

Packers Rocket

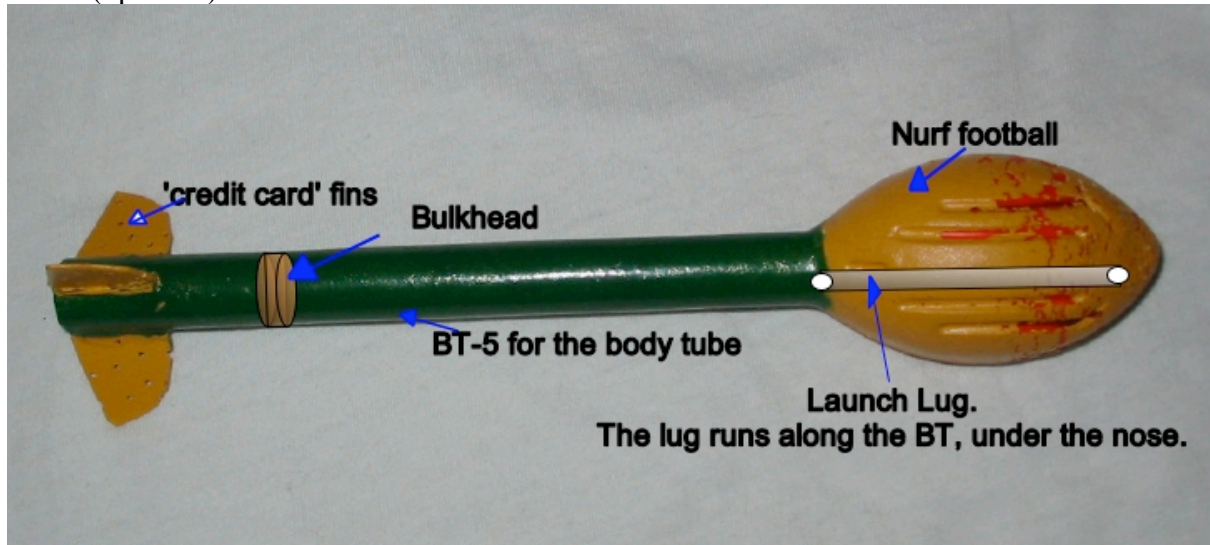
Designed/built by: Nate Jones

Parts list:

- 1x 8" section of 13mm (BT-5) tube
- 1x 1/8" launch lug (≈3" and preferably something stronger, such as plastic)
- 1x one of those annoying credit cards you get in the mail. (note: HEAVY cardstock can be used in place of the card, if you would prefer)
- 1x bulkhead for BT-5
- 1x a small Nerf football, the kind that has a tail with fins. The actual 'football' should be 1.8" in diameter x 3" long.

What you will need:

- White or yellow glue
- Epoxy, CA, or some other glue that will adhere to the plastic credit card material.
- Paint (optional)



This rocket all started with an old Nerf-ball that I found in my 'workshop'. I was toying with it, and in the process thought that the hole in the back of the ball where the tail had once been was about the size of a 13mm motor... you can guess how it went from there as I found out that a piece of BT-5 fit in nicely.

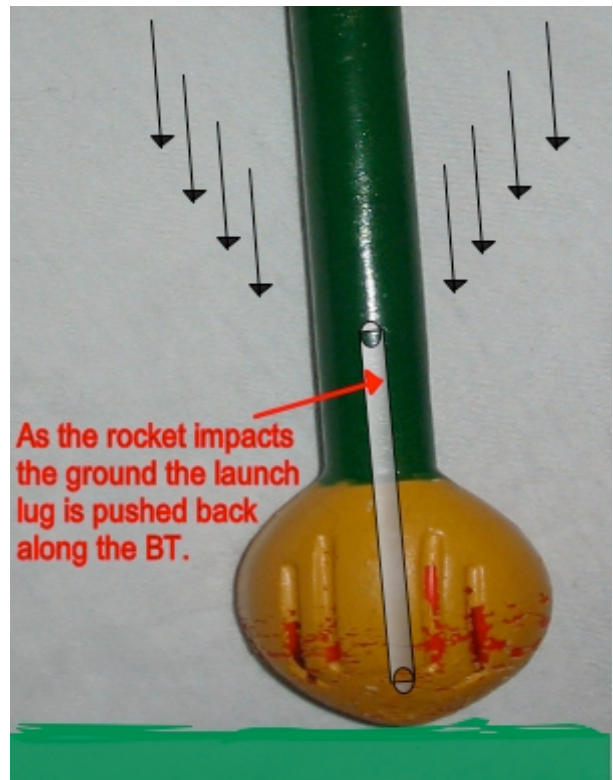
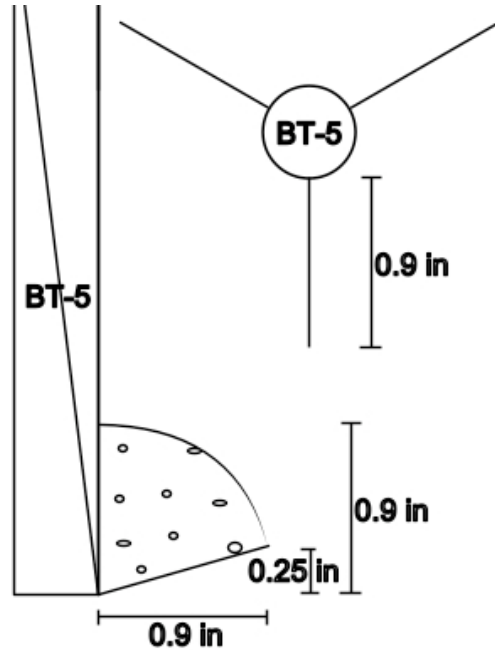
NC attachment. First, remove the foam tail from inside the ball. Then, glue the ball (from now on referred to as the nose cone, or NC) directly to the top of the main body tube by inserting the BT into the hole left from the foam tail. White or yellow glue works fine for this, you don't want it to come off but it's not a high stress joint. Set the BT/NC aside to dry and start working on the fins.

Making and attaching the fins. Because of the heavy NC, this rocket's CG is pretty high, and it is stabilized easily. I'm a Green Bay Packers fan, so of course I made mine green and yellow, and made fins that look like mini cheese heads! I even drilled a bunch of very small holes in the fins to make them look more real. You can see the size and shape of the fins in the diagram on the next page, but depending on *your* favorite football team you may want to make them a different shape. My CP is only about 5" from the nose tip. In a 9.5" rocket that doesn't sound very good, but the rocket still has a stability margin of two calipers! After deciding on a

size/shape for your fins and drawing a template on paper cut it out and transfer the paper cutout to the credit card (or heavy cardstock, if you chose that instead). Trace three fins on the card and then cut them out. Attach the fins flush with the end of the BT using CA or some other glue that will hold the plastic. If you used cardstock, then you can obviously use white or yellow glue for this. Make sure you apply fillets to both sides of each fin.

Bulkhead Installation. By this time the NC/BT glue joint should be dry and you can install the bulkhead, made from balsa or what ever you decide. Using a spent 13mm motor casing, mark the casing 1/4" to 1/2" from the rear end. Then, using a dowel, scrap piece of balsa, or some other long thin glue applicator apply a bead of glue around the inside of the BT where the end of the motor will be when inserted up to the mark you made. Then apply some glue to the bulkhead as well, and, moving quickly, insert the bulkhead and push it up into the rocket with the motor casing. Stop when the mark on the casing is even with the end of the rocket, and quickly pull the motor out. Stand the rocket upright and let the glue dry. Once it is dry, you can turn it upside down and apply glue to the bottom side of the bulkhead to protect it from the ejection gasses. When I built my model I, unfortunately, just put in an engine block, as opposed to a bulkhead. After about 10 flights the NC has burnt through some, so I realized that it would be much better to use a bulkhead.

Launch lug installation. The lug will run right through the NC along the BT. Using a long needle or some other long sharp object, run it along the BT and through the NC where you want the lug to go. Make sure that the lug will *not* be in line with a fin. Once this 'pilot hole' is made push the lug through the NC to make sure it fits through, if not run a very small rats-tail file through the existing hole a few times till the lug just fits through. Make sure it is still a tight fit though, as you WILL NOT glue it in. I used a plastic lug made from part of a kite, as it is stronger than your standard paper lug. If you wish to use a paper lug you can, but it may get ruined after a few flights. The reason that you don't glue the lug in is that this rocket is 'bounce' recovery. At apogee the motor ejects and the rocket simply falls back to the ground and, depending on the



surface it lands on, bounces into the air 5-10ft. Because the lug runs through almost to the tip of the NC if it was glued in it would get smashed, but since it is not it simply slides about half way out of the NC as the nose is compressed against the ground. To fly again just slide the lug back through the NC, pop in another motor and all is set!

Launch and recovery. This rocket takes almost no launch prep, and is a real crowd pleaser just because it's different. The people I have launched with always like to see how high the rocket is going to bounce after a flight to around 200ft on an A10. My model has flown around 10 times now, and I have had no mishaps (other than the small burn on the NC which is why I recommend using a full bulkhead instead of just a thrust ring). Another great thing about 'bounce recovery' is that it is not affected at all by wind☺. I have gone out on days when it was too windy to launch anything that even had a streamer (I have a rather small field), but this was still great. After the motor has ejected the rocket weighs only a little more than the Nerf ball that it started out as, and is completely safe. In between launches you can (and I have!) play catch with the model just like a regular ball.... Just make sure no one steps on it!

I recommend launching this rocket on A10's, because it is a little heavy for most 13mm motors to kick off the ground and it just flies great on that motor. *If* you ever get a hold of a more powerful 13mm motor, don't use it! Why? Because it could be very dangerous... it would probably be best if you just gave it to me☺☺!