

The JPL Annual Invention Challenge is ready for its fourteenth year. The title for this year's contest is the "**Kick Into the Can Contest**". The objective and rules are listed below. Questions related to this contest should be directed to: Paul MacNeal at work phone (818) 354-7824, FAX (818) 393-5886, M/S T1707, located in Building T1707-103, or e-mail to paul.d.macneal@jpl.nasa.gov.

OBJECTIVE: Create a device that kicks a regulation size and weight football into a trashcan located five meters away. Each team will be allowed to have their device kick the football a maximum of three times within a one minute time interval. Points are awarded for getting close to or inside the trashcan. The winner will be the team whose device accumulates the most points.

Rules:

ELIGIBILITY

- 1) The contest is open to all JPL employees, contractors, and immediate family members. The contest is also open to teams of students from Southern California middle schools and high schools providing that they have completed all required forms as outlined in rules 3 and 4 below.

REGISTRATION – JPL PERSONNEL

- 2) Applications for JPL employees, contractors, and immediate family members entering the contest must be filled out and submitted to Public Services prior to midnight November 18, 2011. Completed entry forms should be directed to Public Services at FAX (818) 393-4641, or sent via email to Rhonda.M.Dash@jpl.nasa.gov. An entry form is included at the end of the rules. All entries will be time stamped based upon the time received. Only the first 20 JPL/contractor entries will be permitted to compete. Five alternates will be accepted in case some entries withdraw prior to the competition.

JPL employee family members and friends are welcome to watch the contest, but must be cleared through the security office prior to arrival. JPL employees are required to fill out the visitor request form as found in the link: <https://protective-services.jpl.nasa.gov/visitrequest.php>

REGISTRATION – SCHOOLS

- 3) In order to streamline the paperwork process at JPL, each team must **mail** their completed student team entry form (attached) and the "Authorization and Release for Photos and/or Video Recording" agreement form (attached) for each person (student, guest, teacher, and chaperone) planning to attend the JPL contest. Each video release form must be completely filled out and signed. If the student is under 18 years of age, then their parent or guardian must also sign. **The entire set of forms must be filled out and submitted to Public Services no earlier than September 5, 2011 and be postmarked no later than midnight October 1, 2011. Completed forms must be mailed to Public Services at Jet Propulsion Laboratory, M/S 186-113, 4800 Oak Grove Drive, Pasadena, CA 91109.** All entries will be time stamped based upon the time received. Student teams will be notified to verify their acceptance into the contest by October 5, 2011. Questions regarding the entry forms can be directed to Rhonda Dash in Public Services at (818)354-9318. Each school is allowed no

more than three teams. Internal school competitions are encouraged to select the top three teams if necessary.

Any foreign student (18 or over) or adult will need to fill out a special form which is processed by the Public Services Office. The process takes nearly three weeks, therefore, if you plan on attending the contest at JPL, and you are a foreign national, it is important that you contact Public Services prior to November 8, 2010.

Additions or corrections to the registration forms and/or photo release forms need to be mailed to the Public Services Office with a postmark no later than Thursday, December 1, 2011. Faxed forms will not be accepted. Failure to send in the signed video release form by the requisite time will prevent access to JPL and participation in the contest for those students that fail to comply with this request.

SPECIAL RULES FOR SCHOOL TEAMS

- 4) Only the first 75 student team entries will be permitted to compete at the regional competitions. Student teams will compete at a regional competition held on Saturday, November 19, 2011 at Manual Arts High School in Los Angeles and Orange Coast College in Costa Mesa. Details for the regional competitions will be sent to all registered teams. The top five teams with the most points from each regional competition will be invited to compete at the JPL contest held on Friday, December 9, 2011 (see Rule 5 below). In addition, the next 10 teams with the most points between both regional competitions will also be invited to compete at the JPL contest.

LOGISTICS

- 5) The date and time for the final contest is Friday, December 9, 2011 between 11:30 AM and 1:00 PM. The contest is held at the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. The contest area is located north of the fountain area, in front of the Administration Building (Bldg. 180) steps. The contest will be held rain or shine, but will be covered from the rain. Check-in for the event will begin at 10:15 AM.

DEVICE RULES

- 6) The device must have the following characteristics:
 - a. Be capable of kicking a football over a 2.0 meter high barrier (See Rule 7) located 2.5 meters away and into a trash can (See Rule 8) whose center is located 5.0 meters away. Kicking is defined as a striking or impacting motion that propels the football towards the trash can. Pushing or slinging the football is not allowed. The field judge will decide if the “kick” requirement is met for each kick attempt.
 - b. Be capable of kicking a football up to a maximum of three times in less than one minute. Reusing the football is acceptable. Resetting the device is acceptable. Realignment of the device is allowed.
 - c. Be able to accept a football. Each team is allowed to supply their own football(s) as long as each football is of NFL regulation size, weight, and surface and is properly inflated to the pressure listed on the ball (approximately 13 psi). The short circumference of the ball is 21.0 inches [53 cm] plus or minus 0.25 inches [0.63 cm].

- The long circumference of the ball is approximately 28.0 inches [71 cm]. The length of the football is 11.00 to 11.25 inches [28 to 29 cm]. The football weight must be 14 – 15 ounces [397 to 425 grams]. The surface is pebble-grained leather. All team-provided footballs will be inspected at the check-in table and will be marked as having passed or not passed inspection. Any footballs that do not meet these requirements will be disallowed. The football may not be altered or modified in any way at any time. The contest host will have one football available for use if desired.
- d. Be able to stay behind the 5.0 meter line at all times (before, during, and after the kick).
 - e. Be no taller than 2.0 meters before, during, and after each kick.
 - f. Utilize safe energy sources. Examples of disallowed energy sources are chemical explosions, caustic gases, and rocket motors. High pressure gas systems and other questionable sources must be cleared through Paul MacNeal and the Safety Coordinator prior to performing at both the regional contest and the final contest.
 - g. Be initiated by a single operation (cut a string, flick a switch, pull a pin, etc) provided by the contestant. No human power may be used to add dynamic or potential energy to produce motion in the device. All stored energy systems must be energized prior to starting the task.
 - h. Be made from any materials as long as they are non-toxic and safe.
 - i. Place the official entry number provided by the contest organizer (3” high numbers) on at least two sides of the device for easy identification.
 - j. Not use any clamps, tape, or any other means to attach to the ground. The device must only rest on the ground, however heavy weights may be used.
 - k. Be able to adapt to non-level ground (see Rule 9).
 - l. **SPECIAL RULE FOR SCHOOL TEAMS ONLY:** To avoid plagiarism, each team that competes at the regional contest will have photographs taken of their device with the entry number clearly visible. The basic concept of the device (energy source, kick method, size) must be maintained. The regional contest host will mark the device in an identifiable manner to confirm authenticity at the finals. Minor modifications to the device are allowed within these constraints.

BARRIER DEFINITION

- 7) The barrier structure has the following characteristics:
 - a. The barrier is 2.0 meters (78.75 inches) tall and 2.0 meters (78.75 inches) wide. It is constructed to allow for direct viewing of the trashcan from the 5.0 meter line.
 - b. The football may hit the top of the barrier and still have points awarded for that kick.
 - c. The barrier has weights attached on the legs to minimize the chance of being knocked over. Any device that causes the football to damage, break, or knock over the barrier will cause the team to be disqualified. If the barrier is moved but not broken, it will be repositioned by contest volunteers. The sixty second time period will not be stopped during the repositioning task. The team will not be allowed to initiate their device until the barrier has been repositioned and the field judge has notified the team that they may proceed.

TRASHCAN DEFINITION

- 8) The trashcan has the following characteristics:
- a. The target is a 30 gallon galvanized steel trashcan found at Orchard Supply Hardware for \$17.99. OSH Model number is 201-6145. Supplier name is Dover Parkersburg, Model 630.
 - b. It is 66.0 cm [26.0 inches] tall.
 - c. The top rim inner diameter is 51.4 cm [20.25 inches]. The bottom inner diameter is 43.2 cm [17.0 inches].
 - d. There is a heavy weight inside the trashcan to help maintain stability.



CONTEST AREA DESCRIPTION

- 9) The contest site is located in front of the steps leading to Building 180. The site may contain one or two areas for setting up and operating the device. The ground is concrete with a rough finish and has a slight slope. The barrier (See Rule 7) is located at a distance of 2.50 meters from the 5.0 meter line. The center of the trash can (See Rule 8) is located 5.0 meters away from the 5.0 meter line. See Figure 1 for a description of the contest area.

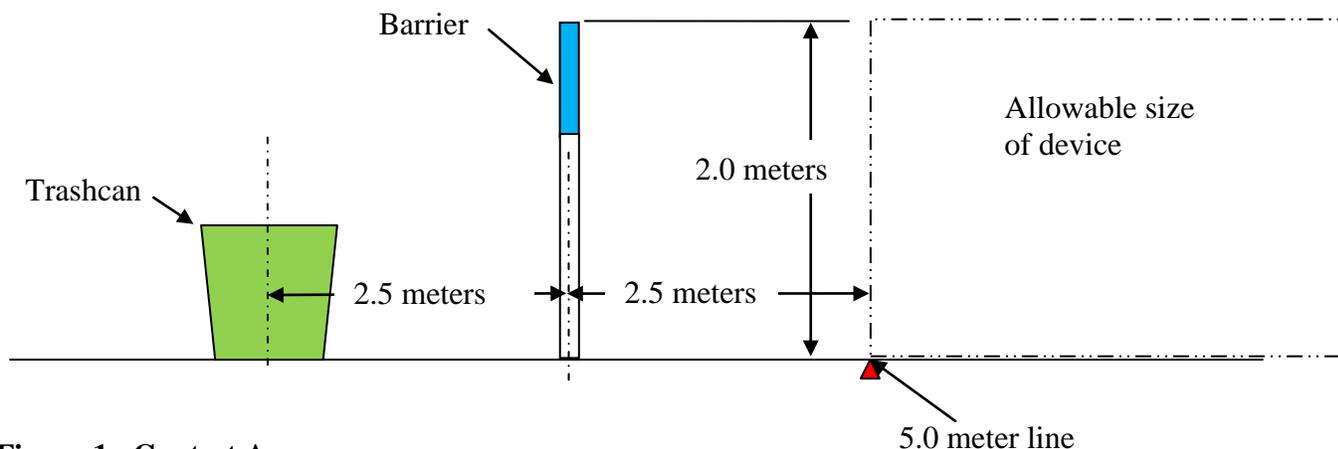


Figure 1. Contest Area

POINT VALUES

- 10) A circular chalk line is drawn around the trash can to indicate point values that can be achieved. Only the highest possible point value is awarded for each “kick” of the football. Point values are awarded if on first contact with the ground or the trashcan the:
- Football passes completely through the top rim of the trashcan = 50 points (bouncing out is permitted)
 - Football hits the rim but does not go inside the trashcan = 30 points
 - Football hits the side of the trash can = 25 points
 - Football hits on or inside a circle that is 2.5 meters in diameter = 10 points

CONTEST PROCEDURE

- 11) The order in which teams will participate is selected by a random process. The team will be given a four minute period of time to set-up their device, initiate and have their device perform its task, and remove the device from the contest area. Strict time limits will be imposed to ensure that all contestants are able to operate their device. The team is responsible for placing the football inside their device each time the football is kicked.

The field judge will inspect the football(s) to verify that they have passed inspection (see Rule 6c). Non-conformance of Rule 6c will require that the team use the one football supplied by the contest host. Once the team has been introduced and has introduced their team and given a brief description of their device, the starter will ask if the team and the timer are ready. The official starter will give a countdown (3...2...1...GO!) for the start of operation for the device. The timer will start the time at the starter’s direction. Each team is allowed to initiate their device to propel the football over the barrier towards the trashcan. If requested by the team, the kicked football may be retrieved by contest volunteers who will give the football back to the team as fast as possible so that it can be placed back into the device two more times for a total of three kicks. A visible clock will countdown how much time is remaining. The timer will sound an air horn when the sixty second time limit has been reached. If the football is in the air on its way towards the trashcan when the sixty

second time is announced, then the points for that kick will count.

Three spotters/retrievers will be located in the contest area to determine where each football contacts the ground (or trashcan) on first contact. The spotters may indicate the point of contact on the ground with a chalk mark. Once the football has been kicked three times or the sixty second time period is over, the spotters will determine what point values are to be awarded for each properly kicked football. The spotter's decisions are final. The field judge will indicate the points on the score sheet for each kick and will sum the total number of points.

The team will be asked to remove their device after their performance and be asked to place it in a designated viewing area as directed by volunteers.

AWARDS

12) Trophies will be divided into two categories: JPL employees/family/contractor entries and school team entries. Trophies for the most points will be given for first, second, and third place for each category at all contests (regional contests and the JPL contest). If two or more point totals are equal, then a tiebreaker round will ensue. Each "tied" team will have one "kick" opportunity to score the most points. All tied teams will operate their device simultaneously. If teams are still tied after the tie breaker round, then additional tie breaker rounds will continue until a winner is declared. Certificates will be issued for the lightest, heaviest, smallest, largest, most unusual, most artistic, and most creative designs.