STEREO CONFIGURATION CHANGE REQUEST

For Office Use Only	TITLE:	CLASS:		NUMBER:
			I	
			II	DATE:

CONFIGURED ITEM:		ORIGINATOR:		PRIORITY:	
		Name:	Dave Curtis		
STS Number:	Payload: STEREO	Organization:	U.C. Berkeley	√	Routine
Component :	Experiment: IMPACT	Phone:	510-642-5998		Urgent
Component Part #:	Serial #:	Email:	dwc@ssl.berkeley.edu		Emergency

TYPE OF REQUEST:			RESPONSIBLE ORGANIZATION / INDIVIDUAL:	IMPACTS: (If yes attach additional pages)				
	Configuration							
√	Deviation	#		COST:		Yes	√	No
	Waiver	#						
	Other:			SCHEDULE:		Yes	√	No

REASONS FOR CHANGE:						RETEST REQUIRED:	
	Improvement		Test / Payload Failure		New Document:		No
	Reliability		Specification Requirements	√	Other:		Yes

PROPOSED CHANGE (Attach additional pages as required):

STE requires a small (microcurrie) radiation source to perform in-flight calibrations.

RATIONALE (Attach additional pages as required):

Items F & G of Section 4.7 of the STEREO Mission Requirements Document state for IMPACT STE instrument that measurements of 5-100 keV electrons are required, including fluxes and energy spectrum. To provide an accurate fluxes and energy spectrum, calibrations of the STE silicon semiconductor detectors' dead layer and electronics gain are required throughout the mission. For a mission duration of many years, gain drifts and dead layer changes of ~10% or more are highly probable. Such changes would compromise the measurements ability to meet the scientific requirements. Radioactive sources are the only viable means to obtain absolute energy calibrations. These are extremely weak (~1 microcurie) 55Fe and 109Cd sources which emit only low energy radiation (~6, 22, and 88 keV X-rays, and 88 keV electrons). This combination provides both gain and dead layer calibrations.

We plan on placing the sources on the inside of each STE door (STE-D and STE-U). The Fe55 source produces 6keV electrons, which are below the threshold of most detectors, and have a range of only .03mm in Aluminum, so they should not be a problem to anybody. The Cd109 makes 88keV electrons (96% of the events), 88keV photons (4% of the events), and about 20keV photons (100% of the events).

- The 88keV electrons have a range of .03mm in Aluminum, and so long as we don't point the source at anybodies aperture (when the door is open), nobody should see these.

- The 88keV photons will penetrate pretty well (2cm attenuation depth in Aluminum), so many detectors will count these, but the flux is low. STE-U is the closest, and is about 1m from the other detectors (PLASTIC, SEPT, LET, SIT). If we assume a one square cm detector at 1m from a 1 micro-currie source generating 4% photons we get a count rate of 0.01 counts/second, which we believe is acceptable.

- The 20keV photons penetrate Aluminum pretty well (2mm attenuation depth), so we will shield that with a higher-Z material (0.07mm in Iron, 0.02mm depth in Tantalum). With 4-5 attenuation depths this rate comes well below the 88keV photon rate.

DOCUMENTS / DRAWINGS AFFECTED (Document No. / Title / Section) :

TBD

AFFECTED (Check all that apply):

FLIGHT SYSTEMS:				GROUND SYSTEMS:			
	Avionics		Electrical and Cables				
√	Experiment		Software / Firmware				

☐	Structures and Mechanical	☐	Other:	☐		☐	Other:

REQUIRED APPROVAL DATE: _____

REQUIRED JUSTIFICATION:

STEREO CONFIGURATION CHANGE REQUEST

For Office Use Only	TITLE:	CLASS:		NUMBER:
			I	
			II	DATE:

CONTRACT / AGREEMENT NUMBER EFFECTIVITY:

	STEREO NAS5-97271	√	IMPACT S-13635Y		PLASTIC NAS5-00132		SECCHI S-13631Y

DOCUMENTS / DRAWINGS TO BE REVISED:

Document / Drawing Number:	Document / Drawing Title:	Section(s) No.	EO No.:	Date Completed:

PROCESSING APPROVAL:

	CCB		
	Out of Board		
	Emergency	Systems Engineer	Date

CCB APPROVAL:

CCB ACTION DATE:		CCB ACTION ITEMS / CONDITIONS:
	Approved	
	Denied	
	Withdrawn	
	Hold	

CLOSEOUT COMMENTS:	DATE OF CLOSEOUT:
	CMO