The Organization of the HEASARC Calibration Database

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Ian M George & Ron S Zellar
Code 668,
NASA/GSFC,
Greenbelt,
MD 20771

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SUMMARY

The location, organization and contents of the HEASARC calibration database on-line at NASA/GSFC is summarized.

LOG OF SIGNIFICANT CHANGES

Release Date	Sections Changed	Brief Notes
1993 Apr 30	All	First Public Version
1995 Feb 15	All	Made compatible with `LaTeX2HTML` software
2004 Apr 01	All	Made compatible with tth
2005 Nov 28	All	Updated to reflect current state of FTP area and caldb structure

Contents

1 OVERVIEW

1.1 Location

The HEASARC calibration database (CALDB) is accessed via the `legacy.gsfc.nasa.gov` machine within the LHEA at NASA/GSFC:

- Internet: `ftp://legacy.gsfc.nasa.gov/caldb`

The entire `caldb` directory tree is available to remote users via anonymous ftp (see Section 1.4.1). Within the HEASARC, the `caldb` has been remote mounted on all other machines and the symbolic links /`caldb` & /`CALDB` created to point to the above top level directory.

1.2 Basic Structure

The contents of the /`caldb` area are divided into the following sub-directories[1]:

- `data` - contains the calibration dataset directory tree.
- `software` - contains the `caltools` software tasks, the `callib` subroutine library and a number of other software-related items.
- `docs` - contains calibration-related documentation

All directories and files within the /`caldb` tree are freely accessible to remote users, and each is discussed in more detail in the following sections.

1.3 Relation to Other Areas of the HEASARC anonymous FTP account

During a reorganization of the HEASARC anonymous FTP account on `legacy` carried out in 1993 Feb, it was decided to re-organize the directory structure to facilitate the search for desired files. The ftp area contains the following sub-directories:

- *mission* - where mission-specific archival data, documentation, software *etc* is located.
  A generic *mission* sub-directory tree usually consists of:
  - `doc`
  - `problems`

[1] We generally use unix-style directory paths throughout this memo for simplicity.

  - `nra_info`
  - `data/`*inst*
  - `timelines`
  - `software`
  - `publications`
  - `calib_data`
- `software` - containing general software (*e.g.* XSPEC, FTOOLS, XRONOS, XIMAGE *etc*)
- `caldb` - the calibration database
- `fits_info` - general information on FITS files and their usages

with the structure described in some detail in Drake and O'Neel (1993).

There are two routes by which a user can access the calibration data: via /*mission*/`calib_data`, or via /`caldb`/*mission*. Many users may prefer to use the former route, collecting calibration data along with other information specific to a given mission/instrument. However users concerned only with calibration data (*eg* those maintaining their own, local copy of the `CALDB`) may prefer to use the latter route. It should be stressed however that both routes access the same physical files, and the two access routes are connected via a symbolic link (see Section 2). A similar choice of routes also exists for some parts of the calibration software and documentation trees. These are also discussed in Sections 3 & 4 respectively.

1.4 Access

As described in Section 1.1, at the present time the HEASARC CALDB exists on

`ftp://legacy.gsfc.nasa.gov/caldb`.

1.4.1 Anonymous ftp to the Legacy machine

Users of machines on the Internet network may use File Transfer Protocol (ftp), to list the contents and/or copy file from the HEASARC `CALDB`.

To initiate ftp from the command line, type the following (boldface) commands in a terminal window at the prompt (comments appear in italics):
ftp legacy.gsfc.nasa.gov then
`ftp>` **user anonymous**
`Password:` *type your e-mail address as the password*
You will now be in the top level directory[2] of the HEASARC anonymous ftp account on `ftp://legacy.gsfc.nasa.gov`

[2]This will be the / directory for ftp users, and the /FTP directory for non-ftp users.

and a message to this effect, along with any important bulletins, should be displayed. A general overview of the account can be found in Drake and O'Neel (1993). More detailed on-line information, instructions *etc* concerning the ftp account can be found within the ASCII `README` file within this (and many other) directories.

The following list of basic ftp commands may be of use to the inexperienced ftp user:

`ftp>` **help**	(or `ftp>` **?**)	*displays list of ftp commands*
`ftp>` **help lcd**		*displays help for ftp command* `lcd`
`ftp>` **cd caldb/docs**		*move to the* `caldb/docs` *directory*
`ftp>` **cd ../**		*move back up one directory*
`ftp>` **ls**		*brief list of the contents of the current* `legacy` *directory*
`ftp>` **dir**		*detailed list of the contents of the current* `legacy` *directory*
`ftp>` **pwd**		*display the present working directory on* `legacy`
`ftp>` **binary**		*set binary transfer type (required for FITS files etc)*
`ftp>` **mget ***		*copies all files in the current* `legacy` *directory to your area*
`ftp>` **ascii**		*set ASCII transfer type (required for LaTeXdocuments, postscript files etc)*
`ftp>` **get README**		*copies the* `README` *from current* `Legacy` *dir to local dir*
`ftp>` **lcd /home**		*change local directory to* `/home` *on user's home machine*
`ftp>` **quit**		*quits from ftp & returns control to local operating system*

A variety of other useful commands are available within ftp, a number of which depend on which version of ftp is installed on the local machine.

2 CALIBRATION DATA FILES

The HEASARC CALDB classifies files as 'Primary Calibration Files' 'Basic Calibration Files' and 'Calibration Product Files' (PCFs, BCFs & CPFs respectively; see also CAL/GEN/91-001). PCFs are 'raw' ground and in-orbit calibration datasets not of immediate interest to most users as they are not directly required for (all but the most specialized) scientific data analysis tasks. BCFs contain the lowest level calibration datasets potentially required by downstream software, and can be considered the 'atomic units' of the instrument calibration. CPFs contain 'convolutions' of the information stored within BCFs customized for a specific analysis task and/or scientific observation.

2.1 BCF & CPF Datasets

All BCF & CPF calibration files are organized using the scheme

`/caldb/data/`*mission*`/`*inst*

where *mission* & *inst* are the OGIP-standard names for the mission and instrument. For internal management purposes, a further division into *inst*`/bcf` and *inst*`/cpf` sub-directories is made in most cases. Miscellaneous, non-instrument specific calibration datasets, including general spacecraft housekeeping information *etc*, can be found in the `/caldb/data/`*mission*`/mis` sub-directory.

Besides the calibration datasets themselves, each sub-directory of `/caldb/data/`*mission* contains:

- a `caldb.indx` Calibration Index File (CIF), required for accesing calibration datasets within the OGIP,
- a tar file containing valid BCF & CPF calibration datafiles

2.1.1 Symbolic Links to Other Areas

As mentioned in Section 1.3, there are 2 routes via which ftp users can access BCF & CPF calibration datasets:

- via the /*mission*/`calib_data` tree (the prefered route for most users), or
- via the `/caldb/data/`*mission* tree (probably the preferred route for users maintaining a remote version of the HEASARC CALDB.

Both routes access the same physical files, and the two access routes are connected via a symbolic link `calib_data` in the /*mission* directory to the `/caldb/data/`*mission* directory[3]

Thus ftp users in (for example) `/rosat` who change directory to `calib_data` (`ftp>` **cd calib_data**) will actually set their current working directory to `/caldb/data/rosat` directory. A message to this effect will appear on their screen, along with instructions that at any time they may return to the main `/rosat` ftp area by changing directory to `rosat` (`ftp>` **cd /rosat**).

2.2 PCFs

Due the the large data volume, for historical reasons the PCFs from all missions are given their own parallel directory tree:

`/caldb/data/pcf/`*mission*

where *mission* in the standard OGIP name for the mission. Each directory is further divided into the following sub-directories:

- `ground` containing (if any) ground calibration measurements and datasets from theoretical simulations

[3]NOTE This symbolic link ONLY works for ftp users. Users not logged onto `legacy` via ftp unfortunately have to specify the path to the relevant caldb area either using:

- `cd /FTP/caldb/data/`*mission*/*inst* etc, (the full path to the calibration database area) or more simply,
- `cd /caldb/data/`*mission*/*inst* etc, (using the `/caldb` symbolic link discussed in Section 1)

- `in-orbit` containing in-orbit calibration data (*eg* raw data from on-board radioactive calibration sources *etc*), but **excluding** calibration observations of astronomical sources.
- `cal_obs` containing scientific datasets from calibration observations of astronomical sources.

2.2.1 Symbolic Links to Other Areas

The calibration datasets resulting from the observation of astronomical sources (*eg* the Crab) are available in the /*mission*/`data`/*inst* directory tree (see Section 1.3). Thus `cal_obs` will be a symbolic link to this directory. It should be noted that **NO** corresponding symbolic link from the /*mission*/`data`/*inst* area back to `/caldb/data/pcf/`*mission*/*inst* will be provided. Users wishing to return will therefore be required to use the full path when changing directory back.

2.3 Non-FITS files

At the present time the HEASARC CALDB does contain a number of calibration datasets in formats other than FITS. In some cases, FITS versions of these datasets (using a standard OGIP file format) also exist within the caldb. Users should note that the permanent existence, quality *etc* of these non-FITS files is in **NO WAY** guaranteed. In most cases such files represent calibration datasets in an old format. Thus such files are stored in an `old` sub-directory of the `.../`*inst*/`bcf` or `.../`*inst*/`cpf` directories. The HEASARC tries to provide ASCII `README` files to explain the formats *etc* of the datasets, and giving the name and location of the corresponding FITS versions of the file, when available.

3 CALIBRATION SOFTWARE

3.1 CALTOOLS & CALLIB

Calibration-related software is publicly available from the `caltools` package distributed with the HEASARC `ftools` analysis software. All routines are written in ANSI FORTRAN or C, and are able to be executed both as standalone tasks on all OGIP-supported platforms/operating systems, or from within the IRAF environment. A list of all currently available and planned `caltools` tasks is given on `http://heasarc.gsfc.nasa.gov/lheasoft/ftools/caldb/caltools.html`.

Users may also be interested in the `callib` subroutine library (in `/caldb/software/callib`) containing commonly used utilities, and in particular, routines for reading and writing calibration datasets adhering to OGIP-standard file formats. A detailed listing of the contents of `callib` can be found in "Summary of CALLIB Routines", CAL/SW/93-005.

Details on the installation and maintenance of the HEASARC `caldb` software collection at remote nodes can be found in "How to Manage a Calibration Database", CAL/GEN/92-015.

3.1.1 Symbolic Links to Other Areas

The `/caldb/software/caltools` file is a symbolic link to the `/software/ftools/caltools` area within the main HEASARC software collection. Similarly `/caldb/software/callib` is a symbolic link to the `/software/ftools/callib` area.

It should be noted that **NO** corresponding symbolic links from these directories back to `/caldb/software` are provided. Users wishing to return will therefore be required to use the full path of the desired directory when changing back.

4 CALIBRATION DOCUMENTATION

The `/caldb/docs` directory is sub-divided into

- `memos` containing all non mission-specific HEASARC calibration memos
- *mission* containing all mission-specific calibration documentation.

In most cases both the LaTeX source code, Postscript & HTML versions of each document are available.

The best starting point for finding calibration-related documentation is via the World-wide Web via the URL:
`/docs/heasarc/caldb/caldb_doc.html`

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