

2-Way Memo

FC84 (72-184)

Subject: Proposed SMEAT Medical and Biomedical Experiment
Systems Rules

DATE OF MESSAGE
May 19, 1972
DATE OF REPLY
INSTRUCTIONS
Use routing symbols whenever possible.
SENDER:
Forward original and one copy.
Conserve space.
RECEIVER:
Reply below the message, keep one copy, return one copy.

To: EC4/W. Glover

FOLD USE BRIEF, INFORMAL LANGUAGE FOLD

The proposed SMEAT Medical and Biomedical Experiment Systems Rules are attached. These rules have not been reviewed with the Medical Officer; however an initial review has been conducted with the flight crew and with Dr. Hoffler. An additional review with the flight crew plus a review with the Medical Officer will be necessary before they can be considered as final. This will be accomplished as soon as feasible.

It is requested that these be incorporated into the SMEAT Mission Rule Document such that necessary updates can be accomplished readily. Questions relative to these rules should be addressed to Robert White, FC84, extension 2468.

Enclosure

cc:

CB/R. Crippen

K. Bobko

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DD/Dr. G. Armstrong

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FC84/MALowe:gt:5/19/72:5365

From:

SMEAT MEDICAL RULES

1. While a crewman is under medical observation for crew health anomaly, the Medical Officer will be required to approve flight plan activities for that crewman.
2. Those items in the IMSS labeled "For Physician Use Only" will not be used by non-physician crewmen without the concurrence of the Medical Officer.
3. The Medical Team Conference must concur on the changing of any of the following medical items; Mission Rules, Guidelines, Procedures, constraints, and priorities.
4. The SMEAT Test will be terminated with a permanent loss of any of the following:
 - a. Voice communications
 - b. An operational ECG

Note: There is one OBS System which may be used. Any VCG axis is a suitable substitute.
 - c. Operational measurement of Heart Rate.

Note: The OBS systems, VCG electronics or observer palpations are suitable.
 - d. Operational measurement of Blood Pressure.

Note: Automatic BPMS or IMSS sphygmomanometer is suitable.
 - e. Operational measurement of Body Temperature.

Note: BTMS, OBS, or IMSS is suitable
5. Occurrence of any anomaly that is determined by the Medical Officer to be detrimental to crew health if the test were allowed to continue may be grounds for a test abort or subject removed.
6. The physician crewman will be consulted in all actions of the Medical Officer with reference to crew health.

PRELIMINARY

BIOMEDICAL EXPERIMENT SYSTEMS MANAGEMENT RULES

1. Redundant Medical Experiment systems will not be utilized until the primary system has failed or degraded.

Note: A list of Medical Experiments which have redundant systems follows:

- A. M093 SIB
 - B. M171 Mass Spectrometer Filament
 - C. Ergometer Constraint
 - D. BPMS Cuff
 - E. LVMS Plethysmographs
 - F. VCG Harness
2. The Mass Spectrometer (MS) vacuum valve will be closed at all times except during a MS pump-down procedure..
 3. At anytime power to the MS ion pump remains off longer than TBD, the EO will provide a Go-No-Go for a MS restart.
 4. If the frozen food temperature exceeds 25° for 15 minutes, restock the food freezer.
 5. The following conditions must be met during the calibration period for the SMMD's.
 - a. Ambient Temperature $65^{\circ}\text{F} \leq T \leq 80^{\circ}\text{F}$.
 - b. Airflow \leq TBD FPS in the vicinity of the SMMD.
 - c. Five mass readings are mandatory.
 6. Mass measurements must be repeated if the following conditions occur during measurement.
 - a. Two readings that do not agree within TBD percent have not been obtained.
 - b. Temperature readings were not obtained at the beginning and end of the measuring session.

EXPERIMENT PHYSIOLOGICAL CONSTRAINTS

General

1. Any experiment run may be aborted for conditions which are intolerable to the crew.

M092

2. M092 will be terminated if Syncope is imminent in the subject. The following cues may indicate the imminent onset of syncope.
 - a. The observer loses communication with the subject.
 - b. A consistent and continuous decrease in heart rate.
 - c. Heart rate dropping below 35 BPM.
 - d. If the heart rate exceeds 160 BPM on the first ΔP level.
 - e. Undesirable change in facial color.
 - f. Systolic Blood Pressure drops below 70 mmHg.
 - g. The subject indicates he is troubled.
3. The successive increment of delta pressure will not be applied if the subject's average Heart Rate exceeds his average resting rate by the following amount.

Delta Pressure

-30 mmHg

-40 mmHg

-50 mmHg

Delta Heart Rate

+30 BPM

+40 BPM

+50 BPM

4. M092 will not be begun if the subject has exceeded a work rate of 700 BTU/Hr during one hour preceding the test.

M171

5. The subject must not eat or perform any strenuous exercise for 2 hours prior to start of an M171 run.
6. M171 will be terminated if the subject's heart rate exceeds 180 BPM.

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M110

7. All crewmen must fast for 8 hours prior to blood sampling.
8. Blood samples will not be drawn within 30 minutes after strenuous exercise.

M133

9. M133 will not be scheduled to be run on crewman with health anomalies.

Failure Definitions

1. Experiment Power is lost if:
 - a. Input Bus Power is lost.
 - b. OWS Bus Select Switch is inoperative.
 - c. Experiment Select Switch is inoperative.
2. High Calibration is lost if both:
 - a. Auto Cal is inoperative and
 - b. Manual High Cal is inoperative.
3. Low Calibration is lost if both:
 - a. Auto Cal is inoperative and
 - b. Manual Low Cal is inoperative.
4. Secondary display is lost if it is inoperative as determined by the crew.
5. Onboard elapsed time is lost if all of the following methods of tracking time are lost:
 - a. ESS Event Times
 - b. SMEAT Chamber time readout
 - c. All crew wrist watches
 - d. Internal timers
6. Onboard heart rate is lost if all of the following methods of heart rate determination are inoperative or unusable.
 - a. VCG Heart Rate Readout
 - b. Backup Heart Rate Display
 - c. Heart Rate Display or ERGM
 - d. Manual Pulse measurement by crewman

7. Onboard Systolic Blood Pressure is lost if both of the following methods of Blood Pressure Measurement are lost:
 - a. BPMS Automatic Mode
 - b. BPMS Manual Mode
 - c. IMSS Sphygmomanometer
8. Onboard Diastolic Blood Pressure is lost if both of the following methods of Blood Pressure Measurement are lost:
 - a. BPMS Automatic Mode
 - b. BPMS Manual Mode
 - c. IMSS Sphygmomanometer
9. VCG Recording is lost if either:
 - a. VCG TM Output on all three (X, Y, Z) channels is inoperative.
 - b. Capability to record the data at either the Analog Data Recorder or Digital Data Recorder.
 - c. Any electrode is loose.
10. VCG Gain Control is lost if:
 - a. The capability to change the signal gains via the switches on the VCG module is inoperative.
11. VCG Impedance Check is not passed if:
 - a. Any electrode shows an impedance of greater than 100K ohms.
 - b. The impedance check is inoperative.
12. The Ergometer Constant Work Operation is lost if any of the following conditions occur:
 - a. Constant work control is inoperative.
 - b. The Ergometer is inoperative.

NOTE: Some other form of exercise may be substituted.

13. LBNPD Delta P Operation will be lost if any of the following conditions exist:
 - a. Internal Pressure Control is inoperative.
 - b. Delta P readout is lost at the crew station.
 - c. The LBNPD will not maintain a Delta P.
14. Body Temperature Determination is lost if all of the following methods of determining body temp is lost:
 - a. BTMS onboard or TM readout.
 - b. IMSS thermometer.
 - c. OBS Body Temp.
15. MA O₂ consumption determination is lost if the MA is inoperative.
16. MA CO₂ production is lost if the MA is inoperative.
17. MA Minute Volume is lost if the MA is inoperative.
18. MA Vital Capacity is lost if the MA is inoperative.
19. LVMS Leg Volume Determination is lost if any of the following conditions exist:
 - a. LVMS Electronics is failed.
 - b. Calibration of the LVMS is inoperative.
 - c. Failure of the active leg band.
20. Experiment Data Recording is lost if all of the following methods of data retrieval are inoperative:
 - a. TM Data Recording (Analog or Digital)
 - b. Crew Voice Reports of critical parameters with voice recording.
 - c. Crew Log of critical parameters which may be used through the small airlock.

NOTE: Refer to Failure Definition 9 for VCG data.

21. The Observer Present is lost if:

- a. The Observer is not on station and free of other distractions at all times.

FUNCTION	M092	M093	M171
1. Experiment Power	(1)	(1)	(1)
2. High Calibration	(2)	(2)	(2)
3. Low Calibration	(2)		(2)
4. Secondary Display	(2)	(2)	(2)
5. OB Elapsed Time	(3)	(3)	(3)
6. OB Heart Rate	(1)	(2)	(1)
7. OB Systolic BP	(1)		(2)
8. OB Diastolic BP	(2)		(2)
9. VCG Recording	(2)	(1)	(2)
10. VCG Gain Control	(2)	(2)	(2)
11. VCG Impedance Check Pass	(2)	(2)	(2)
12. Ergm Const Work Opn		(1)	(1)
13. LBNPD ΔP Operation	(1)		
14. Body Temp Determination	(2)		(2)
15. MA O ₂ Cdns Determination			(2)
16. MA CO ₂ Prod Determination			(2)
17. MA Min Vol Determination			(2)
18. MA Vit Cap Determination			(2)
19. LVMS Leg Vol Determination	(2)		
20. Exper Data Recording	(1)	(1)	(1)
21. Observer Present	(4)	(5)	(5)
22. LBNPD Safety Valve	(2)		

RULINGS

IF MALFUNCTION OCCURS DURING PLANNING	IF MALFUNCTION OCCURS DURING EXPERIMENT EXECUTION
<ol style="list-style-type: none"> 1. Postpone the experiment run until the problem can be repaired. 2. Perform the planned run - repair may be attempted afterwards if the EO deems it feasible. 3. Perform the experiment as planned. A watch may be passed thru the airlock prior to the experiment run. 4. Schedule when an observer can be present. 5. Schedule when an observer can be present. 	<p>Terminate the experiment and reschedule it after the malfunction is repaired.</p> <p>Continue the run. Repair may be attempted afterward if the EO deems it feasible.</p> <p>Continue the experiment run with time.cues from the CapCom.</p> <p>Discontinue the experiment until observer can return.</p> <p>Continue experiment without observer.</p>