FY-48 August 1, 1996
[Filename: CLIMBER.DOC]

Rope Climber

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Type:	Design Problem
Student Time:	Four Weeks
Location:	Classroom/Home

Summary

Students design, build, and demonstrate a device to climb a rope of specified diameter while carrying a specified payload from floor to ceiling in at least two minutes. Ties will be settled by increasing load until the device fails, and the greatest load carried wins.

Can be performed using LEGO or other construction components if available.

ABET Descriptors

Engr Sci Content:	First year engineering, mechanical, electrical
Type:	Component
Elements:	Analysis, synthesis, manufacture, specifications, evaluation
Features:	Design methodology, creativity, open-ended
Constraints:	Reliability, economic factors, space, weight
Effort:	Team or Individual

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Design, build and demonstrate a self-powered device that can be clamped around and climb a rope (1/2" diameter) from the floor to the ceiling of our classroom in no more than two (2) minutes while carrying a one (1) pound payload provided by the instructor. The entire device must fit into a box 6"x 6"x12".

The winner will be the device which climbs the rope in the shortest time. A tie will be settled by adding weight 1/2 pound at a time until the climber can no longer climb the rope, and the device carrying the heaviest weight will be the winner. At the demonstration, you may only interact with the device once in the two minute period.

Sketches and preliminary designs are due in two weeks, and the final demonstration in four weeks. The final device must be basically the same as in the preliminary design. No trained pets or animals will be allowed.

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Engineering Notes: Be sure to provide a sample of the rope to be climbed, as three-strand or braided ropes will handle very differently.

Decide and specify whether the lower end of the rope will be tied down to provide tension or if it will be free. Also specify whether an end will be available to feed through the climber during set up.

Have a ladder available to remove the device from the top of the rope if the ceiling cannot be reached by standing on a table.

Could be assigned to use LEGO or other mechanical assembly kits if available.

Can be performed individually or in teams of 2-3 students. Larger teams are expected to do more preliminary designing and also to produce a procedure of how to attach and run the device.

A variant would be to specify that the instructor has to be able to attach and start the device by following a procedure written by the students.