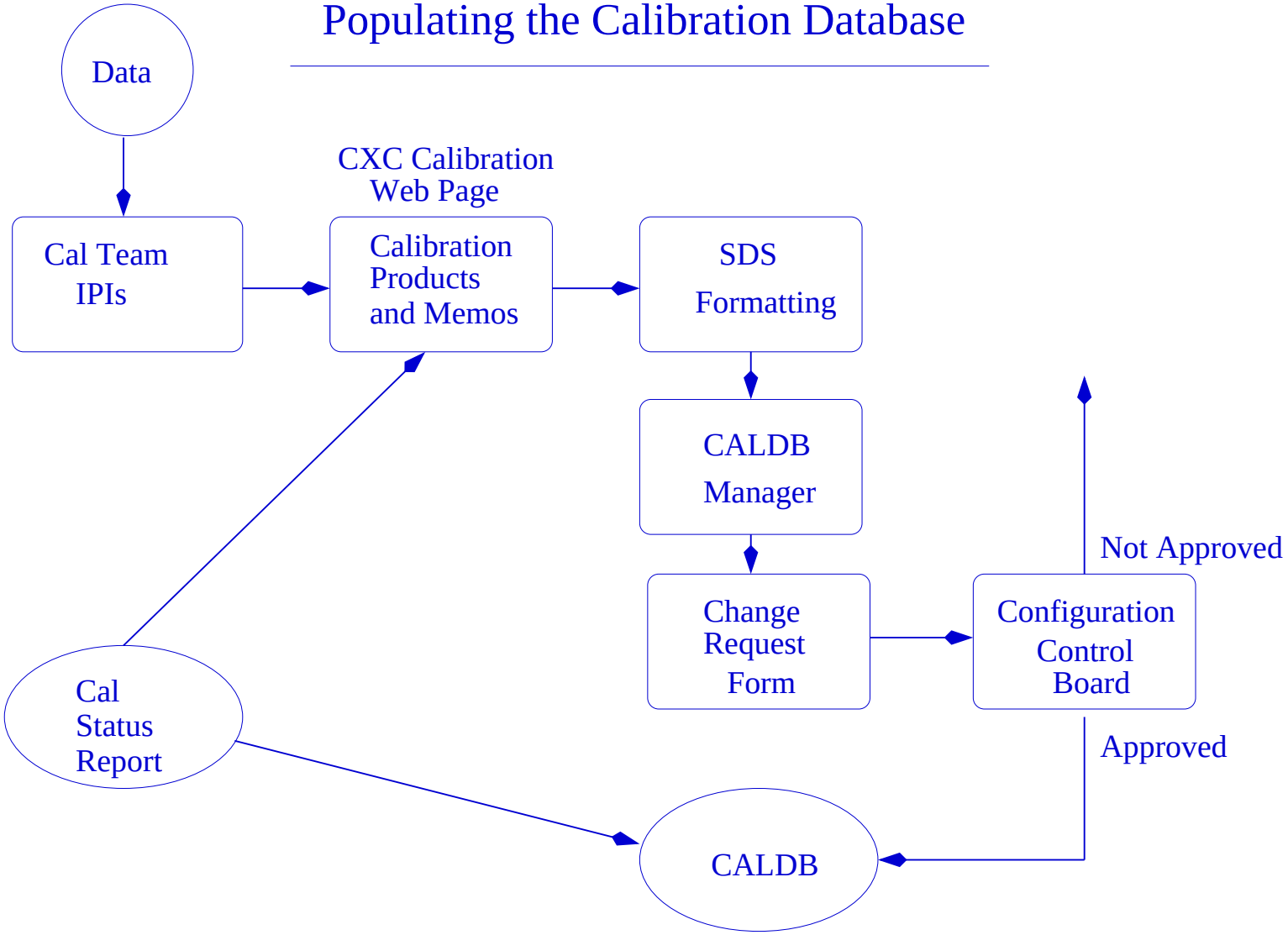
CHANDRA CALIBRATION REVIEW

October 30-31, 2001

Overview of Chandra Calibration

- Raw Data $\Longrightarrow$ Calibration Database (CALDB)
- Information $\Longrightarrow$ Chandra Scientific Community
- Status of Calibration Products

Populating the Calibration Database



Chandra Instruments and Calibration

The pages below are maintained by the Chandra X-ray Center Calibration group and contain information on the calibration of Chandra instruments. Any data products provided are to be used by observers at their own risk.

A summary of Chandra Instruments and Calibration Status can be found in the Proposers' Observatory Guide

For officially released data products for use in CIAO analysis software, refer to the Chandra Calibration Database (CALDB) Webpage.

High Resolution Mirror Assembly (HRMA)
High Resolution Camera (HRC)
Advanced CCD Imaging Spectrometer (ACIS)
Low Energy Transmission Grating (LETG)
High Energy Transmission Grating (HETG)
Aspect Information
Calibration Status Report

COMMENTS:
CXC Cal

Last modified:10/16/01

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CALIBRATION STATUS REPORT (CALDB 2.7)

Instruments	Contents
1.0 ACIS ARDs	1.1 GRADE 1.2 BAD PIXELS 1.3 EVTSPLT 1.4 GTI_LIM 1.5 DETECTOR GAIN 1.6 PI FEFs 1.7 PHA FEFs 1.8 QE (Mean Quantum Efficiency) 1.9 QEU (Quantum Efficiency Uniformity) 1.10 PSF 1.11 OSIP (Order Sorting Integrated Probability)
2.0 HRC ARDs	2.1 BAD PIXELS 2.2 GTI_LIM 2.3 DEGAP 2.4 QE (Mean Quantum Efficiency) 2.5 QEU (Quantum Efficiency Uniformity) 2.6 FPTEST (Event Hyperbolic) 2.7 EFTEST (Event Flatness) 2.8 SATTEST (Event Amp Saturation) 2.9 TAPRING 2.10 GAIN 2.11 PSF 2.12 TGMASK
3.0 HRMA	3.1 AXEFFA 3.2 VIGNET
4.0 LETG	4.1 GREFF 4.2 RMF (Response Matrix)
5.0 HETG	5.1 GREFF 5.2 HEG RMFs 5.3 MEG RMFs
6.0 TELESCOPE	6.1 AIMPTS 6.2 GEOM 6.3 SKY 6.4 TDET

1.0 ACIS ARDs

1.1 GRADE

```
Description: The mapping from flight grades to ASCA grades
Most recent version in CALDB: acisD1996-11-01gradeN0001.fits
File Creation Date: 3/4/99
Known Errors: None
Status: Complete
```

1.2 BAD PIXELS

1.2.1 BADPIX at T=-120 C

```
Description: Detector bad pixel list
Most recent version in CALDB: acisD2000-01-29badpixN0001.fits
File Creation Date: 9/28/00
Known Errors: None
Status: Complete
```

1.2.2 BADPIX at T=-110 C

```
Description: Detector bad pixel list
Most recent version in CALDB: acisD1999-09-16badpixN0002.fits
File Creation Date: 6/24/00
Known Errors: None
Status: Complete
```

1.2.3 BADPIX at T=-100 C

```
Description: Detector bad pixel list
Most recent version in CALDB: acisD1999-08-13badpixN0003.fits
File Creation Date: 6/24/00
Known Errors: None
Status: Complete
```

1.2.4 BADPIX at T=-90 C

```
Description: Detector bad pixel list
Most recent version in CALDB: acisD1999-07-22badpixN0005.fits
File Creation Date: 6/24/00
Known Errors: None
Status: Complete
```

1.3 EVTSPLT

```
Description: Event thresholds and split thresholds
Most recent version in CALDB: acisD1996-11-01evtspltN0001.fits
File Creation Date: 3/3/99
Known Errors: None
Status: Complete
```

1.4 GTI_LIM

```
Description: screening parameters for Good Time Intervals
Most recent version in CALDB: acisD1999-07-22gtilimN0003.fits
File Creation Date: 5/22/01
Known Errors: None
Status: Complete
```

1.5 DETECTOR GAIN

1.5.1 DET_GAIN at T = -120C

```
Description: Detector Gain Table
Most recent version in CALDB: acisD2000-01-29gainN0003.fits
File Creation Date: 07/27/01
Known Errors: There are no known problems with the ACIS-S3
              gain in this file. The gains for the other chips
              are based on the assumption of a linear gain.
              This produces offsets of approximately 20eV
              between the mean pulse heights and true energies
              for photon energies between about 0.4 and 1.0 keV,
              and larger errors at lower energies.
Status: Update expected Nov 2001 for S1 chip
                        Feb 2002 for the FI chips
Contact: Norbert Schultz and Dick Edgar
More Information: CAL projects.
```

1.5.2 DET_GAIN at T = -110C

```
Description: Detector Gain Table
Most recent version in CALDB: acisD1999-09-16gainN0005.fits
File Creation Date: 12/15/00
Known Errors: Low energy gain (see 1.5.1)
Status: Update expected Nov  2001 for BI chips
                        Feb  2002 for FI chips
Contact: Norbert Schultz and Dick Edgar
```

1.5.3 DET_GAIN at T = -100C

```
Description: Detector Gain Table
Most recent version in CALDB: acisD1999-08-13gainN0002.fits
File Creation Date: 12/14/99
Known Errors: Low energy gain (see 1.5.1).
Status: No update planned at present.
```

1.5.4 DET_GAIN at T = -90C

CALIBRATION

ACIS Calibration Data and Data Products

Calibration Products	
NOTE: CTI-Induced Quantum Efficiency Loss in ACIS Front Illuminated Devices	
Recent updates: New S3 FEF release notes now availiable, 08/10/01 New S3 FEF's Available Soon , 07/17/01; **ACIS Calibration Issues in Progress** , 01/12/01; Bad pixel maps, 06/28/01	
• **ACIS Background** Particle background measurements for ACIS-I, ACIS-S and Quiescent background in VF mode. *09/28/01* • **Bad Pixel Locations** Table of bad pixels and columns. *06/28/01* • **Detector geometry** ACIS Focal Plane Array. *11/20/97* • **Effective Area** Plot of HRMA+ACIS FI and BI effective area vs energy. *06/03/99* • **Energy Resolution** In-flight ACIS spectral resolution analysis. *01/18/00* • **Event Grades** Branching ratios, techniques, and simulated branching ratios. *11/06/98* • **The FEP0 Problem** *02/02/00*	• **Gain and CTI update memo** ACIS charge transfer inefficiency and gain corrections. *07/24/01* • **Optical Blocking Filter Transmission** Global I-array and S-array maps; plots of transmission vs. energy and transmission vs. wavelength. *03/10/00* • **Pileup** Pileup analysis using analytical model and PSF data. *10/07/98* • **Point Spread Function** PSF analysis for all on-axis and off-axis XRCF PSF tests. *04/30/99* • **Quantum Efficiency** Plot of ACIS FI and BI QE; map of ACIS spatial non-uniformities. *07/24/00* • **ACIS Response Matrices** Release notes of new S3 Response Matrices, including caveats, limitations, error analysis, and tests against astrophysical sources. *10/09/2001* • **ACIS Calibration Issues in Progress** Analysis of low energy response on the back-illuminated chips *01/12/01*

ACIS Team Calibration Report
V2.2, 1/15/99 (**55 Mb** postscript file)

ACIS-Related Calibration Data

CALDB Pages

Welcome to the Chandra Calibration Database (CALDB) Web Page!

CALDB Version 2.9 UPGRADE is available 22 OCTOBER 2001

PLEASE READ: INTRODUCTION to CALDB 2.9

Next Scheduled CALDB Update Release: 06 Dec 2001

About the Chandra CALDB

- *WHAT'S THIS ALL ABOUT?-->* Describes the purpose of the CALDB, gives HEASARC references, and presents the directory structure. Useful if you want to know about the CALDB itself, who to talk to about it, and how it actually works. This section also provides a walking tour of the Chandra CALDB web site.

Download the Chandra CALDB

- *GET STUFF HERE!-->* If you are a private user or a system administrator, this page allows you to download the Chandra CALDB directory and file structure. Gives you access to gzipped tar files of the current CALDB, and updates thereto. CALDB UPGRADE files are available HERE also.

CALDB files and Calibration links

CALDB Update Schedule

- *WHEN DO I GET THOSE NEW CALIBRATIONS?-->* Gives a listing of anticipated CALDB updates, when they are expected, and links to new calibration measurements when they are posted. Useful for those anticipating calibration improvements or wanting to know if their latest measurements of Chandra instrument calibrations have made it into the CALDB.

CALDB version release notes

- *WHEN **DID** I GET THOSE NEW CALIBRATIONS?-->* This section includes links to published release notes for each and every update of the Chandra CALDB. Useful for users who want to know what version of the CALDB was used in the pipeline processing of their data, or who want to know what the latest enhancements are.

CALDB Pages

CALDB Update Schedule

CALDB v2.9 RELEASED AS OF 22 OCT 2001

NEXT SCHEDULED CALDB UPDATE RELEASE: 06 DEC 2001

Schedule of Anticipated CALDB Updates				
FILENAME or TYPE	**Description**	**CALIBRATION**	**ECR (CfA only)**	**Projected Release Date (These are approximate!)**
ACIS S3 (BI) responses (in FEF hypercubes v2, -110C)	Response matrices for BI chip S3 to include fluorescence and escape peaks for materials other than silicon. Also, to include more appropriate interpolations in energy/PHA space, and improvements in the PI conversion. (CIAO)	TBR	TBR	2001-12-06
ACIS gain table, v6, -110C	The gain updates associated with the v2 -110C FEF's (S3 response upgrade)	TBR	TBR	2001-12-06