

Space Derby Track

Theory, Construction, and Setup

The Space Derby track is made up of two wooden A Frames with monofilament fishing line stretched between them. The distance between the frames should be around 40 to 50 feet. It can be shorter and longer depending on the space available.

The two A Frames are labeled Gate and End. The Gate A Frame is where the rockets start; the End A Frame is where they stop. All wooden parts of the assembly (except for 1 part of the Gate) are made from 1 x 4 lumber ($\frac{3}{4}$ " x $3\frac{1}{2}$ "). I like to use clear Ponderosa Pine because it is easy to work with, hard enough to take abuse over the years and stable enough to not twist and warp over time. Each A Frame has 2 halves: Front and Rear. The Front half on the Gate A Frame has the gate attached to it and faces the Front half on the End A Frame.

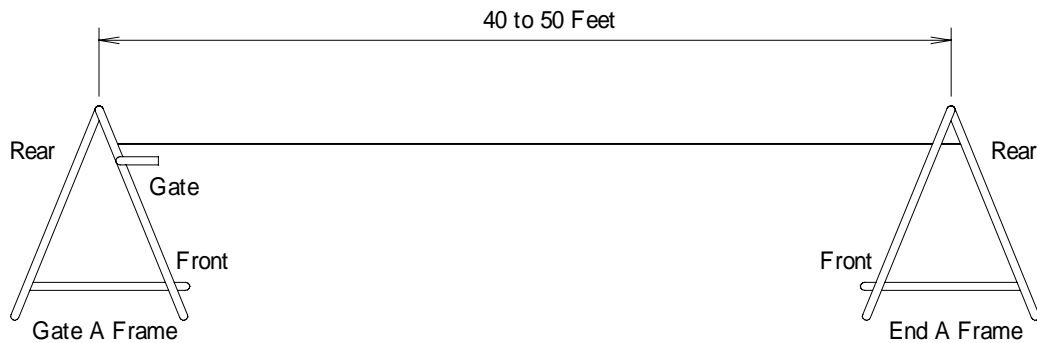


Figure A

Each frame will collapse to 5 feet tall x 4' feet 2" inches wide x 5" deep. This makes for easy storage and transporting. The Rear half fits inside of the Front half and the Spreader on the bottom keeps them separated. A $\frac{1}{4}$ -20 x 2" Flat Head Machine Bolt in each Spreader holds everything in place and locks the assembly in the separated position.

There are eight weights that add stability to the system and provide line tension. Four weights (typically I use 1 gallon plastic water jugs on 3 foot long ropes with hooks on both ends. See figure B) hang from the hooks on the Rear Upper Support as indicated on page 4.

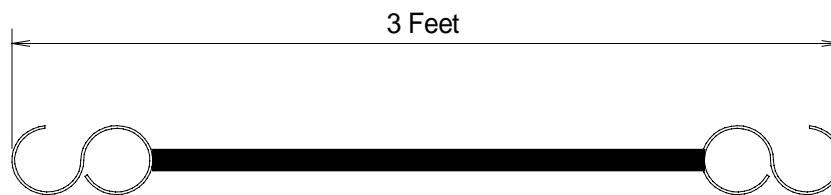


Figure B

Hook the weights so that they hang over the 1¼" dowel. This will push the center of gravity to the rear of the frame, adding stability and more leverage. Without the weights, I have seen the two frames move together. If you use the track on a slippery floor such as a Gym, take a rubber backed floor mat (borrow one from in front of an outside door) and place it under the frames. This should give you the traction that you need.

On the End A Frame, only the two outside positions require weights. The line weights fill the two inside positions. BSA directions suggest using fishing line swivels to keep the track tension correct. I have included that also in Figure C.

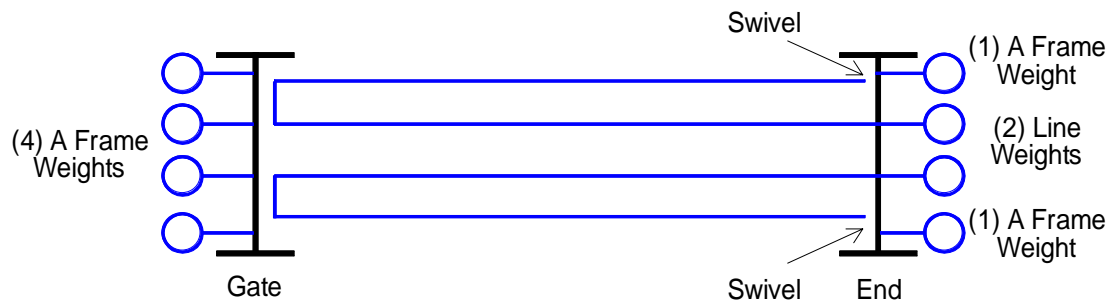


Figure C
(Looking down on the track – Top View)

The Line anchors to a swivel which is connected to the outside eye bolt on the End A Frame Front Upper Support. The line then goes through the outside and inside eye bolts on the Gate A Frame Front Upper Support and returns to the End A frame. The line passes through the Front Upper Support, over the 1¼" dowel and ties to the Line Weights. I use a hook to tie the line to. That way I don't have to hold the weight and tie the line at the same time. That can be tiring and difficult.

For storage, the Front and Rear frames fold into each other. Unscrew the 2" ¼-20 bolt from the spreaders and everything will fold up. The bolt is also used to keep the frames together after they are collapsed. Just screw the bolt through the Rear Half into the Front Half and they cannot separate. It makes it a lot easier to move and store them.

The Gate is made from 5/4 x 4 (1' x 3½") lumber in front, with 1 x 4 (¾" x 3½") lumber on the sides. The drawings indicate screw and glue joints for the Gate. An alternative would be to use a dove tail joint. The joinery needs to be able to take some abuse. When the Gate drops to start a race, it hits the A Frame. It also needs to be strong enough to stay straight from one side of the track to the other. The latch mechanism is only on one side. That means that the far side of the Gate has to be supported from dropping by the latch side. That requires a very strong joint. For that reason and to better hold the ¼-20 brass threaded inserts for the rocket pins, I went with 5/4 material. I have not included any electronic

timers in this design, but a switch to start a counter could easily be added to the Gate. You're on you own to engineer how to detect the finish. Keep in mind that not all rockets will finish the race at the same point like a Pinewood Derby track. We usually race for the farthest distance. If you limit the windings to a finite number (say 100) and max the rubber band number to 3, you can set the track at 50 feet and few if any will hit the end.

The Gate stores in the collapsed gate A Frame. All of the parts such as rocket pins, safety pin, battery operated winders, and latch will fit there. (I still have to detail out the drawings for this. They are not completed yet.) We use a Rubbermaid Tuff-Stuff container that holds 8 water jugs (empty until needed) and all of the other track supplies: ropes for the weights, extra bolts and washers, rocket hangers and line, rubber bands, a few tools (wrenches), etc. It keeps everything in place and doesn't get lost when not in use.

That's everything about the Track that you should need to know. Email me at spacederby@pack80.net with any questions.