Kerbal Space Program - Bug #20840

Revamped Rocket Motors have incorrect Centres of Mass

01/05/2019 12:50 AM - Poodmund

Status:	Confirmed	**Start date:**	01/05/2019
Severity:	Low	**% Done:**	10%
Assignee:			
Category:	Parts		
Target version:			
Version:	1.6.0	**Language:**	English (US)
Platform:	Linux, OSX, Windows	**Mod Related:**	No
Expansion:	Core Game		

Description

The newly revamped Rocket Motors (Poodle, Terrier and Spark) all have their centre of masses situated at the top attachment node on the surface edge of the top mount. This is obviously an inconsistency compared to (most of) the other engines in the game that have their CoM correctly located somewhere within the height of the part. Please note there are other engines in the part catalogue i.e. Skipper with the same issue but they have not been revamped yet and therefore I did not bother to recalculate their CoM.

I have looked at the raw .mu models in Blender and (where variants applied I chose the middle-road truss variant) calculated the volume & CoM of each individual game object in the model to resolve the moments to give a determinate Centre of Mass for the engine. I plotted my workings here:
https://docs.google.com/spreadsheets/d/1MCUfVMstm0FTysGU5_wvk8wv6U8PsoUqMrjWhKmFCjQ/edit#gid=0 for reference.

Obviously this assumes the model meshes are solid whereas in reality they would be hollow plumbing and the engine bells are not correct shelled/skinned as their interiors resolve to a linear centre point within the throat... however, it is a good approximation. I also considered a uniform density based on the part mass specified in the configs but as you see below it seems fairly reasonable. Therefore, I suggest the following with respect to the top attach node origin point:

Poodle CoM: (0,0,-0.6203)
Terrier CoM: (0,0,-0.311)
Spark CoM: (0,0,-0.08344)

These are only a representation of what I found, I would suggest a 2nd opinion and discussion.

History

#2 - 01/07/2019 12:18 PM - diomedea

- Status changed from New to Confirmed

- % Done changed from 0 to 10

Confirmed the issue, though there's a difference: the old Spark engine had COM located at the top stack node as well, unlike was for Terrier and Poodle. So, revamped Terrier and Poodle have introduced a new issue, while revamped Spark is keeping COM unchanged.
The opportunity to correct COM with Skipper, Spark and other rocket engines could deserve a different report, as it would require to assess the insurgency of instabilities for vessels built with them.

#3 - 01/07/2019 01:23 PM - Poodmund

Thanks for the confirmation Diomedea. I hadn't appreciated that the old Spark had this issue also.

Would you like me to go through all the pre-revamped parts and assess this issue and raise a new report?

Files

Untitled-1.png	211 KB	01/05/2019	Poodmund
CoMnewEngines.png	1.51 MB	01/05/2019	Poodmund