Inter City Rocket

General

This is a proof of concept exercise. You will build a not very pretty version of a moving part to use in your city model. This is called a Proof of Concept or POC. It gives you experience in working with the materials and connecting the electrical circuits. The version you build for your city model will look much better, but work basically the same.

All of the parts and supplies you need are in your team's brown bag or on the table. Leave scissors, tape, cans of air and other supplies on the table when you leave the room. You may have to partially disassemble your moving part so it fits in your pack for reasons that will become obvious.

The rocket plane is visually most effective if its flight path takes it across the length of your city (up to 50") and from the ground to the maximum height allowed (20"). The actual vertical height you can use will be less if the model has a lower level. Although you could have an opening that would allow launch from the lower level. For this exercise we will use a 15" height and about 50"

In your city model you will probably not want to use a tower like is used in this POC. The upper end of the thread can be attached to the back or side wall. For a great visual effect, you could attach cotton "clouds" to the wall and have a hole that the rocket flies into and disappears.

If there is a change in the rules that allows a rocket to fly beyond the city constraints, this rocket will fly freely perhaps as far as 20 feet.

Look closely at the prototype of this on display and do a launch.

Take the parts out of the bag and arrange them neatly on the table.

You have two coils of thread one is colored, probably red. The other is "invisible thread" use that for your real model. It is very hard to work with as it is nearly invisible and very fine. It will make it look like your rocket is free flying even though it is not.

USE ONLY MASKING TAPE TO ATTACH THINGS TO THE TABLE

1. **Build the tower assembly**
   1.1. Attach a right-angle brace to each side of the wide end of the trapezoidal 15" long cardboard use double sided tape
   1.2. Attach the right-angle braces to the base piece (about 3" x8") of cardboard about an inch from the back.
   1.3. Cut a strip of cardboard no more than 1" wide and about 3" long.
2. **Build the rocket plane**
   2.1. Cut one of the small 8" straws in half
   2.2. Cut the straw in half
   2.3. Cut a strip of paper about 0.5" wide. Make it into a 1" diameter loop fastened with a very small piece of double sided tape. Cut off excess paper
   2.4. Cut a strip of paper about 1" wide. Make it into a 1.5" diameter loop fastened with a very small piece of double sided tape. Cut off excess paper
   2.5. Fasten the small loop to one end of the straw using a small piece of double sided tape and fasten the large loop to other end of the straw using double sided tape. The loops should be fasted so that the place where the paper is joined is against the straw so that the heaviest part is on the straw side.
   2.6. Seal the end of the straw where the small loop is (this will be the front of the rocket plane) by squishing it together then using masking tape to seal and hold it. When you build the plane for your city glue will probably work better.

3. **Final Assembly**

   3.1. If the string is long enough to go the entire length of the table arrange the to do that, other wise run at a diagonal so that both ends of the assembly are at an edge of the table.

   3.2. Use masking tape (get piece from the front table) to fasten the tower base to the end of the table using two pieces of masking tape. The Back edge of the base should be at the edge of the table and the masking tape can go down the edge of the table and underneath it.

   3.3. Fasten one end of the red thread to the top of the tower with tape.

   3.4. Slide the thread through the loops, with the small loop towards the tower end.

   3.5. Fasten the other end of the red thread to the 1" wide piece of cardboard

   3.6. Attach the 1" piece of cardboard to the table near the edge using masking tape. The tube on the can of air should be able to be inserted all the way into the straw with the can of air upright and vertical. Thread has to be pulled tight, but not so tight as to pull over the tower.

4. **Test your Inter-City Rocket Plane**

   4.1. With the rocket at the bottom of the string, insert the tube from the can of air as far as it will go into the rocket

   4.2. Press the trigger quickly and release. The idea is to get a burst of air.

   4.3. With any luck the rocket will rocket all the way up the string to the tower. Try again if it didn't make it. The main reasons it won't make it are slack string and pressing the trigger on the can of air too slow.

5. **Other things to try and suggestions for your city model.**

   5.1. Use different sized loops

   5.2. Use different lengths of straw

   5.3. Hang the straw on the outside of the hoops

   5.4. Paint your rocket plane

   5.5. Use a machine printed rocket plan that is hollow and has small loops on top to put the thread through.

   5.6. Be creative`

6. **Parts List and Receipt for Parts**

	Unit Cost	Qty	Cost
Cardboard for Tower about 15" x 3" and tapering	$0.00	1	
Cardboard right angle braces	$0.00	2	
Tower base about 3"x6"	$0.00	1	
Bottom Anchor cardboard – cut from scrap to 1" wide	$0.00		
Colored Thread – 6 feet	$0.02	1	
Invisible Thread 6 feet	$0.01		
Straws	$0.00		
Paper	$0.00		
Can of Air	TBD		
Total from Engineering Fair	$0.03		