



Delaware Technology Student Association

2011 - 2012

MAGNETIC LEVITATION VEHICLES

Delaware Only Competition

*"SERVING TECHNOLOGY EDUCATION STUDENTS"
SPONSORED BY THE DEPARTMENT OF EDUCATION*

MAGLEV VEHICLE RACE

Overview: Delaware TSA students entering the Maglev vehicle race are required to design and construct a vehicle which will levitate and balance over a 16 foot long magnetic track and will be moved down the track by a D. C. motor with a propeller. (The track sides are electrified by an 18-volt transformer.) Students will be judged on time trial results, originality of design and aesthetic value.

Written Report: Each student must submit a 200-300 word letter that proposes the development of a maglev system, details the technical specifications of how a maglev system works, and adds convincing reasons why a maglev system would be beneficial to the Mid Atlantic and Northeastern States

Writing Prompt: The United States Department of Transportation is soliciting proposals to develop a new mass to serve the cities of Boston, New York, Philadelphia and Washington, DC. Write a letter to the U.S. Department of Transportation (1200 New Jersey Ave, SE Washington, DC 20590) that proposes the development of a maglev system, details the technical specifications of how a maglev system works, and adds convincing reasons why a maglev system would be beneficial to the Mid Atlantic and Northeastern States.

Contest Purpose: To provide a means for TSA members to demonstrate their understanding of a practical application of magnetic levitation through the design and construction of an original Maglev vehicle within a set of track/vehicle specifications. The contest rules and specifications will be based on the Maglev competition guidelines (attached).

Eligibility for Entry: One Maglev Vehicle per individual student.

Levels of Competition: Level I and Level II.

Time Limitations: Home School Preparation. Vehicle and written report (based on the writing prompt) must be submitted during event registration.

Specific Regulations:

- a. Vehicle shall be suspended solely by means of magnetic levitation. Conductive wires may not rest on the top or the rails.
- b. Vehicles must be at least 1.5" tall and 12" or less in length.
- c. There is no maximum height, nor minimum length restrictions.
- d. The magnetic polarity must be compatible with track specifications.
There is no limit to the number of magnets which may be affixed to a vehicle.
- e. Students will be allowed to adjust and place magnets to track magnets at competition site prior to initial track competition.
- f. The track will be 16 feet long (14 ft race length) and powered by a 12 to 18 volt transformer. See included diagram for track specifications.
- g. Vehicle must be powered by one DC motor as available from such vendors as Kelvin, Pitsco, Radio Shack, etc... and one propeller (Example is a **Kelvin #850647 3-6v 17,000 rpm motor**). Power must come completely from the electrified track.
- h. Once competition begins, after testing phase is over, no repairs and/or modifications can be made. If a vehicle becomes inoperative, it will be eliminated from competition.
- i. Body material is to be supplied by contestant. Choice of material is the option of the contestant.

- j. **Schools must provide all materials including motors and propellers for competition.**
No on-site construction is allowed; however, modifications and adjustments can be made prior to on-track competition.
- k. Students must wear eye protection during the adjustment, testing, and competition periods.

Resources:

Each entry must supply all of the necessary parts/tools/supplies to make repairs and/or adjustments on site; before competition begins. **No tools will be provided by DETSA on site.** Tables to work on will be at the site.

Procedure:

- a. Students will work individually to construct and design a maglev vehicle.
- b. The Maglev will then be judged on originality, appearance, design specification and race time.
- c. Students must be present when racing the vehicle.
- d. Students will have time to arrange and affix their magnets according to the track's polarity before racing.
- e. Students will have three race attempts - if vehicle is not able to run, it will be rated as "Did not finish."
- f. Written Report: Students must submit a **200-300 word** letter based on the writing prompt prior to the registration of the contest. This must be prepared and written before the conference.

Criteria for Judging:

a. Originality, design, and appearance	25 pts.
b. Race times	50 pts.
1st - 50 pts.	
2nd - 45 pts.	
3rd - 35 pts.	
4th - 30 pts.	
5th - etc.	
c. Written Report	<u>25 pts.</u>
TOTAL	100 pts.

Delaware MAGLEV Track Specifications

Side View

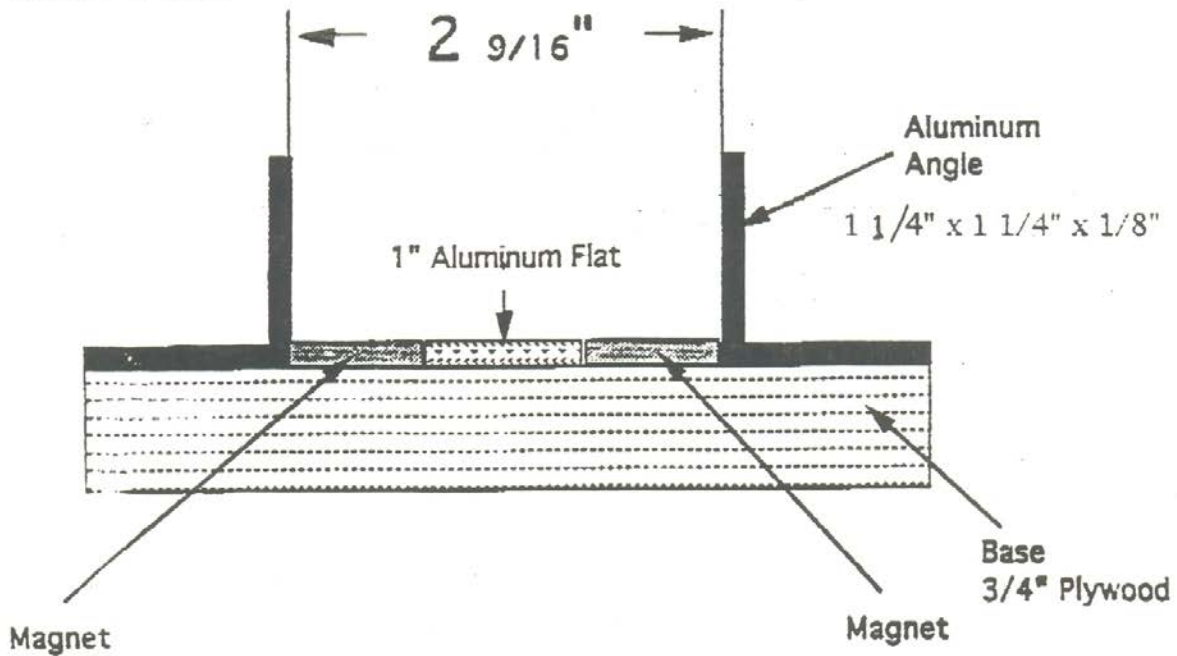


Diagram 5.4 - 2.1

Top View

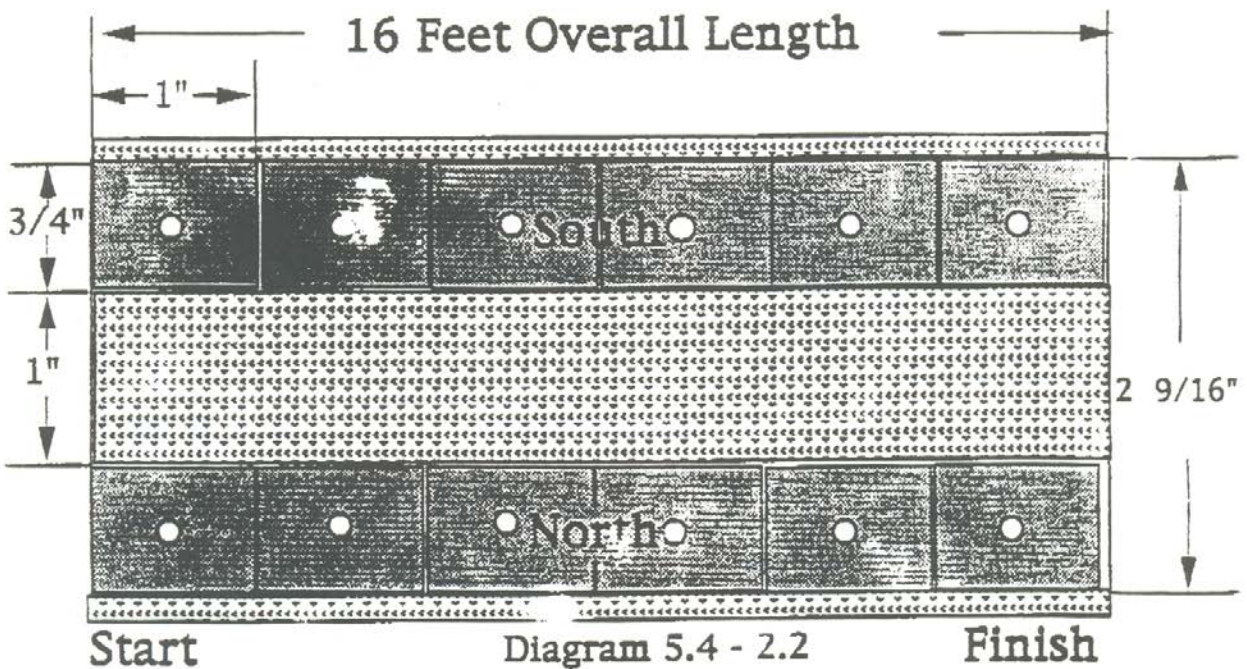


Diagram 5.4 - 2.2

DELAWARE TSA STATE CONFERENCE
Competitive Event Evaluation

MAGLEV VEHICLE RACE

Student's ID: _____ Level: _____

Chapter/School No. _____

A. _____ ORIGINALITY, DESIGN, & APPEARANCE (25 pts)

- _____ Design meets all vehicle specifications **10 pts.**
- _____ Originality of vehicle design **10 pts.**
- _____ Overall design appearance & aesthetic value **5 pts.**

B. _____ RACE TIME TRIAL RESULTS (50 pts)

1st = 50 pts. 2nd = 45 pts. 3rd = 35 pts. 4th = 30 pts. 5th = 25 pts.
*If vehicle travels the distance but does not make top five times = 10 to 20 pts.
*Did not finish = DNF (0 pts)

_____	_____	_____	_____	_____
<i>1st time trial</i>	<i>2nd time trial</i>	<i>3rd time trial</i>	<i>Average time</i>	<i>Rank</i>

C. _____ WRITTEN based on the writing prompt (25 pts.)

- _____ Masterful Response..... **21-25 pts.**
- _____ Skilled Response..... **16-20 pts.**
- _____ Satisfactory Response..... **10-15 pts.**
- _____ Insufficient Response..... **0-9 pts.**
- _____ No Response..... **0 pts.**

D. _____ RULES VIOLATION (-20 pts.)

_____ **POINT TOTAL**

_____ **RANKING**

Judge's Signature _____