

**TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW**

<b>MEDB# and Title:</b>	MEDB 7.6 Neurocognitive Assessment
<b>Sponsor:</b>	Space Medicine
<b>IPT:</b>	Behavioral Health and Performance (BHP)
<b>Category:</b>	Medical Requirements (MR)
<b>References:</b>	ISS MORD, Section 4.1.3 – Flight Crew Medical Training and Certification ; Medical Evaluation Documents (MED) Volume B Section 7.6
<b>Purpose/Objectives:</b>	To help crew members and flight surgeons objectively assess neurocognitive functions under the following conditions: 1) following exposure to toxins or other noxious stimuli, 2) following head trauma, 3) periodically throughout the mission (capabilities monitoring), 4) prior to undertaking high risk or mission critical tasks, and 5) at the request of the crew surgeon, commander, or CMO when neurological deficit is suspected.
<b>Measurement Parameters:</b>	Sustained concentration, verbal working memory, attention, short-term memory testing, spatial processing, and math skills
<b>Deliverables:</b>	Real-time data provided to the crew member (and flight surgeons as appropriate) to monitor, identify, or verify perceived changes in their own cognitive functions
<b>Flight Duration:</b>	Greater than or equal to 30 days
<b>Number of Flights:</b>	Every long duration expedition
<b>Number and Type of Crew Members Required:</b>	All ISS crewmembers (primary: pre-, in- and postflight ; backup: preflight only)
<b>Other Flight Characteristics:</b>	N/A

### 3.3 Preflight Training

**TABLE 3.3: PREFLIGHT TRAINING**

<b>Preflight Training Activity</b>	<b>Description:</b> Familiarization with WinSCAT software. (3 sessions)				
	<b>Duration:</b>	<b>Schedule:</b>	<b>Flexibility:</b>	<b>Blood Voume:</b>	<b>Personnel Required:</b>
	Schedule: 60 min 60 min 45 min	L-120/100 days L-120/100 days L-120/100 days	N/A	N/A	Crew member and BHP Specialist
<b>Ground Support Requirements Hardware/Software</b>	<b>Preflight Hardware:</b>		<b>Preflight Software:</b>		<b>Test Location:</b>
	Medical Equipment Computer (MEC)		WinSCAT		U.S.
<b>Training Facilities</b>	<b>Minimum Room Dimensions:</b>	<b>Number of Electrical Outlets:</b>		<b>Temperature Requirements:</b>	<b>Special Lighting:</b>
	General Office or Conference Room, approximately 10' x 12'	2 (110V)		Normal room temperature	Normal lighting
	<b>Hot or Cold Running Water:</b>	<b>Privacy Requirements:</b>		<b>Other:</b>	
	N/A	Private room free from distractions		N/A	
<b>Constraints/Special Requirements:</b>	N/A				
<b>Launch Delay Requirements:</b>	N/A				
<b>Notes:</b>	Data collected during training sessions may be incorporated into the overall preflight MAT baseline data that is uplinked to MEC prior to the crewmember's first WinSCAT session on orbit.				

3.4 Preflight Activities

TABLE 3.4: PREFLIGHT ACTIVITIES

<b>Preflight Activity</b>	<b>Description:</b>	Crew member is requested to complete the WinSCAT software using the MEC flight-like laptop. The purpose of the MAT is to become familiar with each subtest and to establish a baseline level of performance for flight. ( 3 sessions)				
	<b>Schedule:</b>	<b>Duration:</b>	<b>Schedule:</b>	<b>Flexibility:</b>	<b>Blood Volume:</b>	<b>Personnel Required:</b>
		30 min 30 min 30 min	L- 90 days L- 60 days L- 30 days	N/A	N/A	Crew member and BHP Specialist required for all MAT sessions.
<b>Ground Support Requirements Hardware/Software</b>	<b>Preflight Hardware:</b>		<b>Preflight Software:</b>		<b>Test Location:</b>	
	Medical Equipment Computer (MEC)		WinSCAT		U.S. and Russia	
<b>Testing Facilities</b>	<b>Minimum Room Dimensions:</b>	<b>Number of Electrical Outlets:</b>		<b>Temperature Requirements:</b>	<b>Special Lighting:</b>	
	General Office or Conference Room, approximately 10' x 12'	2 (110V U.S. ; 220V Russian)		Normal room temperature	Normal lighting	
	<b>Hot or Cold Running Water:</b>	<b>Privacy Requirements:</b>		<b>Vibration/Acoustic Isolation:</b>	<b>Other:</b>	
	N/A	Private room free from distractions		N/A	N/A	
<b>Constraints/Special Requirements:</b>	Crew members will be required to perform test in a quiet area, free of interruptions.					
<b>Launch Delay Requirements:</b>	N/A					
<b>Notes:</b>	MAT data must be copied to each crewmember's WinSCAT directory in order for the baseline information to be available on orbit. This will be achieved by uplinking files to the MEC from MCC-H BIOMED MPSR prior to the first in-flight WinSCAT session. In the event this option is not possible, an electronic copy will be manifested as a late-stow item which the crewmember(s) can use to update the appropriate directory.					
<b>Data Delivery</b>	<b>Data/Report to Designated Recipients (Nominal/Contingency):</b>					
	Data are crew member controlled. The crewmember is the designated recipient of the data and sharing this information is at his/her discretion.					

3.5 In-Flight Activities

TABLE 3.5.1: IN-FLIGHT ACTIVITIES

<b>In-Flight Activity</b>	<b>Description:</b>	Crew member will complete the WinSCAT software on the MEC to monitor cognitive functions as the mission progresses and to maintain proficiency attained during preflight testing. The crew member will also complete the WinSCAT as medically indicated, such as following exposure to toxins, anoxic/hypoxic events, or physical injury. WinSCAT may also be taken at the crew member’s option, such as before high risk activities (e.g., pre-EVA, pre-docking, etc.) or at any other time.				
	<b>Schedule:</b>	<b>Duration:</b>	<b>Schedule:</b>	<b>Flexibility:</b>	<b>Blood Volume:</b>	<b>Personnel Required:</b>
	1. Initial sign-in 2. WinSCAT	30 minutes 30 minutes	Once/increment* Once /month**	N/A	N/A	Crew member
<b>Procedures:</b>	Procedures are developed in-house and contained within the Medical Operations procedures book. These procedures are part of the SODF. Procedures will include nominal up-linking/downloading/down-linking procedures.					
<b>Constraints / Special Requirements:</b>	**Beyond regular testing, if medically indicated, assessment is conducted at the discretion of the Crew Surgeon. If two "red flags" are scored during any WinSCAT session, then a subsequent session will be required within 24 hours. If the same two "red flags" are repeated during the second session, WinSCAT data will undergo further assessment by the Crew Surgeon and the BHP psychologist/psychiatrist and will become part of the flight medical record. Further distribution of the data is at crewmember's discretion.					
<b>Photo / TV Requirements:</b>	N/A					
<b>Cold Stowage Requirements:</b>	N/A					
<b>Mission Extension Requirements:</b>	N/A					
<b>Landing Wave-Off Requirements:</b>	N/A					
<b>Data Delivery</b>	<b>Data/Report to Designated Recipients (Nominal/Contingency):</b>					
	WinSCAT data will be down-linked as soon as operationally feasible, following completion of each test session. The Crew Surgeon will view the downlinked data with the assistance of the BHP psychologist/psychiatrist, and possibly external neurocognitive experts. At the end of the mission, WinSCAT data will be erased from the MEC following confirmation that all data have been successfully downlinked..					

**In-Flight Activities, (cont.)**

**TABLE 3.5.2: IN-FLIGHT HARDWARE**

Hardware/Software Name	P/N	ISS Location	Vehicle (Up/Dn)	Category	Late Access / Early Destow/ Early Return	Docked Ops	Weights (kg)	Volume (cm <sup>3</sup> )	Dimensions LxWxH (cm)	Power (watts)	Resupply	Download / Downlink
WinSCAT software on MEC		MEC	Varies	CHeCS	Yes, late access	Yes	N/A	N/A	N/A	120-240 VDC	N/A	Yes (per requirements in Table 3.5.1)
MEC	SKG52100950-XXX	Variable	Shuttle	CHeCS	N/A	No	3.54	4530	27.4 x 33.0 x 5.1	120 VDC/ 28 VDC	N/A	Yes (per requirements in Table 3.5.1)

3.6 Postflight Activities

TABLE 3.6: POSTFLIGHT ACTIVITIES

<b>Postflight Activity</b>	<b>Description:</b>	Postflight assessment to examine return to baseline.				
	<b>Schedule:</b>	<b>Duration:</b>	<b>Schedule:</b>	<b>Flexibility:</b>	<b>Blood Volume:</b>	<b>Personnel Required:</b>
		30 min	R+30 days	As clinically indicated.	N/A	Crew member and BHP Specialist
<b>Ground Support Requirements Hardware/Software</b>	<b>Postflight Hardware:</b>	<b>Postflight Software:</b>		<b>Test Location:</b>		
	Medical Equipment Computer	WinSCAT		U.S.		
<b>Testing Facilities</b>	<b>Minimum Room Dimensions:</b>	<b>Number of Electrical Outlets:</b>		<b>Temperature Requirements:</b>	<b>Special Lighting:</b>	
	General Office or Conference Room, approximately 10' x 12'	2 (110V)		Normal room temperature	Normal lighting	
	<b>Hot or Cold Running Water:</b>	<b>Privacy Requirements:</b>		<b>Vibration/Acoustic Isolation:</b>		
	N/A	Private room free from distractions		N/A		
<b>Constraints/Special Requirements:</b>	N/A					
<b>Notes:</b>	N/A					
<b>Data Delivery</b>	<b>Data/Report to Designated Recipients (Nominal/Contingency):</b>			<b>Mission Summary Report:</b>	<b>Data Archives:</b>	
	N/A			As required	After the flight, all data will become part of the BHP archive.	

**3.7 Summary Schedule**

**TABLE 3.7: SUMMARY SCHEDULE**

ACTIVITY	DURATION	SCHEDULE	FLEXIBILITY	BLOOD VOLUME	PERSONNEL REQUIRED	CONSTRAINTS
<b>Preflight Training</b>						
Neurocognitive Assessment Training (3 sessions)	60 minutes 60 minutes 45 minutes	L-120/100 days L-120/100 days L-120/100 days	N/A	N/A	Crew member & BHP Specialist	N/A
<b>Preflight</b>						
Neurocognitive Baseline (3 sessions)	30 minutes 30 minutes 30 minutes	L-90 days L-60 days L-30 days	N/A	N/A	Crew member & BHP Specialist required at all Baseline sessions	N/A
<b>In-Flight</b>						
Nominal: WinSCAT	30 minutes	Once/month	N/A	N/A	Crew members	N/A
Contingency: (WinSCAT)	30 minutes	As medically indicated or at crew member's option	N/A	N/A	Crew members	As medically indicated or at discretion of the crew member, CDR, or CMO
<b>Postflight</b>						
Neurocognitive Assessment (WinSCAT)	30 minutes	R+30 days	N/A	N/A	Crew member & BHP Specialist	Earlier than R+30 if clinically indicated