# McIDAS

Man computer Interactive Data Access System

# Ingestor Test Fixture Installation and Operation Guide

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SSEC
Space Science and Engineering Center
University of Wisconsin - Madison
1225 West Dayton Street
Madison, WI 53706
Telephone 608-262-2455
TWX 608-263-6738

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# Ingestor Test Fixture

# Overview

The Ingestor Test Fixture (ITF) allows you to view satellite imagery in real time without using a Multisourcerer, GPCI, mainframe computer or McIDAS software. It consists of:

- an SSEC built MULTIBUS®* electronics card
- an electronics enclosure
- a Conrac black and white monitor
- a logging printer (optional)

The ITF is used with an SSEC ingestor application Multibus card and corresponding signal source. The signal source can be a frame synchronizer and antenna chain, a simulator, or an image archive playback unit.

Use the ITF to:

- troubleshoot McIDAS ingestor cards
- monitor image quality

If you use the ITF to troubleshoot McIDAS ingestor cards, you can place the ITF on a bench top. You can then install the ingestor in the ITF and cable the signals from the antenna chain and frame synchronizer to it. A split top cover allows access to the installed ingestor when you remove the front section. The card cage is cut away, allowing installation of test clips and probes at any IC location.

If you use the ITF to monitor image quality, you can mount the ITF in a rack with the electronics enclosed. You can then control it from the front panel keypad or remotely via any RS-232 Data Terminal Equipment device.

The ITF tells the ingestor to preprocess and transfer incoming image data. It then displays the data on the image portion of the black and white monitor. Information about the image such as signal type, scan line or GMT time, along with user selected display parameters such as resolution and offsets are displayed in an alphanumeric portion of the display.

*MULTIBUS is a registered trademark of Intel Corporation.

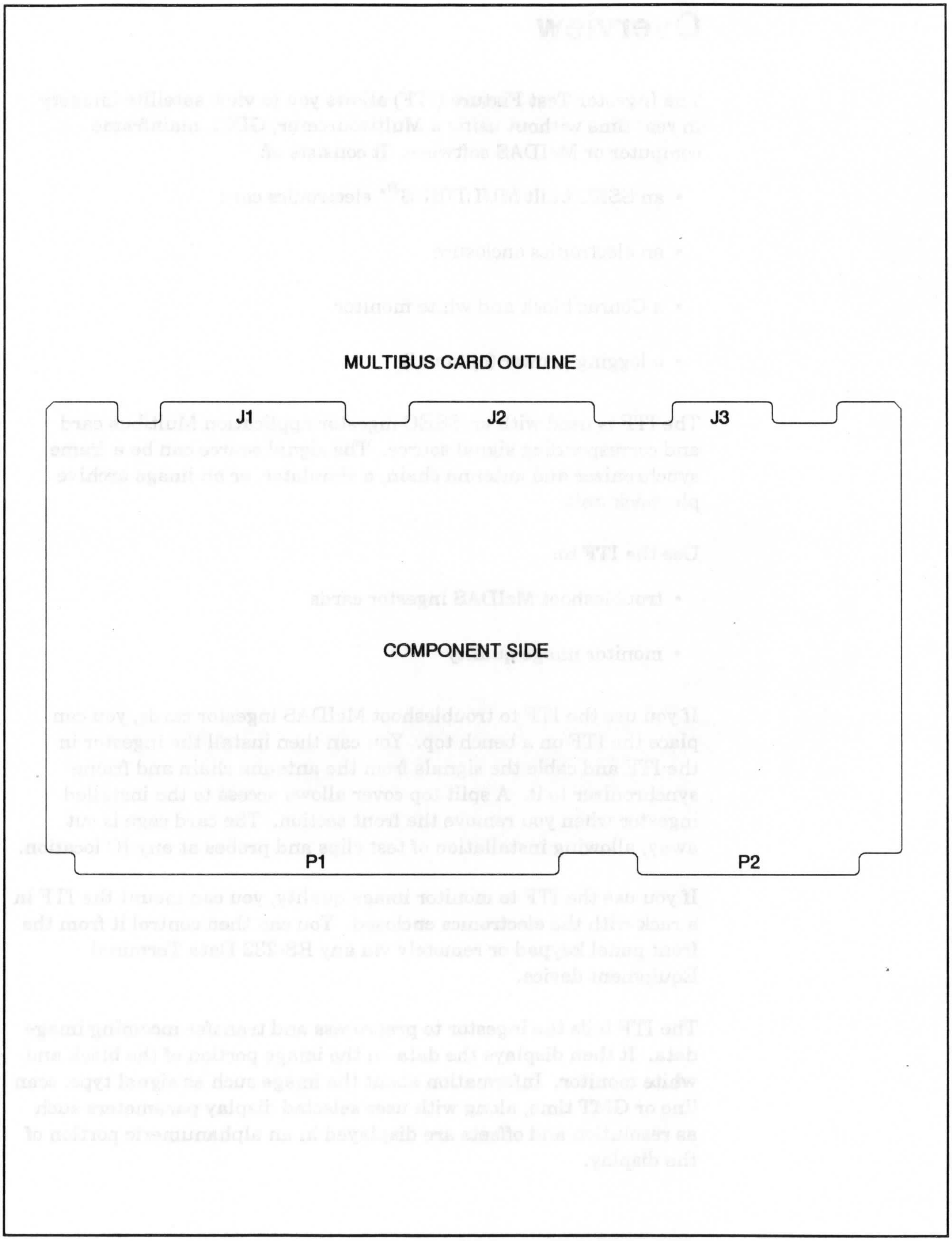



**Figure 1. Component Side of the Multibus Card**

# Installation Procedure

Use the instructions below to install the Ingestor Test Fixture.

## Installing the ITF Multibus Card

If you're mounting the unit on a rack, install all rack mountable components first, allowing reasonably short cable lengths where necessary. Then follow the instructions below.

1. Remove the four screws securing the front cover and remove the front cover.

2. Locate the DIP switch on the Ingestor Test Fixture card at IC location AF29. Set switch number 1 to the OFF position.

3. Insert the Ingestor Test Fixture Multibus card in the bottom slot of the card cage with the component side up. See Figure 1 on the adjacent page.

4. The Multibus cards have five edge connectors. These are labeled on the card and shown in Figure 1. Connect the 50 pin edge connector labeled CONN 4 to the J1 connector on the Ingestor Test Fixture Multibus card.

5. Connect a 75 ohm coax cable from the VIDEO OUT connector on the ITF to the VIDEO IN connector on the Conrac black and white monitor.

6. Power on the monitor.

7. Set the VIDEO IN termination switch on the back of the monitor to the 75 ohm position.

8. Power on the ITF and press the RESET button.

9. Turn up the brightness and contrast controls until you see a dim raster. You should see a diagonal gray scale displayed in the image portion of the display and field labels displayed in the alphanumeric portion. The top of the alphanumeric display should contain the message "NO INGEST CARD INSIDE."

10. Power off the ITF.

## Installing the SSEC Ingestor Application Multibus Card

1. **Set the address select DIP switches on the SSEC ingestor application Multibus card according to the chart below.**

| Ingestor | Multibus address | Switch number | Switch position |
|---|---|---|---|
| GVAR | 080H | | |
| AAA | 088H | 1 | Closed |
| | | 2 | Closed |
| | | 3 | Open |
| | | 4 | Closed |
| | | 5 | X |
| | | 6 | X |
| POES | 090H | 1 | X |
| | | 2 | X |
| | | 3 | Off |
| | | 4 | Off |
| | | 5 | On |
| | | 6 | Off |
| | | 7 | Off |
| | | 8 | On |
| GMS | 098H | 1 | Off |
| | | 2 | On |
| | | 3 | On |
| | | 4 | Off |
| | | 5 | Off |
| | | 6 | On |
| | | 7 | X |
| | | 8 | X |
| PDUS | 0A0H | 1 | Off |
| | | 2 | On |
| | | 3 | On |
| | | 4 | Off |

2. **Insert the ingestor card in one of the ITF's remaining slots.**

## Connecting the Cables in the ITF

1. Refer to Figure 2 on the next page. The connector numbers refer to the edge connectors in the front of the ITF as well as the back panel connectors.

2. Connect the edge connectors specified in Figure 2 for a particular ingestor type to the most convenient ingestor card connector, i.e., don't cross ribbon cables. If CONN 1 or CONN 2 is specified for the ingestor, connect it to J3 of the ingestor. If CONN 3A or CONN 3B is specified, connect CONN 3A/B to J2 of the ingestor. If CONN 5 or CONN 6 is specified, connect it to J1 of the ingestor.

   For example, if you're using a PDUS ingestor, you would connect CONN 1 to J3 and CONN 3B to J2 of the PDUS ingestor.

## Connecting the Signal Source

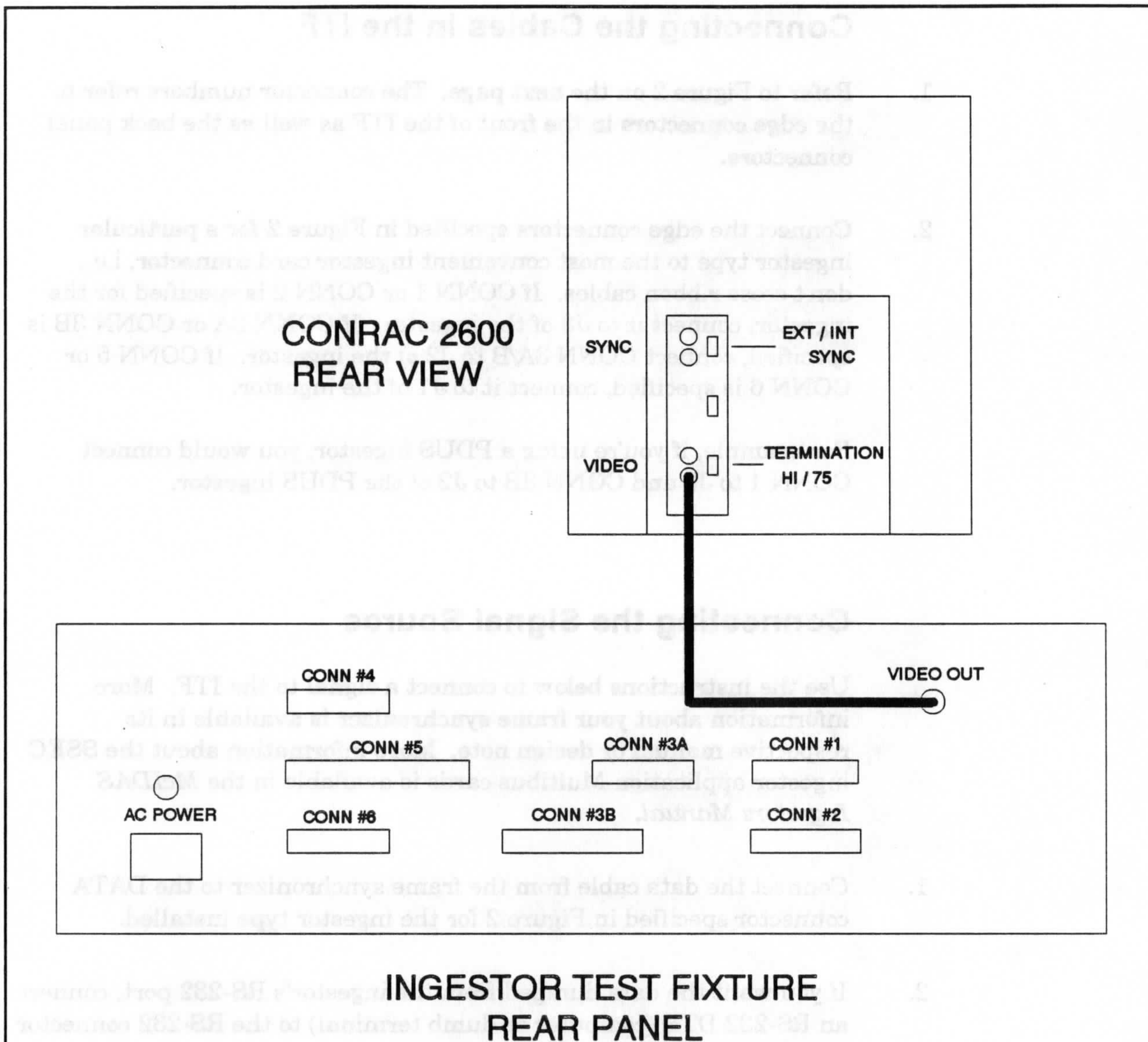
Use the instructions below to connect a signal to the ITF. More information about your frame synchronizer is available in its respective manual or design note. More information about the SSEC ingestor application Multibus cards is available in the *McIDAS Ingestors Manual.*

1. Connect the data cable from the frame synchronizer to the DATA connector specified in Figure 2 for the ingestor type installed.

2. If you want the data dumped from the ingestor's RS-232 port, connect an RS-232 DTE (computer or dumb terminal) to the RS-232 connector indicated in Figure 2. Then connect the appropriate baseband or data and clock signals to the frame synchronizer input.

## Connecting CONN 4

1. Connect CONN 4 to J1 of the ITF Multibus card. To remotely control the ITF, connect an RS-232 DTE device such as a computer or dumb terminal to the CONN 4 connector on the back panel. The ITF outputs image log data to this port. If desired, you can connect a printer wired as a DTE device to continuously log the received images. All characters are ASCII, sent in 8 bits, with zero in the MSB. The interface is at 19200 bits per second, no parity, 1 start bit, 1 stop bit, and no handshaking.




| INGESTOR TYPE | RS232 | DATA | FS CONTROL |
|---|---|---|---|
| PDUS | CONN 1 | CONN 3B | |
| GMS | CONN 6 | CONN 2 | |
| POES | CONN 3A | CONN 2 OR CONN 3B | CONN 5 |
| AAA | CONN 6 | CONN 2 | |
| GVAR | CONN 6 | CONN 2 | |

Figure 2. ITF Cable Connections

## Powering on the ITF

Below are the final steps in the installation procedure.

1. Power on the ITF and press RESET. You should see a diagonal gray scale in the image portion, and the field labels and default parameters in the alphanumeric portion of the display. The ingestor type just installed will appear at the top of the alphanumeric display.

2. Power off the ITF.

3. Remove any connectors blocking J2 of the Ingestor Test Fixture Multibus card.

4. Connect the keypad connector from the front panel to the Ingestor Test Fixture Multibus card on connector J2. The brown wire goes to pin 1 on the right.

5. Replace any connectors that you removed to gain access to J2.

6. Replace the front cover and screws.

7. Power on the ITF again. When a signal comes in with the qualities that meet the criteria of the default parameters in the alphanumeric fields, it will be displayed in the image portion of the screen.

This completes the Installation Procedure.

# Code Updates

The EPROM at location A22 on the ITF Multibus card is the code EPROM. Code updates require that you replace the EPROM with a new one. Note the orientation of the notch on the EPROM since you must install the new EPROM with the same orientation. Remove the old EPROM using an IC extraction tool or a small screw driver to lift it out of the card. Then being careful not to bend any pins, insert the new EPROM in its place.

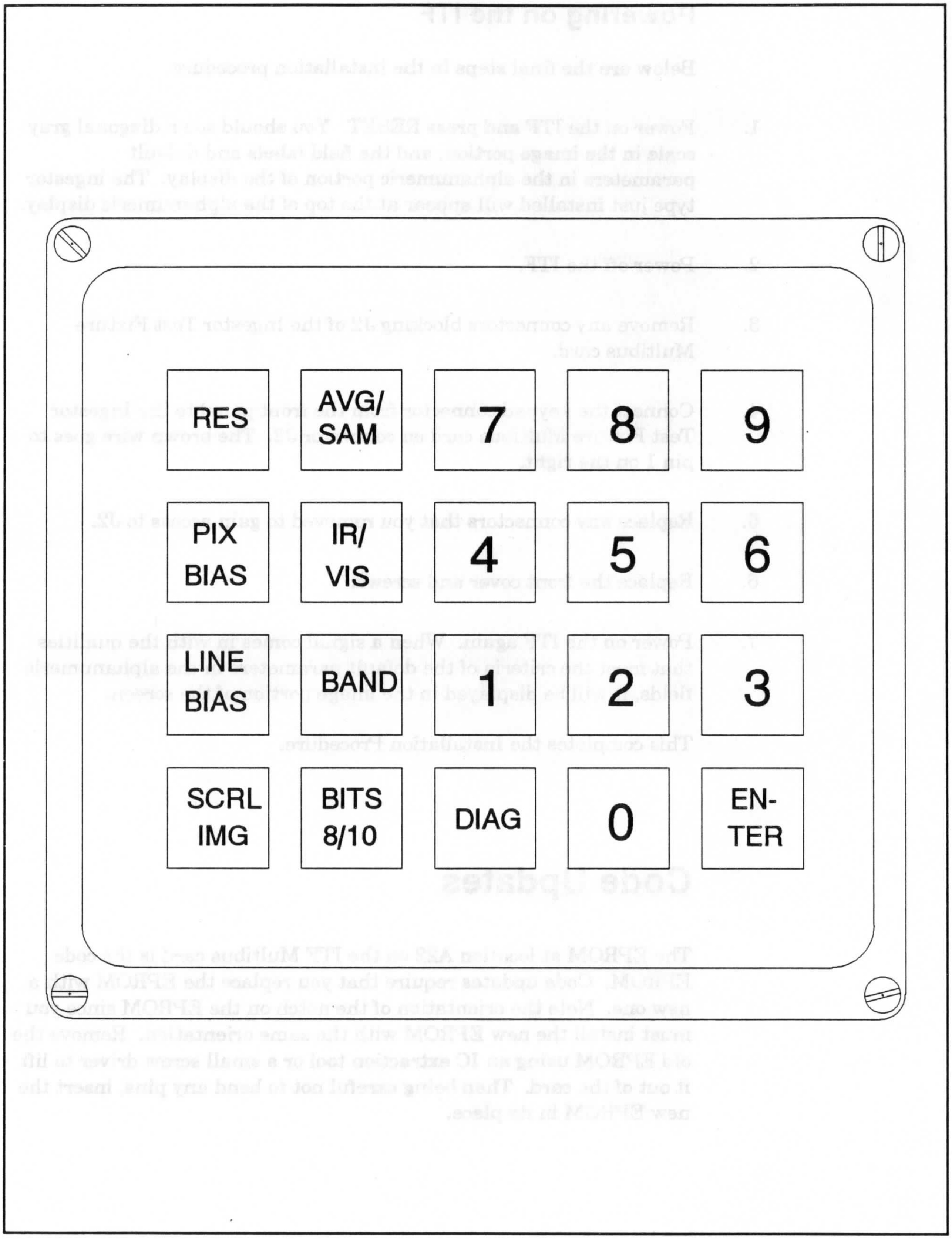



**Figure 3. Ingestor Test Fixture Keypad**

# User Interface

The user interface consists of a 20-key keypad (see Figure 3 on the adjacent page) and the alphanumeric display. You can select fields in the display with the appropriate keys and then enter new values with the numeric keys. A blinking asterisk signifies a field selected for a new parameter entry. If you press the wrong field selection key, you can recall the value by pressing ENTER. If you enter an invalid value for a given parameter, the closest valid value is automatically entered in its place.

Some keys toggle a parameter and do not require a value. Some alphanumeric fields display incoming signal status and are not controlled with the keypad.

## Alphanumeric Fields

Below is a description of each alphanumeric field and its corresponding key. The fields are listed as they appear from top to bottom on the screen.

**Satellite ID**

The satellite ID field displays the ingestor type installed in the ITF and the satellite ID number if available from the signal. This field is not used in conjunction with the keypad.

**Scan Line Number**

This field displays the current scan line number of the image being processed by the ingestor if available from the signal. POES images do not have scan line numbers because each image is of a different portion of the earth. This field is not used in conjunction with the keypad.

**Year, Day and Time**

These fields display the year, Julian day and GMT hours, minutes and seconds. They do not appear for PDUS. The GMT time is displayed in HHMMSS format. This field is not used in conjunction with the keypad.

**Signal Present**

This field displays the format of the image being processed or says NO SIGNAL PRESENT if nothing is coming in. It is only present for PDUS and POES because these signals have many different transmission formats. This field is not used in conjunction with the keypad.

**Image Number**

This field is only present for PDUS because the year, day and time are only given at the beginning of the image transmission. If missed (such as when archived data is played back starting in the middle of an image), there is no identification of which image it is. There is a unique number given to each transmitted raw image. These raw images are processed and retransmitted as several PDUS products. The image number and the format displayed in the SIGNAL PRESENT field identify a particular PDUS transmission. This field is not used in conjunction with the keypad.

**IR/VIS and BAND**

The IR/VIS key toggles between the infrared and visible fields. When you choose VIS or IR, it is displayed when available and all other parameters allow it. Pressing the BAND key steps through the valid bands in the visible or infrared spectrum. If there is only one band, it is not indicated. Water Vapor is a band in the infrared spectrum. It is indicated with a WV to the right of the IR indicator (IR WV). If there are other valid bands, they are numbered and displayed as "IR 8" or "IR 10" for example. For the main IR band representing radiant heat, no band is given and "IR " is displayed.

**Average/Sample**

This field toggles between AVERAGE and SAMPLE when you press the AVG/SAM key. If you choose a reduced resolution, this parameter controls whether several image points are averaged together to form a pixel or if several points are thrown away for each one sampled and displayed. Some ingestors don't have averagers. If you have one of these ingestors installed, this key is disabled and the field only displays SAMPLE.

**Resolution**

The resolution field contains the area in square kilometers represented by each pixel on the display. You select this field's value with the RES key on the keypad. Pressing the RES key clears the RES field and places a blinking asterisk in it. This allows you to enter a 2-digit resolution value in kilometers. If you want a resolution value of 1.25 Km, enter the closest integer value of 1 and press ENTER. If 1.25 Km is a valid resolution, it is displayed in the RES field.

As larger values are entered more area is represented by each pixel and the imagery appears blown down. The smallest valid number is the full resolution of the imagery transmitted where the pixels on a line represent consecutive data words from the satellite.

**Pixel Offset**

This field contains the number of image points from the start of a scan line to throw away before displaying them. You can display only about 215 pixels of an image scan line on a display line. A satellite scan line contains many more image points than 215. Thus, you cannot view the whole image at full resolution. You must blow it down by selecting a low resolution and sampling or averaging, or displaying a vertical strip of the image, or both. The PIXEL offset is the number of image points from the start of the scan line to the beginning of the vertical strip portion of the image to display.

Select this field's value with the PIX BIAS key on the keypad. Pressing this key clears the PIXEL offset field and places a blinking asterisk in it. Enter a pixel offset value up to five digits. Depending on the number of image points in the signal being processed, maximum offsets are set. If you enter a value larger than the maximum, it is automatically replaced with the maximum value.

**Line Offset**

This field contains the number of image lines from the start of the image to throw away before displaying it. Set this field's value with the LINE BIAS key on the keypad. Pressing the LINE BIAS key clears the LINE offset field and places a blinking asterisk in it. You can enter a line offset value up to four digits. Depending on the number of image lines in the signal being processed, maximum offsets are set. If you enter a value larger than the maximum, it is automatically replaced with the maximum value.

If you set the LINE offset field to zero, the imagery is displayed continuously with the oldest line being written over, or scrolled off the screen if the scroll feature is on. If the LINE offset value is not zero, imagery is displayed until 256 lines or one full screen comes in after the scan line reaches the LINE offset value. No more imagery is displayed until the next image comes in and that scan line is reached again. At that time another screen full of data is displayed, updating the same geographic area as the previous image. This area is displayed and continuously updated with each new image as long as the LINE offset value is unchanged.

To update the new image on top of the old image, you must turn the scroll feature OFF. Otherwise the new image will push the old image off the screen. See the SCRL IMG key information below.

This field is not present for POES since POES has no scan line numbers.

## Other Keys

The three keys below do not work in conjunction with the fields of the alphanumeric display.

**SCRL IMG** This key toggles the scroll feature on and off. When the scroll mode is on, a new line is written at one end of the screen and all other lines are shifted toward the other end, shifting the oldest line off the edge. When the scroll mode is off, the imagery does not shift. Each new line writes over the next line until it gets to the edge of the screen. Then it rolls over and the next new line writes over the line at the other end of the screen and continues.

**BITS 8/10** This key tells the ingestor whether to transfer 10-bit data or scale it to 8 bits. If it is sent as straight 10-bit data, the ITF scales it to 8 bits for display. If the ingestor transfers 8-bit data only, this key is disabled. Pressing the BITS 8/10 key toggles between the 8- and 10-bit mode.

**DIAG** The DIAG key steps through three test patterns displayed in the image portion of the screen. Pressing the DIAG key the first time clears the screen leaving it black. Pressing it a second time displays a diagonal gray scale with the lower-left corner black and the upper-right corner white. Pressing it a third time displays a diagonal gray scale with the transition from full white to full black appearing in the center of the screen.

# Remote Control and Logging Functions

The remote control function allows you to use a remote RS-232 DTE device as the keypad. Connect the DTE to CONN 4 on the back panel of the Ingestor Test Fixture (see page 5). The chart below shows how ASCII characters are mapped to the keypad keys.

| ASCII Character | Corresponding Keypad Key |
|---|---|
| R | RES |
| P | PIX OFF |
| L | LIN OFF |
| S | SCROLL |
| A | AVG / SAM |
| I | IR / VIS |
| B | BAND |
| W | BITS 8/10 |
| D | DIAG |
| Carriage Return | ENTER |
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |

You can connect a printer to this port to log image transmissions. The text printed for each image includes the satellite ID, image type, time, etc. Exact log data is stored in the sections specific to the ingestor being used. This data is sent to the device connected to the port.

# AAA

The Ingestor Test Fixture allows you to construct commands to send to a GOES Mode AAA Ingestor. You may request visible or infrared data at any resolution or offset, provided the value has meaning. Data is displayed on a monochrome monitor for the purpose of troubleshooting an ingestor or verifying the quality of a received signal. When troubleshooting, it is sometimes desirable to recreate the exact commands to an ingestor when trying to fix a specific problem.

## Special Installation Instructions

Set the DIP switches on the GOES AAA Ingestor according to the table on page 4 of this manual. Insert the ingestor card in the test fixture and attach connector CONN2 to J3 of the card. Plug the GOES bus cable into connector CONN2 on the back of the test fixture. At this point, the test fixture is ready to be powered up and reset in preparation for operation.

## AAA Specific Field Information

Upon reset, a set of default parameters is loaded for operation of the ingestor. The default mode is to request an IR globe with zero offset and averaged data.

The first field is the data type which is, of course, GOES. When valid data is being received, the satellite ID number is displayed next to the data type. The only satellite presently operating is GOES 7.

The next field is the scan number. This number can be any value between 1 and 1820. It increments each time the GOES satellite mirror is stepped.

The next three fields are the year, day and time. The day number increments from 1 to 365 throughout the year; the time displayed is GMT.

The next field is the VIS/IR field. This field toggles between VIS and IR each time the VIS/IR key is pressed. It indicates the data type requested.

The AVG/SAM field indicates whether the displayed data is averaged or sampled. This field and its corresponding data request are toggled each time you press the AVG/SAM key.

The RES field indicates which data resolution is being requested. The values are FULL, 2, 3, 4, 6, 8, 12, 16 and GLOBE. To change resolutions, first press the RES key followed by the desired number keys. Illegal values are disallowed and converted to a GLOBE request. To select GLOBE for a resolution value you must enter an illegal value. Press the ENTER key after the desired value is selected to complete the selection and turn it into a command. A flashing asterisk appears in this field to indicate that the next keys pressed should be resolution values. Only number keys will be recognized.

The PIXEL field indicates the pixel offset of the request. It is the number of pixels to skip on each scan line before the data is transferred. To change the offset value, first press the PIX BIAS key, followed by the desired numeric keys. A flashing asterisk will appear in the RES field to indicate that the next keys pressed will be used for the pixel offset value. At this point, only number keys will be recognized. When the desired offset is selected, press the ENTER key to complete the selection. If the pixel offset chosen is greater than the allowed maximum based on the resolution value selected, the offset is rounded down to the maximum. This prevents a data request from going past the end of actual data, causing meaningless data to be displayed.

The LINE field indicates the line offset into the image. This value is the number of lines to be skipped before the image is displayed. If the value is non-zero, the test fixture will skip data until the scan number equals the line field value. Then the screen is filled with an image. The display stops until the scan number of the next image equals the line field value and the image is overwritten. In this mode the same section of the earth is overwritten as each new image is received.

To change the line offset, first press the LINE BIAS key followed by the desired numeric keys and press ENTER to complete the selection. As above, when the LINE BIAS key is pressed, a flashing asterisk appears in the field to indicate that the next values entered will be the new line offset value. Only number keys are recognized until the line offset value is entered. The line offset value is changed to the maximum allowable value based on the resolution value selected if the offset chosen is greater than the maximum allowed value.

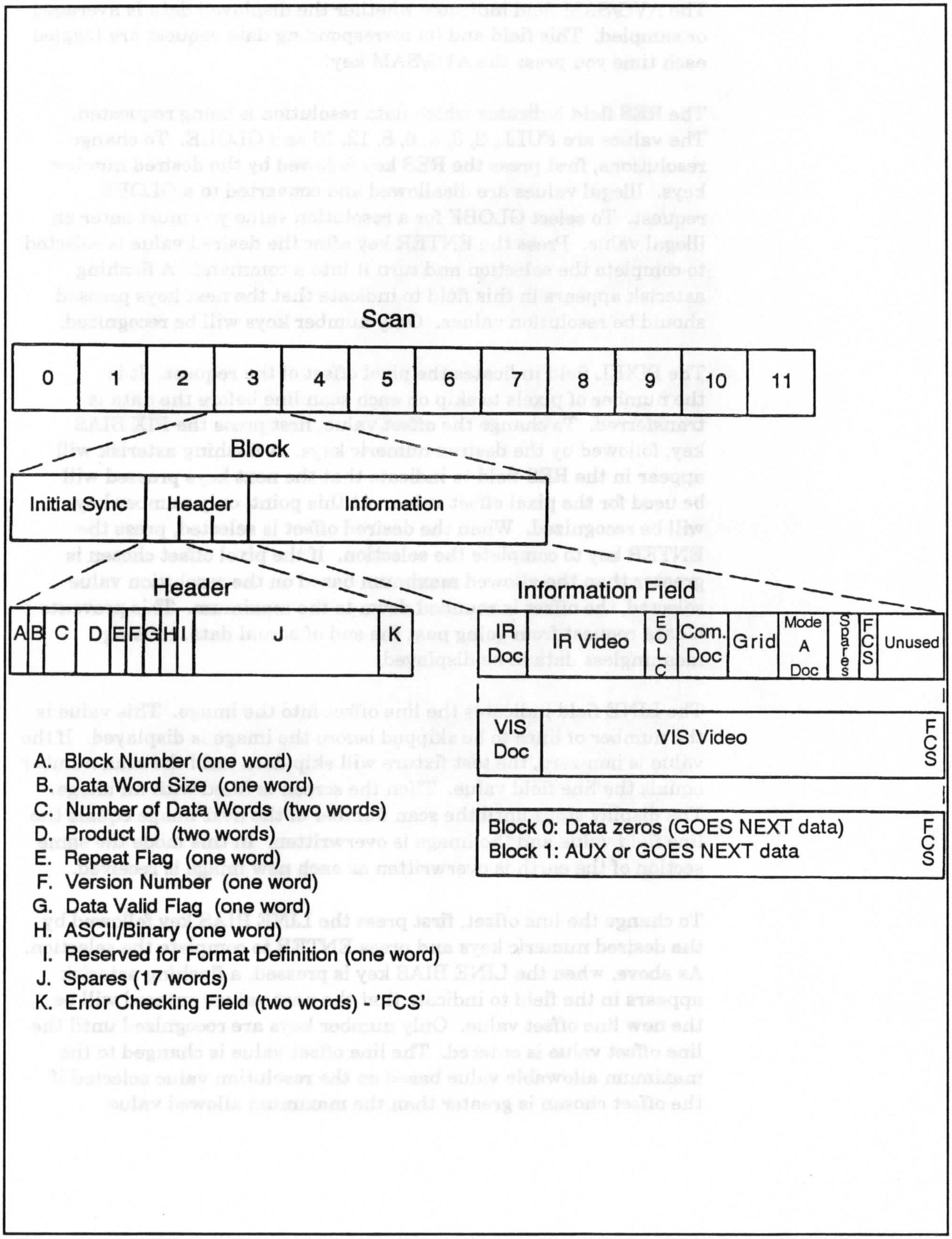



Figure 4. Mode AAA Signal Format

## Data Logging Function

The Ingestor Test Fixture automatically prints a log of all images as they are received. One line is printed at the beginning and end of the image. Each line contains the following information:

- beginning or ending line number
- day number
- time (GMT)
- year

## Mode AAA Signal Format

The format of the meteorological data and associated parameters relating to the GOES Visible and Infrared Spin Scan Radiometer Atmospheric Sounder (VAS) is called Mode AAA. It is depicted in Figure 4 on the adjacent page.

Remotely sensed measurements made by the GOES VAS are transmitted to the National Oceanic and Atmospheric Administration (NOAA) Command and Data Acquisition (CDA) station at Wallops Station, Virginia. At the CDA station, the visible and infrared data are reformatted, calibrated, gridded and transmitted (via the GOES) at a reduced data rate to receiving stations remotely located from the CDA station. It is the format of this reduced rate VAS data, referred to interchangeably as stretched VAS (SVAS) and Mode AAA that is defined here.

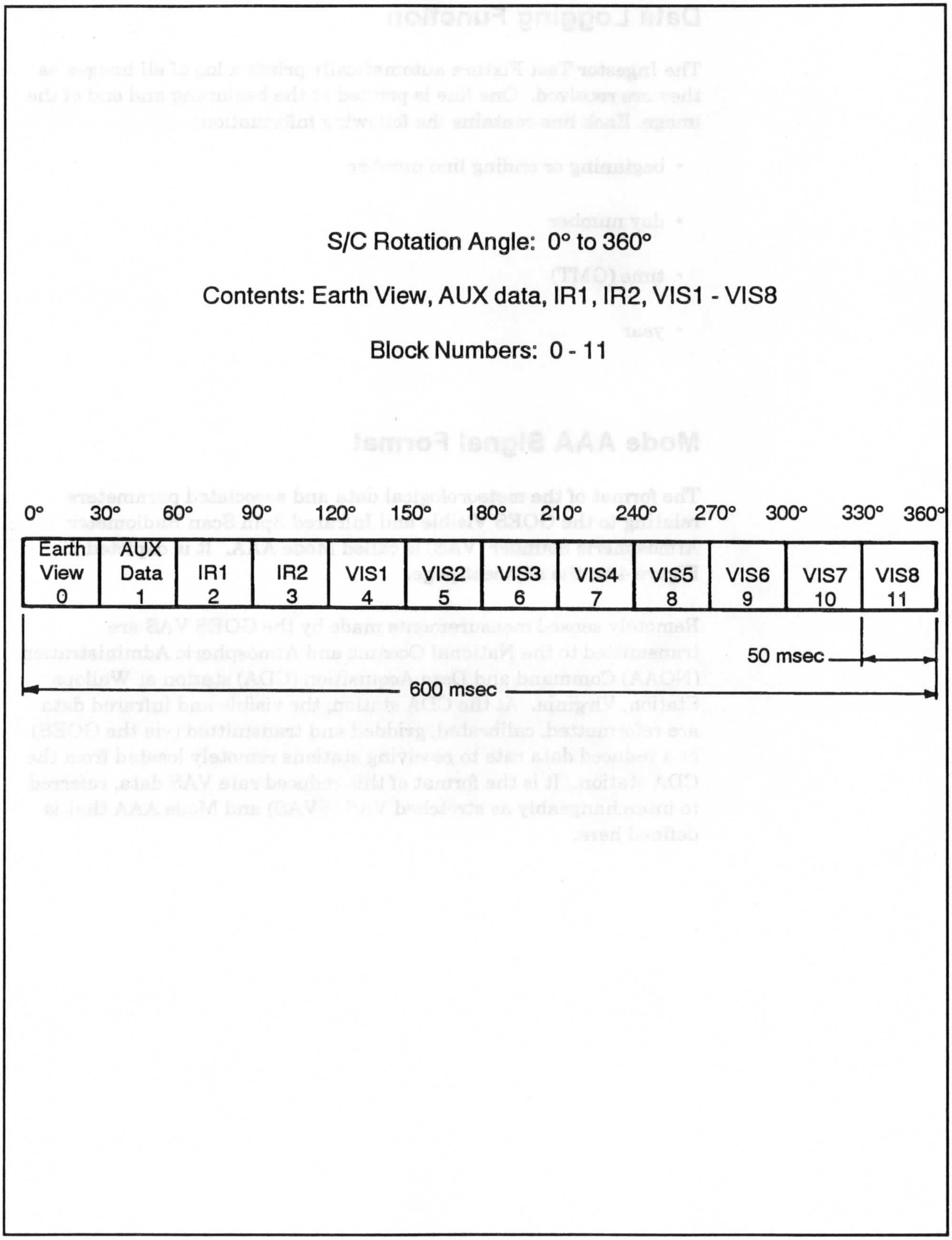



Figure 5. Mode AAA Scan Format

**Scan Format**

The format of one scan of Mode AAA data is shown in Figure 5 on the adjacent page. It is a concatenation of 12 equal-duration blocks of which the total period (600 milliseconds) corresponds to the nominal period of one spacecraft revolution. Consequently, each block is 50 milliseconds duration and corresponds to 30° of spacecraft rotation.

The retransmission scheme is such that 8 blocks each contain data from one of the VAS instrument's visible sensors; 2 blocks each contain data from one of the VAS instrument's infrared sensors; 1 block contains auxiliary data from any of several ground system sources. The Earth View block contains data zeros in the Mode AAA design; future systems may utilize this block for data transmission. The Mode AAA retransmission format is shown in the table below.

| Mode AAA Retransmission Format | |
|---|---|
| **Scan** | |
| Period | 600 msec. nominal |
| Blocks/scan | 12 |
| Bit rate | 2,111,360 bits per second |
| **Block** | |
| Period | 50 msec. nominal |
| Sync length | 10032 bits |
| Header word length | 8 bits per word |
| Header length (triple redundant) | 90 words (720 bits) |
| Information field word length | 6, 8 or 10 bits per word |
| Information field length | 94816 bits |
| **Information Field** | |
| IR block | |
| Word length | 10 bits per word |
| IR documentation length | 16 words (160 bits) |
| IR video | 3822 words (38220 bits) |
| EOLC | 8 words (80 bits) |
| Common documentation | 512 words (5120 bits) |
| Mode A IR documentation | 128 words (1280 bits) |
| Gridding information | 1024 words (10240 bits) |
| Spare | 384 words (3840 bits) |
| FCS | 2 8-bit words (16 bits) |
| Unused | 3586 words (35860 bits) |
| VIS block | |
| Word length | 6 bits per word |
| VIS documentation | 512 words (3072 bits) |
| VIS video | 15288 words (91728 bits) |
| FCS | 2 8-bit words (16 bits) |
| AUX data block | |
| Word length | 6, 8 or 10 bits per word |
| FCS | 2 8-bit words (16 bits) |
| Length | 94816 bits |

During the time that raw VAS data is transmitted from the satellite at a rate of 28 Mb/second, the transponder's receiver is squelched. To avoid data loss, the retransmission of SVAS must be timed so that the Earth View block arrives at the spacecraft coincidently with the receiver's squelch period. For the current GOES satellites, the receiver squelch period can occur from -16.6° to +10.6° for a total of 23.2°. This is well within the 30° allocated for the Earth View block in the AAA format. The retransmission timing will be such that the transponder squelch period terminates 3-1/3 to 5 msec (2° to 3° of spacecraft rotation) before the beginning of the Block 1 synchronizing period.

**Bit Rate**

The nominal bit rate of the retransmitted data is 2,111,360 bits per second. Because of the equal angle sampling method used to format the VAS data, the number of samples per scan line is constant regardless of the satellite spin rate. Therefore, as the spin rate may vary with a ± 5 RPM tolerance, the bit rate varies in direct proportion.

# POES

POES is an acronym for Polar Orbiting Environmental Satellite. As opposed to geosynchronous orbit, the POES spacecraft's orbits are tilted 8° from the poles and cross at the equator. The earth rotates 25.4° per hour beneath the orbits which have a period of approximately 101 minutes. The ITF displays the AVHRR (Advanced Very High Resolution Radiometer) image data sent from the POES satellites. AVHRR data has three formats: HRPT, GAC and LAC. Each format contains images of five spectral bands. Bands 1 and 2 are visible; bands 3, 4, and 5 are infrared.

Pressing the IR/VIS key on the keypad selects between the visible and infrared bands. If visible is selected, pressing the BAND key toggles between bands one and two. If infrared is selected, pressing the BAND key selects a band from 3-5, scrolling one band each time it is pressed.

The imagery can only be sampled by the ITF to display lower resolutions. The resolution values displayed in the RES field apply to the center of the image. Since the spacecraft has an altitude of only about 870 Km, it images only a narrow strip or "apple peel" of the earth as it orbits. When the sensors scan to the east and west edges of the spacecraft's field of view, they cover a much larger geographic area per pixel than when positioned straight down toward the earth. This distortion between the edges and center of the images becomes apparent at lower resolutions or when viewing the edge of an image.

**HRPT Format**

HRPT is an acronym for High Resolution Picture Transmission. AVHRR imagery is transmitted in the HRPT format continuously. This is why there are no scan line numbers for POES. The image data transmitted is an AVHRR scan line directly below and perpendicular to the direction of the spacecraft orbit. This means the spacecraft continuously transmits imagery of the earth as it flies over it.

A receiving station can acquire HRPT data only while the satellite is in a line of sight from a tracking antenna. This means only HRPT imagery within a line of sight radius of a ground station can be directly acquired by that ground station. HRPT imagery has a maximum resolution of 1.1 Km per pixel and has 2048 pixels per scan line for each of the 5 bands.

**LAC Format**

LAC is an acronym for Local Area Coverage. This format is identical to HRPT except that the AVHRR data is played back from a tape recorder on board the spacecraft and is of a prerecorded geographic area outside the line of sight radius of the ground station. During a flyover when the ground station is in communication with the satellite, the ground station can command the POES to record the AVHRR data starting at some future time and play back the data as LAC format transmission during the next ground station flyover. It looks just like an HRPT on the ITF.

**GAC Format**

GAC is an acronym for Global Area Coverage. A GAC is also prerecorded AVHRR data, but it has reduced resolution so that the data from the entire orbit can be recorded. The POES is programmed by the ground station to start recording at some future time. When that time comes, the spacecraft starts recording the reduced resolution AVHRR data and continues for a complete orbit. The data is then played back during the next ground station flyover in the GAC format. GAC format imagery has a maximum 4 Km resolution per pixel and 409 pixels per scan line for each of the 5 bands.

**Log Data Contents**

The log data that the Ingestor Test Fixture's RS-232 port sends when a POES ingestor card is installed contains the following:

- satellite ID
- transmission format
- day
- time
- error count in hexadecimal

# GMS

GMS (Geostationary Meteorological Satellite) is a weather satellite that generates visible and infrared images of the earth over East Asia, Australia and the Pacific Ocean.

The GMS satellite produces visible images that are 10,000 pixels by 10,000 image lines, and infrared images that are 2500 pixels by 2500 image lines. It generates four visible image lines and one infrared image line for each scan line. Each of these image types covers the same geographic area, meaning the infrared imagery has one-fourth the resolution of the visible imagery.

The highest resolution that GMS visible data can be viewed is 1.25 square Km per pixel; the highest resolution that GMS infrared data can be viewed is 5 square Km per pixel. The lowest resolution that visible data can be viewed on the ITF is 10 square Km per pixel. The lowest resolution that infrared data can be viewed on the ITF is 40 square Km per pixel.

When you press the VIS/IR key, pixel offset is automatically adjusted to display the same geographic area that was displayed before pressing the key.

## Log Data Contents

The log data that the Ingestor Test Fixture's RS-232 serial port sends when a GMS ingestor card is installed contains the following:

- satellite ID
- time in HH:MM:SS
- day in MMM DD
- year in YYYY
- error count in hexadecimal

# PDUS

PDUS is processed and retransmitted METEOSAT data. The imagery products available are visible, infrared and water vapor. These products are available in three formats: A type format, B type format and X type format. Each format displays a different geographic area. See Figures 6, 7, 8 and 9 beginning on page 28.

You can transmit any combination of products in any format. For example, the PDUS transmission schedule on page 32 shows a BIW transmission at 0010 GMT. B is the format, I means infrared and W means water vapor. This indicates that an infrared and water vapor image of the geographic area in the B type format will be transmitted at 0010 GMT.

If you select VIS with the VIS/IR key and a BIW is transmitted, BIW SIGNAL PRESENT is displayed on the screen and the SCAN field counts the scan lines. No imagery is displayed because there is no VIS in a BIW transmission. However, at 0610 GMT when a BIVW comes in, the visible product will be displayed as long as the other parameters allow it.

## A Type Format Images

Infrared and water vapor A type format images are 2500 pixels by 2500 lines, yielding a maximum five square kilometer per pixel resolution. Visible METEOSAT A type format images are 5000 pixels by 5000 lines, yielding a maximum 2.5 square kilometer per pixel resolution. 2.5 square kilometer per pixel resolution visible imagery is available from the PDUS retransmission on the Ingestor Test Fixture for AV, BV, XV, AIV, BIV and XIV transmissions.

If you select VIS with the VIS/IR key and 2.5 Km resolution with the RES key, any BIVW transmission coming in will not be displayed since no 2.5 Km data is present in a BIVW. If a BIV comes in later, the visible image will be displayed at 2.5 Km resolution.

Because the METEOSAT satellite has two visible sensors, each earth scan collects two visible lines. When the scan line indicates 600, the 600th infrared and water vapor lines are collected (if present in the transmission) and the 1200th visible line is collected (if present in the transmission). Both represent the same geographic area but the visible has twice the resolution.

Since AIVW, BIVW and XIVW PDUS transmissions contain 2500 visible lines, pixels are sampled by two to keep the image aspect proportional. Five kilometer resolution is the highest that can be displayed in the ITF for these transmissions. AIVH transmissions are half the normal visible resolution, so the highest valid resolution is five kilometers. The pixel offset is still figured for 5000 pixels by 5000 lines for all visible images and 2500 pixels by 2500 lines for all infrared and water vapor images.

**B Type Format Images**

B type format PDUS transmissions are a subset of A type format transmissions displaying only Europe instead of the whole globe. In the visible image, they contain 2500 pixels and have the same resolution as A type format transmissions, but sacrifice half the geographic coverage. The first pixel of a B type format visible image geographically aligns with the 1250th pixel of an A type format visible image. See Figure 8 on page 30.

Infrared and water vapor send only 1250 pixels for a B type format image. The first pixel of a B type format infrared or water vapor image geographically aligns with the 625th pixel of an A type format visible image. See Figure 6 on page 28.

If you select VIS with the VIS/IR key and set the PIXEL offset to 600 with the PIX BIAS key with a BIV coming in, no image is displayed. BIV does not contain data representing the geographic area at pixel 600. If an AIVH comes in later, it is displayed starting at pixel 600.

B type format PDUS transmissions start at scan line 1810. If you select a LINE offset of 1700 with the LINE BIAS key, data is displayed until 256 lines after line 1700 of the next A type format image. After that point, no B type format images are displayed because they do not contain scan line 1700. If you change the line offset to 1810 or greater, all A and B type format images are displayed.

**X Type Format Images**

X type format images contain imagery from the GOES satellite over North and South America. They are treated the same as B type format images with the first pixel of an infrared image at an offset of 625. The first pixel of a visible image is at 1250. X type format images start at scan line 0 and go to 1250 for infrared and 2500 for visible. See Figures 7 (page 29) and 9 (page 31).

**PDUS Specific Field Information**

The image number on the alphanumeric display is transmitted with the image. It is a unique, incrementing number identifying the raw METEOSAT image from which the current incoming PDUS product was derived.

The SAMPLE/AVERAGE field should always read SAMPLE when PDUS is the ingestor type.

The maximum pixel offset can change depending on the resolution setting. If you select a low resolution that displays nearly the whole globe and specify a large offset, so many pixels are thrown away by sampling that you will run out before 215 are displayed and garbage will be displayed in the remainder of the screen. As the resolution decreases, the maximum pixel offset decreases.

**Log Data Contents**

The log data that the Ingestor Test Fixture's RS-232 port sends out when a PDUS card is installed contains the following:

- satellite ID
- image number
- raw image transmit year, time and day
- product type
- administrative messages

If the administrative message is the same as for the previous image, only the message month and count are output. If a new message is sent and the month or count is different than for the previous image, the entire 800-character message is output. Administrative messages for X type format transmissions are not output.

## Sample Settings

To see as much geographic area in a ***visible B type format image*** as possible, set the Visible/Infrared field to VIS with the VIS/IR key. Set the resolution to 40 Km, the pixel offset to 1250 and the line offset to 0 or 1810. Since this example has a large pixel offset and high sample rate, the right one-quarter of the screen will display meaningless information because there are not enough displayed pixels to fill the screen.

To see as much geographic area in an ***infrared or water vapor B type format image*** as possible, set the Visible/Infrared field to IR with the VIS/IR key. Select infrared or water vapor with the BAND key. Set the resolution to 40 Km, the pixel offset to 625 and the line offset to 0 or 1810. As in the example above, there is a large pixel offset and a high sample rate. The right one-quarter of the screen will display meaningless information because there are not enough displayed pixels to fill the screen.

To see as much geographic area in a ***visible A type format image*** as possible, set the Visible/Infrared field to VIS with the VIS/IR key. Set the resolution to 40 Km and the pixel offset between 0 and 1608. Set the line offset to 0.

To see as much geographic area in an ***infrared A type format image*** as possible, set the Visible/Infrared field to IR with the VIS/IR key. Set the resolution to 40 Km and the pixel offset between 0 and 804. Set the line offset to 0.

To see the highest possible ***resolution***, set the Visible/Infrared field to VIS. Set the resolution to 2.5 Km by entering a resolution of 1. Set the pixel offset to 1250 to display A and B type format images. Set the line offset to 0.

To see the highest possible ***resolution infrared or water vapor image***, set the Visible/Infrared field to IR. Select infrared or water vapor with the BAND key. Set the resolution to 5 Km. Set the pixel offset to 625 to display A and B type format images. Set the line offset to 0.

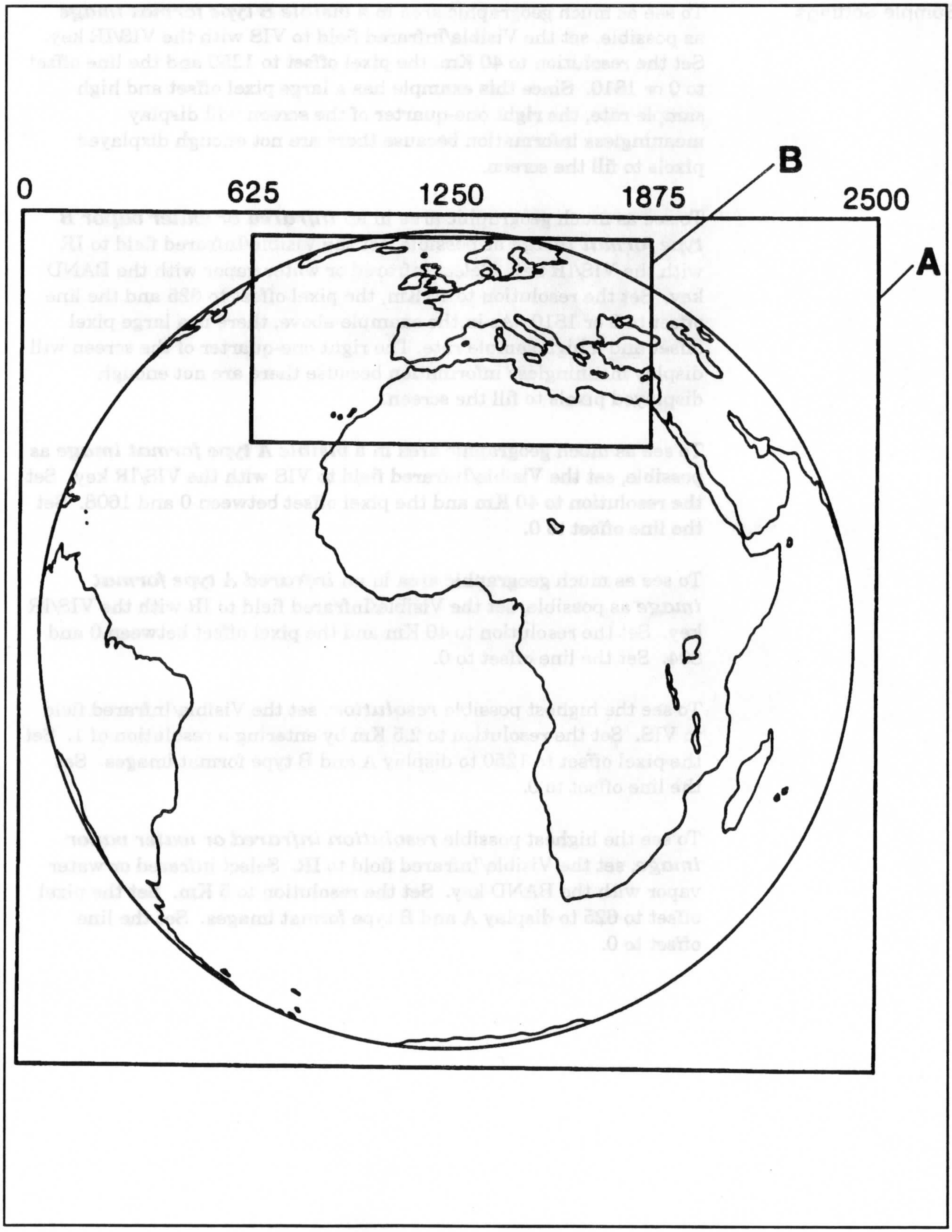



Figure 6. Infrared A and B Type Format Coverage

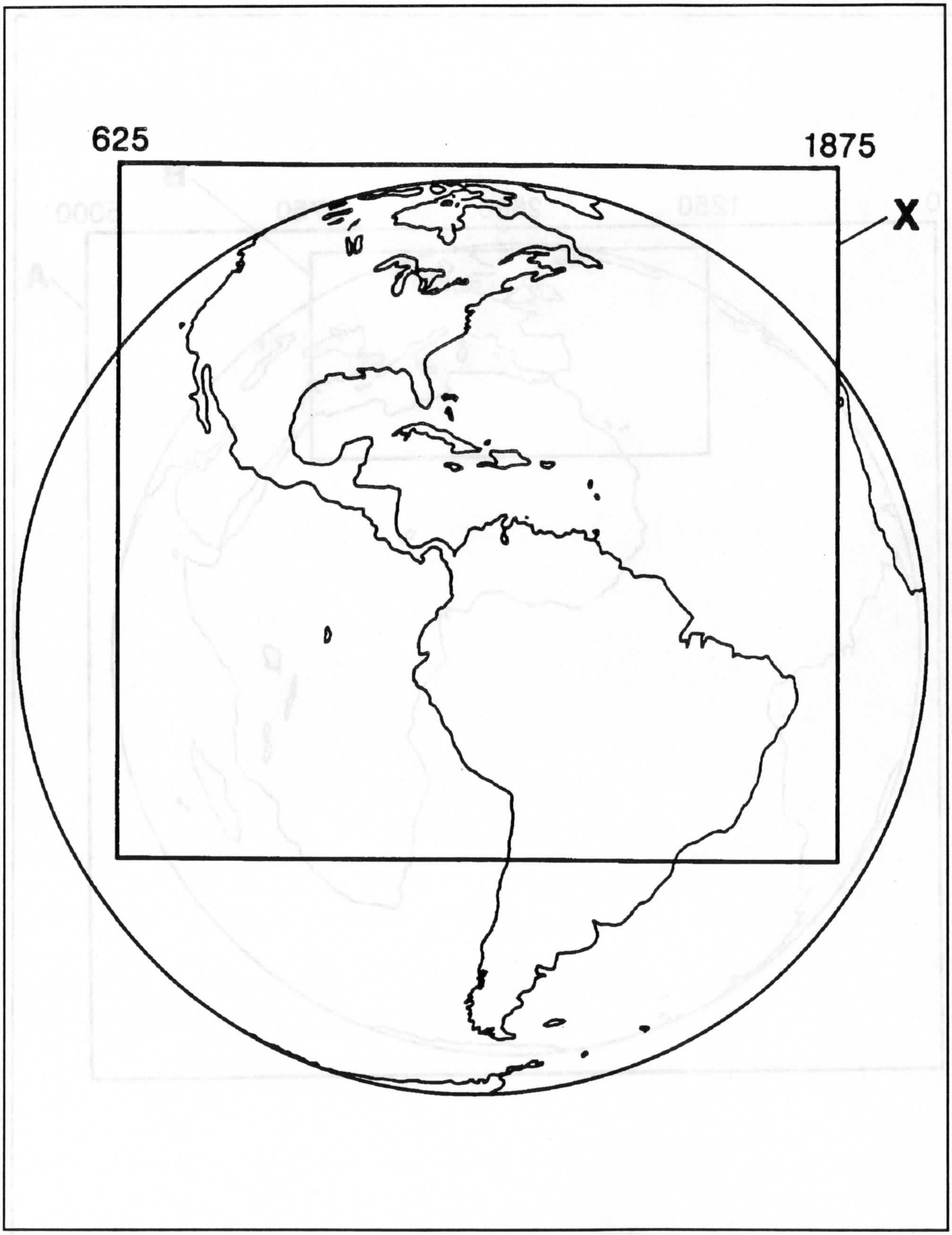



Figure 7. Infrared X Type Format Coverage

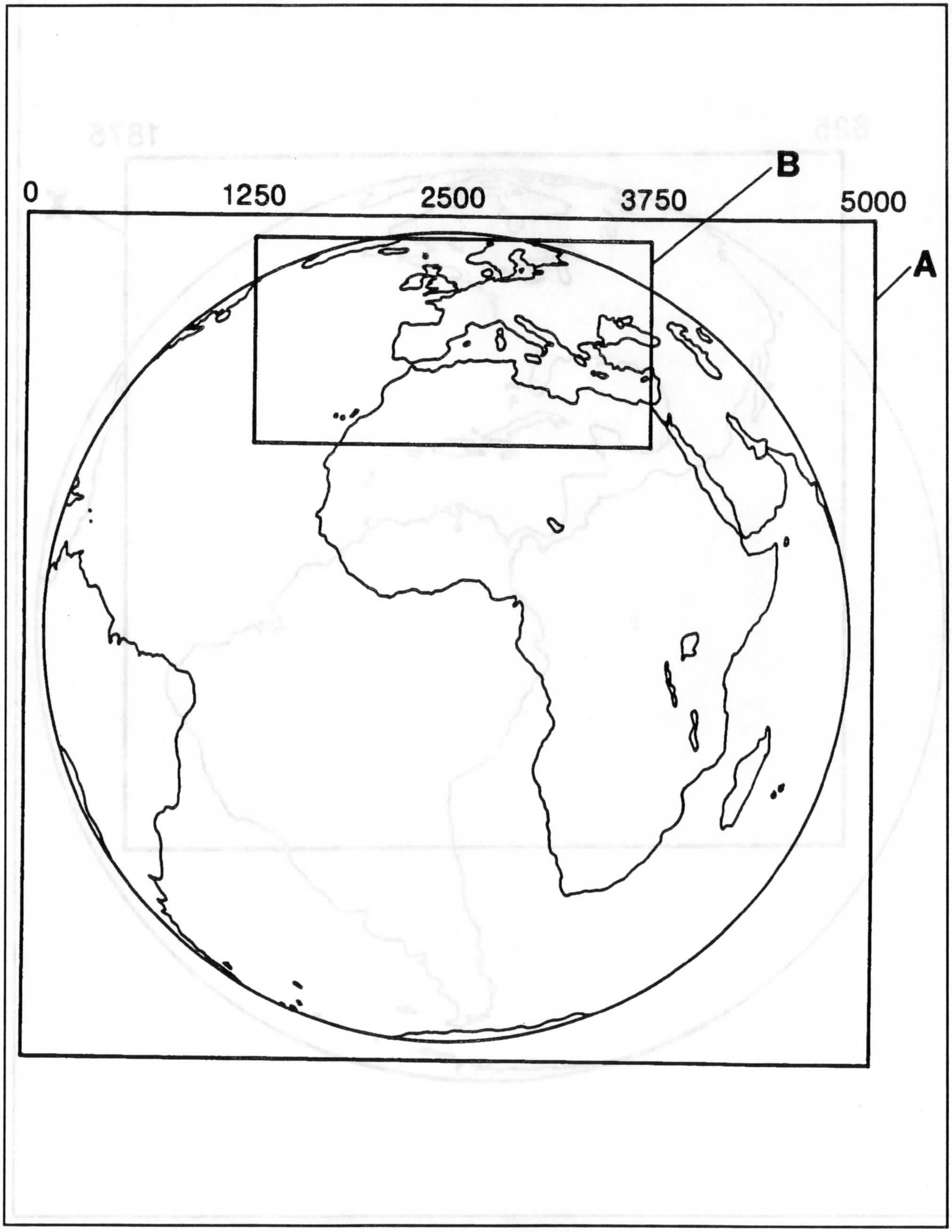



Figure 8. Visible A and B Type Format Coverage

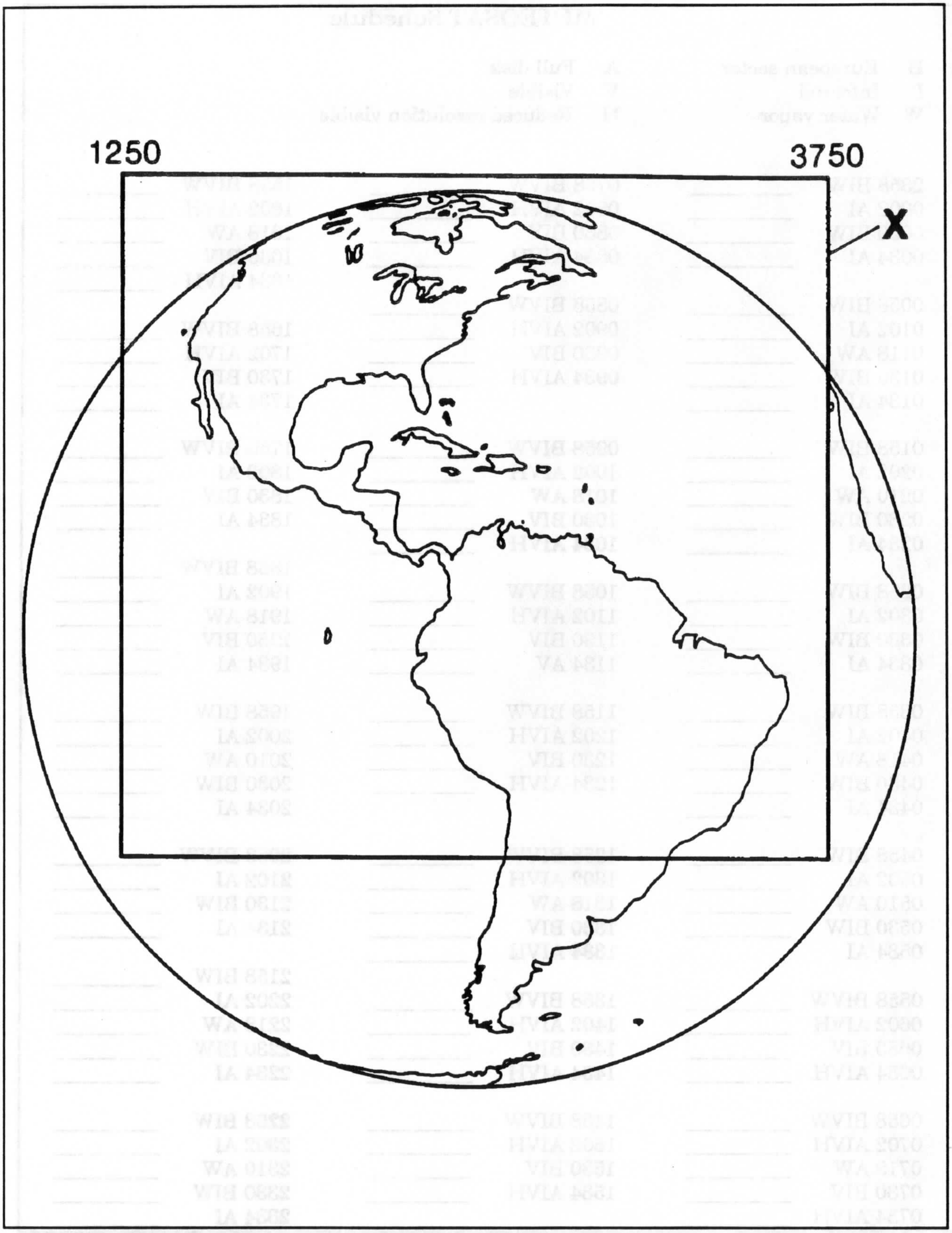



Figure 9. Visible X Type Format Coverage

## METEOSAT Schedule

| | | | |
|---|---|---|---|
| **B** | European sector | **A** | Full disk |
| **I** | Infrared | **V** | Visible |
| **W** | Water vapor | **H** | Reduced resolution visible |

| | | |
|---|---|---|
| 2358 BIW | 0758 BIVW | 1558 BIVW |
| 0002 AI | 0802 AIVH | 1602 AIVH |
| 0030 BIW | 0830 BIV | 1618 AW |
| 0034 AI | 0834 AIVH | 1630 BIV |
| | | 1634 AIVH |
| 0058 BIW | 0858 BIVW | |
| 0102 AI | 0902 AIVH | 1658 BIVW |
| 0118 AW | 0930 BIV | 1702 AIVH |
| 0130 BIW | 0934 AIVH | 1730 BIV |
| 0134 AI | | 1734 AI |
| 0158 BIW | 0958 BIVW | 1758 BIVW |
| 0202 AI | 1002 AIVH | 1802 AI |
| 0210 AW | 1018 AW | 1830 BIV |
| 0230 BIW | 1030 BIV | 1834 AI |
| 0234 AI | 1034 AIVH | |
| | | 1858 BIVW |
| 0258 BIW | 1058 BIVW | 1902 AI |
| 0302 AI | 1102 AIVH | 1918 AW |
| 0330 BIW | 1130 BIV | 1930 BIV |
| 0334 AI | 1134 AV | 1934 AI |
| 0358 BIW | 1158 BIVW | 1958 BIW |
| 0402 AI | 1202 AIVH | 2002 AI |
| 0418 AW | 1230 BIV | 2010 AW |
| 0430 BIW | 1234 AIVH | 2030 BIW |
| 0434 AI | | 2034 AI |
| 0458 BIW | 1258 BIVW | 2058 BIVW |
| 0502 AI | 1302 AIVH | 2102 AI |
| 0510 AW | 1318 AW | 2130 BIW |
| 0530 BIW | 1330 BIV | 2134 AI |
| 0534 AI | 1334 AIVH | |
| | | 2158 BIW |
| 0558 BIVW | 1358 BIVW | 2202 AI |
| 0602 AIVH | 1402 AIVH | 2218 AW |
| 0630 BIV | 1430 BIV | 2230 BIW |
| 0634 AIVH | 1434 AIVH | 2234 AI |
| 0658 BIVW | 1458 BIVW | 2258 BIW |
| 0702 AIVH | 1502 AIVH | 2302 AI |
| 0718 AW | 1530 BIV | 2310 AW |
| 0730 BIV | 1534 AIVH | 2330 BIW |
| 0734 AIVH | | 2334 AI |

Figure 10. METEOSAT Schedule

# Diagnostics

The Ingestor Test Fixture has self-test routines that you can run using the RS-232 serial port. First, connect a DTE device with input and output (e.g., a dumb terminal) to CONN 4. To access these routines, find the DIP switch pack at location AF29 on the ITF board. Set switch 1 to the ON position and reset the ITF. The output on the DTE will read:

```
80/24 MODIFIED INGESTOR TEST FIXTURE MONITOR
.
```

At the "dot" prompt you can enter monitor commands to read and write to I/O ports and memory locations. You can also move and fill blocks of memory, insert bytes of memory, and start program execution at any address. The monitor commands are described in the document titled *Use of the 80/20 SSEC Modified Monitor V1.0.*

To access the test routines, first display the dot prompt above. Then,

Type: **T**

The ITF displays the message below on the DTE.

```
SPACE FOR DIAGNOSTIC MENU
```

Pressing the space bar displays a menu of 9 diagnostic tests. Select a test by pressing its corresponding number.

**Test 1**

CODE EPROM CHECKSUM TEST
This test calculates the checksum of the EPROM. Use it to verify the version of the current code. Check the reported value against the value written on the prom at location A22 on the Ingestor Test Fixture Multibus card.

**Test 2**

RAM TEST
This test performs a walking ones memory write and read back on the microprocessor scratch pad RAM. It then runs a near neighbor addressing check, writing to each RAM location and checking the addresses that differ from the write address by one bit. This test reports the address being tested, the values written and the values expected.

**Test 3** — 8256 MUART REGISTER TEST

This test writes values for some of the MUART's registers and reads them back. If they are not the same, it reports the value written and the value read.

**Test 4** — TEN BIT EPROM CHECKSUM TEST

This test checks the path to the 10-bit scaling prom by calculating its checksum. Check the reported value against the value written on the prom at location D22 on the Ingestor Test Fixture Multibus card.

**Test 5** — IMAGE RAM TEST PATTERN

The microprocessor cannot read data in image RAM. Instead, it is read to the image portion of the display. This test writes a diagonal gray scale with the transition from white to black appearing in the center of the screen. Pixels of high contrast can signal a bad memory location. Bad areas or periodic bad pixels can be caused by an addressing problem.

**Test 6** — CLEAR IMAGE RAM

This test writes a value of zero to all image RAM locations, clearing the image portion of the monitor.

**Test 7** — ALPHANUMERIC DISPLAY TEST

This test displays the contents of the character PROM on the alphanumeric portion of the monitor, displays it again with the blink attribute ON, and then fills the rest of the alphanumeric display with alternating blinking and nonblinking asterisks.

**Test 8** — KEYPAD TEST

This test asks you to press each key on the Ingestor Test Fixture's keypad. Each key press displays the hex value received by the microprocessor and the key label. Press ESC on the DTE device to exit the test.

**Test 9** — RETURN TO MONITOR

Pressing this or any invalid key passes program control back to the monitor.