

WWW Query Tool for CDBS

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ABSTRACT

Using the World Wide Web, direct query-access has been made to the Calibration Database. All eight science instruments' reference data, plus photometric and spectrophotometric standards can be seen. By using wildcards, a user may retrieve information on all reference datasets or by using various qualifiers, the user has the ability to narrow the search down to very particular sets. The information retrieved not only lists the existence of filenames for particular modes of operation, but critical information about when the reference data has been archived and when it has been installed for pipeline calibrations.

1. Introduction

The calibration database holds calibration reference data for all of the science instruments which have ever existed on board the Hubble Space Telescope. The database holds over forty-four thousand distinct modes of operation for all eight science instruments. These modes manifest as database entries for calibration parameters or pointers to over ten thousand different reference files. Other information is available for each set of reference data, such as the DADS archive date, useafter dates (which define the time period for which each calibration file is applicable), the date/time when the installation took place in OPUS, plus the observation begin and end dates, indicating when the observations were taken to produce the calibration reference data.

2. Science Instruments and Modes

Numerous parameters for each science instrument define its operating modes. These act as dependencies in which each reference data set is chosen, depending on each calibration type.

Table 1. Observation Parameters for Science Instruments

NICMOS

NREAD	CAMERA	FILTER	READOUT	SAMP_SEQ
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FOC

CAMMODE	LINEOFF	LINEPFM	OPTCRLY	OPTELT1
OPTELT2	PXFORMT	SAMPOFF	SAMPPLN	SMMMODE
WAVELENGTH	UNI_FILE_NAME			

WFPC2

MODE	ATODGAIN	FILTER1	FILTER2	SERIALS	SHUTTER
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FOS

FCHNL	APER_ID	FGWA_ID	NXSTEPS	APER_POS
DETECTOR	OVERSCAN	PASS_DIR	POLAR_ID	WAVELENGTH

STIS

CCDAMP	SCLAMP	CCDGAIN	CENWAVE	CRSPLIT	LAMPSET
OBSTYPE	APERTURE	BINAXIS1	BINAXIS2	CCDOFFST	DETECTOR
OPT_ELEM					

SYNPHOT

COMPNAME

MULTI

FLD_NAME	TARGETID	OBSMODE
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WFPC

CLOCK	MODE	CAMERA
FILTER1	FILTER2	SHUTTER
FILTNAM1	FILTNAM2	PHOTMODE

HSP

TYPE	THRESH	VGAIND	DET_NUM	VOLTAGE	APER_NAME
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GHRS

GRATING	SPORDER	APERTURE	DETECTOR	TARGETID
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3. The Query Tool

CGI scripts and Perl are used to access the Sybase database holding all of HST's calibration data. The query tool allows the user to retrieve with specialized queries using the various forms, depending on instrument and calibration type, or more generalized queries using wildcards for the reference file names. Each specialized search gives a list of calibration file type dependencies to be used in the search (as shown above). The query tool also allows searches to be made using *Observation Dates* or *Useafter Dates*.

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After an instrument is selected, the user must supply a reference file name (with wildcard options), or choose a calibration type. If a wildcard is used, one might retrieve, a list of all WFPC2 calibration reference files. This is not recommended, for the return from the database will be very large. Using various forms of a wildcard input, the user can pare down the search.

The screenshot shows a Netscape browser window titled "Netscape: CDBS Query". The address bar contains the URL "http://www.stsci.edu/ftp/instrument_news/Observatory/query/query3.html". The page content is as follows:

CDBS Query

[Help on Selection Criteria](#)

Option 1:
Selection on Reference File Name

Instrument: WFPC2

Reference File Name: Submit Query

Option 2:
Selection on Calibration Types

Instrument: WFPC2

WFPC2: MSK STIS: LDT NICMOS: MSK FOC: BAC

GHRS: ABS FOS: AIS

Specific Calibration File-Type Page

For example, the WFPC2 was chosen along with a calibration type of *DRK*. A page specific to that instrument/calibration type appears, only giving the parameter choices which are defined by the file-type dependencies. Again, wildcards may be used. Any combination of the options and input boxes is allowed.

The screenshot shows a Netscape browser window with the title "Netscape: WFPC2 Q1". The browser's menu bar includes "File", "Edit", "View", "Go", "Bookmarks", "Options", "Directory", "Window", and "Help". The toolbar contains icons for Back, Forward, Home, Reload, Stop, Open, Print, and Find. The location bar shows the URL: `http://www.stsci.edu/cgi-bin/external/obj/query/q1_query1.cgi?instrument=wfpc2&cal_file_type=drk`. Below the location bar are links for "What's New?", "What's Cool?", "Destinations", "Hot Search", "People", and "Software".

The main content area is titled "WFPC2 Q1" and contains a link for "Help on Selection Criteria". Below this is the heading "WFPC2 DRK FILE SEARCH" in red. The search form includes the following elements:

- A "Dataset Name" input field containing the text "j?".
- Three dropdown menus: "ATODGAIN: 15", "MODE: FULL", and "SERIALS: ON".
- Two date selection boxes: "Observation Begin Date From:" and "Observation End Date From:", both with empty input fields.
- A "Useafter Date:" input field containing the text "1".
- Two buttons at the bottom: "Submit Query" and "Reset All Parameters".

Preliminary Results Page

After specifying the values of the query parameters, the tool gives a set of preliminary results. This is a subset of the total information about the reference data. It is intended for a quick look at the information retrieved. Each instrument group can define exactly what they want to see at each level. At this stage, a user would determine if the retrieval has been successful, and has the option to complete the process by displaying an expanded information set.

WFC2 FILE AND ROW INFORMATION

[Continue for expanded information](#)

Useafter Date	Mode	A2DGain	Serials	Shutter	Filter1	Filter2	File Name	Observation Begin Date	Observation End Date
Jun 24 1997 11:08:59.000AM	FULL	15	ON		INDEF	INDEF	H711531OU.R3H	Jun 24 1997 12:00:00.000AM	Jun 24 1997 12:00:00.000AM
						Pedigree			
						INFLIGHT			
Useafter Date	Mode	A2DGain	Serials	Shutter	Filter1	Filter2	File Name	Observation Begin Date	Observation End Date
Jul 7 1997 12:36:12.000AM	FULL	15	ON		INDEF	INDEF	H761552SU.R3H	Jul 7 1997 12:00:00.000AM	Jul 7 1997 12:00:00.000AM
						Pedigree			
						INFLIGHT			
Useafter Date	Mode	A2DGain	Serials	Shutter	Filter1	Filter2	File Name	Observation Begin Date	Observation End Date
Jul 14 1997 1:42:12.000AM	FULL	15	ON		INDEF	INDEF	H711323OU.R3H	Jul 14 1997 12:00:00.000AM	Jul 14 1997 12:00:00.000AM
						Pedigree			
						INFLIGHT			
Useafter Date	Mode	A2DGain	Serials	Shutter	Filter1	Filter2	File Name	Observation Begin Date	Observation End Date
Jul 21 1997 7:29:12.000PM	FULL	15	ON		INDEF	INDEF	H701408HU.R3H	Jul 21 1997 12:00:00.000AM	Jul 21 1997 12:00:00.000AM
						Pedigree			
						INFLIGHT			

Expanded Results Page

For this example, the WFPC2 /DRK (Mode=FULL, A2DGAIN=15, and SERIALS=ON), has given all of the information which is known about each calibration reference set. This includes information about the configuration of the science instrument, when and how the data was taken by HST, when the data was put into CDBS, OPUS, DADS, and all available comments.

WFPC2 FILE AND ROW INFORMATION (Expanded Information)

Unsafter Date	Mode	A2DGain	Serials	Shutter	Filter1	Filter2	File Name	Observation Begin Date	Observation End Date
Jun 24 1997 11:03:59:000AM	FULL	15	ON		INDEF	INDEF	H711531OUR3H	Jun 24 1997 12:00:00:000AM	Jun 24 1997 12:00:00:000AM

COMMENT

This is a DARK created from an average of 4 sets of 30 input darks, plus 1 set of 5 darks which are taken on a weekly basis as part of the ongoing WFPC2 Calibration plan. The superdarks used were: g1h1207ku, g1h1207nu, g1h1207qu, g1h1207ru. The 4 sets of superdarks were created by the Hubble Deep Field team in the following fashion: the 30 dark frames were calibrated using CAL.WFPC21308. They were combined with the following algorithm to eliminate cosmic rays: The dark calibration image was initially estimated as the median of the 30 input images at each pixel. An iterative technique was then used to improve this estimate. Each iteration proceeded by computing the noise at each pixel using the initial combined image (assuming total readout, a-to-d con- version, etc. noise of 12 electrons). Then masks were generated for each input image with value 1 if the input image was within 4 sigma of the median image, and 0 otherwise. Zeros in each mask were then expanded to a 3 x 3 square pattern, so as to also exclude pixels immediately adjacent to cosmic rays. The masks were then multiplied into their respective images, the resulting images were summed, and finally the result was normalized using the sum of the masks. The few pixels left without data were filled with the median of the 30 input images at those pixels. This procedure was then iterated using the new combined image as the initial estimate with 4 sigma rejection, and then additional iterations were made with 3 sigma and 2 sigma rejection. The dark calibration image was normalized to a darktime of 1.0 second, using a darktime value of 1843.60 seconds for each CCD. This value is somewhat different from the DARKTIME value in the current calibration dark headers (1800 seconds). Pixels with fewer than 15 input image pixels were marked in the DQF along with all hot pixels over 0.02 DN/sec. The 1 set of 5 weekly darks was created in the same fashion, with the following on-orbit darks used: u3av420em, u3av420cm, u3av420dm, u3av420fm. The mean of this resultant weekly dark, excluding values deviating by more than 3*sigma, was saved to a file, with one mean value for each chip. This was done for 3 iterations and the final means and sigmas were used in conjunction with the weekly dark and the superdark, to generate the pipeline dark: each pixel was compared to the chip statistics, to determine whether it exceeded a threshold based on average and sigma. That is, if abs value/weekly dark - superdark) > 5*sigma then pixel value of weekly is used in the pipeline dark. If the pixel value of the weekly dark did not exceed the threshold, the pixel value of super dark is used for the pipeline dark. The values of 3*sigma used to make this dark are (for the FC, WF2, WF3, and WF4, respectively): 0.0016 0.001315 0.001438 0.001448. The values in the pipeline dark DQF (*b3h) reflect whether a pixel value comes from the weekly dark or from the superdark, and whether it has changed recently. That is, the following values are used: 3 if pixel came from weekly dark and was generated from 3 or less of the 5 input frames for that week. 513 if the pixel value comes from the weekly dark, and did vary substantially with respect to the previous week's pipeline dark (an unfixable pixel in stex task warmpix). 1034 if the pixel value comes from the weekly dark, and did not vary substantially with respect to the value in the previous week (considered a fixable pixel in warmpix). Calwpc2 will bit-wise-OR any pipeline DARK DQF values with the values from any of the other DQF files used in the calibration processing and place results in r1h file.

4. Conclusion

The CDBS Web Query Tool provides an easy way to review the database for current and superceded instruments. Comprehensive information about each calibration reference dataset is available. Since most of the calibration data is online, plans for linking this tool directly to the data via the Internet is planned.

To access the CDBS Web Query Tool, enter the following URL:

http://www.stsci.edu/ftp/instrument_news/Observatory/query/query4.html

