Pivot Point

Adjusting Pivots

You can think of an object's pivot point as representing its local center and local coordinate system.

The pivot point of an object is used for a number of purposes:
- As the center for rotation and scaling
- As the default location of a modifier center.
- As the transform offset for linked children.
- As the joint location for IK.

You can adjust pivot points by clicking Pivot on the Hierarchy panel, and then using the Adjust Pivot rollout tools.

The functions on the Adjust Pivot rollout cannot be animated. Adjusting an object's pivot on any frame changes it for the entire animation.

Affecting Pivot Only

When Affect Pivot Only is on, move and rotate transforms are applied only to the pivot of a selected object.
- Moving or rotating the pivot does not affect the object or its children.
- Scaling the pivot scales the object from the pivot center, but its children are unaffected.

Affect Pivot Only transforms the pivot without moving the object.

Affecting Object Only

When Affect Object Only is on, transforms are applied only to selected objects. Pivots are not affected. Moving, rotating, or scaling the object does not affect the pivot or its children.

Affect Object Only transforms the object without moving the pivot.

Affecting Hierarchy Only

When Affect Hierarchy Only is on, rotate and scale transforms are applied only to the links between objects and their children.
- Scaling or rotating an object affects the link offsets of all its descendents without affecting the geometry of the object or its descendents. The descendents shift position because of the scaled or rotated links.

Use this technique to adjust the offset relationship between linked objects. Use this technique to adjust the offset relationship between linked objects and for adjusting bones to match geometry.
After a hierarchy is created, you can scale the position of the children without changing the individual objects’ dimensions.

Rotating the hierarchy does not affect the individual objects’ orientation.

Aligning Pivots

Buttons on the Alignment group box of the Adjust Pivot rollout change names based on state of Affect Object Only and Affect Pivot Only. Alignment is disabled when Affect Hierarchy Only is active.

- **Center to Object/Pivot**: Moves the object, or so the pivot is at the center of the object.
- **Align to Object/Pivot**: Rotates the object, or pivot, to align the pivot with the object’s original local coordinate system.
- **Align to World**: Rotates the object, or pivot, to align with the world coordinate system.

Resetting the Pivot

Click Reset Pivot to return the pivot point of a selected object to the position and orientation it held when the object was first created.

Reset Pivot has no effect on the object or its children. The state of the Affect Pivot Only and Affect Object Only is ignored.

Adjust Pivot Rollout

Make a selection in the viewport. ➤ Hierarchy panel ➤ Pivot button ➤ Adjust Pivot rollout

You can adjust the position and orientation of an object’s pivot point at any time using the buttons in the Adjust Pivot rollout. Adjusting an object’s pivot has no effect on any children linked to that object.

You cannot animate the functions under the Adjust Pivot rollout. Adjusting an object’s pivot on any frame changes it for the entire animation.

Pivot point sets hand to the center of the clock face.

Procedures

To reposition an object’s pivot point:

1. Select an object and then turn on Hierarchy panel ➤ Adjust Pivot rollout ➤ Affect Pivot Only.
2. Move or rotate the pivot.
3. You can also use Align, Quick Align, and Align to View on the toolbar to align the pivot.

Interface

Move/Rotate/Scale group

Each of the buttons in the Move/Rotate/Scale group box highlights when active. This determines which part of the object is affected by the three buttons in the Alignment area, as well as the Transform and Align commands on the main toolbar.

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect Pivot Only</td>
<td>Affects only the pivot point of the selected objects.</td>
</tr>
<tr>
<td>Affect Object Only</td>
<td>Affects only the selected objects (and not the pivot point).</td>
</tr>
<tr>
<td>Affect Hierarchy Only</td>
<td>Applies only to the Rotation and Scale tools. It applies the rotation or scale to the hierarchy by rotating or scaling the position of the pivot point without rotating or scaling the pivot point itself.</td>
</tr>
</tbody>
</table>

Note: You can use this on hierarchies of 3ds Max objects, but don’t use it on Bones systems. To reposition, rotate or change the size of bones in a chain, see Bones.

Note: It’s important to remember that the Align, Normal Align, and Align to View functions are all affected by the state of Affect Pivot Only, Affect Object Only, and Affect Hierarchy Only. Snap mode allows you to snap the pivot to its own object, or to any other object in the scene.

Alignment group

The effect of these buttons depends on whether you chose Affect Pivot Only or Affect Object Only. They don’t apply to Affect Hierarchy Only.

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center to Object</td>
<td>Moves the pivot to the center of its object.</td>
</tr>
<tr>
<td>Align to Object</td>
<td>Rotates the pivot to align with the object’s transformation matrix axes.</td>
</tr>
<tr>
<td>Align to World</td>
<td>Rotates the pivot to align with the world coordinate axes.</td>
</tr>
</tbody>
</table>

If you chose Affect Pivot Only, the buttons work as follows:

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center to Pivot</td>
<td>Moves the center of the object to its pivot location.</td>
</tr>
<tr>
<td>Align to Pivot</td>
<td>Rotates the object to align its transformation matrix axes with the pivot.</td>
</tr>
<tr>
<td>Align to World</td>
<td>Rotates the object to align its transformation matrix axes with the world coordinate axes.</td>
</tr>
</tbody>
</table>

Pivot group

<table>
<thead>
<tr>
<th>Button</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset Pivot</td>
<td>Resets the pivot point to the position and orientation it held when the object was first created. This is not affected by the state of the Affect Pivot Only and Affect Object Only buttons.</td>
</tr>
</tbody>
</table>

Working Pivot Rollout

Make a selection. ➤ Hierarchy panel ➤ Pivot button ➤ Working Pivot rollout
As an alternative to the object’s own pivot, you can use the *working* pivot for applying transforms to any object in the scene. This allows you, for example, to rotate an object about an arbitrary, persistent point in the scene without interfering with the object’s own pivot.

You position and orient the working pivot using standard transform tools as well as some special options available on this rollout, and can activate it at any time. You can use it for editing geometry at the object and sub-object levels. Keep in mind, however, that the working pivot cannot be used as a transform center when creating animation (see *Animation and the Transform Center*).

**Note** The scene contains only one working pivot, which is independent of other scene elements such as geometry.

### Moving an object along the working pivot Z axis

**Important** Most Working Pivot tools are best used in working contexts other than the Hierarchy panel. For example, you can use it in the Modify panel context while editing mesh sub-objects. For this reason, it’s highly recommended that you use *Customize User Interface* ➤ Main UI group ➤ Working Pivot category actions to create a set of controls that you can use anywhere in the 3ds Max interface. For example, you could create a custom Working Pivot toolbar with buttons that give you access to the Working Pivot commands while editing meshes.

### Procedure

**To use Working Pivot:**

1. Turn on Edit Working Pivot and use standard transform tools or the *Place Pivot To group* commands to place and orient the working pivot. Turn off Edit Working Pivot when done.

2. You can use the working pivot in either of two ways:
   - Turn on Use Working Pivot from either the Hierarchy panel or your custom UI control.
   - By default, this sets the geometric center for rotate and scale transforms to *Use Transform Coordinate Center*; that is, the working pivot position. To specify a different transform center, use the *Use Center flyout*.
   - From the main toolbar ➤ *Reference Coordinate System list*, choose Working.
   - This keeps the current *Use Center* setting.

**Interface**

When any of the modular tools on this rollout is active, a message to that effect appears in each viewport below the viewport name. For example, when you activate Use Working Pivot, the viewport legend reads “USE WP.”

**Edit Working Pivot**

When on, makes the working pivot visible in the scene and lets you transform it.

When you first enter Edit Working Pivot mode, all transform tools use the Local *reference coordinate system* by default. You can change the coordinate system while working in this mode, and the tool remembers the reference coordinate system for each transform. Changing the transform, for example from Move to Rotate, recalls the last coordinate system for that transform during the current Edit Working Pivot session.
Exiting Edit Working Pivot restores the last active transform tool. For example, if you’re rotating an object, and you move the working pivot and then exit Edit Working Pivot mode, the Rotate tool will again be active.

**Note** While Edit Working Pivot is active, the current selection is locked to the working pivot and cannot be changed without exiting this mode.

**Use Working Pivot** - When on, lets you transform the current selection (objects or sub-objects) with respect to the working pivot. The transform gizmo, when visible, moves to the working pivot location. In this mode you typically transform the selection by manipulating the gizmo rather than the selection.

  - This mode overrides the current transform space for all transforms. Exiting this mode restores the individual coordinate system for each transform tool.
  - By default, this sets the geometric center for rotate and scale transforms to **Use Transform Coordinate Center**; that is, the working pivot position. To specify a different transform center, use the **Use Center flyout**.
  - You can activate Edit Working Pivot while using the working pivot; when you exit Edit Working Pivot, Use Working Pivot mode is restored.

**Align To View** - Reorients the working pivot so that its XY plane is parallel to the active view plane and the X and Y axes are parallel to the viewport edges. Available only in Edit Working Pivot and Use Working Pivot modes.

**Reset** - Moves the working pivot to the pivot location of the selected object. With multiple selected objects, the working pivot moves to the pivot position of the last-selected object. With a sub-object selection, the working pivot moves to the geometric center of the selection (the averaged position of the selected sub-objects). If the working pivot doesn’t appear onscreen, use Reset to move it to a known location.

**Place Pivot To group**

These controls let you position the working pivot by clicking the mouse instead of with transform tools. To use, click the View or Surface button, and then click in a viewport to position the working pivot there. To exit, right-click the active viewport or click the button again. You’re then returned to the previous transform tool and working pivot mode if you were using one.

**View** - Places the working pivot in screen space without changing its depth in the screen. Thus the placement is on a grid that is parallel to the screen, intersecting the original position of the pivot.

**Surface** - Places the working pivot on a surface you click on, or, if no surface is present where you click, the construction plane. This works like **AutoGrid**, and you can see the gizmo previewing the alignment to the normal of the surface as you move the cursor over it. Clicking places the pivot to the surface and aligns it to the normal (unless Align To View is on; see following).

**Align To View** - When on, automatically aligns the working pivot to the current view when you place it with View or Surface. This is useful to prepare for transforms in the screen plane.