

# Conditioning for the FAA's Maximal Stress Test



By David Hale

Exercise prescription and lifestyle modification may not provide all the answers for unfit pilot applicants, yet many conditions can be improved — and sometimes eliminated — by a properly dosed activity regime. Improved oxygen transport, physical strength, and endurance are a few of the well known benefits of exercise. Pilots slated for treadmill stress tests may greatly benefit by conditioning prior to the test. In addition, this provides an excellent opportunity to implement healthy lifestyle changes.

## Pre-Activity Screening

Pilots who are unaccustomed to moderately vigorous activity, such as brisk walking (3.2 mph or greater) should be encouraged to begin slowly and possibly enlist the help and supervision of a health/fitness professional. Any parameter under evaluation or treatment (blood pressure, EKG,

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etc.) should be monitored during the initial phase of a conditioning program. While the benefits far outweigh the potential risks, unfit applicants should be informed of all risks and benefits of a conditioning program. The American College of Sports Medicine recommends a signed informed consent statement, which is available upon request<sup>1</sup>.

If the candidate is taking beta blockers or other medications that may affect heart rate, the perceived exertion scale should be used to determine intensity. Instruct patients to exercise between 3 and 5 on the Rating of Perceived Exertion (RPE) Scale (see Chart 1).

## Specificity of Exercise

The FAA requires all applicants taking the maximal stress test to demonstrate a minimum functional capacity equivalent to completion of stage III of the standard Bruce treadmill protocol. The

outcome of conditioning is directly related to the activity employed as a training stimulus. To be successful at walking on an incline, conditioning should be commensurate. The use of a treadmill is recommended over outdoor walking due to the required incline and the ease of monitoring. If possible, find a unit with the capability of at least an 8% incline.

The level of exercise during stage III of Bruce protocol is equal to 10 Mets and is comparable to the following activities (see Chart 2).

Chart 1. Perceived Exertion: The RPE Scale

Rate your overall exertion, not just the fatigue in one area of your body.	
In addition, you should comply with the level recommended by a health professional.	
HOW DOES THE EXERCISE FEEL?	RATING
Nothing At All ☺	0
Extremely Light ☺	5
Very Light ☺	1
Light ☺	2
Moderate ☺	3
Somewhat Heavy ☺	4
Heavy ☺☺	5-6
Very Heavy ☺☺☺	7-9
Extremely Heavy ☺☺☺	10
Maximal ☺☺☺☺	10

*Caffeine, nicotine, several prescription medications, and many environmental factors can affect the accuracy of the heart rate method. To accurately assess the intensity level, utilize the Perceived Exertion Scale.*

<sup>1</sup> American College of Sports Medicine, 401 W. Michigan St., Indianapolis, IN 46202-3233, or from the author, at (208) 699-1499.

Chart 2. Level of Exertion Required to Achieve Stage III of the Bruce Protocol (10 Mets)

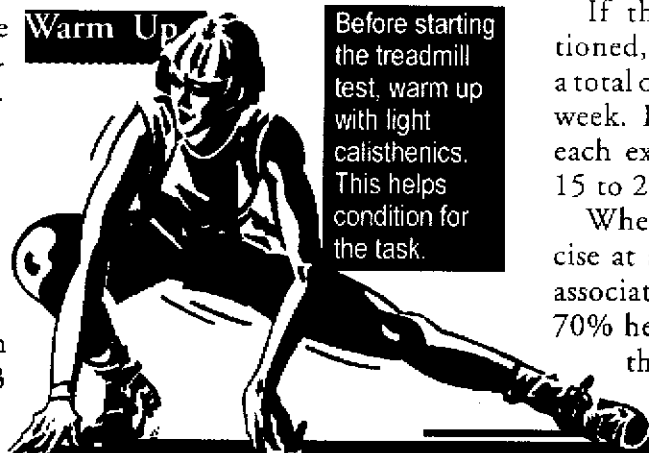
RUNNING			WALKING	
Miles/Hr.	Min./Mile	Incline/Grade (%)	Miles/Hr.	Incline/Grade (%)
4.0	15	10	3.0	17
5.0	12	4	3.4	14
6.0	10	0	3.7	12
<b>STAIR CLIMBING</b>			4.0	10
55 ft./min. or 10 Mets (7 lights) on a Stairmaster® or at least 30 steps/min. on a step height of 36 cm or greater.			4.5	8
<b>BIKING</b>				
The intensity of 225 watts is considered equivalent for a 176 lb. subject.				

In addition, the candidate should comply with the level recommended by a health professional.

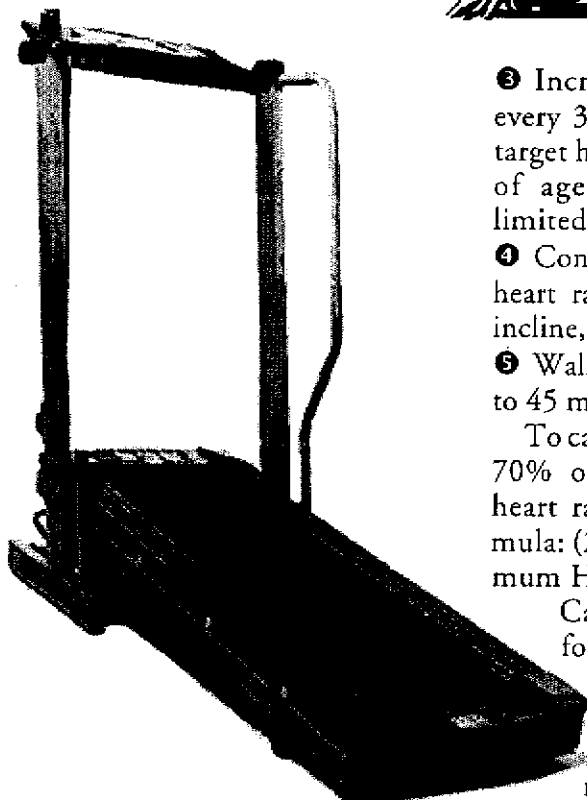
#### Instructions for Conditioning

- ❶ Start the 3-minute timer and slowly begin walking on the treadmill.
- ❷ Increase the speed to 3.4 mph with 0% grade during the first 3 minutes.

#### Warm Up



Before starting the treadmill test, warm up with light calisthenics. This helps condition for the task.



- ❸ Increase the grade/incline 2% every 3 minutes until achieving a target heart rate equivalent to 70% of age-predicted or symptom-limited maximum heart rate.
- ❹ Continue to walk at or near target heart rate, making adjustments in incline, if necessary.
- ❺ Walk 3 to 5 times per week for 25 to 45 minutes.

To calculate *target heart rate* from 70% of age-predicted maximum heart rate, use the following formula:  $(220 - \text{age}) \times .7 = 70\% \text{ Maximum Heart Rate}$ .

Calculation of target heart rate for individuals with known cardiovascular disease should take into consideration the occurrence of abnormal responses to exercise

(exercise induced angina, inappropriate blood pressure response, arrhythmia, etc.).

*Symptom-limited maximum heart rate* can be determined by reviewing previous treadmill test data to identify the maximum achieved heart rate prior to the onset of symptoms.

This symptom-limited heart rate value should be considered *maximum*, and 70% of this value should be used for exercise programming.

If the candidate is deconditioned, time should be limited to a total of 10 to 12 minutes the first week. During the second week, each exercise session should last 15 to 25 minutes.

When the candidate can exercise at an incline of 8% with an associated heart rate within the 70% heart rate zone, completing the third stage of the Bruce protocol can be reasonably assured.

#### References

- Journal of Cardiopulmonary Rehabilitation*, "Core Competencies for Cardiac Rehabilitation Professionals." 1994, 14, pp. 87-92.
- Ornish D, Brown SE, Scherwitz LW, et al. "Can lifestyle changes reverse coronary heart disease?" *Lancet* 1990; 336, 129-33.
- American College of Sports Medicine. Resource Manual for Guidelines for Exercise Testing and Prescription. 2nd Edition. Philadelphia: Lea & Febiger; 1993; pp 82-91.



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