

SDI Operator's Manual

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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 Software Structure](#)

- [SDI Clock Time](#)
 - [SDI Event Handling System](#)
 - [Logging the SDI Console Messages](#)
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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.

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SDI File Descriptions

The types of SDI files common to all high data rate satellite types (GVAR and POES) are:

- [SDF Files](#) (Stretched Data Format)
- [Index Files](#)
- [Descriptor Files](#)
- [Image Files](#)

Image files are also generated for lower data rate satellite types (MTSAT and Meteosat).

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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.ccy.ddd.hhmmss

Where:

signal_type is the satellite signal type, e.g., gvar, poes, etc.

cc is the century when the file was written to disk

yy is the year when the file was written to disk

ddd is the julian day the file was written to disk

hh is the UTC hour the file was written to disk

mm is the minute the file was written to disk

ss is the second the file was written to disk

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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.

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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.

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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.

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SDI Software Structure

The SDI software consists of:

- [Data Processing Software](#)
 - [Configuration Files](#)
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Data Processing Software

The data processing software is made up of two components, the ingest and decode component, and the server component.

The ingest and decode component receives the incoming raw satellite data from the SDI card and stores and decodes the data into files. The ingest and decode components are located in subdirectories of **/opt**.

The server component fulfills client requests by extracting the requested data and sending it to the client. The server components are located in **~mcadde/mcidas/bin** (versions 1999nov29 onward) or **~mcidas/bin** (pre-1999nov29 versions).

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Configuration Files

All configuration files exist (depending on the ingestor type) in the following directories.

Directory	Description
<code>/etc/init.d</code>	ingestor control files, e.g., <code>ingcnt1</code>
<code>/data</code>	ingestor configuration and descriptor files, e.g., <code>notify.list</code> , <code>names.gvar</code>
<code>~mcadde</code>	server configuration files, e.g., <code>.mcenv</code>
<code>~mcadde/mcidas/data</code>	server configuration files, e.g., <code>RESOLV.SRV</code>
<code>/home/tip</code>	decoder configuration files, e.g., <code>.tiprc</code> , <code>noaa15_7_tip.cfg</code>
<code>/sounder</code>	decoder configuration files, e.g., <code>.soundrc</code>

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SDI Clock Time

In general, the local SDI clock time only needs to be approximately correct (within a few minutes) since navigation and image start times use the image time transmitted in the signal. One exception to this is DMSP which uses the local clock on the SDI to help in the navigation of images.

SSEC installs **xntp** on SDI configurations that are local time sensitive (like DMSP). For all other configurations, it is the SDI user's responsibility to maintain the time.

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SDI Event Handling System

This section is divided into the following topics:

- [Overview](#)
 - [The Event Notifier List File](#)
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Overview

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.

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The Event Notifier List File

The event notifier list file, **notify.list**, is in the same directory that the ingestor is started from. It is usually in **/data**, but may be in another directory due to site-specific changes. To find the correct directory, look for the line in the file **/etc/init.d/ingcntl** that begins with the **cd** command. For example, to receive the ingestor events from an ingestor whose **/etc/init.d/ingcntl** includes the line **cd /noaa**, the **notify.list** file would need to be in **/noaa**.

The format of the **notify.list** file is one e-mail address per line. For example, to send events to 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.

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Logging the SDI Console Messages

If the variable LOG is defined in the file `/etc/init.d/ingcntl`, all console messages are appended to the file whose name is set in the LOG variable. As delivered, the system does not log console messages.

CAUTION!

If logging is enabled, you must truncate or rotate the log file or it will grow indefinitely. If logging is added, you must reboot in order for it to take effect. The file could become very large if things are not working well.

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Chapter 2

SDI Installation

This chapter consists of the SDI setup and installation instructions. Go to the corresponding section below to complete the necessary tasks.

- [Initial Checkout and Setup](#)
 - [Installing an SDI Software Update](#)
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Initial Checkout and Setup

The SDI was initially built on an IBM® PC Server 310 computer; most later versions are built on IBM Netfinity server. Both computers run 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 initial checkout and setup to the following:

- [Initial Inspection](#)
- [Location](#)
- [Power Requirements](#)
- [Component Interconnections](#)
- [Bit Sync Requirements](#)
- [Connecting External Inputs and Outputs](#)

Perform the steps below to checkout and setup your new SDI system.

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Initial Inspection

1. Remove the components from their shipping containers and inspect them for signs of shipping damage. Contact SSEC for further instructions if damage is discovered.

Occasionally, SSEC's proprietary PCI interface card (shown in the picture below) becomes partially unseated during shipment. If this happens, you will get the following error message on your console when you power up the SDI.

```
Open error on /dev/jmb no such device or address
```

Therefore, as a precautionary measure, SSEC recommends that you remove the computer's outer case, reseal the interface card, and reinstall the outer case.

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Location

2. 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.

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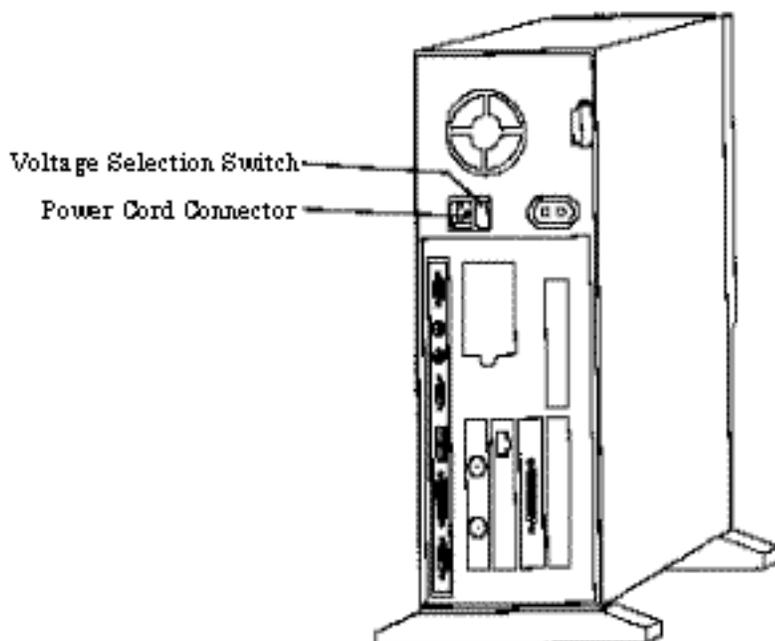
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Power Requirements

3. Check that the voltage-selection switch is set to the correct position.



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 above. 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.

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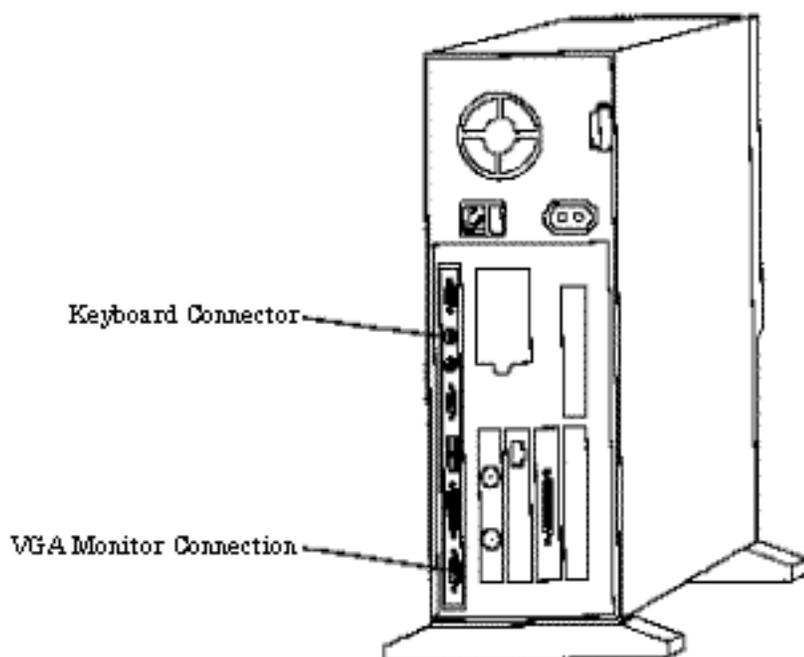
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Component Interconnections

4. (Optional) Connect a monitor to the SDI.



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 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 ssh. Therefore, once normal operation is confirmed, there is no need for a monitor.

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

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.

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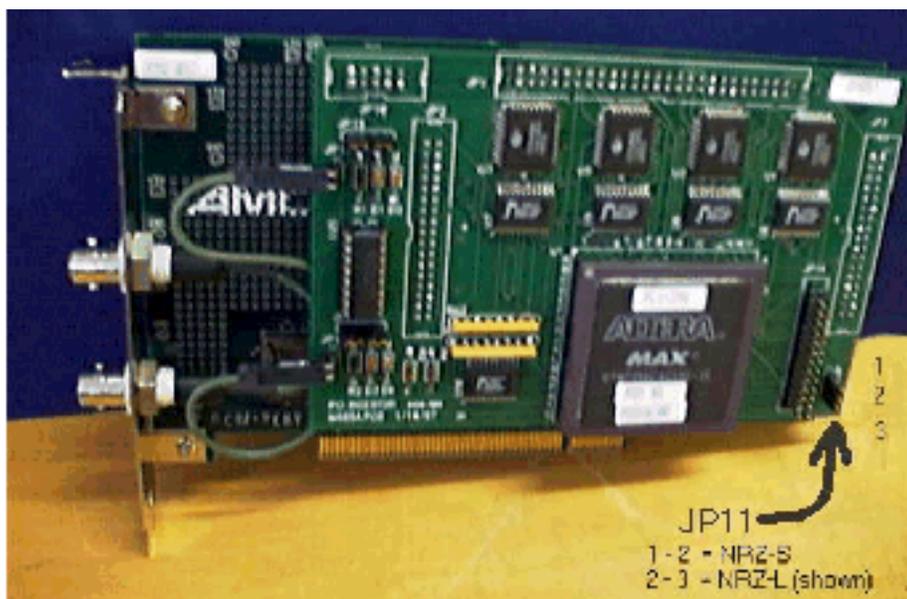
Bit Sync Requirements

Bit syncs provide clock and data outputs in either NRZ-L or NRZ-S format. The *PCI Ingestor* card in the SDI can decode either format via a selection jumper (JP11) on the PCI card. During initial installation, and/or after changing the bit sync, verify that the format selected on the PCI card matches the bit sync's output format. Refer to the picture below for the location of the jumper. With the *PCI Ingestor* board positioned as shown in the picture, pin 1 is "up".

The jumper configuration is defined as:

- 1 - 2 = NRZ-S
- 2 - 3 = NRZ-L

Remove the card from the PC before changing the jumper. If your SDI is an IBM Netfinity, first removing the bottom of the computer simplifies removal of the *PCI Ingestor* card.



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Connecting External Inputs and Outputs

6. Connect the Data and Clock inputs and the Ethernet cable according to the drawing below.

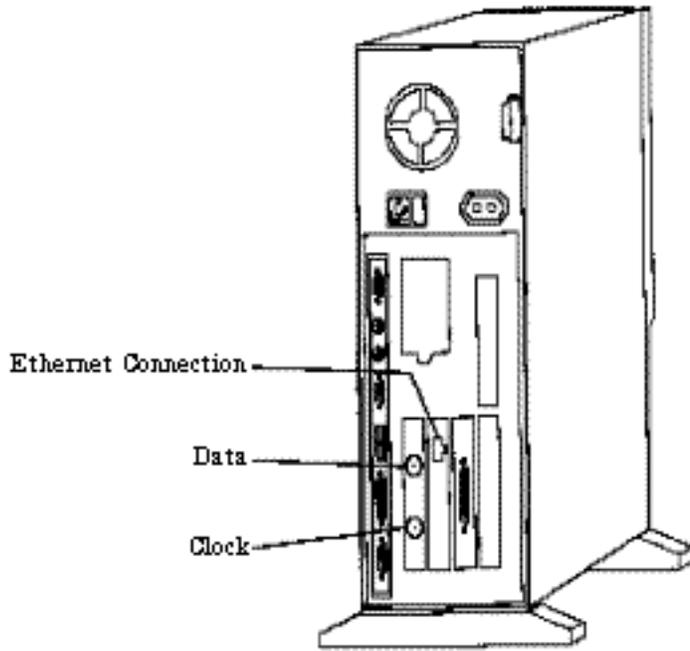
Your antenna chain provides two 75-ohm outputs from its bit synchronizer. They should be labeled data and clock. If the cables are not labeled, you will identify and mark them during the completion of this step.

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 below.

Connect the Ethernet cable to the connector indicated in the drawing below. This completes the initial checkout and setup process.

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



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Installing an SDI Software Update

You can obtain and install SDI software updates if you purchased McIDAS Users' Group (MUG) support for your SDI system or have been contacted and been given approval by SSEC. If you have a problem obtaining or installing the update, ask your site coordinator to contact the McIDAS Help Desk [by email](#) or by phone at (608) 262-2455.

The SDI software update installation consists of two tasks:

- [Obtaining the SDI Software Update Files](#)
 - [Installing the SDI Software Update](#)
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Obtaining the SDI Software Update Files

The SDI software update contains the files below.

File Name	Description
<code>sdi$version\#$.sh</code>	shell script that does the build/install
<code>sdi$version\#$.tar.Z</code>	compressed tar file containing the server binaries, ingestor binaries, and data files

The *version#* above and hereafter refers to the name of the SDI software version (e.g., 2000jun06 or 2000jan12).

The software updates are distributed via download from the MUG Web Site or via CD (for an extra charge).

Obtaining the Update Files From the MUG Web Site

1. Use your Web browser to download the files listed above. Access the MUG Web Site at , and follow the SSEC Desktop Ingestor (SDI) link in the Software section. Each site has its own login and password for downloading files.
2. Log on to the SDI workstation as user **root** and move the downloaded files to the **~mcadde** directory. If you ftp the files from another workstation, be sure to use binary file transfers.

Obtaining the Update Files From a CD

1. Insert the CD into the drive and extract or copy the files listed above.
2. Log on to the SDI workstation as user **root** and move the downloaded files to the **~mcadde** directory. If you ftp the files from another workstation, be sure to use binary file transfers.

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Installing the SDI Software Update

Next, complete the steps below to install the SDI software update.

1. Log on to the SDI workstation as user **root**. Run all commands below from the **~mcadde** directory.
2. Install the SDI software update using the appropriate command below.

To install the ingestor and server software,

```
Type: sh ./sdiversion#.sh install
```

To install the ingestor software only,

```
Type: sh ./sdiversion#.sh install ingestors
```

To install the server software only,

```
Type: sh ./sdiversion#.sh install servers
```

3. From the console, issue a stop command to stop the ingestor.

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

4. From the console, issue a start command to restart the ingestor.

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

See the ingestor specific chapter in this manual for your ingestor's operating and ADDE server procedures.

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Chapter 3

GVAR Ingestor

This chapter applies to the GVAR signal only.

Topics discussed in this chapter are:

- [Overview](#)
 - [Bit Sync Requirements](#)
 - [Ingestor and Sounder Decoder Operating Procedures](#)
 - [GVAR File Descriptions](#)
 - [Navigation](#)
 - [ADDE Server Procedures](#)
 - [SDI GVAR Events](#)
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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**

File names and paths appear in **courier bold**. For example: **/home/mcadde/mcidas/data**

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Overview

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.

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Bit Sync Requirements

As shipped, the *PCI Ingestor* card in the SDI is configured to decode NRZ-L coded data from the bit sync. Currently, most if not all bit syncs used with GVAR produce an NRZ-L formatted clock and data, with the data changing on the rising edge of the clock. However, if your bit sync produces an NRZ-S encoded output, or you replace your bit sync in the future with a model that produces an NRZ-S output, you will need to reconfigure your *PCI Ingestor* card as described in *Chapter 2 - [SDI Installation](#)*.

The output should be TTL level output and terminated at 75 ohms. However, if you use a bit sync with a balanced (double-ended) output, the ingestor card can be reconfigured to receive it. Contact SSEC for reconfiguration instructions.

The GVAR bit rate is 2.111360 megabits per second.

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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](#)
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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 monitor that is physically connected to your SDI computer or an ssh session into the SDI computer from a remote workstation.

If you prefer to use a 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 an ssh 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&)**

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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.

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Interpreting Console Messages

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

- [New Image](#)
- [Bit Slip](#)
- [Error](#)
- [No Sync](#)
- [CRC 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 the [GVAR Index File Naming Convention](#) for the complete description. Thus, **gvar.1997.113.205414** is interpreted as follows:

Field Definition

gvar is the satellite signal type (GVAR)

1997 is the year when the image started

113 is the day of the year the image started

20 is the UTC hour the image started

54 is the minute the image started

14 is the second the image started

INDX 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.

No Sync

The no sync message indicates that the ingestor is not seeing a sync pattern in the data stream. This is normal during housekeeping periods, but if it continues at other times, it could indicate any of the following:

- poor termination of the signal; if you have a "Y" signal (e.g., you split the clock and data signal from the bit syncs many times over) it will affect the termination of the signal; SDI's have a 75

ohm terminator built-in, and if you Y off an additional set of clock and data signals from the bit sync's output, you'll only get 37.5 ohm termination, etc.

- the signal is NRZ-L format versus NRZ-S would prevent the SDI from recognizing the sync pattern; SDIs require NRZ-L format
- the clock and data cables are reversed, resulting in a no-sync error
- satellite problems (e.g., no data is being sent)
- antenna positioning errors, or any of the above listed problems for bit slips could also give the no-sync errors

CRC Error

A new image is started when the priority frame start time changes within a block 0 that has a valid CRC code. A new image will not start if the CRC code is invalid (because of noisy data, etc.), causing the new image's data to be pasted on the end of the previous image. If the CRCs continue to be invalid, a new image is started after five consecutive block 0s with a new priority frame start time are received, regardless of the CRC status. When an image is started while the CRC is bad, the console displays the message:

```
CRC not valid.
```

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Stopping and Restarting the Ingestor or GVAR Sounder Decoder

To stop the ingestor or GVAR Sounder Decoder, perform the following procedure as user **root**.

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](#)) 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**

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Shutting Down the Ingestor

Perform the following procedure to shut down the ingestor.

1. Issue the workstation shutdown command.

Type: **init 0**

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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.](#)

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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](#). The R1 and R2 fields should be set to those values defined for *area1* and *area2*, respectively.

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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). 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-East and GOES-West
- all northern hemisphere images from GOES-East and GOES-West
- all USA images from GOES-East and GOES-West
- any other images from GOES-East and GOES-West that includes all of Wisconsin

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

1. From the console, login as **root** or ssh into the ingestor as **root**.
2. Edit the file **/data/names.gvar**.

The first line in the file must always be

```
ALL 0 0 0 0
```

The last line in file must always be

OTHER 1 0 0 0

The format of the file is: *descriptor_name* *sline* *eline* *sele* *eele*

Where:

descriptor_name descriptor name (e.g., NH for Northern Hemisphere)

sline starting image line number

eline ending image line number

sele starting image element

eele ending image element

The table below is a sample GVAR descriptor file

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

ALL	0	0	0	0
CONUS	3250	5300	16700	17400
NH	3250	7400	11000	20000
SH	10200	10300	11000	12000
FD	2800	10000	11000	20000
OTHER	1	0	0	0

Example:

Using the **names.gvar** file above, any image that completely covers the area from image lines 3250 to 5300, and image elements 16700 to 17400 is listed in the descriptor file named **CONUS**.

3. Save the file.

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GVAR File Descriptions

The following GVAR files are described:

- [GVAR Image Index Files](#)
 - [Block 11 Index Files](#)
 - [GVAR Descriptor Files](#)
 - [Names.gvar Configuration File](#)
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GVAR Image Index Files

GVAR Index File Naming Convention

The naming convention is: *signal_type.ccyymmss*. **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 2005 GVAR image, whose nominal image date and time are 228 and 12:20:00, respectively, has the name **gvar.2005.228.122000.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

<i>Field Name</i>	<i>Description</i>
-------------------	--------------------

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 [Appendix A, GVAR Signal Characteristics](#))
- 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.

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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.ccyy.ddd.hhmm.B11

Where:

cc is the century when the image started
yy is the year when the image started
ddd is the Julian day when the image started
hh is the UTC hour when the image started
mm is the minute when the image started

Every entry in the Block 11 index file identifies a data block in an SDF file and it's 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.

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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

Field Name Description

<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. 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.2005.030.160143.INDX 2973 9249 6512 17752 2
gvar.2005.030.160923.INDX 10037 9049 12496 22900 3
gvar.2005.030.161514.INDX 2805 9049 10120 22900 4
gvar.2005.030.163143.INDX 2973 9249 6512 17752 5
gvar.2005.030.163923.INDX 10037 9049 12496 22900 6
gvar.2005.030.164514.INDX 2805 9049 10120 22900 7
```

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Names.gvar Configuration File

See the [Editing the names.gvar File](#) procedure for a description of the **names.gvar** configuration file.

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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
-

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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

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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](#)
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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-East all images
BLK11	11	GVAR sounder areas
CONUS	20	GOES-East continental U.S.
FD	20	GOES-East full disk
FD-E	20	GOES-East full disk
FD-W	20	GOES-West full disk
NH	20	GOES-East northern hemisphere
OTHER	100	GOES-East unknown
SH	20	GOES-East southern hemisphere
DSINFO -- done		

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

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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 ssh 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-East all images
N1=GVAR,N2=CONUS,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East continental U.S.
N1=GVAR,N2=NH,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East northern hemisphere
N1=GVAR,N2=SH,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East southern hemisphere
N1=GVAR,N2=FD,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East full disk
N1=GVAR,N2=FD-E,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East full disk
N1=GVAR,N2=FD-W,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-West full disk
N1=GVAR,N2=OTHER,TYPE=IMAGE,K=GVAR,R1=1,R2=2500,C=GOES-East unknown
```

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 `IMGLIST` command 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.

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Changing Sounder Server Dataset Names

1. From the console, login as mcadde or ssh 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=EASTL,N2=BLK11,TYPE=IMAGE,RT=N,K=AREA,R1=2001,R2=2336,C=GOES-East SOUNDER AREAS,  
N1=WESTS,N2=BLK11,TYPE=IMAGE,RT=N,K=AREA,R1=1001,R2=1336,C=GOES-West 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`.
-

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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.

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

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SDI GVAR Events

As described in the [SDI Event Handling System](#) section of Chapter 1, 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.

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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](#) for a complete description of the format of this file name

bele is the beginning element of this image

eele is the ending element of this image

bline is the beginning line of this image

eline is the ending line of this image

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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 below)

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

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

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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

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Chapter 4

POES Ingestor

This chapter applies to the POES signal only.

Topics discussed in this chapter are:

- [Overview](#)
 - [Bit Sync Requirements](#)
 - [POES Ingestor Operating Procedures](#)
 - [POES File Descriptions](#)
 - [Navigation](#)
 - [ADDE Server Procedures](#)
 - [SDI POES Events](#)
 - [POES ATOVS](#)
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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**

File names and paths appear in **courier bold**. For example: **/home/mcadde/mcidas/data**

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Overview

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 Name, McIDAS Sensor Source (SS), and Spacecraft Address (or Sat-ID). The following table shows the current mappings between these terms.

Satellite Name	McIDAS Sensor Source (SS)	Spacecraft Address (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
NOAA-16	66	3
NOAA-17	67	11
NOAA-18	68	13
NOAA-N'	69	15

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Bit Sync Requirements

As shipped, the *PCI Ingestor* card in the SDI is configured to decode NRZ-L coded data. The bit sync that is normally used with POES outputs biphas formatted data. An SSEC designed and built converter called a *POES Sync Correlator* converts the biphas output from the bit sync to NRZ-L. However, if your bit sync produces NRZ-L or NRZ-S encoded outputs, do not use the *POES Sync Correlator*. Instead, connect the bit sync outputs directly to the SDI and configure the *PCI Ingestor* card as described in *Chapter 2 - [SDI Installation](#)*.

The clock and data outputs from the *POES Sync Correlator* should be TTL level outputs and terminated at 75 ohms. If you use a different bit sync that has NRZ-L or NRZ-S balanced or single-ended outputs, the SDI card can be reconfigured to receive it. Contact SSEC for reconfiguration instructions.

The POES bit rate is for 666 kilobits per second for HRPT and 1.33 megabits per second for GAC and LAC.

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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](#)
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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 monitor that is physically connected to your SDI computer or an ssh session into the SDI computer from a remote workstation.

If you prefer to use a 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 an ssh 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&)**

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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.2005.198.122552.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.

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.2005.198.122552.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.2005.198.113827.LAC sat=13 day=198 time=115444 lines=3716 del=2 err=2
```

The **sat=13** portion of this message is the spacecraft address as it is defined in the data stream. This is not the McIDAS Sensor Source (SS) number (see the [table](#) at the beginning of this chapter).

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=3716** 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.

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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**.

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Stopping, Restarting or Shutting Down the Ingestor

Stopping the Ingestor

To stop the ingestor, issue a stop command from the console as user **root**.

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`

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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/ingcntl`.
 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](#).
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POES File Descriptions

The following POES files are described:

- [POES Index Files](#)
 - [POES Descriptor Files](#)
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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.ccyymmss.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 2005 GAC image, whose start of ingestion date and time are 228 and 12:20:00, respectively, has the name **poes.2005.228.122000.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.2005.012.180623.HRPT
poes.2005.012.180630 772767 6 5 1 12 180650 140 1
poes.2005.012.180630 776630 2 5 2 12 180650 306 2
poes.2005.012.180630 800492 6 5 3 12 180650 473 3
poes.2005.012.180630 814355 2 5 1 12 180650 640 4
poes.2005.012.180630 828217 6 5 2 12 180650 806 5
poes.2005.012.180630 842080 2 5 3 12 180650 973 6
poes.2005.012.180630 855942 6 5 1 12 180651 140 7
poes.2005.012.180630 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., 2005
 - c** is the julian day that the image was received, 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 spacecraft address, not the McIDAS sensor source number, e.g., 5 (see the [table](#) at the beginning of this chapter)
- 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**

I image frame line number

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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.2005.198.135033.GAC 5 198 104700 12779 141
poes.2005.198.143122.GAC 5 198 122800 12781 142
poes.2005.198.150627.GAC 9 198 132130 11100 143
poes.2005.198.151214.GAC 9 198 113230 13738 144
poes.2005.198.160938.GAC 5 198 141038 12525 145
poes.2005.198.164741.GAC 9 198 144851 12630 146
```

<i>Field Name</i>	<i>Description</i>
INDX_name	consists of a-d , as described in the Index File Format section, plus the signal type (e.g., GAC, LAC or HRPT)
Sat ID	the spacecraft address, not the McIDAS sensor source number (see the Spacecraft Address column in the table at the beginning of this chapter), 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

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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 subsect 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`.

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ADDE Server Procedures

The procedures discussed in this section are:

- [Accessing the Data via ADDE](#)
 - [Changing Server Dataset Names](#)
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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 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***

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

Type: **DATALOC ADD POES 144.92.108.32**

2. 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	Content
ALL	100	POES All POES images
N15GAC	100	POES NOAA-15 GAC images
N15HRPT	100	POES NOAA-15 HRPT images
N15LAC	100	POES NOAA-15 LAC images
N16GAC	100	POES NOAA-16 GAC images
N16HRPT	100	POES NOAA-16 HRPT images
N16LAC	100	POES NOAA-16 LAC images
N17GAC	100	POES NOAA-17 GAC images
N17HRPT	100	POES NOAA-17 HRPT images
N17LAC	100	POES NOAA-17 LAC images
N18GAC	100	POES NOAA-18 GAC images
N18HRPT	100	POES NOAA-18 HRPT images
N18LAC	100	POES NOAA-18 LAC images

DSINFO -- done

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

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Changing Server Dataset Names

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

1. From the console, login as user **mcadde** or ssh 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=N15LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-15  
LAC images,  
N1=POES,N2=N16LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-16  
LAC images,  
N1=POES,N2=N17LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-17  
LAC images,  
N1=POES,N2=N18LAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-18  
LAC images,  
N1=POES,N2=N15GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-15  
GAC images,  
N1=POES,N2=N16GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-16  
GAC images,  
N1=POES,N2=N17GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-17  
GAC images,  
N1=POES,N2=N18GAC,TYPE=IMAGE,K=POES,R1=1,R2=100,Q=/data,C=POES NOAA-18  
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
-

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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 Index File Format in this chapter for a complete description of the format of this file name.
<i>sat_id</i>	is the spacecraft address; this is the raw satellite ID number, not the McIDAS sensor source (SS) number. See the table at the beginning of this chapter
<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

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POES ATOVS

The SDI is capable of decoding ATOVS (Advanced TIROS Operational Vertical Sounder) data from the NOAA-KLM series of satellites (NOAA-15, -16 and -17), as well as NOAA-N (NOAA-18). All ATOVS data are decoded into McIDAS area files, although users also have intermediate file formats available.

This section has information on the following:

- [Decoding ATOVS Data](#)
 - [ATOVS Decode Configuration Files](#)
 - [Serving ATOVS Data](#)
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Decoding ATOVS Data

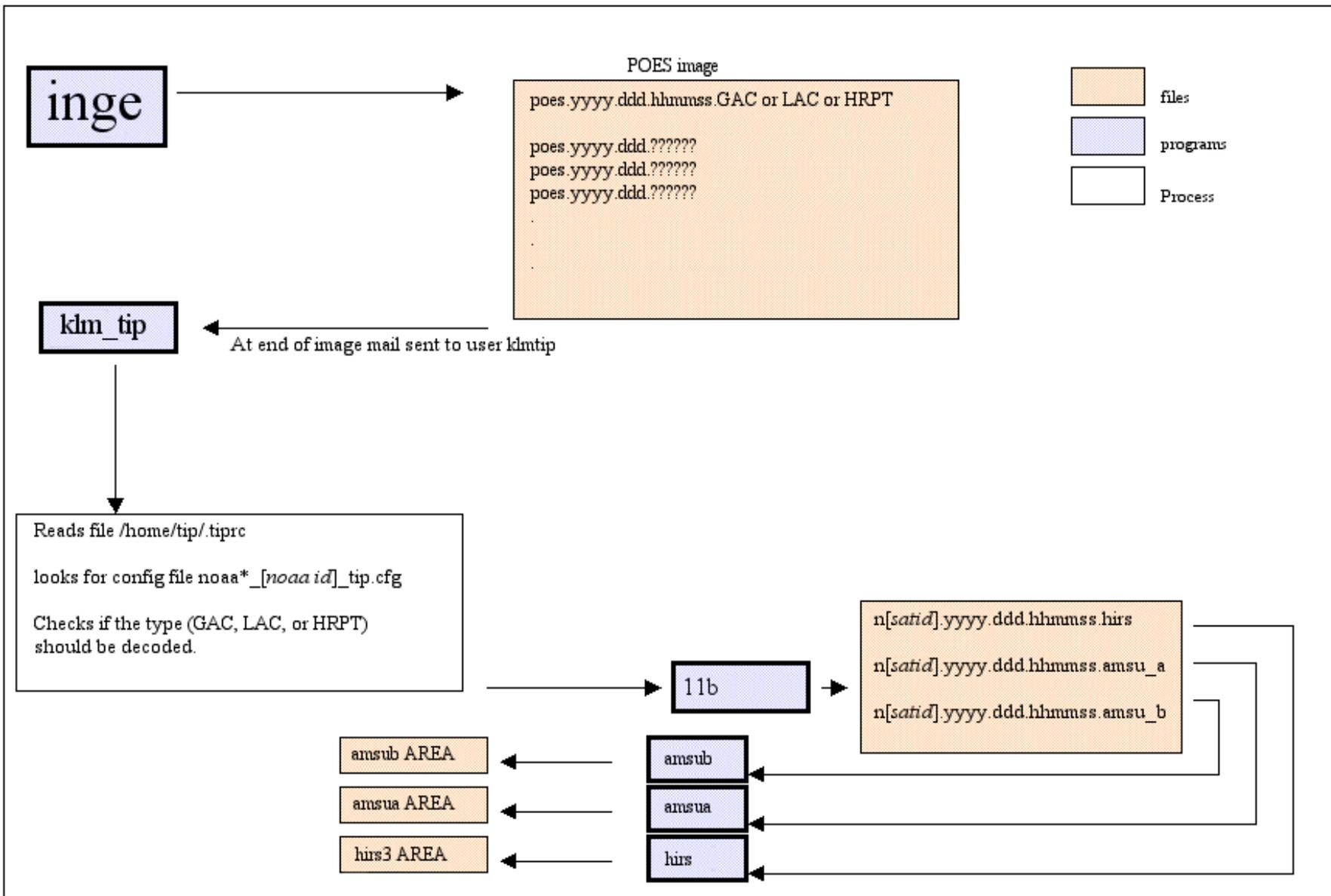
After an HRPT, GAC, or LAC pass finishes, the POES ingestor sends an e-mail event to all users in the event notifier list file, `/data/notify.list`. The user `klmtip` should be in `/data/notify.list`. The user `klmtip` is a mail alias that starts a script called `/opt/tip/bin/klm_tip`. This script reads the appropriate configuration files, and calls other scripts and programs to produce the final ATOVS areas. ATOVS areas are put into `/home/tip`. The Level 1b files are put into `/data/11b`.

The first thing done by the `klm_tip` script is to read the configuration file `/home/tip/.tiprc`. This file sets up the environment and other defaults for the script. The `klm_tip` script reads the appropriate configuration file named `noaa<sat#>_<noaaid#>_tip.cfg` (e.g., `noaa17_11_tip.cfg`). This configuration file has information about whether the file is to be decoded or not, and area ranges. The script `klm_tip` then runs the program `/opt/tip/bin/11b` on the image referred to in the mail event message. This program creates three Level 1b files: a HIRS/3 file, an AMSU-A file, and an AMSU-B file. If areas are also to be generated, three more programs are run: `amsua`, `amsub`, and `hirs`. These programs create the areas and place them in the directory `/home/tip`.

The diagram below describes the flow of data to produce decoded ATOVS data.

POES SDI

NOAA POES Relay or
Direct Broadcast



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ATOVS Decode Configuration Files

There are several configuration files needed for decoding ATOVS data. These files determine directories where the data resides, where areas are to be written, whether areas are to be written, etc.

The configuration file `/home/tip/.tiprc` provides information about where source data resides, where logging information is stored, and **PATH** and **MCPATH** information.

```
LOG_FILE=/home/tip/tip.log

DATADIR="/data"
PATH=$HOME/bin:/usr/bin:/usr/local/bin:/usr/openwin/bin:/opt/SUNWspro/bin

PATH=$PATH:/usr/ccs/bin:/usr/sbin:/opt/tip/bin:/home/mcidas/bin:.
export PATH

# MCPATH used by tip script
export MCPATH=/home/tip:/home/mcidas/data:/home/mcadde/mcidas/data/
```

The `/home/tip/noaa<sat#>_<noaaid#>.tip.cfg` configuration files contain general information for decoding POES ATOVS data. The current file that is shipped with POES SDIs set up to do ATOVS is named `/home/tip/noaa15_7_tip.cfg`.

The file contains the lines listed below, which identify the satellite number (satnum value), whether it is a NOAA-KLM series satellite (NOAAKLM value) and which data is to be decoded (HRPT, GAC and LAC values).

```
satnum=15
NOAAKLM=YES

# Set AREA loops for NOAA-15 AREAs
HRPT=NO
GAC=YES
LAC=NO
```

In the example above the satellite is NOAA-15, it is a NOAA-KLM series satellite, and only GACs are to be decoded.

The next part of this configuration file sets the number of Level 1b files to retain for each instrument type. It also defines the beginning and ending area numbers for each instrument.

```
# If no level1b files are to be retained,
# Comment out the following 3 lines
#
AMSUA_SAV=4
AMSUB_SAV=4
HIRS3_SAV=4

# If AREAs are not to be produced,
# Comment out the following lines
#
BEG_AMSUA=3001
END_AMSUA=3020

BEG_AMSUB=4001
END_AMSUB=4020

BEG_HIRS=5001
END_HIRS=5020
```

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Serving ATOVS Data

To serve the final ATOVS McIDAS areas, the file `~mcadde/mcidas/data/RESOLV.SRV` must reference the data. The directory storing the ATOVS areas must also be in the `MCPATH` of the server.

Configuring RESOLV.SRV

The datasets that the ATOVS data is served from should be set in the file `RESOLV.SRV`. The following is an example.

```
N1=POES,N2=N16AMSUA,TYPE=IMAGE,K=AREA,R1=3001,R2=3020,C=NOAA-16 AMSUA AREAS,
N1=POES,N2=N16AMSUB,TYPE=IMAGE,K=AREA,R1=3101,R2=3120,C=NOAA-16 AMSUB AREAS,
N1=POES,N2=N16HIRS,TYPE=IMAGE,K=AREA,R1=3201,R2=3220,C=NOAA-16 HIRS3 AREAS,
N1=POES,N2=N17AMSUA,TYPE=IMAGE,K=AREA,R1=3301,R2=3320,C=NOAA-17 AMSUA AREAS,
N1=POES,N2=N17AMSUB,TYPE=IMAGE,K=AREA,R1=3401,R2=3420,C=NOAA-17 AMSUB AREAS,
N1=POES,N2=N17HIRS,TYPE=IMAGE,K=AREA,R1=3501,R2=3520,C=NOAA-17 HIRS3 AREAS,
N1=POES,N2=N18AMSUA,TYPE=IMAGE,K=AREA,R1=3601,R2=3620,C=NOAA-18 AMSUA AREAS,
N1=POES,N2=N18AMSUB,TYPE=IMAGE,K=AREA,R1=3701,R2=3720,C=NOAA-18 AMSUB AREAS,
N1=POES,N2=N18HIRS,TYPE=IMAGE,K=AREA,R1=3801,R2=3820,C=NOAA-18 HIRS3 AREAS,
```

For detailed information about editing `RESOLV.SRV` see the section [Changing Server Dataset Names](#).

Configuring .mcenv

The `MCPATH` setting in the file `~mcadde/.mcenv` also needs to contain the directory storing the area files. The following is an example.

```
MCPATH=$HOME/mcidas/data
MCPATH=$MCPATH:/home/tip
MCPATH=$MCPATH:~mcadde/mcidas/data

export MCPATH
```

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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](#)
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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**

File names and paths appear in **courier bold**. For example: **/home/mcadde/mcidas/data**

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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.

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Bit Sync Requirements

As shipped, the *PCI Ingestor* card in the SDI is configured to decode NRZ-L coded data from the bit sync. Currently, most if not all bit syncs used with Meteosat produce an NRZ-L formatted clock and data, with the data changing on the rising edge of the clock. However, if your bit sync produces an NRZ-S encoded output, or you replace your bit sync in the future with a model that produces an NRZ-S output, you will need to reconfigure your *PCI Ingestor* card as described in *Chapter 2 - [SDI Installation](#)*.

The SDI is normally configured for TTL-level inputs at 75 ohms, which is compatible with most bit syncs used with Meteosat. However, if necessary, the ingestor card can be reconfigured for balanced inputs. The data bit rate is 166.66 kilobits per second.

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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](#)
 - [Changing the Amount of Retained Data](#)
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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 monitor that is physically connected to your SDI computer or an ssh session into the SDI computer from a remote workstation.

If you prefer to use a 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 an ssh 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&)**

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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.

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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**

Field Key	Definition
a-c	year, julian day and UTC hour, minute and second the image began being received (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:

- 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:

- 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.

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

Type: `init 0`

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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.

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Meteosat File Naming Conventions

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

signal type-satellite number.ccyymm.ddd.hhmm.ssector-product identifier

Refer to d-h in the [table](#) in *Interpreting Console Messages* for field definitions.

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Navigation

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

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ADDE Server Procedures

The procedures discussed in this section are:

- [Accessing the Data via ADDE](#)
 - [Changing Server Dataset Names](#)
 - [Processing ADDE Data Requests](#)
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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:

```

DISIFO 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.

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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 ssh 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.msar`
- 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.msar` to define which image product types are part of each dataset.

The `/data/names.msar` 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.

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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.

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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.

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Chapter 6

MTSAT Ingestor: HiRID Format

This chapter applies to the MTSAT signal in the HiRID format only.

Topics discussed in this chapter are:

- [Overview](#)
 - [Bit Sync Requirements](#)
 - [Ingestor Operating Procedures](#)
 - [Navigation](#)
 - [ADDE Server Considerations](#)
 - [SDI MTSAT Events](#)
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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**

File names and paths appear in **courier bold**. For example: **/home/mcadde/mcidas/data**

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Overview

The data from MTSAT is rebroadcasted in two formats: High Resolution Imager Data (HiRID) and High Rate Information Transmission (HRIT). HRIT is the MTSAT transmission format. Different ingestor software will be required for the HRIT format. This chapter covers only the HiRID format, which is also known as the GMS-5 compatibility mode.

The MTSAT satellite provides one visible image channel and four IR channels. In the HiRID format, the visible channel is at 1.25 km resolution; the IR channels have a resolution of 5 km and provide split window, short wave IR and water vapor images. The SDI ingestor acquires this data and produces two McIDAS areas per ingest, a visible area and a 4-channel IR area. The navigation and calibration for these areas are taken from the signal telemetry in accordance with JMA documentation.

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Bit Sync Requirements

As shipped, the *PCI Ingestor* card in the SDI is configured to decode NRZ-L coded output from the bit sync, which is usually a programmable SDM-300A Satellite Data Receiver Modem from EF Data. For modem programming purposes, the data bit rate is 660 kilobits per second and uses QPSK (Quadrature Phase Shift Keying) with a 7/8 coding rate. The RS-422 output attaches directly to the SDI card via a user-built cable.

To build the cable, you will need a D15 male connector for connecting to the SDI, a D25 female connector for connecting to the SDM-300A and a suitable length of cable containing at least three twisted pairs of conductors. Use the table below for making the connections.

SDI 15-pin Female Pin Number	Conductor Color	EF Data 25-pin Male Pin Number	Signal Name
1	Blue	4	Data+
9	Blue/white	3	Data-
2	Orange	18	Clock+
10	Orange/white	17	Clock-
5	Green	7	Ground

If you use a different bit sync, or replace an SDM-300A in the future with a model that produces an NRZ-S output, you will need to reconfigure your *PCI Ingestor* card as described in *Chapter 2 - [SDI Installation](#)*.

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Ingestor Operating Procedures

MTSAT ingestor operating procedures consist of the following:

- [Using the Ingestor Console](#)
 - [Starting the Ingestor](#)
 - [Interpreting Console Messages](#)
 - [Stopping, Restarting or Shutting Down the Ingestor](#)
 - [Modifying Ingestor Options](#)
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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 monitor that is physically connected to your SDI computer or an ssh session into the SDI computer from a remote workstation.

If you prefer to use a 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 an ssh 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&)**

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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.

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Interpreting Console Messages

All console messages start with a time stamp. This is the date and time of the message. The possible messages are:

- [Image Start](#)
- [Data Loss](#)
- [CRC Error](#)
- [Image Complete](#)
- [Signal Off](#)

Image Start

An image start message looks like this:

```
2005.208.150729:image start 2005.208.150010 Start scan:334
```

The first date and time is the time the ingestor saw the data while the second is the (slightly earlier) time contained in the data stream itself. The start scan indicates the first good scan line.

Data Loss

Data loss means that one or more scans of data have been missed. This can be because of a problem anywhere in the data transmission chain. Not necessarily in equipment under your control.

CRC Error

CRC error messages occur when the signal is getting noisy. The messages begin to happen before there is a noticeable degradation in image quality, but they are a warning that something is not working up to

expectations and should be looked into. If CRC errors become too numerous, ingestion will stop because it is no longer possible to trust the accuracy of the data documentation blocks.

Image Complete

An image complete message looks like this:

```
2005.208.150121:MTSAT 2005.208.143309 scans=284 2481, areas=21 96
```

This means that the image data is finished. However, the image is not visible to McIDAS yet. See the *Signal Off* message description below for more information.

The two numbers that follow *areas=* designate the VIS image AREA number and the IR image AREA number, respectively. In the image complete message above, the VIS image is written to AREA 2 and the IR image is written to AREA 42.

Signal Off

The signal off message comes later than the *Image Complete* message because data is still transmitted after the valid video. The image is not visible to McIDAS until the *Signal Off* message occurs. Therefore, this message means the image is now available for serving.

```
2005.208.151921:signal  
off
```

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Stopping, Restarting or Shutting Down the Ingestor

Stopping the Ingestor

To stop the ingestor, issue a stop command from the console as user **root**.

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

Type: `init 0`

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Modifying Ingestor Options

SSEC sets the amount of retained data, the AREA storage path, and data storage convention option defaults prior to shipment. This section contain procedures for:

- [Changing the Amount of Retained Data](#)
- [Changing the AREA Storage Path](#)
- [Changing the Data Storage Convention](#)

These options are set in the `/etc/rc3.d/S99inge` file, which starts on power-up or reboot, and the `/etc/init.d/ingcnt1` file. These files are normally hard linked together. If they are linked, as is normally the case, and you make changes to `/etc/rc3.d/S99inge`, you will automatically make the same changes to `/etc/init.d/ingcnt1`. If, through editing, etc., the link becomes broken, your changes will only be applied to the file you edited. In this case, you must manually make identical changes to the other file. Failure to do so may cause the ingestor to operate in an unexpected manner.

To change a particular option, you must perform the following in the order shown:

- edit `/etc/rc3.d/S99inge` using a `vi` or other suitable editor
- make changes and save the file
- verify that the same changes were made to `/etc/init.d/ingcnt1` using a `vi` or other suitable editor
- if `/etc/init.d/ingcnt1` is unchanged (broken link), make changes and save the file
- restart the ingestor

Changing the Amount of Retained Data

The ingestor stores data in round-robin AREA buffers, one for visible images and one for IR images. Once the buffer has filled, the ingestor overwrites the oldest image AREA with next image it ingests.

The following line sets the visible and IR buffer size to 28 AREAs each. The 28 visible AREAs will be

numbered from 1 to 28 and then wrap back around to 1; the 28 IR AREAs will be numbered 29 to 56 and then wrap back to 29.

AREAS=28;export AREAS

This is the default buffer size. Changing **28** to some other number will change the size of the AREA buffer loops, and if you make this number too large, you will exhaust the space in the file system.

Changing the AREA Storage Path

The following line sets the path to the AREAs.

```
cd /home/mcadde/mcidas/data
```

This is the default path; it allows the ingestor computer to also function as the ADDE server for the data. As an alternative, some other path can be chosen, allowing the areas to be written via NFS to some other machine. Because the MTSAT data rate is quite modest, NFS is a viable approach if you want the data on a system with more available disk storage than the ingestor system itself.

Changing the Data Storage Convention

A # symbol at the beginning of a line indicates that the line is commented out. The following line controls the little-endian/big-endian convention. As delivered, the line is:

```
#BIG_ENDIAN=yes;export BIG_ENDIAN
```

The # symbol makes this line a comment. It should remain commented out unless the AREAs are being NFS mounted to a machine where they will be served from a big-endian computer. If this is the case, edit the file and remove the # symbol. This causes the ingestor to write the area data in big-endian convention.

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Navigation

The navigation used for the area data is that of the native signal documentation. In McIDAS terminology, it is a GMSX navigation type. The McIDAS navigation block in the area is the same as the navigation sent in the GMS documentation, except unused bytes are removed. For exact location of the words, see the [McIDAS Programmer's Manual](#). Data in floating point representation has not been modified from the form it was transmitted in, and it has not been endian-modified.

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ADDE Server Considerations

Normally, the ingestor is also the ADDE server for the data. As delivered, the group name for the data is MTSAT. The group contains four datasets, VIS, IR, LOG, and MANAM. VIS and IR refer to the imagery; LOG and MANAM are text datasets that can be examined with the McIDAS [READ](#) command. MANAM is a schedule of expected behavior of the satellite for the coming week. LOG is a listing of all of the console messages, [if logging is enabled](#). As delivered, the system does not log console messages.

If the AREAS variable is modified in the ingestor startup procedure, the `/home/mcadde/mcidas/data/RESOLV.SRV` file must be edited to reflect the change. Otherwise, the name spaces will no longer refer to the limits of the ingested area numbers.

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SDI MTSAT Events

As described in the [SDI Installation](#) chapter, the SDI ingestor implements an electronic mail event system. The contents of the mail event for MTSAT is the same as the Image Complete console message. The AREA numbers are part of this message and can be parsed out and used for processing.

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Appendix A

GVAR Signal Characteristics

This appendix consists of these two parts:

- [GVAR System Overview](#)
 - [Scan Format](#)
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GVAR System Overview

GVAR (GOES VARIable) is the data transmission format used with the current generation of GOES meteorological satellites, beginning with GOES-8. Unlike the evolutionary format of the former GOES system (GOES A superseded by GOES AAA), the GVAR format is not compatible with the previous GOES AAA format.

The purpose of this appendix is to provide sufficient information about the GOES satellite capabilities and the GVAR format for you to understand the data ingesting and processing requirements.

The variable scan length is a major difference between GVAR and GOES. Another difference is that GOES operated in either the imager or sounder mode, whereas GVAR can operate in both modes simultaneously. In fact, the GVAR sensor groups can scan unrelated areas of the earth at the same time.

Table A-1. GVAR Format

DOC	IR1	IR2	VIS 1	VIS 2	VIS 3	VIS 4	VIS 5	VIS 6	VIS 7	VIS 8	SAD
0	1	2	3	4	5	6	7	8	9	10	11

Each GVAR block has:

- 10032-bit synchronization code
- 720-bit header
- N-bit information field
- 16-bit CRC

Blocks 0 and 11 have a fixed length information field of 64,320 bits

Blocks 1 through 10 have variable length information fields directly dependent on the scan width, with a minimum information field length of 21440 bits

A single imager scan generates blocks 0-10 in sequence

Blocks 0 through 10 may be followed by any number of block 11s (0-N) depending on what is available. In priority order, the next block(s) transmitted will be:

- 1 Next Imager Scan - blocks 0-10
- 2 Imager Compensation and Servo Errors - 1 block 11
- 3 Sounder Compensation and Servo Errors - 1 block 11
- 4 Imager Telemetry Statistics - 1 block 11
- 5 Imager Spacelook Statistics and Data - 2 block 11s
- 6 Imager Calibration Coefficients and Limits - 1 block 11
- 7 Imager ECAL Statistics and Data - 2 block 11s
- 8 Imager Blackbody Statistics and Data - 1 block 11
- 9 Imager Visible NLUIS - 2 block 11s
- 10 Imager Star Sense Data - 9 block 11s
- 11 Sounder Scan Data - 2 to 400 block 11s
- 12 Sounder Telemetry Statistics - 1 block 11
- 13 Sounder Spacelook Statistics and Data - 5 block 11s
- 14 Sounder Calibration Coefficients and Limits - 2 block 11s
- 15 Sounder ECAL Statistics and Data - 3 block 11s
- 16 Sounder Blackbody Statistics and Data - 5 block 11s
- 17 Sounder Visible NLUTS - 9 block 11s
- 18 Sounder Star Sense Data - 3 block 11s
- 19 GIMTACS Text Messages - 1 to 2 block 11s
- 20 SPS Text Messages - 1 block 11
- 21 Auxiliary Data - 1 to N block 11s
- 22 Fill Data - 1 block 11

The GVAR format has its origin in the Operational VAS Mode AAA (Triple A) format. The AAA format consists of a repeating sequence of twelve fixed-length, equal size blocks.

The range and flexibility of satellite operations has increased with the advent of the three-axis stabilized GOES craft employing two independent instruments, each having two-degree of freedom scanning mirrors. Using a fixed length transmission format would have placed operational limitations on the satellite's capabilities. The GVAR format was developed to permit full use of the new capabilities while maintaining as much commonality with AAA reception equipment as possible.

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Scan Format

The GVAR transmission sequence is depicted in [Table A-1](#). It consists of twelve blocks numbered 0 through 11. Blocks 0 through 10 are transmitted when an Imager scan line is completed. Block 10 is followed by a variable number of block 11s (0-N) according to the data available for transmission. Block 11 (Sounder/Auxiliary Data-SAD) transmits sounder data and all non-imager data. Blocks 1 through 10 vary in length directly in accordance with the length of the imaging instrument scan line. Table A-2 provides further details about the structure of the GVAR format. In turn, Tables A-3 through A-7 further explain the GVAR block formats.

Table A-2. GVAR Scan Characteristics

Scan Characteristics	
Period	Variable
Blocks/Imager Scan	11
Bit Rate	2,111,360 bits/second
Block Characteristics	
Period	15.25 to 104.6 msec
Sync Length	10032 bits
Header Word Length	8 bits/word
Header Length (triple redundant)	90 words (720 bits)
Information Field:	
Block 0 - Documentation Block (Table A-3)	
Word Size	8 bits
Field Length	8040 words (64,320 bits)

Block 1 - Infrared Block 1 ([Table A-4](#))

Word Size	10 bits
Field Length	68 to 21008 words*
Number of Records	4 per block
Line Documentation	16 words
IR Detector Data	1 to 5236 words

Block 2 - Infrared Block 2 ([Table A-5](#))

Word Size	10 bits
Field Length	51 to 15756 words*
Number of Records	3 per block
Line Documentation	16 words
IR Detector Data	1 to 5236 words

Blocks 3 to 10 - Visible Blocks ([Table A-6](#))

Word Size	10 bits
Field Length	20 to 20960 words*
Number of Records	1 per block
Line Documentation	16 words
Visible Detector Data	4 to 20944 words

Block 11 - Sounder Auxiliary Data ([Table A-7](#))

Word Size	6, 8 or 10 bits
Field Length	10720, 8040 or 6432 words
Record Types	1 to 8
Cyclic Redundancy Check (CRC)	16 bits

* Variable length information fields are subjected to zero packing to meet the minimum block length of 32208 bits. The maximum values above assume a 19.2 degree scan width.

Table A-3. GVAR Block 0 (Documentation Block) Format

Sync Code 1254 Bytes	Header 90 Bytes Triple Redundant	Information Field - 8,040 Bytes						CRCC 2 Bytes
		Instrument and Scan Status	Orbit and Attitude Parameters 1412 Bytes	Scan Reference Data 616 Bytes	Grid Data 3080 Bytes	Spares 918 Bytes	Factory Parameters 1736 Bytes	
10,032 Bits	720 Bits	2,224 Bits	11,296 Bits	4,928 Bits	24,640 Bits	7,344 Bits	13,888 Bits	16 Bits

Note: Block 0 provides documentation for blocks 1-10 (imager data blocks) only. It does not apply to Block 11.

Table A-4. GVAR Block 1 (IR1 Block) Format

Sync Code 1254 Bytes	Header 90 Bytes Triple Redundant	Data Field - Maximum 15,756 Words (10-bit)						CRCC 2 Bytes
		Channel 4, Detector 1		Channel 4, Detector 2		Channel 5, Detector 2		
		Line Doc. 16 Words	Data * 1-5,236 Words	Line Doc. 16 Words	Data * 1-5,236 Words	Line Doc. 16 Words	Data * 1-5,236 Words	
10032 Bits	720 Bits	160 Bits	10-52,360 Bits	160 Bits	10-52,360 Bits	160 Bits	10-52,360 Bits	16 Bits

* The minimum Data Field is specified at 21,440 bits (2,1440 words). Therefore, the minimum detector field length, including the 160-bit Line Doc, is 715 words. Detector data fields less than 715 words are padded out to 715 words with zeros.

Table A-5. GVAR Block 2 (IR2 Block) Format

Sync Code 1254 Bytes	Header 90 Bytes Triple Redundant	Data Field - Maximum 15,756 Words (10-bit)			CRCC 2 Bytes
		Channel 2, Detector 1	Channel 2, Detector 2	Channel 3	

		Line Doc. 16 Words	Data * 1-5,236 Words	Line Doc. 16 Words	Data * 1-5,236 Words	Line Doc. 16 Words	Data * 1-5,236 Words	
10032 Bits	720 Bits	160 Bits	10-52,360 Bits	160 Bits	10-52,360 Bits	160 Bits	10-52,360 Bits	16 Bits

* The minimum Data Field is specified at 21,440 bits (2,1440 words). Therefore, the minimum detector field length, including the 160-bit Line Doc, is 715 words. Detector data fields less than 715 words are padded out to 715 words with zeros.

Table A-6. GVAR Blocks 3-10 (Visible Image Data) Format

Sync Code 1254 Bytes	Header 90 Bytes Triple Redundant	Data Field - Variable Length - 2,144-20,960 Words (10-bit)			CRCC 2 Bytes
		Line Doc. 16 Words	Data 4-20,944 Words	Zeros * 0-2,124 Words	
10032 Bits	720 Bits	160 Bits	40-209,440 Bits	0-21,240 Zero Bits	16 Bits

* The minimum Data Field is specified at 21,440 bits (2,1440 words). Therefore, blocks having less than 2,128 data words (21,280 bits) are padded with zeros to achieve the minimum Data Field length.

Table A-7. GVAR Block 11 Format for Sounder Scan Data

Sync Code 1254 Bytes	Header 90 Bytes Triple Redundant	Data Field - Variable Length - 64,320 Bits (6-, 8- or 10-bit Words)			CRCC 2 Bytes
		SAD Block ID 40 6-bit Words	Data - 64,080 Bits		
			Twelve blocks of raw data samples consisting of one sample from each of 76 sensors.	Line and pixel locators	Seventy-six (76) calibrated channels of 12 pixels each
10032 Bits	720 Bits	240 Bits	4,096 Bits/Block 49,152 Bits Total	336 Bits	16 Bits/Pixel 14,592 Bits Total

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SDI Operator's Manual

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Appendix B

Frequently Asked Questions

This appendix is a list of questions that the SSEC Data Center commonly receives from SDI users.

- [Q. How do I remove a "bad" image \(e.g., an image with a future date and time that was generated due to a problem at the ground station\) from my GVAR SDI or POES SDI?](#)
- [Q. What is a FIFO?](#)
- [Q. I have just edited the /etc/init.d/ingcntl file, but when my SDI rebooted, the changes did not take affect. Why?](#)
- [Q. What is the difference between files /etc/init.d/ingcntl and /etc/rc3.d/S99inge?](#)
- [Q. Why does the message unable to write to utmpx appear when I stop my SDI ingestor?](#)
- [Q. Can the GVAR SDI be configured to hold, for example, more CONUS images than SH images?](#)
- [Q. We just installed our SDI, but upon startup, we get the message Open error on /dev/jmb no such device or address, and no data is ingested. Why?](#)
- [Q. What time zone should my SDI ingestor be set to?](#)
- [Q. How do I increase the number of GINI files being saved?](#)

Q. How do I remove a "bad" image (e.g., an image with a future date and time that was generated due to a problem at the ground station) from my GVAR SDI or POES SDI?

A. First, remove the index files for the bad data from the data directory (usually **/data**). See [GVAR Image Index Files](#) in Chapter 3, or [POES Index Files](#) in Chapter 4 for more information about index files.

Then remove all references to the bad image in the descriptor files. Be careful not to edit the descriptor files while image starts are writing to the files. Edit the files between images, or stop the ingestor, edit the files, then restart the ingestor. See [GVAR Descriptor Files](#) in Chapter 3, or [POES Descriptor Files](#) in Chapter 4 for more information about descriptor files.

Q. What is a FIFO?

A. FIFO stands for First In First Out. It is a pipe that looks like a file.

Q. I have just edited the `/etc/init.d/ingcntl` file, but when my SDI rebooted, the changes did not take affect. Why?

A. The ingestors use `/etc/rc3.d/s99inge` when they boot to start the ingestor. This file should be hard linked to `/etc/init.d/ingcntl`, so that any changes made in one will also be in the other.

Q. What is the difference between files `/etc/init.d/ingcntl` and `/etc/rc3.d/s99inge`?

A. `s99inge` is a script in the system run-level directory `/etc/rc3.d`. The file `/etc/init.d/ingcntl` is the ingestor startup script, used mainly for manually stopping and restarting the ingestor.

In order for the ingestor to restart automatically upon system booting, an ingestor auto-startup script must be included in the system run-level directory `/etc/rc3.d`, where run-level 3 is the normal multi-user level. When SDIs are shipped, `/etc/rc3.d` and `/etc/init.d/ingcntl` are hard linked (so all changes made in one are also made in the other) so the ingestor will be brought up when the system reboots.

Q. Why does the message **unable to write to utmpx** appear when I stop my SDI ingestor?

A. Nothing is wrong. This message is normal when the ingestor shuts down.

Q. Can the GVAR SDI be configured to hold, for example, more CONUS images than SH images?

A. No. It can't because the GVAR SDI retains data in the order it is received. We suggest writing images you want to keep to another local machine.

Q. We just installed our SDI, but upon startup, we get the message **Open error on /dev/jmb no such device or address**, and no data is ingested. Why?

A. This message indicates that the SDI board was not found by the ingestor. Reseat the board.

Q. What time zone should my SDI ingestor be set to?

A. The time zone setting does not matter to the SDI.

Q. How do I increase the number of GINI files being saved?

A. To lengthen the loop of GINI files being saved, add the file type and number of files to save to the file `/opt/nport/retain.nport`.

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