

JUNE 18, 1974

Dr. Thornton

5.2.16 M172, Body Mass Measurement

- 5.2.16.1 Functional Objectives - The objectives of experiment M172 were (1) to demonstrate mass measurement without gravity, (2) to validate behavior of the body mass measurement device (BMMD) and (3) to support M071/M073 experiments requiring mass determination.

Experiment Description

The body mass measurement system used a linear spring mass pendulum device to measure mass based on the inertial properties of mass. This device measured and recorded the time associated with the period of a plate-fulcra spring support pendulum that had a fixed displacement.

The mass was accelerated uniformly by a repeatable restoring force set into the plate-fulcra springs and three periods of a pendulum were timed. Known masses were measured and a calibration nomograph was developed to determine the mass of a crewman.

- 5.2.16.2 Concept - A device incorporating a linear spring mass pendulum was employed to measure mass based on the "inertial properties of mass". This device measured and recorded the time associated with the period of a plate-fulcra spring-supported pendulum with a fixed displacement. The mass was uniformly accelerated by a repeatable restoring force set into the plate-fulcra springs. Three periods of a pendulum were timed. This device had a minimum response to gravitational force, but this was eliminated in orbital flight by recalibration with the same known masses used preflight.

- 5.2.16.3 Key Personnel - Principal Coordinating Scientist

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Principal Investigator

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- 5.2.16.4 Experiment Performance Data - The M172 experiment consisted of calibrating the BMMD with specific items aboard the spacecraft periodically during each mission. The crewmen's masses were measured daily.

	<u>SL-2</u>	<u>SL-3</u>	<u>SL-4</u>
Inflight Calibrations	4	3	3
Special Tests		20	
Routine Mass Measurements	28	56	84

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5.2.16.4.1 Preflight Data

- A. Final KSC Checkout - This final checkout verified the operational status of the BMMD.
- B. Preflight Calibration Data - During the preflight period the BMMD was calibrated a number of times with specific items that were later onboard the spacecraft. These items were later used for inflight calibrations.

5.2.16.4.2 Inflight Data

- A. Inflight Calibration Data - The BMMD was calibrated inflight with the same items used in preflight. These measurements were used to provide a correction factor for the gravitational force effects in the preflight measurements.
- B. Routine Mass Measurements - These routine measurements were each crewman's daily mass measurement. The mass measurements were recorded and voiced down during the evening report.
- C. Crew Comments - Crew comments on the BMMD performance were recorded on the dump tapes as part of the M487 experiment.
- D. Special Tests - A number of special tests including: BMMD Repeatability, BMMD Cal. Mass Stability, BMMD Subject Repeatability, BMMD Subject Stability Test, M171 PR-1 and PR-2 tests.

5.2.16.4.3 Postflight Data

- A. Crew Comments - Crew comments on the SMMD operation and performance are part of the Crew Technical Debriefing on each mission.

5.2.16.4.4 Postflight Reports

- A. Principal Investigator's M172 Final Report - In preparation.
- B. Principal Investigator's Special M172 Studies - in preparation.