Special Test Request Form	STR Number 16

Part 1 – Test Definition Section

Test Title: Parallelized Subsystem Code Engineering Run	**Test Requestor**: Lester Miller

Test Purpose and Justification:

The parallelized version of the CAL and TKR subsystem code is needed in order for the full LAT pass/fail testing to test more closely as we will in space, and in addition to take place on reasonable time scales. This will be achieved by modifying the single subsystem algorithms, and distributing the processing needs of the subsystem algorithms. The conversion of the delivered subsystem algorithms, which took into account the eventual migration to "LATTE 5" form (and eventual use with FSW), represents a major change of the code base. This test is proposed to run through all the code used by INT in parallelized form to ensure that the algorithms are intact after porting, and that model used for parallelized processing is compatible with the infrastructure of building 33. The test will also tell us how the algorithms will scale as we move to sixteen towers. The testing will be conducted in phases as detailed below.

We expect this new test software to be used for the 8 tower testing and beyond. There is substantial schedule risk if unanticipated software related issues occur at that point.

This software has been validated as much as possible on a single tower case using the EM CAL and TKR as models. The software has also been tested where possible using multiple tower schemas in the LAT simulator of LATTE. The data flow lab testbed can mimic multiple tower environments, however it suffers several limitations. It currently cannot be used with solicited triggers, which virtually all the algorithms in question use. To implement solicited triggers, while possible, would place burdens on resources of flight software and online which are heavily subscribed to. Testbed validation is also insensitive to misconfiguration of the LAT front ends, where the majority of algorithm interaction occurs.

In view of these considerations we would like to run the code on the six flight towers currently installed in the LAT. We propose to run with the understanding that any anomalous behavior will be documented with JIRA and any further investigation of problems encountered will take place offline. If further understanding of a problem can be achieved with EM or testbed resources, these will be used in preference to the flight hardware. If fundamental LAT nonconformance is discovered in the process, an NCR will be submitted.

Test Description:
Run all TKR and CAL algorithms used by INT in the parallelized mode.

EGSE Configuration:

Current configuration. Software install of INT release LAT_01-00-71 or above.

Computer XP05 hosts acquisition LATTE process. Other machines host six analysis processes.

LAT Configuration:
Current configuration.

Expected Results/Acceptance Criteria:

Data collection completes with no errors.

Expected Duration:

The complete sequence of tests requires approximately 23 hours of running. There is additional overhead of approximately 0.5 hours for transitioning into and out of the parallelized codebase. The maximum time required to complete a single test is for the CAL muTrg suite, of six hours execution time. The testing can be broken up as

required. We would prefer to be given leeway to execute the tests in an order as decided by Lester Miller during the STR, but following a plan detailed in the work order. Finally, the initial transition to paralellized testing needs some contingency scheduled, two hours should be enough.

Expected Offline Analysis Duration:

1 day for analysis of CAL offline products to verify integrity.

Test Procedure:

Below is a description of the complete testing sequence. As mentioned earlier, we would like to reserve the right to change the order as time and need allow. The tests are generally independent of one another. The only exception to this is the CAL suites calibGen and calibDAC which rely on the successful completion of calibDAC. (Although preexisting calibDAC results will suffice as inputs).

Rename current INT release in flight area and install INT release LAT_01-00-71 or above.

Launch LATTE on all six boxes in room 102 (XP04,5,6,9,10,11)

Launch disk and network performance monitoring processes on all boxes, including ods-svr1.

Run the following tests (ordered by efficacy of test for problem finding):

- TKR test TkrSimOcc (needed for induced occupancy in CAL running)
- CAL suite CPT
- TKR suite CPT
- CAL suite calibDAC
- CAL suite calibGen (unless STR 15 test suffices)
- CAL suite muTrg
- TKR test TkrTotGain
- TKR test TkrThrCalibration
- TKR test TkrThrDispersion
- TKR test TkrReadoutNoise
- TKR test TkrTriggerJitter
- CAL suite LPT
- TKR suite LPT

A proposed phasing of these tests is listed below, but again, there is no interdependence of tests on each other. Between phases Lester Miller would validate the products offline before beginning the next phase. The first phase tests most of the mechanics of sharing data among processes and other infrastructure demands of the parallelized testing. The second phase is the most demanding on the disk and network infrastructure of all tests and is a logical extension of success of the first phase. The third phase is the largest in terms of data volume and introduces the remaining CAL scripts, of which muTrg in particular has a storied history. At that point all CAL scripts will have been tested. The fourth and fifth phase completes the TKR script tests and the last CAL suite, LPT. These last phases do not represent serious new demands on the infrastructure but would uncover any bugs introduced in the porting of the algorithms themselves.

- TKR test TkrSimOcc, TKR CPT, CAL CPT – 2 hours setup 5 hours running, 3 hours offline to validate results.
- CAL suite calibDAC – 0.5 hours setup, 3 hours running. 3 hours offline to validate results
- CAL suites calibGen and muTrg – 0.5 hours setup, 8 hours running. One day offline (CAL subsystem support needed) to validate results. Note that these tests do not require the analysis processes to run. They are acquisition only.

- TKR tests TkrTotGain, TkrThrCalibration, TkrThrDispersion, TkrTriggerJitter, TkrReadoutNoise. 0.5 hours setup, 5 hours running. 3 hours offline to validate results.

  TKR LPT and CAL LPT. 0.5 hours setup, 2 hours running. 3 hours offline to validate results.

Test Script:

See procedure. All running will be done with the six tower full schema, Grid-0-1-4-5-8-9_Tower-0-1-4-5-8-9.xml

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Part 2 – Impact Assessment Section

Procedure development:

Procedures need to be blacklined for parallelized running. The interaction required to operate the software is identical to current interaction with the exception of having the non-acquisition (analysis) machines launch a local LAT simulator and LATTE being launched with arguments specifying connection to the local simulator. In addition, each suite and test has a new dialog box to request either acquire or analysis mode to be selected as appropriate to the process. Analysis processes also lack configuration GUIs since the configuration is specified by the acquisition process, so no GUI interactions are involved with acquisition processes after mode and TEM ID selection.

A procedure for switching between the parallelized and original codebases needs to be developed. This procedure is not complex but needs to be documented. Lester Miller will prepare this procedure before beginning the testing.

The main new ingredient here is the concept of the operator having to deal with up to seven LATTE processes at once, processes which are physically spread about the control room, which could be taxing. If this proves infeasible we can fall back on fewer processes however at the cost of increased testing time. The goals of the test are not affected by this fallback.

There is one new script in the parallelized version of the INT code, called TkrSimOcc. This script finds settings in each tracker unit which produce a noise occupancy similar to that of a muon passage, of around 0.8 hits per layer. Operator interaction is minimal and identical to interaction with existing TKR tests (i.e. accept defaults in the test's gui).

Script development and checkout:

INT release LAT_01-00-71 or above has the code to be tested.

Impact to schedule:

23 hours of test time plus start/stop overhead of phased steps for changing to and from parallelized code.

Risk Assessment:

No risk to flight hardware.

Required Resources:

Access to LAT, all of the fight CPUs in room 102, and a test operator.

Other Affected Parties:

We plan to have disk and networking monitoring processes running on the machines during the test. This will allow us to monitor the demands on the building 33 infrastructure and may inform the design of the traveling rack for full LAT running. Rodney Wong from SCS may be needed to support this operation. SCS will be responsible for interpreting the results of the monitoring.

Part 3: Signature Approval:

Required Authorizations	Printed Name	Signature	Date
Quality	Joe Cullinan	Signature on file	7/7/05
I&T	Elliott Bloom	Signature on file	7/7/05
Program Office	Lowell Klaisner or Dick Horn	Signature on file	7/6/05

Systems Engineering	Pat Hascall	R. Bright (for Pat Hascall)	7/5/05
Affected S/S managers	N/A		
Instrument Scientist	Steve Ritz or Eduardo do Couto e Silva	Signature on file	7/6/05
Other	N/A		
Other	N/A		
Other	N/A		
Other	N/A		