GPRSHome

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Edit A PR/PFR

Michael Amato, System Engineer for ACD

To view project setup for this PR/PFR, select Project Setup (for revision #4).

★ Always Required ★ Required (via Data Field Information page)

Problem Information: PR ID: ACD-ACD-INT-02322-001

★	Project: **ACD**		
	Spacecraft: ACD	★	Subsystem/Instrument: ACD
	Component: EGSE		Assembly:
★	Problem Description: (to add to description, use addendum box below) HldCal output for GARC5 is faulty when this test in run for all GARCs simultaneously. Extra triggers are being seen on all GAFE channels on GARC5, and the script resets the counter during the run. The calibration function, which should be a straight line, shows a peak. Troubleshooting on this problem: 1. This problem was not seen during the full functional test on 6/13/05. 2. This problem has been seen on all full functional tests since 6/17/05 3. Running with only GARC2 and GARC5 enabled produces good results (consistent with the 6/13 run. 4. Running with only GARC4/GARC5 or GARCs 2, 3, 4, 5, 6, 7 also produces good results. 5. Running with all GARCs except GARC5 enabled produces similar nonlinear performance in GARCs 1,2,3,4, but not GARC 0 or GARCs 6-11. 6. If the cables for GARC5 and GARC2 are swapped, the nonlinear behavior still appears in the data labeled GARC5 (which came from GARC2 in this case). 7. Changing back to the HldCal software used on 6/13 does not solve the problem. 8. Changing back to the gGEM software used on 6/13 does not solve the problem. Addendum 1 by Michael Amato on 08/05/2005 at 07:50: Detailed description of the problem and troubleshooting is attached. This PR now consolidates the following PRs, all of which describe the identical problem: ACD-02334-011 ACD-02334-002 ACD-02322-005 ACD-02322-001 These other PRs will be edited to reference this one, so that they can be closed. This PR should be left open for now, so that it can be carried to the next level of assembly. These notes added by Dave Thompson 8/5/05 Addendum to Problem Description:			
★	Actual Problem Date: Jul-14-2005		Actual Problem Time: (use military time to record PM.) 00:00
	Name of Person Entering: (if left blank, will default to user logged in) Dave Thompson		
★	WOA Number: **ACD-INT-02322**	★	Event / Operation Line Number: 690
	Configuration Type: *Other:*		Software Version:

	Item Number:		Item Revision:
	Serial Number:		

Attachment(s):
HldCal Analysis

SAVE and exit | Add Attachment(s) | RESET Form | Notify Other Users

Disposition (needed for closing the PR). If disposition is changed and a signature is present, that signature will be removed.

```
Tentative conclusions:
1. The problem is not in the ACD.  The fact that
swapping the cable of the GARC that appears to
show the problem does not make the problem move
```

(Make sure that you include the cause of the anomaly and the defect correction action taken in your disposition.)

To close the PR, 1 signature needed from the project AND 1 signature needed from QA.

Proj: SE | Close PR

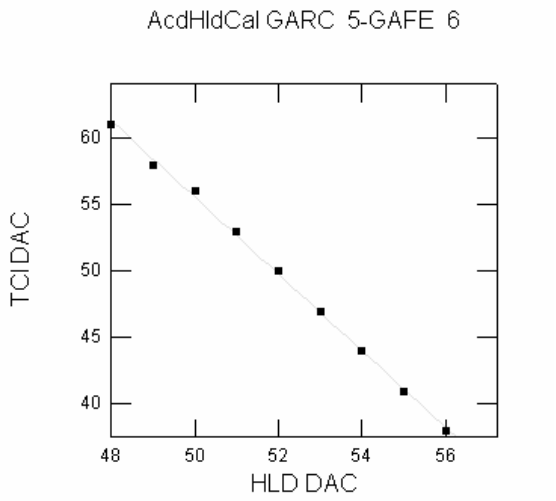
To elevate to PFR, 1 signature needed from the project OR 1 signature needed from QA.

Proj: SE | ELEVATE to PFR

July 22, 2005

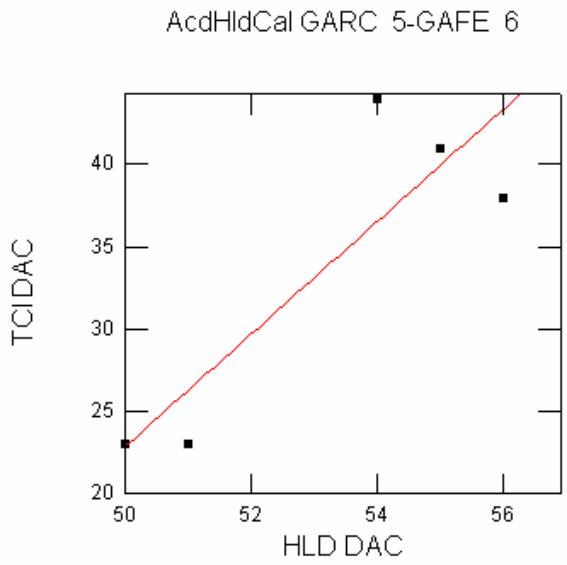
GARC 5 Problem with HldCal Script

HldCal is a script that uses TCI to calibrate the High Level Discriminator. In the full ACD, the script runs simultaneously on all GARCs, cycling through each GAFE on all 12 GARCs. The resultant output is a linear relationship between the HLD DAC and the TCI DAC, as shown in the following figure, taken from a run on June 13, 2005.

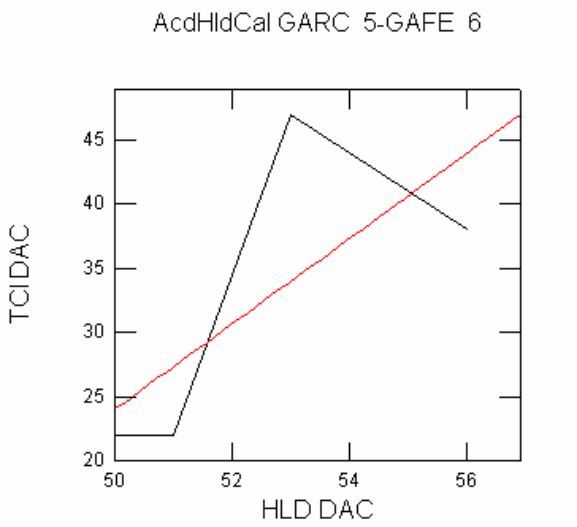


Between June 13 and June 17, a number of changes were made in the system, including an updated version of HldCal, and an updated version of a routine called gGEM. The LATTE version on June 13 was 4.9.0, which was later updated to 4.9.2.

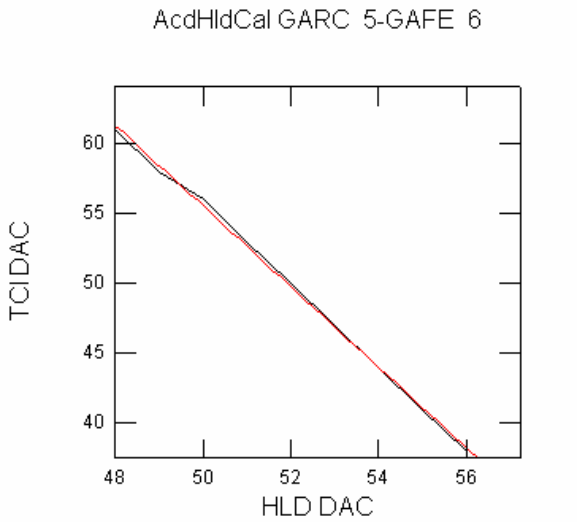
For all runs made after June 17, all the GARC 5 GAFEs show anomalous results, such as



The plotting routine changed after June 17, but the problem remained. Here is a plot from July 14:



When a run was done using only GARC 2 and GARC 5, rather than all GARCs, the result was essentially identical to the June 13 run:



Troubleshooting on this problem (see also Karen's note in the appendix):

1. This problem was not seen during the full functional test on 6/13/05.

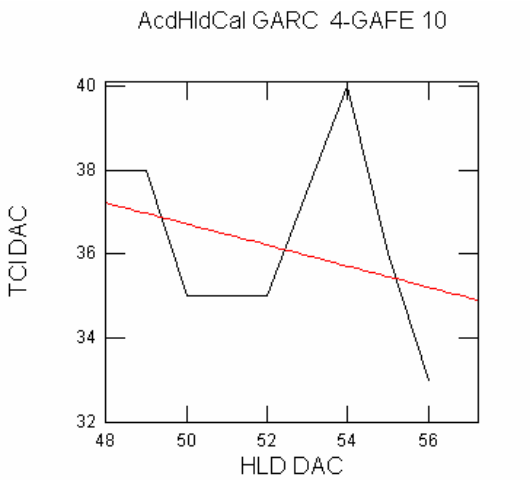
2. This problem has been seen on all full functional tests since 6/17/05

3. Running with only GARC2 and GARC5 enabled produces good results (consistent with the 6/13 run).

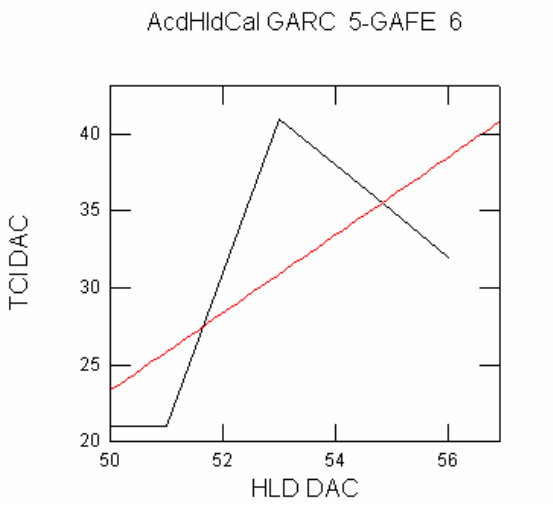
4. Running with only GARC4/GARC5 or GARCs 2, 3, 4, 5, 6, 7 also produces good results.

5. Running with all GARCs except GARC5 enabled produces similar nonlinear performance in GARCs 1,2,3,4, but not GARC 0 or GARCs 6-11.

Here is a sample plot:



6. If the cables for GARC5 and GARC2 are swapped, the nonlinear behavior still appears in the data labeled GARC5 (which came from GARC2 in this case). In fact, the plot is essentially identical to the one with the cables in the original position. The GARC serial numbers are read by the test, so we know the swap was made.



7. Changing back to the HldCal software used on 6/13 does not solve the problem.

8. Changing back to the gGEM software used on 6/13 does not solve the problem.

9. The problem appears to be more counts showing up on the GARC5 GAFE channels than strobes that are sent (see Sharon's note in the appendix).

10. We have never seen a similar problem in testing of individual electronics chassis.

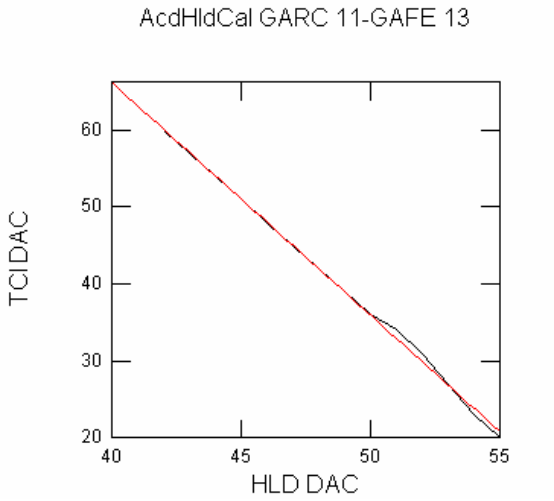
Note Added July 29, 2005

Revised software now flags cases where the counts exceed the number of strobes. We consistently see this on all the GAFEs for GARC 5 and one GAFE for GARC 11. Here are the error messages:

ERROR: GARC 5/Ch 12 - HLD_DAC = 47: TCI_DAC = 50: Counts = 36 exceed strobes at 50 percent efficiency

ERROR: GARC 11/Ch 13 - HLD_DAC = 55: TCI_DAC = 20: Counts = 127 exceed strobes at 50 percent efficiency

The GARC11/GAFE13 plot looks slightly nonlinear, but nothing like the distortion seen for all the GARC 5 GAFEs. An example is shown below:



Tentative Conclusions

1. The problem does not appear to be in the ACD hardware, since it shows up on the same data channels when cables are swapped.

2. This is a problem of calibration or operating conditions, not a problem of performance, as best we can tell.

3. We have found no adequate explanation of how the data are being garbled, but software seems to be a likely candidate.

4. We have an adequate workaround to obtain this calibration, by a run using just two GARCs

5. The whole topic of calibrating the High Level Discriminator is a secondary issue for the ACD, since the only goal of the HLD is to send trigger signals for possible high-Z cosmic rays.

6. We are proceeding with this as an open issue.

1.

Appendix – note by Sharon Orsborne

I have examined the message log from the Full Functional run earlier today which showed some strange results for GARC 5. It appears what was happening is that all the channels on GARC 5 at some point received a veto count which exceeded the number of strobes (varying from one more to double the number of strobes). The script has some logic that checks for counts exceeding strobes - in which case it does not plot the point and it "resets" the tci for that GARC to the lower limit (20). The original philosophy behind this was that the channel must be noisy at the offending hld/tci setting so the tci was reset to 20 to avoid sending the system into a tizzy. Apparently when the test was rerun with only GARC 2 and GARC 5 everything appeared normal. I'm wondering if there couldn't be some crosstalk between GARC 5 and perhaps GARC 4.
If I'm not mistaken our crosstalk script only checks for xtalk between channels on a given GARC. I don't believe we have a script that checks xtalk between boards and obviously that test could not have been performed in LabView. I would suggest that some more testing be performed by systematically pairing GARC 5 up with some neighboring boards to see if there could indeed be some xtalk. If we did find a board paired with GARC 5 that repeats the strange data I would then like to repeat the test running with all GARCS except the "guilty" GARC. It might also be informative to run on all GARCS except GARC 5 (this one might help to point to a software problem if the "bad" GARC moves).

In fact, Karen and I were thinking that a baseline should be established for each GARC individually and compared against a run on ALL GARCS.
Along these lines Karen and I have been feverishly working to get our schema structure in place which will enable us to compare the output of each and every script against a baseline. I think this will be an invaluable tool to validate our data.

I made a mod to AcdHldCal.py so that it will flag as an ERROR the case where the counts exceed the number of strobes, but it will plot the point and continue. I committed it to the repository but perhaps it would be best to perform our testing on the current version in I&T. It is informative to view the msgXXXX.log file in the export directory to observe the number of veto counts received at 50% efficiency for each channel.

Note: Due to sloppy programming on my part we are actually strobing 21 times instead of 20. Doesn't hurt anything but it is helpful to know that when viewing the message log file.

Appendix – note by Karen Calvert

We've been looking over past results and trying to determine what versions of everything we were running with to try and determine if we might have a software problem of some kind.

We did find a clean run on the full ACD on 6/13 from the AcdGafeTest suite (i.e. plots for GARC 5 looked good).

- Running AcdHldCal.py version 1.15
- Running LATTE-04-09-00

The next run we found was run on 6/17 and failed.

- Running AcdHldCal.py version 1.17
- LATTE 4-9-0 with modified gGem (4-8-3)

The difference between AcdHldCal.py 1.15 and 1.17 appears to be insignificant: removed extraneous trigger disable and moved another trigger disable up so that the trigger was disabled immediately after receiving the event rather than waiting until the event was processed.

From the TC Logbook:
6/13: Loaded LATTE 4-9-0 and ACD-01-05. AcdGafeTests runID 401000486 Debugging QPaint errors.
6/14: Copied gGem.py 4-7-3 patch to LATTE 4-9-0 (this had compatibility issue)
6/15: Loaded new gGem.py 4-8-3 running LATTE 4-9-0 with WOA 02305. RunID 401000511. NOTE: Cameron couldn't find the WOA.
6/16: AcdGafeTests - QPaint error debugging
6/17: LATTE 4-9-0, gGem 4-8-3, ACD-01-05b including updates to plotting and trigger enable. Long Functional RunID 401000550 - "AcdHldCal passed but shouldn't have" (whatever that means?) but really GARC 5 plots are bad.
6/20: Ric Claus at GSFC. ACD-01-05c - more mods for making sure ALL scripts had timeouts set to 5.0 (missed some previously) and added some timing debug statements.

Missing Info (yet to be researched):

1) Date of AcdGafeNoise mapping issue trouble-shooting where a new version of VxWorks was loaded (I think).
2) WOA 02305

Here are some of my thoughts on what could be the problem:

1) Problem w/script: But, insignificant differences between 2 versions. Easy enough to test though.
2) Problem w/JJ's mapping [again]: Seems like AcdVetoHitmapPha which also looks at CNOs would detect a CNO mapping problem.
3) Problem w/gGem: To test this out I think we would have to back out to LATTE 4-7-3, but we would need an updated hippodraw
4) Crosstalk from other GARC(s): Not likely since we had a clean run on 6/13 although none of this analysis takes any mechanical work into account. To look at this closer we can run AcdHldCal with various combinations of GARCs. I would think that the AcdVetoCal script might have also shown an anomaly, but it seems to be ok athough maybe it just affects the CNO.