FLIGHT SOFTWARE

INTERFACE CONTROL DOCUMENT

FOR THE

GLOBAL ULTRAVIOLET IMAGER

(GUVI)

FLIGHT INSTRUMENT

7366-9041

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1. Introduction

1.1 Scope

This document defines the software interfaces between the detector processor and the telemetry processor for the Global Ultraviolet Imager (GUVI) flight instrument. The GUVI flight software consists of two components, (1) detector processor software, and (2) telemetry processor software.

1.2 Applicable Documents

TIMED General Instrument Interface Specification, 7363-9050

GUVI Technical Requirements Specification, 7366-9001

GUVI Flight Software Development Plan, 7366-9002

GUVI Subsystem Electrical Interface Control Document, 7366-9020

GUVI Flight Software Requirements Specification, 7366-9040

Space Department Software Quality Assurance Guidelines, SDO-9989, September 1992

2. Detector Processor Interface

2.1 Detector Processor Commands

The telemetry processor controls the operation of the detector processor (DPU) by sending to the detector processor 16 bit command codes. A command code must be placed on the 16 bit DPU input bus within 10 msec after the detector processor is reset. There is no minimum set up time in writing to the DPU input bus. The command code is followed by 16 bit arguments for some commands. Commands 0 through 5 are PROM based DPU commands. The telemetry processor reads detector processor data from the 16 bit DPU output bus.

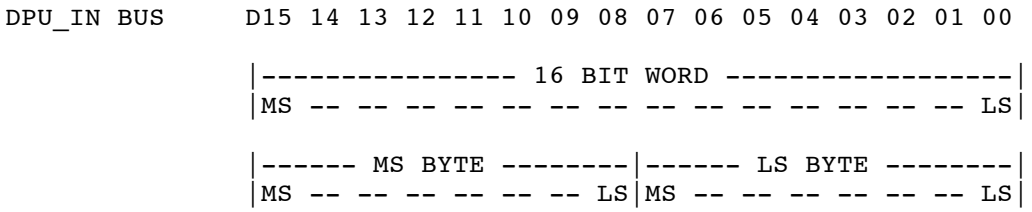
Code	Detector Processor Function
0	Load DPU Memory
1	Read DPU Memory
2	DPU PROM Test
3	DPU RAM Test
4	Run Program
5	Reserved
6	Initialize DPU

7	Process Detector Data
8	Transfer Imaging Mode Data
9	Transfer Spectrograph Mode Data
10	Transfer Single Pixel Data
11	Transfer Test Mode Data
12	Transfer Forced ADC Data
13	Read All Counters
14	Transfer Background Count Data
15	Transfer Dark Count Data
16	Download Color Table
17	Download Background Table
18	Download Dark Table
19 - 31	Reserved

2.2 Data Bus Definition

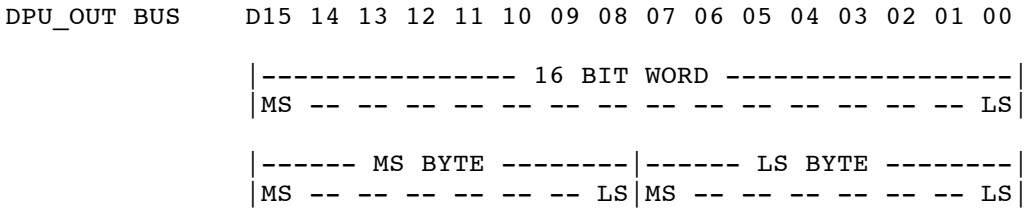
2.2.1 DPU Input Bus

The DPU input bus (DPU_IN) is used to transfer commands and data from the telemetry processor to the detector processor. The bus size is 16 bits. The most-significant bit of the bus is bit 15 (DPU_IN_D15), and the least-significant bit of the bus is bit 0 (DPU_IN_D0).



2.2.2 DPU Output Bus

The DPU output bus (DPU_OUT) is used to transfer data from the detector processor to the telemetry processor. The bus size is 16 bits. The most-significant bit of the bus is bit 15 (DPU_OUT_D15), and the least-significant bit of the bus is bit 0 (DPU_OUT_D0).



2.3 Focal Plane Map

The detector processor bins events over a detector image plane of 32 spatial pixels by 256 spectral pixels. The SIS focal plane (14 spatial pixels by 176 spectral pixels) falls within the detector image plane. The size of the SIS focal plane is 16.5 mm spatial by 15.6 mm spectral. The detector software magnification factors and offsets are set such that the SIS focal plane spatial extent (16.5 mm) covers 14 spatial pixels, and the spectral extent (15.6 mm) covers 160 spectral pixels. The location of the SIS focal plane origin relative to the detector image plane origin is determined during optical calibration. The detector tube photocathode size is 25 mm diameter.

3. Detector Processor Command Definitions

3.1 Load DPU Memory

Function: Load software code or data into detector processor RAM.

Opcode: 0
Data: starting address (MS word)
starting address (LS word)
length (= n)
data word 1
data word 2
...
data word n

Return: Completion code (= -1 for function complete)

Description: The first two words following the opcode indicates the starting address in DPU RAM where the data will be stored. The length word indicates the number of data words to load. The data words to be transferred to the DPU follow the length word. The detector processor will return a completion code after it receives the last data word.

Note: All line items listed as opcode, data, or return items are 16 bit word values.
MS = most significant
LS = least significant

3.2 Read DPU Memory

Function: Read software code or data from detector processor RAM.

Opcode: 1
Data: starting address (MS word)
starting address (LS word)
length (= n)

Return: data word 1
data word 2
...
data word n

Description: The first two words following the opcode indicates the address of the first DPU memory location to be read. The length word indicates the number of data words to read. The DPU returns the contents of n consecutive memory locations beginning at the starting address to the telemetry processor.

3.3 DPU PROM Test

Function: Detector processor PROM checksum test.

Opcode: 2
Data: None

Return: Completion code (= -1 for function successful)
(= 0 for function failed)

Description: The DPU performs a simple checksum test on the DPU PROM. The DPU PROM address range is 0000 hex to 03FF hex. The DPU will return a completion code when the test is finished.

3.4 DPU RAM Test

Function: Detector processor RAM test.

Opcode: 3
Data: None

Return: Completion code (= -1 for function successful)
(= 0 for function failed)

Description: The DPU checks every location in DPU RAM. The RAM test does not preserve previously stored data. The DPU will return a completion code when the test is finished.

3.5 Run Program

Function: Run program stored in DPU RAM.

Opcode: 4
Data: starting address (MS word)
starting address (LS word)

Return: none

Description: The first two words following the opcode indicates the starting address in DPU RAM where program execution shall begin. The detector processor will jump to the starting address location and begin program execution. The detector processor will stop execution when a DPU reset is issued.

3.6 Initialize DPU

Function: Initialize detector processor.

Opcode: 6
Data: Detector selection (0 = Detector #1, 1 = Detector #2)
Hardware Gain W
Hardware Gain S
Hardware Gain I
Hardware Offset W
Hardware Offset S
Hardware Offset I
Software focal plane origin, spectral
Software focal plane origin, spatial
Software offset, spectral
Software offset, spatial
Software magnification, spectral (MS word)
Software magnification, spectral (LS word)
Software magnification, spatial (MS word)
Software magnification, spatial (LS word)
Detector #1 Low Level Discriminator
Detector #2 Low Level Discriminator
Pile up rejection on/off
Dead Time
Spare (5 words)

Return: Completion code (= -1 for function complete)

Description: This function initializes the DPU for detector data processing. Detector configuration values are uploaded from the telemetry processor (24 words total). The detector

configuration data are transferred from the unit parameter table in the telemetry processor EEPROM for the selected detector. The DPU will return a completion code when the function is finished.

3.7 Process Detector Data

Function: Process and bin detector event data.

Opcode: 7
Data: None

Return: None

Description: This is the core dedicated function of the detector processor. The function computes the event x-y position, and accumulates the 2-dimensional detector image plane. The events are binned in the detector image plane 32 x 256 array. The function is called at the start of each detector integration period. The function continues to accumulate event data until a DPU reset is issued.

The 2-dimensional detector image plane is stored in DPU RAM. Each image plane pixel is contained in one word (16 bits) in RAM. The image plane pixel values are not reset to zero at the start of this function. To determine the pixel count during an integration period, the telemetry processor must subtract the previous pixel count from the present pixel count.

3.8 Transfer Imaging Mode Data

Function: Compute image color pixels and transfer image data.

Opcode: 8
Data: None

Return: 70 image pixels (14 spatial x 5 colors)
Input count for selected detector (MS word)
Input count for selected detector (LS word)
Output count (MS word)
Output count (LS word)
Integration period count (MS word)
Integration period count (LS word)
Pulse height sample quality flag (-1 = good, 0 = bad)
Pulse height sample W
Pulse height sample S
Pulse height sample I

Description: This function computes the five color pixels for each spatial position, and transfers the image mode data to the telemetry processor at the end of the integration period. The spectral pixels are summed together as defined in the color definition table to form the color pixels. The color definition table is downloaded to the DPU during the initialization process. The DPU returns a total of 80 words during this function. Following the 70 image pixels, the DPU returns the detector input count, output count, and integration period count during the time the Process Detector Data function was active. This is followed by a pulse height sample quality flag, and the W, S, and I values for one pulse height sample. If the quality flag indicates a bad sample, then the WSI data should not be included in the telemetry packet.

The 70 image pixels (16 bits per pixel) are ordered as:

spatial 0, color 1
spatial 0, color 2
spatial 0, color 3
spatial 0, color 4
spatial 0, color 5
spatial 1, color 1
spatial 1, color 2
spatial 1, color 3
spatial 1, color 4
spatial 1, color 5
.....
spatial 13, color 1
spatial 13, color 2
spatial 13, color 3
spatial 13, color 4
spatial 13, color 5

3.9 Transfer Spectrograph Mode Data

Function: Transfer spectrograph focal plane data.

Opcode: 9
Data: None

Return: 2464 spectrograph pixels (14 spatial x 176 spectral)
Detector #1 Input count (MS word)
Detector #1 Input count (LS word)
Detector #2 Input count (MS word)
Detector #2 Input count (LS word)
Output count (MS word)
Output count (LS word)
Integration period count (MS word)
Integration period count (LS word)

Description: This function transfers the spectrograph mode data to the telemetry processor at the end of the integration period. All pixels within the SIS focal plane are transferred. The software focal plane origin defines the start of the SIS focal plane relative to the detector image plane origin. Following the spectrograph pixels, the DPU returns the input count for both detectors, output count, and integration period count during the time the Process Detector Data function was active. No pulse height data are transferred by this function.

The 2464 spectrograph pixels (16 bits per pixel) are ordered as:

spatial 0, spectral 0
spatial 0, spectral 1
spatial 0, spectral 2
...
spatial 0, spectral 175
spatial 1, spectral 0
spatial 1, spectral 1
spatial 1, spectral 2
...
spatial 1, spectral 175
.....
spatial 13, spectral 0
spatial 13, spectral 1
spatial 13, spectral 2
...
spatial 13, spectral 174
spatial 13, spectral 175

3.10 Transfer Single Pixel Data

Function: Transfer a single pixel from the detector image plane.

Opcode:	10
Data:	Pixel spectral address 1
	Pixel spatial address 1
Return:	Pixel data 1
Data:	Pixel spectral address 2
	Pixel spatial address 2
Return:	Pixel data 2
	...
Data:	Pixel spectral address n
	Pixel spatial address n
Return:	Pixel data n

Description: This function transfers the pixel value for the specified pixel address. The DPU will wait for a new pixel address until a DPU reset is issued. The pixel address is relative to the

SIS focal plane origin. Negative values for the pixel address are allowed to specify pixels outside the SIS focal plane but inside the detector image plane.

3.11 Transfer Test Mode Data

Function: Collect and transfer the WSI data in test mode.

Opcode: 11
Data: None

Return: Event 1 Wedge
Event 1 Strip
Event 1 Intermediate
Event 2 Wedge
Event 2 Strip
Event 2 Intermediate
...
Event n Wedge
Event n Strip
Event n Intermediate

Description: This function collects the raw wedge, strip, and intermediate pulse height samples from the detector, and transfers the data to the telemetry processor. This function is used in the test mode. No x-y position computation or image accumulation is performed by the DPU. The DPU remains in a loop polling the detector A/D converter board for new events until a DPU reset is issued. This function shall be issued at the start of each test mode frame period (1 second). If the detector is not illuminated or the high voltage is off, there may be no events returned by this function.

3.12 Transfer Forced ADC Data

Function: Collect and transfer the WSI data from a forced event.

Opcode: 12
Data: None

Return: Event 1 Wedge
Event 1 Strip
Event 1 Intermediate
Event 2 Wedge
Event 2 Strip
Event 2 Intermediate
...
Event n Wedge

Event n Strip
Event n Intermediate

Description: This function issues a forced conversion control signal to the detector A/D converter board, and collects and transfers the raw wedge, strip, and intermediate pulse height data from the forced conversion. This function is used during initial testing of the detector A/D converter board to determine the hardware offset values. The DPU will repeat the forced conversion until a DPU reset is issued.

3.13 Read All Counters

Function: Read all detector processor counters.

Opcode: 13
Data: None

Return: Detector #1 Input count (MS word)
Detector #1 Input count (LS word)
Detector #2 Input count (MS word)
Detector #2 Input count (LS word)
Output count (MS word)
Output count (LS word)
Integration period count (MS word)
Integration period count (LS word)

Description: This function returns the detector processor counter values. The DPU returns the input count for both detectors, output count, and integration period count during the time the Process Detector Data or Transfer Test Mode Data functions were active. The input count indicates the number of fast amp events during the measurement interval.

3.14 Transfer Background Count Data

Function: Compute background count regions and transfer background data.

Opcode: 14
Data: None

Return: Background count 1
Background count 2
Background count 3

Description: The background count data consist of 3 along track pixels by 7 cross track pixels over the 15 second line scan. This function will be called 7 times during each imaging line scan. The background counts are an indication of the scatter in the spectrograph. The focal plane pixel

addresses that form each of the three background regions will be stored in a look up table. The background region definition table will be downloaded to the DPU during the initialization process.

3.15 Transfer Dark Count Data

Function: Compute dark count regions and transfer dark count data.

Opcode: 15
Data: None

Return: Dark count 1
Dark count 2
Dark count 3
Dark count 4

Description: The dark count data consist of counts accumulated over four regions on the tube. The dark counts regions will be outside the SIS focal plane. This function will be called once per major frame period. The focal plane pixel addresses that form each of the four dark regions will be stored in a look up table. The dark region definition table will be downloaded to the DPU during the initialization process.

3.16 Download Color Table

Function: Download the color definition table to the detector processor.

Opcode: 16
Data: Spatial 0, Color definition segment (55 words)
Spatial 1, Color definition segment (55 words)
Spatial 2, Color definition segment (55 words)
Spatial 3, Color definition segment (55 words)
Spatial 4, Color definition segment (55 words)
Spatial 5, Color definition segment (55 words)
Spatial 6, Color definition segment (55 words)
Spatial 7, Color definition segment (55 words)
Spatial 8, Color definition segment (55 words)
Spatial 9, Color definition segment (55 words)
Spatial 10, Color definition segment (55 words)
Spatial 11, Color definition segment (55 words)
Spatial 12, Color definition segment (55 words)
Spatial 13, Color definition segment (55 words)

Return: Completion code (= -1 for function complete)

Description: This function downloads the color definition table to the DPU for the selected detector and slit position. The color definition data are transferred from the master color definition table in the telemetry processor EEPROM. This function transfers a total of 770 words to the DPU. The DPU will return a completion code when the function is finished. The format of the color definition table is defined in section 5.

3.17 Download Background Table

Function: Download the background region definition table to the detector processor.

Opcode: 17
Data: Background 1, length (= n)
Background 1, Pixel 1 spectral address
Background 1, Pixel 1 spatial address
Background 1, Pixel 2 spectral address
Background 1, Pixel 2 spatial address
...
Background 1, Pixel n spectral address
Background 1, Pixel n spatial address
Background 2, length (= m)
Background 2, Pixel 1 spectral address
Background 2, Pixel 1 spatial address
Background 2, Pixel 2 spectral address
Background 2, Pixel 2 spatial address
...
Background 2, Pixel m spectral address
Background 2, Pixel m spatial address
Background 3, length (= k)
Background 3, Pixel 1 spectral address
Background 3, Pixel 1 spatial address
Background 3, Pixel 2 spectral address
Background 3, Pixel 2 spatial address
...
Background 3, Pixel k spectral address
Background 3, Pixel k spatial address

Return: Completion code (= -1 for function complete)

Description: This function downloads the background region definition table to the DPU. The background region definition table data are stored in the telemetry processor EEPROM. The definition table consists of three sections, which define the three background regions. Each section begins with the number of pixels, followed by the addresses of the focal plane pixels to be summed together to form the background region count. The pixel address is relative to the SIS focal plane origin. Negative values for the pixel address are allowed to specify pixels outside the SIS focal plane but inside the detector image plane. The size of the three background regions will

be limited such that the background region definition table will be a maximum of 128 words. The DPU will return a completion code when the function is finished.

3.18 Download Dark Table

Function: Download the dark region definition table to the detector processor.

Opcode: 18
Data: Dark 1, length (= n)
Dark 1, Pixel 1 spectral address
Dark 1, Pixel 1 spatial address
Dark 1, Pixel 2 spectral address
Dark 1, Pixel 2 spatial address
...
Dark 1, Pixel n spectral address
Dark 1, Pixel n spatial address
Dark 2, length (= m)
Dark 2, Pixel 1 spectral address
Dark 2, Pixel 1 spatial address
Dark 2, Pixel 2 spectral address
Dark 2, Pixel 2 spatial address
...
Dark 2, Pixel m spectral address
Dark 2, Pixel m spatial address
Dark 3, length (= k)
Dark 3, Pixel 1 spectral address
Dark 3, Pixel 1 spatial address
Dark 3, Pixel 2 spectral address
Dark 3, Pixel 2 spatial address
...
Dark 3, Pixel k spectral address
Dark 3, Pixel k spatial address
Dark 4, length (= j)
Dark 4, Pixel 1 spectral address
Dark 4, Pixel 1 spatial address
Dark 4, Pixel 2 spectral address
Dark 4, Pixel 2 spatial address
...
Dark 4, Pixel j spectral address
Dark 4, Pixel j spatial address

Return: Completion code (= -1 for function complete)

Description: This function downloads the dark region definition table to the DPU. The dark region definition table data are stored in the telemetry processor EEPROM. The definition table

consists of four sections, which define the four dark regions. Each section begins with the number of pixels, followed by the addresses of the focal plane pixels to be summed together to form the dark region count. The pixel address is relative to the SIS focal plane origin. Negative values for the pixel address are allowed to specify pixels outside the SIS focal plane but inside the detector image plane. The size of the four dark regions will be limited such that the dark region definition table will be a maximum of 512 words. The DPU will return a completion code when the function is finished.

4. Unit Parameter Table

The unit parameter table defines constants and parameters that will be determined during instrument testing and may need to be updated during the life of the mission. The unit parameter table is stored in the telemetry processor EEPROM. The table size is 47 words. Each line item in the table is a 16 bit word.

Unit Parameter Table Contents
Table revision number
Detector #1 Hardware Gain W
Detector #1 Hardware Gain S
Detector #1 Hardware Gain I
Detector #1 Hardware Offset W
Detector #1 Hardware Offset S
Detector #1 Hardware Offset I
Detector #1 Software focal plane origin, spectral
Detector #1 Software focal plane origin, spatial
Detector #1 Software offset, spectral
Detector #1 Software offset, spatial
Detector #1 Software magnification, spectral (MS word)
Detector #1 Software magnification, spectral (LS word)
Detector #1 Software magnification, spatial (MS word)
Detector #1 Software magnification, spatial (LS word)
Detector #2 Hardware Gain W
Detector #2 Hardware Gain S
Detector #2 Hardware Gain I
Detector #2 Hardware Offset W
Detector #2 Hardware Offset S
Detector #2 Hardware Offset I
Detector #2 Software focal plane origin, spectral
Detector #2 Software focal plane origin, spatial
Detector #2 Software offset, spectral
Detector #2 Software offset, spatial
Detector #2 Software magnification, spectral (MS word)
Detector #2 Software magnification, spectral (LS word)
Detector #2 Software magnification, spatial (MS word)
Detector #2 Software magnification, spatial (LS word)

Detector #1 Low Level Discriminator
Detector #2 Low Level Discriminator
Pile up rejection on/off
Dead Time
Spare (5 words)
Detector #1 nominal HV level
Detector #1 maximum HV level
Detector #1 input rate safing level (MS word)
Detector #1 input rate safing level (LS word)
Detector #2 nominal HV level
Detector #2 maximum HV level
Detector #2 input rate safing level (MS word)
Detector #2 input rate safing level (LS word)
Table checksum

5. Color Definition Table

The color definition table defines the spectral bin content of the 5 imaging mode colors as a function of along track spatial pixel, slit position, and detector. The color definition table is made up of 6 color definition sub-tables for each detector and slit combination (2 detectors x 3 slits). One of the six sub-tables is downloaded to the detector processor by the download color table function.

The color definition table is stored in the telemetry processor EEPROM. The color definition table size is 4622 words. The size of each sub-table is 770 words. The sub-table contains the spectral bin definitions for the 5 colors as a function of the 14 along track spatial pixels. Each spectral bin definition is 11 words in length. The spectral bin definition indicates which of the 176 spectral bins are to be summed together to form the color.

The telemetry processor downloads the sub-table for the selected detector and slit to the detector processor before starting the imaging mode operation. Anytime the detector or slit selection is changed by command, the telemetry processor must reinitialize the DPU and reload the color sub-table.

Color Definition Table Contents
Color table revision number
Detector #1, Wide slit, Color definition sub-table (770 words)
Detector #1, Medium slit, Color definition sub-table (770 words)
Detector #1, Narrow slit, Color definition sub-table (770 words)
Detector #2, Wide slit, Color definition sub-table (770 words)
Detector #2, Medium slit, Color definition sub-table (770 words)
Detector #2, Narrow slit, Color definition sub-table (770 words)
Table checksum

Color definition sub-tables are ordered as follows:

Spatial 0, Color definition segment (55 words)
Spatial 1, Color definition segment (55 words)
Spatial 2, Color definition segment (55 words)
Spatial 3, Color definition segment (55 words)
Spatial 4, Color definition segment (55 words)
Spatial 5, Color definition segment (55 words)
Spatial 6, Color definition segment (55 words)
Spatial 7, Color definition segment (55 words)
Spatial 8, Color definition segment (55 words)
Spatial 9, Color definition segment (55 words)
Spatial 10, Color definition segment (55 words)
Spatial 11, Color definition segment (55 words)
Spatial 12, Color definition segment (55 words)
Spatial 13, Color definition segment (55 words)

Color definition segments (55 words each) are ordered as follows:

Color 1, Bin Definition 1 (LS word)
Color 1, Bin Definition 2
Color 1, Bin Definition 3
Color 1, Bin Definition 4
...
Color 1, Bin Definition 10
Color 1, Bin Definition 11 (MS word)
Color 2, Bin Definition 1 (LS word)
Color 2, Bin Definition 2
...
Color 2, Bin Definition 10
Color 2, Bin Definition 11 (MS word)
Color 3, Bin Definition 1 (LS word)
Color 3, Bin Definition 2
...
Color 3, Bin Definition 10
Color 3, Bin Definition 11 (MS word)
Color 4, Bin Definition 1 (LS word)
Color 4, Bin Definition 2
...
Color 4, Bin Definition 10
Color 4, Bin Definition 11 (MS word)
Color 5, Bin Definition 1 (LS word)
Color 5, Bin Definition 2

...
Color 5, Bin Definition 10
Color 5, Bin Definition 11 (MS word)

Each color is defined by the 11 bin definition words. One set of 11 bin definition words define which of the 176 spectral bins are to be summed together to form the color. One bit is allocated for each spectral bin in each set of 11 bin definition words. A value of one in a spectral bin location indicates that bin is to be included in the color summation, a value of zero indicates that bin is not included. The least-significant word indicates the spectral bin definition for bins 0 to 15. The most-significant word indicates the spectral bin definition for bins 160 to 175. The least-significant bit within each bin definition word points to the lower spectral bin number. Spectral bin 0 is at the low wavelength end of the SIS focal plane, and spectral bin 175 is at the high wavelength end.

Bin definition words are defined as followed:

Word	Spectral Bins	LSB	MSB
Bin Definition 1	0 to 15	bin 0	bin 15
Bin Definition 2	16 to 31	bin 16	bin 31
Bin Definition 3	32 to 47	bin 32	bin 47
Bin Definition 4	48 to 63	bin 48	bin 63
Bin Definition 5	64 to 79	bin 64	bin 79
Bin Definition 6	80 to 95	bin 80	bin 95
Bin Definition 7	96 to 111	bin 96	bin 111
Bin Definition 8	112 to 127	bin 112	bin 127
Bin Definition 9	128 to 143	bin 128	bin 143
Bin Definition 10	144 to 159	bin 144	bin 159
Bin Definition 11	160 to 175	bin 160	bin 175

6. Background Region Definition Table

The background region definition table defines the three background count regions. A background count region is the sum of several adjacent focal plane pixels at the low wavelength end of the SIS focal plane. The same background region definitions will be used for any detector or slit combination, and for each of the seven cross track background measurements. The background region definition table is stored in the telemetry processor EEPROM.

The background region definition table consists of three sections, which define the three background regions. Each section begins with the number of pixels, followed by the addresses of the focal plane pixels to be summed together to form the background region count. The pixel address is relative to the SIS focal plane origin. Negative values for the pixel address are allowed to specify pixels outside the SIS focal plane but inside the detector image plane. The size of the three background regions will be limited such that the background region definition table will be a maximum of 128 words. The length of each section can be different.

Background Region Definition Table Contents

Background 1, length (= n)
Background 1, Pixel 1 spectral address
Background 1, Pixel 1 spatial address
Background 1, Pixel 2 spectral address
Background 1, Pixel 2 spatial address
...
Background 1, Pixel n spectral address
Background 1, Pixel n spatial address
Background 2, length (= m)
Background 2, Pixel 1 spectral address
Background 2, Pixel 1 spatial address
Background 2, Pixel 2 spectral address
Background 2, Pixel 2 spatial address
...
Background 2, Pixel m spectral address
Background 2, Pixel m spatial address
Background 3, length (= k)
Background 3, Pixel 1 spectral address
Background 3, Pixel 1 spatial address
Background 3, Pixel 2 spectral address
Background 3, Pixel 2 spatial address
...
Background 3, Pixel k spectral address
Background 3, Pixel k spatial address

7. Dark Region Definition Table

The dark region definition table defines the four dark count regions. A dark count region is the sum of several adjacent focal plane pixels outside of the SIS focal plane. The same dark region definitions will be used for any detector or slit combination. The dark region definition table is stored in the telemetry processor EEPROM.

The dark region definition table consists of four sections, which define the four dark regions. Each section begins with the number of pixels, followed by the addresses of the focal plane pixels to be summed together to form the dark region count. The pixel address is relative to the SIS focal plane origin. Negative values for the pixel address are allowed to specify pixels outside the SIS focal plane but inside the detector image plane. The size of the four dark regions will be limited such that the dark region definition table will be a maximum of 512 words. The length of each section can be different.

Dark Region Definition Table Contents

Dark 1, length (= n)
Dark 1, Pixel 1 spectral address
Dark 1, Pixel 1 spatial address
Dark 1, Pixel 2 spectral address
Dark 1, Pixel 2 spatial address
...
Dark 1, Pixel n spectral address
Dark 1, Pixel n spatial address
Dark 2, length (= m)
Dark 2, Pixel 1 spectral address
Dark 2, Pixel 1 spatial address
Dark 2, Pixel 2 spectral address
Dark 2, Pixel 2 spatial address
...
Dark 2, Pixel m spectral address
Dark 2, Pixel m spatial address
Dark 3, length (= k)
Dark 3, Pixel 1 spectral address
Dark 3, Pixel 1 spatial address
Dark 3, Pixel 2 spectral address
Dark 3, Pixel 2 spatial address
...
Dark 3, Pixel k spectral address
Dark 3, Pixel k spatial address
Dark 4, length (= j)
Dark 4, Pixel 1 spectral address
Dark 4, Pixel 1 spatial address
Dark 4, Pixel 2 spectral address
Dark 4, Pixel 2 spatial address
...
Dark 4, Pixel j spectral address
Dark 4, Pixel j spatial address