

DYO

IN-FLIGHT ISOMETRIC DYNAMOMETER

Investigators: William Thornton, M.D.

Sponsor: SD/J. Travis Brown

PURPOSE/OBJECTIVES:

1. To evaluate the dynamometer's ability to measure specific joint strength on orbit and following wheel stop.
2. To evaluate the reproducibility of the measurements recorded in 0-g.
3. To evaluate the efficiency of setup/movement of the dynamometer in 0-g.

JUSTIFICATION

Postflight anecdotal data indicate that weakness and a feeling of heaviness is common during initial performance tasks after wheel stop. These feelings subside within twenty-four hours. The In-flight Isometric Dynamometer was designed to document this phenomena. The seat attachment will allow prompt testing of muscle strength on orbit and following wheel stop. The documentation of muscle weakness during the critical phase for emergency egress requires a reliable instrument. This DTO will evaluate and verify the reliability of the In-flight Isometric Dynamometer. This instrument will be used to develop operational exercise countermeasures. Three subjects are requested.

SUPPORT REQUIREMENTS:

The FFT will be used for a preflight training session. The investigator will provide all other equipment needed for data collection and preflight testing.

EQUIPMENT REQUIRED:**GROUND SUPPORT EQUIPMENT:**

1. Isometric Force Measurement System
with Hand Grip and Stirrup
2. Log Form

CERTIFICATION: Unique hardware to support this test is classified as Non-Critical, Class D-DSO per NMI 8010.1, and will be certified for safety and compatability per NSTS 21096, "Program Requirements Document for Non-Critical DSO/DTO Hardware".

FLIGHT HARDWARE:

1. Isometric Force Measurement System
with Hand Grip and Stirrup
2. Log Form

WEIGHT OF FLIGHT HARDWARE: 6 pounds

VOLUME OF FLIGHT HARDWARE: 1/4 locker

Isometric Force Measurement System (13.56 X 7.44 X 4.9 in.)

Hand Grip (4.25 X 4.13 X 6.31 inches)

Stirrup (4.25 X 4 X 1.25 inches)

STOWAGE: Locker stowed for launch

Attached to Mission Specialist's Seat for landing

DATA AND PHOTO REQUIREMENTS: In-flight documentary
35mm still photos are requested.

**ORBITER POWER, SPECIAL LIGHTING, WATER, WASTE
DISPOSAL, etc.:** None required.

TEST CONDITIONS/ACTIVITY REQUIREDPreflight:

A one hour familiarization session and training session will be held. The training will consist of specific muscle strength measurement using the Isometric Force Measurement System. The Dynamometer will be attached to a Mission Specialist seat and configured for shoulder and elbow testing. After a warm up period, a maximal effort in shoulder and elbow extension and flexion will be performed for a minimum of three trials. The Dynamometer will be reconfigured for leg use, and maximal effort in the hip and knee motion of flexion and extension will be performed. Three sets of single repetitions will be performed in each configuration for a total of 24 measurements. Values will be displayed after each effort, and the results will be logged and/or voice recorded.

In-Flight:

The Dynamometer will be attached to a Mission Specialist seat and configured for shoulder and elbow testing. Immediately after wheel stop and after a warm-up period, a maximal effort in shoulder and elbow extension and flexion will be performed. The Dynamometer will be reconfigured for leg use, and maximal effort in the hip and knee motion of flexion and extension will be performed. Three sets of single repetitions will be performed in each configuration for a total of 24 measurements. Values will be displayed after each effort, and the results will be logged and/or voice recorded.

Postflight:

A thirty minute debrief session will be held to document the comments of the operators.

PREFLIGHT:

ACTIVITY	DURATION	SCHEDULE	PERFORMANCE CONSTRAINTS
FAM Session	30 min	L-60	N/A
Training	60 min	L-40 to 60	Unsuited
Training	60 min	L-15 to 30	Suited

INFLIGHT:

Hardware Set Up and Test	15 min	Pre donning of LES	Unsuited
Hardware Test	15 min	Wheel Stop	Suited

POSTFLIGHT:

Debrief	30 min	R+1	N/A
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