



RADIO CONTROLLED TRANSPORTATION

Imagine this:
You cannot enter a playroom where a toddler has scattered toys, but you have been asked to clean up the area in five (5) minutes. Design a radio controlled vehicle to get the job done for you, and ...don't forget the tippy cup.

OVERVIEW

Participants design, fabricate, test, and demonstrate the use of a radio controlled vehicle that collects and distributes a load during a five (5) minute demonstration. Evaluation is based on performance, vehicle craftsmanship, and documentation of design efforts.

PURPOSE

Work as part of a team in demonstrating knowledge of mechanical and energy systems by designing, fabricating, and controlling a radio controlled vehicle.

ELIGIBILITY

Entries are limited to one (1) team of two (2) members per chapter.

TIME LIMITS

- A. Entries must be started and completed during the current school year.
- B. Each team selects a demonstration time during check-in.
- C. Each team is allowed fifteen (15) minutes of preparation time.
- D. Each team has five (5) minutes to demonstrate its solution to the problem.

ATTIRE

Business Casual dress as described in Competitive Events Attire is the minimum requirement.

PROCEDURE


- A. Only registered team members are permitted to check in, prepare, and demonstrate the entry.
- B. Check-in
 1. The team checks in the vehicle, documentation, and radio(s) at the time and place stated in the conference program. The

vehicle must be ready to run at check-in with the exception of battery installation. Teams must indicate the team/chapter ID# on their radio, vehicle and batteries.

2. During check-in, each team selects a demonstration time from the available times posted. Teams should try to avoid conflicts with other events when selecting their demonstration time.
3. Preparation time is used to install batteries and to perform a radio check, NOT for practice or modifications.
4. Each team picks up its vehicle and radio at the selected time and proceeds to a preparation area designated by the event coordinator.
5. Each team is allowed ten (10) minutes to prepare its vehicle for demonstration.
6. Teams preparing vehicles must NOT disturb a team that is demonstrating, especially with any kind of radio frequency disruption.

C. Conditions

1. The demonstration area is the area in which the vehicle moves and collects the load. It is defined by a raised perimeter of which the construction varies from site to site. The demonstration area might have carpeted or bare floors. Obstacles may or may not be placed within the demonstration area.
 - a. The demonstration floor or room will be between twelve (12) feet square and sixteen (16) feet square. Therefore, it may be twelve (12) by fourteen (14) feet square or fifteen (15) by sixteen (16) feet square. Consideration will be made for the space available at the conference site.
 - b. Next to the demonstration floor there will be a closet space, where the vehicle will start and finish and where the collection tub will be placed. The closet space must accommodate the start box (as described in Regulation D.3 below) and the collection tub. The closet space may be the size of a walk-in closet or the size of a hall coat closet (of adequate size to house the start box and the collection tub).
 - c. The collection tub must contain all the toys, with no spillage as the participants load the toys. The tub may be moved by the vehicle, but it must be returned to the closet space before the tippy cup is placed on the start box or placed in the tub. The top edge of the collection tub should not exceed twelve (12) inches.
2. The service area is designated by the event coordinator and may be used by participants to service vehicles as necessary. The closet space may be designated as the service area by the coordinator.

 There are lots of ways to maximize your robot's scoring potential. Study these guidelines and come prepared with a plan.

D. Demonstration

1. Each team must be prepared to begin the demonstration as soon as the evaluators complete the previous team's evaluation, but not before the registered time.
2. Each team is allowed five (5) minutes to demonstrate its vehicle. The clock starts at the judge's signal.
3. To demonstrate that the correct dimensions have been met, the vehicle must start inside the 24" (depth) x 16" (width) x 10" (height) box (internal dimensions). The opening of the end of the box is 10" (height) by 16" (width). There is no floor in the starting box.
4. Operators control the vehicle from the assigned location and may not enter the demonstration area without the coordinator's permission.
5. Battery changes and minor repairs must take place in the service area of the event. Time is NOT stopped for repairs or battery changes.
6. A team whose vehicle fails to begin at the "go" time may be given a second chance to start the vehicle again at the discretion of the event coordinator. The team has one (1) minute to correct the problem. At that point the time starts again.

E. A total of 70 points is scored by:

1. Collecting fifteen (15) toys from the floor and placing them in the collection bin. The bin must be in the closet when the demonstration is started and ended. Toddler-type toys, such as stuffed animals, action figures, colored balls, rattles, small trucks and cars will be the load. Items may not exceed fifteen (15) inches in the largest dimension or be smaller than three (3) inches in the least dimension. The items may not exceed two (2) pounds in weight. Each item is assigned a value of two (2) points, for a total of thirty (30) points.
2. Completing the collection in the least amount of time; points will be awarded according to the chart below. Time stops when the vehicle returns to the starting box.

Seconds	Points
Time stops at 300	0
290	1
280	2
270	3
260	4
250	5
240	6
230	7
220	8
210	9

200	10
190	11
180	12
170	13
160	14
150	15
140	16
130	17
120	18
110	19
100 or less	20

3. Setting the tippy cup on the starting box. The tippy cup must be the last item collected. Twenty (20) points will be awarded for placing the cup, spout up, on the starting box. If it is not placed on the box, it must be placed in the toy bin.
- F. Each team has five (5) minutes after completing its demonstration to remove the batteries from the vehicle and return the vehicle and radio to the holding area.
- G. No more than two (2) team members are needed to pick up the entry from the display area at the time and place stated in the conference program or noted by the coordinator.

REGULATIONS

- A. Vehicle (controlled by first team member)
 1. The vehicle's size may not exceed 10" x 16" x 24". (It must meet the size requirements of carry-on luggage.)
 2. The propulsion and guidance of the vehicle is electric.
 3. Standard radio control car batteries [a single battery pack of six (6) sub "C" cell batteries] supply electrical power.
 4. The team may replace the battery pack(s) during the demonstration.
 5. Propulsion and guidance must be controlled by a single radio with a maximum of two (2) control functions. The controls must work in one of the following ways.
 - a. A single electric stock or modified motor is controlled for propulsion with the second servo used to control steering.
 - b. A pair of servos is used to provide steering and propulsion.
 6. The vehicle may operate in reverse.
 7. Manufactured model car parts may be used to fabricate the vehicle.
 8. No cord or antenna may extend from the vehicle for power or control purposes.
 9. The fabrication should display good craftsmanship.

Read the General Rules and Regulations in the front of this book for information that applies to all of TSA's competitive events.

- B. Collection device (controlled by second team member)
1. The collection device may be mechanical, fluid, and/or electrically powered.
 2. The collection device may be mechanically, electrically or remotely controlled.
 3. The collection device should display good craftsmanship.
 4. The collection device may have a separate power source.
 5. The collection device is not limited to two (2) channels.
 6. Once the vehicle has exited the starting box, it may unfold and extend beyond the dimensions given in Regulation A1.
 7. The collection device may not alter the event course and may not damage the load or event area.
- C. Each entry must include a notebook [a standard three (3)-ring binder] that contains the following on 8½" x 11" paper:
1. Cover page with name of event, conference site, conference date, and team/chapter ID number (identification numbers are issued on site and so may be hand written)
 2. Table of contents, one (1) page
 3. Plans for fabrication of vehicle, maximum five (5) pages
 - a. Mechanical
 - b. Electrical
 - c. Hydraulic
 4. Parts list, one (1) page
 5. Technical log, three (3) pages
 - a. Radio frequency assignment
 - b. Servo assignment
 - c. Battery charging information
 - d. Operating instructions
 - e. Vehicle power and transmission information
 6. Design and test log including date, test duration, problems identified, redesigns, and other comments, maximum five (5) pages
- D. Safety considerations.
1. Power transmission by a fluid must be free of leaks and not exceed 35 psi. A pressure gauge must be in the system in order for judges to verify pressure reading.
 2. The vehicle may not contain a wet cell battery.
 3. The vehicle may not have an external power source and may not use combustion power.
 4. If any vehicle is deemed unsafe, an evaluator or the event coordinator may stop the demonstration. If the safety concern is addressed in a timely manner, another demonstration may be scheduled. The concern must be recorded in writing and explained to the team before the team leaves the event area.

- E. Arriving late for a demonstration is cause for a twenty (20) point deduction. At the discretion of the event coordinator, and if time allows, the team may or may not be allowed to reschedule. A team that fails to appear for its demonstration is not judged.

EVALUATION

- A. Deductions of twenty (20) points can be made for the following (only once for any or all infractions):
1. Damaging the conference course or collection device
 2. Using improper batteries
 3. Arriving late to demonstration
 4. Failure to have two (2) team members who control the appropriate device
 5. Any conduct unbecoming a TSA participant
 6. Failure to follow the guidelines
- B. Disqualification results for the following:
1. The vehicle is unable to start in the start box
 2. Failing to appear at the demonstration
 3. Using an unsafe vehicle
 4. Using combustible material
 5. Using a wet cell battery
 6. Extreme or repeated conduct unbecoming a TSA participant
- C. Please refer to the official rating form for more information.

RADIO CONTROLLED TRANSPORTATION EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

- A. Event coordinator
- B. Assistants for check-in, three (3)
- C. Evaluators
 - 1. Two (2) for demonstration/preparation area and radio check-out/in
 - 2. Three (3) for demonstration
 - 3. Three (3) for report and craftsmanship evaluation
- D. Timekeeper during demonstrations
- E. Scorekeeper during demonstrations
- F. Radio check-in/out and timer for preparation area
- G. Assistants for checking and totaling evaluation sheets, two (2)
- H. Assistants for check-out, three (3)

MATERIALS

- A. Coordinator's notebook, containing:
 - 1. Event guidelines, nine (9) copies
 - 2. Official rating forms
 - 3. List of entries with finalist report
 - 4. List of evaluators/assistants
 - 5. Results envelope
- B. Demonstration area equipment
 - 1. Perimeter material
 - 2. Starting box
 - 3. Fifteen (15) toys
 - 4. One (1) tippy cup
 - 5. One (1) storage bin (toy box)
- C. Stop watches, two (2)
 - 1. Preparation timer
 - 2. Demonstration timer
- D. Table and chairs as needed for
 - 1. Check-in
 - 2. Radio and vehicle storage
 - 3. Evaluators

- 4. Obstacles during demonstration
- E. Calculators, two (2) or a computer with spreadsheet software

PROCEDURE

- A. Upon arrival at the conference, report to the CRC room and check the contents of the Coordinator's notebook. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.
- B. Inspect the area(s) in which the event is being held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
- C. Check in the entries at the time stated in the conference program. Anyone reporting who is not on the entry list may check in only after official notification is received from the CRC chairperson. Late entries are considered on a case-by-case basis and only when the lateness is caused by events beyond the participant's control. Requirements for attire do NOT apply during check-in.
- D. Secure the entries in the designated area.
- E. One (1) hour before the event is scheduled to begin, meet with your evaluators/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.
- F. All participants and evaluators should be in the room at the scheduled beginning time. Check the entry list. In order to compete, participants must be on the entry list or must have approval of the CRC chairperson.
- G. Follow the directions given in the event procedure section above.
- H. Record and initial the following:
 - 1. Deductions
 - 2. Failures to appear
 - 3. Disqualifications
 - 4. Re-demonstrations
- I. For participants who fail to follow the guidelines, the decision either to deduct twenty (20) points or to disqualify a participant must be discussed and verified with the evaluators, event coordinator, and a CRC manager. Secure the initials of the event coordinator and manager on the rating form.
- J. Complete and submit the finalist report, which includes a ranking of the ten (10) finalists, and all related forms in the results envelope to the CRC room.
- K. Manage security and the removal of materials from the area.

RADIO CONTROLLED TRANSPORTATION

2007 & 2008 OFFICIAL RATING FORM

HIGH SCHOOL

TEAM/CHAPTER ID#														
EVALUATIVE CRITERIA														
Documentation (20 pts.)														
Cover sheet	1 pt.													
Table of contents	1 pt.													
Plans for fabrication of vehicle														
Mechanical	4 pts.													
Electrical	3 pts.													
Hydraulic	2 pts.													
Parts list	2 pts.													
Technical log	3 pts.													
Design and test record	4 pts.													
Vehicle construction and design	10 pts.													
Performance70 pts.														
Number of demonstration points scored (total of time points, toy points and tippy cup). In case of a tie, the team with the quickest demonstration time wins.														
SUBTOTAL	100 pts.													
Rules violation (must be initialed by coordinator and manager)	minus 20 pts.													
TOTAL	100 pts.													
Comments:														
I certify these results to be true and accurate to the best of my knowledge.														
<u>Documentation and display evaluator</u>														
Printed name: _____							Signature: _____							
<u>Presentation/interview evaluator</u>														
Printed name: _____							Signature: _____							