### Build Instructions

1. On each of the two 5.0mm 4x8 utility PRLS ¼” plywood sheets, 4 feet was measured from the edge on one of the long sides, representing the midpoint. This would be the center of our 8 feet circle as well as most of the curves for our line follower.

2. On a stick of wood, a hole was drilled at one end, and another hole drilled 4 feet away. A nail was placed in one hole and fastened to the center of the 8 feet circle and a pencil placed in the other hole. This would then be used to draw our semicircle.

3. Step 2 was repeated on the other sheet of plywood. (the two semicircles put when joined together formed our circle of 8 feet diameter)

4. The semicircle on each sheet was then cut out using a combination of jigsaw and bandsaw.

5. From the midpoints found in step 1, a line at a 32.5° angle from the edge was drawn outwards on each sheet. This angle was found using a protractor.
6. A skill saw was then used to cut out this angle.

7. After completing steps 1-6, the full outline of our course was obtained.

8. One of the furring strips was cut into blocks to fit between the furring strips used as support, using a miter saw. The outline of these blocks was traced on the underside of the joined sheets of ply. This was done to later remind us of where the chest latches would be placed.

9. The next step dealt with drawing the outline of our course (the line follower). String was used to obtain these curves. One person held the string at the midpoint found in step 1, and the pencil secured to the string at a length equal to the outer radius of the line follower away for the outermost curve. This distance was measured using a tape measure. The curve was then drawn.

10. Step 9 was repeated for the other curves, changing the distance of the pencil secured in the string from the midpoint, thus accounted for the radii of each curve.
11. To obtain the two tight turns, the angles from midpoint to the center of each turn was measured using a protractor and lines drawn outward. The centers of the turns were located and the turns drawn with a compass. (Note: A piece of cardboard could be used if no compass large enough is available. This can be done by simply making a hole in one corner of the cardboard and placing the compass needle there to hold it in place. Make a second hole at a distance equal to the radius of the turn, away from the first hole. This is where your pencil will go. With the cardboard held in place at the center, simply rotate the cardboard, thus scribing the curve with the pencil.)

12. The blackhole was drawn in a similar fashion as that in step 11.

13. The protractor was used to measure the 22° angle from the midpoint and a line drawn parallel to the edge. This represented the final stretch of our line follower.

14. White spray paint was used to cover all the curves and lines drawn above, thus covering the outline of the line follower, and left to dry.

15. The next step involved doing the under support. Initially, three furring strips were cut and screwed to the course at equal distances across the horizontal width of the course. One piece was then placed in between these original three furring strips. Finally, pieces were placed near the outer edges of the course.

16. Using the excess ply from the original cut out, two rectangular strips of were cut out for the walls of the worm hole. To account for the different radii of the curves outlining the worm hole, the strips were of different lengths. To ensure these strips could bend enough, grooves were cut out on the “inner side” (in terms of the bend) and the outsides soaked with water.

17. A tape measure was used to measure the distance from the left edge of our 8 feet circle to the left outside limit of our asteroid belt, and a mark was made.

18. From this point, 3 more marks were made at distances equal to the distance between each line of asteroids.
19. Lines were then drawn across from these points, using a line level, representing the length of the asteroid belt. The distance between each asteroid was measured on the first two lines and horizontal lines were drawn across to ensure constant spaces in between the asteroids on each line. Holes were then drilled using a 3/8” drill bit at each point.

20. Painters tape was used to cover the line follower of the course, including the starting block, black hole, and the spots for the Tardises and Daleks. Since our course was following a curved pattern throughout, small strips were lain down at a time so we could account for the tight turns.

21. The ramp was built by first cutting a 5” wide piece of wood from the excess ply. The approximate length of the ramp was measured out and a protractor used to measure the angle for the inclination of the ramp. This was cut out using a miter saw. Measurements were then taken to see how wide the ramp needed to be, and another piece of wood cut out accordingly.

22. The sides of the ramp were set up and blocking placed in the corners so the sides could be screwed together. Afterwards, the piece of wood of the proper width was placed on top. This piece was longer than was necessary to ensure it met up with the angled side. It was then sanded down to the appropriate length after the inclined portion was cut and put in place.

23. Tardises were built by cutting the furring strips to a length of 3 ¼” and gluing them together.

24. Daleks were built in a similar fashion with a length of 2 ½”.

25. 3 wooden blocks of approximately 1” in length, cut from a furring strip, were attached to the each wall for the wormhole (1 at each end and 1 in the middle).
26. The whole course was then covered in flat black paint, using a roller. The ramp was also covered with black paint, using a roller, while the strips for the wormhole were painted black with a paintbrush. These were left to dry overnight.

27. All of the painters tape was carefully removed.

28. Carriage bolts were placed in the holes drilled for the asteroid belt. Most of the bolts had a nut attached to the underside to keep them securely fastened. However, a few of the holes had to be drilled through the underside support. As a result, glue was used to secure these carriage bolts.

29. Two lines were drawn from the midpoint outwards $72^\circ$ apart, past the intended location of the wormhole. These lines would be used to define where the strips would be placed.

30. One end of the longer strip was screwed onto the course, through the wooden block. The strip was then bent until the other end of the strip lined up with the second line drawn in the previous step. The other two blocks were then screwed down to the course, thus securing the strip in that position.

31. Step 30 was repeated for the second (smaller) strip.
32. Painters tape was reapplied over the spot for the Tardis located in the worm hole, and the portion of the line follower within the angle formed for the strips, was covered with flat black paint, using a paintbrush and left to dry.

33. One inch squares of a red, blue, yellow pattern were drawn on the line follower for the ramp. Painters tape was cut to one inch width and half of the squares were painted. The same process was followed for the other half when they dried.

34. The ramp location was marked on the course and this was used to determine where the wooden blocks would be screwed down on the course. The ramp was placed on top of the blocks and it was screwed from the outside through the blocks to prevent the ramp was moving.

35. The Tardises were covered with blue spray paint and left to dry.

36. Five Daleks were spray painted white and one was spray painted red. These were left to dry.