Reference Guide of FOS Calibration Reference Files and Tables

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August 1994

Abstract

Complete tabulations of *recommended* FOS reference files (*except* flat field, inverse sensitivity, and dead diodes) and reference tables ***AS OF 12 AUGUST 1994*** are specified in convenient matrix format. Lists of recommended flat fields are covered in CAL/FOS-090 (C. D. Keyes and C. J. Taylor, April, 1993), inverse sensitivity is in CAL/FOS-093 (C. J. Taylor and C. D. Keyes, June, 1993), and dead diodes is in CAL/FOS-112 (C. J. Taylor, August, 1994) and current lists of all three are found on STEIS in the /instrument_news/fos directory. ASCII and Postscript versions of the lists of recommended FOS reference files and tables covered in this report are posted on STEIS in the /instrument_news/fos directory.

I. Introduction

There are currently six reference file types and eleven reference table types used in calibration (see Table 1). Two reference file types, Point Spread Function and Line Spread Function, are not used in CALFOS. Determining the correct file to use can be daunting, as there are thousands of reference files. This report will list the recommended files as well as the history of all the files delivered to CDBS. While the IRAF/STSDAS task **getreffile** and the Calibration Reference screens in StarView will list the recommended reference files and tables for a particular observation, it is a good idea to double check this report and the latest versions of the flat field, inverse sensitivity (IVS), and dead diodes recommendation lists on STEIS.

In the future there will be one new reference file type and four new reference table types. The reference file will be an Average Inverse Sensitivity (not to be confused with the current Inverse Sensitivity reference file). The four new reference tables will be: HST Focus History, Relative aperture throughput, Relative aperture throughput versus focus, and Time changes in inverse sensitivity. An upcoming Instrument Science Report will explain the new file and tables. Future updates to the recommendation list and history list will contain these new files.

Table 1: FOS Reference Files and Tables Types

CDBS relation	CALFOS Header Keyword	Filename Extension	Contents
cybacr	BACHFILE	.r0h & .r0d	Default background file (count rate)
cyfltr	FL*n*HFILE	.r1h & .r1d	Flat field file
cyivsr	IV*n*HFILE	.r2h & .r2d	Inverse Sensitivity file (ergs cm^{-2} $Å^{-1}$)
cyretr	RETHFILE	.r3h & .r3d	Retardation file for polarimetry data
cyddtr	DDTHFILE	.r4h & .r4d	Dead (Disabled) Diode file
cyqinr	DQ*n*HFILE	.r5h & .r5d	Data Quality Initialization file
cypsf	N/A	.r6h & .r6d	Point Spread Function files
cylsf	N/A	.r7h & .r7d	Line Spread Function files
cyccs0r	CCS0	.cy0	Aperture areas
cyccs1r	CCS1	.cy1	Aperture positions
cyccs2r	CCS2	.cy2	Sky emission line position
cyccs3r	CCS3	.cy3	Sky/background filter widths
cyccs4r	CCS4	.cy4	Wollaston/waveplate parameters (Polarimetry)
cyccs5r	CCS5	.cy5	Sky shift parameters
cyccs6r	CCS6	.cy6	Wavelength parameters
cyccs7r	CCS7	.cy7	GIMP scale factors
cyccs8r	CCS8	.cy8	Mean background count rate
cyccs9r	CCS9	.cy9	Scattered light correction
coccg2r	CCG2	.cmg	Paired-pulse parameters (with GHRS)

The three reference file types that are covered in CAL/FOS-090, 093, and 112 (flat fields, inverse sensitivity, and dead diodes, respectively) are time variable and have more complex recommendations. The reference files and tables in this report have more straightforward recommendations. Tables 2-8 are recommended reference files and tables. Two types of reference files, the Data Quality Initialization and Line Spread Functions, have too many files to be easily presented in a table. However, ASCII tables of the recommended files are posted on

STEIS as fos_qin_recommend.txt (for Data Quality Initialization) and fos_lsf_recommend.txt (for Line Spread Function) in the /instrument_news/fos directory.

II. Lists of Recommended Files and Tables

The common and/or supported configurations of the recommended files and tables are presented in Tables 2-8. The columns vary according to type of reference file and table and depend on the CDBS selection criteria. However, each entry does have the same format: the USEAFTER date as *yyyymmdd* and the filename with both the header and data file extensions.

This section contains a brief description and the selection criteria used by CDBS (except USEAFTER) to determine the correct file. The selection criteria are from the Calibration Data Base Design, Version 6.0 (April, 1994).

<u>Background Reference File (Table 2):</u>
This reference file is the default background in count rate. The CDBS selection criteria are detector and overscan. However Table 2 shows the files for the default, overscan=5.

<u>Flat Field Reference File (not listed here):</u>
The recommended flat field files are listed in CAL/FOS-090 and in updated files (in both ASCII and Postscript formats) on STEIS in the /instrument_news/fos directory. The updated files are: flat_field_tables_*mmmyy*.ps, flat_field_tables_*mmmyy*.txt, post_costar_flat_field_*mmmyy*.ps, and post_costar_flat_field_*mmmyy*.txt, where *mmmyy* is month the posting date in month and year, ".ps" indicates the Postscript version, and ".txt" is the ASCII text version.

The CDBS selection criteria are: detector, overscan, aperture id, aperture position, filter grating wheel id, polarizer id, and pass direction. The tables in CAL/FOS-090 and the updated tables on STEIS are for overscan=5.

<u>Inverse Sensitivity Reference File (not listed here):</u>
The recommended IVS files are listed in CAL/FOS-093 and in updated files (in both ASCII and Postscript formats) on STEIS in the /instrument_news/fos directory. The updated files are: ivs_tables_*mmmyy*.ps, ivs_tables_*mmmyy*.txt, post_costar_ivs_*mmmyy*.ps, and post_costar_ivs_*mmmyy*.txt, where *mmmyy* is the posting date in month and year, ".ps" indicates the Postscript version, and ".txt" is the ASCII text version.

The CDBS selection criteria are: detector, overscan, aperture id, aperture position, filter grating wheel id, polarizer id, and pass direction. The tables in CAL/FOS-093 and the updated tables on STEIS are for overscan=5.

Retardation Reference Files (Tables 3-6):

The retardation files are used during polarimetry calibration to create the observation matrix *f(w)*. Tables 3 and 4 show the reference files for the supported configurations. The recommended files are ground based numbers based on recent inflight wavelength dispersion and were created by Richard Allen.

Tables 5 and 6 show the reference files for the non-supported configurations.

The CDBS selection criteria are: detector, overscan, polarizer id, and filter grating wheel id.

Dead (Disabled) Diode Reference Files (not listed here):

The recommended dead diode files are listed in CAL/FOS-112 and in updated files (in both ASCII and Postscript formats) on STEIS in the /instrument_news/fos directory. The updated files are: dead_diode_tables_*mmmyy*.ps and dead_diode_tables_*mmmyy*.txt, where *mmmyy* is month the posting date in month and year, ".ps" indicates the Postscript version, and ".txt" is the ASCII text version.

The CDBS selection criterion is detector.

Quality Initialization Reference Files (not listed here):

Because there are almost 1800 different recommended quality initialization files, tables of recommended files are not listed here. Posted on STEIS in the /instrument_news/fos is an ASCII table of the recommended files, fos_qin_recommend.txt. The table columns are: useafter, detector, overscan, aper_id, aper_pos, fgwa_id, polar_id, pass_dir, and header_file. **WARNING, THE FILE IS MORE THAN 80 CHARACTERS WIDE.**

The quality initialization files are used to flag intermittent or noisy diodes but *have not been kept up to date*. Current lists of intermittent and noisy diodes are included in the recommended list of dead diode reference files posted on STEIS and are available from the Research Support Branch Analysis Hot Line (telephone: (410) 338-1082 or e-mail: *analysis@stsci.edu*).

The CDBS selection criteria are: detector, overscan, aperture id, aperture position, filter grating wheel id, polarizer id, and pass direction.

Point Spread Function Reference Files (Table 7):

FOS point spread function (PSF) reference files are not used in CALFOS calibration steps. They have been delivered to CDBS for reference. The PSF's are Pre-COSTAR only. Refer to CAL/FOS-104 (I. N. Evans, September, 1993) for more details.

The CDBS selection criteria are: detector and wavelength.

Line Spread Function Reference Files (not listed here):
Because there are 513 Line spread function (LSF) reference files, tables of the recommended files are not listed here. Posted on STEIS in the /instrument_news/fos directory is an ASCII table of the recommended files, fos_lsf_recommend.txt. The table columns are: useafter, detector, aper_id, wavelength, and header_file. The LSF are Pre-COSTAR only. For more details, please refer to CAL/FOS-104.

The CDBS criteria are: detector, wavelength, and aperture id.

Aperture Areas Reference Table (Table 8):
This reference table contains the areas of the FOS entrance apertures and is used to scale the sky spectrum to the object spectrum. The appropriate table entry is determined by: detector, aperture id, and aperture position.

Aperture Positions Reference Table (Table 8):
This reference table is used to determine which aperture (UPPER or LOWER) of a paired aperture was used. The appropriate table entry is determined by: detector and filter grating wheel id.

Sky Emission Line Position Reference Table (Table 8):
This reference table specifies spectral regions in a sky spectrum known to have emission lines. The regions are not smoothed before the sky is subtracted from the object spectrum. The appropriate table entry is determined by: detector, filter grating wheel id, first channel (diode), and NXSTEPS. Note that these are the pre-launch values. The Science Verification data has never been confirmed due to poor table design.

Sky/Background Filter Widths Reference Table (Table 8):
This reference table specifies the mean and median filter widths for smoothing the background and sky spectra. The appropriate table entry is determined by detector.

Wollaston/Waveplate Parameters Reference Table (Table 8):
This reference table is used in the polarimetry calibration. It contains the angles of each of the two pass directions with respect to the Q=1 coordinate axis of the polarization reference frame. The appropriate table entry is determined by: detector and polarizer id.

The difference between the b9d1019my.cy4 table and the e5v13262y.cy4 tables is that the latter table has the first inflight calibrated Red side (Amber) values and updated Blue side values. Only the supported configurations were updated.

Sky Shift Parameters Reference Table (Table 8):
This reference table gives the shift (in data points) used to align the sky spectrum with the object spectrum before subtracting. The appropriate table entry is determined by: detector, aperture id, aperture position, filter grating wheel id, and NXSTEPS.

Wavelength Parameters Reference Table (Table 8):
This reference table gives the dispersion relation used to compute the wavelength of each data point from the diode position. The appropriate table entry is determined by: detector, filter grating wheel id, aperture id, aperture position, polarizer id, and pass direction.

The difference between the two tables, bck10546y.cy6 and e5v11576y.cy6, is that the latter contains the first calibrated Red side (Amber) polarimetry wavelengths and updated Blue side polarimetry wavelengths. Only supported polarimetry configurations were updated.

GIMP Scale Factors Reference Table (Table 8):
This reference table contains the scale factors used for scaling the model geomagnetic field strength calculations in CALFOS. These calculations are used to correct the geomagnetically induced image motion problem (GIMP). The appropriate table entry is determined by detector.

Starting in April, 1993 the GIMP has been corrected onboard by default. If the science header keyword YFGIMPEN is equal to FALSE, then the onboard correction was not performed and this calibration table is used in CALFOS.

Mean Background Count Rates Reference Table (Table 8):
This reference table contains the predicted mean background count rates as a function of geomagnetic latitude and longitude. The mean background count rate at the position and time of the observation is interpolated from the table and scales the reference background file in CALFOS. The appropriate table entry is determined by: detector, geomagnetic latitude, and geomagnetic longitude.

Scattered Light Correction Reference Table (Table 8):
This reference table contains the beginning and ending diode ranges which define the region of the spectral data from which the amplitude of scattered light will be measured. These regions correspond to spectral regions that have no sensitivity to dispersed light. Some gratings lack regions of no sensitivity and therefore contain zeros for the range specification. The appropriate table entry is determined by: detector and filter grating wheel id.

Paired-Pulse Parameters Reference Table (Table 8):
This reference table contains the paired-pulse parameters used to correct for non-linearity at high count rates. This table is shared with GHRS. The appropriate table entry is determined by: instrument and detector.

III. Location of Reference Files and Tables

Unless otherwise noted, all the reference files and tables listed in this report are in CDBS, PODPS, and the Archive. The files and tables are first delivered to CDBS and then get released to PODPS and delivered to Archive.

In addition, copies of the files are made available in /cdbs/yref (for reference files) and /cdbs/ytab (for reference tables) directories on: Tib, Nemesis, Icarus, Sol, VAX Science Cluster, and are posted on STEIS. New files and tables are copied nightly via daemon from the Tib cluster to STEIS and Nemesis (the UNIX science clusters then point to Nemesis). However, the files and tables must be manually put on Tib and the VAX Science Cluster by Calvin Tullos in the Science Observatory Branch. Outside users can get them from STEIS in the /cdbs/yref or /cdbs/ytab directories, or retrieve them from Archive using the Files or Dataset screen. Remember that the files and tables will be in UNIX format on STEIS and VAX format from the Archive. Use the STSDAS tasks, **vax2sun** and **sun2vax**, to convert to the appropriate format.

The easiest methods to determine if you have the correct reference file or table for your observation are to run STSDAS **getreffile** (in stlocal.cdbsutil) or use the Calibration Reference screen in StarView (see HST Data Handbook, "Identifying the Best Files Using StarView", page 71). Both programs use the date of the observation and the USEAFTER dates of the reference files and tables to determine the correct file. The most recent version of the file will be chosen if there are multiple files with the same USEAFTER date. We urge you to check the results with the tables of recommended files posted on STEIS. Note that **getreffile** is available only at STScI.

If you want to find the files for a particular configuration, then the best way is to use the STSDAS task, **query**, in the stlocal.cdbsutil package (again only at STScI). You'll have to use the CDBS Relation name in Table 1 to as the parameter id in **query**. The CDBS selection criteria are listed in Section II for each reference file and table. Refer to the Calibration Data Base Design (Version 6.0, April, 1994) for the list of columns available for each reference file and table. In order to find out the "filename" for the reference tables, you'll have to use the STSDAS task, **inquiry** (in stlocal.cdbsutil). The parameter id "relinfo_sdas" contains the names of the reference tables. These tasks will give you the reference file or table that fulfills the specified search parameters, but it will not tell you if it is an appropriate file. Please refer to tables of recommended files and the history tables to verify if it is an appropriate file or table. All information in this report from the CDBS was obtained using **query** and **inquiry**.

IV. Availability of Information and Updates

Periodically updated ASCII text and Postscript versions of Tables 2-8 will be maintained in the /instrument_news/fos directory on STEIS and will be available for anonymous ftp from *stsci.edu*. The files will be named "ref_files_tables_*mmmyy*.ps" and "ref_files_tables_*mmmyy*.txt", where *mmmyy* is the posting date in month and year, the extension ".ps" denotes the Postscript version, and ".txt" denotes the ASCII version. For example, the first files delivered are "ref_files_tables_aug94.ps" and "ref_files_tables_aug94.ps". Remember this is for all reference files and tables except for flat fields, IVS, and dead diodes which have their own recommended lists (flat_field_tables_*mmmyy*.*, post_costar_flat_fields_*mmmyy*.*, ivs_tables_*mmmyy*.*, post_costar_ivs_*mmmyy*.*, and dead_diodes_*mmmyy*.* - where * is ".txt" or ".ps").

Copies and updates can be obtained from the Research Support Branch Analysis Hot Line (telephone: (410) 338-1082 or e-mail: *analysis@stsci.edu*).

References

Baum, S. (ed.), 1994, HST Data Handbook.

Calibration Data Base Design, Version 6, 1994.

Evans, I.N., 1993, Instrument Science Report CAL/FOS-104.

Keyes, C.D. and Taylor, C.J., 1993, Instrument Science Report CAL/FOS-090.

Taylor, C.J., 1994, Instrument Science Report CAL/FOS-112.

Taylor, C.J. and Keyes, C.D., 1993, Instrument Science Report CAL/FOS-093.

Notes for Table Interpretation:

"*": wildcard

yyyymmdd: USEAFTER date (4 digit year A.D., 2-digit month, 2-digit day) {in Tables 2-8}

*abcdefghi.r*h*,(*.r*d*): rootname of reference file and extensions for header (and data) files

*abcdefghi.cy** or *.cm**: rootname and extension of reference table

The letter "l" in rootnames in the tables is italicized ("*l*") to make it more legible.

RECOMMENDED FOS BACKGROUND REFERENCE FILES (.r0h)

Table 2: FOS BACKGROUND REFERENCE FILES

Detector	USEAFTER and File
AMBER	19900101 b3m1128fy.r0h,.r0d
BLUE	19900101 b3m1128my.r0h,.r0d

RECOMMENDED FOS RETARDATION REFERENCE FILES (.r3h)

Table 3: AMBER RETARDATION REFERENCE FILES for SUPPORTED CONFIGURATIONS

Grating	Pol A	Pol B
H19	Not supported	19900101 a4n1540sy.r3h,.r3d
		19930608 e5v1122ry.r3h,.r3d
H27	Not supported	19900101 a4n15413y.r3h,.r3d
		19930608 e5v1122sy.r3h,.r3d
H40	19900101 b6o10478y.r3h,.r3d	Not supported
	19930608 e5v1122ty.r3h,.r3d	

Table 4: BLUE RETARDATION REFERENCE FILES for SUPPORTED CONFIGURATIONS

Grating	Pol A	Pol B
H13	Not supported	19900101 b6o10471y.r3h,.r3d
		19930608 e5v11230y.r3h,.r3d
H19	Not supported	19900101 b7p12535y.r3h,.r3d
		19930608 e5v11231y.r3h,.r3d
H27	Not supported	19900101 b6o10478y.r3h,.r3d
		19930608 e5v11232y.r3h,.r3d

Table 5: AMBER RETARDATION REFERENCE FILES for NON -SUPPORTED CONFIGURATIONS

Grating	Pol A	Pol B
H19	19900101 a4n1540py.r3h,.r3d	Supported
H27	19900101 a4n15410y.r3h,.r3d	Supported
H40	Supported	19900101 a4n15418y.r3h,.r3d
H57	19900101 a4n1541by.r3h,.r3d	19900101 a4n1541ey.r3h,.r3d
H78	19900101 a4n1541jy.r3h,.r3d	19900101 a4n1541*l*y.r3h,.r3d
L15	19900101 a4n1541oy.r3h,.r3d	19900101 a4n1541qy.r3h,.r3d
L65	19900101 a4n1541sy.r3h,.r3d	19900101 a4n15421y.r3h,.r3d
PRISM	19900101 a4n15423y.r3h,.r3d	19900101 a4n15426y.r3h,.r3d

Table 6: BLUE RETARDATION REFERENCE FILES for NON -SUPPORTED CONFIGURATIONS

Grating	Pol A	Pol B
H13	19900101 a4n15429y.r3h,.r3d	Supported
H19	19900101 a4n1542fy.r3h,.r3d	Supported
H27	19900101 a4n1542ny.r3h,.r3d	Supported
H40	19900101 b6o1047ay.r3h,.r3d	19900101 a4n1543ky.r3h,.r3d
H57	19900101 a4n1543oy.r3h,.r3d	19900101 a4n1543qy.r3h,.r3d
L15	19900101 a4n1543ty.r3h,.r3d	19900101 a4n15442y.r3h,.r3d
L65	19900101 a4n15445y.r3h,.r3d	19900101 a4n15449y.r3h,.r3d
PRISM	19900101 a4n1544cy.r3h,.r3d	19900101 a4n1544fy.r3h,.r3d

RECOMMENDED FOS DATA QUALITY INITIALIZATION REFERENCE FILES (.r5h)
See ASCII table fos_qin_recommend.txt

RECOMMENDED FOS POINT SPREAD FUNCTION FILES (.r6h)

Table 7: FOS POINT SPREAD FUNCTION FILES

AMBER		BLUE	
Wavelength	USEAFTER and Filename	Wavelength	USEAFTER and Filename
1600	19900101 dbb1015ry.r6h,.r6d	1200	19900101 dbb10189y.r6h,.r6d
1800	19900101 dbb10160y.r6h,.r6d	1400	19900101 dbb1018ey.r6h,.r6d
2000	19900101 dbb10163y.r6h,.r6d	1600	19900101 dbb1018hy.r6h,.r6d
2200	19900101 dbb10166y.r6h,.r6d	1800	19900101 dbb1018jy.r6h,.r6d
2400	19900101 dbb10168y.r6h,.r6d	2000	19900101 dbb1018*l*y.r6h,.r6d
2600	19900101 dbb1016ay.r6h,.r6d	2200	19900101 dbb1018py.r6h,.r6d
2800	19900101 dbb1016cy.r6h,.r6d	2400	19900101 dbb1018ry.r6h,.r6d
3000	19900101 dbb1016ey.r6h,.r6d	2600	19900101 dbb10190y.r6h,.r6d
3200	19900101 dbb1016gy.r6h,.r6d	2800	19900101 dbb10192y.r6h,.r6d
3400	19900101 dbb1016iy.r6h,.r6d	3000	19900101 dbb10194y.r6h,.r6d
3600	19900101 dbb1016*l*y.r6h,.r6d	3200	19900101 dbb10196y.r6h,.r6d
3800	19900101 dbb1016my.r6h,.r6d	3400	19900101 dbb10199y.r6h,.r6d
4000	19900101 dbb1016py.r6h,.r6d	3600	19900101 dbb1019by.r6h,.r6d
4200	19900101 dbb1016ry.r6h,.r6d	3800	19900101 dbb1019ey.r6h,.r6d
4400	19900101 dbb1016ty.r6h,.r6d	4000	19900101 dbb1019hy.r6h,.r6d
4600	19900101 dbb10171y.r6h,.r6d	4200	19900101 dbb1019ky.r6h,.r6d
4800	19900101 dbb10172y.r6h,.r6d	4400	19900101 dbb1019*l*y.r6h,.r6d

Table 7: FOS POINT SPREAD FUNCTION FILES

AMBER		BLUE	
Wavelength	USEAFTER and Filename	Wavelength	USEAFTER and Filename
5000	19900101 dbb10174y.r6h,.r6d	4600	19900101 dbb1019ny.r6h,.r6d
5200	19900101 dbb10176y.r6h,.r6d	4800	19900101 dbb1019py.r6h,.r6d
5400	19900101 dbb10178y.r6h,.r6d	5000	19900101 dbb1019ry.r6h,.r6d
5600	19900101 dbb1017ay.r6h,.r6d	5200	19900101 dbb1019ty.r6h,.r6d
5800	19900101 dbb1017dy.r6h,.r6d	5400	19900101 dbb10201y.r6h,.r6d
6000	19900101 dbb1017fy.r6h,.r6d		
6200	19900101 dbb1017iy.r6h,.r6d		
6400	19900101 dbb1017ky.r6h,.r6d		
6600	19900101 dbb1017*l*y.r6h,.r6d		
6800	19900101 dbb1017ny.r6h,.r6d		
7000	19900101 dbb1017py.r6h,.r6d		
7200	19900101 dbb1017ry.r6h,.r6d		
7400	19900101 dbb1017ty.r6h,.r6d		
7600	19900101 dbb10180y.r6h,.r6d		
7800	19900101 dbb10182y.r6h,.r6d		
8000	19900101 dbb10183y.r6h,.r6d		
8200	19900101 dbb10184y.r6h,.r6d		
8400	19900101 dbb10186y.r6h,.r6d		

RECOMMENDED FOS LINE SPREAD FUNCTION FILES (.r7h)
See ASCII table fos_lsf_recommend.txt.

RECOMMENDED FOS REFERENCE TABLES

Table 8: RECOMMENDED FOS REFERENCE TABLES

Table Description	Keyword	USEAFTER and Filename
Aperture areas	CCS0	19900101 a3d1145dy.cy0
Aperture positions	CCS1	19900101 aaj0732ay.cy1
Sky emission line position	CCS2	19900101 a3d1145fy.cy2
Sky/background filter widths	CCS3	19900101 a3d1145gy.cy3
Wollaston/waveplate parameters (polarimetry)	CCS4	19900101 b9d1019my.cy4
		19930608 e5v13262y.cy4
Sky shift parameters	CCS5	19900101 a3d1145jy.cy5
Wavelength parameters	CCS6	19900101 bck10546y.cy6
		19930608 e5v11576y.cy6
GIMP scale factors	CCS7	19900101 ba910502y.cy7
Mean background count rates	CCS8	19900101 ba31407*l*y.cy8
Scattered light correction	CCS9	19900101 e3i09491y.cy9
Paired-pulse parameters	CCG2	19900101 a3d1145*l*y.cmg