

<b>Fiscal Year:</b>	FY 2008	<b>Task Last Updated:</b> FY 02/19/2009	
<b>PI Name:</b>	Dinges, David F. Ph.D.		
<b>Project Title:</b>	Psychomotor Vigilance Test (PVT) on ISS		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Behavior and performance		
<b>Joint Agency Name:</b>		<b>TechPort:</b>	Yes
<b>Human Research Program Elements:</b>	(1) <b>HFBP</b> :Human Factors & Behavioral Performance (IRP Rev H)		
<b>Human Research Program Risks:</b>	(1) <b>BMed</b> :Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders (2) <b>Sleep</b> :Risk of Performance Decrements and Adverse Health Outcomes Resulting from Sleep Loss, Circadian Desynchronization, and Work Overload		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Comments:</b>			
<b>Project Type:</b>	Flight	<b>Solicitation / Funding Source:</b>	Directed Research
<b>Start Date:</b>	08/01/2008	<b>End Date:</b>	07/31/2013
<b>No. of Post Docs:</b>		<b>No. of PhD Degrees:</b>	
<b>No. of PhD Candidates:</b>		<b>No. of Master' Degrees:</b>	
<b>No. of Master's Candidates:</b>		<b>No. of Bachelor's Degrees:</b>	
<b>No. of Bachelor's Candidates:</b>		<b>Monitoring Center:</b>	NASA JSC
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<b>Flight Program:</b>	ISS		
<b>Flight Assignment:</b>	ISS NOTE: start/end dates changed per J. Dardano/JSC --previously 4/30/2008-8/31/2013 (4/16/2009)		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>			
<b>Grant/Contract No.:</b>	NNX08AY09G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

<b>Task Description:</b>	<p>This project will deploy a specially developed, zero upmass, algorithmically optimized, brief (3-minute) version of the well-validated Psychomotor Vigilance Test (PVT), referred to as the “PVT SelfTest,” on the International Space Station (ISS), to provide astronauts with objective feedback on performance changes in vigilant attention, psychomotor speed, lapses of attention, and impulsivity during ISS Increments 20 to 25 (N=24 astronauts). The overarching goal of the project is to establish the extent to which the PVT SelfTest can aid astronauts to objectively identify when their performance capability is degraded by various fatigue-related conditions that can occur as a result of ISS operations and time in space (e.g., acute and chronic sleep restriction, slam shifts, extravehicular activity (EVA), and residual sedation from sleep medications). Thus, the project addresses a number of high-priority NASA Behavioral Health and Performance (BHP) research gaps including (1) identification of the best measure for assessing decrements in cognitive function due to fatigue and other aspects of spaceflight; (2) determination of an individual astronaut’s vulnerability to sleep loss; (3) establishment of cognition decline or change during long-duration missions (LDM); and (4) facilitation of ways for crewmembers and ground support to detect and compensate for decreased cognitive readiness to perform in space. The project, which will bring the PVT SelfTest to Countermeasure Readiness Level (CRL) 7 and Technology Readiness Level (TRL) 7 (i.e., system prototype demonstration in space environment), builds on our previous NASA-funded work. Preliminary validation studies of the PVT SelfTest in astronauts engaged in NASA Extreme Environment Mission (NEEMO) missions 9, 12, and 13 indicated that the 3-minute test was acceptable to astronauts, and provided unique astronaut norms on the test. We have used the data from astronauts engaged in NEEMO missions, and related data on the PVT SelfTest from extensive laboratory validation studies, to optimize the algorithm for astronaut PVT SelfTest performance, and to complete a feedback interface that displays their performance relative to astronaut norms. The PVT SelfTest software will be deployed in a computer in the ISS Human Research Facility (HRF) throughout each of six ISS missions on N=24 astronauts. The N=4 U.S. astronauts on each of six ISS increments (20-25) will complete the PVT SelfTest (and a few pre- and post-test questions about operations relevant to fatigue) for a total time of 6 minutes, once every 4 days throughout each 180-day ISS mission. Each astronaut will serve as their own control, and data will be aggregated over time for comparisons of PVT SelfTest performance relative to the presence versus absence of sleep loss and circadian disruption (e.g., slam shifts), of various work intensity conditions (e.g., EVA), of sleep medication use, and of time in mission. Astronauts will be asked to indicate the extent to which their PVT SelfTest performance feedback (via a graphical interface) was useful for assessing their performance capability and countermeasure needs. Thus the project will help astronauts objectively identify and mitigate fatigue-related performance deficits during space operations.</p> <p>See also <a href="http://www.nasa.gov/">http://www.nasa.gov/</a></p>
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	<p>The PI developed the original 10-minute Psychomotor Vigilance Test (PVT), which the Reaction Self Test was derived from, to measure changes in psychomotor speed, lapses of attention, wake state instability, and impulsivity induced by fatigue and other performance-degrading factors commonly found in operational environments. Based on research supported by federal and non-US federal agencies, as well as the pharmaceutical industry, the 10-minute PVT has been extensively validated in laboratory studies, simulators and operational environments to be sensitive to a variety of performance-degrading fatigue-related factors.</p>
<b>Task Progress:</b>	New project in FY2008.
<b>Bibliography Type:</b>	Description: (Last Updated: 05/08/2025)