Fiscal Year:	FY 2008	**Task Last Updated:**	FY 09/17/2009
PI Name:	Kaiser, Mary Ph.D.		
Project Title:	Combined whole-body vibration plus G-loading influences on visual performance and operator ratings		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Space Human Factors Engineering		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **SHFH**:Space Human Factors & Habitability (archival in 2017)		
Human Research Program Risks:	(1) **HSIA**:Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	mary.k.kaiser@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	650-604-4448
Organization Name:	NASA Ames Research Center		
PI Address 1:	MAIL STOP 262-2		
PI Address 2:			
PI Web Page:			
City:	Moffett Field	**State:**	CA
Zip Code:	94035	**Congressional District:**	18
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	05/21/2008	**End Date:**	11/30/2008
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Woolford, Barbara	**Contact Phone:**	218-483-3701
Contact Email:	barbara.j.woolford@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:			
Performance Goal No.:			
Performance Goal Text:			
Task Description:	Recent engineering analyses of the integrated Ares-Orion stack show that vibration levels for Orion crews have the potential to be much higher than those experienced in Gemini, Apollo, and Shuttle vehicles. Of particular concern to the Constellation Program (CxP) is the 12 Hz thrust oscillation (TO) that the Ares-I rocket develops during the final ~20 seconds preceding first-stage separation, at maximum G-loading. While the structural-dynamic mitigations being considered can assure that vibration due to TO is reduced to below the CxP crew health limit, it remains to be determined how far below this limit vibration must be reduced to enable effective crew performance during launch. Moreover, this “performance” vibration limit will inform the operations concepts (and crew-system interface designs) for this critical phase of flight. While Gemini and Apollo studies provide preliminary guidance, the data supporting the historical limits were obtained using less advanced interface technologies and very different operations concepts.		

	We performed two sets of studies. The first set dealt with display readability and has already been presented to the HRP community. In this poster, we present the second set, which deals with display usability. In the first study, Crew Office participants were asked to judge the degree of usability impairment as vibration ramped up and down. Three different display formats (Textual, 1-D Gauges, 2-D Graphics) were evaluated. In the second study, we studied whether judgments were impacted by vibration frequency and composition (i.e., a pure sine wave versus one with harmonic remnants). The results from these empirical studies, coupled with the findings from the complementary studies on display readability, provide initial guidance for evaluating the display trade-space for Constellation vehicles and systems.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2008. [Ed. note: added to Task Book September 2009]
Bibliography Type:	Description: (Last Updated:)