



Life Forms & LightWave 3D:

Animating LightWave characters in Life Forms

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Background

Credo Interactive Inc., Makers of Life Forms, has developed a software component or plug-in which adds the ability to import and export LightWave scene files (.lws) from Life Forms.

This document explains how to import and export LightWave scene files and what this means for your project. This document will go through how to:

- use Life Forms to animate segmented models from LightWave,
- export BioVision bones from LightWave for your Mesh models,

Setting up bones for a complex mesh like the human model does require some expertise. We suggest that you also consult other resources for more information. This document is not going to explain the basics of Inspire 3D or LightWave 3D. It assumes that you are already proficient in using these programs.

If you have Puppet Master, and you want to animate your Puppet sections in Life Forms, please refer to the Life Forms and Puppet Master tutorial available from <http://www.credo-interactive.com/lightwave3d/index.html>.

What you need

You will need:

- **LightWave 3D 5.5 or later**
- **Life Forms Studio 3** (Demo Life Forms 3 can also be used. The demo version can be downloaded for free from <http://www.credo-interactive.com>. Note that the demo allows you to export only 5 frames of animation).
- **Latest LightWave plug-ins**. Download these from <http://www.credo-interactive.com/lightwave3d/index.html>

Installing the LWS plug-ins

Please read the Readme file that comes with the plug-ins.



Overview: What the LWS plug-ins do

The LightWave plug-ins import and export LWS files from LightWave.

Import Options

On LWS import plug-in gives you the option of importing just bones. This option allows Life Forms to read in just the bones from an LWS file containing a mesh model that you have boned.

Importing or Opening a LWS file

- 1 Choose **File menu > Open**.
- 2 In the File types drop-down menu, select **Lightwave.LWS**.
- 3 Browse and select the LWS file that contains the character that you have boned.
- 4 The Import Options dialog box will open.



Depending on your project you will either:

- **Check the Import Bones Only** checkbox when you have set up bones for animating a single-mesh model. The geometry of a single-mesh model (i.e. not segmented) is usually quite large and takes a long time to import. Since Life Forms does not deform meshes anyway, there is no need to import it. All we really need are the Bones. Hence, click **Import Bones Only**.
- **Do not check the Import Bones Only** checkbox when you want Life Forms to read in scene objects, segmented models and Puppet sections from the LWS file.

Note: The zero angle position of bones imported from LightWave 3D is such that the skeleton lies on the floor facing upwards. You can't change the zero angle position, but you can give the skeleton a default shape or position that will make it easier to work with. See [“Setting the Default Shape” on page 15](#).



Export Options

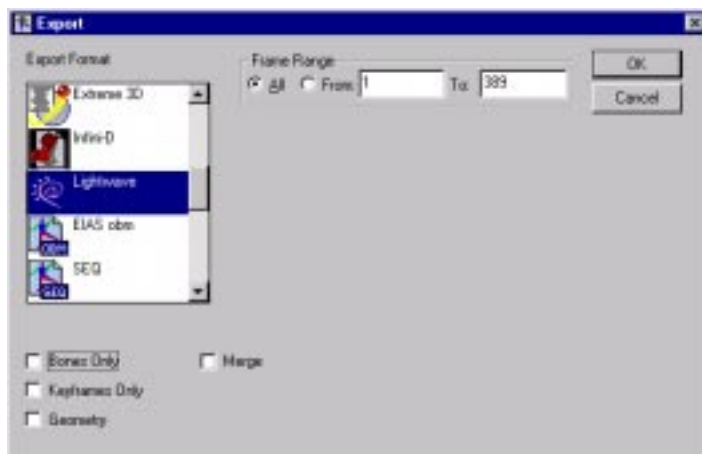
Life Forms gives you the following options when exporting motion as a LWS file:

- Export with Bones Only
- Export with Geometry Only
- Export Keyframes Only.

Merging motion data to a LWS file

You can import a LWS file in Life Forms, animate the scene objects and models and insert the motion data into the original LWS file by using the Merge Option. The merge process preserves all the material, lighting and camera set up in the LWS file, and is therefore highly recommended.

- 1 Click on any window of the animation you want to export. Then, choose **File menu > Export**.
- 2 In the Export dialog box, select **LightWave** from the **Export Format** list as shown.



- 3 Click the **Merge** checkbox. Notice that when you do so, the options to export **Bones Only** or **Geometry** disappear.
- 4 Click **Merge File....** Browse and select the LWS file that you want to merge the motion data to. This LWS file must be the file from which you imported the bones or geometry in the first place.
- 5 Choose whether or not to export **Keyframes Only** — By default Life Forms exports all frames as keyframes. Exporting only Keyframes instead of all frames makes the animation easier to manipulate in LightWave 3D. However, if the animation is keyframed very sparsely and only keyframes are exported, you may see “twitching” actions when you play the animation



in LightWave 3D. Another way to reduce the number of Keyframes created is to use the Thin Keyframes command. See [“Reducing the number of keyframes” on page 14](#).

- 6 Click **OK**. Life Forms will now insert or merge the animation to the LWS file.

Exporting Bones to a LWS file

Select this export option to export the motion with a set of Bones. This option is useful for exporting motion capture skeletons as LightWave bones. In LightWave 3D, you can then load a mesh and attach these bones to it.

- 1 Click on any window of the animation you want to export. Then, choose **File menu > Export**.
- 2 In the Export dialog box, select **LightWave** from the **Export Format** list.
- 3 Click the **Bones Only** checkbox.
- 4 Choose whether or not to export **Keyframes Only** — By default Life Forms exports all frames as keyframes. Exporting only Keyframes instead of all frames makes the animation easier to manipulate in LightWave 3D. However, if the animation is keyframed very sparsely and only keyframes are exported, you may see “twitching” actions when you play the animation in LightWave 3D. Another way to reduce the number of Keyframes created is to use the Thin Keyframes command. See [“Reducing the number of keyframes” on page 14](#).
- 5 Click **OK**. Name and save the LWS file.

Exporting Geometry to a LWS file

Select this export option to export the motion and models. This option is useful exporting any Life Forms animation to a new LWS file. Props and model joints in Life Forms will be exported LWO files.

- 1 Before you choose the **Export** command, you have a **Content** directory or folder for the LWS file you are about to export. A Content directory is a folder of any name where you want to store the LWS scene file and Object folder that Life Forms will create. You can use an existing folder or create a new one.
- 2 Life Forms cannot recognize a folder when it is empty. Allow Life Forms to “see” the folder by moving any file into it. It doesn’t matter what the file is.
- 3 Click on any window of the animation you want to export. Then, choose **File menu > Export**.



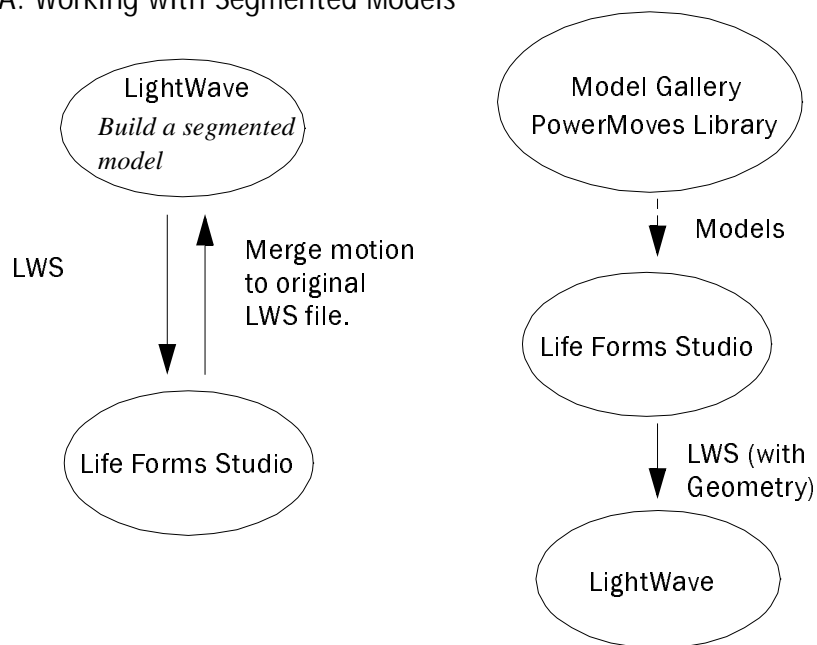
- 4 In the Export dialog box, select **LightWave** from the **Export Format list**.
- 5 Click the **Geometry** checkbox. When you select this option Life Forms exports LWO files for the geometry.
- 6 Click **Content Directory**. In the dialog box, that appears browse and find the folder you want to save to. Open the folder and select any file in this folder. This file will not be altered. Selecting the file merely lets Life Forms recognize and use the folder that it is in.
Note Life Forms will not be able to recognize the folder if it is empty.
- 7 Choose whether or not to export **Keyframes Only** — By default Life Forms exports all frames as keyframes. Exporting only Keyframes instead of all frames makes the animation easier to manipulate in LightWave 3D. However, if the animation is keyframed very sparsely and only keyframes are exported, you may see “twitching” actions when you play the animation in LightWave 3D. Another way to reduce the number of Keyframes created is to use the Thin Keyframes command. See [“Reducing the number of keyframes” on page 14](#).
- 8 Click **OK**. Life Forms now exports a LWS file to the folder you selected in Step 6. Life Forms also creates an Objects folder there. It exports all LWO files for this scene file to a subfolder of the Objects folder. This subfolder will have the same name as the scene file.



How to Use LWS plug-ins

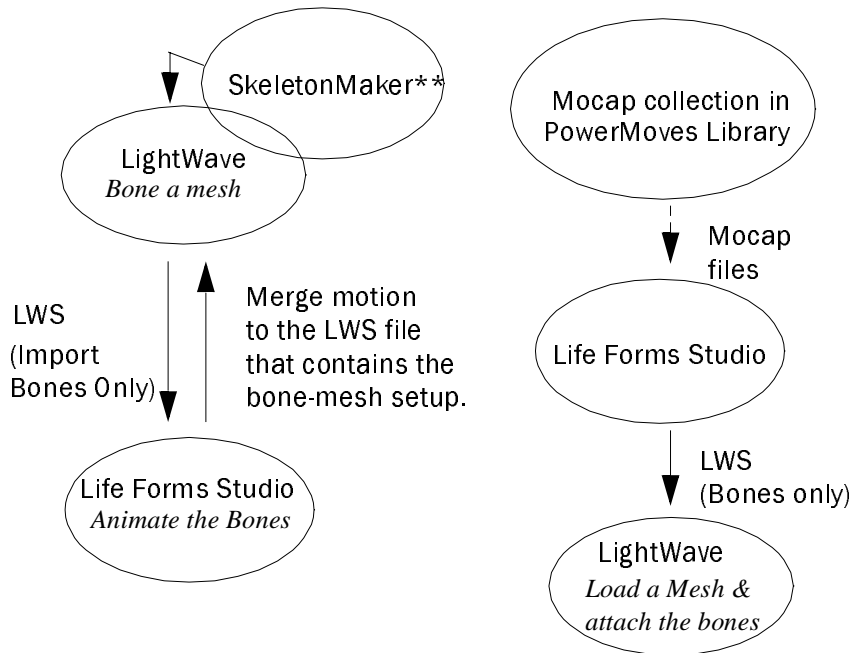
The diagrams below show how data can be moved between Life Forms and Lightwave when working with segmented models or bones. There are two scenarios: working with segmented models and working with Bones.

A. Working with Segmented Models





B. Working with BONES



** SkeletonMaker is a LightWave 3D plug-in that makes it easier to create bones. This plug-in is optional. You can create bones without using it. The SkeletonMaker plug-in is not available in Inspire 3D.

Animating Jointed Models

Life Forms will animate any jointed model that has been correctly set up in LightWave. Once you have brought the model into Life Forms, you can animate it very efficiently by using Life Form’s procedural Walk Generator, by keyframing and by pasting motion capture data.

Key Point

Life Forms will animate any polygonal and segmented model from LightWave that is correctly linked and has correct pivot points.

Example

1 Setting up the Segmented Model



Life Forms provides several Life Forms-ready models in the Life Forms format (.lfa) in the Model Gallery and PowerMoves Library.

In LightWave, you will need to build or import a segmented model. If you are building a custom model, we recommend that you build it with arms down to the side.

Before it can be animated, you must set its pivot points and link each joint to another creating a hierarchy of joints. Remember that all LWO files for this model must be contained in the same folder. Information about linking and setting pivot points is found in the LightWave User Guide.

2 Remove all but one Null root object

Unlike LightWave, Life Forms requires that each model has only one root object. The root's position and rotation is inherited by the other joints.

3 Save the file as a LightWave scene file (LWS)

Before saving the model in a scene file, we recommend that you turn off all IK settings and remove all frames of animation. This is because Life Forms only reads in keyframe data for the position of the root joint and the shape of the figure (i.e. data about the position of the joints). LightWave allows you to keyframe other parameters as well but these are not read into Life Forms. Now you may save the file.

4 Open the LWS file in Life Forms

Choose **File menu > Open**. In the Open dialog box, locate the LWS file and click OK. When the file is open, you are ready to animate the model.

5 Apply Motion Capture data

- Open a motion captured animation, for example **Exercise.lfa** in **Life Forms 3.0 Demo folder/ Tutorial- Life Forms folder**.
- Copy all frames from Exercise.lfa animation. Do this by clicking in the grey panel to the left the animation's Timeline. Then, choose **Edit menu > Copy**.
- Click on the first frame of the destination file. This positions the insertion point at the first frame.
- Choose **Edit menu > Paste Defaults** submenu. Check that paste **Relative Location** and **Absolute Facing** is checked.
- Then, choose **Edit menu > Paste**.

The Joint Map editor will appear. This is where you match the source to the destination joints. By doing so, you are telling Life Forms how to apply motion data from one model to another.

Repeat the copy and paste procedure to apply the motion data from **HipHip.lfa** (also found in the Tutorial folder) after the first sequence.

6 Tweaking the Motion Capture data.

After mocap is applied to a model, you may notice that the mocap animation looks awkward when applied to a model whose rest position is not exactly the same as that of the mocap skeleton. For example, if the legs of the segmented model are slightly apart, this model will run strangely when a run animation is applied to it. You can correct these problems by using the Range edit function to apply a relative rotation to the affected joints. More information about using the Range edit function is found in



the **Getting Started.pdf** in the **Life Forms 3 Demo folder/ Tutorial-Life Forms folder**.

7 Merge motion to the original LWS file

In Life Forms, choose **File menu > Export**. In the Export file type, click the LightWave icon.

- **Select the Merge button**

Click the **Choose** button. This opens the dialog box that lets you locate the source LWS file. Locate and select the file then click **Open**. In the Export dialog box, click OK to merge the motion data to the source LWS file.

“Merging” data to a LWS file allows you to add just the motion data to the LWS file. All the colour, texture and lighting setup in the source LWS file is preserved. If you add other models in Life Forms, for example you imported one of the free models in the PowerMoves Library, you cannot choose Merge. You must export the motion and models to a NEW LWS scene file.

Using Segmented Models that come with Life Forms

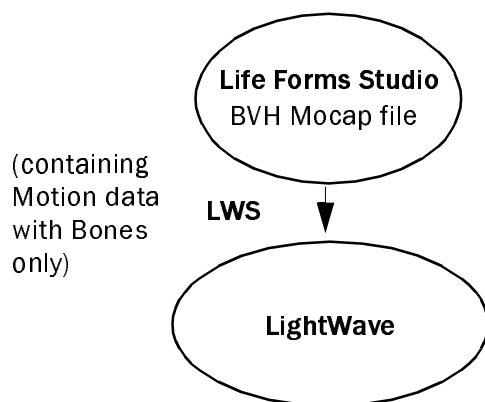
Because Life Forms reads and writes geometry in the LWS file format, you can easily bring segmented models from Life Forms into LightWave 3D. This means that any animation in Life Forms can be exported to a LWS file for LightWave 3D.

Another approach to character animation is to use Puppet Master. Life Forms will read and animate Puppet master sections that are correctly set up. For more information please refer to the [Life Forms and Puppet Master tutorial](http://www.credo-interactive.com/lightwave3d/index.html) at <http://www.credo-interactive.com/lightwave3d/index.html>



Animating a Mesh using Bones

When set up correctly, bones can deform and animate a single-mesh model. The illustration below summarizes how data moves between Lightwave and Life Forms in this tutorial.



This tutorial only gives you the rudimentary information on how to bring BVH motion data into LightWave as bones and apply it to a mesh model very crudely. To fine tune the control you'll need to have a sound understanding of how to use Bones in Lightwave (and some patience too). The LightWave User Guide contains documentation on how to set bone strength, rest length, and on how to use joint compensation to control the way bones affect the mesh.

Key Point

This example shows you the basics of how to export bones and motion data from Life Forms, and how to apply it to a mesh model.

Example

1 Open a motion captured animation

In Life Forms, open a motion captured animation for example **Exercise.Ifa** in the **Life Forms 3 Demo folder / Tutorial-Life Forms folder**. Or, if you have the full version of Life Forms, go to the **PowerMoves Library CD/ PowerMoves II/ New Motion Capture folder**.

2 Set the mocap skeleton to a position that fits the mesh

The motion captured animations that come with Life Forms are imported from BioVision mocap files. Thus the bones in these files have the same default position of the BioVision skeletons — that is they have arms down and to the side. This position is may not be the same as the default position of your mesh.



If so we need to rotate the arms and legs so that the skeleton has the same position as the mesh — for example legs of mesh are slightly apart and arms stretch out to the side at shoulder height, rotate the arm and leg bones to these positions also. Do this by:

- Clicking on the first frame in the Timeline to position the insertion point there.
- Open the Figure editor choosing **Window > Figure Editor**. You should now see the skeleton in the Figure Editor window.
- Select the right upper arm and click the **Z Rotation dial** to rotate them to the desired position. Do the same for the left upper arm, left and right thigh.

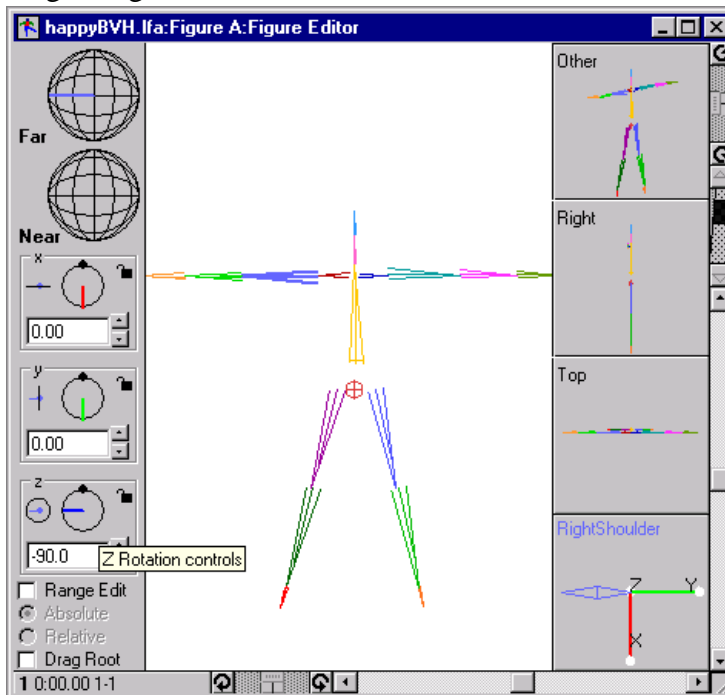
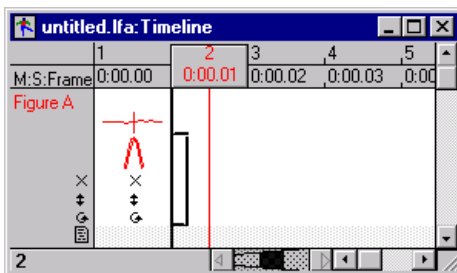


Figure Editor window

Notice that an icon of the figure's shape appears in the first frame of the Timeline. This means that you have keyframed the figure's shape in the first frame of the animation.

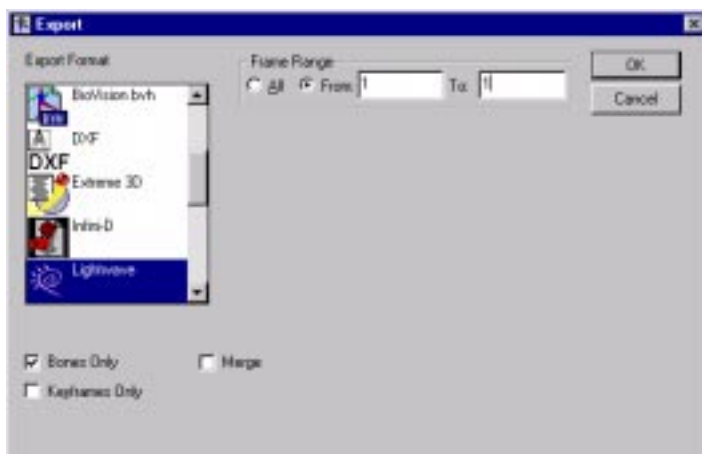


Timeline window



3 Export the skeleton

Now, export the first keyframe that you just created as a LWS file. Do this by choosing **File menu > Export**. In the Export Format list, select LightWave LWS. Check Bones Only. Export Frame One only. Click OK.



Export dialog box

4 Open the LWS file

In LightWave, open the LWS file using **File menu > Open**.

5 Replace the Null object with a Mesh

Replace the null root object of the skeleton with the Mesh object. You can do this in the Object dialog box by clicking the **Replace Object** button. Don't worry if the Mesh is terribly distorted. This problem will be fixed when you set the rest position of the ARM bones

6 Resize the Mesh to fit bones

Open the Modeler and get the Mesh. You will now have to size and position the mesh in the modeler. Check each change using the **Put** button and switch to Layout mode. Make all bones Active to see how the bones interact with the Mesh.

Keep resizing and positioning the mesh in the Modeler, checking the effect in layout mode until the mesh and bones fit well.

Now you want to save the adjusted Mesh as a new LWO file. Name it so that you know which skeleton to use it with.

Note You may have to zero the rest position of the root bone, or conversely offset the mesh from it's zero position.

7 Adjust the Bone rest position

This is done by rotating the bones until they fit properly within the mesh. Note down the **H, P and B values** of the rotation. Open the Object dialog box, and click **Object Skeleton**. Select the joint then click **Rest Position**. Enter the H, P, B values and click OK.

Note, this adjustment is needed because the zero angle position of the skeleton from BioVision files is arms down to the side while single mesh models are modelled with their arms up at shoulder level. Other motion



capture file formats do not insist that the arms must hang down from the shoulder and to the side. For example some Acclaim ASF skeleton files have different zero angle positions for the arms and leg. Depending on how the motion capture file is boned, you may not need to adjust the Rest Position of the bones.

After setting the Rest Position of the bones correctly, the bones no longer distort the mesh.

8 **Export Motion data from Life Forms**

Open the motion capture file you were working with. Export **All** its keyframes as a LWS file. In the Export dialog box, click **Bones Only**. Click **OK** to export.

9 **Set the correct Rest position**

In LightWave, open the Object panel. Click **Object Skeleton**, select the joint and click **Rest Position**. Enter the **H, P, B values** you recorded in step 4.

In LightWave, open the LWS scene file with the animated skeleton. Replace the null object with the adjusted mesh, and voila — you have an animated mesh.

10 **Adjust the Bones strength**

Refine the interaction between the bones and mesh by adjusting bones strength and rest lengths. Pinching can be controlled using Joint compensation.

Reducing the number of keyframes

Motion data is sometimes keyframed at every frame, for example:

- in Motion captured animation
- when you export to LWS format. Life Forms exports every frame as a keyframe by default.

Keyframe-dense data can be difficult to manipulate. By reducing the number of keyframes you will make the scene file smaller. You also make the animation easier to modify in LightWave. To reduce the number of keyframes exported, you should:

- Use the **Thin Keyframes** command.
- Choose export **Keyframes Only** when exporting LWS files from Life Forms. If you do not check Keyframes Only, Life Forms creates a keyframe for every frame of the animation when it writes the LWS file.

To thin a motion captured animation

1 **Select the range frames you want to thin.**

Hold down the SHIFT key while you click on the first frame in the range. Scroll to the last frame in the range and click on it. The range of frames you selected should now be enclosed.



2 Open the Thin Keyframes dialog box

Choose **Edit menu > Thin Keyframes**. You can thin some motion sequences more severely than others. For a simple motion sequence you may choose to keep as few as 1 keyframe every 5 frames. You'll have to experiment to determine the ideal ratio.

3 Experiment to determine the ideal ratio

Click **Play** in the Control Panel and examine the quality of the animation. Click **Edit menu > Undo** if you are not satisfied with the result.

Setting the Default Shape

It is helpful to be able to reset the figure to a predefined neutral shape or default shape when keyframing and editing an animation. The default shape is an arbitrary pose or shape that you determine. By setting the default shape of a model you are not modifying the model's geometry or zero angle position.

To set the model's default shape

- 1 Double-click on the figure in the Stage window to open the Figure editor window.
- 2 Position the joints to the desired default position in the Figure editor window.
- 3 Select the entire figure by double-clicking it.
- 4 Choose **Edit menu > Set Default Shape**.

Considerations

- 1 Models must be polygonal meshes
- 2 Models must have only one null root object when imported into Life Forms.
- 3 Only the root of a hierarchy may contain translations, when importing LWS file with animation.
- 4 Importing Scene files with Motion data into Life Forms is generally NOT recommended.
- 5 Merging animation to Scene files that contain motion data is NOT recommended.
- 6 Life Forms does not read LightWave's IK settings from the Scene file.



Feedback

If you have suggestions or corrections to make, or you want to contribute a tutorial you feel will help Life Forms and LightWave users, email your ideas to info@credo-interactive.com.