

2.0 MO74 EXPERIMENT SUB- APPENDIX C

The purposes of this experiment are:

a) Demonstrate accurate non-gravitric mass measurement under weightlessness in the range of 25 gr to 1 kg including biological samples.

b) Validate theoretical MO74 of the device under weightlessness and investigate the interaction with a weightless volume.

SPECIMEN MASS MEASUREMENT

c) Support biomedical experiments and other requirements for mass determination and develop optimum operational procedures for each usage.

The SIMD device is a linear spring mass oscillator in which the period is electronically timed. After calibration with a series of known masses this period data may be converted to mass information, either graphically or analytically in flight or available to ground personnel.

William Thornton, M.D.
Principal Investigator

2.1 PREFLIGHT

2.1.1 Specific Objectives

Determine the MO74 of the device under 1g conditions for use as a reference for the MO74 of the device under weightlessness. Analyze the behavior of the device under weightlessness.

Jack Ord, Col., USAF
Co-Principal Investigator

2.2 INFLIGHT

2.2.1 Functional Objectives

- FO 1) Perform SIMD calibration (30 gr thru 900 gr)
- FO 3) Flight calibrated masses from 30 grams to 900 grams.

and such operational measurements that are required.

2.0 MO74 EXPERIMENT OBJECTIVES

The purposes of this experiment are:

- a) Demonstrate accurate non-gravimetric mass measurement under weightlessness in the range of 25 gm to 1 kgm including biological samples.
- b) Validate theoretical behavior of the device under weightlessness and investigate its interaction with a weightless vehicle.
- c) Support biomedical experiments and other requirements for mass determination and develop optimum operational procedures for such usage.

The SMMD device is a linear spring mass oscillator in which the period is electronically timed. After calibration with a series of known masses this period data may be converted to mass information, either graphically or analytically in flight or normally by ground personnel.

2.1 PREFLIGHT

2.1.1 Specific Objectives

Determine the ~~calibration~~ characteristics of the SMMD under 1g conditions for use in ~~analyzing the calibration characteristics of the device under 0g.~~ *analyzing its behavior under weightlessness.*

2.2 INFLIGHT

2.2.1 Functional Objectives

- FO 1) Perform SMMD calibration ~~validations~~ using pre-thru
- FO 3 flight calibrated masses from 50 grams to 900 grams.

and such operational measurements that are required.

2.3 POSTFLIGHT

2.3.1 Specific Objectives

2.3.1.1 Pertinent portions of the crew debriefing shall be made available to the PI/PCS for analysis.

Log books and other sources of data such as fecal measurements shall be made available to the P.I. for analysis.

3.0 SUMMARY OF MISSION

Operational and Orbital Conditions Influencing the Conduct
of M 074

A. OPERATIONAL CONDITIONS

Failure of the ^{ward room} electronics module on the first day reduced the data available by approximately 40%. To date, ^{data from} only two SMMD calibrations, out of four and no operational data has been received. At this time only 15-20% of the experiment can be considered complete. From data that has

B. ORBITAL CONDITIONS

none

been received operation of the remaining SMMD appears nominal.

4.0 SUMMARY OF OPERATIONAL CHRONOLOGY, DIFFICULTIES, AND ANOMALIES

Table 4-1 contains an operational chronology for M071. A description of this table appears in Section 2.0, Summary of Medical Experiments Accomplishments, the main body of this report. The difficulties and anomalies summarized in this table were a basis for Section 3.0, Summary of Major Performance Difficulties and Anomalies within the main body. Table C - 4.2 contains descriptive material of the major itemized difficulties and anomalies.

1. MEDICAL	
2. DEATH	
3. CLINICAL FACTORS	
4. TIME	
5. PROBLEMS	
6. TIME REQUIRED	
7. RESULTS	
8. APPROPRIATE	
9. T/M QUALITY	
10. SATISFACTORY	
11. UNSATISFACTORY	
12. T/M COVERAGE	
13. SATISFACTORY	
14. UNSATISFACTORY	
15. EXPERIMENT HARDWARE	
16. SATISFACTORY	
17. UNSATISFACTORY	
18. DATA PROCESSING	
19. SATISFACTORY	
20. UNSATISFACTORY	
21. ANOMALIES/PROBLEMS	
22. DOCUMENTED	
23. CLOSURE	
24. SUMMARY	
25. ACCEPTABLE	
26. UNACCEPTABLE	

SUMMARY OF OPERATIONAL CHRONOLOGY

MEDICAL EXPERIMENT M074		MISSION NO: SL- CREWMAN: C - S - P - NAME: _____	
	PRE-FLT	FLIGHT	POST-FLIGHT
EXP. REPETITION			
MISSION DAY			
JULIAN DAY			
PROTOCOL			
a. NOMINAL			
b. UNSATISFACTORY	X		
PROCEDURES			
c. NOMINAL			
d. DEVIATED			
CLINICAL FACTORS			
e. NONE			
f. SIGNIF. IMPACT			
TIME REQUIRED			
g. NOMINAL			
h. ABOVE NOMINAL			
T/M QUALITY			
i. SATISFACTORY			
j. UNSATISFACTORY			
T/M COVERAGE			
k. SATISFACTORY			
l. UNSATISFACTORY			
EXPERIMENT HARDWARE			
m. SATISFACTORY	X		
n. UNSATISFACTORY			
DATA PROCESSING			
o. SATISFACTORY			
p. UNSATISFACTORY			
ANOMALIES/PROBLEMS			
No. Documented			
No. Closed			
SUMMARY			
ACCEPTABLE			
UNACCEPTABLE	X		

TABLE C-4.1

SKYLAB MEDICAL EXPERIMENTS ANOMALY REPORT

EXP. M074/ SMEAR NO. _____	SKYLAB MISSION SL- _____	MISSION DAY _____ DAY _____	FMAR CONTROL NO. _____
STATEMENT OF PROBLEM:			
<p>Table C-4.2 lists planned experiments for M074. Together with the data requirements and principal collection mode, an overall evaluation of each measurement, sample, or film.</p> <p>a) DISCUSSION b) ANALYSIS c) ACTION TAKEN</p> <p>quantity yielded for the data requirement were experimentally acceptable throughout the designated flight phase. A comment section is provided when a "Unsatisfactory" rating requires explanation and either an "Unsatisfactory" or "Unknown" entry is made. An "Unsatisfactory" rating means that the data are experimentally unacceptable; an "Unknown" entry means the data are still under review.</p> <p>None of the ratings imply experimental success. The data list applies to principal data requirements and principal collection mode. Not all measurements are mandatory for the minimal data mode. Some measurements may be obtained from a backup data collection mode - voice reports and logs; however, the backup modes are not designated. Therefore, an "Unsatisfactory" entry may be made, yet the "comments" will note that the backup mode provided the necessary information.</p>			
<p>TYPE OF PROBLEM: Ground: Data Link Software Other</p> <p>FLIGHT/FTTH: Hdwe; Procedural; Other _____</p>			
CLOSE OUT ACTION:			
<p>Hardware Fix; Procedure Change; Software Change</p>			
EFFECT ON SUBSEQUENT EXPERIMENT SUCCESS:			
<p>Major Minor None</p>			
CLOSEOUT DATE _____ BY _____ APPROVED _____			

TABLE C-4.2

5.0 LISTING AND EVALUATION OF DATA OBTAINED

Table 5.1 lists planned data requirements for M074 together with an overall evaluation of each measurement, sample, or film.

A "Satisfactory" rating signifies that the information quality and quantity yielded for the data requirement were experimentally acceptable throughout the designated flight phase. A comment section is provided when a "Satisfactory" rating requires explanation and either an "Unsatisfactory" or "Unknown" entry is made. An "Unsatisfactory" rating means that the data are experimentally unacceptable; an "Unknown" entry means the data are still under review.

None of the ratings imply experimental success. The data list applies to optimal data requirements and principal collection mode. Not all measurements are mandatory for the minimal data mode. Some measurements may be obtained from a backup data collection modes - voice reports and logs; however, the backup modes are not designated. Therefore, an "Unsatisfactory" entry may be made, yet the "comments" will note that the backup mode provided the necessary information.

TABLE C-5.1

LISTING AND EVALUATION OF DATA OBTAINED FOR:

MO74 (SPECIMEN MASS MEASUREMENT)

Data

Evaluation

Preflight:

Calibration at 1-G

In-Flight

Calibration data at MD2

Calibration data at MD14

Calibration data at MD15

Calibration data at MD27

Postflight

Crew debriefing

TABLE C-5.1

LISTING AND EVALUATION OF DATA OBTAINED FOR:

MO74 (SPECIMEN MASS MEASUREMENT)

<u>Data</u>	<u>Evaluation</u>
<u>Preflight:</u>	
Calibration at 1-G	
<u>In-Flight</u>	
Calibration data at MD2	
Calibration data at MD14	
Calibration data at MD15	
Calibration data at MD27	
<u>Postflight</u>	
Crew debriefing	

6.0 INITIAL SCIENTIFIC ANALYSIS

This is an amplification of the synopsis appearing in the Abstract. Specific topics to be discussed in this section are:

1. Each crewman status for the day of this report with regard to the preflight baseline
2. Postflight findings
3. Inflight findings

While the table emphasizes the overall operational status of the experiment, that tabulated data together with the initial scientific findings discussed in the preceding paragraph is fundamental to the recommendations appearing in the next paragraph, paragraph 8.0, Recommendations.

7.0 SUMMARY OF FOLLOW-ON OPERATIONAL STATUS

Table C - 7.1 addresses the operational status of the experiment, its protocol and corresponding procedures for the next mission. The top of the table contains a general status statement regarding overall operational readiness for the next mission at Recovery +7 days after the most recently completed mission. The matrix has four (4) status levels. The first three (3) are self explanatory. Level 4, "change action required, but "not permissible" signifies that a change to either a protocol or procedural consideration is required; however, the change involves a design modification and cannot be accommodated. The program's inability to implement the change arises from an inaccessible SWS in orbit or the complexity of the design change is beyond the intermission time availability.

While the table emphasizes the overall operational status of the experiment, that tabulated data together with the initial scientific findings discussed in the preceding paragraph is fundamental to the recommendations appearing in the next paragraph, paragraph 8.0, Recommendations.

SUMMARY OF FOLLOW-ON OPERATIONAL STATUS

GENERAL OPERATING POSTURE FOR THE NEXT MISSION:

1. READY IN PRIMARY OPERATING MODE - NO FURTHER CHANGES REQUIRED
2. READY IN PRIMARY OPERATING MODE WITH CHANGES NOTED BELOW
3. EXPERIMENT TO BE CONDUCTED IN DEGRADED OPERATING MODE
4. EXPERIMENT CANCELLED

STATUS	PROTOCOL CONSIDERATIONS				PROCEDURAL CONSIDERATIONS
	PREFLIGHT	INFLIGHT	RECOVERY	POST FLIGHT	
	SCHEDULING STATUS EXP. SEQUENCE MEASUREMENT LIST DATA PROCESSING	HDWE. DEGRADED SCHEDULING STATUS EXP. SEQUENCE MEASUREMENT LIST DATA PROCESSING	SCHEDULING STATUS EXP. SEQUENCE MEASUREMENT LIST DATA PROCESSING	SCHEDULING STATUS EXP. SEQUENCE MEASUREMENT LIST DATA PROCESSING	PERFORMANCE CON- DITIONS CREW CHECKLIST SAMPLE HANDLING DATA HANDLING & PROCESSING
NO CHANGE					
CHANGE ACTION SCHEDULED					
CHANGE ACTION COMPLETE					
CHANGE ACTION REQ'D., BUT NOT PERMISSIBLE					

TABLE C - 7.1

8.0 RECOMMENDATIONS

Recommendations contained herein are limited to the continued operational conduct of the experiment by the next flight crews. Findings which may influence the medical position regarding a crew's commitment to the next planned mission are summarized in separate post flight medical reports - specifically the 10-day Post Flight SL- _____ Medical Report, the SL- _____ Interim Medical Report, and Intermission Medical Flight Operations Readiness Statement.

As a function of initial scientific findings and the existing operational posture of the experiment, the following recommendations are submitted for implementation: (the entry "NONE" signifies no special changes apply).

- A. Scheduling Recommendations
- B. Experimental Sequence Recommendations
- C. Measurement Recommendations
- D. Sample Collection and Handling Recommendations
- E. Data Processing Recommendations
- F. Performance Conditions Recommendations
- G. Crew Checklists Recommendations