# Treadmill Test Plan

*(for the evaluation of the variable inertia prototype flight treadmill)*

Goal: To assess the physiological and perceptual responses of subjects during graded and prolonged exercise bouts on the variable inertia treamill.

Principle evaluations to be completed by Exercise Physiology Laboratory, NASA-Johnson Space Center.

Subjects: Six subjects that are in good condition ($VO_2max$ > 50 ml/kg/min). Subjects will weigh between 150-180 lbs.

## Responses to graded exercise

The graded exercise testing (GXT) protocol is outlined below:

| Brake Setting | Time (min/Stage) | Speed (~mph) | Grade (%) | Predicted VO2 (ml/kg/min) |
|---|---|---|---|---|
| 1 | 5 | 1.6 | 15 | 21 |
| 2 | 5 | 3.7 | 15 | 36 |
| 3 | 5 | 4.7 | 15 | 43 |

Each subject shall repeat the graded exercise test under the three inertia settings (Low, Medium, High). This will neccesitate three separate testing sessions. These sessions should be held during the same week if possible. Dependent measures include: $VO_2$, $VCO_2$, RER, and HR at each stage, and BORG's RPE (10 point scale). Each subject will also be interviewed regarding comparisons of one inertia setting to the other. These settings will be presented in a random, counterbalanced fashion to the subjects. The subjects will be blinded to the inertia setting (single blind study).

## Responses to prolonged exercise

The prolonged exercise testing protocol is outlined below:

| Elapsed Time | Speed/Grade |
|---|---|
| 5 | 1.6/15% |
| 10 | 1.6/15% |
| 15 | 1.6/15% |
| 25 | 1.6/15% |
| 30 | 1.6/15% |
| 35 | 3.7/15% |
| 40 | 3.7/15% |
| 45 | 3.7/15% |
| 50 | 3.7/15% |
| 55 | 3.7/15% |
| 60 | 3.7/15% |

Each subject shall repeat the prolonged exercise test under the three inertia settings. This neccesitates three separate testing sessions. The tests will be for 60 mins. or until the subject has reached volitional fatigue. The subjects will be encouraged to continue exercising as long as possible. Dependent measures include: $VO_2$, $VCO_2$, RER, and HR at each stage, and BORG's RPE (10 point scale). Each subject will also be interviewed regarding comparisons of one inertia setting to the other. These settings will be presented in a random, counterbalanced fashion to the subjects. The subjects will be blinded to the inertia setting (single blind study).

## Statistical Approach

1. Evaluate for mean and or physiological differences in $VO_2$, $VCO_2$, RER, HR and BORG's RPE at each stage. The physiological limits will be set at 5% (7%, 12%) for $VO_2$ and 10% for RER.

2. Responses to graded exercise:

Compute ANOVAs (3 x 3) for $VO_2$, $VCO_2$, RER, HR and BORG's RPE. Indepedent variables are brake setting and inertia setting.

3. Responses to prolonged exercise:

Compute ANOVAs (2 x11) $VO_2$, $VCO_2$, RER, HR and BORG's RPE. Indepedent variables are brake setting and inertia setting.

4. Perceptual data for each test will be compared. No statistical analysis is necessary.