Motion Mixer

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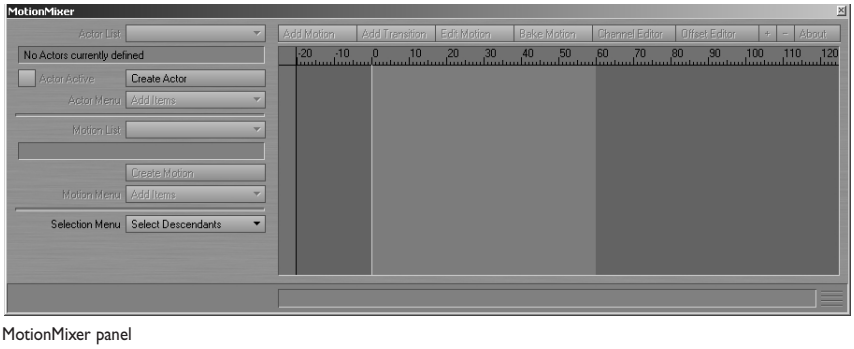
Motion Mixer

MotionMixer, a master plug-in, was designed to bring the same concepts found in non-linear video editing to computer animation. You can store, re-use, and adjust motions for entire hierarchies. You can even mix motions together.

MotionMixer's "actors" define objects or groups of objects, while "motions" define their animations. The Timeline gives you the ability to move, trim and scale motions together. You can add "transitions" to control exactly how motions blend together. Creating incredibly complex animations from a library of relatively simple moves is fast and easy, bringing exciting possibilities to your LightWave animations.

The best way to get comfortable with MotionMixer is to set something up yourself.

- Choose **Motion Mixer** on the toolbar to run MotionMixer. (You may also, display the Master Plug-ins panel. Then add MotionMixer to your scene. Double-click it to open its panel.)



MotionMixer panel

The MotionMixer panel is broken down into four areas, Actors and Motions on the left, and the Timeline and toolbar buttons on the right. Beneath the toolbar is the familiar frame display.

Beneath the frame display are the MotionMixer “tracks” where motions and transitions are placed. There can be any number of tracks, each of which can hold any number of motions or transitions.

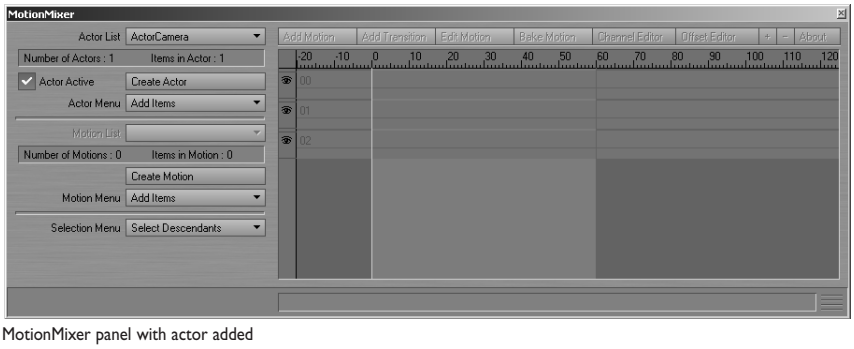
2 In Layout, select the camera. Next, click **Create Actor**. Enter ACTORCAMERA as its name and click **OK**.

The **Set Pose Frame** field determines which frame in the scene MotionMixer will use as its reference point. Generally, this is the frame at which a character is in its rest or set-up pose, or the frame where a mechanical assembly is in its starting position—often frame 0.

When you create an actor, you are telling MotionMixer which items in the scene you want it to control as a group. Scene items may be added or removed at any time and an actor can contain items of different types (i.e., objects, bones, cameras, and lights). However, an item can only belong to one actor. An actor may represent a character and its bone structure, a mechanical apparatus such as an aircraft's landing gear, or as in this case, an individual item such as the scene's camera.

Create Actor dialog

3 The panel will begin to come to life. The **Actor List** pop-up menu will display the “current actor”, which we just created. If you had other actors, you could use this pop-up menu to change the current actor.



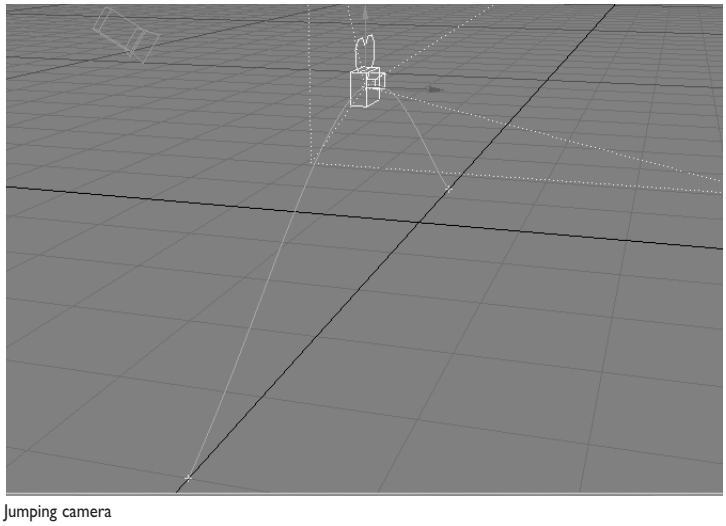
MotionMixer panel with actor added

If there were multiple actors in a scene, you would choose the “current actor” from the **Actor List** pop-up menu. The current actor is the one you want to work with and the one whose tracks and motions are displayed on the Timeline.

The actor information display shows the number of actors in the scene and the number of items defined in the current actor.

4 Now, let's create a motion. Motions are segments of animation that can represent anything from a character's walk cycle to a jet fighter performing a barrel roll. When an actor is active, MotionMixer controls it. So to create a motion in Layout, you must first deactivate the actor. Disable **Actor Active**.

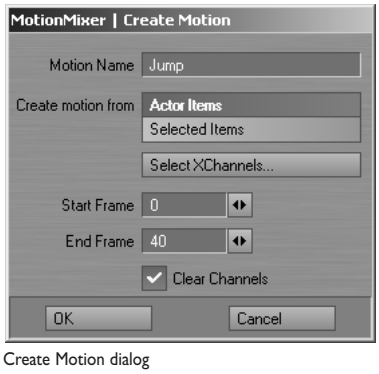
5 In Layout, keyframe the camera so that it moves straight along the Z axis from frame 0 through 40. Make a key at frame 20 that makes it jump up along the Y axis.



Jumping camera

6 Click **Create Motion** on the MotionMixer panel. Enter JUMP for the **Motion Name** and set the **End Frame** to 40, since that is the end of the motion we set up. Leave other settings at their default and click **OK**.

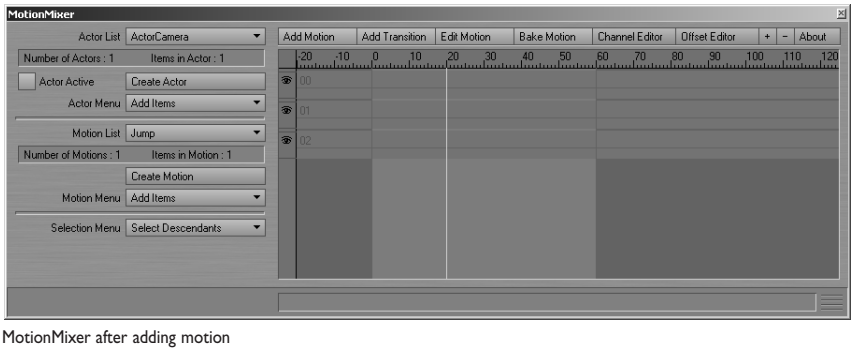
If we had used **Selected Items** instead of **Actor Items**, the motion would come from items selected in the scene.



Create Motion dialog

"XChannels" are non-transformation channels (i.e., any channel other Position, Rotation, and Scale...or is that a long-running sci-fi TV show?). **Select XChannels** opens a new panel that allows you to specify which XChannels will be present in the motion. However, you can always toggle them on and off later in the Channel Editor.

Clear Channels removes the animation from the items in Layout—after capturing into MotionMixer of course. Since MotionMixer normally overrides and controls the motion, the animation is not usually needed. However, you may wish to disable **Clear Channels**, so you can create further motions from different parts of the same animation.



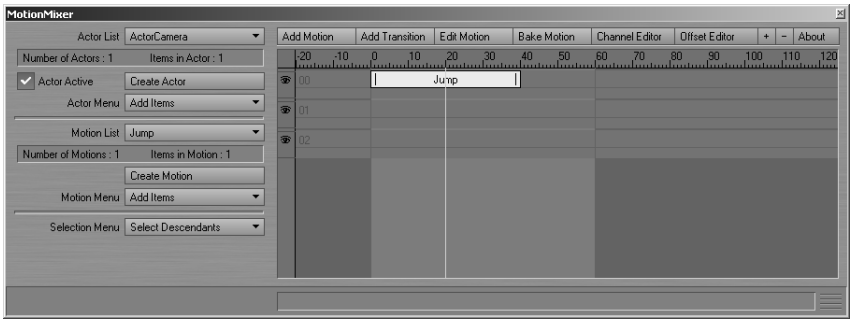
MotionMixer after adding motion

7 The actual keyframed motion of the camera has now been "sucked" into MotionMixer. If you drag the Layout frame slider, you will notice the camera doesn't move.

The motion information display will show the number of motions that are defined in the current actor and the number of items contained in the current motion.

The **Motion List** pop-up menu will display the "current motion", which we just created. If the current actor had other motions, you could use this pop-up menu to change the current motion—this is the motion you are working with.

8 OK, we can finally add a motion to the timeline. Click **Add Motion** on the toolbar and then click on the 00 Timeline slot at frame 0. This will add the motion to the timeline.



Motion added to Timeline

If you want to cancel the operation, prior to clicking in the Timeline, click in an empty area of the panel, outside of the Timeline display. To remove a motion from the Timeline select it with your LMB and press the DELETE key.

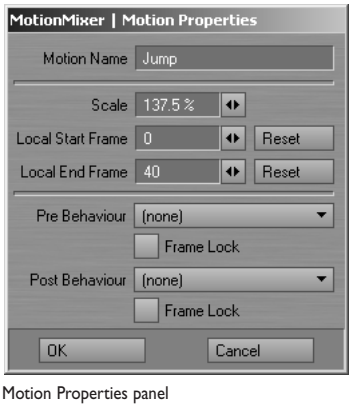
9 Enable **Actor Active** and drag the Layout frame slider. MotionMixer is now in control and moves the camera.

You can reposition the motion by dragging the center of the motion bar. You can scale the motion by dragging either end of the bar to resize it. The range and scale of the motion will be displayed at the bottom of the panel.

10 Save this scene for future use!

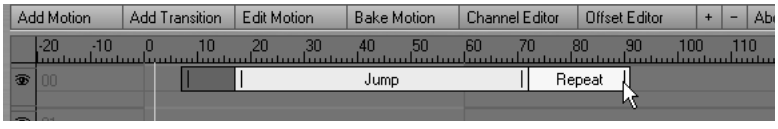
Motion Properties

A motion's properties can be edited by right-clicking a motion in the Timeline. The motion can be renamed by simply editing the **Motion Name** field. The **Scale** field allows the motion's scale to be modified numerically. Use **Local Start Frame** and **Local End Frame** to trim the ends of a motion without changing the original data.



Motion Properties panel

A motion uses “behaviors” in the same way that LightWave uses them in the Graph Editor. After you click **OK**, you will see any behaviors added to the appropriate ends of the motion on the Timeline. You can change the length of a behavior by dragging its end. (See Chapter 8 for more information on behaviors.)



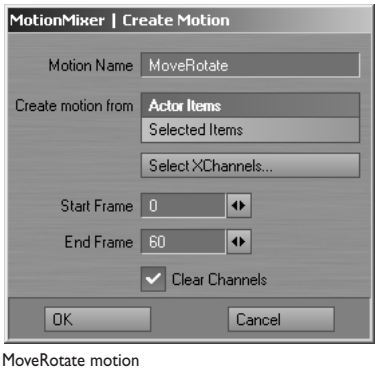
Changing length of Post Behavior

Normally, when you move a motion that has a behavior, the behavior will move along with the motion and retains its length. However, the **Frame Lock** option “pins” the start or end frame of a behavior to the Timeline. Dragging the motion will shorten or lengthen the behavior. Eventually, it will push the behavior once it has reached its minimum length.

Blending Motions with Transitions

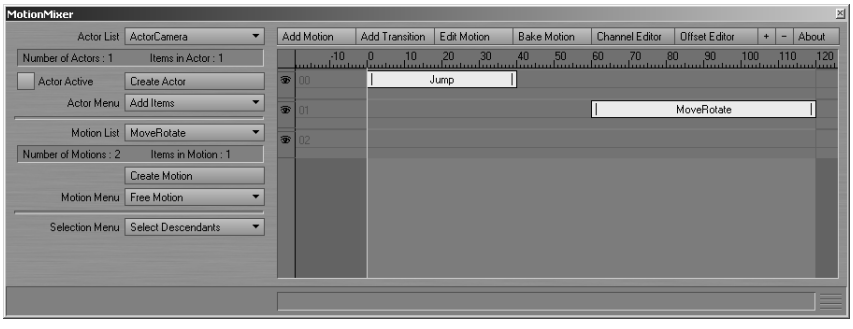
Transitions are one of the most powerful features of MotionMixer. They allow you to blend motions together.

1. Start off where the previous exercise left off. We want to create another motion so disable **Actor Active**.
2. Create a keyframe at frame 60 so that the camera moves along the Z axis, but rotates 360 degrees on its heading.
3. Click **Create Motion**. Use MOVEROTATE for the motion name. Other settings can be left at their defaults. Click **OK**.



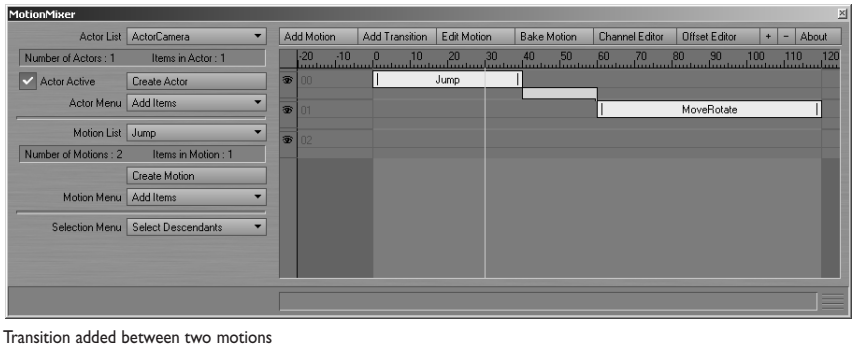
MoveRotate motion

4. Set the scene’s last frame to 120. Add the motion to slot 01 on the Timeline.



MoveRotate motion added to Timeline

5 Click on the Jump motion bar and then click **Add Transition** on the toolbar. Next, click the MoveRotate motion bar. This adds a transition between the two motions.



Transition added between two motions

Press Layout's play button and watch the movement of the camera. During the frames controlled by the transition (41 through 59), the camera's position is interpolated to line up with the start of the second motion. You should notice that the movement between the motions is quite abrupt. This is because it is a linear interpolation curve by default. For a smoother blend, read on.

6 Right-click on the transition bar. This brings up the Graph Editor and the transition should be listed as an animation channel!

The vertical range of the curve represents the percentage of transition. For example: a value of 0% means 100% of the start motion and 0% of the end motion, 60% means 40% of the start and 60% of the end, and so on.

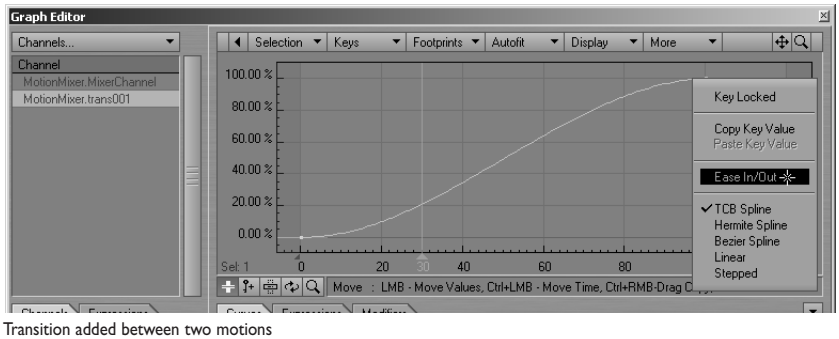
The horizontal axis, which normally is frames, represents how far through the transition you are—not the range of frames in the transition. For example: 0 means the start of the transition (i.e., 0%) and 100 means the end (i.e., 100%).

NOTE

Ignore the time slider in the curve window, if you're scrubbing the animation in Layout. It does not reflect the position within a transition.

To smooth out the transition, you simply set the Tension to 1 for both Incoming Curves (they are both TCB Splines). You can do this quickly by right-clicking on each key and selecting **Ease In/Out** from the pop-up menu.

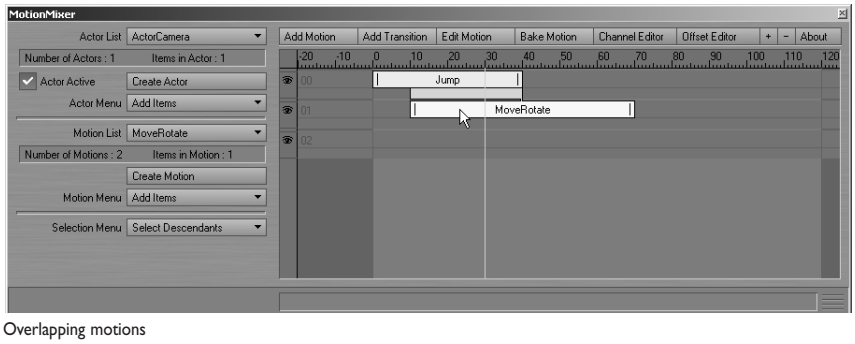
Of course, since this is like any other curve, you can add more keys, use different Incoming Curve options, and so on. However, the first and last keys should always be left at 0 and 100. If you add new keys, only add them between 0 and 100 or you will likely get unpredictable results.



Transition added between two motions

7 Close the Graph Editor and watch the animation playing back. You'll see a smoother transition, but the difference in the end of the first motion and the start of the second is too great to achieve a totally smooth blend. The smoothest blends are most often achieved by overlapping the motions, so that the transition starts before the first Motion finishes and ends after the second has started.

8 Drag the MoveRotate motion back so it starts at around frame 10. As you adjust the amount of overlap you'll see the blend become much smoother. Remember that you can drag motions while Layout is playing, so you can modify the transition overlap interactively.



Overlapping motions

Renaming or Replacing Items in Layout

Renaming or replacing an item in Layout that belongs to an Actor will update the Actor and any motions. However, the channel names (as seen

in the Graph Editor) will not be updated until the scene has been saved and reloaded. This does not affect the operation of MotionMixer, but you should save and reload as soon as it is convenient.

The Track Area

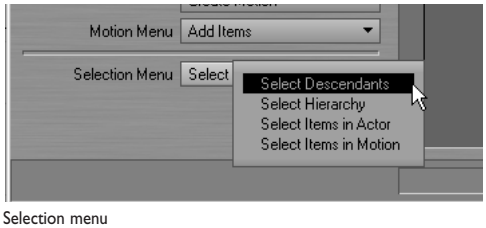
Each track can be deactivated by clicking on the eye icon with your RMB. When a track has been deactivated, all motions and transitions on the track are also disabled. This is useful for isolating a motion on another track, so that it can be worked on without the effects of any transitions or blending.

The display can be scrolled horizontally by holding down the ALT key while dragging your LMB on an empty area of the display. Scrolling the display vertically can be achieved by using your UP and DOWN Arrowkeys.

The plus (+) button on the toolbar adds a new track to the Timeline at the end of the current list of tracks. The minus (-) button removes the currently selected track along with any motions on it. You can select a track by clicking on it.

Selection Menu

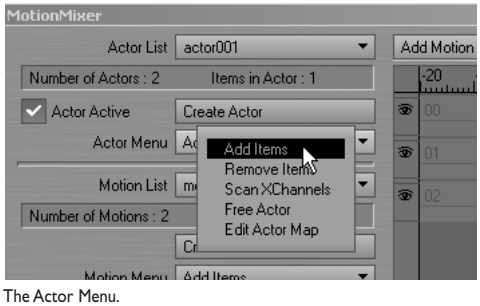
The Selection Menu can be used as shortcuts to select items in Layout.



Selection menu

Actor Menu

The **Actor Menu** pop-up menu provides methods for working with actors and the items defined within them.



The Actor Menu.

Add Items adds the currently selected items in Layout to the current actor.

Removes Items removes the items selected in Layout, from the current actor. MotionMixer will no longer control these items. This does not clear the item from Layout, however. Clearing an item from your scene will also remove it from an Actor.

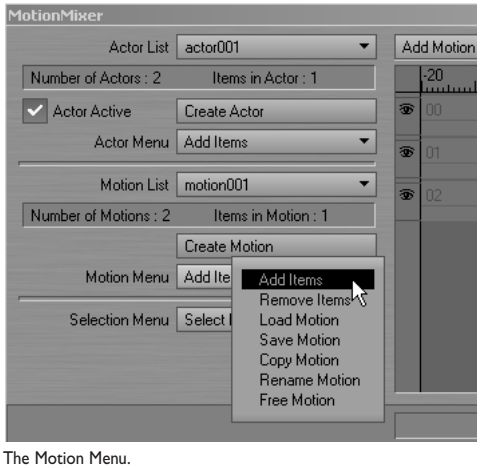
You can use **Scan XChannels** to add Endomorph channels, if MorphMixer is added to an item *after* that item has been added to an actor. MotionMixer allows you to mix all of the animation channels belonging to an item. The non-transformation channels (i.e., any channel other Position, Rotation, and Scale) are called "XChannels." Other examples of XChannels are: a light's RGB color and Intensity channels, a camera's Zoom Factor, an object's Dissolve channel, and so on.

Free Actor removes the current actor from memory. All items contained in the actor are removed and all motions are freed.

Edit Actor Map opens the Actor Map panel, discussed below.

Motion Menu

The Motion Menu provides methods for working with motions and the items defined within them.



The Motion Menu.

Add Items adds the currently selected items in Layout to the current motion. Use this when you need items of different types in the same motion.

Remove Items removes the currently selected items in Layout from the current motion. Any animation data for these items will not be restored.

Load Motions loads a motion into the current actor. Motion files have an .HMOT file extension and contain data for all the items in an animation. If the motion that's being loaded contains animation data for items that are different from those in the current actor, the Motion Mapping panel will be displayed.

Save Motion saves the current motion to disk.

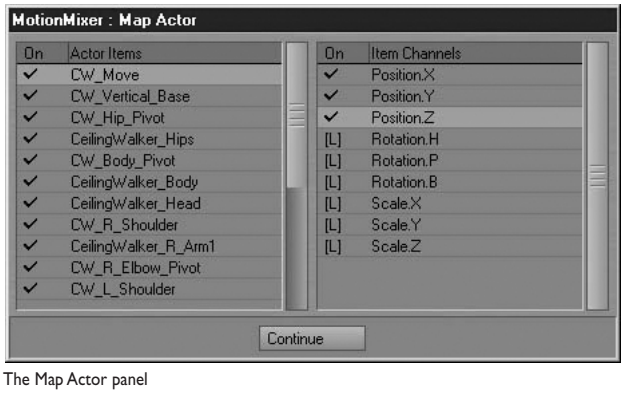
Copy Motion creates a copy of the current motion. You will be prompted for a name, after which the motion will be added to the **Motion List**.

Rename Motion allows you to change the name of the current motion. This can also be done in the Motion Properties panel.

Free Motion removes the current motion from memory, all channels are cleared and the motion is removed from the actor.

Actor Maps

The Actor Map informs MotionMixer which channels in an item should be evaluated on playback and while "baking." By default, all channels and all items are active.



The Map Actor panel

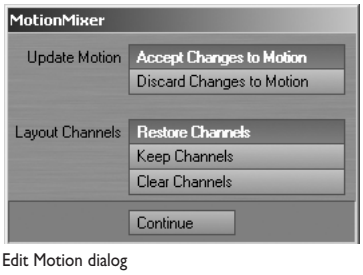
Usually, an animation will not use all channels in all items. Having fewer channels active will improve playback performance in complex scenes and reduce the amount of keyframe data generated by the baking process. For example, in a character bone hierarchy, scaling is likely never used, so these three channels can be deactivated for each item. Moreover, often there is only one item that has any positional animation (e.g., the pelvis), so all the other items can have their position channels deactivated. Finally, some bones, like an elbow joint, only rotate around one axis, so the other two rotation axes can be deactivated.

To toggle the state of an item or channel, click in the column marked On. A check mark in this column indicates that the item or channel is active. An [L] indicates that this item or channel is locked (i.e., inactive). This is a global setting and overrides any states set in the Channel Editor.

NOTE
Actor Maps are saved and loaded in the Lightwave scene file.

Editing Motions

The **Edit Motion** button on the toolbar places the currently selected motion back into Layout for editing. All other tracks and motions are disabled while this mode is active. Once the motion is in Layout, you can edit the animation as you would normally. When you've finished making changes, toggle the Edit Motion button off. This will bring up the Edit Motion dialog.



Edit Motion dialog

Accept Changes to Motion updates the motion with the changes you made. **Discard Changes to Motion** does not update the motion.

Restore Channels restores any animation that was present in Layout before editing the motion. **Keep Channels** leaves the motion in Layout. This is handy for creating new animations based off an existing motion. **Clear Channels** clears all the channels in Layout associated with the motion's items. Motions are placed back at the frame/time from where they were created and are reset to their original (100%) scale.

Baking Motion

The **Bake Motion** button on the toolbar allows a range of frames to be recorded by evaluating the animation at a specified interval. This enables any combination of motions, transitions, and behaviors to be collapsed into a single motion that can be loaded back into MotionMixer or just used in Layout.

Edit Motion dialog

The **Start Frame**, **End Frame** and **Frame Step** fields specify the range of frames that will be baked and the frequency of the evaluation. Note that MotionMixer will always create a key on the first and last frames of the range.

NOTE
Often a **Frame Step** of 2 or 3 is accurate enough.

By enabling **Create Motion**, MotionMixer will automatically create a new motion from the baked sequence and place it in the **Motion List**. The **Motion Name** field enables you to specify a name for this new motion. If this is disabled, the baked keyframes will be left in Layout, allowing you to perform further editing before creating a motion as described earlier.

To bake a motion:

1 Click the **Initialize** button. This attaches the MotionMixerBaker motion plug-in to all the items in the actor. When this action is finished, the **Bake** button becomes active.

2 Click the **Bake** button. MotionMixer steps through the specified range of frames and records each item's animation by creating new keyframes in Layout. When the process has finished the MotionMixerBaker motion plug-ins are automatically removed.

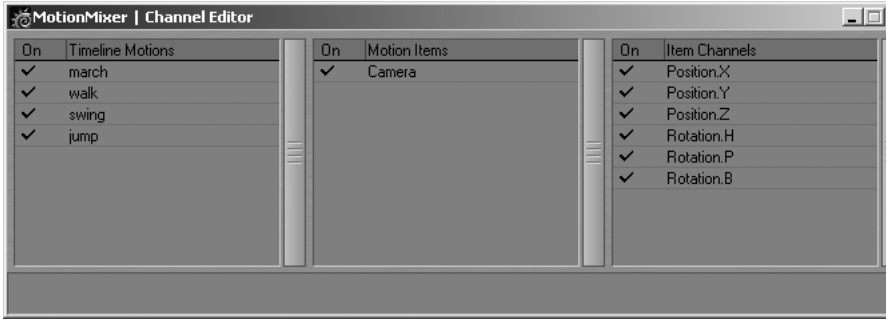
The current Actor Map determines the items and channels that are baked. If an item or channel is locked, then no new keys will be made for it. This is an effective way of reducing the amount of new data created and optimizing the resulting motion.

NOTE
Currently, you will need to bake the entire animation sequence, if you intend to render the scene with ScreamerNet. Once this is done, remove the MotionMixer plug-in from the scene and save the scene using a different name.

NOTE
Baking does not currently support XChannels.

The Channel Editor

The Channel Editor gives you complete control over which motions, items and channels contribute to your animation. Open it by clicking **Channel Editor** on the toolbar.



The Channel Editor

The panel contains three lists. The list on the left controls the states of the motions that are currently placed on the Timeline. Clicking in the left hand On column, toggles the state of each motion. In the center of the panel is the Items list. This shows all the items that are controlled by the motion selected in the **Motion List**. Any or all of these items can be enabled or disabled. The list on the right shows the state of the channels for the item currently selected in the Motion Items list. If a channel is marked with the [L] symbol, that channel has been locked by an Actor Map and cannot be altered here.

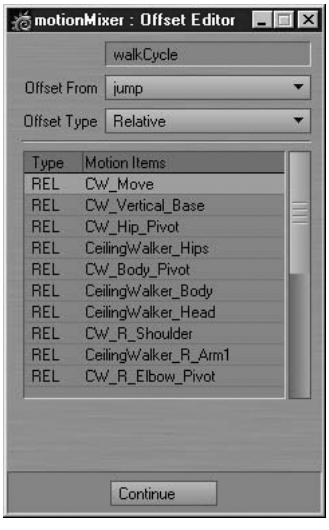
The Channel Editor can be used to combine two or more motions together. For example, say you have a character walk cycle and a waving animation and you'd like to combine them to create a walking waving animation. First, you'd position each motion on the Timeline so that they play at the same time.

Then, open the Channel Editor to edit the state of the items in each motion. In the walk cycle animation, you'd disable all the items for the upper body, leaving just the legs animating.

For the waving animation, you'd disable all the items relating to the character's lower body, leaving just the upper body animating. Now, when you play back the animation, you'll see the lower body animation from the walk cycle playing along with the upper body animation from the waving animation. The resulting animation can then be baked and saved for future use. Other animations could be layered on top of these, providing an easy way to add secondary motion to your work.

Offset Editor

By default, MotionMixer uses an absolute offset when evaluating motions. This means that each motion is evaluated in isolation from any other motion on the Timeline. Alternatively, a motion may be offset from another motion. This is called a “relative offset.” If you want a motion to continue on from the point at which another motion has finished, you can use a relative offset.



The Offset Editor

To set an offset:

1. Select the motion on the Timeline that you'd like to set the offset for and click on the **Offset Editor** button on the toolbar.
2. Select the motion you want to create an offset from the **Offset From** pop-up menu and the type of offset from the **Offset Type** pop-up menu. Note that you cannot offset a motion from itself.

To remove an offset:

You can remove an offset from a motion either by setting **Offset From** to **(none)** or setting the **Offset Type** to **Absolute**.

More on XChannels

When you create an actor, or add items to an actor, MotionMixer looks for any non-transform channels and assigns them automatically. If channels are added to an item *after* it has been added to an actor, MotionMixer will detect the change and add them to the actor. The exception to this is Endomorphs. Endomorph channels will be added to an actor automatically only when MorphMixer has been added *before* the item was added to the actor. If MorphMixer is added after that item has been added to an Actor, you must use **Scan XChannels** in the **Actor Menu**, which was mentioned earlier

Removing XChannels from an actor is achieved by either using the **Remove Items** entry in the **Actor Menu**, clearing the item from the scene, or manually removing the MM_ChannelDriver modifier on the Graph Editor.