Technical Note: GPS/GNSS Simulators

Vehicle Modeling

Background

The typical application for a GPS simulator assumes an unobstructed view of the satellites. For advanced testing applications, it is possible to model the placement of the GPS antenna relative to the vehicle body. Starting in application software version 6.2, vehicle modeling allows the simulated satellite signals to be blocked by the vehicle. Applications of this feature include aircraft maneuvers.

Tools

Support for vehicle models (and similar to the environmental models) in Orolia's GSG-5/6 series simulators is via compressed keyhole markup language files (kmz) popularized by Google Earth. A simple way to create these files is with the tool SketchUp available from Trimble Navigation. Download and install SketchUp from sketchup.com. The rest of this document describes SketchUp Make 2014 but older versions have been tested.

When running SketchUp for the first time you need to select a template. Select one of the two 'Simple Templates' using either feet or meters. The plugin "Model Info" is recommended to view the triangle count of the models. To install the plugin select the Add plugin extensions to SketchUp button from the toolbar.


Search for "Model Info" in the Extension Warehouse window, click on the Model Info link. Install the plugin by clicking the install button. You may be prompted to log into Google in order to download and install the plugin. You will be prompted to install an additional library as well in order to use the Model Info plugin. After both plugins are installed, close the Extension Warehouse window.

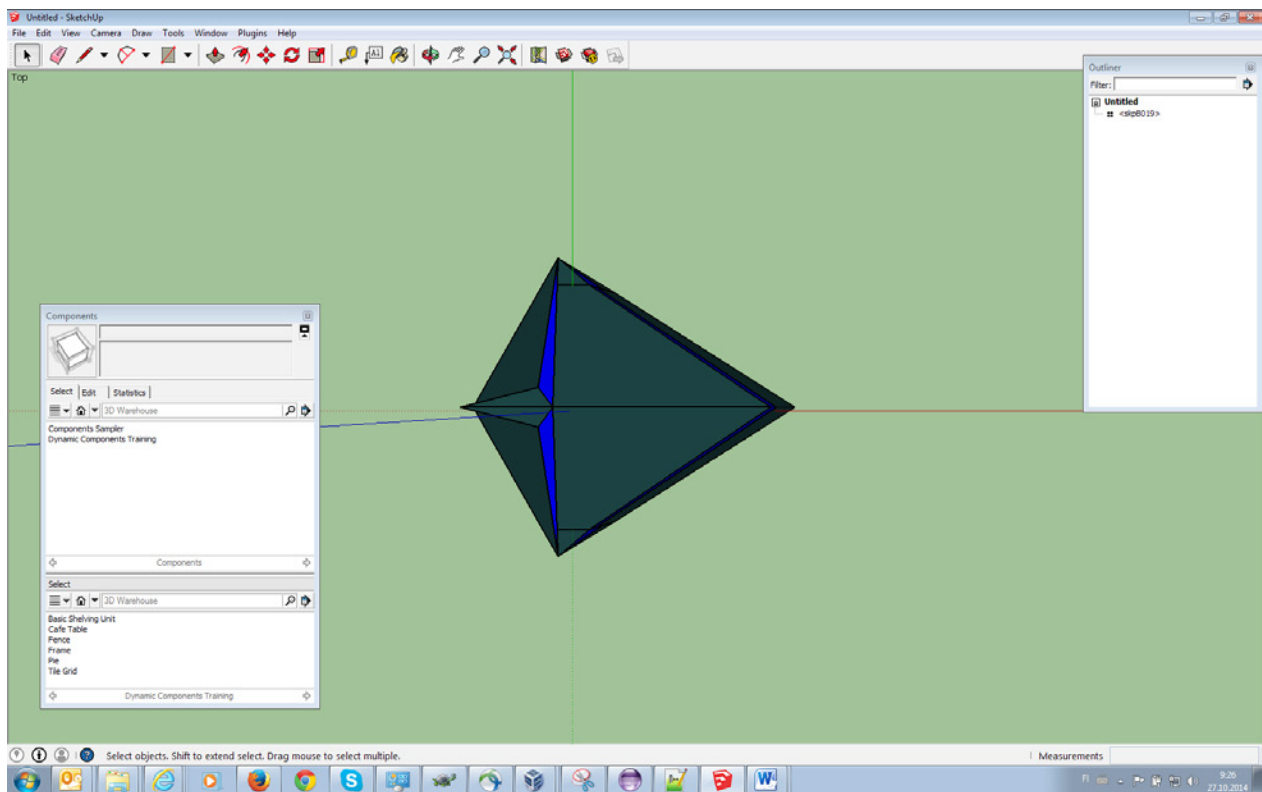### Using SketchUp for creating vehicle models

Delete the default model 'Sophie' by selecting her and pressing the delete key and open following windows
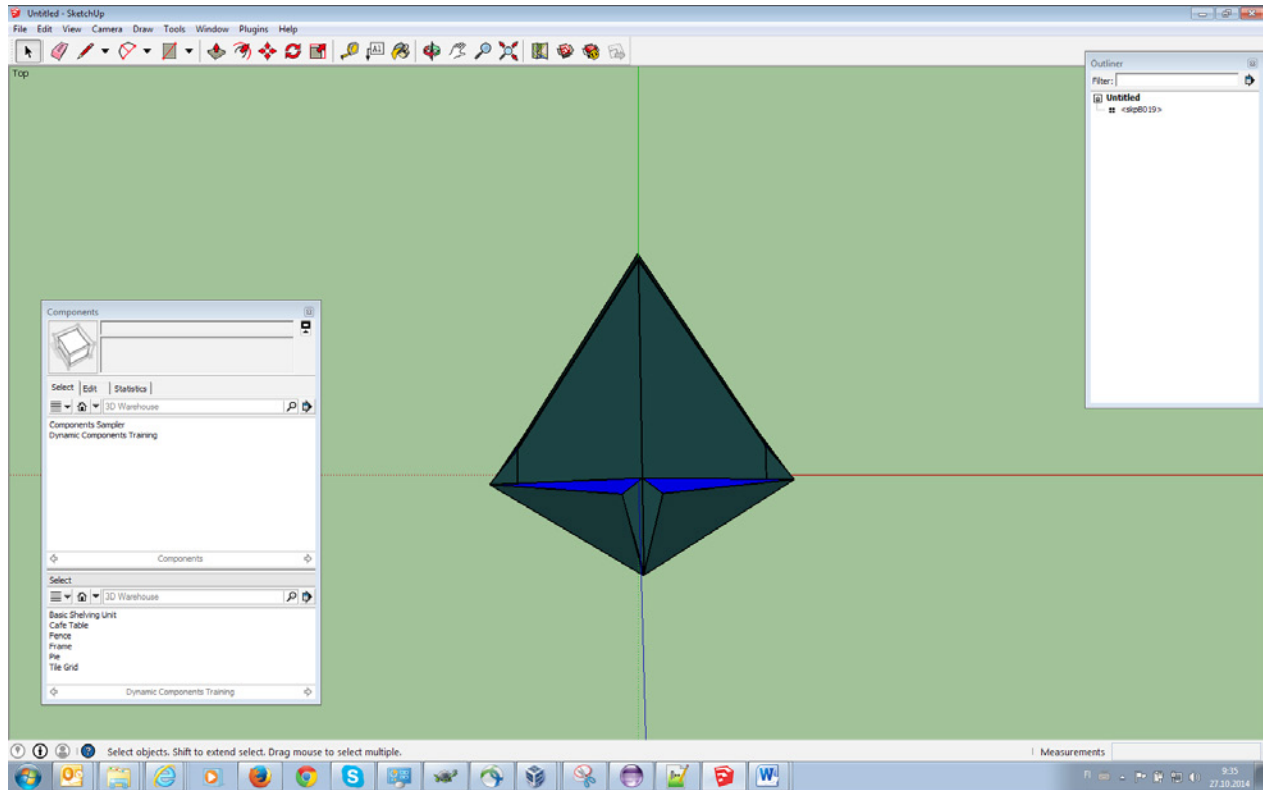
Window -> Components

Window -> Outliner
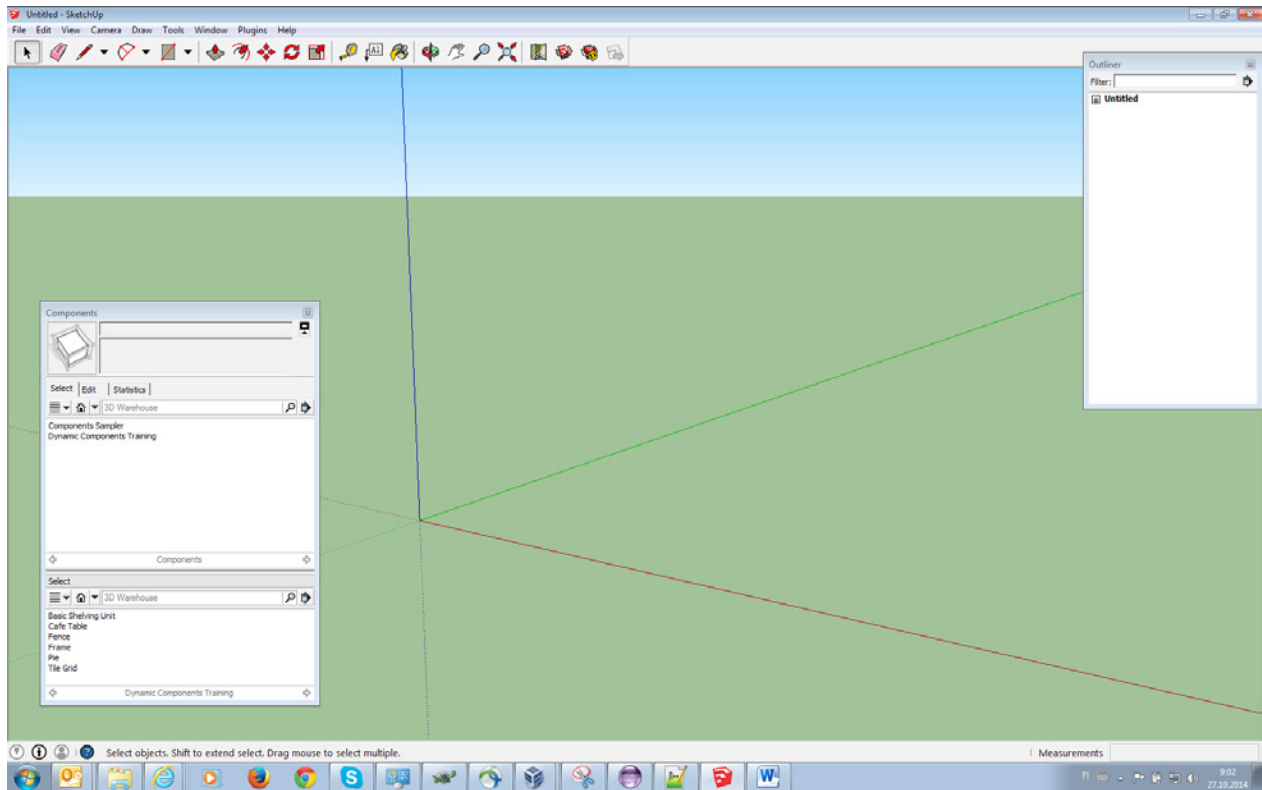
Import or draw a vehicle model.

Note that the nose of the vehicle should point to the north (green axis), and the body mass center should be in the origin, see Manual Section 6.6.3.17.
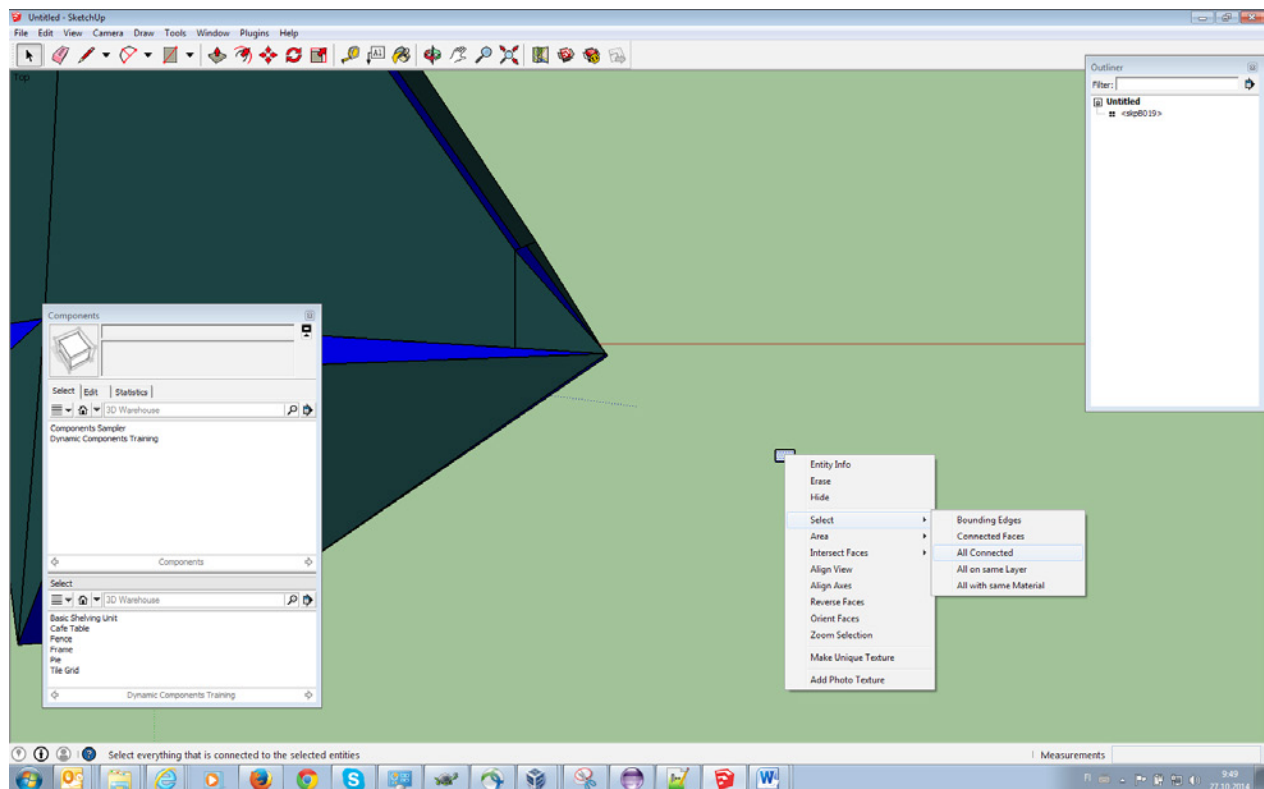

Draw independently an antenna. It should be a very simple component as we only need its origin as the receiver antenna point, or lever arm. The component name must be 'RecAnt'.
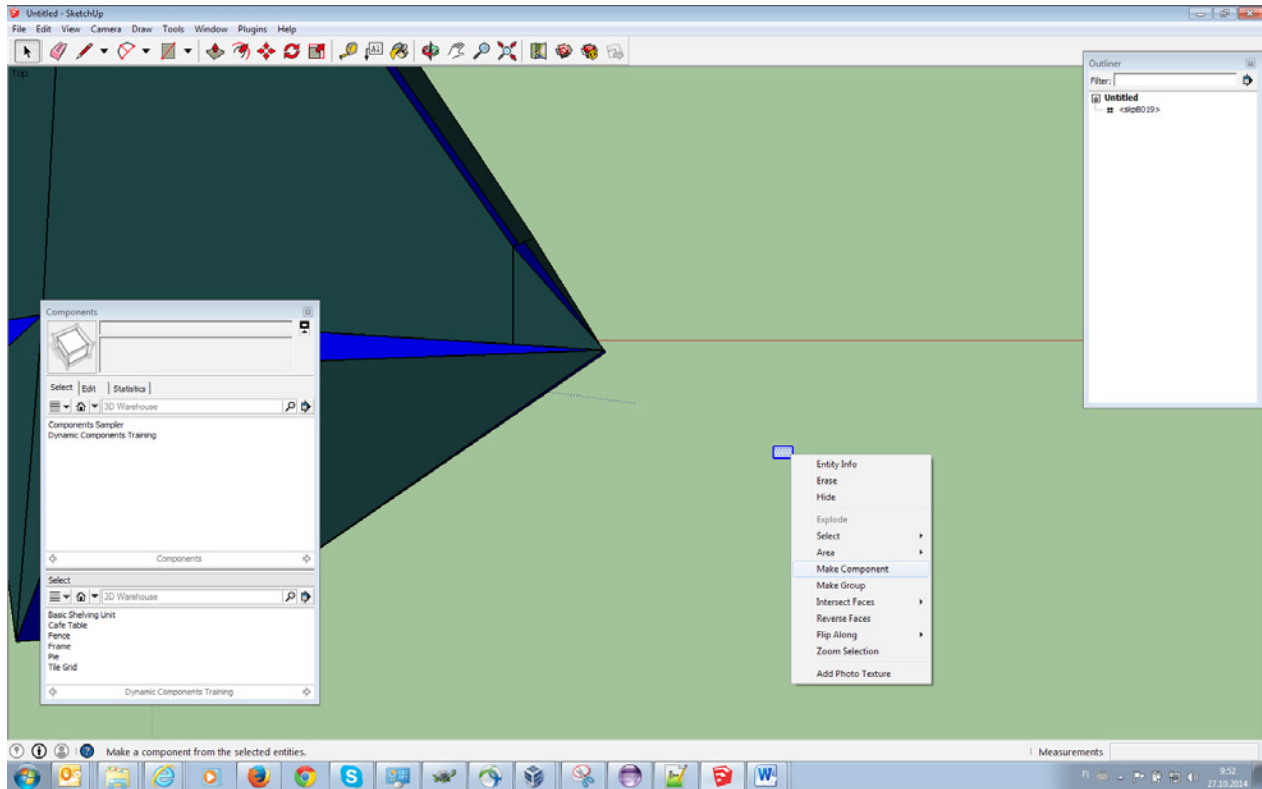
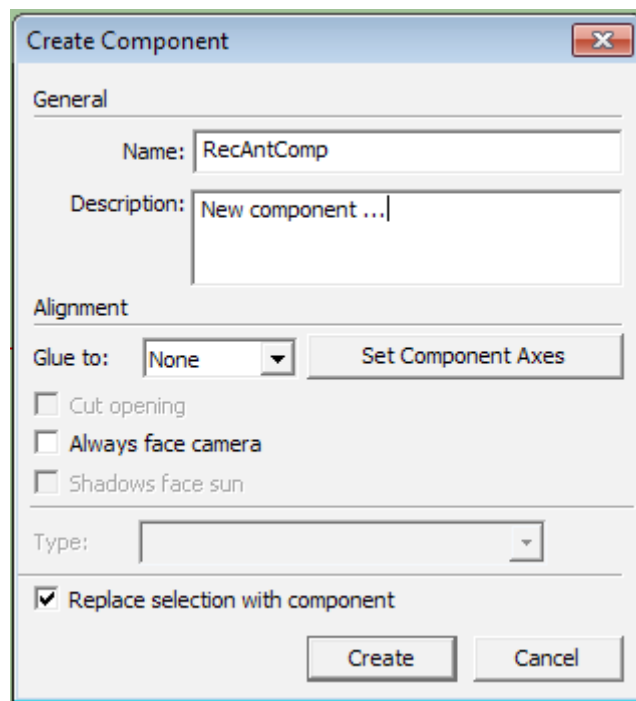In this exercise the antenna model is only a rectangular.
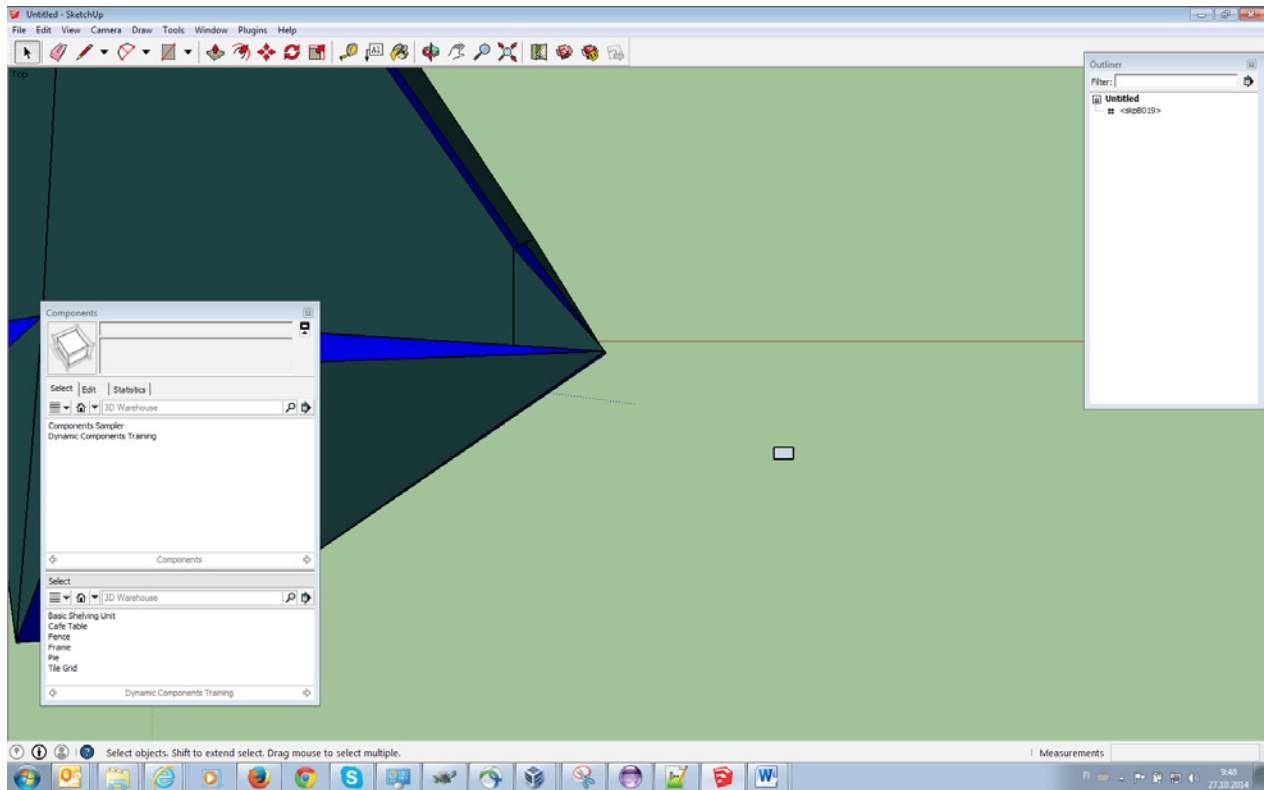
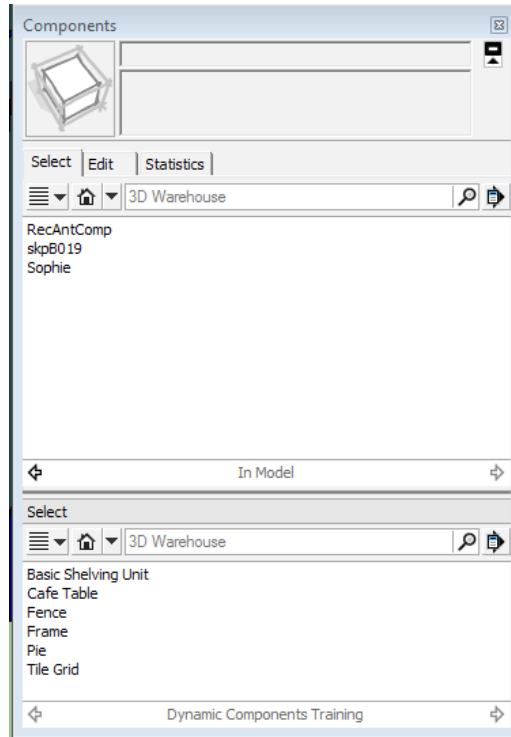Right click on the new rectangular -> Select -> All Connected

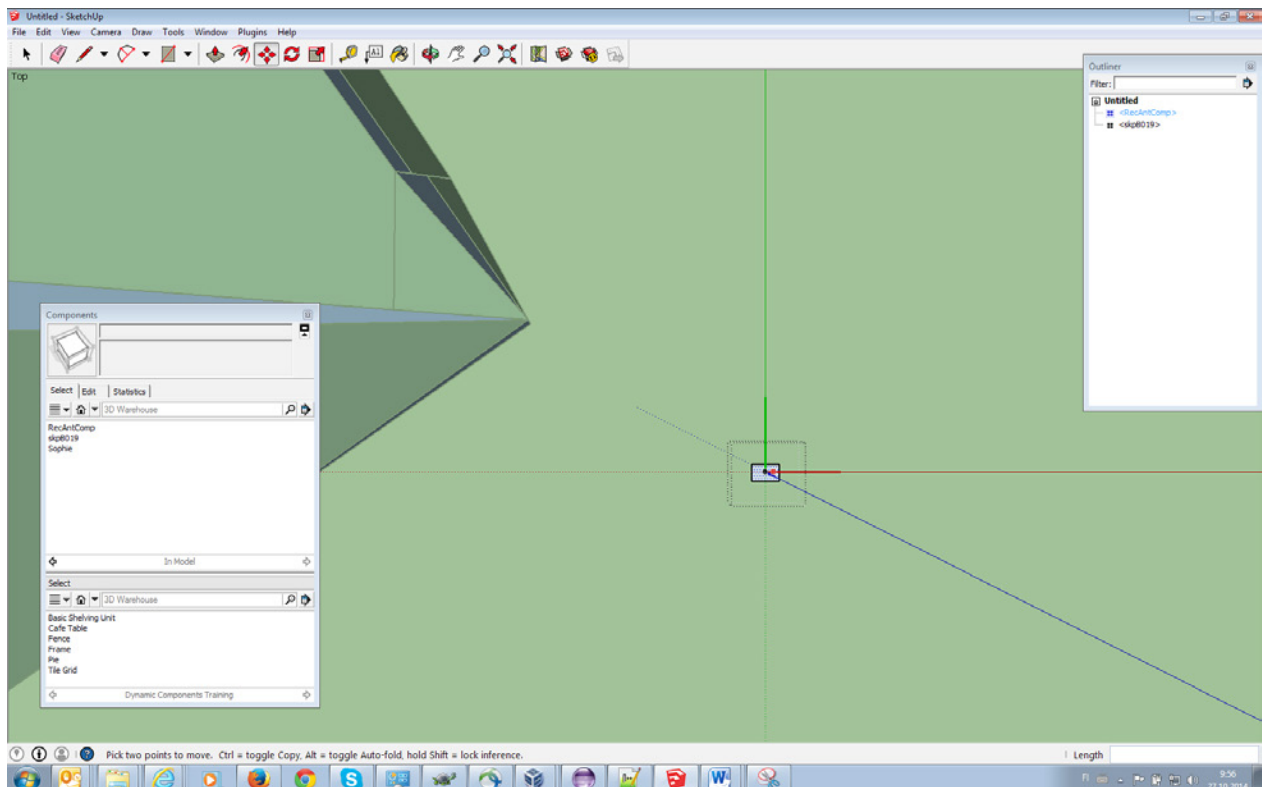Right click again on the selection -> Make component

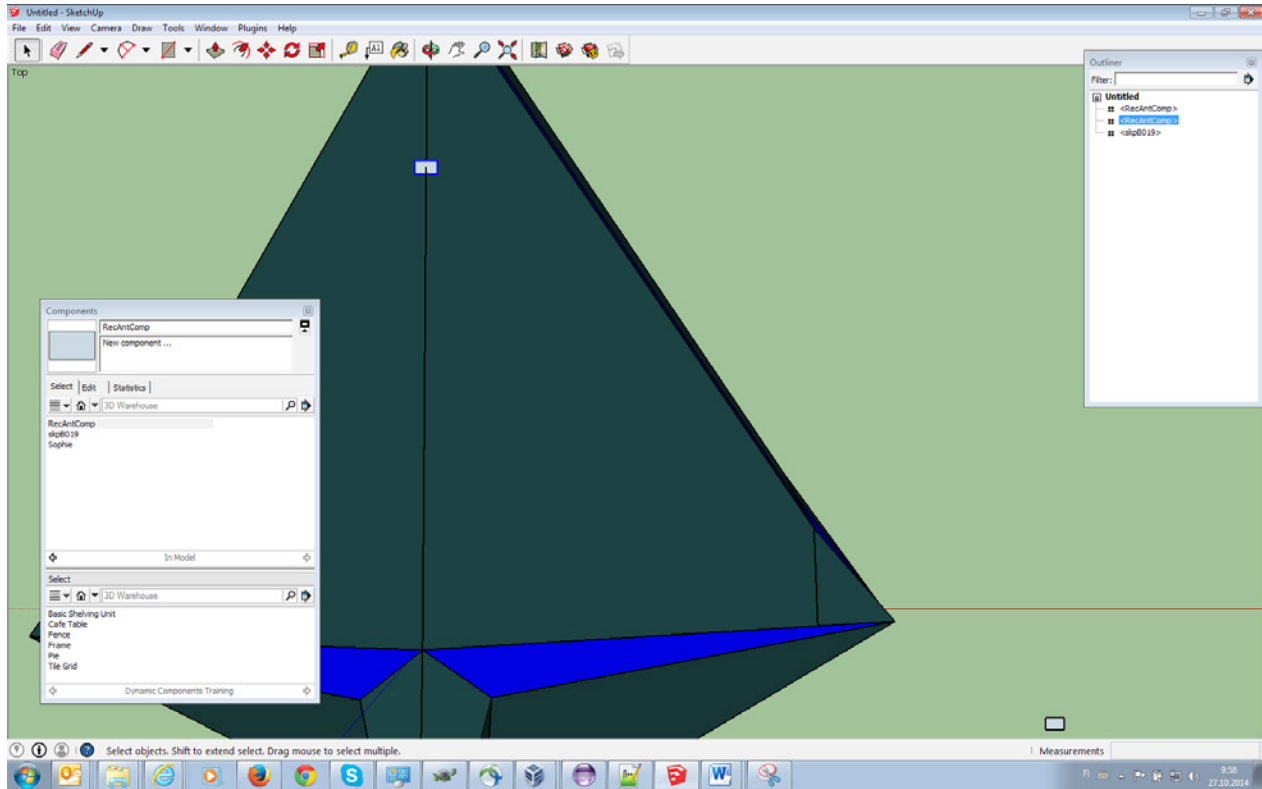Name the component and fill in description, press Create

The component appears in the list of components

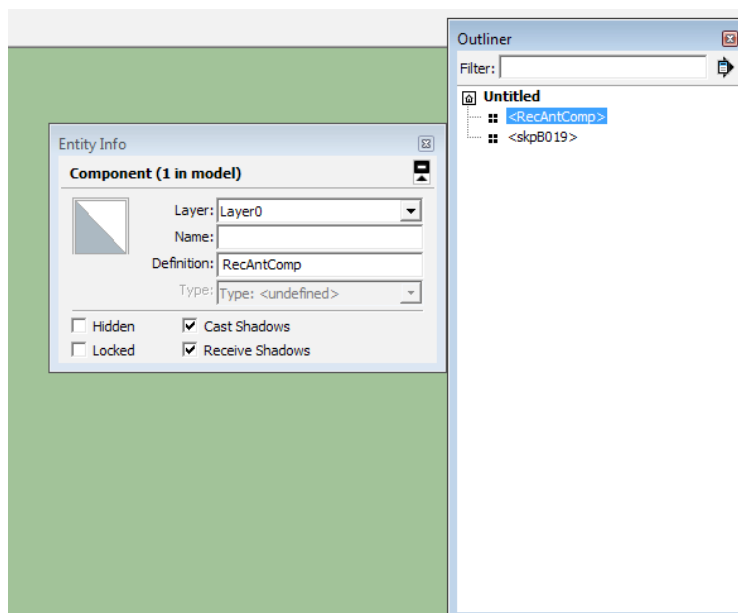It is possible to edit the component further if needed

By selecting the RecAntComp from the components list, an instance of the component is generated and can be placed on the vehicle.

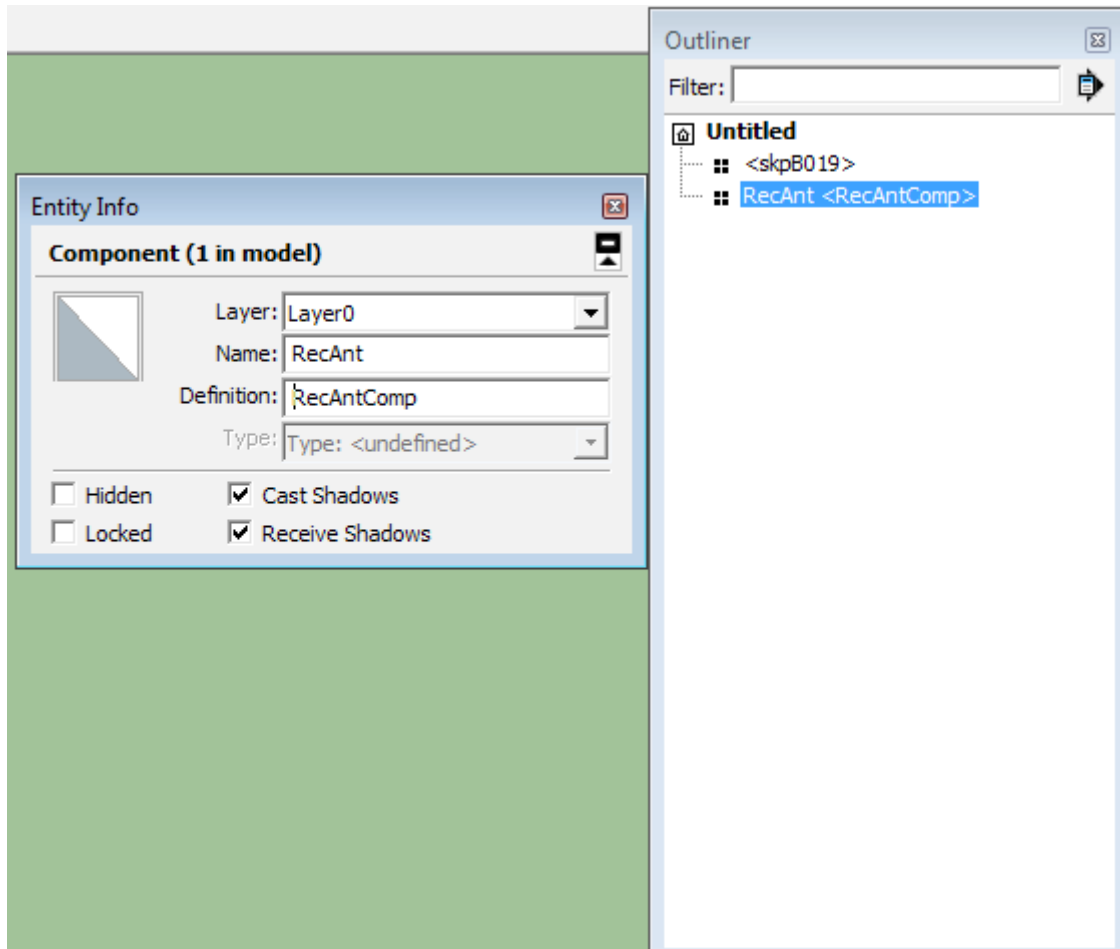Remove the instance of RecAntComp drawn in Step 4.

Check Outliner, the RecAntComp should be there. Right click on the component -> Entity Info
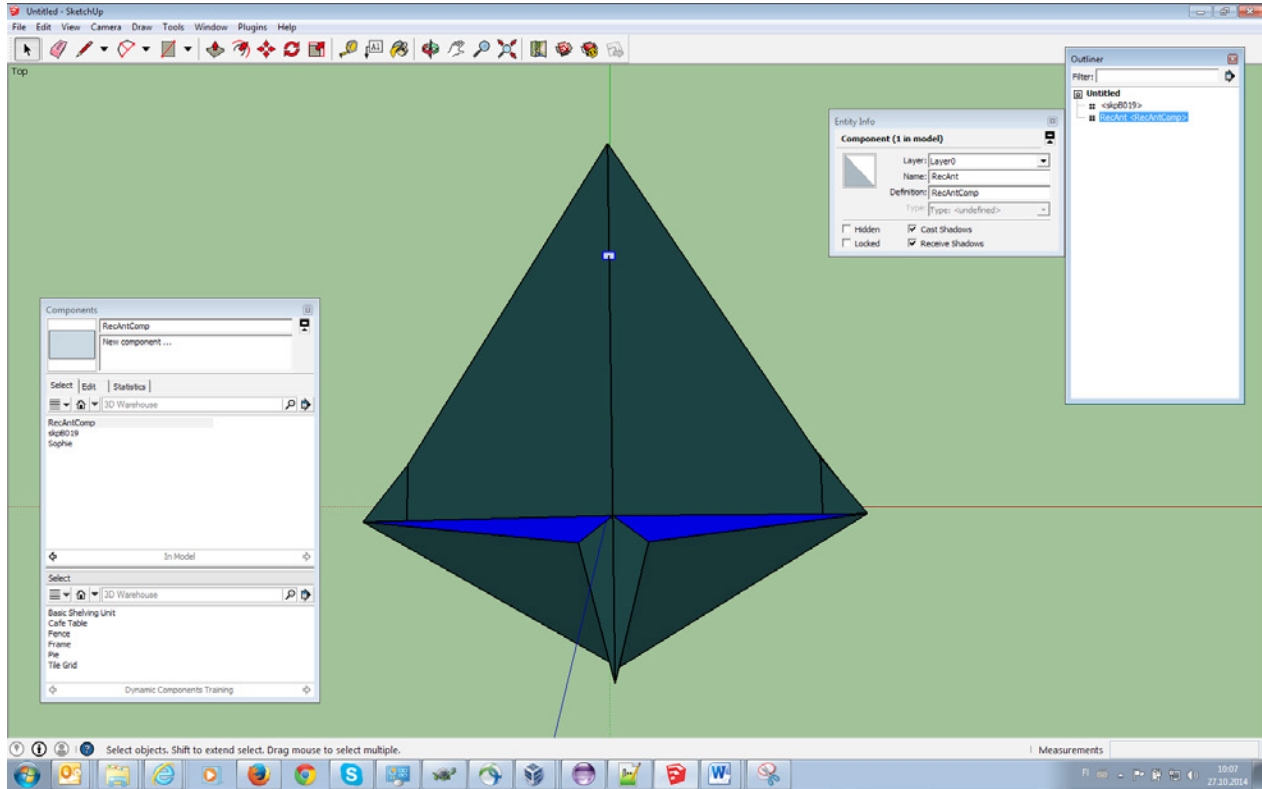The component name is empty.

In Entity Info Name type 'RecAnt'. **Note that the name 'RecAnt' is mandatory.**

Check Outliner, the RecAntComp should have 'RecAnt' name.

And the final view before saving


Export the model as a 3D kmz-file.

When the model is unpacked, the dae-file should contain a node named 'RecAnt' with a matrix element

```
<node id="ID132" name="RecAnt">
    <matrix>1 0 0 0.2898411 0 1 0 40.6411 0 0 1 15.89997 0 0 0 1</matrix>
    <instance_node url="#ID133" />
</node>
```
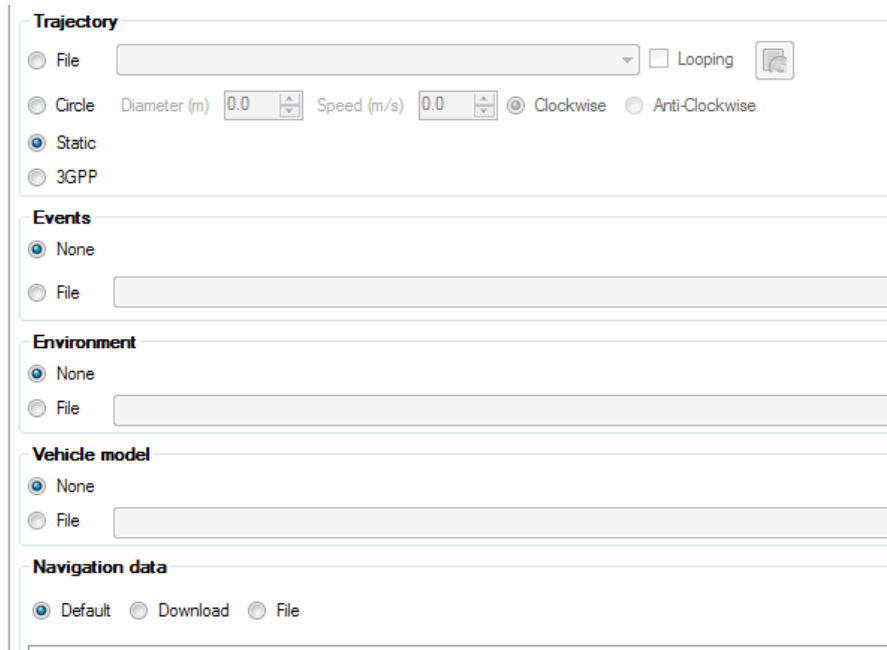
Check the Triangle Count

GSG-5/6 series simulators have a 130 triangle limit for the vehicle models. The Model Info plugin is used to determine the number of triangles in the file. For use in the GSG simulator the file must be exported as a .kmz file. In order to count the actual number of triangles in the exported file, close the .skp file (Close the SketchUp Application) and reopen it. From the File menu select Import... and choose the .kmz file exported. From the Plugins menu Choose Model Info – Statistics to Console. The triangle count for the model is displayed. As long as the model is not more than 130 triangles, it can be used in the simulator. The triangle count is limited to a total of 300 for the combined environment and vehicle models.
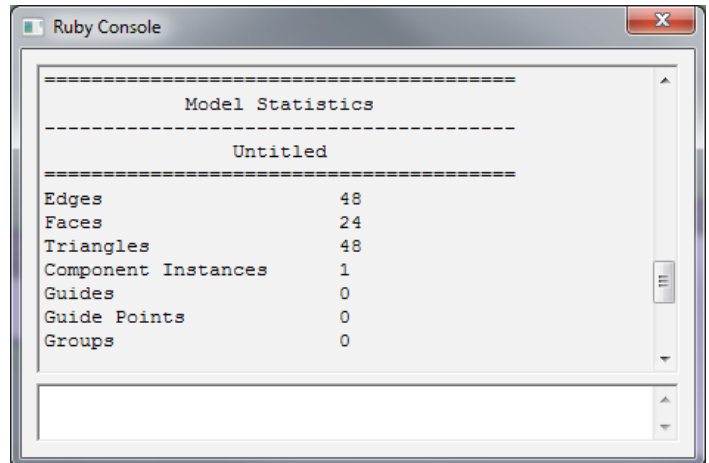
Use Model in a Scenario

Starting in GSG StudioView version 4.2.0.1 a model via kmz file can be added to the scenario. On the navigation tab for the scenario editor, find the Vehicle Model. To upload the kmz model to the StudioView file repository, select the radio button "File" and select the file. Configure the remainder of the scenario settings as desired.

When the scenario file is loaded using the StudioView Uploader, the kmz file is also transferred to the unit. If manually moving files using the StudioView File Manager or the GSG Web Interface, make sure kmz files are saved in the environmentModels folder.

Additional Information

When Lever Arm is set in a scenario file and a vehicle model file is given in a scenario, the receiver antenna position as set in the vehicle model takes precedence.

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