Chandra Operations Control Center CXO
OBC Flight Software Patch Request 31 August 2020

Patch Request #: 479

Patch Title: Configure OFP Radiation Monitor for B-side HRC Operations

Justification for change:

The switch to B-side operations on HRC requires that the OFP Radiation Monitor be configured to use the B-side, rather than A-side, channels (MCP event rate and anti-coincidence shield rate). The high radiation thresholds for the A-side channels were chosen so that the anti-co shield count would act as primary radiation detection, with the event rate as a backup. If HRC has an anomaly on the B-side similar to what it had on the A-side, the event rate may exceed its threshold, tripping RadMon if it is enabled. This may be desirable behavior, so the same thresholds are used for the B-side as for the A-side.

This patch changes RadMon K-constants so that the following channels are monitored.

Channel	Threshold	Delay
ACIS Flag	0	1
HRC MCP B	30	9
HRC AntiCo B	245	9

The monitor trips after any particular channel count is above threshold for a number of cycles greater than its corresponding delay.

Plan for design review, development and test, and definition of team involved:

Patch Content

The proposed change is to Radiation Monitor K-constants.

Patch 12 words.

Mnemonic	Address	Current Value	Hex	Update Value	Hex	Comment
KR.Count_Flag(HI, 9,ACIS)	2F038	1	0001	0	0000	Deactivate MCP A
KR.Count_Flag(HI,10,ACIS)	2F03A	1	0001	0	0000	Deactivate AntiCo A
KR.Count_Flag(HI,11,ACIS)	2F03C	0	0000	1	0001	Add MCP B
KR.Count_Flag(HI,12,ACIS)	2F03E	0	0000	1	0001	Add AntiCo B
KR.Threshold(HI, 9,ACIS)	2F0D9	30.0	7800 0005	1.00E+09	7735 941E	Deactivate MCP A
KR.Threshold(HI,10,ACIS)	2F0DD	245.0	7A80 0008	1.00E+09	7735 941E	Deactivate AntiCo A
KR.Threshold(HI,11,ACIS)	2F0E1	1.00E+09	7735 941E	30.0	7800 0005	Set for MCP B
KR.Threshold(HI,12,ACIS)	2F0E5	1.00E+09	7735 941E	245.0	7A80 0008	Set for AntiCo B

* Floating point values in 1750A format

Technical Review

A technical review will be held, including FOT Flight Software, WESC Flight Software, MSFC Flight Software and FOT IEPHIN/RadMon representatives, to approve patch content.

Patch Development

Development of the patch will be performed by the FOT Flight Software Engineer with review from the WESC Flight Software Engineer. The Recompile Redux – Eclipse process used for patch development is documented in a FSW Maintenance Plan draft.

Code Review

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Since the patch only involves K-constants, no code review is required.

Patch Testing

The command load for the patch will be "uplinked" to the OBC in ASVT and the OBC checksum adjustment will be verified. The normal dump-and-compare test will also be done to verify that the correct memory locations are modified as expected. In addition, regression and/or validation tests will be performed.

On completion of testing, a review of the test results will be held with FOT Flight Software, WESC Flight Software, MSFC Flight Software and FOT Engineering representatives.

Team Members

Daniel Wong (FOT Flight Software Engineer)
Eric Martin (FOT IEPHIN/RadMon Engineer)
Anthony Roteliuk (WESC Flight Software Engineer [independent reviewer])

Risk assessment:

All flight software patches introduce some risk, but that risk is mitigated by testing and review. ASVT testing will show that the proper memory locations are modified and that RadMon performance is appropriate.

Level of effort required:

½ day for FOT Flight Software Engineer to develop the patch
½ day for FOT Flight Software Engineer to test the patch
1 day for FOT IEPHIN/RadMon Engineer to test the patch
½ day for test report documentation
½ day for Test Results Review

Documentation impact, including proposed changes to DM05 and the SCS Handbook:

DM05 (the K-constant values in Table 3.5-1 of DM05 will be updated to reflect the new values).

Impact on the ground system:

SOP_OPS_STATE_OF_HEALTH (and associated displays) will need an update.