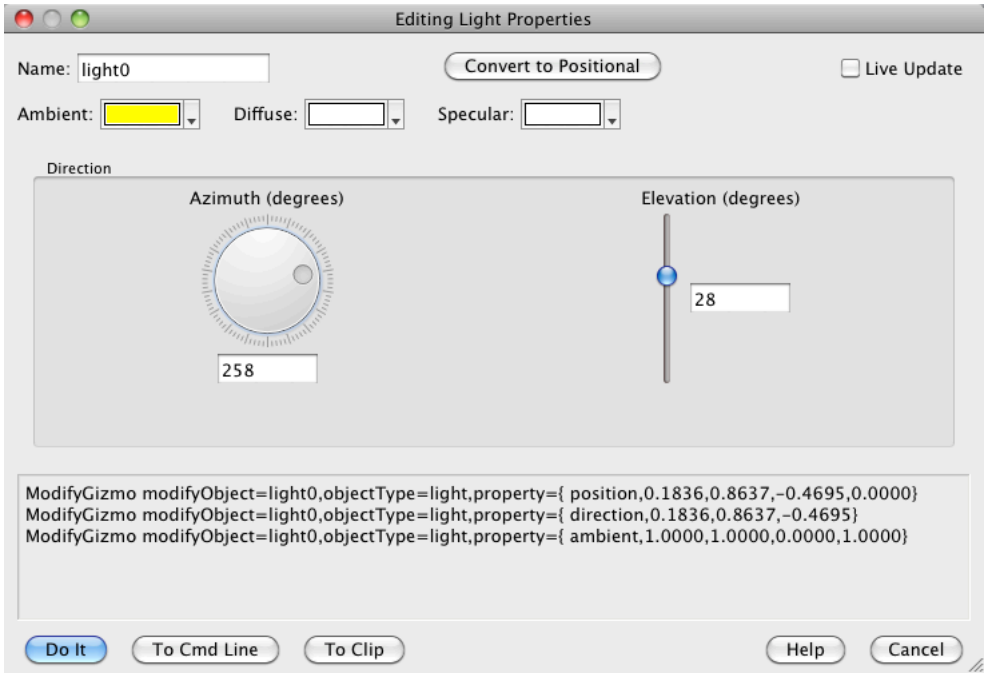


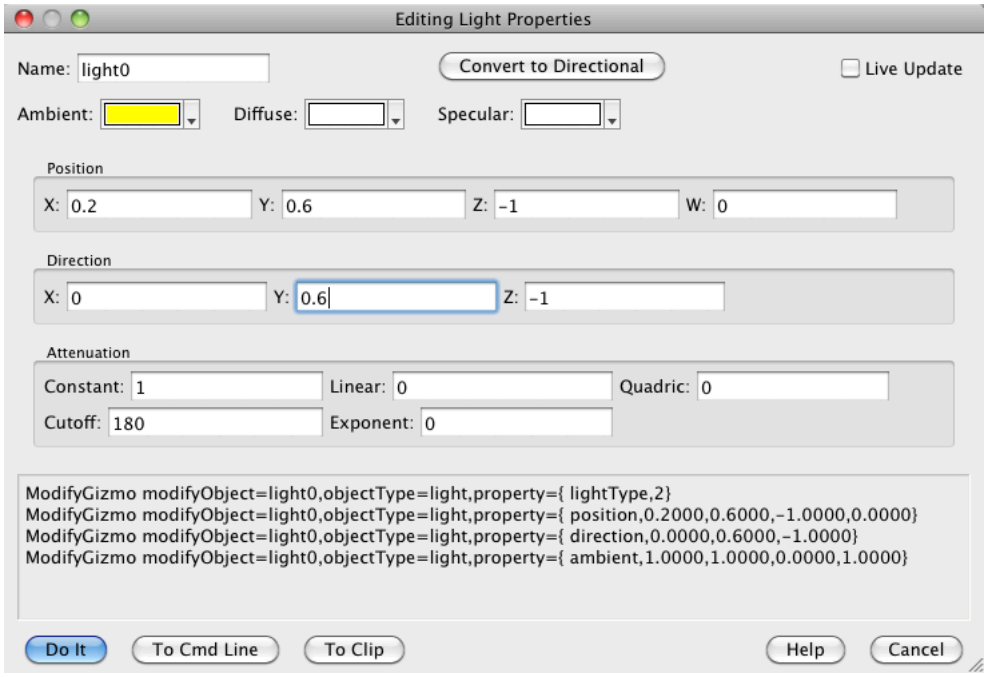
The position of the light is specified via two angles: azimuth and elevation. Elevation is also called "altitude", especially in astronomy. The meaning of these angles is described at http://en.wikipedia.org/wiki/Azimuth. When the elevation is +90 or -90 degrees, the azimuth is undefined.

Ambient, diffuse and specular lighting are described at http://en.wikipedia.org/wiki/Phong_reflection_model. Ambient light illuminates all parts of all objects equally regardless of their orientation and of the position of the light. Diffuse light is reflected off a surface in all directions, as when light hits a rough surface. Specular light is reflected in a specific direction, as when light hits a shiny surface. The illumination created by diffuse and specular light at a given point on an object depends on the angle of the light ray relative to the normal to the surface of that point.

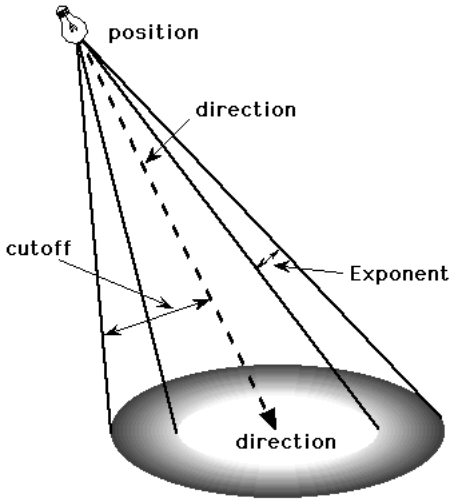
Gizmo Positional Lights

A positional light is a light source that originates at a finite distance from the illuminated scene. A desk lamp is a typical example of a positional light. It can be placed somewhere above the desk and it produces non-uniform illumination as its intensity falls off as a function of distance from the center of the illumination spot.

When you create a light object, it is initialized as a directional light. You can click click the Convert to Positional button in the dialog to get the corresponding positional light settings which you can then adjust as desired.



The parameters for specifying positional lights are illustrated here:



Positional Light Geometry

The top three controls in the directional light dialog specify the RGBA values of each of the ambient, diffuse and specular light components. You should provide some ambient component in at least one of the lights in the display list. This requirement holds even if you are trying to create a predominantly diffuse or specular effect.

When you create a Gizmo object you have the option to specify a color or to leave it unspecified. If you specify a color, Gizmo creates a default color material for the object. The default color material has the GL_FRONT_AND_BACK and GL_AMBIENT_AND_DIFFUSE settings. If you are interested in specular effects you must add specular and shininess attributes (see **Gizmo Colors, Material and Lights** on page II-428).

The Position and Direction controls in the dialog describe the position and direction of the light source. The position is expressed in homogeneous coordinates where the last element (w) is used to normalize the X, Y and Z components. Therefore, if you set w=1, then the X, Y, and Z components specify the absolute position