

# SDI-104 Operator's Manual

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## Chapter 1

# SDI Overview

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The SSEC Data Ingestor (a.k.a. SDI-104 or SDI) is based on a PC/104-Plus SSEC Ingestor Board on a PC running DSL (an embedded Linux distribution). It takes a simple approach to satellite data ingesting by receiving the clock and data from a bit sync and writing the raw bits to disk with minimal processing. There is no scheduling required as all data are saved.

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.

The advantages to these approaches are:

- For the high data rate approach, SDF files usually use less disk space than McIDAS Area files; therefore, more data can be stored on-line.
- The SDI runs without operator intervention. After attaching the clock and data cables and powering up the box, data ingestion begins.
- The same hardware works for multiple satellite families; i.e., the same hardware that handles GVAR also handles POES, Meteosat, etc. Only the software varies.

This chapter is divided into the following sections:

- [SDI Data Processing Overview](#)
- [SDI File Descriptions](#)
- [SDI Software Structure](#)
- [Accessing the SDI](#)

- [Viewing the SDI Console Messages](#)
- [SDI Event Notification System](#)
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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 256K by 32-bit FIFO. When 128K words have been collected, the ingestor software transfers 128K words to an SDF file in the ingestor's hard drive. Eight transfers are required to build a 1,048,576 byte (1 MB) 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 and configuration files, as described below.

### 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/bin`.

### Configuration Files

All configuration files (e.g., `notify.list`, `rc.GVAR`, `rc.local`, `RESOLV.SRV`) exist in the `/data/opt/etc` directory.

Here is some additional information about the files in the `/data/opt/etc` directory:

- the startup scripts re-create these files to a default state if they are not found in `/data/opt/etc`
- system configuration overrides can be enabled by editing the `rc.local` file
- if the `SOUNDER` variable is set in `rc.GVAR`, the sounder decoder will be started by the ingestor start script

### Information Files

The `/opt/doc` directory contains readme and changes files for each ingestor package. For example,

files for the MTSAT HRIT ingestor might include `adde-mtsathrit-readme.txt`, `adde-mtsathrit-changes.txt`, `inge-mtsathrit-readme.txt` and `inge-mtsathrit-changes.txt`.

The readme files contain information about the function of the package, as well as current errata and extended information such as debugging or testing techniques. The changes files includes a history of what was added during the revisions to the package.

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## Accessing the SDI

You can access the SDI (to run commands, check status, etc.) locally or remotely, as described below.

### Local Access

You can access the SDI locally by connecting a monitor and keyboard, as shown in the **Component Interconnections** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#).

### Remote Access

You can also access the SDI remotely (from other workstations) by using *ssh*. To do so, you must copy the SSH key file **id\_dsa** from the **/home/.ssh** directory on the supplied USB memory stick (which contains a duplicate copy of the contents of the SDI's hard disk and CompactFlash boot disks) to the workstation that you'll be using to access the SDI. If desired, you can use *ssh-keygen* to create a derived equivalent passworded private key-file (as shipped, the keys are not password-protected).

Once the SSH key file is in place, you can access the SDI remotely with a command similar to that below.

```
Type: ssh -i /path-to-keyfile/id_dsa root@sdi-address
```

where **path-to-keyfile** is the path to the directory containing the **id\_dsa** file on the local workstation (that you're using to access the SDI) and **sdi-address** is the IP address of the SDI machine

If you want to create a **root** password that will remain in place after a reboot of the system, complete the instructions below. Note: SSEC strongly recommends that you use the SSH key when remotely connecting to the SDI.

1. At the console, create a **root** password with the **passwd** command.

```
Type: passwd
```

2. Copy the **passwd** and **shadow** files from RAM to the hard disk.

```
Type: cp /etc/passwd /mnt/HDD/data/opt/etc/.
```

```
Type: cp /etc/shadow /mnt/HDD/data/opt/etc/.
```

3. Edit the `/data/opt/etc/rc.local` file and add the bold lines listed below to the file after the *rebuild resolv.conf* section's “EOF” line. The section in italics is already in the `rc.local` file.

```
#####  
# rebuild resolv.conf for this site  
# cat >/etc/resolv.conf <<EOF  
# domain ssec.wisc.edu  
#earch ssec.wisc.edu  
# nameserver 128.104.108.26  
#EOF  
#####  
## Set up for root password  
# Remove the files in RAM  
rm /etc/passwd  
rm /etc/shadow  
#  
# Copy the files from the HD to RAM  
#  
cp /mnt/HDD/data/opt/etc/passwd /etc/passwd  
cp /mnt/HDD/data/opt/etc/shadow /etc/shadow  
#####
```

4. Reboot the SDI.

Type: **reboot**

5. Verify that the password works by remotely connecting to the SDI using **ssh**.

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## Viewing the SDI Console Messages

The Ingestor Console, referred to hereafter as console, displays the ingestor's status. See the ingestor chapters' **Interpreting the Console Messages** sections (e.g., [GVAR section](#)) for the console messages you may see with each ingestor.

The console messages can be routed to one (and only one) of these three destinations:

- local monitor
- remote monitor
- file

### Local Monitor

The SDI is not shipped with a monitor, but if you have one you can connect it using the instructions in the **Component Interconnections** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#). The console messages are routed to this local monitor unless you choose one of the other options below (remote monitor or file).

### Remote Monitor

Log into the SDI using the procedure described in the **Remote Access** section of [Accessing the SDI](#). Then complete the following procedure to send console output to your remote monitor.

1. Export the display to your workstation.

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

where: *workstation* is the name of your workstation

2. Type: **xterm -C &**

### File

Log into the SDI using the procedure described in the **Remote Access** section of [Accessing the SDI](#). Then complete the following procedure to send console output to a file.

1. Edit the file `/data/opt/etc/rc.GVAR` (or `rc.POES` for POES ingestor, `rc.MTSAT-HRIT` for MTSAT HRIT ingestor, etc.)
2. Change the setting of `INGE_OUTPUT=` to the location and file name to which you want to route the console messages. For example, if you want to send the console messages to file `/data/console.log`, change the line to: `INGE_OUTPUT=/data/console.log`

**CAUTION!**

***If console output is sent to a file, the file will continue to grow indefinitely. Therefore, you should monitor the file, and perhaps truncate or rotate it periodically to prevent it from growing too large.***

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# SDI Event Notification System

This section has an overview of the Event Notification System, then a description of the Event Notifier List File and its options.

## Overview

The SDI ingestor includes an event notification system that allows three types of notifications:

- email
- write to a file
- run a program or script

When the ingestor detects an event (e.g., a start of a new image), it performs the notifications specified in the `/data/opt/etc/notify.list` file. This file is also known as the event notifier list file; see its [section below](#) and edit the file to customize notifications for your site. Note that if you specify email notifications, the SDI requires information on the SMTP server and mailing addresses in order to be able to deliver these notifications. These settings can be customized, if necessary, by editing the `/data/opt/etc/rc.local` file.

If email or write to a file notifications are specified, the content of the email message or file describes the event. The content differs, depending on the source and type of event. The following is an example of email or file content generated by a GVAR ingestor event:

```
gvar.2006.202.205303.INDX 16537 21512 2973 5368
```

Refer to the satellite specific chapter (e.g., [GVAR](#)) for a complete description of your satellite's event types and the email or file content the events generate.

## Event Notifier List File

As stated in the section above, the event notifier list file, `notify.list`, is in the `/data/opt/etc` directory. The file specifies which, if any, notifications are performed whenever an ingestor event occurs.

The list of ingestor events, types of notifications, and examples showing how to implement the notifications are included in the comments at the top of the supplied `notify.list` file. Because the types of events depends on which ingestor the SDI is running, the `notify.list` file is different for each ingestor type.

For example, the box below contains an excerpt from the **notify.list** file supplied on GVAR ingestors.

```
# Line format
# -----
# event:action:target
#
# event (GVAR events)
#   imagestart          * default for email
#   sounderstart
#   sounderend
#
# action                target
#   mailto
#   file
#   exec
#
# Examples
# -----
# imagestart:mailto:notify@domain.com
# sounderstart:file:/data/sndr.log
# sounderend:file:/data/sndr.log
# imagestart:exec:/data/opt/bin/image_notify.sh
#
```

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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. However, in order to maintain the correct time on the SDI, SSEC includes **ntpd** in the system software.

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# Shutting Down the SDI

The SDI uses a journaling filesystem to store satellite data its hard drive. The operating system files are loaded from the CompactFlash and run from a ramdisk.

If you need to shut down the SDI you can simply remove power (unplug it). To do a formal shut down sequence (the recommended method), perform the following steps.

1. Log into the SDI using the procedure described in [Accessing the SDI](#).
2. Shut down the workstation.

Type: **shutdown -h now**

This will stop the operating system and all processes, but the hardware will remain on. It is now safe to remove the power cable.

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## Chapter 2

# SDI Installation

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

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

The photos below show the front and rear panels, respectively. Refer to the photos as needed throughout these instructions.

**Front Panel** (click to enlarge in separate window):



**Rear Panel** (click to enlarge in separate window):



The SDI is based on an embedded PC and is packaged in a 2U (3.5 in) high rack mount enclosure. The SDI has all the necessary software installed on the delivered system. The SDI system has been thoroughly tested prior to shipment.

Perform the seven procedures below to checkout, setup and power up your new SDI system.

## 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.

## Location

**2. Place the SDI rack mount unit in a suitable location and store the USB memory stick in a safe, accessible location for future use.**

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

## Power Requirements

**3. Connect the power cord to the rear panel using the rear panel photo above as guidance. Do not power up (connect the male end of the power cord to the outlet) the unit yet; powering up is done in step 7 below.**

The SDI runs on AC power. The input voltage must be in the range of 100-240 VAC at 50-60Hz. The input power connector is a standard NEMA 5-15P. The internal power supply auto senses the input voltage and frequency. The SDI consumes less than 60 watts of power.

## Component Interconnections

**4. (Optional) Connect a monitor and keyboard using the rear panel photo above as guidance.**

The SDI does not include or require a monitor or keyboard. However, you may want to use a monitor to initially verify normal operation. Also, if a monitor is not connected to the SDI at power up or reboot, the internal CPU board disables the video port (so if you add a monitor later, you must reboot to enable the video port).

If you decide to connect a monitor, you can use any standard CRT monitor or a flat panel monitor capable of running in an analog mode by connecting its cable connector to the 15-pin HD-connector located on the back panel at the bottom-right corner of the SDI, as shown in the rear panel photo above. The keyboard connector is located just above the monitor connector.

The SDI is normally operated from a remote location using *ssh*. Therefore, once normal operation is confirmed, there is no need for a monitor. A private SSH key file (**id\_dsa**) that is required for remote access is provided on the supplied USB memory stick. For more information

and instructions for configuring remote access, see Chapter 1 - [Accessing the SDI](#).

## Bit Sync Requirements

### 5. If necessary, reset the bit sync's output format on the SSEC Ingestor Board.

Bit syncs can provide clock and data outputs in NRZ-L, NRZ-S or NRZ-M format. The SSEC Ingestor Board (SIB) in the SDI can decode these formats via selection jumpers on the SSEC Ingestor Board. During initial installation and/or after changing the bit sync, verify that the format selected on the SSEC Ingestor Board matches the bit sync's output format. Refer to the photos below for the location of the jumper.

The jumper configurations are defined as:

Jumper Installed	Data Type
None	NRZ-L
DS0	NRZ-S
DS1	NRZ-M

**Jumpered for NRZ-S data** (click to enlarge in separate window):



**Jumpered for NRZ-M data** (click to enlarge in separate window):



## Connecting External Inputs and Outputs

## **6. Connect the clock and data inputs and the Ethernet cable using the rear panel photo above as guidance.**

The SDI expects clock and data. The system will accept single ended TTL level signals on either 75 or 50 ohm coax cable or differential RS422 signals on a D15P connector. The SDI is configured for just one of these signal types.

The SDI is compatible with 10/100/1000 Mbps Ethernet.

## **Initial Power Up**

### **7. Power up the SDI by plugging the power cord into an AC outlet. (Note: The SDI unit does not have an On/Off switch.)**

Once power is applied, the front panel's red *Power* LED should come on. If it does not illuminate, please [contact SSEC](#).

When the SDI has finished booting, the front panel's green *Status* LED will start flashing. If it does not start flashing, either the internal CPU board or the ingest software (which is started automatically) did not recognize the SSEC Ingestor Board (SIB) and you should [contact SSEC](#). If the LED started flashing and then stopped after 16 seconds, check the clock and data source to make sure there is a valid clock signal. The absence of the clock signal will cause the LED to stop flashing.

If the front panel's green *Status* LED continues to flash after 16 seconds the SDI is receiving a clock signal and the ingest software is reading the SIB.

**Note:** As noted in step 4 above, if a monitor is not connected to the SDI at power up or reboot, the internal CPU board disables the video port (so if you add a monitor later, you must reboot to enable the video port).

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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 updates are available on the McIDAS Website at <http://www.ssec.wisc.edu/mcidas/software/sdi/> (which is reached through the **Download Software > SSEC Data Ingestor (SDI)** menu). As noted there, the ingestor+server updates are specific to each ingestor type (GVAR, MTSAT, etc). If system updates (to the operating system, etc.) are required, they are available as a separate package valid on SDIs of any ingestor type.

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## Chapter 3

# FY-2 Ingestor

---

This chapter applies to the FY-2 signal only.

Many of the pages in this chapter instruct you to view or edit files on the SDI. To do so, you need to log into the SDI using the procedure described in the Chapter 1 (SDI Overview) section titled [Accessing the SDI](#). If you need to do a shut down, use the procedure described in the Chapter 1 section titled [Shutting Down the SDI](#).

Topics discussed in this chapter are:

- [Overview](#)
  - [Bit Sync Requirements](#)
  - [Ingestor Operating Procedures](#)
  - [Navigation](#)
  - [ADDE Server Procedures](#)
  - [SDI FY-2 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/data**

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## Overview

The FY-2C and later satellites provide one visible image channel and four IR channels. 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 China Meteorological Administration (CMA) documentation.

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## Bit Sync Requirements

As shipped, the SSEC Ingestor Board (SIB) in the SDI is configured to decode the requested data type from your bit sync. The SIB can decode NRZ-L, NRZ-S and NRZ-M encoded bit sync signal types. The SIB requires the data to change on the rising edge of the clock as the data is sampled on the falling edge of the clock. If you need to change the bit sync data type, refer to the instructions in Chapter 2's [Initial Checkout, Setup and Power Up](#) to make the jumper change on the SIB.

The SDI also comes configured to the requested clock and data signal interface type. The SDI accepts single ended TTL on either 75 or 50 ohm coax cable or RS422 level signals on a D15P connector. If you need to change the clock and data signal interface type, please [contact SSEC](#).

The FY-2 bit rate is 660 kilobits per second.

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# Ingestor Operating Procedures

Some common FY-2 ingestor operating procedures are listed below.

- [Starting the SDI](#)
  - [Interpreting Console Messages](#)
  - [Stopping and Starting the Ingest Software](#)
  - [Changing the Amount of Retained Data](#)
  - [Changing the Data Storage Convention](#)
- 

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## Starting the SDI

To start the SDI, complete the **Initial Power Up** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#).

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## Interpreting Console Messages

As described in the Chapter 1 section titled [Viewing the SDI Console Messages](#), the console messages can be routed to a local monitor, a remote monitor, or a file.

All FY-2 console messages start with a time stamp to indicate the date and time of the message. The possible messages are:

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

### Image Start

An image start message looks like this:

```
2008.188.150729:image start 2008.188.150010  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 End

An image end message looks like this:

```
2008.188.150121:FY2 2008.188.143309 scans=284 2481, areas=2 506
```

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 end message above, the VIS image is written to AREA 2 and the IR image is written to AREA 506.

## 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.

```
2008.188.151921:signal off
```

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# Stopping and Starting the Ingest Software

The **ingcntl** script is used to control the ingest software.

To stop the ingest software, run the following command.

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

To start the ingest software, either reboot (see Chapter 1 - [Shutting Down the SDI](#)) or run the following command.

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

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# 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.

SSEC sets a default buffer size of 504 (about seven days of data) for the amount of FY-2 visible and IR data to retain. This means that the 504 visible AREAs will be numbered from 1 to 504 then wrap back around to 1; the 504 IR AREAs will be numbered 505 to 1008 and then wrap back to 505.

Perform the following procedure if you want to change the amount of data retained in your ingestor.

1. Edit the file `/data/opt/etc/rc.FY2`
2. Change the value of the variable named `AREAS=` from its default setting of 504 to the number of AREAs you want to retain of each type (visible and IR).
3. [Stop and restart the ingestor process.](#)

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## Changing the Data Storage Convention

The file `/data/opt/etc/rc.FY2` has a setting that controls the little-endian/big-endian convention for files. SSEC sets the default to little-endian convention, but includes a pair of lines in `rc.FY2` that can be edited to change the setting to big-endian convention.

The lines should remain as is (both commented out because they begin with a `#` symbol) 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, perform the following procedure to change the setting so the ingestor writes the AREA files in big-endian convention.

1. Edit the file `/data/opt/etc/rc.FY2`
2. Uncomment the two lines below by removing the `#` symbol at the beginning of each of the lines. This will cause the ingestor to write the AREA files in big-endian convention.

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

3. [Stop and restart the ingestor process.](#)

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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 FY-2 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 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

Normally, the ingestor is also the ADDE server for the data. As delivered, the group name for the data is FY2. The group contains four datasets, ALL, VIS, IR, and MANAM. VIS and IR refer to the imagery; MANAM is a text dataset that can be examined with the McIDAS [READ](#) command. MANAM is a schedule of expected behavior of the satellite for the coming week.

If the AREAS variable is modified in the ingestor startup procedure, the `/data/opt/etc/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.

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 FY2.

Perform these steps to access the SDI's data.

1. From a McIDAS workstation:

Type: **DATALOC ADD FY2 *SDI\_IP\_address***

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

Type: **DATALOC ADD FY2 144.92.108.32**

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

Type: **DSINFO I FY2**

The output should look something like:

```
Dataset Names of Type: IMAGE in Group: FY2

Name          NumPos      Content
-----
All           1008        All FY2 images
IR            1008        FY2 realtime IR
VIS           504         FY2 realtime visible
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. To change ADDE names associated with particular datasets, edit the `/data/opt/etc/RESOLV.SRV` file. The following is a sample of this file. Notice that all fields are comma delimited.

```
N1=FY2,N2=ALL,TYPE=IMAGE,K=AREA,R1=1,R2=1008,C=All FY2 images,  
N1=FY2,N2=VIS,TYPE=IMAGE,K=AREA,R1=1,R2=504,C=FY2 realtime visible,  
N1=FY2,N2=IR,TYPE=IMAGE,K=AREA,R1=505,R2=1008,C=FY2 realtime IR,  
N1=FY2,N2=MANAM,TYPE=TEXT,K=TEXT,Q=MANAM,
```

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
- Q** is the directory that the descriptor file is in
- C** is the comment field displayed with the DSINFO command

2. 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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## SDI FY-2 Events

As described in the [SDI Event Notification System](#) section of Chapter 1, the SDI ingestor allows automated event notifications via email, writing to a file, or running a program or script.

The FY-2 ingestor generates two types of events: *Image Start* and *Image End*. When an event occurs and notifications are requested, the event's [console message](#) is used for the content of the email or text written to the file. The console message, including the AREA numbers in the *Image End* message, can also be parsed and fed into the script or program that is run when the event occurs.

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## Chapter 4

# GVAR Ingestor

---

This chapter applies to the GVAR signal only.

Many of the pages in this chapter instruct you to view or edit files on the SDI. To do so, you need to log into the SDI using the procedure described in the Chapter 1 (SDI Overview) section titled [Accessing the SDI](#). If you need to do a shut down, use the procedure described in the Chapter 1 section titled [Shutting Down the SDI](#).

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/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 the GVAR Transmission Format section of the [GOES Operations Ground Equipment \(OGE\) Interface Specification](#) (pdf) document.

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 SSEC Ingestor Board (SIB) in the SDI is configured to decode the requested data type from your bit sync. The SIB can decode NRZ-L, NRZ-S and NRZ-M encoded bit sync signal types. The SIB requires the data to change on the rising edge of the clock as the data is sampled on the falling edge of the clock. If you need to change the bit sync data type, refer to the instructions in Chapter 2's [Initial Checkout, Setup and Power Up](#) to make the jumper change on the SIB.

The SDI also comes configured to the requested clock and data signal interface type. The SDI accepts single ended TTL on either 75 or 50 ohm coax cable or RS422 level signals on a D15P connector. If you need to change the clock and data signal interface type, please [contact SSEC](#).

The GVAR bit rate is 2.111360 megabits per second.

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# Ingestor and Sounder Decoder Operating Procedures

Some common GVAR ingestor and Sounder Decoder operating procedures are listed below.

- [Starting the SDI](#)
  - [Interpreting Console Messages](#)
  - [Stopping and Starting the Ingest Software and GVAR Sounder Decoder](#)
  - [Changing the Amount of Retained Data](#)
  - [Changing the Amount of Decoded Sounder Data](#)
  - [Editing the names.gvar File](#)
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## Starting the SDI

To start the SDI, complete the **Initial Power Up** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#).

The GVAR Sounder Decoder is also started automatically when the computer is powered up if the **SOUNDER** variable is set in the `/data/opt/etc/rc.GVAR` file.

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## Interpreting Console Messages

As described in the Chapter 1 section titled [Viewing the SDI Console Messages](#), the console messages can be routed to a local monitor, a remote monitor, or a file.

The GVAR console messages you may see are:

- [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.2006.113.205414.INDX Names:ALL CONUS
```

The **gvar.2006.113.205414.INDX** portion of this message is an index file name. Refer to the [GVAR Index File Naming Convention](#) for the complete description. Thus, **gvar.2006.113.205414** is interpreted as follows:

#### *Field Definition*

**gvar** is the satellite signal type (GVAR)

**2006** 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 . 2006 . 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 amplitude of the signal; SDIs have a terminator built-in; if you Y off an additional set of clock and data signals from the bit sync's output, you'll get a lower signal amplitude and possibly create what may appear to be a very noisy signal
- the data signal is NRZ-L format versus the ingestor card being jumpered for NRZ-S data; this would prevent the SDI from recognizing the sync pattern; the jumper on the ingestor card must be set for the appropriate data type
- 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 Starting the Ingest Software and GVAR Sounder Decoder

The **ingcnt1** script is used to control the ingest software. The script also controls the GVAR Sounder Decoder if the **SOUNDER** variable is set in the `/data/opt/etc/rc.GVAR` file.

To stop the ingest software and GVAR Sounder Decoder (if its variable is set), run the following command.

Type: `/etc/init.d/ingcnt1 stop`

To start the ingest software and GVAR Sounder Decoder (if its variable is set), either reboot (see Chapter 1 - [Shutting Down the SDI](#)) or run the following command.

Type: `/etc/init.d/ingcnt1 start`

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# Changing the Amount of Retained Data

SSEC sets a default of 64,800 SDF files (three full days, or about 65 GB) for the amount of GVAR data to be retained. Perform the following procedure if you want to change the amount of data retained in your ingestor.

1. Edit the file `/data/opt/etc/rc.GVAR`
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 `/data/opt/etc/rc.GVAR`. Below is a sample of the lines in the file that set the range numbers.

```
# Start and end AREA files for sounder decoder
AREA1=1001
AREA2=1048
export AREA1 AREA2
```

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 values of the *AREA1* and *AREA2* variables in the `/data/opt/etc/rc.GVAR` file. The value of *AREA2* must always be greater than or equal to that of *AREA1*.
2. Update the values of the R1 and R2 fields of the appropriate sounder datasets in the ADDE dataset resolution table. See [Changing GVAR Sounder 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. 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**.

2. 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 2006 GVAR image, whose nominal image date and time are 113 and 12:20:00, respectively, has the name **gvar.2006.113.122000.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

### *Field Name*    *Description*

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 GVAR Transmission Format section of the <a href="#">GOES Operations Ground Equipment (OGE) Interface Specification</a> (pdf) document)
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 (Full Disk)
- 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 image is listed in the FD, NH, SH, CONUS 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/CONUS` contains a list of all the GVAR index files on the SDI computer containing, at a minimum, an image of the continental US.

## 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
-------------	-------------------------

*eele* ending element number  
*pos* 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 NH 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, the NH 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.2006.063.160143.INDX 2973 9249 6512 17752 2
gvar.2006.063.160923.INDX 10037 9049 12496 22900 3
gvar.2006.063.161514.INDX 2805 9049 10120 22900 4
gvar.2006.063.163143.INDX 2973 9249 6512 17752 5
gvar.2006.063.163923.INDX 10037 9049 12496 22900 6
gvar.2006.063.164514.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

The navigation system overview and file naming conventions are described below.

### Overview

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 either 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

### 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 GVAR Imager Dataset Names](#)
  - [Changing GVAR Sounder 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           2500       GOES all images
CONUS         2500       GOES continental U.S.
FD            2500       GOES full disk
NH            2500       GOES northern hemisphere
OTHER         2500       GOES unknown
SH            2500       GOES southern hemisphere
SNDR          48         GOES sounder AREAs
DSINFO -- done
```

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

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# Changing GVAR Imager Dataset Names

Perform steps 1-2 below to change GVAR imager dataset names. See the [next page](#) to change GVAR sounder dataset names.

1. To change ADDE names associated with particular datasets, edit the `/data/opt/etc/RESOLV.SRV` file. The following is a sample of this file. Notice that all fields are comma delimited.

```
N1=GVAR,N2=ALL,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES all images,
N1=GVAR,N2=CONUS,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES continental U.S.,
N1=GVAR,N2=FD,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES full disk,
N1=GVAR,N2=NH,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES northern hemisphere,
N1=GVAR,N2=SH,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES southern hemisphere,
N1=GVAR,N2=OTHER,TYPE=IMAGE,RT=N,K=GVAR,R1=1,R2=2500,Q=/data,C=GOES unknown,
```

Where:

- N1** is the ADDE group name
- N2** is the ADDE descriptor name
- TYPE** is the data type
- RT** not used for GVAR datasets
- 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
- Q** is the directory that the descriptor file is in
- C** is the comment field displayed with the DSINFO command

2. 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 GVAR Sounder Dataset Names

Perform steps 1-2 below to change GVAR sounder dataset names. See the [previous page](#) to change GVAR imager dataset names.

1. To change ADDE names associated with particular datasets, edit the `/data/opt/etc/RESOLV.SRV` file. The following is an example of a sounder dataset defined in this file. Notice that all fields are comma delimited.

```
N1=GVAR , N2=SNDR , TYPE=IMAGE , RT=N , K=AREA , R1=1001 , R2=1048 , C=GOES sounder AREAs ,
```

Where:

**N1** is the ADDE group name

**N2** is the ADDE descriptor name

**TYPE** is the data type

**RT** is the real-time data flag (used mostly with grid and point datasets)

**K** is the data format or kind

**R1** is the beginning AREA number in the range

**R2** is the ending AREA number in the range; this number should always be greater than or equal to R1

**C** is the comment field displayed with the DSINFO command

2. Change the values of AREA1 and AREA2 in the `/data/opt/etc/rc.GVAR` file to match R1 and R2 in `/data/opt/etc/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 Notification System](#) section of Chapter 1, the SDI ingestor allows automated event notifications via email, writing to a file, or running a program or script.

The GVAR ingestor and sounder decoder generate three types of events:

- [Image Start](#) (imager start of image)
- [Sounder Start](#)
- [Sounder End](#)

### Image Start

The Image Start event is generated any time the GVAR ingestor sees a new image and creates an index file. The body of the email for this event is in the following format:

*index\_file\_name bele eele bline eline*

Where:

<i>index_file_name</i>	is the name of the index file; see <a href="#">GVAR Index File Format</a> for a complete description of the format of this file name
<i>bele</i>	is the beginning element of this image
<i>eele</i>	is the ending element of this image
<i>bline</i>	is the beginning line of this image
<i>eline</i>	is the ending line of this image

### Sounder Start

The Sounder Start 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 email 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.

## Sounder End

The Sounder End event is generated any time the GVAR sounder decoder finishes the decoding of a sounder image. The body of the email 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 5

# MTSAT HRIT Ingestor

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

Many of the pages in this chapter instruct you to view or edit files on the SDI. To do so, you need to log into the SDI using the procedure described in the Chapter 1 (SDI Overview) section titled [Accessing the SDI](#). If you need to do a shut down, use the procedure described in the Chapter 1 section titled [Shutting Down the SDI](#).

Topics discussed in this chapter are:

- [Overview](#)
  - [Bit Sync Requirements](#)
  - [Ingestor Operating Procedures](#)
  - [Navigation](#)
  - [ADDE Server Procedures](#)
  - [SDI MTSAT HRIT 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/data**

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## Overview

In the past, MTSAT data was broadcast in multiple formats, including High Resolution Imager Data (HiRID), which was terminated in March/April 2008. It is currently broadcast in High Rate Information Transmission (HRIT), the format covered in this chapter.

The MTSAT satellite provides one visible image channel and four IR channels. In the HRIT format, the data rate is 3.5 Mb/second and spatial resolution at the sub-satellite point is 1 km for the visible channel and 4 km for the IR channels.

For each channel, the transmitted image data is divided into multiple separate files, called image segment files. Full Earth images consist of ten image segment files per channel, and single hemisphere images consist of five image segment files per channel. A full Earth MTSAT visible channel image is 11,000 lines by 11,000 elements, so a complete visible image consists of ten image segment files, each containing 1,100 lines by 11,000 elements. Similarly, a full Earth MTSAT IR channel image is 2,750 lines by 2,750 elements, so a complete IR image consists of ten image segment files, each 275 lines by 2,750 elements. See [Figure 1](#) for a graphic depicting a full Earth visible or IR image and its ten segment files.

The data contained in an image segment file can be fully determined by the file name alone. The naming convention is:

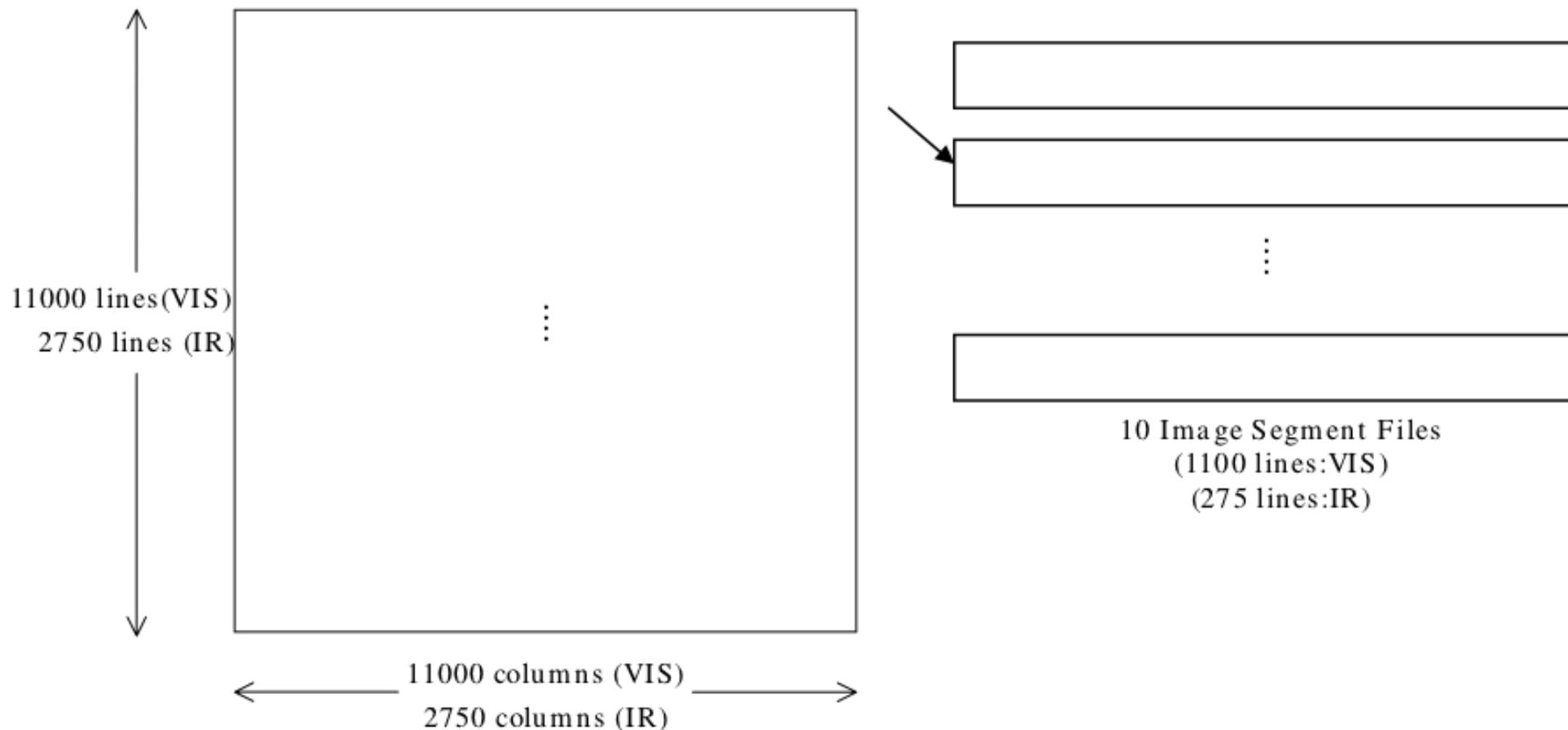
*ffffppppccccYYYYMMDDhhmmnnnn*

Where:

<i>ffff</i>	is the file type ( <b>IMG_</b> for image data, <b>OVL_</b> for map overlay)
<i>pppp</i>	is the projection ( <b>DK01</b> for full disk, <b>DK02</b> for Northern Hemisphere, <b>DK03</b> for Southern Hemisphere, <b>SF01</b> for Small Frame image)
<i>cccc</i>	is the spectral channel ( <b>VIS_</b> , <b>IR1_</b> , <b>IR2_</b> , <b>IR3_</b> , or <b>IR4_</b> , which correspond to McIDAS band numbers 1, 2, 3, 4 and 5, respectively)
<i>YYYYMMDD</i>	is the observation date ( <i>YYYY</i> =year, <i>MM</i> =month, <i>DD</i> =day)
<i>hhmm</i>	is the observation time ( <i>hh</i> =hour, <i>mm</i> =minute)
<i>nnnn</i>	is the image segment file number ( <b>_001</b> to <b>_010</b> )

For example, the file **IMG\_DK01IR1\_200612312332\_001** is image segment data file #1 of a full Earth disk image for infrared channel 1, observed at 23:32 UTC on 31 December 2006. Note: If the file type is OVL\_, the file name consists of only the file type, the projection, and a three-character spectral channel (e.g., **OVL\_DK01\_VIS** or **OVL\_DK02\_IR**).

Figure 1. **Full Earth Image and HRIT Segment Files** (from *JMA HRIT Mission Specific Implementation*, Issue 1.2 [[pdf](#)])



An ASCII text file named **MANAM** is also extracted from the transmitted data. The file, which is short for "Manual Amendment", contains the current operational plan for the satellite. The file can be consulted for the regular transmission schedule, and for changes/anomalies due to maneuvers, eclipses, etc.

The **MANAM** file is written to the same directory as image data, and is purged on the same schedule. Each time a new **MANAM** file is received (typically twice daily), a backup copy with the naming format **MANAM\_YYYYMMDDhhmm** (where *YYYYMMDDhhmm* is the received date and time) is created. This ensures that the file named **MANAM** has the most recent information, and that backup files (with the date and time in their name) are also available.

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## Bit Sync Requirements

As shipped, the SSEC Ingestor Board (SIB) in the SDI is configured to decode the requested data type from your bit sync. The SIB can decode NRZ-L, NRZ-S and NRZ-M encoded bit sync signal types. The SIB requires the data to change on the rising edge of the clock as the data is sampled on the falling edge of the clock. If you need to change the bit sync data type, refer to the instructions in Chapter 2's [Initial Checkout, Setup and Power Up](#) to make the jumper change on the SIB.

The SDI also comes configured to the requested clock and data signal interface type. The SDI accepts single ended TTL on either 75 or 50 ohm coax cable or RS422 level signals on a D15P connector. If you need to change the clock and data signal interface type, please [contact SSEC](#).

The MTSAT HRIT bit rate is 3.5 Mb/second.

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# Ingestor Operating Procedures

Some common MTSAT HRIT ingestor operating procedures are listed below.

- [Starting the SDI](#)
  - [Interpreting Console Messages](#)
  - [Reading the Log Files](#)
  - [Stopping and Starting the Ingest Software](#)
  - [Changing the Amount of Retained Data](#)
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## Starting the SDI

To start the SDI, complete the **Initial Power Up** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#).

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# Interpreting Console Messages

As described in the Chapter 1 section titled [Viewing the SDI Console Messages](#), the console messages can be routed to a local monitor, a remote monitor, or a file.

All MTSAT HRIT console messages start with a time stamp to indicate the date and time of the message. The possible messages are:

- [Image Start](#)
- [Image End](#)
- [Ingestor Restart](#)
- [MANAM Received](#)

## Image Start

Image start messages follow this format:

*currentdate&time:IMG\_pppp\_imagedate&time*

Where:

*currentdate&time* is the current date and time in yyyy.ddd.hhmmss format

*pppp* is the image projection, as described in the *pppp* section of the [Overview](#)

*imagedate&time* is the image date and time in yyyyymmddhhmm format

For example, if the start of the 11 April 2007 18:57 UTC Northern Hemisphere image is received at 19:18:46 UTC on the same day, the console message will be similar to this:

```
2007.101.191846:IMG_DK02_200704111857 start
```

## Image End

Image end messages follow the same format as image start messages, except the last field is "end".

For example, if the end of the 11 April 2007 18:57 UTC Northern Hemisphere image is received at 19:20:19 UTC on the same day, the console message will be similar to this:

```
2007.101.192019:IMG_DK02_200704111857 end
```

## Ingestor Restart

Ingestor restart messages looks similar to this:

```
2007.102.151921:ingestor restart
```

If this message appears, you should go to the [log files](#) to investigate the cause and status.

## MANAM Received

MANAM received messages follow this format:

*currentdate&time:MANAM\_filedate&time*

Where:

*currentdate&time* is the current date and time in yyyy.ddd.hhmmss format

*filedate&time* is the date and time, in yyymmddhhmm format, that the file was received

For example, if a MANAM file is received at 08:18 UTC on 14 January 2008, the console message will be similar to this:

```
2008.014.081853:MANAM_200801140818 manam
```

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# Reading the Log Files

Like image segment files, log files are also located in the `/mnt/HDD/data/` directory. The maximum size that the log file is allowed to grow to before being rolled and the number of log files to retain are defined by the `LOG_SIZE=` and `LOG_COUNT=` settings in the `/data/opt/etc/rc.MTSAT-HRIT` file. The following is a sample listing of files rolled at 1 MB and ten files retained.

```
root@0[data]# cd /mnt/HDD/data
root@0[data]# ls -lt mtsat*
-rw-r--r--  1 root    root      767437 Feb 20 19:35 mtsat-hrit.log
-rw-r--r--  1 root    root    1048599 Feb 20 12:01 mtsat-hrit.log.1
-rw-r--r--  1 root    root    1048641 Feb 20 01:03 mtsat-hrit.log.2
-rw-r--r--  1 root    root    1048631 Feb 18 19:01 mtsat-hrit.log.3
-rw-r--r--  1 root    root    1048626 Feb 18 08:03 mtsat-hrit.log.4
-rw-r--r--  1 root    root    1048600 Feb 17 21:03 mtsat-hrit.log.5
-rw-r--r--  1 root    root    1048674 Feb 17 10:19 mtsat-hrit.log.6
-rw-r--r--  1 root    root    1048607 Feb 16 23:35 mtsat-hrit.log.7
-rw-r--r--  1 root    root    1048610 Feb 16 11:02 mtsat-hrit.log.8
-rw-r--r--  1 root    root    1048587 Feb 15 23:02 mtsat-hrit.log.9
-rw-r--r--  1 root    root    1048603 Feb 15 11:02 mtsat-hrit.log.10
```

You can monitor ingest by tailing the log.

Type: `tail -f mtsat-hrit.log`

The sections below contain information about what the log files report during various scenarios.

- [Normal Processing](#)
- [Ingestor Exception and Restart](#)
- [Old File Purge](#)
- [Processing Statistics](#)

## Normal Processing

For normal processing of an image segment, you'll see something like the output below.

```

INFO      | jvm 1      | 2007/02/20 12:01:19 | Found start of a new file! Filename:
IMG_DK01VIS_200702201130_004
INFO      | jvm 1      | 2007/02/20 12:01:26 | before JPG read...
INFO      | jvm 1      | 2007/02/20 12:01:27 | BufferedImage width: 11000
INFO      | jvm 1      | 2007/02/20 12:01:27 | BufferedImage height: 1100
INFO      | jvm 1      | 2007/02/20 12:01:29 | This file is complete...

```

## Ingestor Exception and Restart

If the *jvm* number increases, an error caused the ingestor to restart. This should be reported in the log file, as shown in the example below.

```

INFO      | jvm 1      | 2007/02/20 17:35:31 | Found start of a new file! Filename:
IMG_DK02VIS_200702201713_005
INFO      | jvm 1      | 2007/02/20 17:35:48 | before JPG read...
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
INFO      | jvm 1      | 2007/02/20 17:35:48 | # An unexpected error has been detected by
HotSpot Virtual Machine:
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
INFO      | jvm 1      | 2007/02/20 17:35:48 | # SIGSEGV (0xb) at pc=0x6afce646,
pid=21359, tid=311316
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
INFO      | jvm 1      | 2007/02/20 17:35:48 | # Java VM: Java HotSpot(TM) Server VM
(1.5.0_07-b03 mixed mode)
INFO      | jvm 1      | 2007/02/20 17:35:48 | # Problematic frame:
INFO      | jvm 1      | 2007/02/20 17:35:48 | # C [libclib_jiio.so+0xab646]
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
INFO      | jvm 1      | 2007/02/20 17:35:48 | # An error report file with more
information is saved as hs_err_pid21359.log
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
INFO      | jvm 1      | 2007/02/20 17:35:48 | # If you would like to submit a bug
report, please visit:
INFO      | jvm 1      | 2007/02/20 17:35:48 | # http://java.sun.com/webapps/bugreport/
crash.jsp
INFO      | jvm 1      | 2007/02/20 17:35:48 | #
ERROR     | wrapper    | 2007/02/20 17:35:48 | JVM exited unexpectedly.
STATUS    | wrapper    | 2007/02/20 17:35:53 | Launching a JVM...
INFO      | jvm 2      | 2007/02/20 17:35:53 | Wrapper (Version 3.2.0) http://wrapper.
tanukisoftware.org
INFO      | jvm 2      | 2007/02/20 17:35:53 |
INFO      | jvm 2      | 2007/02/20 17:35:54 | RT-STPS SSEC extension, version 1.1.
Created Monday, February 12, 2007
INFO      | jvm 2      | 2007/02/20 17:35:54 | 2/20/07 5:35 PM Auto-loading
configuration.
INFO      | jvm 2      | 2007/02/20 17:35:54 | 2/20/07 5:35 PM Load HRIT.xml
INFO      | jvm 2      | 2007/02/20 17:35:54 | 2/20/07 5:35 PM Go
INFO      | jvm 2      | 2007/02/20 17:35:54 | 2/20/07 5:35 PM Ready to serve.

```

## Old File Purge

Ingested data is purged when the period defined by the DAYS= setting in the `/data/opt/etc/rc.MTSAT-HRIT` file has elapsed. A purge check is done after each image is ingested. When image data is purged, you'll see log file output similar to that below.

INFO	jvm 1	2007/02/20 12:01:34	Purging file: IMG_DK01IR2_200702171130_004
INFO	jvm 1	2007/02/20 12:01:34	Purging file: IMG_DK01IR3_200702171130_004

## Processing Statistics

Every hour frame and packet level statistics are dumped. When this happens, the output is similar to that below.

INFO	jvm 1	2007/02/20 12:11:44	Processing statistics: (counts reset each time logged)
INFO	jvm 1	2007/02/20 12:11:44	packet.apid0
INFO	jvm 1	2007/02/20 12:11:44	Packets Output=9559
INFO	jvm 1	2007/02/20 12:11:44	Discarded Packets=0
INFO	jvm 1	2007/02/20 12:11:44	Bad Lengths=0
INFO	jvm 1	2007/02/20 12:11:44	Bad Length Sample=0
INFO	jvm 1	2007/02/20 12:11:44	Missing Packets=0
INFO	jvm 1	2007/02/20 12:11:44	Packets With Fill=0
INFO	jvm 1	2007/02/20 12:11:44	Sequence Errors=0
INFO	jvm 1	2007/02/20 12:11:44	cadu_service
INFO	jvm 1	2007/02/20 12:11:44	Unrouteables=0
INFO	jvm 1	2007/02/20 12:11:44	Fill CADUs=310902
INFO	jvm 1	2007/02/20 12:11:44	Output CADUs=88177
INFO	jvm 1	2007/02/20 12:11:44	frame_status
INFO	jvm 1	2007/02/20 12:11:44	Lock Frames=399084
INFO	jvm 1	2007/02/20 12:11:44	Flywheels=0
INFO	jvm 1	2007/02/20 12:11:44	Slipped Frames=0
INFO	jvm 1	2007/02/20 12:11:44	True Frames=0
INFO	jvm 1	2007/02/20 12:11:44	Inverted Frames=399084
INFO	jvm 1	2007/02/20 12:11:44	CRC Error Frames=0
INFO	jvm 1	2007/02/20 12:11:44	RS-Corrected Frames=34851
INFO	jvm 1	2007/02/20 12:11:44	RS-Uncorrectable Frames=5
INFO	jvm 1	2007/02/20 12:11:44	Deleted Frames=5
INFO	jvm 1	2007/02/20 12:11:44	Passed Frames=399079
INFO	jvm 1	2007/02/20 12:11:44	frame_sync
INFO	jvm 1	2007/02/20 12:11:44	Mode=search
INFO	jvm 1	2007/02/20 12:11:44	Search Buffers=142431
INFO	jvm 1	2007/02/20 12:11:44	Lost Sync Count=3
INFO	jvm 1	2007/02/20 12:11:44	Flywheels=0
INFO	jvm 1	2007/02/20 12:11:44	Total Frames=399084
INFO	jvm 1	2007/02/20 12:11:44	hrit.hritfile
INFO	jvm 1	2007/02/20 12:11:44	Packets Written=9559
INFO	jvm 1	2007/02/20 12:11:44	path.vc0
INFO	jvm 1	2007/02/20 12:11:44	CADUs=88177
INFO	jvm 1	2007/02/20 12:11:44	CADU Seq Errors=0

```
INFO | jvm 1 | 2007/02/20 12:11:44 | Missing CADUs=0
INFO | jvm 1 | 2007/02/20 12:11:44 | Idle VCDUs=0
INFO | jvm 1 | 2007/02/20 12:11:44 | Bad FHPs=0
INFO | jvm 1 | 2007/02/20 12:11:44 | Troublesome Frames=0
INFO | jvm 1 | 2007/02/20 12:11:44 | Created Packets=9603
INFO | jvm 1 | 2007/02/20 12:11:44 | Irrational Packet Lengths=0
INFO | jvm 1 | 2007/02/20 12:11:44 | Discarded Fragments=0
```

High numbers in the *RS-Uncorrectable Frames=* or *Lost Sync Count=* entries above usually indicate data reception or transmission problems. To do a time-order check for a high number of *RS-Uncorrectable Frames=* errors, run a command similar to that below from the **/data** directory.

```
Type: ls -lart | grep mtsat-hrit.log | xargs grep Uncorrect | grep -v Frames=1 |
grep -v Frames=0
```

Values of 10 or more often result in dropped segments. If you see values of 10 or more occurring continuously or for spurts, you should check your antenna for optimum signal strength. It may need peaking or there may be data path hardware issues causing interference in the signal.

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# Stopping and Starting the Ingest Software

The **ingcntl** script is used to control the ingest software.

To stop the ingest software, run the following command.

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

To start the ingest software, either reboot (see Chapter 1 - [Shutting Down the SDI](#)) or run the following command.

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

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# Changing the Amount of Retained Data

The ingestor stores data in image segment files, as described in the [Overview](#).

SSEC sets a default retention window of three days of data for MTSAT HRIT visible and IR imagery. Approximately 12 GB of disk space is needed for each day's worth of retained data.

Perform the following procedure if you want to change the amount of data retained in your ingestor.

1. Edit the file `/data/opt/etc/rc.MTSAT-HRIT`
2. Change the value of the variable named `DAYS=` from its default setting of 3 to the number of days of data you want to make available.
3. [Stop and start the ingest software](#).

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## Navigation

There is no separate navigation file for MTSAT HRIT. All navigation information is contained in the [segment files](#).

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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

Normally, the ingestor is also the ADDE server for the data. As delivered, the group name for the data is MTSAT. The group contains six datasets, ALL, FD, NH, SH, OTHER, and MANAM. The descriptors FD, NH and SH refer to the data coverage (Full Disk, Northern Hemisphere, and Southern Hemisphere, respectively); MANAM is a text dataset that can be examined with the McIDAS [READ](#) command. MANAM is a schedule of expected behavior of the satellite for the coming week.

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 MTSAT.

Perform these steps to access the SDI's data.

1. From a McIDAS workstation:

Type: **DATALOC ADD MTSAT *SDI\_IP\_address***

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

Type: **DATALOC ADD MTSAT 144.92.108.32**

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

Type: **DSINFO I MTSAT**

The output should look something like:

```
Dataset Names of Type: IMAGE in Group: MTSAT

Name          NumPos      Content
-----
All           99999      All MTSAT images
FD            99999      MTSAT full disk
NH            99999      MTSAT northern hemisphere
OTHER         99999      MTSAT other
SH            99999      MTSAT southern hemisphere

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. To change ADDE names associated with particular datasets, edit the `/data/opt/etc/RESOLV.SRV` file. The following is a sample of this file. Notice that all fields are comma delimited.

```
N1=MTSAT,N2=ALL,TYPE=IMAGE,RT=N,K=MTST,R1=1,R2=999999,MASK=/data/IMG_*,C=All MTSAT
images,
N1=MTSAT,N2=FD,TYPE=IMAGE,RT=N,K=MTST,R1=1,R2=999999,MASK=/data/IMG_DK01*,C=MTSAT
full disk,
N1=MTSAT,N2=NH,TYPE=IMAGE,RT=N,K=MTST,R1=1,R2=999999,MASK=/data/IMG_DK0[12]*,C=MTSAT
northern hemisphere,
N1=MTSAT,N2=SH,TYPE=IMAGE,RT=N,K=MTST,R1=1,R2=999999,MASK=/data/IMG_DK0[13]*,C=MTSAT
southern hemisphere,
N1=MTSAT,N2=OTHER,TYPE=IMAGE,RT=N,K=MTST,R1=1,R2=999999,MASK=/data/IMG_SF01*,C=MTSAT
other,
N1=MTSAT,N2=MANAM,TYPE=TEXT,RT=N,K=TEXT,Q=/data/MANAM,
```

Where:

- N1** is the ADDE group name
- N2** is the ADDE descriptor name
- TYPE** is the data type
- RT** not used for MTSAT datasets
- 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
- Q** is the directory that the descriptor file is in
- C** is the comment field displayed with the DSINFO command

2. 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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## SDI MTSAT HRIT Events

As described in the [SDI Event Notification System](#) section of Chapter 1, the SDI ingestor allows automated event notifications via email, writing to a file, or running a program or script.

The MTSAT HRIT ingestor generates four types of events: *Image Start*, *Image End*, *Ingestor Restart* and *MANAM Received*. When an event occurs and notifications are requested, the event's [console message](#) is used for the content of the email or text written to the file. The console message can also be parsed and fed into the script or program that is run when the event occurs.

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## Chapter 6

# POES Relay Ingestor

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This chapter applies only to the POES signal that is relayed via U.S. ground stations (Wallops Island, VA and Gilmore Creek, AK).

Topics discussed in this chapter are:

- [Overview](#)
  - [Bit Sync Requirements](#)
  - [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/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.

<b>Satellite Name</b>	<b>McIDAS Sensor Source (SS)</b>	<b>Spacecraft Address (Sat-ID)</b>
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 SSEC Ingestor Board (SIB) in the SDI is configured to decode the requested data type from your bit sync. The SIB can decode NRZ-L, NRZ-S and NRZ-M encoded bit sync signal types. The SIB requires the data to change on the rising edge of the clock as the data is sampled on the falling edge of the clock. If you need to change the bit sync data type, refer to the instructions in Chapter 2's [Initial Checkout, Setup and Power Up](#) to make the jumper change on the SIB.

The SDI also comes configured to the requested clock and data signal interface type. The SDI accepts single ended TTL on either 75 or 50 ohm coax cable or RS422 level signals on a D15P connector. If you need to change the clock and data signal interface type, please [contact SSEC](#).

The bit sync normally used with POES HRPT outputs biphasse formatted data. The SDI converts the biphasse data to NRZ-L data in software.

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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# Ingestor Operating Procedures

Some common POES Relay ingestor operating procedures are listed below.

- [Starting the SDI](#)
  - [Interpreting Console Messages](#)
  - [Logging Console Messages](#)
  - [Stopping and Starting the Ingest Software](#)
  - [Changing the Amount of Retained Data](#)
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## Starting the SDI

To start the SDI, complete the **Initial Power Up** section of Chapter 2 - [Initial Checkout, Setup and Power Up](#).

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# Interpreting Console Messages

As described in the Chapter 1 section titled [Viewing the SDI Console Messages](#), the console messages can be routed to a local monitor, a remote monitor, or a file.

The normal POES console message types you may see are:

- [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.2006.288.122552.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.2006.288.122552.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.2006.288.113827.LAC sat=13 day=288 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=288** 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 and Starting the Ingest Software

The **ingcntl** script is used to control the ingest software.

To stop the ingest software, run the following command.

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

To start the ingest software, either reboot (see Chapter 1 - [Shutting Down the SDI](#)) or run the following command.

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

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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.ccyy.ddd.hhmmss.mode*

Where:

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

As an example, the index file name for a 2006 GAC image, whose start of ingestion date and time are 288 and 12:20:00, respectively, has the name **poes.2006.288.122000.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.2006.288.180623.HRPT
poes.2006.288.180630 772767 6 5 1 12 180650 140 1
poes.2006.288.180630 776630 2 5 2 12 180650 306 2
poes.2006.288.180630 800492 6 5 3 12 180650 473 3
poes.2006.288.180630 814355 2 5 1 12 180650 640 4
poes.2006.288.180630 828217 6 5 2 12 180650 806 5
poes.2006.288.180630 842080 2 5 3 12 180650 973 6
poes.2006.288.180630 855942 6 5 1 12 180651 140 7
poes.2006.288.180630 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., 2006

**c** is the julian day that the image was received, e.g., day 288

**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**

**l** 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.2006.288.135033.GAC 5 198 104700 12779 141
poes.2006.288.143122.GAC 5 198 122800 12781 142
poes.2006.288.150627.GAC 9 198 132130 11100 143
poes.2006.288.151214.GAC 9 198 113230 13738 144
poes.2006.288.160938.GAC 5 198 141038 12525 145
poes.2006.288.164741.GAC 9 198 144851 12630 146

```

*Field Name*    *Description*

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 <a href="#">table</a> 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 the [SDI Event Notification System](#) section of Chapter 1, the SDI ingestor allows automated event notifications via email, writing to a file, or running a program or script.

The POES ingestor generates only one event, *Index Created* (new image). This event is generated any time the POES ingestor sees a new image and creates an index file. The body of the email 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 <a href="#">Index File Format</a> 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 <a href="#">table</a> 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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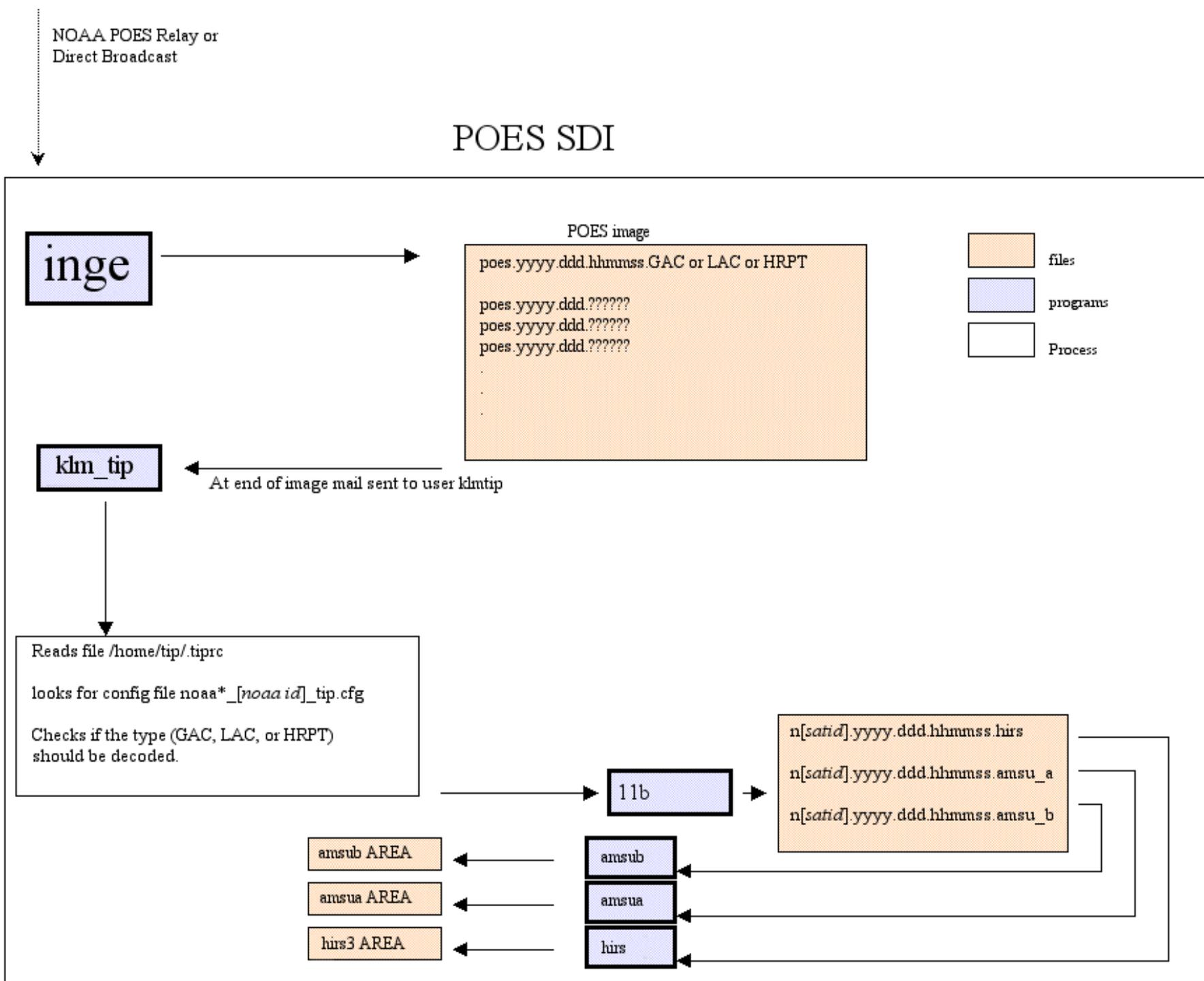
### Decoding ATOVS Data

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#>_<noaid#>_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



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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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## Appendix A

# SDI Technical Specifications

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## Embedded Computer System

- CPU 1 GHz Celeron
- RAM 1 G Byte
- Disk 80 G Byte UDMA (minimum)
- I/O PS2 keyboard, HD15S video – rear panel  
USB2 – front panel – for software upgrades
- Network 100 M bps or 1 G bps using a standard RJ45 connector – rear panel
- Ingestor Board SSEC designed with PC104+ interface
- Feature Boots from CompactFlash, OS runs from RAM

## Power

- Input Voltage 100 to 240 VAC , 50-60 Hz
- Power < 60 W
- Connector IEC-320-C14 – rear panel
- Circuit breaker 1.5A – rear panel

**Note:** Unit comes with 7.5 foot power cord which mates to the input power connector and comes with a NEMA 5-15P connector on the other end.

## Operating Environment

- Temperature 40-90 ° F
- Humidity 20-80% RH non condensing

## Enclosure

- Type 19 inch rack mount
- Height 2 RU (3.5 inches)
- Depth 15 inches
- Cooling internal fan

## Signal Specifications

- Inputs Clock, Data;  
Data sampled on the falling edge of Clock
- Input Connector BNC female or D15P – rear panel
- Input Configuration Single ended (TTL) or RS422  
(differential)
- Input Termination 50 , 75 or 120 ohm
- Input Data Rate 10 Kbps – 40 Mbps
- Data Types NRZ-L, NRZ-S, NRZ-M set by jumper

## External Indicators

- Power red LED – front panel
- Status green LED – front panel

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## Appendix B

# Customizing an SDI

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The SDI has an embedded Linux operating system resident on a read-only CompactFlash disk (CFD) installed on its motherboard. Atop this base operating system are installable packages, including the ingestor software, optional servers, and default as-shipped network configuration information.

The SDI normally operates from a ramdisk, using its hard disk primarily for data storage. System customization, therefore, is not as simple as changing configuration files on the filesystem and rebooting. There are three ways of changing the operation of the system:

### 1. *Include a `/data/opt/etc/rc.local` script on the hard disk (HDD).*

This script is included if available during the running of the `/opt/etc/rc.SDI104` boot script during initial system startup. The `rc.local` script includes override settings for the following:

- network address and routing information, including nameservice
- mail (SMTP) and time (NTP) servers
- notification mailing address; the ingestor notification list is `/data/opt/etc/notify.list`

See below for an [example rc.local script](#).

### 2. *Rewrite the CFD content using the installation "key".*

The installation key is a USB device provided which includes an operating system and scripts to rewrite the CFD. This provides turnkey installation, upgrade and restoration capability.

### 3. *Author an additional package and place it on the hard disk in the `/packages/` directory.*

Packages are started and stopped using the UNIX "runlevel" conventions, such that runlevel 3 is a maintenance mode while runlevel 4 is operational mode.

Packages are elementary `.tar.gz` files (created using command "tar zcvf") and will be unpacked by the SDI boot scripts into the root filesystem. Packages are loaded at runlevel 3; after all packages are loaded from the CFD and the HDD, the system proceeds to runlevel 4. It is preferable that data and executable files be created in `/data/opt/` subdirectories, and that softlinks be made into the root file system. For instance, a startup script can be placed in `/data/opt/package-name/bin/` and softlinked to `/etc/rc.d/S##packagename/`. Packages should include files and not directories. The load order for SDI runlevel 4 (in `/etc/rc4.d/`) is:

- a. S00sib : load and test SSEC Ingest Board driver
- b. S05hdd : mount hard disk and link to `/data/` for data buffering
- c. S19sdi : set up default settings, read `rc.local`, create configuration files and setup network
- d. S30inge : start-up data ingest software

e. S40adde : start up McIDAS ADDE server

### Example rc.local script

```
#!/bin/sh
#
# SDI-104 startup override script
#
# The boot sequence for an SDI-104 includes
#
# /etc/bootlocal.sh
# This script addresses system-specific settings such as mount points, device
# drivers for the ingest hardware, package loading and base filesystem
organization.
# It creates an /opt/etc/env.SDI104 with hardware environment variables
# and launches the system into runlevel 4.
# /opt/etc/rc.SDI104
# This script is the default start sequence, run as an init script at runlevel 4.
# It sets up environment variables, checks for and parses in $HDD/etc/rc.local,
# and then continues on to start the default ingestor.
#
# Lines with two hashes (##) at the beginning can be uncommented in order to over-
ride
# default CompactFlash configuration.

# Environment variables which are available from /opt/etc/env.SDI104
#
# HDD: mount point for hard disk, which is assumed mounted read-write at this point
# A subdirectory $HDD/data is softlinked to /data at this point.
# ETH: primary ethernet interface, typically "eth0" or "eth1"
# CFD: mount point for compact flash, which is not mounted (not recommended for use)

. /opt/etc/env.SDI104 # Load environment variables from env.SDI104

#####
# Default ingestor to invoke - this determines the /opt/___/bin/ingecntl script to
run

## INGESTOR=gvar

#####
# Network address and routing
# Note: If changing network settings, ALL 3 fields must be updated.

##ADDRESS=192.168.1.10
##NETMASK=255.255.255.0
##GATEWAY=192.168.1.1

#####
# rebuild resolv.conf for this site

## cat >/etc/resolv.conf << EOF
```

```
## domain local
## search local
## nameserver 192.168.1.1
## EOF

#####
# Other site-specific initialization
# For instance, mounting an NFS share and replacing the /data softlink.

## rm /data
## mkdir /mnt/nfs
## mount -t nfs 192.168.1.4:/data /mnt/nfs -o rsize=32768,wspace=32768
## ln -s /mnt/nfs /data

#####
# Upon completion of this script, rc.SDI104 resumes
# and starts the default ingestor.
```

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## Appendix C

# Replacing the Hard Drive

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This appendix contains the instructions for replacing the hard drive on an SDI system if the existing one fails or needs to be replaced for any other reason.

Here are the tools needed to complete the task:

- #2 and # 1 Phillips head screw drivers
- anti-static flat work surface
- grounding strap
- needle nose pliers

Complete the instructions below to remove the existing hard drive and replace it with a new one.

1. If possible, save all the files from the `/data/opt/etc` directory to another computer or to the USB memory stick. The steps for saving the files to a USB memory stick are listed below.

- a. Insert a USB memory stick into the front panel USB port and mount the USB memory stick with the command below.

Type: `mount /dev/sda1 /mnt/sda1`

- b. Create a new directory on the USB memory stick with the command below.

Type: `mkdir /mnt/sda1/etc`

- c. Copy the files to the USB memory stick with the command below.

Type: `cp /data/opt/etc/*.* /mnt/sda1/etc/.`

- d. Unmount the USB memory stick with the command below, then remove it from the USB slot.

Type: `umount /mnt/sda1`

2. Shut down the SDI by entering the command below on the console keyboard and wait until the system has halted.

Type: `init 0`

3. Remove the power cord from the back of the box.

4. Remove the Clock/Data cabling, the keyboard cable, the monitor cable and the ethernet cable.

5. Place the SDI system on a safe antistatic work surface with a grounding terminal. Place the wrist strap around one wrist and connect the other end of the grounding strap to the grounded terminal.
6. Remove the nine (9) Phillips head screws ( 3-top, 3-left, 3-right) holding the cover to the SDI and remove the cover.
7. Carefully remove the hard drive power cable and IDE cable. Note the connector orientation before you remove the cables.
8. Remove the hard drive mounting brackets by removing the four (4) Phillips head screws from the bottom of the SDI enclosure.
9. Remove the hard drive from the mounting brackets by removing the four (4) Phillips head screws. Note the placement of the screws in the mounting brackets relative to the hard drive screw holes.
10. Verify the new hard drive jumper is set to the "Master" position. Use the needle nose pliers to remove the jumper if necessary. The jumper location information is shown on the hard drive.
11. Install the new hard drive to the mounting brackets using the four (4) Phillips head screws in the same manner as the old hard drive. The information sticker about the hard drive will be facing up when the drive is installed.
12. Install the hard drive mounting brackets to the SDI enclosure bottom using the four (4) Phillips head screws.
13. Install the power cable and IDE cable to the new hard drive being careful to make sure the cables are connected as they were to the old hard drive.
14. Replace the cover the SDI on the enclosure and install the nine (9) Phillips head screws to keep the cover in place.
15. Connect a (console) keyboard and a monitor to the connectors on the back panel.
16. Insert the power cord into the back of the SDI and wait for the system to boot.

Once the system has booted, check to see if the following messages appear. Then proceed to step 17.

```
S30inge: ERROR: /data not a writable directory
S40adde: ERROR: /data not a writable directory
```

17. Put the system at level 3 with the command below.

Type: **init 3**

18. If the messages in the box in step 16 did **not** appear, go to step 20.

If the messages did appear, the hard drive has not been formatted and you must complete the instructions below and those in step 19 before proceeding to step 20.

Format the hard drive and sync the contents of the compact flash boot sector to the hard drive with the command below.

Type: **/opt/bin/sdi104-formatHD .**

The prompt in the box below will appear twice, to ask if you wish to format the hard drive, and to sync the hard drive boot sector to the boot sector on the compact flash. Enter "**yes**" in response to both prompts.

If you are ready to continue, please type `yes` to continue.

19. Reboot the SDI with the command below.

Type: `reboot`

20. Move all the files from the `/mnt/HDD/data/opt/etc` directory to a new directory with the following commands.

Type: `mkdir /mnt/HDD/data/opt/etc/old`

Type: `mv /mnt/HDD/data/opt/etc/*.* /mnt/HDD/data/opt/etc/old/.`

21. Insert the USB memory stick and mount the drive as described in step 1a above.

22. Copy all the files from the `/mnt/sda1/etc` directory to the `/mnt/HDD/data/opt/etc` directory with the command below.

Type: `cp /mnt/sda1/etc/*.* /mnt/HDD/data/opt/etc/.`

23. Unmount the USB memory stick with the command below, then remove it from the USB slot.

Type: `umount /mnt/sda1`

24. Reboot the system with the command below, then verify that the system comes up correctly.

Type: `reboot`

25. Shut down the SDI by entering the command below on the console keyboard and waiting until the system has halted.

Type: `init 0`

26. Remove all cabling and place the system back in its service location.

27. Connect the console keyboard, the monitor, the ethernet cable and the Clock/Data cabling. Then insert the power cord.

28. Verify the system boots OK and starts ingesting data.

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## Appendix D

# Frequently Asked Questions

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This appendix is a list of questions that McIDAS User Services and the SSEC Data Center commonly receives from SDI users. The questions are organized by categories for general information, system setup, and troubleshooting.

### General Information

- [Q. What are the main differences between my "old" SDI and the "new" SDI-104 system?](#)
- [Q. How are ingestor and server software updates distributed?](#)
- [Q. How will security updates be distributed?](#)
- [Q. What is a FIFO?](#)
- [Q. What is the difference between files /etc/init.d/ingcntl and /etc/rc4.d/S30inge?](#)
- [Q. Can the GVAR SDI be configured to hold, for example, more CONUS images than SH images?](#)
- [Q. Under what circumstances are SDF \(Stretched Data Format\) files created on a GVAR SDI? And how are they used?](#)
- [Q. How do you change to a different ingestor type \(e.g., from GVAR to MTSAT\)?](#)

### System Setup

- [Q. How do I remotely access my SDI?](#)
- [Q. Why doesn't the SDI have a root password at the keyboard?](#)
- [Q. How do I customize my SDI?](#)
- [Q. What time zone should my SDI ingestor be set to?](#)
- [Q. How do I write to the CompactFlash?](#)
- [Q. How do I implement my site's security policy on my SDI?](#)

## Troubleshooting

- [Q. What if the SDI's hard drive fails?](#)
- [Q. What if the SDI's CompactFlash won't boot?](#)
- [Q. We just installed our SDI, but upon startup, we get the message \*\*Open error on /dev/sib0 no such device or address\*\*, and no data is ingested. Why?](#)
- [Q. The front panel's green \*Status\* LED stopped flashing. Why did this happen?](#)
- [Q. I connected an analog monitor and keyboard to the SDI, but the monitor remains dark. Why?](#)
- [Q. I tried to change a configuration file and either wasn't allowed, or the change didn't stick through a reboot. Why?](#)
- [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 ?](#)

## General Information

**Q.** What are the main differences between my "old" SDI and the "new" SDI-104 system?

**A.** See the McIDAS Website's [SDI Migration Information](#) page for a discussion of the differences.

**Q.** How are ingestor and server software updates distributed?

**A.** The ingestor and server (i.e., ADDE) software updates are available, with their installation script, on the McIDAS Website's [SDI Software Updates](#) page. The updates are prepackaged and are subsequently installed on the CompactFlash using the installation script. The updates can be transferred to the SDI-104 over ethernet via secure copy (*scp*) or copied from the USB memory stick, which mounts on the SDI-104 front panel USB port.

**Q.** How will security updates be distributed?

**A.** Like the ingestor and server software updates, operating system security updates will be distributed as packages in a section titled *System Updates* on the McIDAS Website's [SDI Software Updates](#) page.

**Q.** What is a FIFO?

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

**Q.** What is the difference between files `/etc/init.d/ingcnt1` and `/etc/rc4.d/s30inge`?

**A.** `s30inge` is a script in the system run-level directory `/etc/rc4.d`. The file `/etc/init.d/ingcnt1` 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/rc4.d`, where run-level 4 is a multi-user level. When SDIs are shipped, `/etc/rc4.d` and `/etc/init.d/ingcnt1` are soft 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.** 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.** Under what circumstances are SDF (Stretched Data Format) files created on a GVAR SDI? And how are they used?

**A.** SDF files are created when there are both clock and data going into an ingest card. SDFs are immediately written to disk in 1 MB files whether or not they contain any useful data. These files are then analyzed bit by bit looking for sync. If no sync is found in the entire 1 MB file, the file is deleted immediately. If sync is found, the block is identified. If the block is a Block 11, it is indexed in a \*.B11 index file. If the block is 1-10 it is indexed in the last \*.INDX file. If it is a block 0, it is either indexed in the last existing \*.INDX file or a new INDEX file is created if it is the start of a new image. A new image is determined when the Priority Frame Start Time has changed and the CRC is valid. If the Priority Frame Start Time changes and the CRC is bad, at least 3 consecutive identical Priority Frame Start Times are needed to start a new image if the CRC fails each time.

Technically, only clock is needed for SDFs to be created. The ingestor will not generate any files at all if there is no clock; it may even appear as if the ingest process is hung. If you have clock but no data, SDFs will be generated, but no sync would ever be found, and the files would be immediately deleted, so during casual inspection it may appear as though no SDFs are being created.

**Q.** How do you change to a different ingestor type (e.g., from GVAR to MTSAT)?

**A.** Changing the ingestor type (e.g., from GVAR to MTSAT) is also known as "cross-grading". Although it's possible to cross-grade, the procedure is complicated and varies, depending on the ingestor and version. Therefore, you should [contact SSEC](#) for assistance.

## System Setup

**Q.** How do I remotely access my SDI??

**A.** As shipped, the SDI is delivered with a DSA private key for SSH access. This key is unique to your organization. This SSH key is used to access the **root** account on the SDI. See [Accessing the SDI](#) in Chapter 1 for details.

**Q.** Why doesn't the SDI have a root password at the keyboard?

**A.** The SDI, as a server appliance, is built for a machine room environment where physical access is effectively identical to administrator access. The operating system itself is difficult to tamper with or destroy due to its being loaded from CompactFlash and run from RAM. A password-protected console login can be enabled if your circumstances specifically require it. See [Accessing the SDI](#) in Chapter 1 for details.

**Q.** How do I customize my SDI?

**A.** The SDI arrives configured with network, service and ingest settings appropriate for your environment from information you give us. Most of the as-shipped system settings can be overridden through a user customization script placed on the hard drive (**/data/opt/etc/rc.local**). Some

packages such as the ADDE server situate their configuration files on the `/data/opt/etc` directory as well. For more information, see [Appendix B - Customizing an SDI](#).

**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 write to the CompactFlash?

**A.** We strongly recommend that the CompactFlash not be overwritten or modified except by maintenance scripts provided by SSEC. This is done in order to maintain a supported configuration of the SDI.

**Q.** How do I implement my site's security policy on my SDI?

**A.** The SDI includes a minimal set of services as shipped - ADDE and SSH. These services can both be trimmed using TCP wrapper practices, with the minor detail that the `hosts.allow` and `hosts.deny` files must be placed in `/etc` on the ramdisk by the `rc.local` user customization script.

## Troubleshooting

**Q.** What if the SDI's hard drive fails?

**A.** The CompactFlash has the utilities we use to partition, format, and build a contingency boot partition on a fresh hard drive. Replacing the hard drive is a user serviceable item.

**Q.** What if the SDI's CompactFlash won't boot?

**A.** As shipped, the SDI includes a bootable partition on the hard drive as a contingency in this unlikely event. The BIOS is configured to boot from the hard drive if the CompactFlash will not boot the system.

The CompactFlash is only written during software updates and should not fail during the lifetime of the SDI.

**Q.** We just installed our SDI, but upon startup, we get the message **Open error on /dev/sib0 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. Please [contact SSEC](#) for assistance.

**Q.** The front panel's green *Status* LED stopped flashing. Why did this happen?

**A.** If the front panel's green *Status* LED was initially flashing but then stopped, please check for a valid clock signal. If the SDI does not receive a clock signal, the LED will stop flashing.

If there is a valid clock signal present at the clock input, reboot the SDI and check to see if the LED flashes for 16 seconds after the system has rebooted. If, after a reboot, the LED does not flash, please [contact SSEC](#) for assistance.

**Q.** I connected an analog monitor and keyboard to the SDI, but the monitor remains dark. Why?

**A.** If an analog monitor is not connected to the SDI at power up or reboot, the internal CPU board disables the video port. To enable the video port, connect an analog monitor to the SDI and reboot the system.

**Q.** I tried to change a configuration file and either wasn't allowed, or the change didn't stick through a reboot. Why?

**A.** The operating system loads from CompactFlash into the ramdisk. Therefore, changes made to the files on the ramdisk do not stick after a reboot. Most user customizations happen by way of the **/data/opt/etc** files resident on the hard drive. Please [contact SSEC](#) if there is a particular situation not covered in [this manual](#).

**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 ?

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

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