

# STIS Paper Products (Revision A)

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## **ABSTRACT.**

*This report details the features of the STIS paper products produced by the HST data pipeline. The requirements closely follow the design of paper products recommended by the Data Quality Committee, although some changes were required to fully support STIS. We also make suggestions for implementation and future maintenance of the STIS paper products task. Included in "Appendix 1." on page 24 is a list of problems with the paper products as they are now (see "Appendix 2" on page 37 for examples of the current paper products).*

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## **1. Introduction**

A routine part of the HST data is the post-calibration production of hardcopy products, or 'paper products', that summarize the data obtained. The general problem of producing these products was studied extensively by the Data Quality Committee and is described in their report (Sparks, et al. 1995). These products are used for both informing the GO and for data quality evaluation by the contact scientists. As such, the products must be general enough to support both sets of users. This report describes in detail the requirements for the paper products that summarize STIS data.

The original concept for implementing the paper products task was to have the task run under the IRAF cl. Due to the scarcity of programming resources, we expect the STIS group to assume partial responsibility for maintaining this task in the future. Consequently, it is important that the task be written in some combination of C using the CVOS and the cl scripting language to facilitate this maintenance.

## **2. Description of STIS Paper Products**

STIS paper products are designed to summarize a set of exposures. Typically, the set of exposures will constitute one visit in an observing proposal. The individual pages in the paper product either describe the details of a single exposure or, for the purpose of easy comparison, summarize the ensemble of exposures. A given page in the STIS paper prod-

ucts falls into one of two categories: visit-level page or exposure-level page. Below we list the individual pages—the pages are described in detail in Section 3, “Page Generation and Layouts,” on page 4.

### ***Visit-level Pages***

- Cover Page  
A cover page containing the proposal ID, the visit number, the proposal title, and the PI’s name.
- Explanatory Notes  
A set of notes explaining the paper products and the information they contain.
- Target List  
A table listing the targets in the set of observations being summarized.
- Observation List  
A table recapping the proposal information for each exposure for the set of observations being summarized including three processing and data quality flags.
- Optional Parameters  
A table listing the proposal-level “optional parameters” for the set of observations being summarized.
- Statistics  
A table of simple statistics for the set of observations being summarized to allow for a quick comparison among observations.

### ***Exposure-level Pages***

- Exposure Plots  
A graphical representation of the data contained in each exposure. Plots are specific to a particular instrument configuration and observing mode. In some cases, more than one plot is produced. The types of Exposure Plots are: ACQ Image Plot, ACQ/PEAK Image Plot, Image Plot, Rectified 2-D Spectral Image Plot, 1-D Extracted Spectrum, Plot Time-Series Plot, and Local Rate Check Image Plot.
- Data Quality Summary  
A comprehensive summary of the spacecraft performance, pipeline processing status, and calibration data quality for each exposure.
- Calibration Reference File Summary  
A summary of the calibration processing switches and reference files used to process each exposure.

**Table 1: STIS Paper Products Pages–Selection Criteria**

Summary Level	Page Type	Production Criteria	Filename Extension(s) Indicating Source of Keywords and Data <sup>1</sup>
Visit	Title Page	All	_raw
	Target List	All	_raw
	Observation Summary	All	_raw and _jif and _trl
	Optional Parameters	All	_raw
	Statistics	All	_sfl or _crj or _flt or _raw
Exposure	ACQ Image Plot	OBSMODE=ACQ	_raw
	ACQ/PEAK Image Plot	OBSMODE=ACQ/PEAK	_raw
	Image Plot	OBSMODE=ACCUM or TIME-TAG and OBSTYPE=IMAGING	_geo or _sfl or _crj or _flt or _raw
	2-D Spectral Image Plot	OBSMODE=ACCUM or TIME-TAG and OBSTYPE=SPECTROSCOPIC	_sx2 or _x2d or _sfl or _crj or _flt or _raw
	1-D Extracted Spectrum Plot	OBSMODE=ACCUM or TIME-TAG and OBSTYPE=SPECTROSCOPIC	_sx1 or _x1d
	Time-Series Plot	OBSMODE=TIME-TAG	_tag
	Local Rate Check Image Plot	DETECTOR=NUV-MAMA or FUV-MAMA and LRC_XSTS=T	_lrc
	Summary Page	OBSMODE=ACCUM or TIME-TAG	_trl and _jif
Calibration Files Page	OBSMODE=ACCUM or TIME-TAG	_trl	

<sup>1</sup>Where more than one filename extension is given (indicated by ‘or’), the preferred source of keyword information is listed first. When a given filename is not available, the next one in the list should be used.

### 3. Page Generation and Layouts

Table 1 on page 3 summarizes the criteria for producing STIS paper products pages. The table lists the individual page types followed by the criteria that trigger the creation of a given page. For those pages that are always produced, the criterion is stated as “All”. Additionally, the table lists the data files from which to extract the keyword and plot information. If more than one filename extension is listed, the preferred source is first. The disk should be searched for file with the preferred extension first. If this file is unavailable, the next filename extension should be searched for, and so on. If no file can be found satisfying the selection criteria, a warning message is produced by the paper products task.

#### *Title Page*

The Title Page consists of a Header, a Footer, and three (3) keyword/value pairs. See Table 2 on page 4 for a description of the keyword-value pairs to be included on the Title Page. The keyword/value pairs are written in 20 point size. See page 25 for a sample Title Page. All visits contained in the paper products pages should be listed next to the “Visit” label.

**Table 2: Title Page Keyword/Value Pairs**

<b>Label</b>	<b>Found in Header Keyword(s)</b>	<b>Print Format</b>
Title	PROPTTL1 PROPTTL2	2 lines of c68
PI	PR_INV_L PR_INV_F	c68
Proposal	PROPOSID	i4
Visit	OBSET_ID	i2

#### *Explanatory Notes*

The Explanatory Notes page is an instruction sheet for using and understanding the collection of STIS paper products pages. As this information describes the paper products themselves, as opposed to the observations, this page does not change from visit to visit. The section headers are written in bold font style. The headers in each section are written in 12 point Narrow Helvetica Bold. The text in each section is written in 12 point Times. See page 26 for the text and format of the Explanatory Notes page.

### ***Target List***

The target list is a table containing target names, positions, and target descriptions. The target name and description are derived from the proposal information. The positions are the calculated positions based on processing of the proposal by the ground system. See Table 3 on page 5 for a description of the keyword/value pairs to be included. See the sample target list table on page 27.

**Table 3: Target List Keyword/Value Pairs**

<b>Column Name</b>	<b>Found in Header Keyword</b>	<b>Print Format</b>
Target Name	TARGNAME	c24
R.A. (J2000)	RA_TARG	hh:mm:ss.ss
Dec. (J2000)	DEC_TARG	ddd:mm:ss
Description	TARDESCR	c40

### ***Observation Summary***

The observation summary consists of the instrument configuration as downlinked from the spacecraft in the science data stream. While the specification of the instrument configuration uses proposal instruction language, wherever possible, actual rather than predicted values are used. See Table 4 on page 5 for a description of the keyword/value pairs to be included. See the sample observation list table on page 27.

**Table 4: Observation Summary Keyword/Value Pairs**

<b>Column Name</b>	<b>Found in Header Keyword(s)</b>	<b>Print Format</b>
Visit-Exp #	LINENUM	c7
Rootname	ROOTNAME	c9
Target Name	TARGNAME	c24
Detector	DETECTOR	c10
Operating Mode	OBSMODE	c15
Aperture	APERTURE	c16
Optical Element	OPT_ELEM	c16

Column Name	Found in Header Keyword(s)	Print Format
Cenwave (A)	CENWAVE	i4
Total Exp Time (s)	TEXPTIME	f7.2
# of Exposures	NRPTXP or CRSPLIT (whichever is >0)	i3
OBS <sup>1</sup>	See “Data Quality Flags” on page 6.	c1
PROC <sup>1</sup>	See “Data Quality Flags” on page 6.	c1
CAL <sup>1</sup>	See “Data Quality Flags” on page 6.	c3

<sup>1</sup>These three columns should be straddled by the column label: “Quality Flags”.

## ***Data Quality Flags***

### ***OBS***

The OBS quality flag summarizes as good or bad the spacecraft performance during the execution of the observations as described by the OMS data. All information used in determining the value of this flag comes from the `_jif` header file.

The flag should be set to UNKNOWN (represented by a blank space) by default.

The flag should be set to BAD (represented by a filled circle) if any one of the following conditions is true

- `NRECENT > 0`
- `NLOSSES > 0`
- `V2_P2P > 0.06`
- `V3_P2P > 0.06`
- Any of the following keywords appears in the primary `_jif` header: `T_ACQ2FL`, `T_GSFAL`, `T_TAPDRP`, `T_SLEWNG`, `T_TDFDWN`, `T_SISAFE`, `T_FGSFAL`, `T_SDLOST`, `T_SISPND`, `T_NO_SAM`, `T_NOSLEW`, `T_NO_EPH`.

The flag should be set to GOOD (represented by an open circle) otherwise.

### ***PROC***

The PROC quality flag summarizes as good or bad the pipeline processing status for all of the individual processes that comprise the pipeline (e.g., data capture, data partitioning, generic conversion, science calibration, and data archiving). Problems during any

phase of pipeline processing results in messages being written to the \_trl file. Thus, the \_trl file is dredged to look for messages to determine the status of the processing.

The flag should be set to UNKNOWN (represented by a blank space) by default.

The flag should be set to BAD (represented by a filled circle) if either of the following conditions is true:

- A pattern match is found to a string with a format such as 1996260160303-E. This string is written by the processes prior to science calibration. The strings are at the beginning of a line and consist of a time stamp plus the substring '-E'. Note: the match cannot be done explicitly on the timestamp.
- The string "ERROR" is found in the \_trl file. Errors of this type are written by CALSTIS and represent conditions that result in the interruption of science calibration. See "Comments printed by CALSTIS" on page 19 for examples of message formats to be used by CALSTIS.

The flag should be set to GOOD (represented by an open circle) otherwise.

### *CAL*

The CAL quality flag summarizes the quality of the calibration reference data used in calibrating the observations. Problems with the calibrations are written to the \_trl file by CALSTIS.

The flag should be set to UNKNOWN (represented by a blank space) by default.

The flag should be set to bad (represented by a filled circle) if any of the following conditions is true:

1. The string "SKIPPED" appears in the \_trl file.
2. The string "DUMMY" appears in the \_trl file

In the case of all calibration switches being set to "OMIT", the flag should be set with the value of "NOT APPLICABLE" (represented by "N/A").

The flag should be set to good (represented by an open circle) otherwise.

### *Optional Parameters*

The optional parameters summary consists of additional instrument configuration items which are specified in the proposal as optional parameters. As with the Observation Summary, the telemetry values are used rather than the predicted ones. For observations with OBSMODE=TIMETAG, the value of BUFFTME should always be printed to the table. The keywords associated with PATTERN observations (NUMPOS, STEPSIZE, BOXSCALE, PATTDRC) should only be checked against their default values if PAT-

TERN does not equal “NONE”. See Table 5 on page 8 for a description of the keyword-value pairs to be included. See the sample optional parameter table on page 28.

**Table 5: Optional Parameter Keyword/Value Pairs**

<b>Column Name</b>	<b>Found in Header Keyword(s)</b>	<b>Print Format</b>
Visit-Exp #	LINENUM	c7
Rootname	ROOTNAME	c9
Target Name	TARGNAME	c24
Detector	DETECTOR	c10
Operating Mode	OBSMODE	c15
Optional Parameters	See Table 6 on page 9	

The optional parameters are written as strings with the format: KEYWORD=VALUE (e.g., BINAXIS1=1). Since there can be multiple optional parameters for a given configuration/mode, multiple KEYWORD=VALUE strings are concatenated (separated with a comma), e.g., “BINAXIS1=1,BINAXIS2=1”. Table 6 on page 9 gives the rules for constructing the optional parameter value that appears in the Optional Parameter table. The set of optional parameters to use is determined from the values of the DETECTOR and OBSMODE keywords. For example, for OBSMODE=ACQ/PEAK the only optional parameter is the keyword SIZEAXIS2. In the case of PATTERN=NONE, only the PATTERN keyword/value pair is printed, but the keywords associated with PATTERNs (NUMPOS, STEPSIZE, BOXSCALE, and PATTDRC) are not printed out.

**Table 6: Details of Constructing the Optional Parameter Values**

DETECTOR	OBSMODE	Optional Parameter Header Keyword	Default value	Label	Print Format
STIS/FUV-MAMA STIS/NUV-MAMA	ACCUM	BINAXIS1	1	BINAXIS1	i1
		BINAXIS2	1	BINAXIS2	i1
		PATTERN	NONE	PATTERN	c12
		NUMPOS	0	NUM-POS	i2
		STEPSIZE	0	STEP-SIZE	f5.1
		BOXSCALE	1.0	SCALING-FACTOR	f3.1
		PATTDRC	PLUS	PATTERN-DIRECTION	c5
		SIZAXIS1	1024	SIZEAXIS1	I4
		SIZAXIS2	1024	SIZEAXIS2	I4
		CENTERA2	TARGET	CENTERAXIS2	i4
	TIME-TAG	BUFFTME	(no default)	BUFFER-TIME	i4
		PATTERN	NONE	PATTERN	c12
		NUMPOS	0	NUM-POS	i2
		STEPSIZE	0	STEP-SIZE	f5.1
		BOXSCALE	1.0	SCALING-FACTOR	f3.1
		PATTDRC	PLUS	PATTERN-DIRECTION	c5
		SIZAXIS1	1024	SIZEAXIS1	I4
		SIZAXIS2	1024	SIZEAXIS2	I4
		CENTERA2	TARGET	CENTERAXIS2	i4
		ACQ/PEAK	SIZAXIS2	1024	SIZEAXIS2

DETECTOR	OBSMODE	Optional Parameter Header Keyword	Default value	Label	Print Format
STIS/CCD	ACCUM	CRSPLIT	2	CR-SPLIT	i1
		CCDGAIN	1	GAIN	i1
		BINAXIS1	1	BINAXIS1	i1
		BINAXIS2	1	BINAXIS2	i1
		SIZAXIS2	1044	SIZEAXIS2	i4
		PATTERN	NONE	PATTERN	c12
		NUMPOS	0	NUM-POS	i2
		STEPSIZE	0	STEP-SIZE	f5.1
		BOXSCALE	1.0	SCALING-FACTOR	f3.1
		PATDRC	PLUS	PATTERN-DIRECTION	c5
	ACQ	ACQTYPE	POINT	ACQTYPE	c7
		CENTMETH	FLUX-CENTROID	DIFFUSE-CENTER	c16
		CHECKBOX	0	CHECKBOX	i3
	ACQ/PEAK	SIZAXIS2	either 32 or 64	SIZEAXIS2	i4

### *Statistics*

The statistics summary table consists of a few instrument configuration items plus selected (simple) statistics for the observations. The data used for computing the statistics are (in order of preference): summed flat-fielded, cr-rejected, flat-fielded, or raw. The image statistics should come from the same file used in generating the image plot. No statistics are needed for ACQ or ACQ/PEAK images. See Table 7 on page 10 for a description of the keyword-value pairs to be included. See the sample statistics table on page 28.

**Table 7: Statistics Keyword/Value Pairs**

Column Name	Found in Header Keyword(s)	Print Format
Visit-Exp #	LINENUM	c7
Rootname	ROOTNAME	c9
Target Name	TARGNAME	c24
Detector	DETECTOR	c10

Column Name	Found in Header Keyword(s)	Print Format
Operating Mode	OBSMODE	c15
Total Exp Time (s)	TEXPTIME	f7.2
File used	(filename extension, e.g. “_flt”)	c4
# Pixels	NAXIS1 or NAXIS1*NAXIS2	i7
# Good Pixels	NGOODPIX	i7
Good Minimum	GOODMIN	f10.2
Good Maximum	GOODMAX	f10.2
Good Mean	GOODMEAN	f10.2
Min S/N	SNRMIN	f6.2
Max S/N	SNRMAX	f6.2
Mean S/N	SNRMEAN	f6.2

### ***Exposure Plots***

Exposure Plot pages present two kinds of information: 1) descriptive information taken from header keywords and 2) graphical representations of the data.

#### *Exposure Plot Keywords*

There are common sets of keywords used to describe different exposures as well as keywords that are specific to a given instrument configuration and observing mode. We have grouped keywords into sets to assist in the production of the STIS paper products. Three sets of keywords are common to all exposure plots: the OBS set describes the observations, the TARGET set describes the target, and the STATS set gives the simple statistics of the exposure. The other sets of keywords are determined by the detector in use and the observing mode and type. Table 8 on page 12 lists all of the sets of keywords, the selections criteria for writing them to the exposure plots as well as a pointer to the table containing the specific keyword/value pairs to be included. For any given exposure plot all applicable groups of keywords are used. The number of groups used varies with the details of the observation: 1) OBS, 2) TARGET, 3) CCD or MAMA, 4) IMAGING or SPECTROSCOPIC, 5) BINNING, 6) SUBARRAY, 7) ACQ or ACQ/PEAK or MAMA LRC, and 8) STATS. For example, a CCD acquisition exposure plot has the following keyword groups written to the plot: OBS, TARGET, CCD, IMAGING, ACQ, and STATS. A binned,

MAMA ACCUM plot has the following keyword groups: OBS, TARGET, SPECTROSCOPIC, BINNING, and STATS.

On the STIS Exposure Plot pages the groups of keywords appear in a vertical column on the right-hand side of the page. Within the column, groups are separated by a single blank line.

**Table 8: Exposure Plot Keyword Groups**

Keyword Group	Selection Criteria	Keyword/Value Table
OBS	All	Table 9 on page 12
TARGET	All	Table 10 on page 13
IMAGING	OBSTYPE=IMAGING	Table 11 on page 13
SPECTROSCOPIC	OBSTYPE=SPECTROSCOPIC	Table 12 on page 13
CCD	DETECTOR=CCD	Table 13 on page 14
MAMA	DETECTOR=FUV-MAMA or NUV-MAMA	Table 14 on page 14
BINNING	BINAXIS1>1 or BINAXIS2>1	Table 15 on page 14
SUBARRAY	SUBARRAY=T	Table 16 on page 14
ACQ	DETECTOR=CCD and OBSMODE=ACQ	Table 17 on page 15
ACQ/PEAK	DETECTOR=CCD and OBSMODE=ACQ/PEAK	Table 18 on page 15
MAMA LRC	DETECTOR=FUV-MAMA or NUV-MAMA and LRC_XSTS=T	Table 19 on page 15
STATS	All	Table 20 on page 15

**Table 9: OBS Keyword/Value Pairs**

Label	Header Keyword(s)	Print Format
Rootname	Rootname	c9
Obs. Date	TDATEOBS	c8
Obs. Time	TTIMEOBS	c8

**Table 10: TARGET Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Target Name	TARGNAME	c24
R.A. (J2000)	RA_TARGET	hh:mm:ss.ss
Dec. (J2000)	DEC_TARGET	ddd:mm:ss

**Table 11: IMAGING Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Detector	DETECTOR	c10
Observation Mode	OBSMODE	c15
Observation Type	OBSTYPE	c15
Lamp	SCLAMP	c6
Filter	FILTER	c16
Optical Element	OPT_ELEM	c16
Total Exposure Time	TEXPTIME	f7.2
# of Exposures	NRPTEXP	i3

**Table 12: SPECTROSCOPIC Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Detector	DETECTOR	c10
Observation Mode	OBSMODE	c15
Observation Type	OBSTYPE	c15
Lamp	SCLAMP	c6
Aperture	APERTURE	c16
Optical Element	OPT_ELEM	c16
Central Wavelength	CENWAVE	i4
Total Exposure Time	TEXPTIME	f7.2
# of Exposures	NRPTEXP	i3

**Table 13: CCD Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
CCDAMP	CCDAMP	c1
CCDGAIN	CCDGAIN	i1

**Table 14: MAMA Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Global Count Rate	GLOBRATE	r4
Local Rate Check Image Exists	LRC_XSTS	l1
MAMA Axis 1 Offset	MOFFSET1	i2
MAMA Axis 2 Offset	MOFFSET2	i2

**Table 15: BINNING Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Axis 1 Binning	BINAXIS1	i1
Axis 2 Binning	BINAXIS2	i1

**Table 16: SUBARRAY Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Axis 1 Subarray Center	CENTERA1	i4
Axis 2 Subarray Center	CENTERA2	i4
Axis 1 Size	SIZAXIS1	i4
Axis 2 Size	SIZAXIS2	i4

**Table 17: ACQ Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Acquisition Type	ACQTYPE	c15

**Table 18: ACQ/PEAK Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Search Method	PKSEARCH	c6
# of Steps	NUMSTEPS	i2
Step Size	STEPSIZE	r4

**Table 19: MAMA LRC Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
Local Rate Check Failed	LRC_FAIL	11

**Table 20: STATS Keyword/Value Pairs**

<b>Label</b>	<b>Header Keyword(s)</b>	<b>Print Format</b>
# Pixels	NAXIS1 or NAXIS1*NAIXS 2	i7
# Good Pixels	NGOODPIX	i7
Good Minimum	GOODMIN	f10.2
Good Maximum	GOODMAX	f10.2
Good Mean	GOODMEAN	f10.2
Min S/N	SNRMIN	f6.2
Max S/N	SNRMAX	f6.2
Mean S/N	SNRMEAN	f6.2

## Exposure Plot Graphics

Table 21 on page 16 lists the specifications for the Exposure Plot graphical representation of the data. If any of the image axes is larger than 1024, the resolution of the grey scale image should be reduced by a factor of 2 on each axis. The filename extension (e.g., `_raw`, `_flt`, etc) of the file used to produce the grey scale image should be printed above the image. For internal calibration images (SCLAMP does not equal NONE or TARGNAME=BIAS or TARGNAME=DARK), the Summary and Calibration Status pages should not be printed in order to save paper and time. Refer to the Sample Pages for the “look-and-feel” of the plot pages.

**Table 21.** Exposure Plot Specifications

Page Type	Plot description	Notes	Sample Page
ACQ Image	Grey-scale image from 1st image extension of science data	The Summary and Calibration Status Summary pages are not printed for ACQ images.	See page 29
	Grey-scale image from 2nd image extension of science data		
	Grey-scale image from 3rd image extension of science data		
	Grey-scale image from OMS data ( <code>_jif</code> )		
ACQ/PEAK Image	Grey-scale image from 1st image extension of science data	The Summary and Calibration Status Summary pages are not printed for ACQ/PEAK images.	See page 30
	Pseudo-image with pixel values displayed as numbers from “PEAK” science extension		
	Two line plots showing summed counts in each detector coordinate axis (summed data must be generated from science data using <code>blkavg</code> task)		
	Grey-scale image from OMS data ( <code>_jif</code> )		
Image	Grey-scale image from 1st image extension of science data	The Summary and Calibration Status Summary pages are not printed for internal observations.	See page 31
2-D Spectral Image	Grey-scale image from 1st image extension of science data	The Summary and Calibration Status Summary pages are not printed for internal observations.	See page 33
1-D Extracted Spectrum	Line plots of all spectra placed on a common wavelength scale		See page 34
Local Rate Check Image	Grey-scale image from 1st image extension of science data		See page 32
Time-Series	TBD		TBD

Some Exposure Plots require supporting graphical data to assist in interpreting the plots. For STIS Exposure plots the additional information is either a compass indicating the directions of North and East; or a rectangular bar showing the greyscale used to display image data; or a line plot histogram showing number of occurrences as a function of data value. Table 22 on page 17 lists the graphical aides needed for each plot type. See page 32 for examples of each type of supporting graphical information.

**Table 22: Supporting Graphical Information for Exposure Plots**

Page Type	Compass? <sup>a</sup>	Gray Scale?	Histogram?
ACQ Image	Yes	Yes	No
ACQ/PEAK Image	Yes	Yes	No
Image	Yes	Yes	Yes
2-D Spectral Image	No	Yes	Yes
Local Rate Check Image	Yes	Yes	Yes
1-D Extracted Spectrum	No	No	No
Time-Series	No	No	No

a. No compass is printed for internal observations (see definition on page 16)

### ***Summary Page***

The Summary Page gives the detailed data quality summary of the observation using information extracted from the OMS products (`_jif` and `_jit` files), the trailer file (`_trl`) and keywords from the science header. This information formed the basis for the setting of the data quality flags in the Observation Summary table (See the description of the “Data Quality Flags” on page 6). The page consists of four “areas” of information which are described below. For an example of a Summary Page see page 35.

The default value for in the data quality ‘areas’ of the Summary page is “Status unknown”. If the status is good, the message written is “No anomalies”. Error messages are described in detail in the following three sections.

### ***HST Spacecraft Performance***

OMS keywords are used to provide the HST Performance Summary. The keyword/value pairs listed in Table 23 on page 18 are written in three columns as shown on

page 35. The presence of special OMS keywords in the \_jif primary header file result in information messages being written below the keyword/value pairs. The special keywords are only written to OMS headers under unusual spacecraft performance. If the special keywords exist, the messages listed in Table 24 on page 18 should be included.

**Table 23: OMS Keywords used to Populate HST Performance Status**

Description	Header Keyword(s)	Print Format
# Recenterings	NRECENT	i3
# Losses of Lock	NLOSSES	i3
V2 Jitter (RMS)	V2_RMS	f5.2
V2 Jitter (P2P)	V2_P2P	f5.2
V3 Jitter (RMS)	V3_RMS	f5.2
V3 Jitter (P2P)	V3_P2P	f5.2

**Table 24: OMS Special Keywords**

Description	Header Keywords & Selection Criteria
Target acquisition failure.	T_ACQ2FL=T
Guide star acquisition failure.	T_GSFAL=T
Possible loss of science data due to ETR problem.	T_TAPDRP=T
Slewing occurred during this observation.	T_SLEWNG=T
Take data flag NOT on throughout observation.	T_TDFDWN=T
Science instrument safed during observation.	T_SISAFE=T
FGS astrometry target acquisition failed.	T_FGSFAL=T
No JPL ephemeris available.	T_NO_EPH=T
SI requested small angle maneuver rejected.	T_NO_SAM=T
NSSC-1 executive refused to honor slew request.	T_NOSLEW=T
Science data may be lost due to SI error.	T_SDLOST=T
Science instrument suspended during observation.	T_SISPND=T

### *Pipeline Processing*

Errors that occur during pipeline processing are written to the trailer file (\_trl). As described in “Data Quality Flags” on page 6, the following messages are searched for in the trailer file:

- A pattern match is found to a string such as 1996260160303-E. This string is written by the processes prior to science calibration. The strings are at the beginning of a line and consist of a time stamp plus the substring ‘-E’.
- The string “ERROR” is found in the \_trl file. Errors of this type are written by CALSTIS and represent conditions that result in the interruption of science calibration. (See page 19 for examples of CALSTIS message formats.)

If any messages meeting these criteria are found, then the line containing the search string is written to the Pipeline Processing “area” of the Summary Page. In the case of the timestamp string, the timestamp should be trimmed off of the message and replaced by the string: “ERROR:”.

### *Calibration Data Quality*

This section of the Summary Page is used to alert observers to the use of dummy or fill-value calibration reference files in the pipeline calibration. If the string “DUMMY” is dredged from the trailer file, then the line containing “DUMMY” is written to the Calibration Data Quality “area” of the Summary Page.

### *Keyword/Value Pairs*

A set of keyword/value pairs identical the ones included in the Exposure Plots pages is written to the right of the page in a column.

### *Comments printed by CALSTIS*

The CALSTIS code prints out comments, errors and warning messages to the \_trl file. The paper products code will need to sort through these in order to find important error messages. The following format is to be used as a baseline for CALSTIS comments. More complicated cases should be looked at on a case-by-case basis.

A message should be printed out stating which CALSTIS-n, version number, and date is being run. There should be begin and end messages with time stamps for each CALSTIS-n. Header keywords should be printed in all capital letters. The words “CALSTIS” and “ERROR” should be capitalized, but other informative words like “Begin” and “Input” should just have their first letters capitalized. The second word of each line should begin in the tenth column of printout. Information is printed about the image being processed after the begin message. A message is printed when the task starts and finishes the

steps for a particular switch. Reference file names, PEDIGREE, and DESCRIP are printed the first time a file is used.

*Example comments printed by CALSTIS to the \_trl file*

\*\*\* CALSTIS-1 - Version 1.0 (05-Feb-1997) \*\*\*

Begin 21-Feb-1997 20:30:55.49

Input o3s404030\_raw.fits

Output o3s404030\_ft.fits

OBSMODE ACCUM

APERTURE 52X0.1

OPT\_ELEM G430L

DETECTOR CCD

Group 1 Begin Fri 20:31:44 21-Feb-1997

Input read into memory

CCDTAB oref\$score2\_ccd.fits

CCDTAB PEDIGREE = GROUND

CCDTAB DESCRIP = Oct. 1996 Air Calibration

DQICORR PERFORM

BPIXTAB oref\$ccd\_bpx.fits

BPIXTAB PEDIGREE = DUMMY

BPIXTAB DESCRIP = Oct. 1996 Air Calibration

Error array initialized using readnoise=4, gain=1, bias=1296 \  
and values were checked for saturation

ERROR Some major error occurred.

DQICORR COMPLETE

BLEVCORR PERFORM

Warning Some warning message here.

Mean of bias level subtracted was 1234.72

BLEVCORR COMPLETE

FLATCORR OMIT

Output written to disk.

Group 1 End Fri 20:31:44 21-Feb-1997

End 21-Feb-1997 20:31:46

\*\*\*CALSTIS-1 complete\*\*\*

***Calibration Status Summary***

The Calibration Status Summary is a detailed description of calibration switches and associated calibration reference files (see page 36 for an example). Included in the description of the files is the PEDIGREE information. While the switch and reference file information is filled from the science header keywords as shown in the table below, the

PEDIGREE information must be dredged from the trailer file as written by CALSTIS. The PEDIGREE information must be associated with the appropriate switches. Only those switch keywords that are present in the header should be written to the Calibration Status Summary. Table 25 on page 21 lists the calibrations switches, the text string that describes the switches and the associated reference files for each switch. The Calibration Status Summary includes all switches and files found in the primary header.

**Table 25: Calibration Switches and Reference File Keywords**

<b>Calibration Switch</b>	<b>Description</b>	<b>Calibration Reference File(s)</b>
STATFLAG	Calculate statistics	
DOPPCORR	Correct Doppler-induced velocity shift	
DQICORR	Data Quality Initialization	BPIXTAB
LFLGCORR	Flag pixels for local and global non-linearities	
LORSCORR	Convert MAMA data to Lo-Res before processing	MOFFTAB
GLINCORR	Correct for global detector non-linearities	MLINTAB
ATODCORR	Correct for A to D conversion errors	ATODTAB
BLEVCORR	Subtract bias level computed from overscan	CCDTAB
BIASCORR	Subtract bias image	BIASFILE
CRCORR	Combine observations to reject cosmic rays	CRREJTAB
EXPSCORR	Process individual observations after cr-rejection	
DARKCORR	Subtract dark image	DARKFILE
BACKCORR	Subtract background (sky and interorder)	APDESTAB
FLATCORR	Flat field data	PFLTFILE DFLTFILE LFLTFILE
SHADCORR	Apply shutter shading correction	SHADFILE
PHOTCORR	Populate photometric header keywords	PHOTTAB
GEOCORR	Perform geometric correction for imaging modes	IDCTAB
X2DCORR	Rectify 2-D spectral image	SDCTAB
X1DCORR	Perform 1-D spectral extraction	XTRACTAB SPTRCTAB
WAVECORR	Use wavecal to adjust wavelength zeropoint	LAMPPTAB
DISPCORR	Apply dispersion solutions	DISPTAB INANGTAB

<b>Calibration Switch</b>	<b>Description</b>	<b>Calibration Reference File(s)</b>
HELCORR	Convert to heliocentric wavelengths	
FLUXCORR	Convert to absolute flux units	APERTAB
RPTCORR	Add individual repeat observations	
SGEOCORR	Correct for small scale geometric distortions	SDSTFILE

***Additional Layout Notes***

- All pages for the STIS paper products are in landscape orientation.
- The font used is Helvetica Narrow.
- The character size used is 9 points for keyword-value pairs and 12 point for informational text or messages.
- Margins will be 1.25 cm on all sides.
- Keyword names used as labels are right justified and aligned and separated from the left-justified and aligned values by a colon. For example:

KEYWORD1: VALUE1  
KEYWORD2: VALUE2

- Table columns are left justified.
- Information messages written to the Summary Page are left justified.
- Table rows are separated by a thin horizontal line.
- The table header is separated from the table rows by a double set of thin horizontal lines.
- Column headers and table titles are in bold type—other text is in plain type.
- Each page has a Header which consists of a rectangular box of dimensions 1.25 cm by 25.4 cm and is filled at (approximately) 30% gray. The text string “STIS” is right justified within the box printed in 36 point Bold-Oblique font.
- Each page has a Footer which consists of the text string “Space Telescope Science Institute, (Week)day HH:MM:SS DD-MMM-YY, page number” at the bottom right of the page printed in 9 point font size.
- Headers for visit and exposure pages have the proposal id to the left of the text string “STIS” in the rectangular header box. The format is “Proposal: 1234” and is written in 18 point font.
- Headers for visit pages have the string “Visit.Exp#: 1.10” left-justified in the header box and written in 18 point font. The value for Visit is the value of the OBSET\_ID keyword in the science header file. If more than one visit is covered, the format is “Visit: 06, 07, 09, ...,12”. However, a full listing of the visits should be included on the title page.

- Headers for the exposure pages have the string “Visit-Exp#: 01-10” left-justified in the header box and written in 18 point font. The value for Visit-Exp# is the value of the LINENUM keyword in the science header file.
- Keywords used to populate visit and exposure summary pages are taken from the primary and 1st science extension headers.
- The image statistics in the visit and exposure level pages should be from the same file used in generating the grey scale image.

#### 4. Requirements for the STIS Paper Products Task in STSDAS

The STSDAS version of the STIS paper product task must:

1. Be written in C using the CVOS and/or as a cl script
2. Written to permit updating by STIS group
3. Accept a filename template as input
4. Provide control over the production of specific pages through the use of task parameters as shown in Table 26 on page 23.

**Table 26: Paper Products as Controlled by Task Switches**

Task Switch	Paper Product Page
visit_sum	Visit Summary
image_plot	ACQ Image
	ACQ/PEAK Images
	Image
image_plot	2-D Spectral Image
	1-D Extracted Spectrum
	obs_sum
cal_sum	Calibration Summary

#### 5. References

W.B. Sparks, D. Swade, S. Baum, S. Casertano, C. Cox, S. Hulbert, R. Jedrzejewski, A. Koratkar, S. Parsons, M.A. Rose, K. Tittle. *HST Paper Products: A Report by the Data Quality Project*. STScI, 1995.

## 6. Appendix 1.

There are a number of fixes that still need to be made to the code in order to correct certain problems or to bring the paper products into agreement with the requirements spelled out in this ISR.

### *Problems List*

- Code should look for `_raw` files and `_wav` files.
- There should be a switch to turn title and descriptive pages off or on. There should also be switches for turning off certain pages in the paper products as specified in Table 26 on page 23 of this ISR.
- Column labels in visit level Target list are to be left justified, not centered. (Note that this will be inconsistent with other SI paper products.)
- Column headers and table titles need to be put into bold type.
- In the visit level Observation list, the abbreviation for “Not Applicable” should be “N/A” in all cases.
- The column “File” should be moved from the Observation List to the Observation Statistics table, and its header should be changed to “File used”.
- The image statistics in the visit and exposure level paper products should come from the file selected by the criteria in Table 1 on page 3.
- From Summary page (2nd exposure level page): If there is no jitter file to plot in the Spacecraft Performance Summary, a box should be drawn around the message to indicate that an image is missing from that space.
- From Summary page (2nd exposure level page): Each printed message in summary sections should have a bullet next to it.
- From Summary page (2nd exposure level page): Enlarge the Telescope Pointing Image if possible; it is smaller than the ISR example.
- From Summary page (2nd exposure level page): The default message to put in the HST, Pipeline, and Calibration Data Quality Summary areas when there is no info from `*jif` or `*trl` files should be "Status Unknown."
-

**Proposal: 6789**

**Visit: 01**

**PI: Smith, James X.**

**Title: A Really Long Title Describing a Really Short Observing Program that has been  
Awarded a Small Amount of Money and will take a Very Long Time to Complete**

## Description of Visit Summaries

### Target List

The Target List contains the target name, the coordinates for the target as calculated by the ground system based on the target information taken from the proposal, and the text description of the target given in the proposal. Note that the coordinates listed represent the predicted position of the target in the sky and do not give the pointing of HST at the time of the observation.

### Observation List with Data Quality Flags

The Observation List contains information that uniquely identifies individual exposures as specified in the observing proposal. Additionally, the status of the spacecraft and ground-system performance during the execution of the observation are summarized by the

Procedural Quality Flags:

- OBS    Status of the performance of HST
- PROC    Status of the pipeline processing of the observations.
- CAL    Status of the reference data used in calibration.

The symbols used to indicate the status of the Procedural Quality are:

- OK.
- Not OK—Refer to the Data Quality Summary for details.
- Blank    Status unknown.

### Observation List—Optional Parameters

The Observation List contains additional instrument configuration information. Entries in the table reflect the values of the Optional Parameters specified in the observing proposal.

### Observation Statistics

This Observation Statistics table contains a simple set of statistics of the raw (or flat-fielded) data for the observations.

## Description of Exposure Summaries

### Plots for Each Exposure

Plots are created for each exposure. Gray-scale or line plots are produced as appropriate for the instrument configuration and observing mode for each exposure. Exposure information taken from the headers of the data files is also provided.

### Data Quality Summary for Each Exposure

The Data Quality Summary contains details of problems flagged by the Data Quality flags. Exposure information taken from the headers of the data files is also provided.

### Calibration status summary for each exposure

The calibration summary gives detailed information about the calibration of the observations. Individual calibration steps are listed with completion status. Reference files used are listed by name and information about the pedigree of the calibration data is provided

#### Need Help?

Send e-mail to your contact scientist or  
[help@stsci.edu](mailto:help@stsci.edu)

**Targets List**

Target Name	RA	DEC	Equinox	Description
HD000000	12h 00m 00.00s	+10° 0' 00.0"	J2000	

**Observation List**

Visit-Exp #	Rootname	Target Name	Detector	Operating Mode	Aperture	Optical Element	Central Wavelength	Total Exposure Time	# of Exposures	Procedural Quality Flags		
										OBS	PROC	CAL
01-10	O1234501	HD000000	CCD	ACQ	50CCD	MIRROR	n/a	60s	2	●	○	○
01-20	O1234502	HD000000	CCD	ACQ/PEAK	50CCD	MIRROR	n/a	60s	1	●		●
01-30	O1234503	HD000000	NUV-MAMA	ACCUM	52X0.1	G230L	2025	60s	2	○	○	○

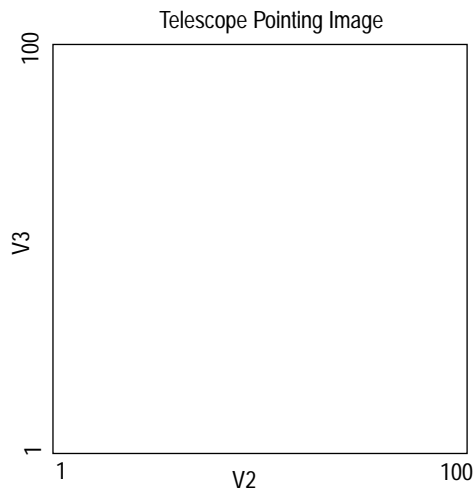
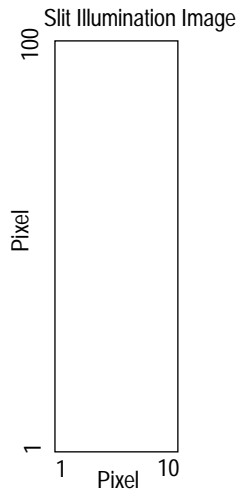
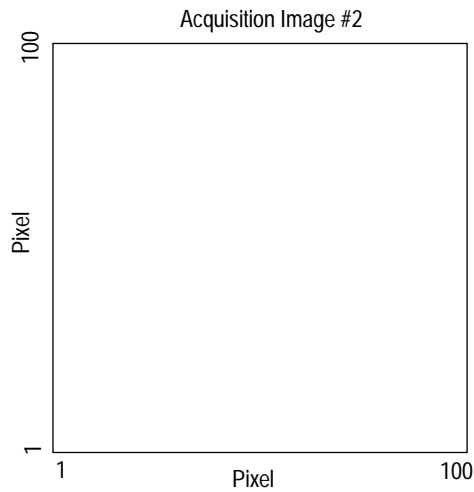
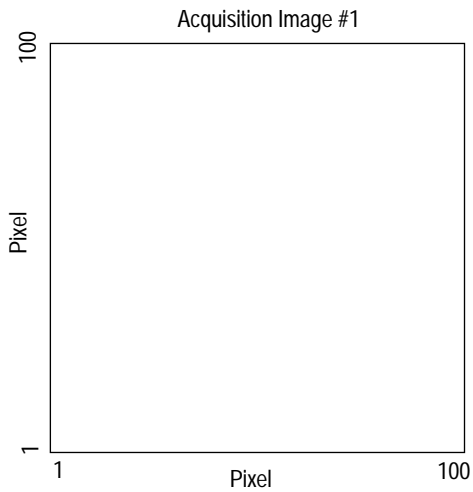
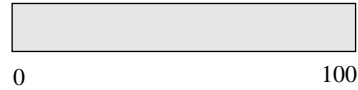
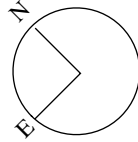
○=OK; ●=Not OK; blank=Unknown

## Observation List–Optional Parameters

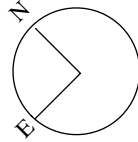
Visit-Exp #	Rootname	Target Name	Detector	Operating Mode	Optional Parameters
01-10	O1234501	HD000000	CCD	ACQ	ACQTYPE=POINT
01-20	O1234502	HD000000	CCD	ACQ/PEAK	CCDGAIN=8
01-30	O1234503	HD000000	NUV-MAMA	ACCUM	

## Observation Statistics

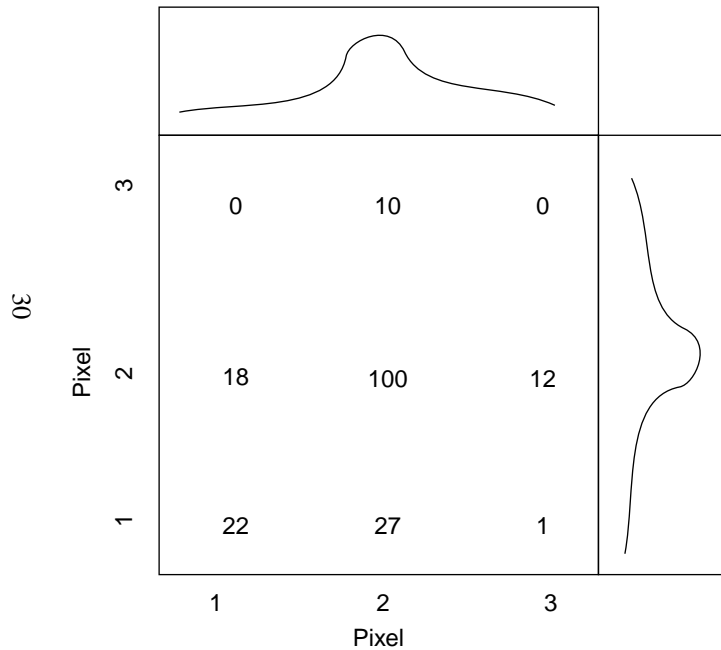
Visit-Exp #	Rootname	Target Name	Detector	Operating Mode	Total Exposure Time	# Pixels	# Good Pixels	Good Min	Good Max	Good Mean	Min S/N	Max S/N	Mean S/N
01-10	O1234501	HD000000	CCD	ACQ	60s								
01-20	O1234502	HD000000	CCD	ACQ/PEAK	60s								
01-30	O1234503	HD000000	NUV-MAMA	ACCUM	60s								



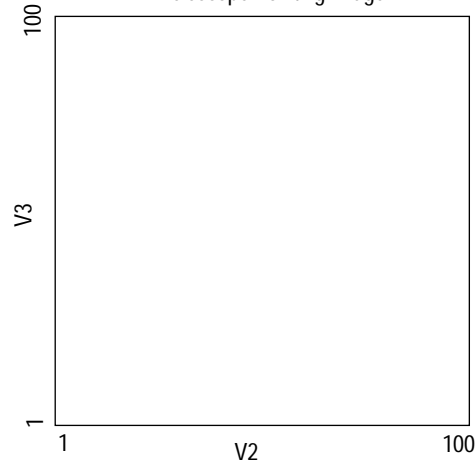
Rootname: o1234503  
 Obs. Date: 02 Feb 96  
 Obs. Time: 12:00:00  
  
 Target: HD00000  
 RA: 12h 00m 00.00s  
 DEC: +10D 00' 00.0"  
 Equinox: J2000  
  
 Detector: CCD  
 Observation Mode: ACQ  
 Observation Type: IMAGING  
 Filter: CLEAR  
 MIRROR: MIRVIS  
 Total Exposure Time: 60 s  
 # of Exposures: 2  
  
 CCDAMP: A  
 CCDGAIN: 4  
  
 Axis 1 Binning: 1  
 Axis 2 Binning: 1  
  
 Acquisition Type: POINT  
  
 # Pixels: 10000  
 # Good Pixels: 10000  
 Min Good: 0  
 Max Good: 100  
 Mean Good: 10  
 Min S/N: 0  
 Max S/N: 3  
 Mean S/N: 1



ACQ/PEAKUP Image



Telescope Pointing Image



Rootname: o1234503  
 Obs. Date: 02 Feb 96  
 Obs. Time: 12:00:00

Target: HD00000  
 RA: 12h 00m 00.00s  
 DEC: +10D 00' 00.0"  
 Equinox: J2000

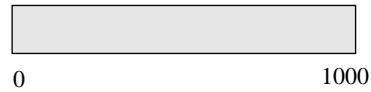
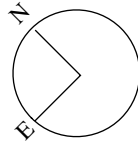
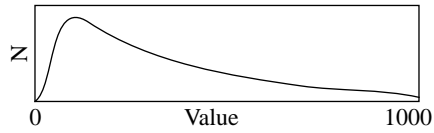
Detector: CCD  
 Observation Mode: ACQ/PEAK  
 Observation Type: IMAGING  
 Filter: CLEAR  
 MIRROR: MIRVIS  
 Total Exposure Time: 60 s  
 # of Exposures: 2

CCDAMP: A  
 CCDGAIN: 4

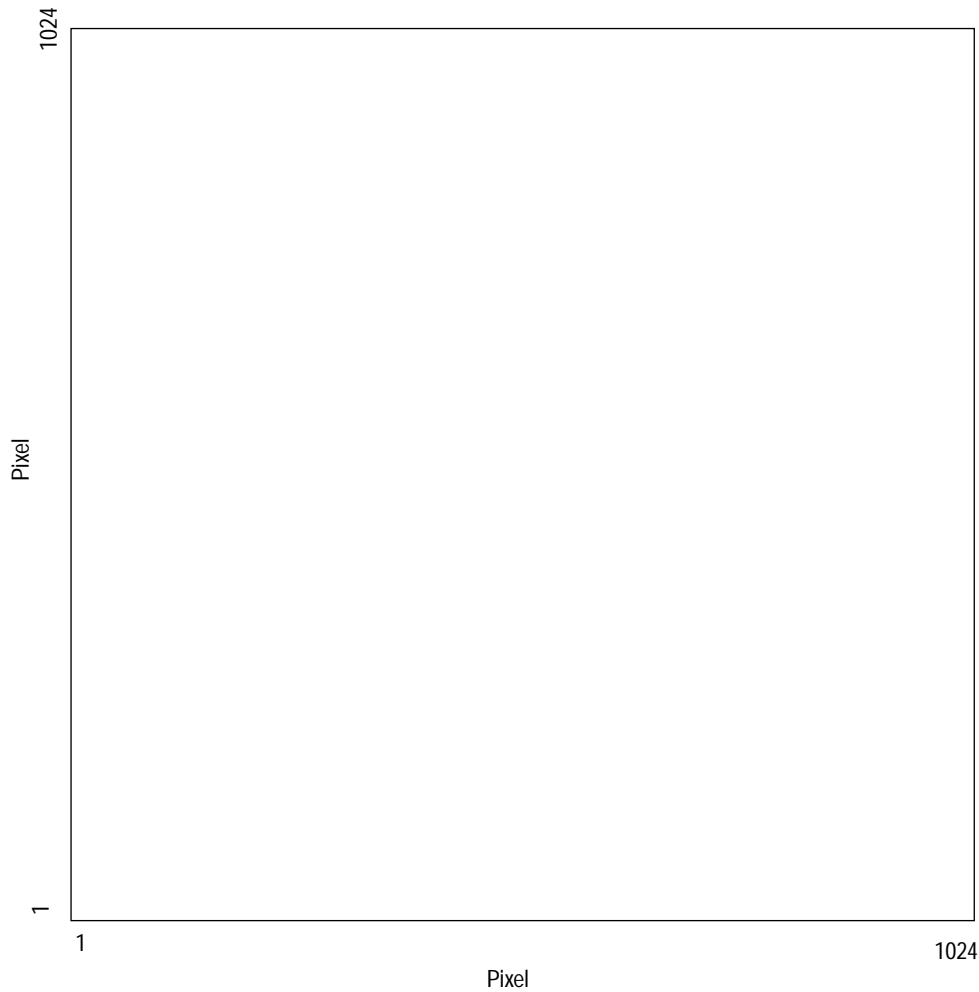
Axis 1 Binning: 1  
 Axis 2 Binning: 1

Search Method: SPIRAL  
 # of Steps: 9  
 Step Size: 100

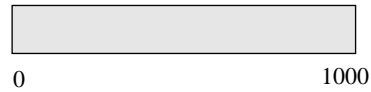
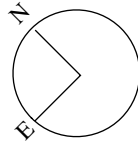
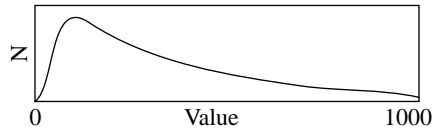
# Pixels: 10000  
 # Good Pixels: 10000  
 Min Good: 0  
 Max Good: 100  
 Mean Good: 10  
 Min S/N: 0  
 Max S/N: 3  
 Mean S/N: 1



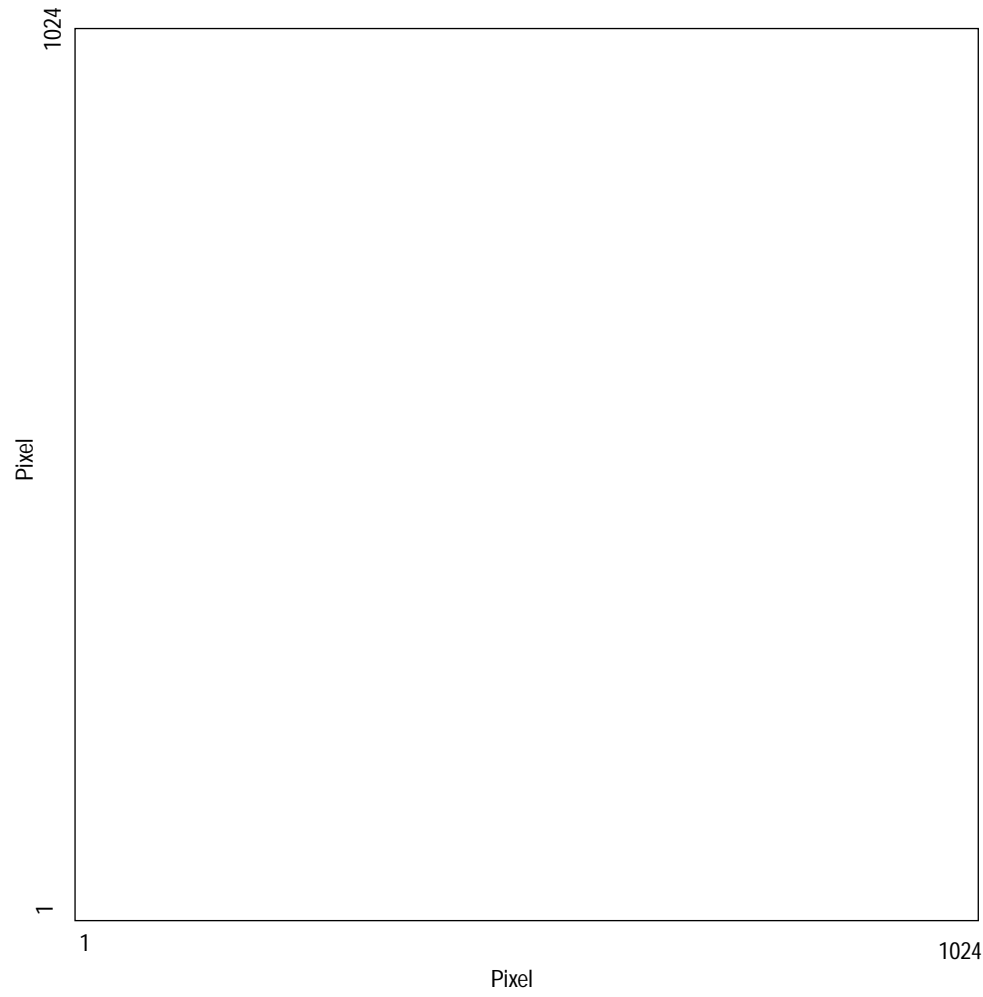
ACCUM Image



Rootname: o1234503  
 Obs. Date: 02 Feb 96  
 Obs. Time: 12:00:00  
  
 Target: HD00000  
 RA: 12h 00m 00.00s  
 DEC: +10D 00' 00.0"  
 Equinox: J2000  
  
 Detector: CCD  
 Observation Mode: ACCUM  
 Observation Type: IMAGING  
 Filter: CLEAR  
 MIRROR: MIRVIS  
 Total Exposure Time: 60 s  
 # of Exposures: 2  
  
 CCDAMP: A  
 CCDGAIN: 4  
  
 Axis 1 Binning: 1  
 Axis 2 Binning: 1  
  
 Search Method: SPIRAL  
 # of Steps: 9  
 Step Size: 100  
  
 # Pixels: 1048576  
 # Good Pixels: 1048576  
 Min Good: 0  
 Max Good: 1000  
 Mean Good: 100  
 Min S/N: 0  
 Max S/N: 33  
 Mean S/N: 10



MAMA Local Rate Check Image



Rootname: o1234503  
 Obs. Date: 02 Feb 96  
 Obs. Time: 12:00:00

Target: HD00000  
 RA: 12h 00m 00.00s  
 DEC: +10D 00' 00.0"  
 Equinox: J2000

Detector: NUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: SPECTROSCOPY  
 Aperture: 52X0.1  
 Grating: G230L  
 Central Wavelength: 2376  
 Total Exposure Time: 60 s  
 # of Exposures: 1

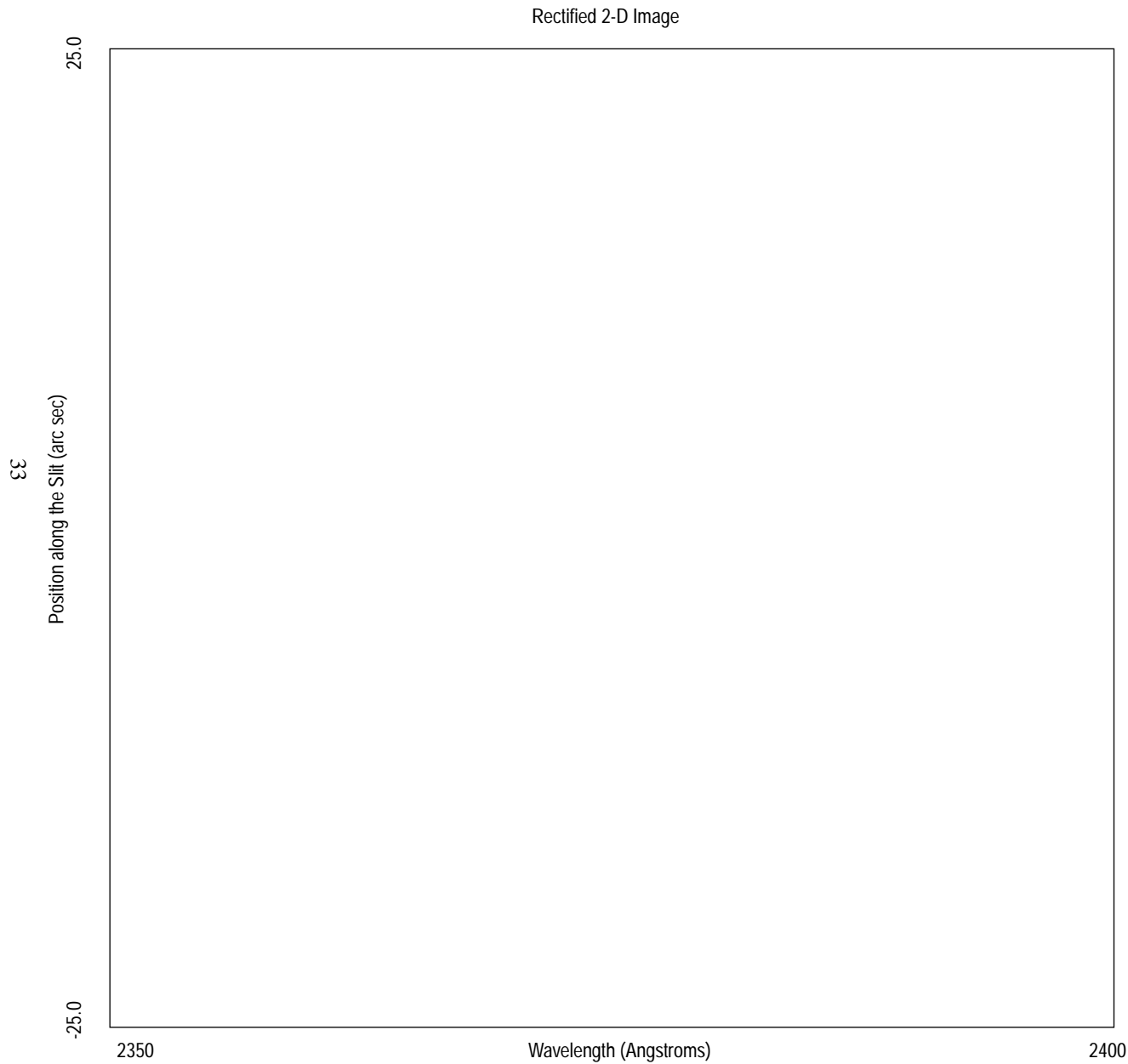
Global Count Rate: 5  
 LRC Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Axis 1 Binning: 2  
 Axis 2 Binning: 2

Axis 1 Subarray Center: 512  
 Axis 2 Subarray Center: 512  
 Axis 1 Size: 512  
 Axis 2 Size: 512

Local Rate Check Failed: F

# Pixels: 262144  
 # Good Pixels: 262144  
 Min Good: 1.0e-09  
 Max Good: 6.0e-09  
 Mean Good: 4.0e-09  
 Min S/N: 45  
 Max S/N: 55  
 Mean S/N: 50



Rootname: o1234503  
Obs. Date: 02 Feb 96  
Obs. Time: 12:00:00

Target: HD00000  
RA: 12h 00m 00.00s  
DEC: +10D 00' 00.0"  
Equinox: J2000

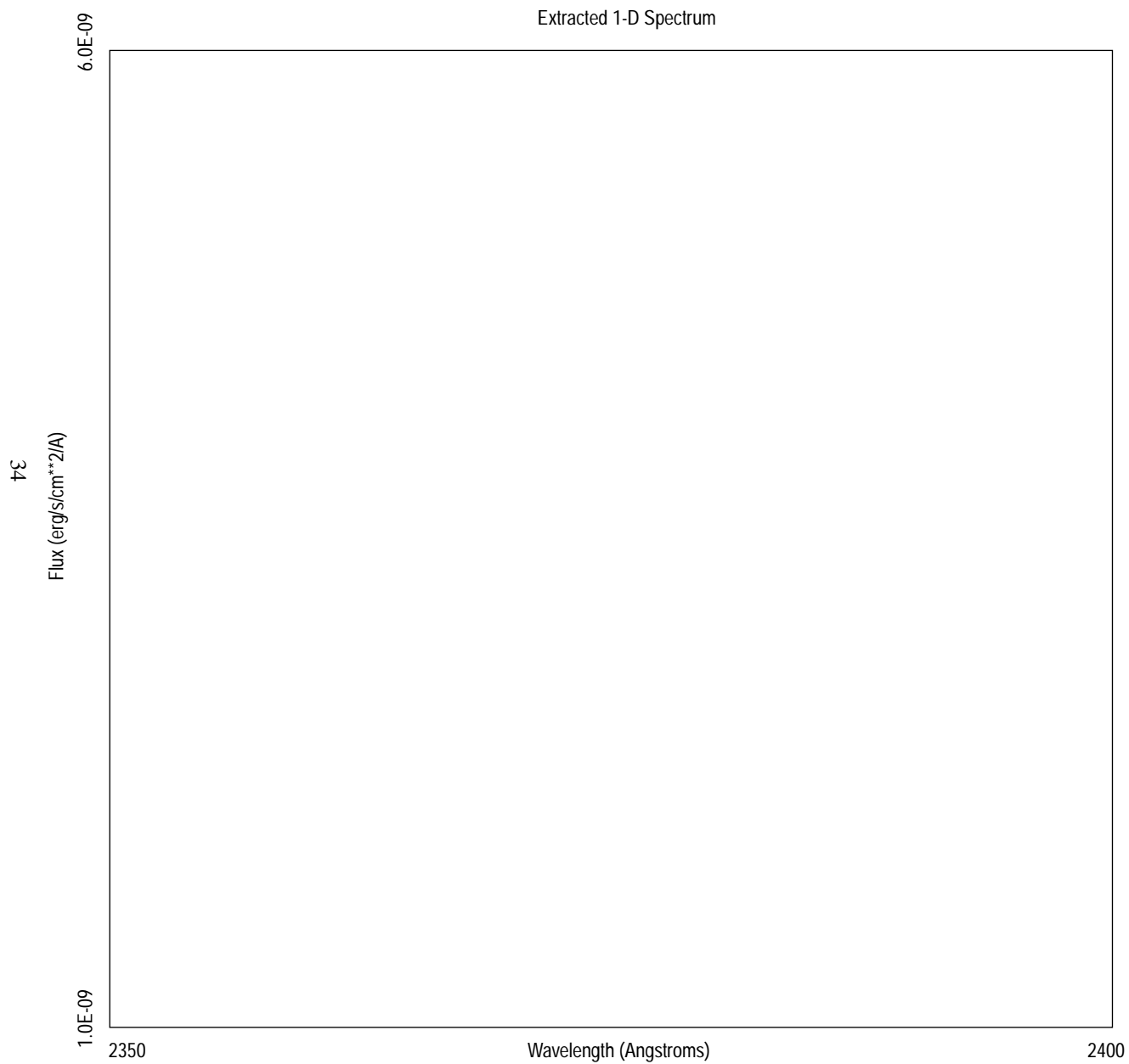
Detector: NUV-MAMA  
Observation Mode: ACCUM  
Observation Type: SPECTROSCOPY  
Aperture: 52X0.1  
Grating: G230L  
Central Wavelength: 2376  
Total Exposure Time: 60 s  
# of Exposures: 1

Global Count Rate: 5  
LRC Image Exists: T  
MAMA Axis 1 Offset: 0  
MAMA Axis 2 Offset: 0

Axis 1 Binning: 2  
Axis 2 Binning: 2

Axis 1 Subarray Center: 512  
Axis 2 Subarray Center: 512  
Axis 1 Size: 512  
Axis 2 Size: 512

# Pixels: 262144  
# Good Pixels: 262144  
Min Good: 1.0e-09  
Max Good: 6.0e-09  
Mean Good: 4.0e-09  
Min S/N: 45  
Max S/N: 55  
Mean S/N: 50



Rootname: o1234503  
Obs. Date: 02 Feb 96  
Obs. Time: 12:00:00

Target: HD00000  
RA: 12h 00m 00.00s  
DEC: +10D 00' 00.0"  
Equinox: J2000

Detector: NUV-MAMA  
Observation Mode: ACCUM  
Observation Type: SPECTROSCOPY  
Aperture: 52X0.1  
Grating: G230L  
Central Wavelength: 2376  
Total Exposure Time: 60 s  
# of Exposures: 1

Global Count Rate: 5  
LRC Image Exists: T  
MAMA Axis 1 Offset: 0  
MAMA Axis 2 Offset: 0

Axis 1 Binning: 2  
Axis 2 Binning: 2

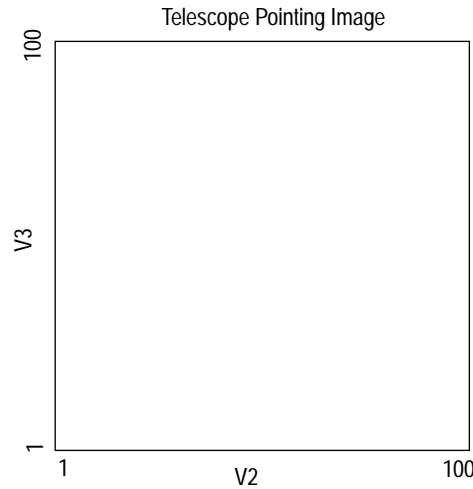
Axis 1 Subarray Center: 512  
Axis 2 Subarray Center: 512  
Axis 1 Size: 512  
Axis 2 Size: 512

# Pixels: 512  
# Good Pixels: 512  
Min Good: 1.0e-09  
Max Good: 6.0e-09  
Mean Good: 4.0e-09  
Min S/N: 45  
Max S/N: 55  
Mean S/N: 50

**HST Spacecraft Performance Summary**

- Possible loss of data due to science tape recorder track change.
- Take data flag not on throughout observation.

V2 Jitter (RMS): 2.0  
 V3 Jitter (RMS): 1.0  
 V2 Jitter (PP): 2.0  
 V3 Jitter (PP): 1.0



35

**Pipeline Processing Summary**

- No anomalies.

**Calibration Data Quality Summary**

- Reference bias image used in processing contains placeholder data.
- Data quality initialization calibration step was not completed.

Rootname: o1234503  
 Obs. Date: 02 Feb 96  
 Obs. Time: 12:00:00

Target: HD00000  
 RA: 12h 00m 00.00s  
 DEC: +10D 00' 00.0"  
 Equinox: J2000

Detector: NUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: SPECTROSCOPY  
 Aperture: 52X0.1  
 Grating: G230L  
 Central Wavelength: 2376  
 Total Exposure Time: 60 s  
 # of Exposures: 1

Global Count Rate: 5  
 LRC Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Axis 1 Binning: 2  
 Axis 2 Binning: 2

Axis 1 Subarray Center: 512  
 Axis 2 Subarray Center: 512  
 Axis 1 Size: 512  
 Axis 2 Size: 512

# Pixels: 512  
 # Good Pixels: 512  
 Min Good: 1.0e-09  
 Max Good: 6.0e-09  
 Mean Good: 4.0e-09  
 Min S/N: 45  
 Max S/N: 55  
 Mean S/N: 50

## Calibration Status Summary

Switches and Flags			Reference Files and Tables		
Keyword	Value	Calibration Step	Keyword	Value	Pedigree
DOPCORR	OMIT	Doppler Compensation			
DQICORR	COMPLETE	Data quality initialization	BBPIXTAB	f000001o	GROUND 01Jan95-01Feb95
ATODCORR	COMPLETE	Correct for A-to-D conversion	ATODFILE	f000002o	GROUND 01Jan95
BLEVCORR	COMPLETE	Subtract bias using overscan			
BIASCORR	OMIT	Subtract bias using image	BIASFILE	f000003o	DUMMY 01Jan95
DARKCORR	COMPLETE	Subtract dark	DARKFILE	f000004o	DUMMY 01Jan95
FLATCORR	COMPLETE	Flat field image	PFLTFILE	f000005o	INFLIGHT 01Jan95
			DFLTFILE	f000006o	INFLIGHT 01Jan95-01Feb95
			LFLTFILE	f000007o	INFLIGHT 01Jan95
SHADCORR	COMPLETE	Apply shutter shading	SHADFILE	f000008o	DUMMY 01Jan95
PHOTCORR	COMPLETE	Populate photometry keywords	PHOTTAB	f000009o	DUMMY 01Jan95
CRCORR	COMPLETE	Reject cosmic rays			
WAVECORR	COMPLETE	Adjust wavelength zeropoint	WAVECAL	f00000ao	GROUND 01Jan95
SGEOCORR	COMPLETE	Correct geometric distortion	SDSTFILE	f000011o	GROUND 01Jan95
X2DCORR	COMPLETE	Extract 2-d image	DISNTAB	f000011o	GROUND 01Jan95
X1DCORR	COMPLETE	Extract 1-d image	XTRACTAB	f000011o	GROUND 01Jan95
DISPCORR	COMPLETE	Apply dispersion solution	DISPTAB	f000012o	INFLIGHT 01Jan95
			IANGTAB	f000013o	INFLIGHT 01Jan95
HELCORR	COMPLETE	Convert heliocentric	OFFSTAB	f000014o	INFLIGHT 01Jan95
BACKCORR	COMPLETE	Subtract background			
FLUXCORR	COMPLETE	Convert to absolute flux	APHRTAB	f000016o	GROUND 01Jan95
RPTCORR	COMPLETE	Combine repeat exposures			

## **Appendix 2**

The following 16 pages include examples of the paper products as they are currently produced.

**Proposal: 863**

**Visit: 06, 09, 11, 12**

**PI: Smith, James**

**Title:**

## Description of Visit Summaries

### Target List

The Target List contains the target name, the coordinates for the target as calculated by the ground system based on the target information taken from the proposal, and the text description of the target given in the proposal. Note that the coordinates listed represent the predicted position of the target in the sky and do not give the pointing of HST at the time of the observation.

### Observation List with Data Quality Flags

The Observation List contains information that uniquely identifies individual exposures as specified in the observing proposal. Additionally, the status of the spacecraft and ground-system performance during the execution of the observation are summarized by the Procedural Quality Flags:

- OBS      Status of the performance of HST.
- PROC     Status of the pipeline processing of the observations.
- CAL      Status of the reference data used in calibration.

Symbols used to indicate the status of the Procedural Quality are:

- OK.
- Not OK-Refer to the Data Quality Summary for details.
- Blank      Status unknown.

### Observation List-Optional Parameters

The Observation List contains additional instrument configuration information. Entries in the table reflect the values of the Optional Parameters specified in the observing proposal.

### Observation Statistics

This Observation Statistics table contains a simple set of statistics of the raw (or flat-fielded) data for the observations.

## Description of Exposure Summaries

### Plots for Each Exposure

Plots are created for each exposure. Gray-scale or line plots are produced as appropriate for the instrument configuration and observing mode for each exposure. Exposure information taken from the headers of the data files is also provided.

### Data Quality Summary for Each Exposure

The Data Quality Summary contains details of problems flagged by the Data Quality flags. Exposure information taken from the headers of the data files is also provided.

### Calibration status summary for each exposure

The calibration summary gives detailed information about the calibration of the observations. Individual calibration steps are listed with completion status. Reference files used are listed by name and information about the pedigree of the calibration data is provided.

### Need Help?

Send e-mail to your contact scientist or  
[help@stsci.edu](mailto:help@stsci.edu)

**Target List**

Target Name	R.A. (J2000)	Dec. (J2000)	Description
TARGET1	18:00:00.00	-61:30:00.0	(N/A)
TARGET2	18:00:00.00	-61:31:00.0	(N/A)

**Observation List**

Visit-Exp#	Rootname	Target Name	Detector	Operating Mode	Aperture	Optical Element	Cenwave (A)	Total Exp Time (s)	# of Exp	File	Quality Flags		
											Obs	Proc	Cal
6.290	O3S40602O	TARGET1	FUV-MAMA	ACCUM	52X0.1	G140L	1575	7.0	1	flt	○	●	○
6.410	O3S4060RO	TARGET1	NUV-MAMA	ACCUM	F25CIII	MIRNUV	(N/A)	180.0	1	flt	○	○	○
9.520	O3S40901O	TARGET1	CCD	ACQ	F28X50LP	MIRVIS	(N/A)	10.0	1	raw	○		N/A
11.610	O3S41102O	TARGET2	CCD	ACCUM	50CORON	MIRVIS	(N/A)	2.0	2	raw			
12.630	O3S41202O	TARGET1	CCD	ACQ/PEAK	52X0.1	MIRVIS	(N/A)	0.2	1	raw	●		N/A

Quality flags:      ○ = OK              ● = Not OK              Blank = Unknown or file missing

**Observation List-Optional Parameters**

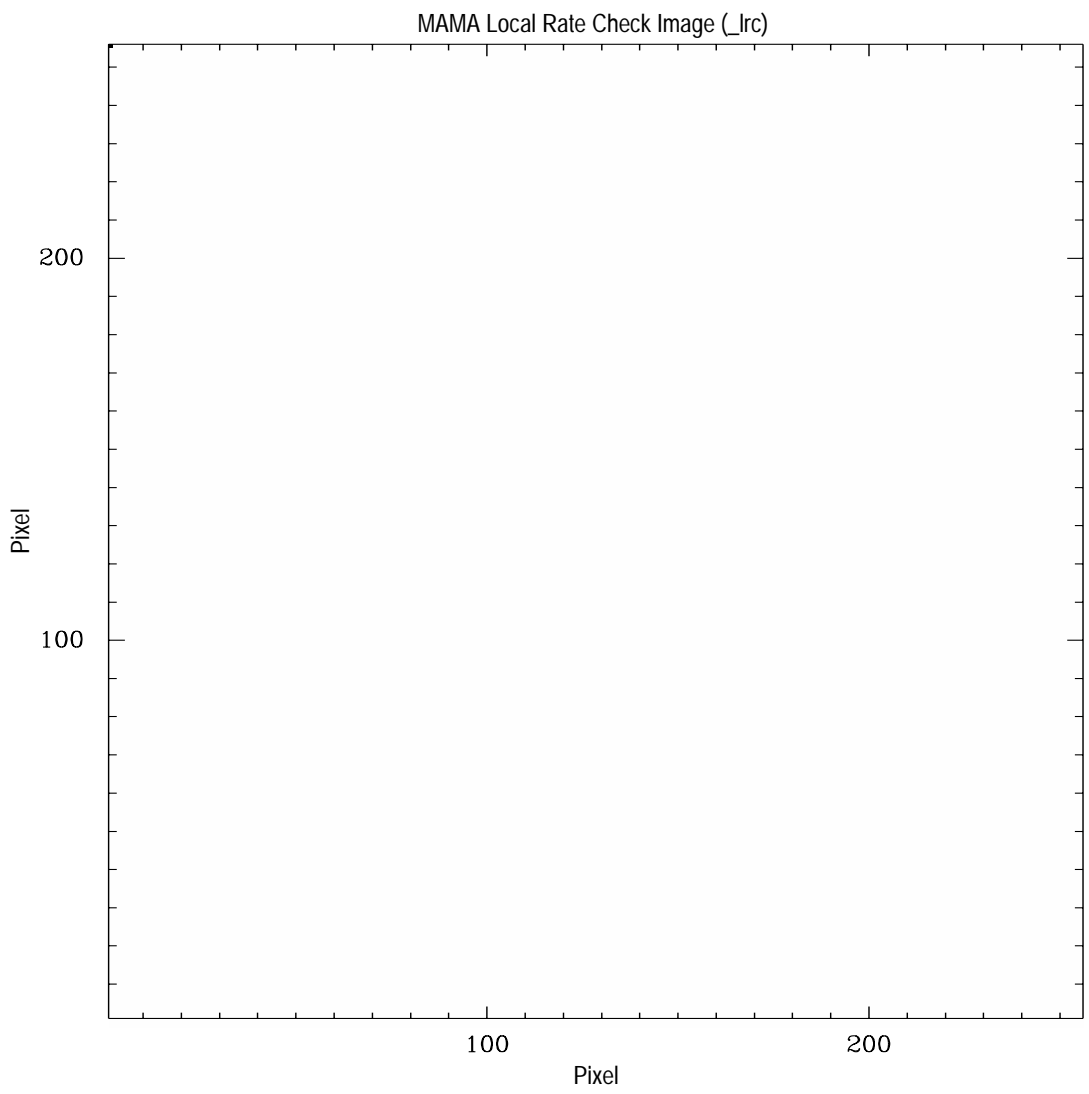
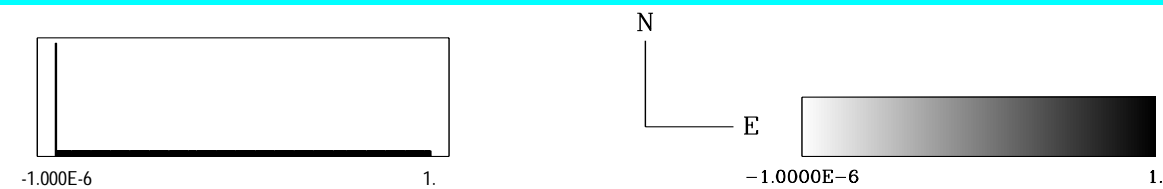
Visit-Exp#	Rootname	Target Name	Detector	Operating Mode	Optional Parameters
6.290	O3S40602O	TARGET1	FUV-MAMA	ACCUM	BINAXIS1=1, BINAXIS2=1, PATTERN=NONE, SIZEAXIS1=1024, SIZEAXIS2=1024, CENTERAXIS2=513

***Observation List-Optional Parameters***

Visit-Exp#	Rootname	Target Name	Detector	Operating Mode	Optional Parameters
6.410	O3S4060RO	TARGET1	NUV-MAMA	ACCUM	BINAXIS1=1, BINAXIS2=1, PATTERN=(N/A), SIZEAXIS1=1024, SIZEAXIS2=1024, CENTERAXIS2=513
9.520	O3S40901O	TARGET1	CCD	ACQ	ACQTYPE=POINT, DIFFUSE-CENTER=, CHECKBOX=3
11.610	O3S41102O	TARGET2	CCD	ACCUM	CR-SPLIT=2, GAIN=1, BINAXIS1=4, BINAXIS2=4, SIZEAXIS2=1044, PATTERN=(N/A)
12.630	O3S41202O	TARGET1	CCD	ACQ/PEAK	SIZEAXIS2=32

***Observation Statistics***

Visit-Exp#	Rootname	Target Name	Detector	Operating Mode	Total exp Time (s)	# pixels	# Good pixels	Good Min	Good Max	Good Mean	Min S/N	Max S/N	Mean S/N
6.290	O3S40602O	TARGET1	FUV-MAMA	ACCUM	7.0	1048576	1043626	-0.0	1.0	0.0	-0.0	0.5	0.0
6.410	O3S4060RO	TARGET1	NUV-MAMA	ACCUM	180.0	1048576	1048565	-7.5	15.8	0.0	-1.7	3.5	0.0
11.610	O3S41102O	TARGET2	CCD	ACCUM	2.0	72086	0	0.0	0.0	0.0	0.0	0.0	0.0



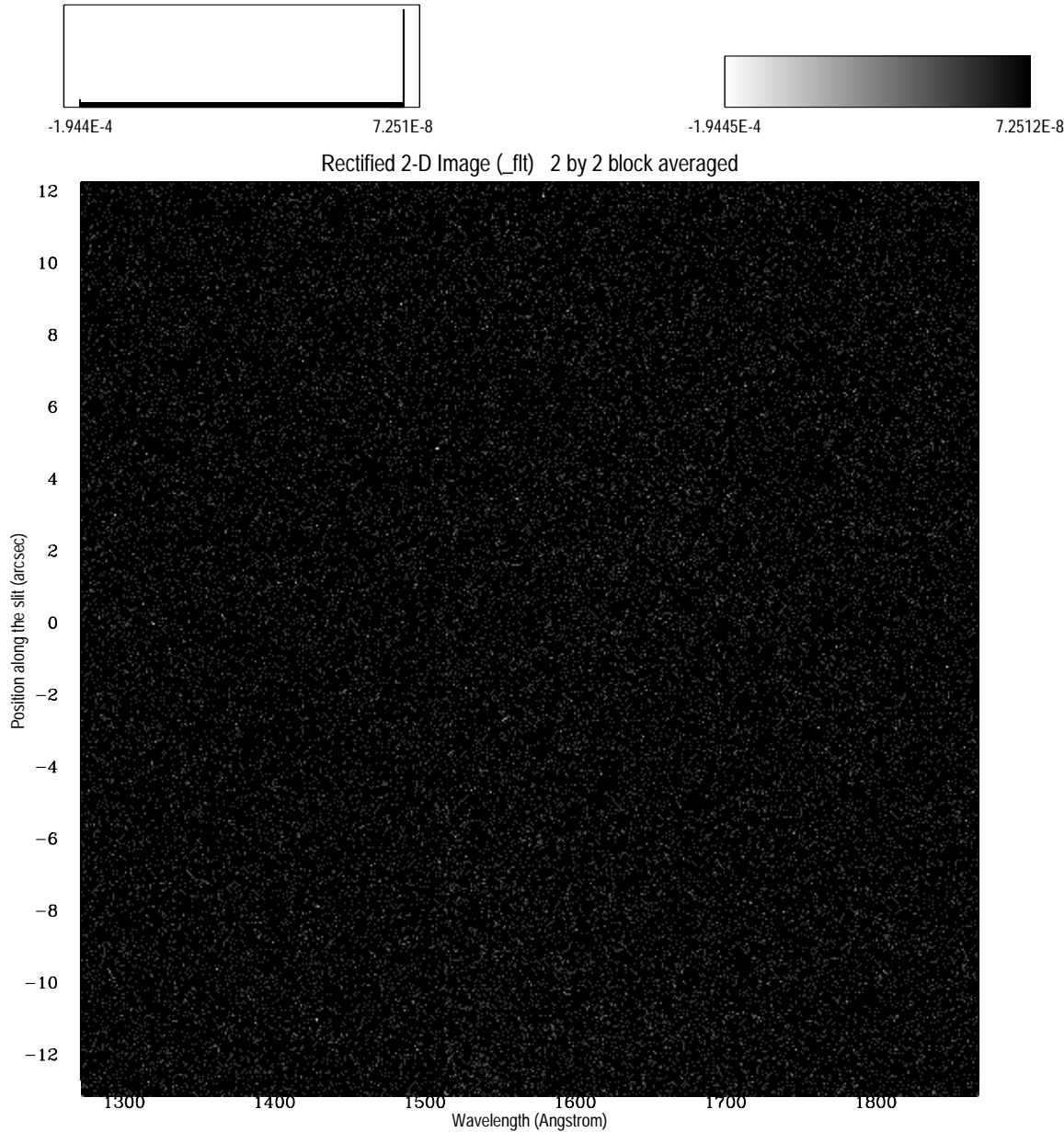
Rootname: O3S406020  
 Obs. Date: 30/03/97  
 Obs. Time: 07:24:26  
 Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0

Detector: FUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: SPECTROSCOPIC  
 Lamp: NONE  
 Aperture: 52X0.1  
 Grating: G140L  
 Central Wavelength: 1575  
 Total Exposure Time: 7.00  
 # of Exposures: 1

Global Count Rate: 0.0  
 Local Rate Check Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Local Rate Check Failed: F

# Pixels: 65536  
 Minimum: 0.00  
 Maximum: 1.00



Rootname: O3S406020  
 Obs. Date: 30/03/97  
 Obs. Time: 07:24:26

Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0

Detector: FUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: SPECTROSCOPIC  
 Lamp: NONE  
 Aperture: 52X0.1  
 Grating: G140L  
 Central Wavelength: 1575  
 Total Exposure Time: 7.00  
 # of Exposures: 1

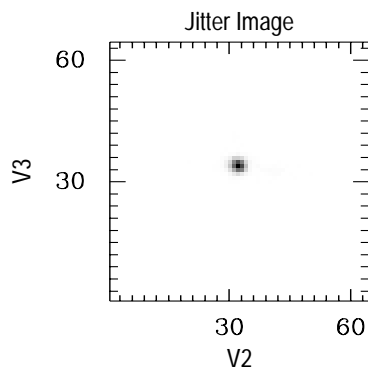
Global Count Rate: 0.0  
 Local Rate Check Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Local Rate Check Failed: F

# Pixels: 1048576  
 # Good Pixels: 1043626  
 Good Minimum: -0.00  
 Good Maximum: 1.00  
 Good Mean: 0.00  
 Min S/N: -0.00  
 Max S/N: 0.50  
 Mean S/N: 0.00

## HST Spacecraft Performance Summary

# Recenterings: 0  
 # Losses of Lock: 0  
 V2 Jitter (RMS): 2.5  
 V3 Jitter (RMS): 3.6  
 V2 Jitter (PP): 0.0  
 V3 Jitter (PP): 0.0



## Pipeline Processing Summary

ERROR: Error: Where is the any key?  
 ERROR: Some unknown error  
 ERROR: O3S40301R was not appended to qoarchives!  
 ERROR: Power shut down in OPUS  
 ERROR: Red alert!  
 ERROR: Yet another error.  
 ERROR: Can you say Error?  
 (There are more errors...)

## Calibration Data Quality Summary

No anomalies.

Rootname: O3S406020  
 Obs. Date: 30/03/97  
 Obs. Time: 07:24:26

Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0

Detector: FUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: SPECTROSCOPIC  
 Lamp: NONE  
 Aperture: 52X0.1  
 Grating: G140L  
 Central Wavelength: 1575  
 Total Exposure Time: 7.00  
 # of Exposures: 1

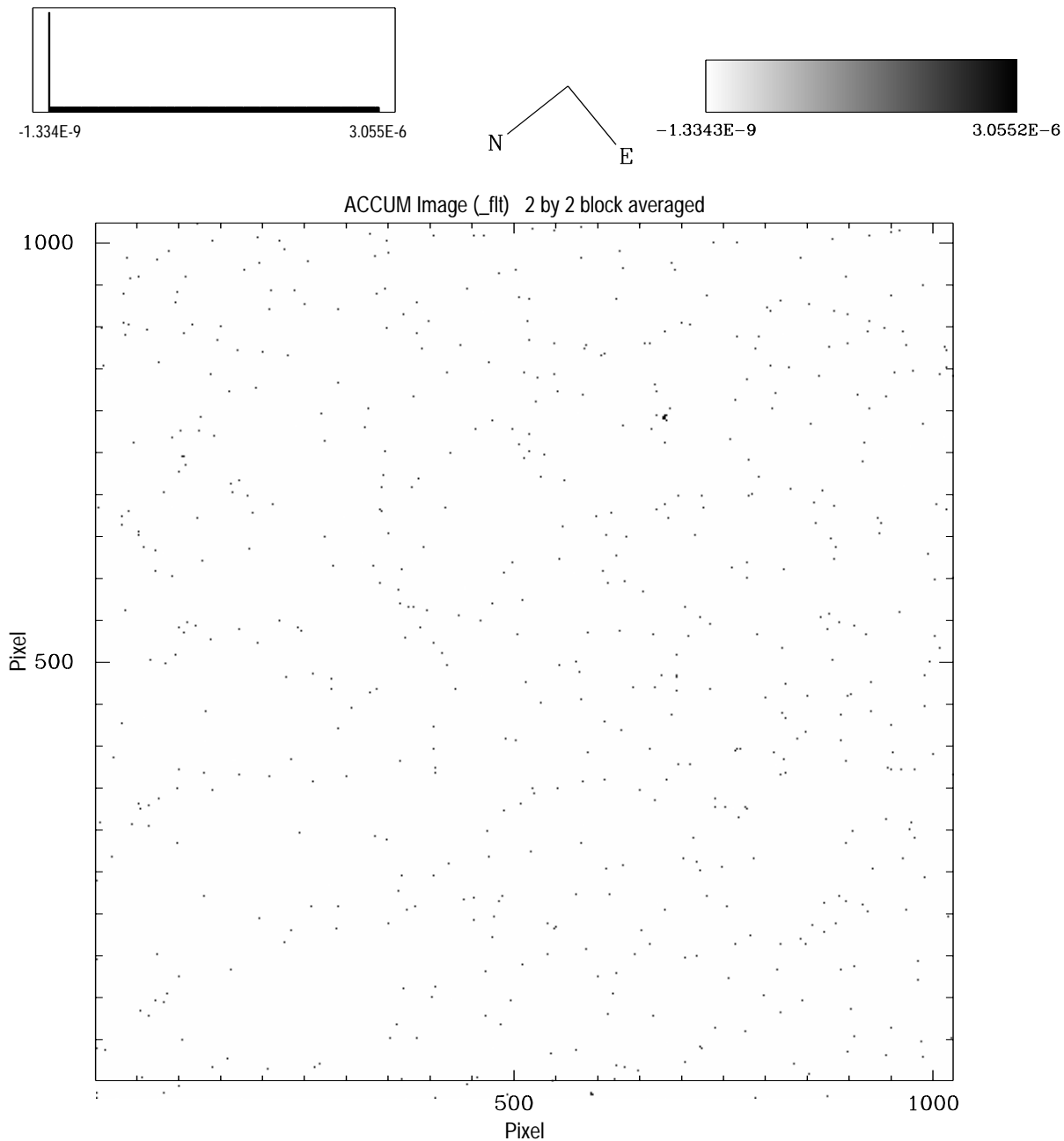
Global Count Rate: 0.0  
 Local Rate Check Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Local Rate Check Failed: F

# Pixels: 1048576  
 # Good Pixels: 1043626  
 Good Minimum: -0.00  
 Good Maximum: 1.00  
 Good Mean: 0.00  
 Min S/N: -0.00  
 Max S/N: 0.50  
 Mean S/N: 0.00

## Calibration Status Summary

Switches and Flags			Reference Files and Tables		
Keyword	Value	Calibration Step	Keyword	File Name	Pedigree
STATFLAG	T	Calculate statistics			
DOPPCORR	OMIT	Correct Doppler-induced velocity shift			
DQICORR	PERFORM	Data quality initialization	BPIXTAB	oref\$1v11477o_bpx.fits	
LFLGCORR	PERFORM	Flag pixels for local and global non-linearities			
LORSCORR	PERFORM	Convert MAMA data to Lo-Res before processing	MOFFTAB	oref\$4s1350io_moc.fits	
GLINCORR	PERFORM	Correct for global detector non-linearities	MLINTAB	oref\$1v15598o_lin.fits	
ATODCORR		Correct for A-to-D conversion errors	ATODTAB		
BLEVCORR		Subtract bias level computed from overscan	CCDTAB		
BIASCORR		Subtract bias image	BIASFILE		
CRCORR		Combine observations to reject cosmic rays	CRREJTAB		
EXPCORR		Process individual observations after cr-rejection			
DARKCORR	PERFORM	Subtract dark image	DARKFILE	oref\$1v1208fo_drk.fits	
BACKCORR	OMIT	Subtract background (sky and interorder)	APDESTAB	oref\$1v1126no_apd.fits	
FLATCORR	PERFORM	Flat field data	PFLTFILE	oref\$2i1352co_pfl.fits	
			DFLTFILE		
			LFLTFILE	oref\$2i1352bo_lfl.fits	
SHADCORR		Apply shutter shading correction	SHADFILE		
PHOTCORR		Populate photometric header keywords	PHOTTAB	oref\$2315583o_pht.fits	
GEOCORR		Perform geometric correction for imaging modes	IDCTAB		
X2DCORR	PERFORM	Rectify 2-D spectral image	SDCTAB	oref\$231637lo_sdc.fits	
X1DCORR	OMIT	Perform 1-D spectral extraction	XTRACTAB	oref\$4s1350ho_1dx.fits	
			SPTRCTAB	oref\$4s1350fo_1dt.fits	
WAVECORR	OMIT	Use wavecal to adjust wavelength zeropoint	LAMPTAB		
DISPCORR	OMIT	Apply dispersion solutions	DISPTAB	oref\$1v1530to_dsp.fits	
			INANGTAB	oref\$1v1541eo_jac.fits	
HELCORR	PERFORM	Convert to heliocentric wavelengths			
FLUXCORR	PERFORM	Convert to absolute flux units	APERTAB	oref\$1v1141oo_apr.fits	
RPTCORR	OMIT	Add individual repeat observations			
SGEOCORR	OMIT	Correct for small scale geometric distortions	SDSTFILE		



Rootname: O3S4060RO  
 Obs. Date: 30/03/97  
 Obs. Time: 08:24:48

Target Name: TARGET1  
 R.A. (J2000): 18:00:00.0  
 Dec. (J2000): -61:30:00.0

Detector: NUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: IMAGING  
 Lamp: NONE  
 Filter: 191nm\_NBP\_(CIII)  
 Mirror: MIRNUV  
 Total Exposure Time: 180.00  
 # of Exposures: 1

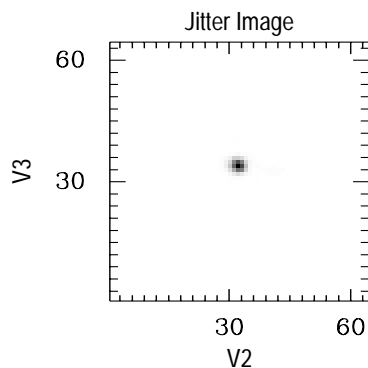
Global Count Rate: 0.0  
 Local Rate Check Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Local Rate Check Failed: F

# Pixels: 1048576  
 # Good Pixels: 1048565  
 Good Minimum: -7.47  
 Good Maximum: 15.76  
 Good Mean: 0.00  
 Min S/N: -1.66  
 Max S/N: 3.47  
 Mean S/N: 0.00

## HST Spacecraft Performance Summary

# Recenterings: 0  
 # Losses of Lock: 0  
 V2 Jitter (RMS): 2.5  
 V3 Jitter (RMS): 3.6  
 V2 Jitter (PP): 0.0  
 V3 Jitter (PP): 0.0



## Pipeline Processing Summary

No anomalies.

## Calibration Data Quality Summary

No anomalies.

Rootname: O3S4060RO  
 Obs. Date: 30/03/97  
 Obs. Time: 08:24:48

Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0

Detector: NUV-MAMA  
 Observation Mode: ACCUM  
 Observation Type: IMAGING  
 Lamp: NONE  
 Filter: 191nm\_NBP\_(CIII)  
 Mirror: MIRNUV  
 Total Exposure Time: 180.00  
 # of Exposures: 1

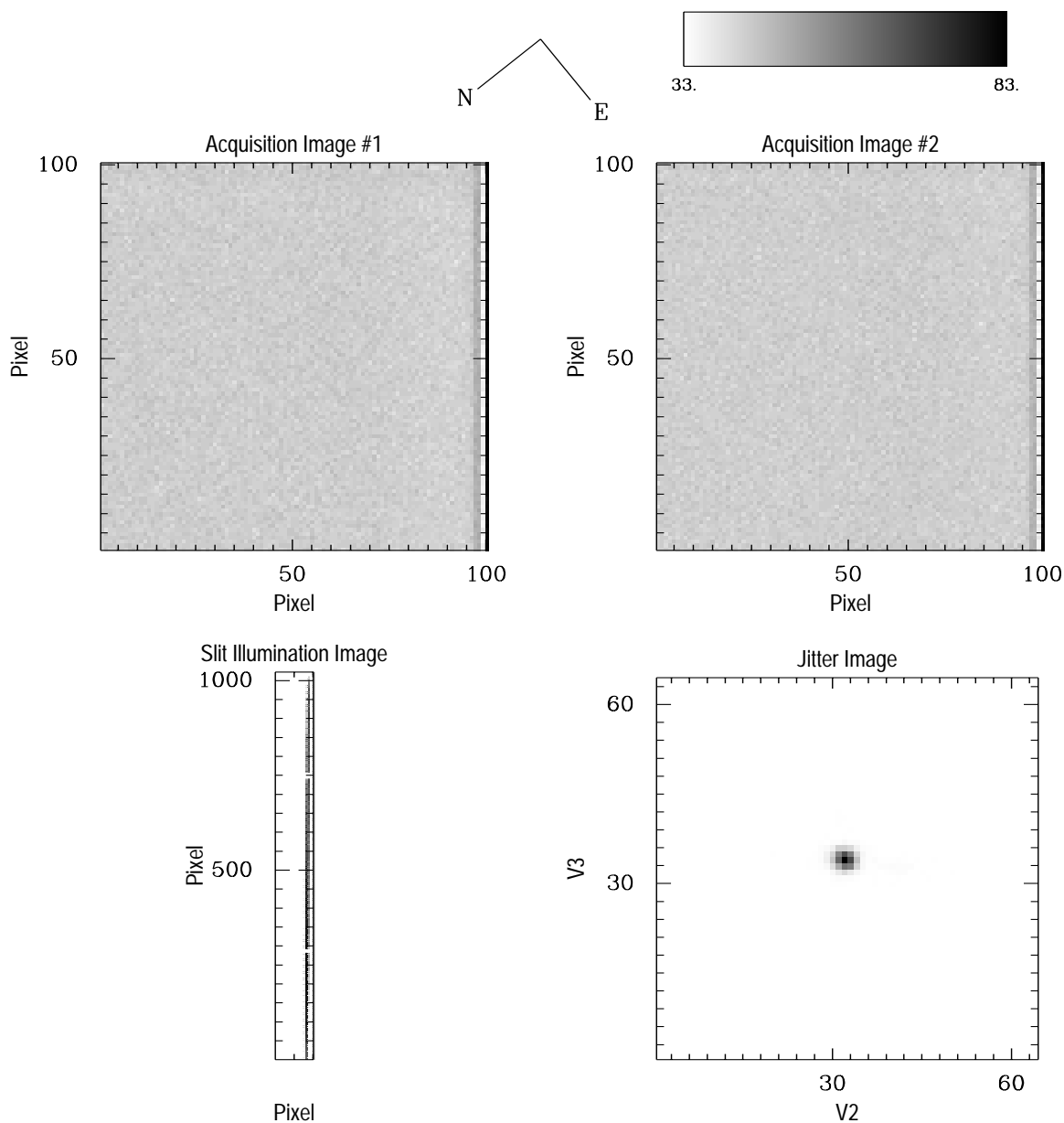
Global Count Rate: 0.0  
 Local Rate Check Image Exists: T  
 MAMA Axis 1 Offset: 0  
 MAMA Axis 2 Offset: 0

Local Rate Check Failed: F

# Pixels: 1048576  
 # Good Pixels: 1048565  
 Good Minimum: -7.47  
 Good Maximum: 15.76  
 Good Mean: 0.00  
 Min S/N: -1.66  
 Max S/N: 3.47  
 Mean S/N: 0.00

## Calibration Status Summary

Switches and Flags			Reference Files and Tables		
Keyword	Value	Calibration Step	Keyword	File Name	Pedigree
STATFLAG	T	Calculate statistics			
DOPPCORR		Correct Doppler-induced velocity shift			
DQICORR	PERFORM	Data quality initialization	BPIXTAB	oref\$gcu15109o_bpx.fits	
LFLGCORR	PERFORM	Flag pixels for local and global non-linearities			
LORSCORR	PERFORM	Convert MAMA data to Lo-Res before processing	MOFFTAB		
GLINCORR	PERFORM	Correct for global detector non-linearities	MLINTAB	oref\$gcv1120to_lin.fits	
ATODCORR		Correct for A-to-D conversion errors	ATODTAB		
BLEVCORR		Subtract bias level computed from overscan	CCDTAB		
BIASCORR		Subtract bias image	BIASFILE		
CRCORR		Combine observations to reject cosmic rays	CRREJTAB		
EXPCORR		Process individual observations after cr-rejection			
DARKCORR	PERFORM	Subtract dark image	DARKFILE	oref\$h1816554o_drk.fits	
BACKCORR		Subtract background (sky and interorder)	APDESTAB		
FLATCORR	PERFORM	Flat field data	PFLTFILE	oref\$gcn13125o_pfl.fits	
			DFLTFILE	oref\$gcv0939do_dfl.fits	
			LFLTFILE	oref\$gco13579o_lfl.fits	
SHADCORR		Apply shutter shading correction	SHADFILE		
PHOTCORR	PERFORM	Populate photometric header keywords	PHOTTAB	oref\$gcd1017po_pht.fits	
GEOCORR	OMIT	Perform geometric correction for imaging modes	IDCTAB		
X2DCORR		Rectify 2-D spectral image	SDCTAB		
X1DCORR		Perform 1-D spectral extraction	XTRACTAB		
			SPTRCTAB		
WAVECORR		Use wavecal to adjust wavelength zeropoint	LAMPTAB		
DISPCORR		Apply dispersion solutions	DISPTAB		
			INANGTAB		
HELCORR		Convert to heliocentric wavelengths			
FLUXCORR		Convert to absolute flux units	APERTAB		
RPTCORR	OMIT	Add individual repeat observations			
SGEOCORR	OMIT	Correct for small scale geometric distortions	SDSTFILE		



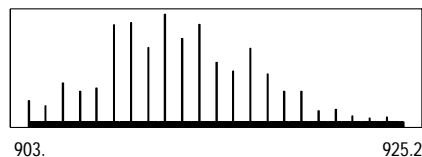
Rootname: O3S409010  
 Obs. Date: 30/03/97  
 Obs. Time: 10:51:02  
 Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0  
 Detector: CCD  
 Observation Mode: ACQ  
 Observation Type: IMAGING  
 Lamp: NONE  
 Filter: Long\_Pass  
 Mirror: MIRVIS  
 Total Exposure Time: 10.00  
 # of Exposures: 1  
 CCDAMP: D  
 CCDGAIN: 8  
 Axis 1 Subarray Center: 512  
 Axis 2 Subarray Center: 512  
 Axis 1 Size: 100  
 Axis 2 Size: 100  
 Acquisition Type: POINT

Visit-Exp#: 11.610

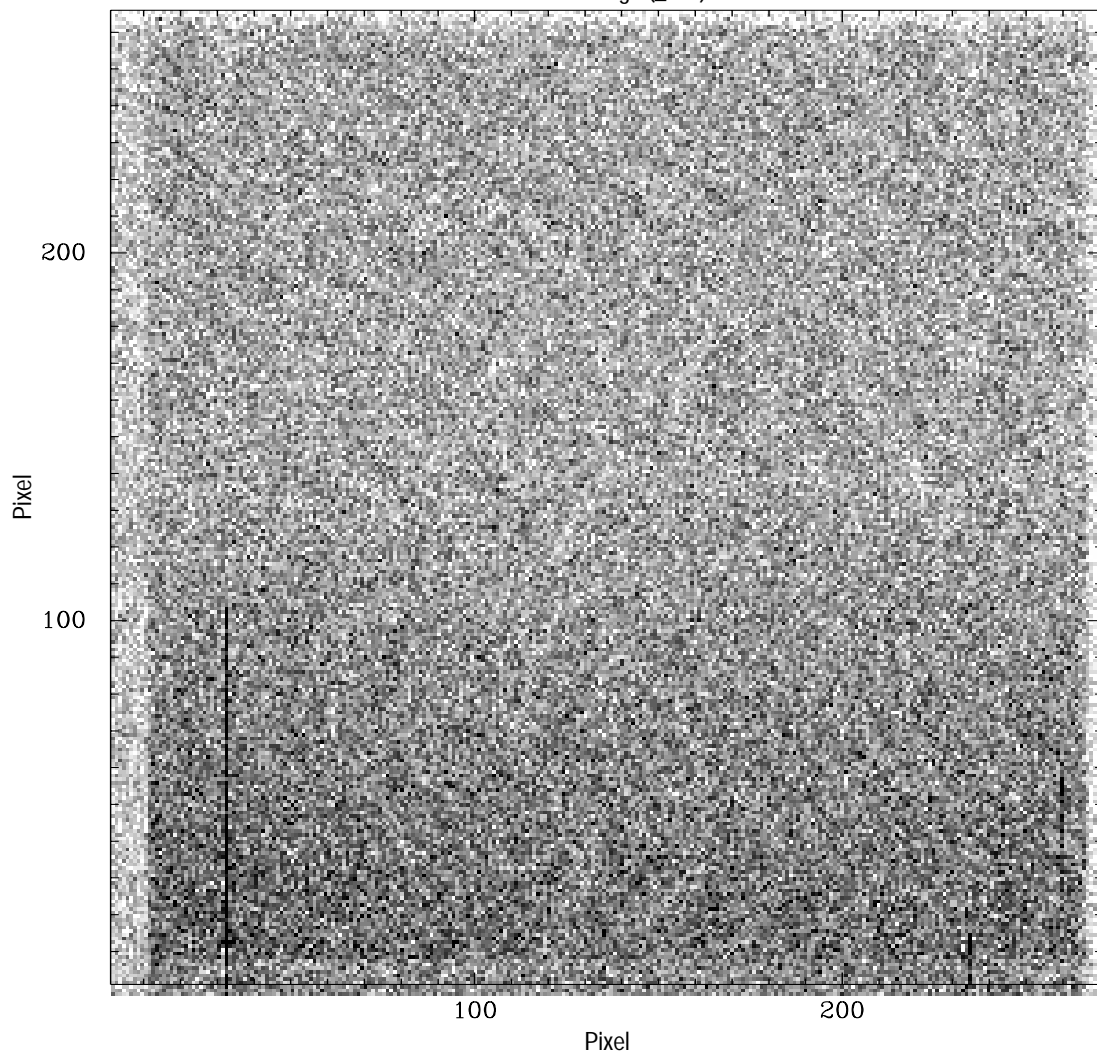
Observation: O3S411020

Proposal: 863

**STIS**



ACCUM Image (\_raw)



Rootname: O3S411020  
Obs. Date: 30/03/97  
Obs. Time: 12:02:08  
Target Name: TARGET2  
R.A. (J2000): 18:00:00.00  
Dec. (J2000): -61:31:00.0  
Detector: CCD  
Observation Mode: ACCUM  
Observation Type: IMAGING  
Lamp: NONE  
Filter: Clear  
Mirror: MIRVIS  
Total Exposure Time: 2.00  
# of Exposures: 1  
CCDAMP: D  
CCDGAIN: 1  
Axis 1 Binning: 4  
Axis 2 Binning: 4  
# Pixels: 72086  
# Good Pixels: 0  
Good Minimum: 0.00  
Good Maximum: 0.00  
Good Mean: 0.00  
Min S/N: 0.00  
Max S/N: 0.00  
Mean S/N: 0.00

**HST Spacecraft Performance Summary**

(Jitter file not available)

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**Pipeline Processing Summary**

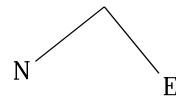
---

**Calibration Data Quality Summary**

Rootname: O3S411020  
Obs. Date: 30/03/97  
Obs. Time: 12:02:08  
  
Target Name: TARGET2  
R.A. (J2000): 18:00:00.00  
Dec. (J2000): -61:31:00.0  
  
Detector: CCD  
Observation Mode: ACCUM  
Observation Type: IMAGING  
Lamp: NONE  
Filter: Clear  
Mirror: MIRVIS  
Total Exposure Time: 2.00  
# of Exposures: 1  
  
CCDAMP: D  
CCDGAIN: 1  
  
Axis 1 Binning: 4  
Axis 2 Binning: 4  
  
# Pixels: 72086  
# Good Pixels: 0  
Good Minimum: 0.00  
Good Maximum: 0.00  
Good Mean: 0.00  
Min S/N: 0.00  
Max S/N: 0.00  
Mean S/N: 0.00

## Calibration Status Summary

Switches and Flags			Reference Files and Tables		
Keyword	Value	Calibration Step	Keyword	File Name	Pedigree
STATFLAG	T	Calculate statistics			
DOPPCORR		Correct Doppler-induced velocity shift			
DQICORR	PERFORM	Data quality initialization	BPIXTAB	oref\$1v11475o_bpx.fits	
LFLGCORR		Flag pixels for local and global non-linearities			
LORSCORR		Convert MAMA data to Lo-Res before processing	MOFFTAB		
GLINCORR		Correct for global detector non-linearities	MLINTAB		
ATODCORR	OMIT	Correct for A-to-D conversion errors	ATODTAB		
BLEVCORR	PERFORM	Subtract bias level computed from overscan	CCDTAB	oref\$1v1158do_ccd.fits	
BIASCORR	PERFORM	Subtract bias image	BIASFILE	oref\$1u14588o_bia.fits	
CRCORR	PERFORM	Combine observations to reject cosmic rays	CRREJTAB	oref\$1v12041o_crr.fits	
EXPCORR		Process individual observations after cr-rejection			
DARKCORR	PERFORM	Subtract dark image	DARKFILE	oref\$1v1208eo_drk.fits	
BACKCORR		Subtract background (sky and interorder)	APDESTAB		
FLATCORR	PERFORM	Flat field data	PFLTFILE	oref\$2310096o_pfl.fits	
			DFLTFILE		
			LFLTFILE		
SHADCORR	OMIT	Apply shutter shading correction	SHADFILE		
PHOTCORR	PERFORM	Populate photometric header keywords	PHOTTAB	oref\$231557so_pht.fits	
GEOCORR	OMIT	Perform geometric correction for imaging modes	IDCTAB		
X2DCORR		Rectify 2-D spectral image	SDCTAB		
X1DCORR		Perform 1-D spectral extraction	XTRACTAB		
			SPTRCTAB		
WAVECORR		Use wavecal to adjust wavelength zeropoint	LAMPTAB		
DISPCORR		Apply dispersion solutions	DISPTAB		
			INANGTAB		
HELCORR		Convert to heliocentric wavelengths			
FLUXCORR		Convert to absolute flux units	APERTAB		
RPTCORR	OMIT	Add individual repeat observations			
SGEOCORR		Correct for small scale geometric distortions	SDSTFILE		



Rootname: O3S412020  
 Obs. Date: 30/03/97  
 Obs. Time: 12:13:30

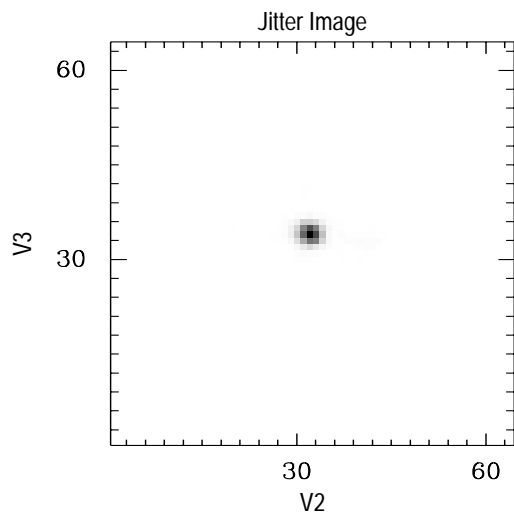
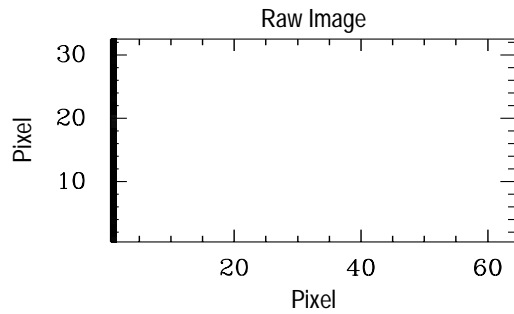
Target Name: TARGET1  
 R.A. (J2000): 18:00:00.00  
 Dec. (J2000): -61:30:00.0

Detector: CCD  
 Observation Mode: ACQ/PEAK  
 Observation Type: IMAGING  
 Lamp: NONE  
 Filter: Clear  
 Mirror: MIRVIS  
 Total Exposure Time: 0.20  
 # of Exposures: 1

CCDAMP: D  
 CCDGAIN: 4

Axis 1 Subarray Center: 512  
 Axis 2 Subarray Center: 512  
 Axis 1 Size: 64  
 Axis 2 Size: 32

Search Method: Spiral  
 # of Steps: 24  
 Step Size: 0



ACQ/PEAKUP Image

