

WFPC2 Data Structures

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This chapter describes how WFPC2 data are configured and delivered and how these data products relate to the original specifications in the Phase II proposal. We describe the data format used by STScI to distribute WFPC2 data and the meanings of the header keywords that the user is likely to find most important. Finally, we describe the paper products sent to the Principal Investigator (PI) with the initial data delivery and how Archive users can reproduce them.

25.1 Data Files and Suffixes

HST data files are generally distributed in FITS format, either via tape or electronically from the Archive, and need to be converted into the so-called GEIS format using the STSDAS task **strfits**. Users not familiar with GEIS format or the **strfits** task should consult Chapter 2. After conversion, a directory listing (type `dir` within IRAF) will show that the files all have a nine-character rootname and a three-character suffix (formerly called the “extension”). For each instrument, this suffix uniquely identifies the file contents. The WFPC2 suffixes are listed in Table 25.1.

Files whose suffix ends with the letter “h” (e.g., `u2850303p.c1h`) are ASCII *header files*. The header files contain keywords that describe the parameters used to take the observation, the processing of the data, and the properties of the image. Files whose suffix ends in the letter “d” (e.g., `u2850303p.c1d`) are binary *data files*; these files contain the data as well as the group keywords. A single GEIS image is composed of a header and data *pair* (e.g., the files `u2850303p.c1h` and `u2850303p.c1d` together represent a single image). Note that, in FITS format, header and data are combined into a

single file. For network transfers, the name of the FITS file is composed as follows: *rootname_suffix.fits*, with the letter “f” replacing “h” or “d” in the suffix (e.g., *u2850303p_c1f.fits*).

Table 25.1: WFPC2 Dataset Suffixes and File Sizes

Suffix	File Contents	Approximate Size
<i>Raw Data Files</i>		
.d0h/ .d0d	Raw science data	5 MB
.q0h/ .q0d	Data quality for raw science data	5 MB
.x0h/ .x0d	Extracted engineering data	100 kB
.q1h/ .q1d	Data quality for extracted engineering data	100 kB
.shh/ .shd	Standard header packet containing observation parameters	30 kB
.pdq	Text file containing jitter statistics and other data quality information	20 kB
<i>Calibrated Data Files</i>		
.c0h/ .c0d	Calibrated science data	10 MB
.c1h/ .c1d	Data quality for calibrated science data	5 MB
.c2h/ .c2d	Histogram of science data pixel values	220 kB
.trl	Trailer file	20 kB

A single WFPC2 exposure is obtained as four images (one image for each CCD chip). GEIS files use group format to keep all of the data from a given HST exposure together in a single image file (see Chapter 2). The data corresponding to each sub-image for the WFPC2 are stored sequentially in the groups of a single GEIS image. The header file for an image contains the information that applies to the observation as a whole (i.e., to all the groups in the image), viewable by paging the header. The group-specific (that is, chip-specific) keyword information is stored with the group data itself in the binary data file; group keywords are only accessible via specialized software, such as the STSDAS tasks **hedit** or **imhead**.

WFPC2 images are normally four-group images: the first group is used for the planetary camera and groups 2, 3, and 4 are used for the wide field cameras. If only a subset of chips are read out, only a subset of groups will be present. The group keyword DETECTOR lists the detector used for that group (1 through 4).

25.2 Header Keywords

In Table 25.2 we list those header keywords found in a calibrated WFPC2 image (suffix .c0h) that many observers are likely to find useful. A complete list of header keywords, with brief explanations, can be found in the Keyword Dictionary, available on the STScI Web pages:

<http://archive.stsci.edu/keyword>

The STSDAS tasks **hedit** or **imhead** can be used to view any or all of the header and group keywords. WFPC2 keywords include items such as observing mode, integration time, filters and reference files used, calibration steps performed, and the properties of the data itself (e.g., number of groups, dimensions in pixels of each group, reference pixels, coordinates, scale, flux units, image statistics). Some additional calibration information is given at the end of the header file in HISTORY keywords.

Some keywords can occasionally be confusing. Users should pay special attention to DATE, which refers to the date the file was written, as opposed to DATE-OBS, the date of the observation; FILTER1 and FILTER2, which are the numerical designations of the filter(s) used, while the filter names are FILTNAM1 and FILTNAM2; and PHOTZPT, which is *not* the photometric zeropoint (in the ST magnitude system) as normally understood, but rather the zeropoint in the ST magnitude system to be used after conversion to FLAM units (see “Photometric Zero Point” on page 28-1).

Astrometry keywords can also be confusing. The orientation of the image is specified by a global keyword, PA_V3, and a group keyword, ORIENTAT. The keyword PA_V3 gives the position angle (in degrees) of the telescope’s V3 axis on the sky, measured from North through East. The V3 axis is roughly 225 degrees from the x axis of the PC. This axis differs by exactly 180 degrees from the ORIENT value specified in the Phase II submission, which refers to the U3 axis. The group keyword ORIENTAT gives, for each detector, the position angle of the y axis in the plane of the sky, measured from North through East. This angle differs from PA_V3 by roughly -135 , -45 , $+45$, and $+135$ degrees, for PC1, WF2, WF3, and WF4, respectively. See Figure 24.2 for a graphic representation of the geometric relationship between the four detectors. Accurate values of the positions and rotations between chips can be obtained from the Science Instrument Aperture File (SIAF). The SIAF is available via the WWW at:

http://www.stsci.edu/ftp/instrument_news/Observatory/siaf.html

In addition, each group has eight keywords (listed under coordinate-related keywords below) that specify the transformation from pixels to world coordinates (right ascension and declination) in the tangent plane approximation at the center of the chip.

Table 25.2: WFPC2 Header Keywords

Keyword	Description
<i>Information about the groups</i>	
GROUPS	Multi-group image? Indicates whether data has groups.
GCOUNT	Number of groups per observation (1 to 4)
<i>Coordinate-related keywords</i>	
CRVAL1	RA of reference pixel (deg)
CRVAL2	Dec of reference pixel (deg)
CRPIX1	X coordinate of reference pixel
CRPIX2	Y coordinate of reference pixel
CD1_1	Partial derivative of RA with respect to x
CD1_2	Partial derivative of RA with respect to y
CD2_1	Partial derivative of Dec with respect to x
CD2_2	Partial derivative of Dec with respect to y
<i>Orientation</i>	
MIR_REVR	Is image mirror reversed?
ORIENTAT	Orientation of y axis (deg)—different for each group
<i>Bias level information (columns 3–14 of the .x0h/.x0d file)</i>	
DEZERO	Bias level from engineering data
BIASEVEN	Bias level based on average of odd columns in .x0h/ .x0d file (even columns in science image)
BIASODD	Bias level based on average of even columns in .x0h/ .x0d file (odd columns in science image)
<i>Pixel statistics</i>	
GOODMIN	Minimum value of “good” pixels (not flagged in DQF)
GOODMAX	Maximum value of “good” pixels
DATAMEAN	Mean value of “good” pixels
<i>Photometry keywords</i>	
PHOTMODE	Photometry mode
PHOTFLAM	Inverse sensitivity (units of erg/sec/cm ² /Å for 1 DN/sec)
PHOTZPT	Zeropoint (currently -21.10, if DOPHOTOM = yes)
PHOTPLAM	Pivot wavelength (in angstroms)
PHOTBW	rms bandwidth of filter (in angstroms)

Table 25.2: WFPC2 Header Keywords (Continued)

Keyword	Description
<i>Image statistics keywords</i>	
MEDIAN	Middle data value when good quality pixels sorted
HISTWIDE	Width of the histogram
SKEWNESS	Skewness of the histogram
MEANC10	Mean of a 10 x 10 region at the center of the chip
MEANC100	Mean of a 100 x 100 region at the center of the chip
MEANC300	Mean of a 300 x 300 region at the center of the chip
BACKGRND	Estimated background level
<i>Image keywords</i>	
INSTRUME	Instrument used; always WFPC2
ROOTNAME	Rootname of the observation set
FILETYPE	SHP - standard header packet EXT - extracted engineering file EDQ - EED data quality file SDQ - science data quality file SCI - science data file
MODE	Mode: FULL (full resol.) or AREA (2 x 2 pixel summation)
SERIALS	Serial clocks: ON, OFF
<i>Data type keywords</i>	
IMAGETYP	DARK/BIAS/IFLAT/UFLAT/VFLAT/KSPOT/EXT/ECAL
CDBSFILE	GENERIC/BIAS/DARK/FLAT/MASK/NO Is the image a reference file and if so, type is specified
<i>Reference file selection keywords</i>	
DATE	File creation date (dd/mm/yy)
FILTNAM1	First filter name
FILTNAM2	Second filter name; blank if none
FILTER1	First filter number (0–48) (Historical, but used in SOGS)
FILTER2	Second filter number (0–48)
FILTROT	Partial filter rotation angle (degrees)
<i>More reference file selection keywords</i>	
ATODGAIN	Analog to digital gain (electrons/DN)

Table 25.2: WFPC2 Header Keywords (Continued)

Keyword	Description
<i>Calibration switches</i>	
MASKCORR	Do mask correction: PERFORM, OMIT, COMPLETE
ATODCORR	Do A-to-D correction: PERFORM, OMIT, COMPLETE
BLEVCORR	Do bias level correction: PERFORM, OMIT, COMPLETE
BIASCORR	Do bias correction: PERFORM, OMIT, COMPLETE
DARKCORR	Do dark correction: PERFORM, OMIT, COMPLETE
FLATCORR	Do flatfield correction: PERFORM, OMIT, COMPLETE
SHADCORR	Do shaded shutter correction: PERFORM, OMIT, COMPLETE
DOSATMAP	Output saturated pixel map: PERFORM, OMIT, COMPLETE
DOPHOTOM	Fill photometry keywords: PERFORM, OMIT, COMPLETE
DOHISTOS	Make histograms: PERFORM, OMIT, COMPLETE
OUTDTYPE	Output image datatype: REAL, LONG, SHOR—always set to REAL by PODPS pipeline
<i>Calibration reference files used^a</i>	
MASKFILE	Name of the input static mask containing known bad pixels and charge traps
ATODFILE	Name of the A-to-D conversion file
BLEVFILE	Name of engineering file with extended register data
BLEVDFIL	Name of data quality file (DQF) for the engineering file
BIASFILE	Name of the bias frame reference file
BIASDFIL	Name of the bias frame reference DQF
DARKFILE	Name of the dark reference file
DARKDFIL	Name of the dark reference DQF
FLATFILE	Name of the flatfield reference file
FLATDFIL	Name of the flatfield reference DQF
SHADFILE	Name of the reference file for shutter shading
PHOTTAB	Name of the photometry calibration table
SATURATE	Data value at which saturation occurs (always 4095 for WFPC2, which includes the bias)

Table 25.2: WFPC2 Header Keywords (Continued)

Keyword	Description
<i>Ephemeris data</i>	
PA_V3	Position angle of V3 axis of HST
RA_SUN	Right ascension of the sun (deg)
DEC_SUN	Declination of the sun (deg)
EQNX_SUN	Equinox of the sun
<i>Fill values</i>	
PODPSFF	0 (no fill), 1 (fill present)
RSDPFILL	Bad data fill value set in pipeline for calibrated image
<i>Exposure Information</i>	
DARKTIME	Estimate of darktime (in sec)
EQUINOX	Equinox of the celestial coordinate system
SUNANGLE	Angle between sun and V1 axis (deg)
MOONANGL	Angle between moon and V1 axis (deg)
SUN_ALT	Altitude of the sun above Earth's limb (deg)
FGSLOCK	Commanded FGS lock (FINE, COARSE, GYROS, UNKNOWN)
<i>Timing information</i>	
DATE-OBS	UT date of start of observation (dd/mm/yy)
TIME-OBS	UT time of start of observation (hh:mm:ss)
EXPSTART	Exposure start time (Modified Julian Date)
EXPEND	Exposure end time (Modified Julian Date)
EXPTIME	Exposure duration (seconds)
EXPFLAG	How exposure time was calculated. (NORMAL, INTERRUPTED, INCOMPLETE, EXTENDED, UNCERTAIN, INDETERMINATE, or PREDICTED)
<i>Proposal information</i>	
TARGNAME	Proposer's target name
RA_TARG	Right ascension of the target (deg) (J2000)
DEC_TARG	Declination of the target (deg) (J2000)
PROPOSID	RPS2 proposal identifier

a. Calibration reference file keywords are populated even if unused.

25.3 Correlating Phase II Exposures with Data Files

Because of the need to schedule observations as efficiently as possible, the order in which exposures are executed may be different from the order in which they appear in the observer's Phase II submission—unless an explicit special requirement dictates otherwise. As a result, the data may be received in an order that differs from that originally proposed by the observer. In this section we discuss how to correlate the data received with the exposures specified in the Phase II submission, which can often facilitate the process of interpreting the observations and their interconnection. For archival researchers, recent Phase II specifications submitted by the original observer can be consulted at:

<http://presto.stsci.edu/public/propinfo.html>

The first step is often identifying to which program a data file belongs, which can be accomplished via the header keyword PROPOSID. Data files can then be associated with the corresponding exposure line in the Phase II proposal by comparing exposure information in the Phase II proposal with data file header keywords. For WFPC2 data, the most useful comparisons are shown in the table below.

Table 25.3: Comparing Phase II Proposal Keywords to Data Header Keywords

Phase II	Data Header
Target_Name	TARGNAME
Position	RA_TARG, DEC_TARG
Spectral Element	FILTNAME
Time_Per_Exposure	EXPTIME

A convenient tool for viewing some of the most important data header keywords in an easy-to-read formatted output is the STSDAS task **iminfo**. An example of the output of this task is shown in Figure 25.1. Note that the data header keywords are expanded to standard English words in this output. The header file (.c0h extension) can also be examined with IRAF tools **hedit** or **imheader**, with any standard text editor, or simply by listing the contents of the file. Again, please note that a standard text editor will not display the group keywords, which are stored in the image file.

In the specific example shown in Figure 25.1 we see that the Proposal ID is given as 05837. Entering the proposal ID into the space provided on the Web page listed above (without the leading 0) and clicking on **[Get Program Information]** brings up the Program Information page for that proposal. Under Program Contents on that page you can choose either the file typed in during Phase II or a formatted output. The latter may be easier to read; we reproduce a portion of that file in Figure 25.2.

Figure 25.1: Displaying WFPC2 Header Keywords with `iminfo`

```

-----
Rootname          Instrument      Target Name
U2P60204T        WFPC2          CAL-GANY-W

Program           = 2P6          Obs Date        = 19/08/95
Observation set   = 02          Proposal ID     = 05837
Observation       = 04          Exposure ID     = 02-023
Source            = Tape Recorded  Right ascension = 16:16:34.4
File Type         = SCI          Declination     = -20:45:14
Equinox           = J2000

First filtername  = F410M          Number of groups = 4
Second filtername =                               Data type        = real

Image type        = EXT          Exposure time (sec) = 5.
Mode              = FULL        Dark time (sec)    = 5.
Serials           = OFF
Shutter           = B
Kelsall spot lamp = OFF          Calibration steps done:
im> █            MASK ATOD BLEV BIAS FLAT SHAD

```

The Exposure ID listed by `iminfo` is 02-023. This corresponds to visit 02, exposure 23. A different format was used in Cycles 0 through 4; exposures in these proposals have a single, unique numeric identifier. To reach this exposure line, page down through the proposal until visit 02 is reached. Now search for exposure 23 in visit 02. As shown in Figure 25.2, this exposure requested a single 5 second exposure of target CAL-GANY-W through filter F410M. A quick comparison with the keywords listed by `iminfo` shows that, indeed, this data file contains the observation specified in this exposure line.

Figure 25.2: Exposure Log Sheet for WFPC2

```

Visit: 02
Visit Requirements: BEFORE 16-oct-95
On Hold Comments: <none>
Additional Comments: This visit has limited scheduling opportunities, we prefer as close to
                    Jupiter opposition as possible exp-time calculated from observed SL9 WF
                    images from SL9 campaign

```

Exposures

Exposure Number	Target Name	Instr Config	Oper. Mode	Aper or F0W	Spectral Element	Central Waveln.	Optional Parameters	Num Exp	Time	Special Requirements
21	cal-gany-w	WFPC2	IMAGE	PC1	F218W		ATD-GAIN=7	2	500s	NO SPLIT
22	cal-gany-w	WFPC2	IMAGE	PC1	F255W		ATD-GAIN=7	1	40s	
23	cal-gany-w	WFPC2	IMAGE	PC1	F410M		ATD-GAIN=15	1	5s	
24	cal-gany-w	WFPC2	IMAGE	PC1	F953H		ATD-GAIN=15	1	30s	
25	cal-gany-w	WFPC2	IMAGE	PC1	F675W		ATD-GAIN=15	1	0.2s	
26	cal-gany-w	WFPC2	IMAGE	PC1	F300W		ATD-GAIN=15	1	10s	

A comparison of these keywords should quickly reveal the data file corresponding to a given exposure line. There are, however, two cases in which such a comparison is somewhat more complicated.

It is recommended that WFPC2 exposures longer than 600 seconds be split into two shorter exposures to facilitate removal of cosmic rays. If the optional

parameters `CR-SPLIT` and `CR-TOLERANCE` are omitted in the Phase II submission, and the exposure *is* longer than 600 seconds, it will be split into two exposures for more efficient scheduling. The default `CR-TOLERANCE` of 0.2 can be used, meaning that the split exposure times could each range from 30–70% of the total exposure, with their sum equal to the original total exposure time.

Exposure times may occasionally be shortened by up to 20% without the approval of the PI, provided that the resulting S/N is 90% of that with the original exposure time. Such changes may be required to fit observations into specific orbital time slots. If, after examining your exposure headers, you still have questions regarding the execution of your observing plan, we recommend you speak with your program's Contact Scientist.

The output generated by `iminfo` contains information on the target, exposure time, and filters used but nothing on guide star status. The `hselect` task, used as follows, provides access to that information by printing the `FGSLOCK` header keyword to the screen:

```
c1> hselect u2p60204t.c0h FGSLOCK yes
FINE
```

The `FGSLOCK` keyword can have the values `FINE`, `COARSE`, `GYROS`, or `UNKNOWN`. Coarse tracking is no longer allowed, so this keyword in recent data will most likely read either `FINE` or `GYROS`. Gyro tracking allows a drift rate of approximately 1 mas/sec. It would only be used if requested by the proposer. `FINE` tracking typically holds pointing with an rms error of less than 7 mas. Typically two guide stars are used in HST observations, but on occasion only one appropriate guide star can be found. Such observations will suffer from small drift rates (a few mas in a 1000 second exposure). If you suspect the quality of tracking obtained during your observations, please review Appendix C which describes how to determine the number and quality of guide stars actually used as well as how to use the OMS jitter files.

25.4 WFPC2 Paper Products

As part of the initial data delivery, the observer receives a package of so-called *paper products*, which are intended to provide a quick look at the data in hard-copy form. The paper products changed significantly in August 1997; we will describe first their newest version, and then discuss the changes from the previous version. The paper products are generated by the STSDAS task `pp_dads` provided with STSDAS version 2.0. This task enables archival users to generate their own sets of paper products.

The current paper product package consists of two parts. The first is a visit-level overview of the datasets in the package, meant to be similar to the observing log in ground-based observations. The information is presented in three separate tables: Target List, Observation List, and Observation Statistics. The Target List gives the targets observed in this visit, with their positions. The Observation List includes essential information on each dataset, such as rootname,

target name, operating mode, aperture, filter, exposure time, and a number of flags intended to alert the user to any procedural problem with the data. The flags are represented graphically by circles, open when the data are okay, filled if any (potential) problem is encountered, to be detailed in the second part. The Observation Statistics is a table with basic image statistics for each dataset, such as mean counts, background level, and a rough estimate of the limiting magnitude that can be reached with respect to the background level in the image. Note that this limiting magnitude is computed with a rather simple, all-purpose algorithm, and is meant only as an approximate indication; it should not be used for any detailed calculations. Image statistics are given separately for each CCD.

The second part of the package presents the data exposure by exposure. Usually there are three pages for each exposure: the first two pages are grayscale representations of the image (one containing all four chips together, the other featuring the PC only), and the third summarizes various exposure characteristics, flags and error conditions that might arise. The grayscale presentation on the first page of the four chips together is a crude mosaic; each chip is rotated and placed in the correct position with respect to the others, but the overlap and the small differential rotations between chips (see Chapter 24) are not corrected for. The next page presents the PC by itself, at a larger scale that brings out smaller details not evident in the mosaic. This third page, giving dataset information, is divided into several zones, each summarizing information on a specific topic: the HST Spacecraft Performance Summary, with information on pointing and jitter; the Pipeline Processing Summary, with information on whether the file was processed properly by the pipeline (see Chapter 26); the Calibration Data Quality Summary, where any inconsistencies in the choices of calibration files are highlighted; the Exposure Summary, which details when and how the exposure was taken, and the Calibration Status Summary, which reports all reference files used in the calibration and their pedigree, if available. Some basic consistency checks are carried out, and the user is alerted to any potential problems thus discovered.

A few notes are in order regarding the grayscale representation of the data. The images are presented as they appear after the standard pipeline processing (see Chapter 26). Bias, standard dark, and flatfield corrections have been applied, but hot pixels and cosmic rays are not removed; hence the mottled appearance of many images, especially those with exposure times longer than a few hundred seconds. In order to limit the size of the printouts, images are block-averaged (2×2) before printing, causing some details to be lost. In general, because of the limited resolution of even good black-and-white printers, finer image details are lost; the grayscale images cannot in any way replace even a quick look on the screen.

Paper products shipped before August 1997 differ in two main respects. First, they do not have the visit-level summary of observations; some of the information is available via the tape log, but without any data quality flags or image statistics. Second, the exposure-level information is presented in a different way: the dataset information page consists simply of a printout of the PDQ file (See “Data Files and Suffixes” on page 25-1.). The grayscale images are produced by a different task, which gives them a different appearance, but the overall information content in them is very similar. Sample paper products in the new format are shown in

Figure 25.3. Users who have received paper products in the old format can regenerate them in the new format using **pp_dads**.

Figure 25.3: Paper Products: List of Targets and Observations

Visit: 35	Proposal: 05370				WFPC2					
<i>Target List</i>										
Target Name	R.A. (J2000)	Dec. (J2000)	Description							
HI-LAT	13:27:11.62	-47:29:54.8	STARS; GALAXIES;							
<i>Observation List</i>										
Logsheet Line#	Rootname	Target Name	Operating Mode	Serials/ Gain	Aperture or FOV	Filters	Wavelength	Exposure (sec)	Quality Flags Obs Proc Cal	
35.000	U27R8502T	HI-LAT	FULL	OFF/7.00	WFALL	F814W	8006.80	600.0	○	○
35.000	U27R8501T	HI-LAT	FULL	OFF/7.00	WFALL	F814W	8006.80	600.0	○	○
39.000	U27R9U01T	HI-LAT	FULL	OFF/7.00	WFALL	F814W	8006.80	700.0	○	○
39.000	U27R9U02T	HI-LAT	FULL	OFF/7.00	WFALL	F814W	8006.80	700.0	○	○
Quality flags: ○ = OK ● = Not OK Blank = Unknown or file missing										

Figure 25.4: Paper Products: Observation Statistics (separately for each CCD)

Visit: 35	Proposal: 05370				WFPC2							
<i>Observation Statistics</i>												
Logsheet Line#	Rootname	Target Name	Filter	Exposure Time	POSTARG	Detector	Modal Sky	Sky Sigma	Min DN	Max DN	Limiting Mag.	
35.000	U27R8502T	HI-LAT	F814W	600.00	N/A	N/A	1	6.14	2.51	-359.14	18101.54	28.82
35.000	U27R8502T	HI-LAT	F814W	600.00	N/A	N/A	2	27.68	20.75	-1126.21	52096.83	26.74
35.000	U27R8502T	HI-LAT	F814W	600.00	N/A	N/A	3	40.38	72.99	-410.52	92238.00	25.47
35.000	U27R8502T	HI-LAT	F814W	600.00	N/A	N/A	4	56.39	90.57	-1382.49	125202.3	25.14
35.000	U27R8501T	HI-LAT	F814W	600.00	N/A	N/A	1	9.37	2.60	-300.12	35567.71	28.78
35.000	U27R8501T	HI-LAT	F814W	600.00	N/A	N/A	2	66.88	20.56	-1131.11	287711.6	26.75
35.000	U27R8501T	HI-LAT	F814W	600.00	N/A	N/A	3	43.30	68.34	-576.75	108361.5	25.54
35.000	U27R8501T	HI-LAT	F814W	600.00	N/A	N/A	4	55.46	89.38	-1570.77	124874.8	25.15
39.000	U27R9U01T	HI-LAT	F814W	700.00	N/A	N/A	1	20.07	4.14	-302.07	103304.2	28.45
39.000	U27R9U01T	HI-LAT	F814W	700.00	N/A	N/A	2	38.79	30.39	-1315.45	110014.1	26.49
39.000	U27R9U01T	HI-LAT	F814W	700.00	N/A	N/A	3	43.25	90.29	-649.44	76723.60	25.41
39.000	U27R9U01T	HI-LAT	F814W	700.00	N/A	N/A	4	60.14	103.00	-1845.88	123228.6	25.16
39.000	U27R9U02T	HI-LAT	F814W	700.00	N/A	N/A	1	6.01	2.70	-354.96	12388.22	28.91
39.000	U27R9U02T	HI-LAT	F814W	700.00	N/A	N/A	2	42.91	25.78	-1234.59	121265.8	26.67
39.000	U27R9U02T	HI-LAT	F814W	700.00	N/A	N/A	3	71.66	88.56	-815.84	266563.8	25.43
39.000	U27R9U02T	HI-LAT	F814W	700.00	N/A	N/A	4	66.55	104.06	-1770.08	157240.0	25.15

Figure 25.5: Paper Products: Combined Grayscale Display

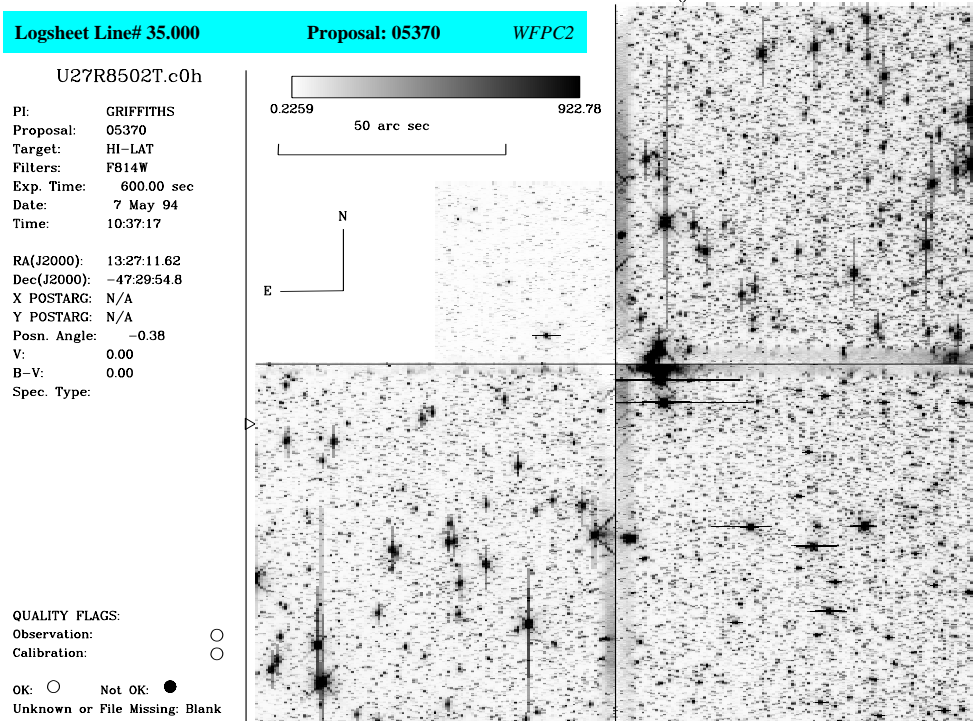


Figure 25.6: Paper Products: Observation Summary

Logsheet Line# 35.000	Observation: U27R8502T	Proposal: 05370	WFPC2
<p><i>HST Spacecraft Performance Summary</i></p> <p># Recenterings: # Losses of Locks: V2 Jitter (RMS): V2 Jitter (PP): V3 Jitter (RMS): V3 Jitter (PP):</p> <p>Could not find JITTER file. Very highly packed star field. Brighter stars saturated and blooming. Filter F814W, exposure 600s</p>		<p><i>Exposure Summary</i></p> <p>Target Name: HI-LAT RA (J2000): 13:27:11.62 Dec (J2000): -47:29:54.8 X POSTARG: N/A Y POSTARG: N/A Aperture: WFALL Exp Time (sec): 600.0</p>	
<p><i>Pipeline Processing Summary</i></p> <p>No Error Checks Made.</p>		<p>Rootname: U27R8502T Date: 7 May 94 Time: 10:37:17 Proposal: 05370 PI: GRIFFITHS</p>	
<p><i>Calibration Data Quality Summary</i></p> <p>No Anomalies.</p> <p>No Calibration File Pedigree Information available.</p>		<p>Chip 3 Statistics</p> <p>Sky: 40.38 Sky Sigma: 72.99 Minimum: -410.52 Maximum: 92238.00 Limiting Mag: 25.47</p>	

Calibration Status Summary

Switches and Flags		Reference Files and Tables			
Keyword	Value	Calibration Step	Keyword	filename	Pedigree
MASKCORR	COMPLETE	Mask Correction	MASKFILE	uref\$e2112084u.r0h	
ATODCORR	COMPLETE	A-to-D Correction	ATODFILE	uref\$dbu1405iu.r1h	
BLEVCORR	COMPLETE	Bias Level Correction	BLEVFILE	ucal\$u27r8502t.x0h	
BLASCORR	COMPLETE	Bias Correction	BLASFILE	uref\$e4p1629bu.r2h	
DARKCORR	COMPLETE	Dark Correction	DARKFILE	uref\$e1q1433du.r5h	
FLATCORR	COMPLETE	Flat Field Correction	FLATFILE	uref\$e391434fu.r4h	
SHADCORR	OMIT	Shaded Shutter Correction	SHADFILE	uref\$e371355eu.r5h	
DOPHOTOM	COMPLETE	Populate Photometry Keywords	PHOTTAB	ucal:u27r8502t.c3t	

