About this Document

Motion data from Life Forms can be brought into Maya. Find out how to do this here. There are 3 sections in this tutorial:

- The Introduction section gives you some background information about Life Forms.
- The Tutorial section gives step-by-step instruction and sample files.
- The User Guide section gives key procedures and reference information for using Life Forms with Maya.

Introduction

Where does Life Forms fit?

Life Forms in various stages of your production process. It could be used for:

- planning your mocap sessions
- prototyping for a project bid
- editing motion capture data

Life Forms is also used as a source of motion data.

Using Life Forms to edit proprietary motion capture data.

You may be working in a project that has its own captured data sets. If the data is exported as Acclaim or BioVision files, you can import the motion data into Life Forms. In Life Forms, you can create looping sequences, combine sequences, rotate paths, blend animations and much more.

Using Life Forms as a source of motion data

Aside from the 600 + keyframed variations and 140 + motion captured animations, you can use Life Forms for keyframing your own animations and for generating walk sequences with the Walk Generator. Life Forms is also supported by PowerMoves - the Online 3D Content series.

How does it work?

You may ask "How do I bring motion data from Life Forms into Maya?"

Life Forms exports Acclaim Motion capture files, which can be converted into melscript.

The Acclaim file format stores the skeleton figure in the .ASF file and the motion data in the .AMC file. These files are converted into Maya melscript files by using BioMechanics Inc.'s Acclaim-to-melscript converters. Melscript files are then imported into a Maya scene via the Script Editor.

Key Point

The process can be summarized as follows: In Life Forms, edit and export motion data in the Acclaim file format. Then, import and skin the motion data in Maya.

What does Life Forms do?

Life Forms is a motion editing and composition software. It is a easy and cost-effective way to edit and work with motion capture data. It is also known for its simple and effective keyframing interface.

Life Forms editing functions allow you to recombine, blend, edit frame ranges, thin motion data and use premade sequences before importing motion data into Maya. These features allow you to use motion capture animations more creatively.

Some of the editing functions that are particularly useful to Maya users are described here:

Smart Paste Functions

Life Form is an excellent tool for blending and combining animations. In Life Forms you combine animations by pasting keyframes from one animation to another. Life Forms adjusts the path for you.

In addition to the automatic adjustment in the path or location keyframes, Life Form's is able copy and paste motion from selected joints only. For example, this allows you to combine the arm action from one animation with the leg action from another.

Thinning mocap data

In Life Forms, you can reduce the density of motion capture data by deleting or thinning keyframes. You may, for example, instruct Life Forms to remove one keyframe for every 5 keyframes.

Slow down mocap animation easily

To slow down an action simply select a range of frames in the graphical timeline, and then expand the selection. While you are expanding the selection, the status box in the Timeline window displays the percentage by which you have slowed down the motion.

Editing a range of frames

Applying a relative offset or absolute rotation to a joint over a range of frames is very easy to do in Life Forms. Use this feature when you want to apply a small change to all frames in the animation. For example, you can apply a relative rotation to the figure's upper back joints so that it bends over during the entire walk cycle.

Source of animation content

Aside from the 600 + keyframed variations and 140 + motion captured animations from the **PowerMoves Library CD** that comes with Life Forms Studio 3.x, Life Forms is complemented by the **PowerMoves - Online 3D Content series**. This product consists of 3D models and motion sets that you can purchase online from http://www.CharacterMotion.com/products.

In addition to premade motions, Life Forms can be used for keyframing your own animations and transitions, and for generating walk sequences using the procedural **Walk Generator**.

Copy and paste to different skeletons

Motion data is never wasted in Life Forms. You can reuse the motion data by applying it to different models by using the Joint Map editor.

The motion editing features described here are explained in detail in the User Guide.

Tutorial

About the Tutorials

The tutorials demonstrate how to use Life Forms to produce motion data for Maya. **Tutorial 1** shows you how to create motion. **Tutorial 2** shows how to export motion from Life Forms. **Tutorial 3** shows how to import motion data into Maya and apply it to a mesh.

Each tutorial spans several pages but takes at most 15 minutes to complete. If you are pressed for time, you may skip Tutorial 1 and go directly to Tutorial 2. Each Tutorial is broken down into Parts. Sample files are provided for each part of the tutorial so that you can enter the tutorial at any step.

Note: This tutorial was tested with Maya NT. You can, however, also use Maya for the SGI.

What you need

- Sample files. These files can be downloaded along with this tutorial.
- Maya for NT or SGI.
- Life Forms Studio.
- Latest Acclaim plug-ins (Not required for Life Forms Studio 3.5 and 3.9)

Important

Please install the latest version of the Acclaim.out.dll export plug-in before starting the tutorial. Install the plug-in by moving it to the Life Forms folder / Plug-in folder.

Tutorial1: Editing & Exporting Mocap

In Tutorial 1 you will learn how to assemble an animation using motion captured data and export it as Acclaim .ASF and.AMC files. Next, you will learn how to convert the Acclaim files to melscript (.mel) and a motion file (.mov).

The parts of this tutorial are:

1 **Assembling an animation**
2 **Straightening the neck**
3 **Exporting Acclaim files**
4 **Converting Acclaim files to Maya melscript.**

All sample files for this tutorial are included for download with this tutorial.

Part 1: Assembling an animation

In this step we will create the animation by pasting 2 mocap animations into the same timeline.

1 In Life Forms, choose **File menu > Open**. Browse to the Maya1tutorial folder, select **Front Hand Spring.lfa** and click Open.

2 Advance to the last frame of the animation by clicking the Last button in the Control Panel.

Control Panel
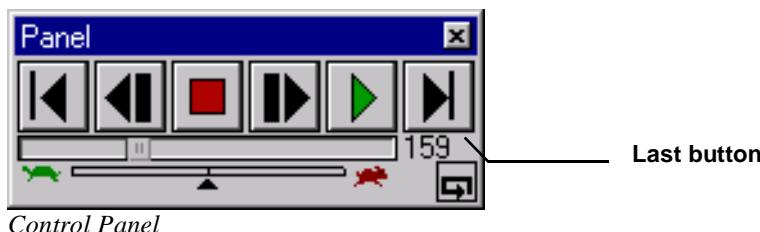
3   In the Timeline window, click on Frame 88 of the animation. The insertion point is now at Frame 88 as shown.

Insertion Point
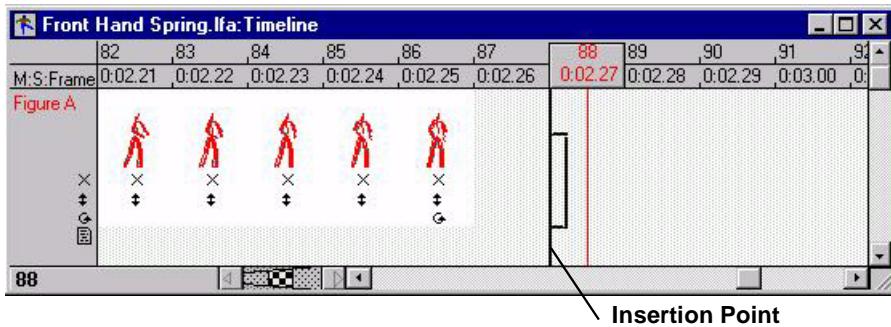
4   Open the File browser by choosing **File menu > Browser**.

5   In the File Browser, open the Maya1tutorial folder and select **Kick Fly Spin.lfa**.


Part of the File Browser
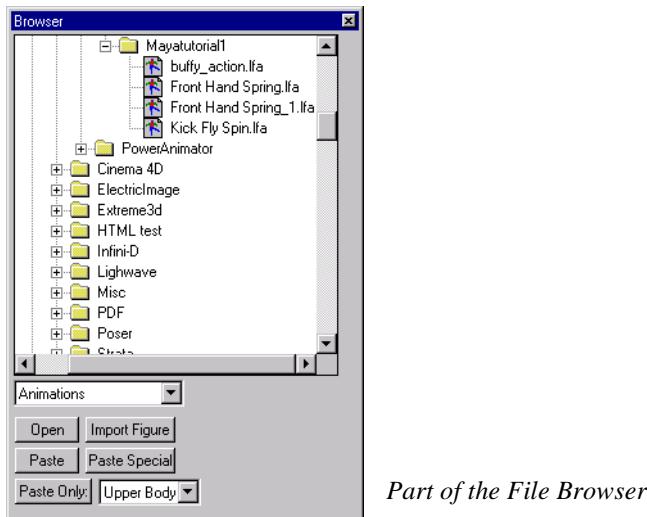
6   In the File Browser, click **Paste Special**.

7 In the Paste Special dialog box, select the options as shown. You must select **Relative location**. However, you may choose to paste absolute or relative values for the Facing angle.
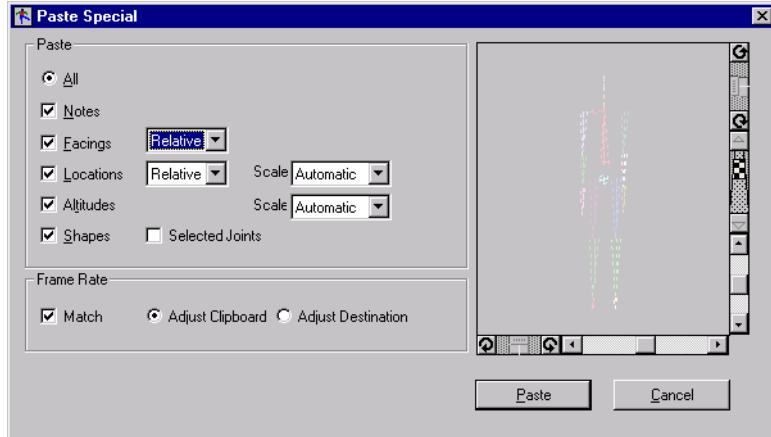

It is important to select Relative option for Location so that Life Forms will paste the Kick spin animation to end of the previous animation's path.

8 Click **Paste**.

9 To slow down the transition between the two mocap sequences we need to insert empty frames between them. Select Frame 87 by dragging the mouse across it. It will now be enclosed as shown.
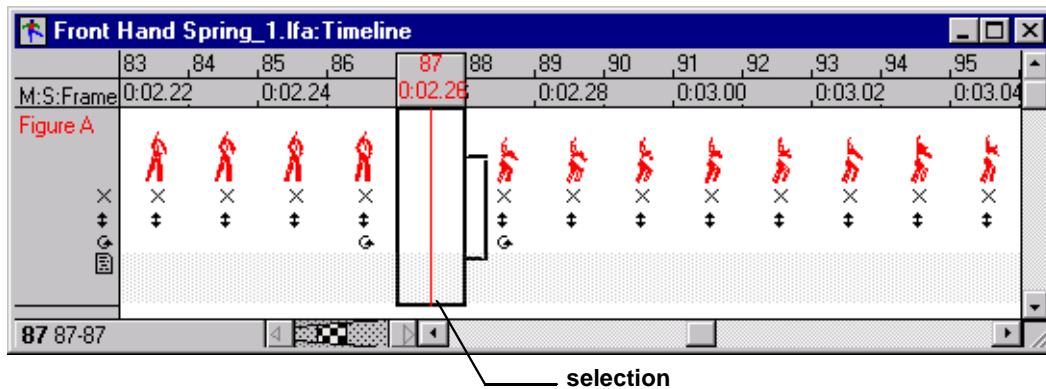
selection

10 Position the mouse over the selection handle. The cursor will now be a double-headed arrow as shown below.

Selection Handle   **Cursor**
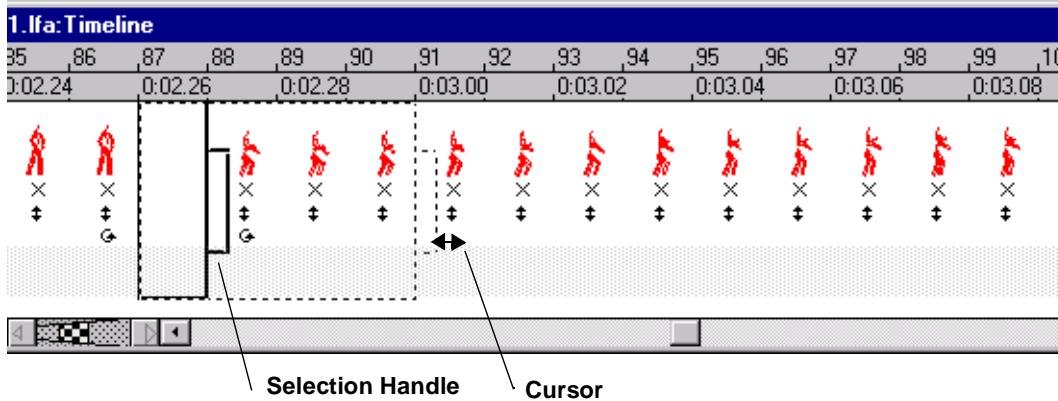
11 Drag the selection handle to increase the space between the two sequences.

12 Click the **Play** button in the Control panel to view the animation.

The Animation will play back in the Stage window.

13 Click **File menu > Save As**. In the Save As dialog box, name the file and click Save.

Tip   If you cannot find your Stage window, select any window of the animation and choose the Arrange command in the Window menu. This brings all the windows for this animation to the front.

Part 2 Straightening the neck

For this step we will use the file that you saved in the previous part, or you may use the sample file: **Front Hand Spring_1.lfa.** This file contains BioVision motion capture data. The default orientations of the neck and head bones are not erect. We have to apply an absolute rotation at all keyframes in the motion data to straighten the neck.

1 In the Figure editor window, zoom in to view the figure close up. Zoom by pressing the Down arrow in the Zoom bar. Look closely at the position

of the neck. You may have to zoom in by pressing the Down arrow in the Zoom bar.

Zoom bar
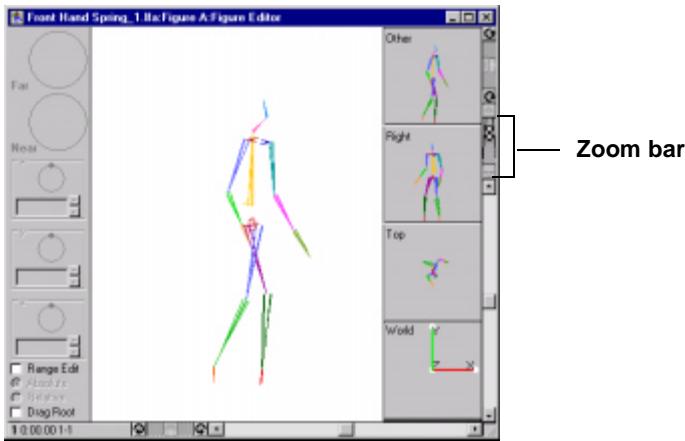
You will see that the rest position of the neck bone points forward. The mesh model, on the other hand, has an erect neck. We will have to straighten the neck bone of the skeleton to make it fit the mesh. We will straighten it by applying an absolute rotation to the neck.

1   In the Figure Editor, click the following checkboxes:

- **Range Edit**
- **Absolute**

**2**   Click on the grey area to the left of the animation's timeline. This selects all the animation's keyframes.

Current Frame marker

Click here
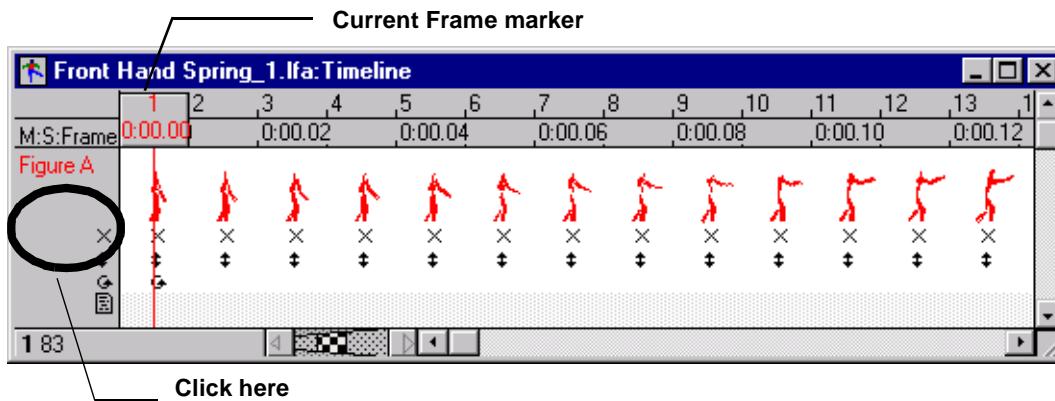
**3**   Click the **Rewind** button on the Control panel.

The current frame marker will now be at Frame 1.

4 Place the mouse in the Fade zone handle as shown. When the cursor changes to the diagonal arrow, click and drag all the way to the left until the Fade zone is completely collapsed.

fade zone handle
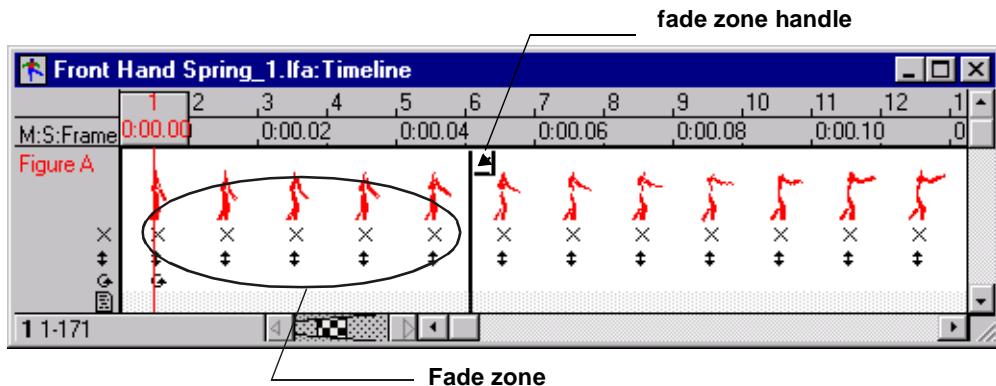
Fade zone

5 Click the **Last** button in the Control Panel. This advances the Current Frame marker to the last frame of the animation.

6 Collapse the Fade-out zone by scrolling to the end of the animation. Place the mouse in the Fade zone handle as shown. Click and drag all the way to the right.


Fade-out zone
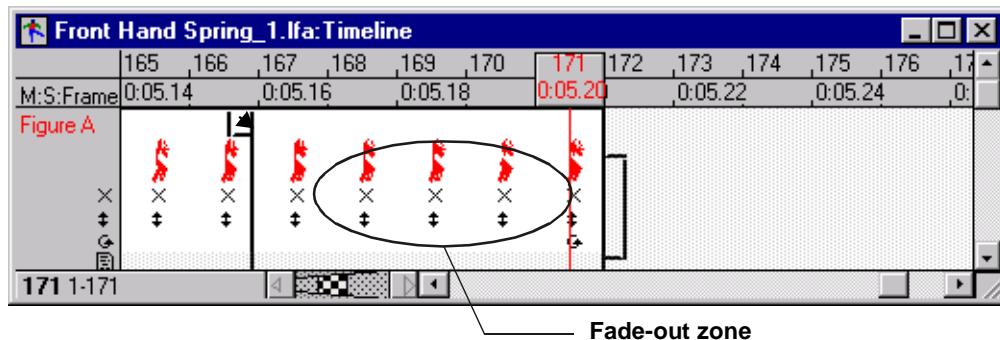
7 Click the **Rewind** button on the Control Panel to step to Frame 1.

8   Click on the Figure Editor window and switch to the front view by choosing **View menu > Front**. You should see the following:
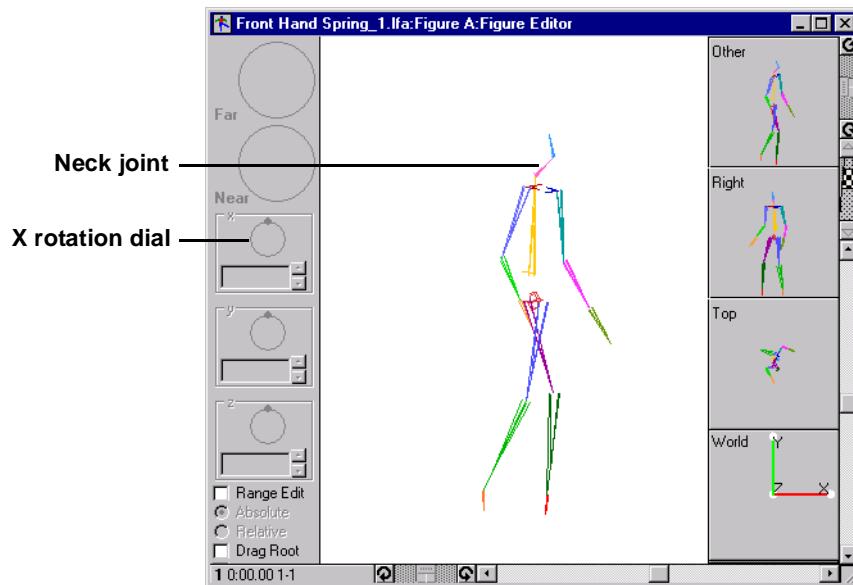
9   Click on the neck joint. This selects the joint.

10 In the Figure editor window, drag the X rotation dial anti-clockwise to align the neck to the back bone as shown.
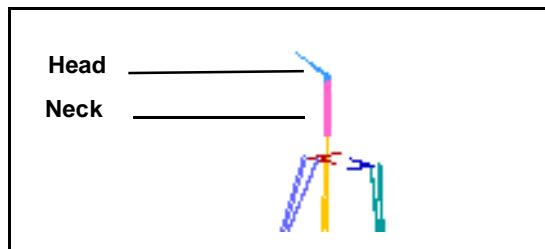
11 Click on the head joint.

12 Drag the X rotation dial until the head is vertically above the neck as shown.
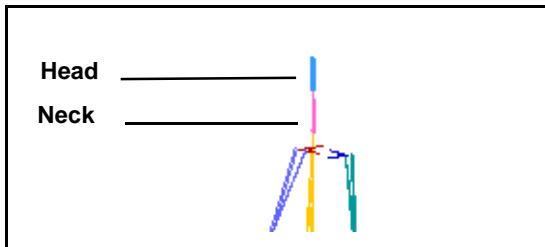
13 Choose **File menu > Save As**. In the Save dialog box, name the file and Save it.

We have now copied and pasted two mocap sequences into one timeline and adjusted the position of the neck joint.We are now ready to export the motion data.

Concept

When Life Forms exports motion data, it generates a skeleton definition based on the proportions (joint offsets), and pivot points of the model in the animation. Thus, by applying the motion data to another model before exporting it, you can alter the skeleton definition for that motion .

Take a look at Flexiskel in **Flexiskel.lfa**. This is an example of a generic model that you can apply motion data to, then fine-tune the motion and reexport the data as either Acclaim or BioVision motion capture files. For more information about building custom models, please refer to the Life Forms User Guide.

Tutorial 2: Export Motion for Maya

In Tutorial 2 we will explain how to export Acclaim .ASF and .AMC files and convert them to melscript (.mel) and a motion file (.mov).

The two parts of this tutorial are:

1 **Exporting Acclaim files**
2 **Converting Acclaim files to Maya melscript.**

All sample files for this tutorial are available for download with this tutorial.

Part 1: Exporting the animation

In this step we will export the animation that you saved in the previous step, or you may use the sample file **Buffy_action.lfa**.

1 In Life Forms, make the animation you want to export active by clicking one of its windows.

2 Choose **File menu > Export**.

3 In the Export dialog box:

   • click **All** for Frame range.
   • select **Acclaim** from the Export Format list.

- clear the **Keyframes only** checkbox.
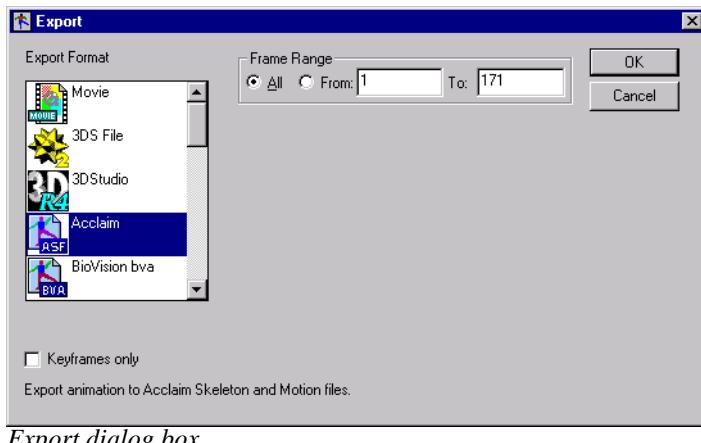
Export dialog box

Concept

The Keyframes Only option allows you to export only keyframes into the Acclaim file. This option is handy if you used the Thinning command in Life Forms to reduce the number of keyframes in the motion data. We recommend that you thin motion data, and export keyframes only. Doing so creates motion data that is much easier to work with in Maya.

4   Click OK. The Save As dialog box appears.

5   In the Save As dialog box, name the file and click Save.

An .ASF and .AMC will now be exported. The ASF file contains the skeleton figure and the AMC file contains the motion data for that figure.

Part 2: Converting the Acclaim files

Maya does not read Acclaim motion data files. Acclaim files must be converted to Maya melscript before they can be read into Maya. This is done using converter software from BioMechanics Inc. These converters run on IRIX 5.x /6.x and Windows NT operating systems. For more information about these converters please go to **http://www.biomechanics-inc.com/software** .

This step shows you how to use the converters to create .mel files.

1   Unzip the **asfamc2mel_Unix.tar** file (UNIX). This file contains the converter software. Use **asfamc2mel_NT.zip** for WindowsNT/2000.

2   Move the files named **amc2mov** and **asf2mel** to your user directory.

3   Select the Acclaim motion data files you exported in the previous step, or select **buffy.amc** and **buffy.asf**.

4   Enter the command line:

> asf2mel File.asf File.mel

asf2mel takes two parameters: ASF file (File.asf) and the name of the output file (File.mel). This command translates the skeleton information in File.asf to a melscript file File.mel.

For example to convert buffy.asf enter the following:

> asf2mel Buffy.asf Buffy.mel

5   Enter the following command line:

> amc2mov File.asf File.amc 30 File_importer.mel
File.mov

amc2mov takes 5 parameters: the ASF file, the AMC file, the frame rate, and the name of the .mel file and .mov file it will create.

30 is the frame rate of the motion data.

The **amc2mov** command creates a .mov file which contains the motion data and a importer.mel file which contains the melscript for importing motion data and applying it to the skeleton.

For example to convert buffy.amc enter the following:

> amc2mov Buffy.asf Buffy.amc 30 Buffy_importer.mel
Buffy.mov

For you convenience give all related files similar file names as shown in this example.

6   You will now have 3 files: Buffy.mel, Buffy_importer.mel and Buffy.mov.

You have now successfully exported motion data from Life Forms and generated melscript files which can be loaded into Maya.

The next step is to apply the motion data to a mesh in Maya.

Tutorial 3: Using Life Forms Mocap data in Maya

In Tutorial 3 we will learn how to load melscript files into Maya and use the motion data to animate a single-skin mesh. This tutorial has 3 parts:

1   **Loading the Skeleton**
2   **Binding the motion data to the skin**
3   **Loading the Motion data**

Sample files for this tutorial are available for download with this tutorial.

Part 1: Loading the Skeleton

The skeleton definition is stored in the melscript file (.mel). Melscript files are loaded in the Script Editor window.

If you did not perform the previous step, you can use the sample file **Buffy.mel**.

1   In Maya, choose **File menu > Open Scene**.

2   In the Open dialog box, select **MelStart.mb**.

This opens the Maya binary file (.mb) that contains the mesh shown in the following illustration.
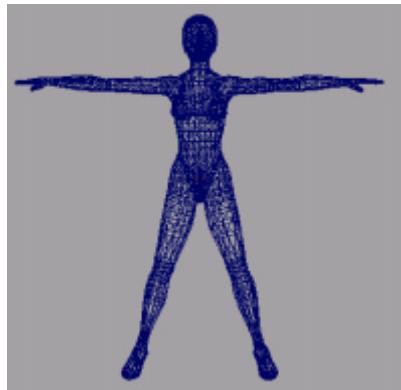
3   Open the Script Editor window by choosing **Window menu > General Editors > Script Editor**.

4   In the Script Editor dialog box, select **File menu > Source Script**.

This opens the Source Script window which lets you select and open .mel files.

5   In the Source Script dialog box, select the .mel file created in Tutorial 2, or select the sample file **buffy.mel**. This .mel file contains the skeleton definition for the motion data.

6   Click Open. Maya will create a skeleton figure for the motion data.

You will see a skeleton figure in the viewport. The skeleton's arms and legs are not aligned to the mesh. Don't worry. They will be after we have performed the next few steps.

Mesh
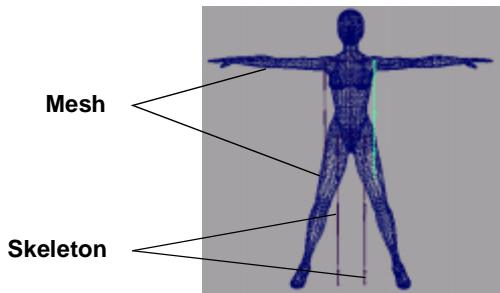
Skeleton

Important
Do not move the root joint of the skeleton. **Do not Scale** the skeleton. If you move or scale the skeleton you will not be able to apply motion data.

In this step we showed you how to load a skeleton into Maya in the Script Editor. The next step is to bind the mesh to the skeleton in a process called Skinning.

Part 2: Skinning

Skinning is the process of binding a mesh to a skeleton so that the skeleton's actions can deform the geometry [1]. Before skinning a skeleton you will need to rotate the bones to fit the mesh. You may also need to adjust the mesh to fit the skeleton properly. In this step, you will learn how to rotate the skeleton's arm and leg joints, and how to bind the skeleton to the mesh.

1   In Maya, click the Object tool in the toolbar.

Object tool

2 Select the Left Shoulder joint by clicking the bone that represents the Left Upper arm. The entire arm will be highlighted, and the Rotation fields of the LeftShoulder_joint will be displayed in the Panel window.

Left Shoulder joint
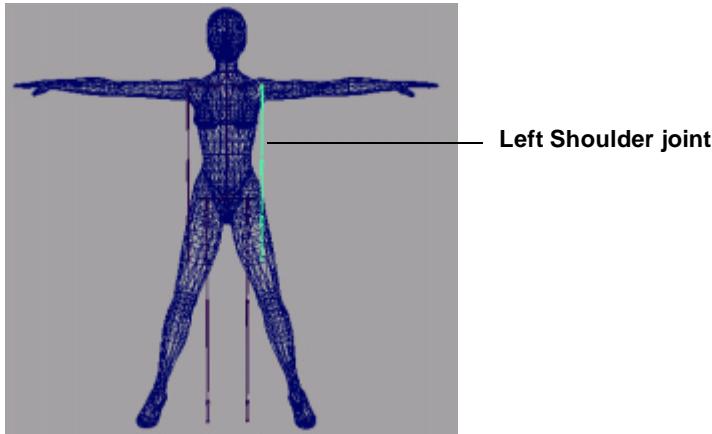
3 In the **Rotate Z** field type **-90** as shown in the following:


```
Channels  Object
LeftShoulder_joint
        Translate X  119.38
        Translate Y  0
        Translate Z  0
          Rotate X  0
          Rotate Y  0
          Rotate Z  90
          Scale X  1
          Scale Y  1
          Scale Z  1
          Visibility  on
```
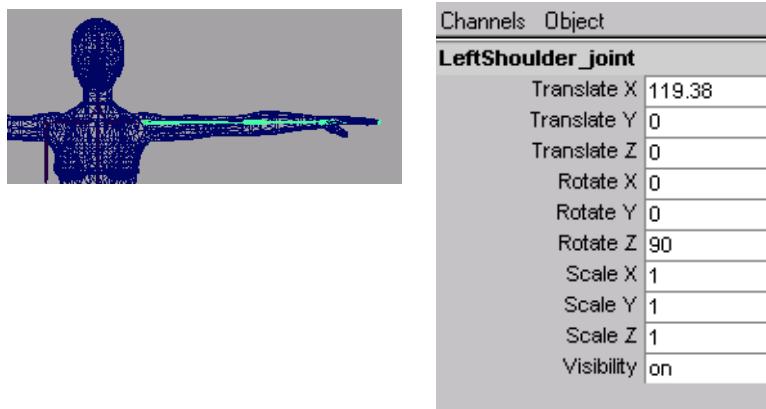
4 Click on the Right Upper Arm to select the Right shoulder joint. In the **Rotate Z** type **+90**.

5 Select the Right Hip joint. In the Rotate Z field enter **-14**.

6 Select the Left Hip joint. In the Rotate Z field enter **+14**.

7 Select the entire skeleton by dragging the mouse to enclose all the bones. The skeleton will now be highlighted.

8   Select the mesh by Shift-clicking on it. Both the skeleton and the mesh will now be highlighted as shown..
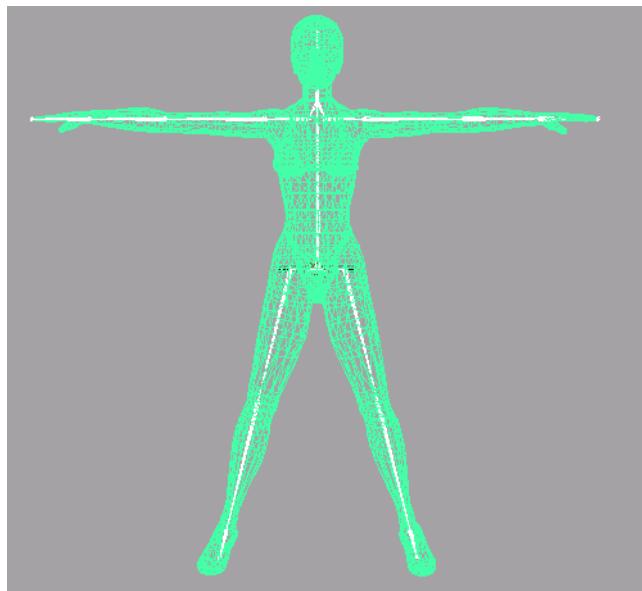
9   Select Animation mode in the drop-down menu in the top left corner of the Tool bar.

10 Choose **Skinning menu > Bind skin box**. The Bind skin option box will open.

11 In the Bind skin option box select the following options:

- **Complete skeleton**
- **Color joints**
- **Closest Point method.**

The Closest Point method binds the joint completely (i.e. 100%) to the bone closest to it.
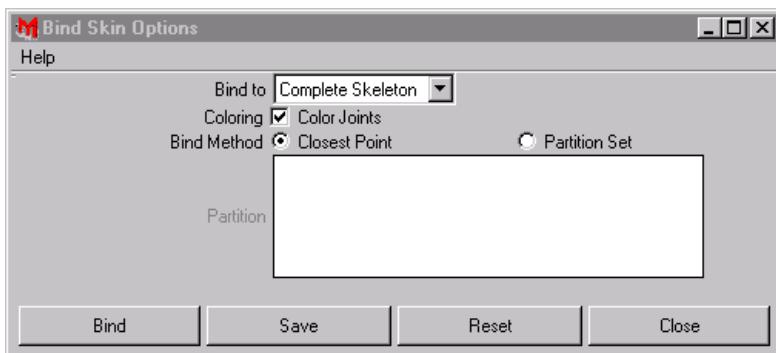
12 Click **Bind**.

Maya will now attach the skeleton to the mesh. When it is finished, it will display "Result root_jointskin Partition" in the command line window. Several messages referring to dummy joints may appear in the Script Editor. These can be ignored.

13 Click the **Component tool** and then click on the mesh.

Component Tool

You will now see that the control vertices of the mesh have different colors. The color of the control vertices indicate which bone they are attached to.

Now that we've learned how to skin the skeleton, we can complete the tutorial by applying the motion data.

Part 3: Loading Motion data

The motion data is stored in the .mov file. The importer melscript contains script for applying the motion data in the .mov file to the skeleton. Here we will learn how to apply the motion data via the Script Editor.

1 In the Script Editor window, choose **File menu > Source Script**. In the Source Script dialog box, select the importer.mel file you created in the previous tutorial, or use **buffy_importer.mel** from the tutorial folder.

A dialog box will appear asking you to select a .mov file.

2 Select the .mov file you generated or **Buffy.mov** from the tutorial folder.

Note that Windows will give this file the QuickTime movie icon because it has the same filename extension as QuickTime files. This .mov file is a Maya Move file that stores motion data.

3 Click Open.

When motion data is applied the model assumes the position of the first keyframe of the motion.

4 To find the model, choose **Edit menu > Select All**. Press **F**.

The figure will now be centered in the viewport.

5   In the Perspective viewport, zoom (Alt + Left & Middle mouse button),
     pan (Alt + Left mouse button), and orbit (Alt + Middle mouse button) un-
     til you can see the mesh clearly.
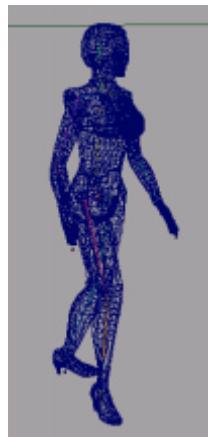
6   Playblast the animation by choosing **Window menu > Playblast**.

     When the Playblast console appears, click the Play button to see the ani-
     mation.

     The feet may "sink" into the ground plane slightly. You can correct this
     problem by translating the appropriate Motion curve.

We have successfully imported motion data and applied it to a mesh model. This
brings us to the end of this tutorial. You may find that the transition between the
two mocap sequences is not as smooth as it should be. You can use Life Forms to
create a better transition between motion captured sequences by adding keyframes
and increasing the duration of the transition point before exporting the motion data
to Maya.

User Guide

Exporting Motion data from Life Forms

Motion data is transferred from Life Forms to Maya via the Acclaim file format.
This file format stores the skeleton in .ASF files and the matching motion data in
.AMC files.

To export Acclaim files

1   Make the animation that you want to export active by clicking its win-
     dows.

1   Choose **File menu > Export**. The Export dialog box will appear.
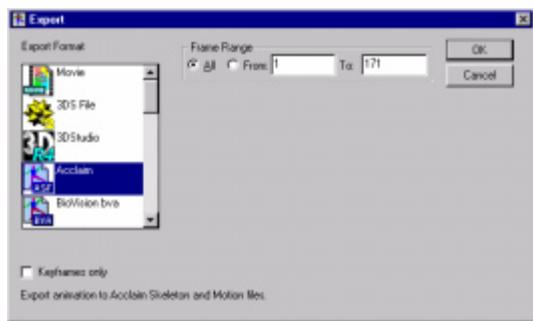
2   In the Export dialog box, select **Acclaim** from the Export Format list.

3   In the Frame Range fields, click **All** or enter the start and end frame number of the range you want to export.

4   You may choose to:

   •   Export only the keyframe data. To do this click the **Keyframe only** checkbox.
   •   Export every frame of the animation as a Keyframe. Clear the Keyframe only checkbox.

5   Click OK. The Save As dialog box will appear.

6   Name and save the file. Life Forms will now export an .ASF and .AMC file for each figure in the animation.

When the animation has several figures, Life Forms will export a set of ASF and AMC files for each figure. A number will be appended to the end of the file name as follows: The first figure will be named Filename_0.asf and Filename_0.amc, and the second figure in the animation will be named Filename_1.asf and Filename_1.amc, and so on.

Matching Mesh and Skeletons in Maya

The mesh model must fit the bones perfectly. By this we mean three things:

- The mesh must completely enclose the skeleton,
- The joints of the skeleton coincide with the joint area of the mesh model. For example, the upper arm and lower arm bones should meet in the elbow area of the mesh.
- The skeleton must be centered in the mesh.

For these reasons, it is strongly recommended that you decide on the skeleton that you will be using before you begin modelling. You should then use the skeleton as a guide when modeling the character.

If you are using an existing mesh, you will have to adjust the mesh to fit the skeleton. The process is roughly as follows:

1   Import the mesh model.

2   First load in the .mel file containing the skeleton definition.

3   Do not move the skeleton, instead move the mesh model to the skeleton. Adjust its position until the skeleton is centered within the mesh.

4   You may also alter the default position of certain bones in Life Forms. **See Tutorial1 "Part 2 Straightening the neck" on page 9.**

5   Next rotate the bones of the skeleton to fit the mesh. **See Tutorial 3, "Part 2: Skinning" on page 17.**

6   Use modeling functions, move the control vertices of the mesh to encompass the skeleton. Be sure to check your work in several views.

Scaling Motion data in LF

If the skeleton comes in much too large or too small for your set, check that the unit of measurement you are using in Maya is the same as in Life Forms. You should set the units in the Preferences dialog box to meters in both programs.

If after correcting the units the skeleton is still too large or too small, you should scale the motion data in Life Forms **before** exporting it to Maya. Do not try to scale the skeleton and motion data in Maya.

To scale motion data before export

1   In Life Forms, select all frames of the animation.

2   Choose **Edit menu > Copy**.

3   Choose **Figure menu > Height & Scale**.

4   In the Height & Scale dialog box enter the height of you want to scale the skeleton to.

5   Click OK.

6   In the Timeline window, select all frames of the animation.

7   Choose **Edit menu > Paste**.

To set units of measurement

1   In Life Forms, choose **File menu > Preferences**.

2   Click the meters radio button.

Designing Custom Skeletons

When Life Forms exports motion data, it generates a skeleton definition based on the proportions (joint offsets), and pivot points of the model in the animation. By pasting the motion to another model, then fine-tuning the motion, and re-exporting the motion, you can change the skeleton definition for that motion data. Take a look at Flexiskel in **Flexiskel.lfa**. It is an example of a generic model that can be used for this purpose. For more information about building custom models, please refer to the Life Forms User Guide.

You can build a simple hierarchy in any 3D Program that exports a geometry file format that Life Forms imports (for example: LightWave 3D, 3D Studio Max, Inspire 3D, and some VRML modellers). When building custom skeletons you have to allocate time for testing the skinning, file transfer and other issues. However, if you take the time to set up the perfect skeleton for your mesh character, you will find that the mesh will be easier to skin and the quality of the animation will improve.

Notes for building skeletons for Life Forms

1   In a 3D program that exports a file format that Life Forms reads, build a simple hierarchy of primitives - being careful to set the pivot points correctly to fit your mesh character.

2   There are several considerations that you should be aware of when building skeletons that are easily animated. You can avoid many pitfalls by using the **Flexiskel** as a guide.

Experimenting with other skeletons

Life Forms comes with several Life Forms-ready models. These models have different hierarchies and offsets, and they generate different skeletons when

motion data is exported from them. The skeleton structures exported from these models may fit your mesh better.

For the tutorials, we used the BioVision skeleton because it is easy to handle. You will find, however, that you must adjust the position of the neck and head of the BioVision skeleton to fit most biped meshes.

Specifying insertion time

When the importer mel script imports motion data, it inserts it at frame 0 by default. You can however instruct the importer to insert the motion at any time in the animation. This is useful when you want to add motion data to the motion already in the scene.

To specify the insertion time

1   Open the importer mel script in a text editor. These files are found in the PowerPak Motions/Maya/Mel script folder.

2   Scroll to the bottom of the file.

3   Find the ApplyTake function.

```
if (""!=$mov_file) {
    currentUnit -time ntsc;
    readTake -device "amc_device" -angle "degree" -
linear "inch" -take $mov_file;
    applyTake -device "amc_device";
    currentTime -edit 1;
    playbackOptions -minTime 1;
    fitAllPanels -all;
  }
  deleteAMCDevice;
}
```

4   For example, change the parameters for ApplyTake to the following:

```
applyTake -device "amc_device" -start Time 58;
```

This line instructs the melscript to insert the motion at frame 58.

Re-importing motion to a skinned model

After you have attached the skeleton to the mesh, you can reapply motion data to it without having to skin it again.

To apply new motion data to an existing skeleton

1   Choose **Windows menu > General Editors > Script Editor**.

2   In the Script Editor window, choose **File menu > Source Script**.

3   In the Source Script dialog box, select the importer melscript. The Open dialog box will appear.

4   In the Open dialog box select the .mov file.

Editing Clusters

After skinning the model, you will find that you must reassign some control points. Please refer to Using Maya, Animation: Using Cluster Deformers[2].The HyperGraph, Sets & Expressions User Guide contains instructions for editing set memberships and editing point weights[3].

To get good results make sure that CVs are assigned to the correct clusters and problem areas on the mesh have appropriate weights.

End Notes

1. Alias WaveFront: *Using Maya: Animation*. Chapter 13 pg. 283.

2. Alias WaveFront: *Using Maya: Animation*. Chapter 19, pg. 395.

3. Alias Wave Front: *Hypergraph, Sets & Expressions*. Chapter 2. pg. 91 - 106.