Most meteorological satellites simultaneously scan a portion (sector) or all of the earth with several sensors having different spectral characteristics. Only the data from sensors having the same spectral characteristics can be used to generate a specific image. For example, a GVAR satellite's imager, provides data for generating several IR images and one visible image during a scan of a sector. To generate a visible image, only the visible spectrum data is used; to generate an IR image, only the data from a specific IR sensor is used.

The satellite sends all data to the ground station in near real time. For most satellite types, the ground station delays data only long enough to form complete blocks. When a block is formed, it is queued for retransmission. Therefore, serial data, as received from a meteorological satellite, consists of interleaved sensor data blocks, as well as nondisplayable data such as documentation and calibration blocks. To generate an image, the data from a specific sensor or group of sensors must be sorted out of the incoming data stream and presented to a display device.

SDI's approach to the sorting process when handling high data rates is to store all received data in fixed length files (SDF files) in the order it is received. Then, create a data location file for each possible image that points to the data blocks in the SDFs that are required to build the image. If a specific image is requested, the entries in its location file are used by transfer software to locate the beginning and length of each data block in the image. The transfer software simply reads the blocks in the sequential order listed in the data location files. In this way, SDF data is never actually sorted or moved; it is only inventoried and read. This approach is used by the SDI for the higher data rate satellites because there is not enough time between incoming data transfers to decommutate the data into areas.

SDI's approach to the sorting process when handling low data rates is to initially store all received data in a buffer. Then, locate the beginning of a data block and read its data type from the block's header information. Finally, the data block is transferred to the appropriate image file. A separate image file is created for each data sensor type received.

SDI File Descriptions

The types of SDI files common to all high data rate satellite types are:

- Stretched Data Format (SDF) files
- index files
- descriptor files
- image files

SDF Files

The SDI hardware converts the serial data and clock to 32-bit parallel words and stores them in an 8K by 32-bit FIFO. When 4,096 words have been collected, the ingestor software transfers 4,096 words to an SDF file in the ingestor's hard drive. Sixty-four transfers are required to build a 1,048,576 byte (1 Mbyte) SDF file. Thus, each SDF contains 8,388,608 satellite data bits.

Data Storage Requirements

To determine the number of seconds per SDF, divide 8,388,608 by the satellite's bit rate. For example, GVAR's data rate is 2,111,360 bits per second. Therefore, each SDF provides 3.973 seconds of data storage ($8,388,608/2,111,360=3.973$). At this rate, 906 SDFs are generated per hour.

The data in each SDF file includes all data types sent. Nothing is stripped out and there are no byte aligned boundaries. Thus, new data blocks can start anywhere in any SDF word.

SDF File Naming Convention

SDF files are named using the following convention.

signal_type.ccyy.ddd.hhmmss

Where:

| | |
|--------------------|--|
| <i>signal_type</i> | is the satellite signal type, e.g., gvar, poes, etc. |
| <i>cc</i> | is the century when the file was written to disk |
| <i>yy</i> | is the year when the file was written to disk |
| <i>ddd</i> | is the julian day the file was written to disk |
| <i>hh</i> | is the UTC hour the file was written to disk |
| <i>mm</i> | is the minute the file was written to disk |
| <i>ss</i> | is the second the file was written to disk |

Index Files

The data location files are called index files, and one is created for each image type detected in the SDFs. An index file consists of a series of text lines, one for each data block or frame in the image. If the image consists of 1800 blocks, its index file contains 1800 text lines. Each text line describes the location of a data block in an SDF that is required to create the complete image. For example, if a certain image consists of 1,000 blocks distributed in 400 SDFs, its index file has 1,000 ASCII text lines. Since the index files are in ASCII format, they can be viewed using most Unix file viewing commands.

Index file text entries are generated by an SDF scanning process that looks for the beginnings of blocks. When a block's beginning is located, its length, type and location information, including the SDF file name, are formed into a text line and stored in the appropriate index file.

For some satellites, multiple index files are created simultaneously. For example, GVAR imager data block descriptions are stored in one index file (Blocks 0 through 10), while all Block 11 descriptions are stored in another index file.

Index File Format

The index file format is different for different satellites types. Refer to the index file Format description in the satellite-specific chapter for a complete description of the index file format for your ingestor.

Descriptor Files

A descriptor file contains a list of currently available index files (images) for a specific data type and area of coverage. The file name indicates the area of coverage or type of data. Each satellite type has a unique set of descriptor file names, which are described in its ingestor procedures chapter. However, all satellite types have a descriptor file name called ALL. This descriptor file contains a list of all available images for this satellite type, regardless of the area of coverage.

Note!

The descriptor names are designed to be used as a search tool for images and their times over your areas of interest only. No sectorizing is done by the SDI system.

Descriptor File Naming Convention

The naming convention is: */data/descriptor*

Where: *descriptor* is the descriptor file name.

As an example, the file */data/HRPT* contains a list of all the index files for POES HRPT images on the SDI computer.

Descriptor File Format

The descriptor file format is different for different satellite types. Refer to the Descriptor File Format description in the satellite-specific chapter for your ingestor for details.

Image Files

Image files contain a very raw format of the satellite signal. The ingestor removes only the sync blocks and aligns the data on byte boundaries if it is 8-bit data.

Image file formats depend on the transmission format of the satellite. Therefore, refer to the Image File Format description in the satellite-specific chapter of your ingestor for details.

SDI Event Handling System

The SDI ingestor implements an event handling system via the electronic mail medium. When the ingestor detects an event; e.g. a start of a new image, it sends a mail message to a list of users defined in an event notifier list file. The content of the mail message describes the event. Content differs depending on the source and type of the event. The following is an example of the content of an event mailed by the GVAR ingestor:

```
gvar.1997.202.205303.INDX 16537 21512 2973 5368
```

Please refer to the satellite specific chapter for a complete description of the event types and contents of event mail messages for your satellite.

Format of the Event Notifier List File

The list of users who wish to receive ingestor events are placed in the `/data/notify.list` file. The format of this file is one e-mail address per line. For example, to send events to the following users; `john@doe`, `mary@jane` and `tomato@soup.wisc.edu`, the `notify.list` file would look like:

```
john@doe
mary@jane
tomato@soup.wisc.edu
```

There may be additional event notifier list files for satellite-specific processes, such as GVAR Sounder.

Chapter 2 SDI Installation

The SDI is built on an ¹IBM® PC Server 310 computer running a Solaris operating system. SSEC's application software and custom hardware have been installed, and the complete SDI is tested prior to shipment. This reduces the installation to the following:

- Location
- Power Requirements
- Component Interconnections
- Bit Sync Requirements
- Connecting External Inputs and Outputs

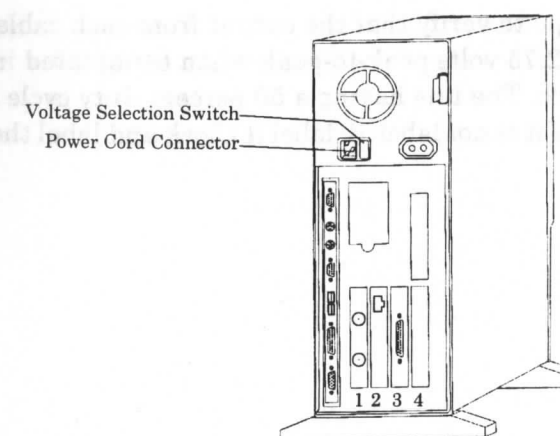
Perform the steps below to install your SDI.

Location

1. The SDI requires a standard PC environment that has access to the data and clock outputs from your satellite antenna chain. Since the SDI functions as an ADDE server, your location must also have a TCP/IP connection so that it can be accessed by ADDE clients.

Power Requirements

2. The PC Server 310 runs on one of two switch selectable AC voltage ranges, 90-137 VAC or 180-265 VAC



The voltage-selection switch is located immediately to the right of the AC power cord connector, as shown in the drawing at the left. If your voltage is between 90 VAC and 137 VAC check to see that **115** is visible on the switch; if your voltage is between 180 VAC and 265 VAC, check to see that **230** is visible on the switch.

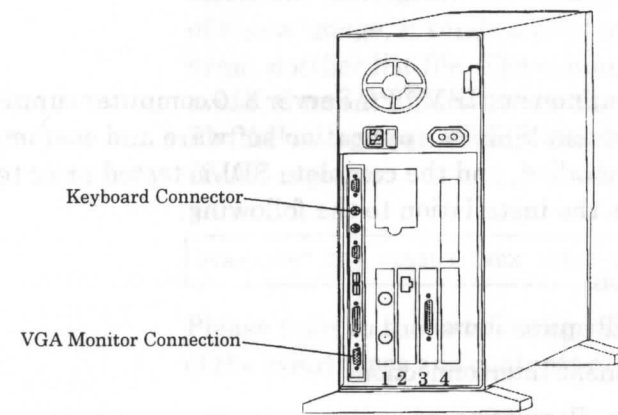
CAUTION

If you set the voltage switch to the wrong position, you might permanently damage your SDI when you turn it on.

1. IBM is a registered trademark of International Business Machines Corporation

Component Interconnections

3. The SDI does not include or require a monitor or mouse. However, you may want to use a monitor to initially verify normal operation.



You can use any color or monochrome VGA monitor by connecting its data cable connector to the 15-pin D-connector located at the bottom-left corner of the computer, as shown in the drawing at the left.

The SDI is normally operated from a remote location by Telnet. Therefore, once normal operation is confirmed, there is no need for a monitor.

4. Connect the keyboard to the connector indicated in the drawing above.

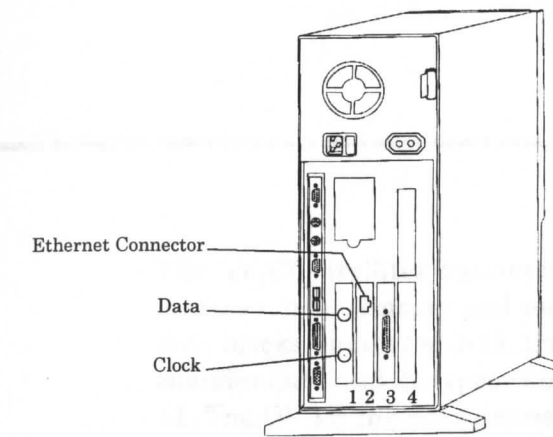
Bit Sync Requirements

The bit sync requirement is different for different satellite types. Refer to the *Bit Sync Requirements* description in the satellite-specific chapter for your ingestor for details.

Connecting External Inputs and Outputs

5. Your antenna chain provides two 75-ohm outputs from its bit synchronizer. They should be labeled data and clock. If the cables are not labeled, you will identify and mark them during the completion of this step.

Use an oscilloscope to verify that the output from each cable is between 2.0 and 2.75 volts peak-to-peak when terminated in a 75-ohm impedance. The line having a 50 percent duty cycle signal is the clock line. If it is not labeled, label it Clock and label the other line Data.



Connect the Data and Clock inputs shown in the drawing at the left. This completes the SDI installation process.

Connect the Ethernet cable to the connector indicated in the drawing at the left.

Continue with the chapter that contains the operating instructions for your data type.

Chapter 3

GVAR Ingestor

The GVAR satellites contain two independent instruments, an imager and a sounder. Imager and sounder data are transmitted in formatted data blocks numbered 0-11. Imager data is transmitted via blocks 0-10; sounder data and 21 types of non-image data are transmitted via block 11. The GVAR Ingestor process writes all data to one megabyte files called Stretched Data Format (SDF) files. Between data writing cycles, the GVAR Ingestor process searches the SDF files for block starts. It stores the search results in one of two index file types, imager index files (.INDX file extension) or sounder index files (.B11 file extension). A new imager index file is created for each new image. A new block 11 index file is created every 10 minutes.

Since there are 22 types of block 11 data, a separate decoder called the GVAR Sounder Decoder is used to process sounder data from the 22 types of block 11 data

The GVAR Sounder Decoder process reads the BK11 index files that were created by the GVAR ingestor. It decodes the block 11 sounder blocks into McIDAS AREA files, which are written to the /data directory.

Knowledge of the GVAR system and its data characteristics are not essential for routine operation of an SDI. However, if you experience difficulty, familiarity with these characteristics may help you diagnose operational problems. See *Appendix A, GVAR Signal Characteristics* at the back of this manual for an overview of the GVAR data format.

Knowledge of the SDI files, their structures, or their naming conventions are not considered essential for normal operation of the SDI. However, if you request technical assistance from SSEC, you may be asked to examine these files to assist SSEC in diagnosing your SDI operational problems. Therefore, an overview of these files is provided at the end of this chapter.

Topics discussed in this chapter are:

- Bit Sync requirements
- GVAR Ingestor and Decoder Operating Procedures
- SDI GVAR File Descriptions
- Navigation
- ADDE Server Procedures
- SDI's GVAR Events System

Interpreting Bold and Italicized Terms

Throughout this chapter, actual keyboard entries appear in **BOLD** type. You will type these entries exactly as they appear. For example:

Type: **export DISPLAY=**

Variable entries appear in italics. For example,

Type: **export DISPLAY=*workstation*:0**

In this example, replace *workstation* with the workstation's name. For example, if you want to export the display to a workstation named zebra:

Type: **export DISPLAY=*zebra*:0**

Bit Sync Requirements

The bit sync used for the GVAR transmission must produce NRZ-L format clock and data, with the data changing on the rising edge of the clock. The output should be TTL level output and terminated at 75 ohms. The GVAR bit rate is 2.111360 megabits per second.

Ingestor and Sounder Decoder Operating Procedures

GVAR ingestor and Sounder Decoder operating procedures consist of the following:

- Using the Ingestor Console
- Starting the Ingestor and GVAR Sounder Decoder
- Interpreting Console Messages
- Stopping and Restarting the Ingestor or GVAR Sounder Decoder
- Shutting Down the Ingestor
- Changing the Amount of Retained Data
- Changing the Amount of Decoded Sounder Data
- Editing the names.gvar File

Using the Ingestor Console

The Ingestor Console, referred to hereafter as console, displays the ingestor's status. This procedure describes two console choices, a local monitor and a remote monitor.

The console is either a VGA monitor that is physically connected to your SDI computer or a telnet session into the SDI computer from a remote workstation.

If you prefer to use a VGA monitor, refer to Chapter 2 - *SDI Installation* for installation instructions. You will need to acquire a monitor locally since the SDI is not shipped with a monitor.

To use a telnet session, perform the following steps.

1. Log into the SDI as root
2. Export the display to your workstation.

Type: **export DISPLAY=*workstation*:0**

where: *workstation* is the name of your workstation

Type: (**xterm -C**)

Starting the Ingestor and GVAR Sounder Decoder

When the computer is powered up, the ingestor and decoder start automatically. If you are unsure about the state of the ingestor, shutting down and restarting is the recommended procedure.

Interpreting Console Messages

If you have a console, these are messages you may see:

- New Image
- Bit Slip
- Error

There may also be messages from the system that are unrelated to the satellite ingest process, for example disk error or full disk.

New Image

At the beginning of each new image, a line similar to the following appears on the console.

```
New image gvar.1997.113.205414.INDX Names:ALL CONUS
```

The `gvar.1997.113.205414.INDX` portion of this message is an index file name. Refer to page 3-10 for the index file naming convention. Thus, `gvar.1997.113.205414` is interpreted as follows:

| <u>Field</u> | <u>Definition</u> |
|-------------------|--|
| <code>gvar</code> | is the satellite signal type (GVAR) |
| <code>1997</code> | is the year when the image started |
| <code>113</code> | is the day of the year the image started |
| <code>20</code> | is the UTC hour the image started |
| <code>54</code> | is the minute the image started |
| <code>14</code> | is the second the image started |
| <code>INDX</code> | is the index file extension |

The `Names:ALL CONUS` portion of the message above describes the ADDE dataset descriptors where the new index file is listed. In this example, `gvar.1997.113.205414.INDX` is listed in the descriptor files named ALL and CONUS.

Bit Slip

When the SDI software detects the start of a new GVAR data block, it reads the block length information from the block's header to compute the beginning of the next block. If the next block does not start at the predicted location, the current block contains more or less bits than its header indicated. A message appears on the console indicating the time and the words *bit slip*. You can expect to see some bit slips, and this may result in the loss of some data.

An increase in the number of bit slip errors may indicate a:

- deteriorating signal
- antenna positioning errors
- degradation of antenna chain electronics
- cable problem

Error

If the next block's synchronization code can't be located, the entire data block is lost and a message labeled as *error* appears on the console. This will result in the loss of data.

Stopping and Restarting the Ingestor or GVAR Sounder Decoder

Perform the following procedure to stop the ingestor or GVAR Sounder Decoder.

1. To stop the ingestor process, issue a stop command from the console.

Type: `/etc/init.d/ingcntl stop`

2. To stop the GVAR Sounder Decoder process, issue a stop command from the console.

Type: `/etc/init.d/sndcntl stop`

To restart the ingestor or GVAR Sounder Decoder process, either reboot (see *Shutting Down the Ingestor* below) or perform these two steps:

1. To start the ingestor process, issue the start command from the console.

Type: `/etc/init.d/ingcntl start`

2. To start the GVAR Sounder Decoder process, issue the start command from the console.

Type: `/etc/init.d/sndcntl start`

Shutting Down the Ingestor

Perform the following procedure to shut down the ingestor.

1. Issue the workstation shutdown command.

Type: `init 0`

Changing the Amount of Retained Data

SSEC sets a default of one hour for the amount of GVAR data to be retained (900 SDF files) prior to shipment. Perform the following procedure if you want to change the amount of data retained in your ingestor.

1. From the console, edit the file `/etc/init.d/ingcntl`

2. Change the value of the variable named `SAVE_FILES=` to the number of files to retain. For example, a GVAR SDF file represents 4 seconds of time. Therefore, 900 SDF files are generated during one hour of continuous transmission time, requiring about 1 gigabyte of data storage.
3. Stop and restart the ingestor process as described above.

Changing the Amount of Decoded Sounder Data

The GVAR Sounder Decoder images are written to a rotating spool of McIDAS area files. The amount of data retained is determined by the size of this spool, which may be adjusted to fit your needs by editing the beginning and ending range numbers in the file `/sounder/.soundrc`. Below is a sample of this file:

```
# This file defines the AREA loop for the sounder
# decoder.
#####
area1=1001
area2=1336
```

Where:

area1 is the beginning number in the AREA spool
area2 is the ending number in the AREA spool

To adjust the amount of retained sounder areas, perform the following steps:

1. Modify the *area1* and *area2* variables in the `/sounder/.soundrc` sounder configuration file. The variable *area2* must always be greater than or equal to *area1*.
2. Update the R1 and R2 fields of the appropriate sounder datasets in the ADDE dataset resolution table. See *Changing Sounder Server Dataset Names* on page 3-17. The R1 and R2 fields should be set to those values defined for *area1* and *area2* respectively.

Editing the names.gvar File

The `names.gvar` file is a configuration file that is used only with GVAR ingestors. It lists the GVAR descriptor file names and defines their sector boundaries (see the *GVAR Descriptor Files* description on page 3-12). Operators can edit this file to change descriptor boundaries if desired. Though most SDI GVAR ingestors have the same descriptors, each ingestor may define them differently via its `names.gvar` configuration file.

GVAR descriptors are used as search tools for locating GVAR images and their times for your geographical area of interest. For an image to be listed under a particular descriptor, it must include all of the sector area described by the descriptor's sector boundaries. This is a minimum requirement and some images may contain much more data than the descriptor indicates. For example, if you create a descriptor called WISC (Wisconsin) and set its sector boundaries just large enough to include all of the state of Wisconsin, WISC will contain any GVAR image that shows the entire state of Wisconsin. These images will include:

- all full disk images from GOES 8 and GOES 9
- all northern hemisphere images from GOES 8 and GOES 9
- all USA images from GOES 8 and GOES 9
- any other images from GOES 8 and GOES 9 that includes all of Wisconsin

To change descriptor names or their boundaries, perform the following procedure.

1. Turn on the SDI computer if it is currently off.
2. From the console, login as root or telnet into the ingestor as root.
3. Edit the file `/data/names.gvar`.

The first line in the file must always be

```
ALL 0 0 0
```

The last line in file must always be

```
OTHER 1 0 0
```

The format of the file is: `descriptor_name sline eline sele ee`

Where:

| | |
|------------------------------|--|
| <code>descriptor_name</code> | descriptor name (e.g., NH for Northern Hemisphere) |
| <code>sline</code> | starting image line number |
| <code>eline</code> | ending image line number |
| <code>sele</code> | starting image element |
| <code>eele</code> | ending image element |

The table below is a sample GVAR descriptor file

| | | | | |
|-------|-------|-------|-------|-------|
| ALL | 0 | 0 | 0 | 0 |
| CONUS | 3200 | 6200 | 11000 | 16000 |
| NH | 2850 | 7400 | 11000 | 20000 |
| SH | 10400 | 11500 | 11000 | 12000 |
| FD | 2800 | 11500 | 11000 | 20000 |
| FD-E | 2800 | 11500 | 4000 | 24000 |
| FD-W | 2800 | 11500 | 6000 | 26000 |
| NH | 2850 | 7400 | 11000 | 20000 |
| OTHER | 1 | 0 | 0 | 0 |

Table 3-1: Sample Descriptor File Format (fields are space delimited)

Example:

Using the `names.gvar` file above, any image that completely covers the area from image lines 3200 to 6200, and image elements 11000 to 16000 is listed in the descriptor file named CONUS.

4. Save the file.

SDI GVAR File Descriptions

The following GVAR files are described:

- GVAR Image Index Files
- Block 11 Index Files
- GVAR Descriptor Files
- Names.gvar Configuration File

GVAR Image Index Files

GVAR Index File Naming Convention

The naming convention is: *signal_type.ccy.ddd.hhmmss*.INDX

Where:

| | |
|--------------------|--|
| <i>signal_type</i> | is the satellite signal type, e.g., gvar |
| <i>cc</i> | is the century when the image started |
| <i>yy</i> | is the year when the image started |
| <i>ddd</i> | is the julian day the image started |
| <i>hh</i> | is the UTC hour the image started |
| <i>mm</i> | is the minute the image started |
| <i>ss</i> | is the second the image started |

As an example, the index file name for a 1996 GVAR image, whose nominal image date and time are 228 and 12:20:00, respectively, has the name *gvar.1996.228.122000*.INDX. This date and time is the "priority frame start time" from the satellite.

GVAR Index File Format

Each GVAR index file text entry has the following six fields GVAR

| <u>Field Name</u> | <u>Description</u> |
|-------------------|--|
| SDF name | name of the Stretched Data Format file containing the block |
| Word Offset | a four-byte word offset into the SDF file that locates the word containing the starting bit of this block. |
| Bit Offset | a bit offset into the word pointed to by the Word Offset to locate the block's starting bit |
| Length | the length of the block in bits |
| Block Type | the data block type identified; values are 0 to 10 (see <i>Appendix A, GVAR Signal Characteristics</i>) |
| Image Line | the image line this block is associated with (GVAR block 0's only) |

Sync errors and bit-slip errors are also logged in the GVAR Image index files.

Block 11 Index Files

Unlike an image index file, which describes a complete image, a new Block 11 index file is created every 10 minutes. The time portion of the Block 11 index file's name is the time the index file was created. Unlike the image index files, the time in the Block 11 index name is a local workstation time. When a Block 11 is located in an SDF file, an entry is made in the current Block 11 index file. Block 11 index files are in ASCII format and therefore can be viewed using most unix file viewing commands.

The naming convention for the block 11 index files is:

gvar.ccy.ddd.hhmm.B11

Where:

| | |
|------------|--|
| <i>cc</i> | is the century when the image started |
| <i>yy</i> | is the year when the image started |
| <i>ddd</i> | is the Julian day when the image started |
| <i>hh</i> | is the UTC hour when the image started |
| <i>mm</i> | is the minute when the image started |

Every entry in the block 11 index file identifies a data block in an SDF file and its location within the SDF file. As in the imager index files, sync errors and slipped bits are also logged in the block 11 index file entries.

The fields in the Block 11 index have the same meanings as the imager index.

GVAR Descriptor Files

Descriptor File Naming Convention

The naming convention is: `/data/descriptor`, where *descriptor* is the descriptor file name. The descriptor file names used for GVAR are

- ALL (list of all available GVAR images)
- CONUS (Continental US)
- NH (Northern Hemisphere)
- SH (Southern Hemisphere)
- FD-E (Full Disk - East)
- FD-W (Full Disk - West)
- USA
- OTHER (list of images that do not fall into any other category other than ALL)

Because of the variable scan characteristic of GVAR, a nearly infinite number of image sectors are possible, making rigidly defined descriptor file names impractical. Therefore, GVAR descriptor file names describe the minimum coverage an image must have to be listed in the respective file. Except for descriptor files ALL and OTHER, each GVAR descriptor file name listed above is defined locally in a configuration file by listing the line and element of its four corners. When a new GVAR image becomes available (new index file), its four corners are compared to those of each GVAR descriptor listed above. If the new image falls completely inside the descriptor's boundary, it is listed in that file. All images are listed in at least two files. Some images are listed in several files. For example, an FD-E image is listed in the FD-E, NH, SH, CONUS, USA and ALL files. No image is listed in the OTHER listing if it is listed in any file besides ALL.

As an example, the file `/data/USA` contains a list of all the GVAR index files on the SDI computer containing, as a minimum, an image of the USA.

Descriptor File Format

Each GVAR descriptor file text entry has the following six fields

| <u>Field Name</u> | <u>Description</u> |
|-------------------|---|
| <i>INDX_name</i> | name of the index file describing this image |
| <i>sline</i> | starting line number |
| <i>eline</i> | ending line number |
| <i>sele</i> | starting element number |
| <i>eele</i> | ending element number |
| <i>pos</i> | absolute position number in the dataset - used by the ADDE Server |

GVAR descriptors are defined in your site's `/data/names.gvar` configuration file. They indicate the image's area of coverage (e.g., CONUS for the continental US, or NHE for the northern hemisphere) for a particular image. This file can be edited to help you find images for particular areas of interest using the *Editing the names.gvar File* procedure on page 3-8. However, remember that the images the SDI indicates for your specified area of interest contain entire images (at full resolution) for that time period. For example, if your area of interest is CONUS, NHE and FD (full disk) images also cover this area. However, much more data must be transferred for an FD image than for a CONUS image. descriptor files are also used by the ADDE server.

The table below is an example of the GVAR ALL descriptor file.

```
gvar.1997.030.160143.INDX 2973 9249 6512 17752 2
gvar.1997.030.160923.INDX 10037 9049 12496 22900 3
gvar.1997.030.161514.INDX 2805 9049 10120 22900 4
gvar.1997.030.163143.INDX 2973 9249 6512 17752 5
gvar.1997.030.163923.INDX 10037 9049 12496 22900 6
gvar.1997.030.164514.INDX 2805 9049 10120 22900 7
```

Table 3-2: GVAR/ALL Descriptor File Format

Names.gvar Configuration File

See the *Editing the names.gvar File* procedure on page 3-8 for a description of the `names.gvar` configuration file.

Navigation

GVAR navigation is filed in the McIDAS SYSNAV file format. The SDI Event System is configured to execute `/usr/local/bin/sysnav.sh` at the start of a new image. This program reads the navigation information from the current image and files navigation if any of the following conditions are true:

- this is the first image of a new day
- the navigation in the current image differs from the navigation of the most recently filed navigation

Navigation File Naming Convention

The naming convention of the McIDAS SYSNAV files for GVAR is:
`/navigation/SYSNAVYYSS`

Where:

YY is the julian year of the navigation

SS is the McIDAS sensor source number of the satellite

ADDE Server Procedures

The procedures discussed in this section are:

- Accessing the Data via ADDE
- Changing Imager Server Dataset Names
- Changing Sounder Server Dataset Names
- Managing the Server's Routing Table

Accessing the Data via ADDE

Once the SDI begins to ingest data and is connected to the network, the data can be accessed on McIDAS workstations via ADDE. The ADDE group name, by default, is GVAR.

Perform these steps to access the SDI's data.

1. From a McIDAS workstation:

Type: **DATALOC ADD GVAR SDI IP address**

For example, if the SDI has an IP address of 144.92.108.32

Type: **DATALOC ADD GVAR 144.92.108.32**

2. Use the ADDE command named DSINFO to determine the descriptor names:

Type: **DSINFO I GVAR**

The output should look something like:

| \$Dataset Names of Type: IMAGE in Group: GVAR | | |
|---|--------|----------------------------|
| Name | NumPos | Content |
| All | 100 | GOES-8 all images |
| BLK11 | 11 | GVAR sounder areas |
| CONUS | 20 | GOES-8 continental U.S. |
| FD | 20 | GOES-8 full disk |
| FD-E | 20 | GOES-8 full disk east |
| FD-W | 20 | GOES-8 full disk west |
| NH | 20 | Goes-8 northern hemisphere |
| OTHER | 100 | GOES-8 unknown |
| SH | 20 | GOES-8 southern hemisphere |
| DSINFO -- done | | |

At this point the suite of ADDE commands can be used with the data.

Changing Imager Server Dataset Names

Perform steps 1-3 in the following procedure to change or update imager server dataset names; perform steps 4-6 in the following procedure to change GVAR sounder dataset names.

1. From the console, login as mcadde or telnet into the ingestor as user mcadde.
2. To change ADDE names associated with particular datasets, edit the `~mcadde/mcidas/data/RESOLV.SRV` file. The following is a sample of this file. Notice that all fields are comma delimited.

```
N1=GVAR,N2=ALL,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 all images
N1=GVAR,N2=CONUS,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 continental U.S.
N1=GVAR,N2=NH,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 northern hemisphere
N1=GVAR,N2=SH,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 southern hemisphere
N1=GVAR,N2=FD,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 full disk
N1=GVAR,N2=FD-E,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 full disk east
N1=GVAR,N2=FD-W,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 full disk west
N1=GVAR,N2=OTHER,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-8 unknown
N1=CRUD,N2=CONUS,TYPE=IMAGE,K=AREA,R1=1,R2=2500,C=GOES-8 continental U.S.
```

Where:

N1 is the ADDE group name
N2 is the ADDE descriptor name
TYPE is the data type
K is the data format or kind
R1 is the beginning dataset position number (usually 1)
R2 is the ending dataset position number; this number should always be greater than the total number of images the ingestor has been configured to retain
C is the comment field displayed with DSINFO

3. Save the file.

The ADDE command called `IMGLIST` list the images in a dataset. It always shows the image resolution as 1 (full resolution) and the image size as the complete image size. All sectorizing or image blowdowns are done via other ADDE commands such as `IMGDISP`, `IMGCOPY`, etc.

Changing Sounder Server Dataset Names

1. From the console, login as mcadde or telnet into the ingestor as user mcadde.
2. To change ADDE names associated with particular datasets, edit the file `~mcadde/mcidas/data/RESOLV.SRV`. The following is an example of sounder datasets defined in this file. Notice that all fields are comma delimited. You can not place a comma in the comment field.

```
N1=GOES8L,N2=BLK11,TYPE=IMAGE,RT=N,K=AREA,R1=2001,R2=2336,C=GOES8 SOUNDER AREAS,
N1=GOES9S,N2=BLK11,TYPE=IMAGE,RT=N,K=AREA,R1=1001,R2=1336,C=GOES9 SOUNDER AREAS,
```

Where:

N1 is the ADDE group name
N2 is the ADDE descriptor name
TYPE is the data type - IMAGE
K is the data format or kind - area
R1 is the beginning AREA number in the range
R2 is the ending AREA number in the range, which should always be greater than or equal to R1
C is the comment field displayed with DSINFO

3. Change the values of R1 and R2 in the `/sounder/.soundrc` file to match R1 and R2 in `~mcadde/mcidas/data/RESOLV.SRV`.

Managing the Server's Routing Table

Users (clients) of the SDI ingestor's data must update their routing tables to link the SDI ingestor's group names to IP addresses. To do this, you must create or update a site routing table that contains the routing information for your site's clients.

The site's routing table can be created and updated in any McIDAS-X session by using the ADDE command named `DATALOC` to link group names to the IP addresses of remote servers. You will need to copy the table to a directory that is accessible to all clients. Clients must NFS mount the directory to access the file.

The default file name for all client routing tables is `MCTABLE.TXT`. To use a different name when creating or updating the site table, you must specify the file name in the `MCTABLE_WRITE` environment variable of the account running the McIDAS-X session. Write-protect the file so it can't be modified or deleted by your clients.

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

To make the table accessible to your McIDAS-X and McIDAS-OS2 clients, each client's `MCTABLE_READ` environment variable must be modified to include this table.

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

[Faint, illegible text]

SDI GVAR Events

As described in Chapter 2, the SDI ingestor implements an electronic mail event system. The GVAR ingestor and sounder decoder generate three types of events:

- Index Created (imager start of image)
- Sounder SOI (Start Of Image)
- Sounder EOI (End Of Image)

These events are sent to the list in the `/data/notify.bk11` file.

Index Created

The Index Created event is generated any time the GVAR ingestor sees a new image and creates an index file. The body of the e-mail for this event is in the following format: `index_file_name bele eele bline eline`

Where:

`index_file_name` is the name of the index file; see *GVAR Index File Format* on page 3-11 for a complete description of the format of this file name

`bele` is the beginning element of this image

`bline` is the beginning line of this image

`eline` is the ending line of this image

Sounder SOI

The Sounder SOI event is generated any time the GVAR sounder decoder detects the start of a new sounder image and is creating a new McIDAS AREA file. The body of the e-mail for this event is in the following format:

`SOI bline nline bele nele jday time ss bscan escan area.`

Where:

`SOI` indicates this is a sounder start of image

`bline` is the beginning detector scan line in sounder image (see Note 1)

`nline` is the number of detector scan lines in sounder image (see Note 1)

`bele` is the beginning element of sounder image

`nele` is the number of elements in sounder image

`jday` is the nominal julian day (yyddd) of sounder image

`time` is the nominal time (hhmmss) of sounder image

`ss` is the McIDAS sensor source number of satellite

`bscan` is the beginning scan number of sounder image

`escan` is the ending scan number of sounder image

`area` is the McIDAS AREA number of decoded sounder image

Note 1: There are four detector scan lines in each GVAR sounder scan line.

Sounder EOI

The Sounder EOI event is generated any time the GVAR sounder decoder finishes the decoding of a sounder image. The body of the e-mail for this event is in the following format:

`EOI area`

Where:

`EOI` indicates this is a sounder end of image

`area` is the McIDAS AREA number if decoded sounder image

Chapter 4

POES Ingestor

Knowledge of the POES system and its data characteristics are not essential for routine operation of an SDI. However, if you experience difficulty, familiarity with these characteristics may help you diagnose operational problems.

Knowledge of the SDI files, their structures, or their naming conventions are not considered essential for normal operation of the SDI. However, if you request technical assistance from SSEC, you may be asked to examine these files to assist SSEC in diagnosing your SDI operational problems. Therefore, an overview of these files is provided in this chapter.

Throughout this chapter, you will see the related terms: Satellite ID, Satellite Name and McIDAS Sensor Source (SS). The following table shows the current mappings between these terms.

| Satellite Name | McIDAS Sensor Source (SS) | Sat-ID |
|----------------|---------------------------|--------|
| NOAA-9 | 45 | 11 |
| NOAA-10 | 60 | 15 |
| NOAA-11 | 61 | 1 |
| NOAA-12 | 62 | 9 |
| NOAA-14 | 64 | 5 |
| NOAA-15 | 65 | 7 |

Topics discussed in this chapter include:

- POES Ingestor Operating Procedures
- POES File Descriptions
- Navigation
- ADDE Server Procedures
- SDI POES Events

Interpreting Bold and Italicized Terms

Throughout this chapter, actual keyboard entries appear in BOLD type. You will type these entries exactly as they appear. For example:

Type: **export DISPLAY=**

Variable entries appear in italics. For example,

Type: **export DISPLAY=*workstation*:0**

In this example, replace *workstation* with the workstation's name. For example, if you want to export the display to a workstation named *zebra*:

Type: **export DISPLAY=*zebra*:0**

| Index | Message | Interpretation |
|-------|-------------------------|-------------------------|
| 1 | Deleted | Deleted |
| 2 | New Image (index filed) | New Image (index filed) |
| 3 | ... | ... |
| 4 | ... | ... |
| 5 | ... | ... |
| 6 | ... | ... |
| 7 | ... | ... |

POES Ingestor Operating Procedures

POES SDI operating procedures consist of the following:

- Using the Ingestor Console
- Interpreting Console Messages
- Logging Console Messages
- Stopping, Restarting or Shutting Down the Ingestor
- Changing the Amount of Retained Data

Using the Ingestor Console

The Ingestor Console, referred to hereafter as console, displays the ingestor's status. This procedure describes two console choices, and provides a list of console messages and their interpretations.

The console is either a VGA monitor that is physically connected to your SDI computer or a telnet session into the SDI computer from a remote workstation.

If you prefer to use a VGA monitor, refer to Chapter 2 - *SDI Installation* for installation instructions. You will need to acquire a monitor locally since the SDI is not shipped with a monitor.

To use a telnet session, perform the following steps.

1. Log into the SDI as root
2. Export the display to your workstation.

Type: **export DISPLAY=*workstation*:0**

where: *workstation* is the name of your workstation

Type: **(xterm -C)**

Interpreting Console Messages

If you have a console, these are the normal message types you may see; they are discussed below:

- Deleted
- New Image (index filed)

There may also be messages from the system that are unrelated to the satellite ingest process, for example disk error or full disk.

When an image ingest begins, a line similar to the following appears on the console.

```
poes.1997.198.122552.LAC
```

This message is an index file name. It is made up of the satellite type (POES in this example), the year, julian day and time that the image began being ingested, and the type of data in the file (Local Area Coverage, or LAC in this example). For complete information on the file naming scheme, refer to the *Index File Naming Convention* section on page 4-7 in this chapter.

Deleted

If the image contains less than 200 lines after it is completely ingested, it is automatically deleted, and the word **deleted** is appended to the console message to indicate its deletion. If the image above is deleted, this message would appear.

```
poes.1997.198.122552.LAC deleted
```

New Image

If the image contains 200 or more lines after it is completely ingested, the image is kept, and additional information about the image is appended to the console message, as shown in the following example.

```
poes.1997.198.113827.LAC sat=9 day=198 time=115444 lines=13716 del=2 err=2
```

The **sat=9** portion of this message is the satellite ID number as it is defined in the data stream. This is not the McIDAS Sensor Source (SS) number (see page 4-1).

The **day=198** portion is the nominal julian start day of the image.

The **time=115444** portion is the nominal start time (hhmmss) of the image.

The **lines=13716** portion is the total number of lines in this image.

The **del=2** portion indicates the number of lines deleted from this image. Sometimes there is a small amount of bad data or data from the previous image at the start of the data transmissions. The **del=** parameter indicates how many of these lines have been deleted from the image. The first 60 lines of HRPT files generated at SSEC are always deleted before checking for bad data and are not shown in the **del=** count.

The **err=2** portion indicates the number of bit slips or data errors detected in the image.

Logging Console Messages

The console messages can also be routed to a file by setting the file name you want the messages written to in the environment variable LOG. SSEC's console messages are written to the file `/var/log/inge`.

Stopping, Restarting or Shutting Down the Ingestor

Stopping the Ingestor

To stop the ingestor, issue a stop command from the console.

Type: `/etc/init.d/ingentl stop`

Restarting the Ingestor

To restart the ingestor process, either reboot by performing the *Shutting Down the Workstation* procedure below and then cycling the power to restart the ingestor, or issue the start command from the console. To issue the start command,

Type: `/etc/init.d/ingentl start`

Shutting Down the Workstation

To shut down the entire workstation, including the ingestor, issue the workstation shutdown command from the console.

Type: `init 0`

Changing the Amount of Retained Data

SSEC sets the default for the amount of POES data to be retained as a function of the size of the hard disk installed prior to shipment. About 900 SDF files can be stored per gigabyte of hard drive space. For example, if SSEC is currently shipping machines equipped with a nine-gigabyte hard drive, its default is set to retain 7,000 SDF files. Perform the following procedure if you want to change the amount of data retained in your ingestor.

1. From the console, edit the file `/etc/init.d/ingentl`.

2. Change the value of the variable named SAVE_FILES= to the number of files to retain. One SDF file represents about six seconds of transmission time for GAC and LAC, or about 12 seconds of transmission time for HRPT. Therefore, 600 or 300 SDF files are generated per hour of GAC and LAC or HRPT data transmission time. This results in about 600 or 300 megabytes of data storage, respectively. The values realized operationally will vary because POES is not a continuous transmission. You will likely have to watch disk space utilization and adjust the SAVE_FILES= variable accordingly.
3. Stop and restart the ingestor process as described above.

POES File Descriptions

The following POES files are described:

- POES Index Files
- POES Descriptor Files

POES Index Files

One index file is generated for each image detected in the SDFs.

Index File Naming Convention

The naming convention is: *signal_type.ccyymmdd.hhmmss.mode*

Where:

| | |
|--------------------|---|
| <i>signal_type</i> | Is the satellite signal type, e.g., poes |
| <i>cc</i> | the century the image ingest started |
| <i>yy</i> | the year the image ingest started |
| <i>ddd</i> | the julian day the image ingest started |
| <i>hh</i> | the UTC hour the image ingest started |
| <i>mm</i> | is the minute the image ingest started |
| <i>ss</i> | is the second the image ingest started |
| <i>mode</i> | is the transmission mode of the satellite, e.g., LAC, GAC, HRPT |

As an example, the index file name for a 1996 GAC image, whose start of ingestion date and time are 228 and 12:20:00, respectively, has the name `poes.1996.228.122000.GAC`.

Index File Format

Each index file text entry has the following eight fields. One entry exists in the index file for each data frame.

The screen display below is a portion of a POES index file for an HRPT image. Each line consists of eight fields, described below.

```

$ more poes.1998.012.180623.HRPT
poes.1998.012.180630 772767 6 5 1 12 180650 140 1
poes.1998.012.180630 776630 2 5 2 12 180650 306 2
poes.1998.012.180630 800492 6 5 3 12 180650 473 3
poes.1998.012.180630 814355 2 5 1 12 180650 640 4
poes.1998.012.180630 828217 6 5 2 12 180650 806 5
poes.1998.012.180630 842080 2 5 3 12 180650 973 6
poes.1998.012.180630 855942 6 5 1 12 180651 140 7
poes.1998.012.180630 969805 2 5 2 12 180651 306 8
  a   b   c   d   e   f   g   h   i   j   k   l

```

Field Key Description

| | |
|------------|--|
| a-d | components that form the name of an SDF containing a portion of this image, where: a is the signal type, e.g., POES b is the year, e.g., 1998 c is the julian day that the image was <u>received</u> , e.g., day 012 d is the hour, minute and second the image was received, e.g., 18:06:30 |
| e | the byte address offset in the SDF that contains the start bit of the scan; for example, the first line in the screen display above begins somewhere in the 772,767th byte |
| f | the location of this scan's starting bit in the byte pointed to by e |
| g | the satellite's ID number, not the McIDAS sensor source number, e.g., 5 (see page 4-1) |
| h | subblock; for GAC, this should always be zero; for HRPT and LAC this should be a repeating pattern, e.g., 1, 2, 3, 1, 2, 3,... |
| i | nominal julian day of the image |
| j | nominal hour, minute and second of the data, e.g., 18:06:50 |
| k | millisecond within the nominal second (e.g., 50) described in j |
| l | image frame line number |

POES Descriptor Files

POES descriptor files contain a list of currently available images for a specific data type. The data type is typically defined as the transfer mode. The file name indicates the transfer mode and each has a unique descriptor file name.

Descriptor File Naming Convention

The naming convention is: /data/descriptor, where *descriptor* is the descriptor file name as defined by the transfer mode of the satellite. The descriptors used for POES are:

- ALL (list of all available POES images)
- GAC (Global Area Coverage)
- HRPT (High Resolution Picture Transfer)
- LAC (Local Area Coverage)

The descriptor name is designed to be used as a search tool for images and their times. No sectorizing is done by the SDI system.

Descriptor File Format

The screen display below is an example of a POES GAC descriptor file. Each text entry consists of five fields, which are described below.

```

poes.1997.198.135033.GAC 5 198 104700 12779 141
poes.1997.198.143122.GAC 5 198 122800 12781 142
poes.1997.198.150627.GAC 9 198 132130 11100 143
poes.1997.198.151214.GAC 9 198 113230 13738 144
poes.1997.198.160938.GAC 5 198 141038 12525 145
poes.1997.198.164741.GAC 9 198 144851 12630 146

```

Field Name Description

| | |
|------------------|--|
| INDX_name | consists of a-d , as described in the <i>Index File Format</i> section, plus the signal type (e.g., GAC, LAC or HRPT) |
| Sat ID | the raw satellite ID number, not the McIDAS sensor source number (see page 4-1), e.g., 5 |
| Day | nominal start julian day (ddd) of the image |
| Time | nominal start time (hhmmss) of the image |
| eline | ending line number of the image |

position unique number assigned to an image; if the same image is listed in more than one descriptor file (e.g., All and HRPT) it will have the same position number in each file

Navigation

The SDI POES Ingestor does not perform any navigation processing. Navigation exists on the SDI ingestor system for the purpose of serving the image data. The server requires navigation because it must navigate the images in order to process requests and subset the images.

The navigation file used by the ADDE image server is the McIDAS format SYSNAV1 file. This navigation file is updated with the latest POES navigation information from the TBUS messages transmitted on the Domestic Data Service conventional data circuit. The TBUS messages are decoded by the McIDAS-XCD conventional data ingestor/decoder, filed into the SYSNAV1 navigation file and predictions made. Twice daily, the SYSNAV1 file is copied from the -XCD decoder workstation to the SDI ingestor workstation and placed in the directory ~mcadde/mcidas/data.

ADDE Server Procedures

The procedures discussed in this section are:

- Accessing the Data via ADDE
- Changing Server Dataset Names

Accessing the Data via ADDE

Once the SDI begins to ingest data and is connected to the network, the data can be accessed on workstations running McIDAS via ADDE. The ADDE group name, by default, is POES. Perform the *Changing Server Dataset Names* procedure on page 4-12 if you want to change it.

Perform these steps to access the SDI's data.

1. From a McIDAS workstation:
Type: **DATALOC ADD POES SDI_IP_address**
2. For example, if the SDI has an IP address of 144.92.108.32
Type: **DATALOC ADD POES 144.92.108.32**
3. Use the ADDE command named DSINFO to list the descriptor names.

Type: **DSINFO I POES**

The output should look something like:

| Dataset Names of Type: IMAGE in Group: POES | | | |
|---|--------|------|---------------------|
| Name | NumPos | POES | Content |
| ALL | 100 | POES | All POES images |
| N09GAC | 100 | POES | NOAA-09 GAC images |
| N09HRPT | 100 | POES | NOAA-09 HRPT images |
| N09LAC | 100 | POES | NOAA-09 LAC images |
| N10GAC | 100 | POES | NOAA-10 GAC images |
| N10HRPT | 100 | POES | NOAA-10 HRPT images |
| N10LAC | 100 | POES | NOAA-10 LAC images |
| N11GAC | 100 | POES | NOAA-11 GAC images |
| N11HRPT | 100 | POES | NOAA-11 HRPT images |
| N11LAC | 100 | POES | NOAA-11 LAC images |
| N12GAC | 100 | POES | NOAA-12 GAC images |
| N12HRPT | 100 | POES | NOAA-12 HRPT images |
| N12LAC | 100 | POES | NOAA-12 LAC images |
| N14GAC | 100 | POES | NOAA-14 GAC images |
| N14HRPT | 100 | POES | NOAA-14 HRPT images |
| N14LAC | 100 | POES | NOAA-14 LAC images |

DSINFO -- done

At this point the suite of ADDE commands can be used with the data.

Changing Server Dataset Names

Perform the following procedure to change or update server dataset names.

1. From the console, login as user **mcadde** or telnet into the ingestor as user **mcadde**.

2. To change ADDE names associated with particular datasets, edit the file `~mcadde/mcidas/data/RESOLV.SRV`. The following is an example listing of this file. Notice that all fields are comma delimited. You can not place a comma in the comment field.

```
N1=POES,N2=N09LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-09 LAC images,
N1=POES,N2=N10LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-10 LAC images,
N1=POES,N2=N11LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-11 LAC images,
N1=POES,N2=N12LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-12 LAC images,
N1=POES,N2=N14LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-14 LAC images,
N1=POES,N2=N09GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-09 GAC images,
N1=POES,N2=N10GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-10 GAC images,
N1=POES,N2=N11GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-11 GAC images,
```

Where:

- N1** is the ADDE group name (the default is POES; you can change N1 if desired)
- N2** is the ADDE descriptor name (these names are fixed for POES and must not be changed)
- TYPE** is the data type - IMAGE
- K** is the data format or kind - POES
- R1** is the beginning dataset position number (usually set to 1)
- R2** is the ending dataset position number. This number should always be greater than the total number of images the ingestor has been configured to retain.
- C** is the comment field displayed with DSINFO

SDI POES Events

As described in Chapter 1, the SDI ingestor implements an electronic mail event system. The POES ingestor generates only one event:

Index Created (new image)

The Index Created event is generated any time the POES ingestor sees a new image and creates an index file. The body of the e-mail for this event is in the following format:

```
index_file_name sat_id ddd hhmmss nlines
```

Where:

| | |
|------------------------|---|
| <i>index_file_name</i> | is the name of the index file; See <i>Index File Format</i> in this chapter for a complete description of the format of this file name. |
| <i>sat_id</i> | is the raw ID number of the satellite; this is the raw satellite ID number, not the McIDAS sensor source (SS) number. See page 4-1 |
| <i>ddd</i> | is the julian day in DDD of the start of this image |
| <i>hhmmss</i> | is the time in HHMMSS of the start of this image |
| <i>nlines</i> | is the total number of lines in this image |

Chapter 5

Meteosat Ingestor

This chapter applies to the Meteosat PDUS High Resolution Information (HRI) signal only.

Topics discussed in this chapter are:

- Overview
- Bit Sync Requirements
- Ingestor Operating Procedures
- Meteosat File Naming Conventions
- Navigation
- ADDE Server Procedures
- SDI Meteosat Events

Interpreting Bold and Italicized Terms

Throughout this chapter, actual keyboard entries appear in **BOLD** type. You will type these entries exactly as they appear. For example:

Type: **export DISPLAY=**

Variable entries appear in italics. For example,

Type: **export DISPLAY=*workstation*:0**

In this example, replace *workstation* with the workstation's name. For example, if you want to export the display to a workstation named zebra:

Type: **export DISPLAY=**zebra**:0**

Overview

The PDUS HRI signal transmits imagery in these formats:

- A (full globe images)
- B (Europe, North Africa and the Middle East)
- LX (renavigated and recalibrated GOES or Meteosat)

Images derived from the A and B signal types are often referred to as A-sector or B-sector images, respectively. Although the SDI can ingest the LX format, the Meteosat ADDE server currently does not support serving this data format.

HRI signal transmissions may contain data in as many as three spectral bands; infrared, visible and water vapor. In transmissions containing more than one band, each band covers the same geographic area, and the bands are interleaved. Unlike other geostationary satellites, Meteosat images are transmitted bottom to top.

The full globe A-sector images start at image coordinates 1,1. Visible images are 5000 lines by 5000 elements at full resolution (2.5 km). Infrared and water vapor images are 2500 lines by 2500 elements at resolution 2 (5 km).

The European B-sector images cover the area bounded approximately by longitude 40° W to 30° E, latitude 70° N to 25° N. B-sector images start at image coordinates 133, 1251. Visible images are 1251 lines by 2500 elements at full resolution (2.5 km). Infrared and water vapor images are 625 lines by 1248 elements at resolution 2 (5 km).

Meteosat operations are controlled by the European Meteorological Satellite (EUMETSAT) ground facility in Darmstadt, Germany. There, images are received, processed and retransmitted to Wallops Island for transmission to U.S. users. Meteosat data can also be received via the GE Americom satellite, SPACENET-2.

The Meteosat dissemination schedule is available at Eumetsat's website at <http://www.eumetsat.de/en/>. The schedule includes the slot number, beginning transmission time and image description code. EUMETSAT refers to the slot number in their communications about the schedule in administrative messages. The image description code consists of the sector (A or B) and the image types (Infrared, Visible, VH=resolution 2 visible, Water vapor). Every day at 11:42 UTC, a full-resolution (2.5 km), full-disk (AV) image is sent.

Bit Sync Requirements

The bit sync used for the Meteosat transmission must produce NRZ-L format clock and data, with the data changing on the rising edge of the clock. The output should be TTL level output and terminated at 75 ohms.

Ingestor Operating Procedures

Meteosat ingestor operating procedures consist of the following:

- Using the Ingestor Console
- Starting the Ingestor
- Interpreting Console Messages
- Stopping, Restarting or Shutting Down the Ingestor
- Shutting Down the Ingestor
- Changing the Amount of Retained Data
- Editing the names.msaf File

Using the Ingestor Console

The Ingestor Console, referred to hereafter as console, displays the ingestor's status. This procedure describes two console choices, a local monitor and a remote monitor.

The console is either a VGA monitor that is physically connected to your SDI computer or a telnet session into the SDI computer from a remote workstation.

If you prefer to use a VGA monitor, refer to Chapter 2 - *SDI Installation* for installation instructions. You will need to acquire a monitor locally since the SDI is not shipped with a monitor.

To use a telnet session, perform the following steps.

1. Log into the SDI as root
2. Export the display to your workstation.

Type: **export DISPLAY=workstation:0**

where: *workstation* is the name of your workstation

Type: **(xterm -C)**

Starting the Ingestor

When the computer is powered up, the ingestor starts automatically. If you are unsure about the state of the ingestor, shutting down and restarting is the recommended procedure.

Interpreting Console Messages

If you have a console, you may see these messages:

- Image Started
- Data Loss
- Signal Off

There may also be messages from the system that are unrelated to the satellite ingest process, for example disk error or full disk.

Image Started

A line similar to the following appears on the console at the beginning of each new transmission. Its components are defined in the table below.

```
1998.174.033409:pdus7.1998.170.0330.AIW image started
```

a b c d e f g h

| <i>Field Key</i> | <i>Definition</i> |
|------------------|---|
| a-c | year, julian day and UTC hour, minute and second the image began being received (note this is the local PC's time) |
| d-h | file name |
| d | signal type and satellite number |
| e-g | century, year, julian day and UTC hour and minute of the image product being received; ccyy.ddd.hhmm |
| h | a two- to four-character sector and product identifier code; the first character is always the sector identifier and is one of the following: <ul style="list-style-type: none"> • A=full globe • B=Europe, North Africa, and the Middle East; the remainder of the code is the product identifier code, which may be one or two of the following: <ul style="list-style-type: none"> • V (visible) • I (infrared) • W (water vapor) • VH (visible - high resolution) therefore, AIW in this example means this product contains data for creating full globe (A) infrared (I) and water vapor (W) images |

Data Loss

The Data Loss message indicates a transient error. It means a *frame* was not found where one was expected. A *frame* is 1/4 or 1/2 of a line, depending on the mode. A Data Loss error usually results in a bad line in the image being received.

Signal Off

The Signal Off message is displayed each time 256 Kbytes of data are received without the three-byte sync code that appears at the beginning of each frame.

Stopping, Restarting or Shutting Down the Ingestor**Stopping the Ingestor**

To stop the ingestor, issue a stop command from the console.

Type: `/etc/init.d/ingentl stop`

Restarting the Ingestor

To restart the ingestor process, either reboot by performing the *Shutting Down the Ingestor* procedure below and then cycling the power to restart the ingestor, or issue the start command from the console. To issue the start command,

Type: `/etc/init.d/ingentl start`

Shutting Down the Ingestor

To shut down the ingestor, issue the workstation shutdown command from the console.

Type: `init 0`

Changing the Amount of Retained Data

The `inge` process reads the `retain.pdus` file to determine how many images of each sector type to keep online. SSEC's `retain.pdus` file is shown and described below.

```
53 62 13
```

This file listing is interpreted as follows:

- keep the 53 most recent A-sector images
- keep the 62 most recent B-sector images
- keep the 13 most recent LX images

Perform the steps below to change the amounts of Meteosat PDUS data to retain.

1. From the console, edit the `retain.pdus` file.

Type: `vi /data/retain.pdus`

2. Using the vi editor, make your changes and save the file. Then, exit the file. The `/data/retain.pdus` file is checked by the ingestor at each image start time.

Meteosat File Naming Conventions

Meteosat images are stored in `/data` and are named using the following convention:

signal type-satellite number.ccy.ddd.hhmm.sector-product identifier

Refer to d-h on page 5-5 for field definitions.

Navigation

The navigation for each image is extracted from the PDUS file and converted to McIDAS format when served through ADDE.

ADDE Server Procedures

The procedures discussed in this section are:

- Accessing the Data via ADDE
- Changing Server Dataset Names
- Processing ADDE Data Requests
- Editing the names.msaf File
- SDI Meteosat Events

Accessing the Data via ADDE

Once the SDI begins to ingest data and is connected to the network, the data can be accessed on McIDAS workstations via ADDE. The ADDE group name, by default, is MET.

Perform these steps to access the SDI's data.

1. From a McIDAS workstation:

Type: **DATALOC ADD MET SDI IP address**

For example, if the SDI has an IP address of 144.92.108.32

Type: **DATALOC ADD MET 144.92.108.32**

2. Use the ADDE command named DSINFO to determine the descriptor names:

Type: **DSINFO I MET**

The output should look something like:

| DSINFO I MET | | |
|--|--------|--|
| Dataset Names of Type: IMAGE in Group: MET | | |
| Name | NumPos | Content |
| ALL | 100 | All Meteosat Images |
| B | 20 | B-Sector Channels 1 8 10 (VIS IR WV) |
| FD | 20 | Full Disk 5km; Channels 1 8 10 (VIS IR WV) |
| FDHV | 20 | Full Disk 2.5km Vis |

At this point the suite of ADDE commands can be used with the data.

Changing Server Dataset Names

Perform steps 1-4 in the following procedure to change or update Meteosat server dataset names.

1. From the console, login as mcadde or telnet into the ingestor as user mcadde.
2. To change ADDE names associated with particular datasets, edit the `~mcadde/mcidas/data/RESOLV.SRV` file. The following is a sample of this file. Notice that all fields are comma delimited.

```
N1=MET,N2=ALL,TYPE=IMAGE,K=MSAT,R1=1,R2=100,Q=/data,C=All Meteosat images,
N1=MET,N2=FDHV,TYPE=IMAGE,K=MSAT,R1=1,R2=20,Q=/data,C=Full Disk 2.5km VIS,
N1=MET,N2=FD,TYPE=IMAGE,K=MSAT,R1=1,R2=20,Q=/data,C=Full Disk 5km; Channels 1 8 10 (VIS IR WV),
N1=MET,N2=B,TYPE=IMAGE,K=MSAT,R1=1,R2=20,Q=/data,C=B-Sector Channels 1 8 10 (VIS IR WV),
```

Where:

- N1** is the ADDE group name
- N2** is the ADDE descriptor name and must match one of the descriptor names in `/data/names.msaf`
- TYPE** is the data type
- K** is the data format or kind
- R1** is the beginning dataset position number (usually 1)
- R2** is the ending dataset position number; this number should always be greater than the total number of images the ingestor has been configured to retain
- C** is the comment field displayed with DSINFO

3. Edit `/data/names.msaf` to define which image product types are part of each dataset.

The `/data/names.msaf` file is a configuration file that associates PDUS image types(s) with an ADDE dataset descriptor name. Each line of this file contains a unique ADDE dataset descriptor name and the image type(s) that are assigned to it. The same image type may be assigned to multiple dataset descriptors. *Edit this file only if a new image type is transmitted or you want to change or create new dataset names.* The table below lists the default ADDE descriptor names and the image types assigned to each.

| ADDE Descriptor Names | Image Types |
|-----------------------|--|
| ALL | AV, AI, AW, AIV, AIW, AIVW, AIVH, BV, BI, BW, BIV, BIW, BIVW |
| B | BV, BI, BW, BIV, BIW, BIVW |
| FD | AI, AW, AIV, AIW, AIVW, AIVH |
| FDHV | AV |

The ADDE command called IMGLIST lists the images in a dataset. It always shows the image resolution as 1 (full resolution) and the image size as the complete image size. All sectorizing or image blowdowns are done via other ADDE commands such as IMGDISP, IMGCOPY, etc.

Processing ADDE Data Requests

When an ADDE request is made, the server compares the requested data descriptor type with the descriptor names listed in the `/data/names.msat`. For example, if the request is for FD (Full Disk), the server looks for online images having an A-sector type (AI, AW, AIV, AIW, AIVW and AIVH). If any A-sector images are found, the remaining criteria in the request (date, time, data coverage) are used in filling the request.

Editing the names.msat File

See step 3 in the *Changing Server Dataset Names* section on page 5-9.

SDI Meteosat Events

As described in Chapter 2, the SDI ingestor implements an electronic mail event system. The Meteosat ingestor generates an *image started* event.

Chapter 6

NOAAPORT Ingestor

The NOAAPORT Ingestor reformats the NOAAPORT NWSTG channel 1 data stream to look like the *Family of Services* data stream. It takes data and clock output from the SDR54 Satellite Data Receiver Modem and reformats it. For channel 1, there are two output data streams, one for binary data and one for ascii data. Channels 2 and 3 contain satellite data in GINI (GOES Ingest NOAAPORT Interface) format, which are stored on disk. The ingestor is configured for one of these channels before shipping.

The ingestor removes various layers of protocol that were used during data transport. First, the HDLC (High-Level Data Link Control) protocol is examined. Flags are located, zero-bit insertions are removed, and the bits in the bytes are reordered from LSB first to MSB first. Then, the other protocol envelopes are stripped away and used to determine which stream the data should be presented on.

The ingestor buffers the data stream, which requires that you only need to keep up with its average rate, not its peak rate. By default, the amount of buffering is set to 100MB, which represents 8.3 minutes of raw data, but you can change it if desired.

Data decoders currently used with *Family of Services* data require few changes when used with the NOAAPORT Ingestor's data stream. The main difference is that instead of opening an async device, as they may have in the past, they now open a FIFO or a socket. Other differences that occur are not from differences in format, but differences in the data itself. The NOAAPORT data stream contains many more grids and many larger grids, than the *Family of Services* data stream, so you may need to modify assumptions about maximums.

Knowledge of the NOAAPORT system and its data characteristics are not essential for routine operation of an SDI. However, if you experience difficulty, familiarity with these characteristics may help you diagnose operational problems. Refer to <http://www.nws.noaa.gov/noaaport/html/noaaport.shtml> for NOAAPORT system and data format information.

Knowledge of the SDI files, their structures, or their naming conventions are not considered essential for normal operation of the SDI. However, if you request technical assistance from SSEC, you may be asked to examine these files to assist SSEC in diagnosing your SDI operational problems. Therefore, an overview of these files is provided at the end of this chapter.

Topics discussed in this chapter are:

- Bit Sync Requirements
- NOAAPORT Ingestor Operating Procedures
- SDI NOAAPORT

Interpreting Bold and Italicized Terms

Throughout this chapter, actual keyboard entries appear in **BOLD** type. You will type these entries exactly as they appear. For example:

Type: **export DISPLAY=**

Variable entries appear in italics. For example,

Type: **export DISPLAY=*workstation*:0**

In this example, replace *workstation* with the workstation's name. For example, if you want to export the display to a workstation named zebra:

Type: **export DISPLAY=*zebra*:0**

Bit Sync Requirements

The SDR54 Satellite Data Receiver Modem from EFData is used. The RS422 output attaches directly to the SDI card.

NOAAPORT Ingestor Operating Procedures

The NOAAPORT Ingestor operating procedures consist of the following:

- Using the Ingestor Console
- Starting the Ingestor
- Interpreting Console Messages
- Stopping and Restarting the Ingestor
- Shutting Down the Ingestor
- Changing the Amount of Retained GINI Data
- Configuring

Using the Ingestor Console

The Ingestor Console, referred to hereafter as console, displays the ingestor's status. This procedure describes two console choices, a local monitor and a remote monitor.

The local console is a VGA monitor that you physically connect to your SDI computer; a remote console is a telnet session into the SDI computer from a remote workstation.

If you prefer to use a VGA monitor, refer to *Chapter 2 - SDI Installation* for installation instructions. You will need to acquire a monitor locally since the SDI is not shipped with a monitor.

To use a telnet session, perform the following steps.

1. Log into the SDI as root

2. Export the display to your workstation.

Type: **export DISPLAY=workstation:0**

where: workstation is the name of your workstation

3. Type: **(xterm -C&)**

Starting the Ingestor

When the computer is powered up, the ingestor starts automatically. If you are unsure about the state of the ingestor, shutting down and restarting is the recommended procedure.

Interpreting Console Messages

If you have a console, these are messages you may see:

| Message | Interpretation |
|----------------|--|
| hdlc error | the message is too short for an hdlc message |
| bit error | seven 1-bits were found in a row; this is a protocol violation and indicates noise |
| short record | the record is too small to obey NOAAPORT conventions |
| long record | the record is too long to obey NOAAPORT conventions |
| clock stopped | no data; this usually indicates a hardware problem |
| no flags found | the data is garbage; check for hardware problems |
| spool wrapped | no one is reading the FIFOs; data is being lost |

There may also be messages from the system that are unrelated to the ingest process, for example disk error or full disk.

Stopping and Restarting the Ingestor

To stop the ingestor process, issue a stop command from the console:

Type: **/etc/init.d/ingentl stop**

To restart the ingestor process, either reboot (see *Shutting Down the Ingestor* below) or, from the console:

Type: **/etc/init.d/ingentl start**

Shutting Down the Ingestor

Perform the following procedure to shut down the ingestor.

Issue the workstation shutdown command:

Type: **init 0**

Changing the Amount of Retained GINI Data

Channels 2 and 3 contain satellite image data in GINI format. To save these files, add lines to the `/data/retain.nport` file. Each line defines the abbreviated WMO header (TTAAii) of the product and number of files to retain. For example, adding the line:

TGIE01 10

This will take effect when the next product comes in.

Configuring

Both data streams must have readers in order for data to flow out of either of them. If you are only interested in one of the data streams, run the `/bin/cat` output of the other FIFO into `/dev/null`. However, only one client may connect to each port. If there are more than one, the data will be garbled.

If the client for the data streams is on another system, the FIFO outputs can be read by connecting to TCP/IP sockets 1501 and 1502 on the ingest machine. This channels the `cat` output from the FIFO into the socket. If the port numbers 1501, 1502 are not appropriate for your needs, they may be changed by editing `/etc/services` on the ingest machine.

Most of the actual work is done by the decoders, which are the client of the ingestor's data streams. Those things which are configurable are:

- File `/opt/nport/exceptions`
- Startup Script `/etc/rc3.d/S99ing`

File `/opt/nport/exceptions`

This file is used to mark WMO headers or classes of headers which are identified as `ascii`, but are actually all or partly binary data. Inclusion of the product ID in this file causes the product to flow on the binary data stream. If the file `/opt/nport/exceptions` is missing or of zero length, no products will be redirected. When your system is delivered, the file will contain a product list suitable for the McIDAS XCD ingest package. If the file is modified, the changes take place immediately. You do not have to reboot the system. Comments on the structure of `/opt/nport/exceptions` reside in the companion file, `/opt/nport/exceptions.doc`.

Startup Script `/etc/rc3.d/S99ing`

The startup script starts the ingestor automatically when the system is rebooted. It must use `sh` semantics, not `ksh`. In particular, two environmental variables are of interest to you, `WRAP`, and `LOG`. `WRAP` is the maximum number of megabytes of unread data the ingestor can store before overwriting occurs. At delivery, it is set to 100 (100 megabytes), which represents about 8.3 minutes of data. If the client decoder falls behind the ingestor by more than 8.3 minutes, the oldest data in the FIFOs is overwritten.

If the variable `LOG` is defined, then any console messages are also appended to a file whose name is in the `LOG` variable. The system is delivered with no log. If one is added, you must truncate or rotate it periodically, or it will grow forever. If a log is added, you must reboot in order for it to take effect. It is probably not a good idea to have a `LOG`. It could become very large if things are not working well.

SDI File Structures

The channel 1 data streams are available locally as two names pipes, `/tmp/jmb.fifo.1` and `/tmp.jmb.fifo.2`. If the client for the data streams is on another system, the FIFO outputs can be read by connecting to TCP/IP sockets 1501 and 1502 on the ingest machine.

If GINI data is ingested, these files are stored on disk in the `/data` directory.

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