

DTO

IN-FLIGHT ISOMETRIC DYNAMOMETER

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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 results.
3. To evaluate the efficiency of setup/movement of the dynamometer in O-g.

JUSTIFICATION

Available 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 for 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:

Suit?
The FFT will be used for data collection preflight. The investigator will provide all other equipment needed for data collection.

EQUIPMENT REQUIRED:

GROUND SUPPORT EQUIPMENT:

Isometric Strength Measurement System
Hand Grip
Stirrup
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:

Isometric Strength Measurement System
Hand Grip
Stirrup
Log Form

WEIGHT OF FLIGHT HARDWARE: 6 pounds

**FLIGHT DURATION, INCLINATION, ALTITUDE, ATTITUDE, OR
LOW-G REQUIREMENTS:** Flights of varying duration.

DATA AND PHOTO REQUIREMENTS: No additional requirements.

**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 performance using the Isometric Strength Measurement System. The Dynamometer will be attached to a Mission Specialist seat configured for shoulder and elbow testing. 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.

In-Flight:

The Dynamometer will be attached to a Mission Specialist seat configured for shoulder and elbow testing. 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	Between L-60 and L-40	Unsuited
Training	60 min	L-14	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