

3.2 Medical Requirements Overview**TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW**

MRID# and Title:	MR019L Heart Rate Monitoring
Sponsor:	Medical Operations
IPT:	Bone, Muscle & Exercise
Category:	Medical Requirements (MR)
References:	Astronaut Medical Evaluation Requirements Document (AMERD), JSC 24834 Appendix C, Section III (3.1)
Purpose/Objectives:	To provide heart rate measuring capability and exercise effort control during treadmill (TM) and cycle ergometer (CE) exercise activities.
Measurement Parameters:	Heart rate, elapsed time.
Deliverables:	Heart Rate Monitor (HRM) data.
Flight Duration:	≥ 30 days
Number of Flights:	Every Expedition
Number and Type of Crew Members Required:	All prime and back-up U.S. crewmembers for preflight. All crewmembers for in-flight.
Other Flight Characteristics:	N/A

3.3 Preflight Training

TABLE 3.3: PREFLIGHT TRAINING

Preflight Training Activity	Description:	Per the ISS Crew Training Catalog, JSC-36301. Countermeasures Systems Operations 2 for all crewmembers: This lesson introduces crewmembers to remaining CMS hardware components, stowage locations, operating procedures, exercise protocols, and interfaces. The first part of the lesson concentrates on the purpose and operation of the components. This is followed by hands-on procedures using the hardware, including checkout and stowage procedures. (This session covers CEVIS, TVIS and HRM).			
	Schedule:	Duration:	Schedule:	Flexibility:	Personnel Required:
		Countermeasures System Operations 2 120 minutes	L-1 year	N/A	Trainers/Crew
		Heart Rate Monitor Training/Familiarization (See MR080L Physical Fitness Assessment: Cardiovascular Physical Fitness 5 minutes per session	L-45 to L-15	N/A	Crewmember /ACSR
Ground Support Requirements Hardware/Software	Preflight Hardware:	Preflight Software:		Test Location:	
	Heart Rate Monitor Kit Medical Equipment Computer	N/A N/A		U.S. Training Only U.S. Training Only	
Training Facilities	Minimum Room Dimensions:	Number of Electrical Outlets:	Temperature Requirements:	Special Lighting:	
	15 ft. x 15 ft.	One 110 VAC	20-25°C	N/A	
	Hot or Cold Running Water:	Privacy Requirements:	Other:		
	N/A	Sessions should be limited to trainer, crewmember, flight surgeon and mission support personnel. Other attendees are permitted at crewmember discretion.	N/A		
Constraints/Special Requirements:	Conducted as part of MR080L training. HRM to be worn during all TM and CE exercise for a 2 week period only. HRM download procedures will also be reviewed.				
Launch Delay Requirements:	If there is a launch delay of more than 2 months, access to the Heart Rate Monitor Kit is required for battery change-out. Operational use and stowage of the HRM kit should never fall outside the temperature range of 0-40°C.				
Notes:	N/A				

3.4 Preflight Activities – No Preflight*

TABLE 3.4: PREFLIGHT ACTIVITIES

Preflight Activity	Description:	*The preflight usage of the HRM for two weeks and the practice sessions for downloading the data will occur as part of the training sessions for the Physical Fitness Assessment MRID (MR080L) and is not classified as a separate MAT session. The heart rate monitor will be worn by each long duration crewmember during any TM or CE exercise performed within the period of L-45 - L-15. Heart rate monitors, and instructions for use , will be provided by an Astronaut Strength, Conditioning and Rehabilitation (ASCR) Team member. Crewmembers will be instructed to report to the Exercise Lab on their way to or from the gym to download data when necessary.			
	Schedule:	Duration:	Schedule:	Flexibility:	Personnel Required:
		N/A	N/A	N/A	N/A
Data Delivery	Data/Report to Designated Recipients (Nominal/Contingency):				
	Wearing of the HRM during this period is done as part of training and familiarization and is not a MAT session (see MR080L).				

3.5 In-Flight Activities

TABLE 3.5.1: IN-FLIGHT ACTIVITIES

In-Flight Activity	Description:	Heart rate monitors will be worn by each crewmember during all TM and CE exercise and Periodic Fitness Evaluation (PFE) sessions. However, the heart rate watch (HRW) will only be worn for the first 2 weeks of each increment. Thereafter, the HRW will be used only during PFE sessions, while exercising on the Russian cycle ergometer, or in contingencies (e.g. TVIS or CVIS receiver malfunction).					
	Schedule:	Activity:	Duration:	Schedule:	Flexibility:	Blood Volume:	Personnel Required:
		1. Ascent: 2. On-Orbit: Heart Rate Monitoring	N/A 5 minutes per session	N/A Every TM, CE, and PFE session.	N/A N/A	N/A N/A	N/A Crewmember
		Heart Rate Download to MEC	20 minutes	Contingency only	N/A	N/A	Crewmember
Procedures:	All nominal and contingency procedures have been developed and submitted to SODF and will be contained in the Medical Operations Book.						
Constraints / Special Requirements:	N/A						
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):
	HRM data will be downlinked along with the exercise files on the TVIS/CVIS cards. Data received by the ground support console (includes Flight Surgeon) will be forwarded to the discipline expert, who will analyze the data and confer with ASCR for recommendations. The discipline expert will forward final recommendations to the ground support console within a week of receiving the data.

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 ³)	Dimensions LxWxH (cm)	Power (watts)	Resupply	Download / Downlink
Heart Rate Monitor Kit	SED46115818-xxx	FGB	2A.2	CHeCS	R+5 hr	No	1.5	4729	30.5 x 15.2 x 10.2	Battery	Includes watches, transmitters and chest straps – 4 each and will be re-supplied with every crew rotation.	Contingency only
Medical Equipment Computer Kit 1	SEG46116031-xxx	Deployed	2A.2	CHeCS	No	No	4.1	33276	31.3 x 21 x 5.5	120 or 28 VDC CHeCS/U OP	N/A	N/A
Heart Rate Monitor Resupply Kit	N/A	FGB	2A.2 and subs	CHeCS	N/A	No	1.0	2056	15.2 x 7.6 x 17.8	None	Every crew rotation	N/A

3.6 Postflight Activities

TABLE 3.6: POSTFLIGHT ACTIVITIES

Postflight Activity	Description:	Heart rate monitoring will be performed as indicated by crew surgeon.			
	Schedule:	Duration:	Schedule:	Flexibility:	Personnel Required:
		Heart Rate Monitoring 5 minutes	As indicated by Crew Surgeon	N/A	Crewmember/ASCR
Ground Support Requirements Hardware/Software	Postflight Hardware:	Postflight Software:		Test Location:	
	Heart Rate Monitor Kit	N/A		U.S.	
Testing Facilities	Minimum Room Dimensions:	Number of Electrical Outlets:	Temperature Requirements:	Special Lighting:	
	15 ft. x 15 ft.	One 110 VAC	20-25°C	N/A	
	Hot or Cold Running Water:	Privacy Requirements:	Vibration/Acoustic Isolation:	Other:	
	N/A	Sessions should be limited to trainer, crewmember, flight surgeon and mission support personnel. Other attendees are permitted at crewmember discretion.	N/A	N/A	
Constraints/Special Requirements:	Conducted as part of MR080L training. HRM to be worn during all TM and CE exercise for a 2 week period only. HRM download procedures will also be reviewed.				
Early Destow / Early Return:	N/A				
Notes:	N/A				
Data Delivery	Data/Report to Designated Recipients (Nominal/Contingency):				
	If session is indicated by Flight Surgeon, an ASCR team member will retrieve HR hardware and deliver it to discipline experts, who will download and analyze HR data. Discipline experts submit recommendations and results to ASCR and the Data Archivist no later than 14 days after landing. ASCR submits final recommendations to the Flight Surgeon no later than 16 days after landing.				

3.7 Summary Schedule

TABLE 3.7: SUMMARY SCHEDULE

ACTIVITY	DURATION	SCHEDULE	FLEXIBILITY	BLOOD VOLUME	PERSONNEL REQUIRED	CONSTRAINTS
Preflight Training						
Countermeasures System Operations 2	120 minutes	L-1 year	N/A	N/A	Trainers/Crew	None
Heart Rate Monitor Training/Familiarization (See MR080L Physical Fitness Assessment: Cardiovascular Physical Fitness)	5 minutes per session	L-45 to L-15	N/A	N/A	Crewmember/ACSR	Conducted as part of MR080L training. HRM to be worn during all TM and CE exercise for a 2 week period only. HRM download procedures will also be reviewed.
Preflight – N/A						

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ACTIVITY	DURATION	SCHEDULE	FLEXIBILITY	BLOOD VOLUME	PERSONNEL REQUIRED	CONSTRAINTS
In-Flight						
1. Ascent: 2. On-Orbit: Heart Rate Monitoring	N/A 5 minutes per session	N/A Every TM, CE, and PFE session	N/A N/A	N/A N/A	Crewmember	N/A
Heart Rate Download to MEC	20 minutes	Contingency only	N/A	N/A	Crewmember	N/A
Wheels-Stop – N/A						
Postflight						
Heart Rate Monitoring	5 minutes	As indicated by Crew Surgeon	N/A	N/A	Crewmember/ASCR	N/A
Postflight Debrief – N/A						