CHANDRA
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MEMORANDUM

Date: June 26, 2007
From: Nancy RA. Wolk
To: ACIS OPS
Subject: ACIS OPS Load Review Changes
Cc: Dan Schwartz
File: `acis-backstop-changes.tex`
Version: `1.0`

Abstract

This memo discusses the recent changes to the code "acis-backstop.pl" and the impacts on load review by ACIS operation personnel. The new tests that are performed are described in detail and a summary of the changes are listed.

1 Introduction

The ACIS operations load review code has undergone a series of changes to streamline the code for faster execution, and for ease of maintenance. In addition, several new tests have been added and older tests were made to execute more efficiently. These changes should help make load reviews more autonomous and ease the work load on the ACIS operations team.

2 Summary of Changes

A summary of the major changes are below:

- The CRM file is read in and the diagnostic tests are now recorded and compared against loaded parameter blocks.
- The NIL file is read, if it exists, and when a HRC observation is in place, this file is checked for a NIL observation. If one exists, the requested SI_mode is compared against the loaded parameter block.
- There is a single connect statement to the database, instead of one per observation.
- The radzone passages are monitored differently to prevent extra messages that claim the review has failed due to a late entry or early exit.
- The radzone shut down triplet must occur before perigee, or an error is produced.
- Requested windows in the OCAT are now compared to the actual window block parameters including energy filters.
- New diagnostic tests were added.
- A change to the subroutine that tracks the SI_MODEs was made to allow for diagnostics to be the bias form of the test to prevent errors.
- The entire code was streamlined for easier reading and maintenance.
- The main loop now consists of a while statement and each type of command is processed with a subroutine.
- Instead of flagged errors, an error list stores the errors that occur.
- A bug in the energy filter code that allowed floating point requested energies has been fixed.
- The pad-checker.pl code is now obsolete, replaced with a subroutine in acis-backstop.pl.
- The acisparams.csh, acisparams.pl and winparams.pl are obsolete, now included in the code.

3   List of Tests Performed

This section contains a detailed list of all tests (new and old) performed in the load review.

- Radiation Zone Tests
  - Confirm the focal plane has HRC-S when RADMON is disabled.
  - Report an error if ACIS is in the focal plane.
  - Report inconsistencies in the Entry and Exit of the radiation zone. Track the first entry and confirm that perigee has occurred before accepting an exit as accurate.
  - Report errors with the timing of RADMON enable/disable and radzone exit/entry.
  - Report error of RADMON disable and ACIS in the focal plane.
  - Report error when a diagnostic is to be done and HRC-S is not in the focal plane.
  - Track the expected radzone triplet for ACIS and report and error if it is not seen at the Perigee event.
  - Report any SIM translations during the entry/exit of the radzone.
- Obsid change tests
  - There must be 3 minutes between the obsid change and the previous stop science.
  - Confirm there was actually an observation taken between science obsids. Report a missing start science otherwise.
- Format Change Tests
  - Report if there is a change to Format 1 less than 3 minutes after a stop science.
  - Report an error if an ACIS test is on-going and the format become Format 1.
- Start Science Tests
  - Check if RADMON is enabled.
  - Compare the parameter block values with the ocat.
  - Compare the stored parameter block with the SI_MODE requested.
  - Compare the window block values with the ocat.
  - Compare the focal plane instrument, the grating and the sim-z versus ocat.
  - Confirm we are in Format 2 for a test with ACIS in the focal plane.
  - Report if dither is disabled at start science.
- Stop Science Tests
  - Calculate time of observation. Report errors if less than 90% of requested or more than 110% of requested.
- Generic ACIS command tests
  - Report an error if we execute RT_0000001 when RADMON is enabled (table dump).
  - Confirm all acis command packets happen less than 2 minutes after a start science.
  - Confirm that there is less than 10 minutes between a WSVIDALLDN and the 2nd stop science preceding it.
- SIM Translation Tests
  - Report a warning if we can't recognize the location of the SIM as a standard instrument.
  - Report timing if we translate from HRC to HRC during an ACIS test (could be NIL test).
  - Report an error if a translation from/to ACIS during an observation.
- End of Load Review Tests At the end of the load review, several tests are performed.
  - Check for any perigee crossings.
  - Compare the number of obsid changes to the number of start sciences.
  - Compare the number of System dump commands to start sciences.
  - Compare the number of Stop sciences to start sciences.
  - Compare the number of Huffman table dumps to start sciences.
  - Compare the number of System dumps to Huffman table dumps.

4 Changes in the file ACIS-LoadReview.txt

The ACIS Ops reviewers may see some new items in the ACIS-LoadReview.txt file. Here is a sampling of what was obvious and what the new messages mean.

```
LATEST OCAT INFO FOR OBSID 8283:
No ACIS info found for obsid 8283.
This is an HRC-S observation.
```

```
 ==> NIL SI_Mode is HSO_0002
```

Now that the next in line engineering requests are pulled from the tar file, these messages will occur whenever there is an HRC observation and a NIL observation scheduled.

```
==> Parameter Block for SI mode HSO_0002B is WT0023A014 and is stored.
```

NIL requests will be checked for the correct parameter block. Since NIL and radiation zone diagnostics are often not inserted with the OFLS, the code is programmed to accept a subset of SI_MODES as always having the bias form. This example demonstrates that the review is searching for the bias form of the parameter block.

```
==>The requested SI_MODE for the inbound CTI is TE_00216
```

```
==> The requested SI_MODE for the outbound CTI is TE_0021C
```

The CRM file is now being read into the acis-backstop.pl code and when the radmon is disabled, the SI_MODE for the closest diagnostic test is printed.A similar check is performed for the outbound diagnostic when the exit radzone event is reported.

```
2007:141:05:26:39.882    3992716  ORBPOINT    EPERIGEE
```

```
>>>WARNING: No EEF1000 seen before EPERIGEE. Is the load starting in the belts?
```

```
>>>ERROR: The radzone ACIS commanding triplet was not seen
```

This type of error will occur if the load starts in the belts. A perigee event is seen, but not the radzone triplet nor the belt entry since those events happened in the last load.
    A successful test will look like this:

```
-- CHANDRA LOAD END --
```

```
************************
ACIS LOAD REVIEW SUMMARY
************************
```

```
THERE ARE 21 REAL-TIME COMM PASSAGES IN THIS LOAD.
```

```
FREQUENCY OF ACIS COMMAND OCCURRENCES TABLE:
-----------------------------------------------------------------------
  OBSIDs  WSVIDALLDNs  RS_0000001  RH_0000001  X[TC]Z0000005  AA00000000
-----------------------------------------------------------------------
    29         5           25          22           22           65
```

```
**NOTE: There are 3 perigee crossings in this load.
```

```
FREQUENCY OF OTG INSERTIONS/RETRACTIONS:
-----------------------------------------------
  LETG_INs  LETG_REs  HETG_INs  HETG_REs
-----------------------------------------------
      0         0         1         1


--------------------------------------------------------------------------


--------------------------------------------------------------------------

ACIS BACKSTOP: No failures or warnings found
--------------------------------------------------------------------------

 ACIS LOAD REVIEW PASSED
```

5   Future Work

The next set of improvements of the load review will include:

- Timing for the clearing of the buffers.
- Earth solid angle calculations.
- Bright source violations.
- Any other enhancements agreed upon.