

RECOMMENDED PREFLIGHT CHECK-OUT PROCEDURES
FOR
SHUTTLE MARK-I TREADMILL

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Procedures for the preflight performance test should include testing of the treadmill's as follows:

A subject capable of safely jogging/running at relatively high levels of performance, up to 6 mph at 16% grade, for repeated periods of ~3 minutes duration and with a minimum weight, clothed, of 170 pounds must be available.

A jig which reliably elevates the entire treadmill in Flight Configuration (FC) to 9, 12³, and 16 percent grade should be used and the speedometer mounted in FC. The current "red jig" which requires partial disassembly/reassembly of the unit should not be used.

The tests consist of having the subject run on the treadmill "hands off" at 3 elevations (9, 13, and 16 percent) at each of the 7 speed settings. After the speed is stable, usually approximately 30 seconds after starting, 10 treadmill revolutions are timed either manually with a stop watch or better still with an electronic timer with 0.01 second resolution, for a minimum of 3 trials. The individual times should not vary from each other more than ± 1.5 percent at a given condition. ⁸ That the same time the speedometer readings should be recorded. During these tests, treadmill anomalous operation including surging (above ~~2.5~~ ^{5.5} mph), unstable speed, and unusual noises should be watched for. Such indication can only be learned, not specified.

After averaging the timed values for each epoch, the actual velocity should be calculated from known tread length. Limits at any grade are:

Minimum speeds 2.0 to 2.5 mph

Maximum speeds ~~5.5~~ ^{5.5} mph

Speeds above this maximum are acceptable if the following criteria are met.

Speed limits at the intermediate speed settings, 2 - 6, should be approximately evenly spaced between minimum and maximum limits with differences between settings of $17 \pm 7\%$ of the speed range (maximum - minimum) for a given elevation. This does not include the two highest speeds at the lowest elevation. Speed limits should not vary with elevation more than $\pm 10\%$ except for the minimum speed where $\pm 15\%$ is allowed.

Speedometer readings (three minimum) should be averaged at each grade/speed test and compared to calculated speeds. Maximum difference allowable is $\pm 7 \frac{1}{2}\%$ at any velocity.

The speedometer should be checked in all its functions and modes, and all must be functioning (except pacing), e.g., time, speed, distance, and heart rate.

Prior to each flight the harness must be fitted to the largest crewmember and with at least 25 pounds vertical force on front and back bungee connections and with the hip belt in correct position, shoulder straps must be long enough to remove all weight from the shoulders by adjustment. ^{TP} Once bungee problems are resolved, a simple check-out procedure can be developed.

The values used here were based on design criteria and review of previously collected data. Tolerances and procedures have checked, but it would be desirable for me to see the initial run through using them. I am available to answer any questions.