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Date: December 20, 2002
To: Norbert Holtkamp
From: Tom Shea
Subject: **Third report of the LLRF Advisory Board**

Introduction

To provide rapid feedback regarding the field control module (FCM) design review, this report is being released only two weeks after the last one. The following LLRF Advisory Board (LAB) members attended the review, held at LANL on December 17th, 2002, and contributed to this report:

- Tom Shea (ORNL, Chairman)
- Curt Hovater (JLab)
- Craig Swanson (ORNL/AlphaCad)
- Mike Thuot (LANL)

Unfortunately, Coles Sibley was unable to attend

This report also incorporates input from the FCM review team: Curt Hovater, Larry Doolittle, and Chris Ziomek. By early January, this team will release a much more detailed report that specifically covers the FCM review.

Mike Thuot and Craig Swanson also attended the firmware development meeting that was held the day after the review.

Assessment

Looking back over the past three months, the entire LLRF team deserves commendation for their significant progress. Three initial systems are available at LBNL, LANL, and ORNL. The team is working well together on the development of the ultimate system. At varying levels, all of our past recommendations have been addressed. Those that require more attention are mentioned below.

Hardware design is progressing well. The presented design leverages proven hardware as much as possible. Its modularity and simplicity allows the schedule risk to remain manageable.



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As presented, the system specification is not complete and the error budget needs refinement. Work on LLRF reference system does not appear to be tightly integrated with other LLRF work. This must be remedied immediately to complete development of the specification and to avoid interface issues between the reference system and the FCM. The schedule will be best served by producing first hardware in parallel with the refinement of the specification. Tests of this hardware will provide information that cannot be obtained in any other way. Before DTL integration, there appears to be enough time to produce a second revision based on this test information and the revised specification.

As presented in the review, there appeared to be too much new firmware development planned given the time and resources available. However, the LLRF team revised these plans during the next day's meeting and will now leverage the existing LBNL code as much as possible. Early effort relies solely on existing personnel at all three labs. These changes demonstrated resilience and a willingness to compromise that will serve the team well as future challenges arise.

An interface control document was presented. For completion, it should also address the controls interface.

Detailed plans for each of the three labs were made available. To properly assess the overall schedule risk and budget issues, it would still be helpful to see an integrated plan. For expediency, the integration could be performed at a high level.

Recommendations

Integrate the resource-loaded plans

The result should reflect inter-lab teamwork and form the basis for the proposed budget.

Complete the specification and ICD for the ultimate system

The specification should include a more refined error budget and more information from the reference system. To the existing ICD, control system information should be added (i.e. process variables and timing events). Do not allow this work to slow hardware development.

By January 24, 2002, prepare a detailed response to the FCM review.

This will assure that the FCM review is closed out before release of the next LAB report.

The next LAB report will be released January 31, 2002