3.2 Medical Requirements Overview

TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW

MRID# and Title:	MR086L On-Orbit Hearing Assessment (OOHA)
Sponsor:	Medical Operations
IPT:	Neurological Function/Acoustic
Category:	Medical Requirements (MR)
References:	ISS Medical Operations Requirements Document (MORD) Rev A, SSP 50260: Section 5.0, Environmental Health, subsection 5.7.3, Noise Exposure and Monitoring
Purpose/Objectives:	To assess (and detect any changes in) crewmember hearing status on orbit
Measurement Parameters:	Hearing thresholds from 250 Hz – 10,000 Hz
Deliverables:	Audibility results will be sent down via the MEC dump within the week of on-orbit test (this is private data)
Flight Duration:	≥ 30 days
Number of Flights:	All
Number and Type of Crew Members Required:	All prime, long-duration crews required. Back-up crews required for training only.
Other Flight Characteristics:	N/A

3.3 Preflight Training

TABLE 3.3: PREFLIGHT TRAINING

Preflight Training Activ **Description:**	Crewmember will be trained on the set up of the On-Orbit Hearing Assessment (OOHA) protocol, using EarQ. As detailed in MR084L, this training lesson also includes the use of hearing protection, as well as training on the use of the acoustic dosimeter (IAD).			
Schedule:	**Duration:**	**Schedule:**	**Flexibility:**	**Personnel Required:**
	EHS Acoustic Training: 60 min. (includes acoustic dosimeter, and EarQ training)	No earlier than L-18 months	N/A	Crewmembers/trainers
Ground Support Requirements Hardware/Software	**Preflight Hardware:**	**Preflight Software:**	**Test Location:**	
	Acoustic Dosimeter MEC Laptop RS 232 cable Hearing Protection Devices ANR Earphones Rechargeable battery (ANR)	Ear-Q software	US	
Training Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**
	Approx. 8 feet X 10 feet	2	Ambient	N/A
	Hot or Cold Running Water:	**Privacy Requirements:**	**Other:**	
	N/A	Private room, free of distraction.	One table, 2 chairs.	
Constraints/Special Requirements:	N/A			
Launch Delay Requirements:	Crewmember may request refresher training if desired.			
Notes:	N/A			

3.4 Preflight Activities

TABLE 3.4: PREFLIGHT ACTIVITIES

Preflight Activity **Description:**	Crewmember will, while wearing a custom-made Prophonics Molded Earplugs Set (that has previously undergone a Fit Check described in MR084L), perform an initial ground-based Functional Check and hearing assessment with the EarQ software to obtain baseline hearing data prior to flight. A functional (listening) check of the earplug set will be conducted to confirm that the crewmember can hear an audible signal in both earplugs. The EarQ will be used to complete a ground-based preflight hearing assessment that will serve as a baseline for comparison with subsequent OOHA data. Conventional audiometry, using earphones and an audiometer that are calibrated to ANSI standards, will be conducted on the same day as the baseline EarQ hearing assessment, to detect variances caused by use of custom-made earplugs and EarQ.			
Schedule:	**Duration:**	**Schedule:**	**Flexibility:**	**Personnel Required:**
	EarQ Test and Fit/Function Check 60 min.	No earlier than L-150 days (on same day as audiometry)	N/A	Crewmember, trainer, audiologist
Ground Support Requirements Hardware/Software	**Preflight Hardware:**	**Preflight Software:**	**Test Location:**	
	MEC laptop RS232 cable Prophonics Molded Earplugs Set ANR earphones Rechargeable Battery (ANR) Air Conduction Audiometer Sound-treated Audiometric Booth	EarQ software	U.S.	
Testing Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**
	8’ x 10’ (for EarQ)	Two	Ambient	N/A
	Hot or Cold Running Water:	**Privacy Requirements:**	**Vibration/Acoustic Isolation:**	**Other:**
	N/A	Private room free of distractions	Low noise levels	One table, 2 chairs
Constraints/Special Requirements:	Crewmember should not be exposed to loud noises (greater than 85dBA or weapons firing) within 16 hours of conventional audiometry.			
Launch Delay Requirements:				
Notes:	Audiometry is conducted as part of MR013L Audiogram for ISS Crews			

Data Delivery	**Data/Report to Designated Recipients (Nominal/Contingency):**
	Data report will be delivered to the FS via Mission Integration Coordinator (MIC) within 48 hrs after data collection. A copy of the data will also be included in the crewmember's record.

3.5 In-Flight Activities

TABLE 3.5.1: IN-FLIGHT ACTIVITIES

In-Flight Activity Description:	The On-Orbit Hearing Assessment will assess changes in crew hearing on-orbit. The crewmember will be scheduled for the EarQ once within the first 14 days of flight, and then every 30 days thereafter.					
Schedule:	**Activity:**	**Duration:**	**Schedule:**	**Flexibility:**	**Blood Volume:**	**Personnel Required:**
	On-Orbit Hearing Assessment (OOHA) with EarQ	Setup: 10 min EarQ test: 20 min/crewmember Stow: 5 min	Baseline OOHA on or before FD14; once/month thereafter, and as dictated by noise environment or crew complaints.	First test may occur on or before FD14.	N/A	All crew
Procedures:	SODF: Med Ops, Nominal/EHS: On-Orbit Hearing Assessment With EarQ Software - Nominal Ops					
Constraints / Special Requirements:	All 3 crewmembers should be scheduled consecutively. Deployed location for this test will be at the MEC location on-orbit, preferably in the Temporary Sleep Station near the Deck. Crew should use the same location for repeated test results.					
Photo / TV Requirements:	N/A					
Cold Stowage Requirements:	N/A					
Mission Extension Requirements:	N/A					
Landing Wave-Off Requirements:	N/A					
Data Delivery	**Data/Report to Designated Recipients (Nominal/Contingency):**					
	Results from the OOHA will be saved to the MEC and downloaded to the ground within a week from the test. The Auditory Bioeffects Group (Drs. S. Hart or R. Danielson) of the Neurologic Function IPT will deliver a report to the FS within 3 days after receiving data. If a significant threshold shift is detected, the crew will be referred back to the in-flight procedures for corrective action.					

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	Weight (kg)	Volume (cm^3)	Dimensions LxWxH (cm)	Power (watts)	Resupply	Download / Downlink
MEC	SEG46116031-XXX	Various	Shuttle	CHeCS	N/A	N/A	9.1	33,272	35.6 cm x 25.4 cm x 36.8 cm	28V or 120 V Peak: 46 W Ave: 25 W	N/A	Weekly via OCA
EarQ software	WLSD210177-XXX	Lab	Shuttle	CHeCS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Half CTB Acoustic Countermeasure Kit (Contains Prophonics)	SEG46117646-301	Lab	Shuttle	CHeCS	N/A	N/A	Approx. 4.1	26,518	50.2 x 21.3 x 24.8	N/A	Every crew rotation	N/A
Full CTB Acoustic Countermeasure Kit (Flown when needed; contains Bose ANR Headset)	SEG46117646-302 (full CTB)	Lab	Shuttle	CHeCS	N/A	N/A	Approx. 6.1	45,444	50.2 x 21.3 x 42.5	Recharge-able ANR headset battery	As needed	N/A

Postflight Activities – NA

3.5 Summary Schedule

TABLE 3.7: SUMMARY SCHEDULE

ACTIVITY	DURATION	SCHEDULE	FLEXIBILITY	BLOOD VOLUME	PERSONNEL REQUIRED	CONSTRAINTS
Preflight Training						
EHS Acoustic Training (includes hearing protection devices, ISS acoustic dosimeter, & EarQ audiometry training)	60 minutes	No earlier than L-18 months	N/A	N/A	Crewmember/trainer	N/A
Preflight Activities						
Ground-based fit check, functional check and hearing assessment (with EarQ software and conventional audiometry)	60 minutes	No earlier than L-150 (on same day as audiometry)	N/A	N/A	Crewmember, trainer, audiologist	N/A
In-Flight						
On-Orbit Hearing Assessment with EarQ (OOHA)	Setup: 10 min EarQ test: 20 min/ crewmember Stow: 5 min	One time on FD14 or earlier, then every 30 days	First test may occur on or before FD14.	N/A	Crew	All 3 crewmembers should be scheduled consecutively. Deployed location for this test will be at the MEC location on-orbit, preferably in the Temporary Sleep Station near the Deck. Crew should use the same location for repeated test results.
Postflight : NA						
Postflight Debrief						
Part of the overall Med Ops Debrief.						