Click the paste icon on the universal tool bar. The copied frame will be inserted in the film strip and highlighted.
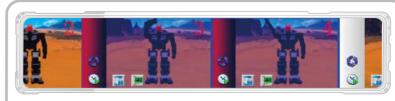
3

The cut function works in a similar way to the copy function, but removes the original frame(s) from the film strip when copying them to the clipboard.

4

The delete function permanently removes selected frame(s) from the film strip.

5

Tween:

The tween function inserts an interim frame between two selected frames. The new frame contains joint positions that are the mid point between the joint positions in the frames either side of it. This function can be useful when fine tuning motion sequences.
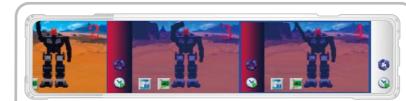

Select two frames by clicking on the first and then clicking on the second whilst holding down the shift key. Then click the Tween icon.

1

The tween frame will be inserted between the original two frames and automatically selected.

2

Reverse:

The reverse function reverses the order of a sequence of selected frames. This function can be useful for creating reverse motions from an existing motion sequence.

Select frames to be reversed by clicking on the first and then clicking on the last whilst holding down the shift key. Then click the Reverse icon.
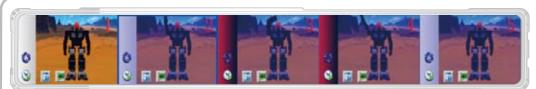
1

All of the selected frames will now be resequenced in reverse order.

2

Copy Left to Right, Copy Right to Left:

The Copy Left to Right and Copy Right to Left functions copy all of the joint position values from one side of the robot to the other so that the robot is symmetrical.

Select frame (or frames) to be mirrored (multiple frames can be selected by clicking on the first and then clicking on the last whilst holding down the shift key). Then click the Copy Right to Left icon.

1

All of the selected frames will now have their right side joint positions copied to the left side.

2

Copy Left to Right works in exactly the same way as Copy Right to Left but copies all of the joint position values from the left side of the robot to the right.

3

Mirror:

The mirror function swaps joint position values from left to right and right to left and inverts the joint position value of the head joint. This function can be useful for creating opposite motions from an existing motion sequence or when motion sequences contain the same series of motions which switch alternately between the right and the left sides of the body (for example walking).

Select frame (or frames) to be mirrored (multiple frames can be selected by clicking on the first and then clicking on the last whilst holding down the shift key). Then click the Mirror icon.

1

All of the selected frames will now have their joint positions transposed, left-to-right and right-to-left.

2

Looping:

In cases where you wish the robot to repeat an action several times (such as walking), it would be undesirable for the robot to have to return to the home frame between each cycle. In these cases looping can be employed. Multiple frames can be selected within a motion sequence that will be repeated whilst a button or combination of buttons is held down on the remote control handset. Frames before and after the looped section will only play once at the beginning and end of the motion sequence.
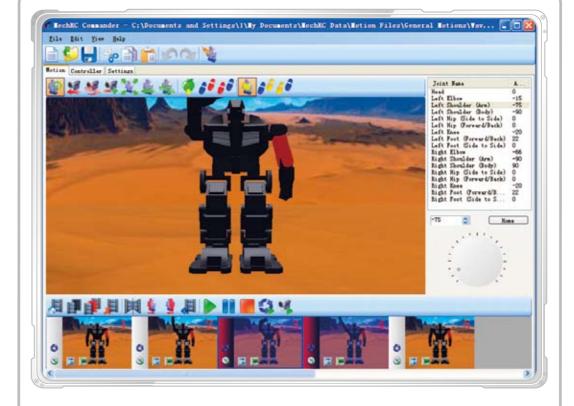

Select frames to be looped by clicking on the first and then clicking on the last whilst holding down the shift key. Then click the Loop icon in the last selected frame.

1

The looped frames will now be denoted by red transition bars.

2

You can check the performance of the motion file by clicking the loop button on the edit/playback toolbar and then clicking play. This will play the motion from the currently selected frame, continuously playing the looped section, until the loop button is clicked again. This will cause the last section of the motion sequence to be played. Note that if a connection to the robot is established, the robot will move simultaneously with the image of the robot on screen.

3

Camera Controls:

When creating a motion you may need to view the robot from different angles in order to position the joints correctly. For this reason MechRC Commander comes with a set of camera positioning and animation tools, allowing you not only to position the camera anywhere you like in the scene, but also to animate it during playback on screen

Pan Camera:
When selected, moving the mouse up and down, left and right, will move the camera up and down, left and right in the scene.

Rotate Camera:
When selected, moving the mouse up and down, left and right, will rotate the camera around the robot in the scene.

Zoom Camera In/Out:
When selected, moving the mouse up and down will move the camera in to and out of the scene.

Toggle Animation of Camera:
When highlighted, the camera will animate from frame to frame during motion playback according to how it is positioned in each frame. If unselected, the camera will remain stationary.

Fit Robot to Screen:
Clicking this button will rotate and move the camera so that it is pointing at the robot and so that the robot fills the screen.

Robot Orientation Controls:

Although it has no effect on the playback of motions on the robot itself, you may wish to make your on-screen robot mimic the actual movements of your real life robot. For this reason MechRC Commander comes with a set of robot orientation tools to help you produce realistic robot animations.

Pan Robot:
When selected, moving the mouse up and down, left and right, will move the robot up and down, left and right in the scene.

Rotate Robot:
When selected, moving the mouse up and down, left and right, will rotate the robot within the scene.

Gravity Snap:
When selected the robot is moved vertically downward in the scene until its lowest point is in contact with the groundplane.
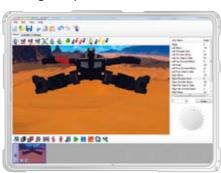

Left Foot Land:
When selected the robot will be rotated and moved vertically in the scene so that its left foot is sitting flat on the groundplane.

Right Foot Land:
When selected the robot will be rotated and moved vertically in the scene so that its right foot is sitting flat on the groundplane.

Joint Reference Controls:
In order to improve the on screen animation of your robot, you may find it useful to be able to reference the point about which joints move when their angle is adjusted. For example, if you are creating a walking motion then a more accurate animation would show the body of the robot rotating about the left foot when the left foot is on the floor and about the right foot when the right foot is on the floor. These tools allow you to specify the centre of rotation (chest, left foot or right foot) for each frame in a motion sequence and, whilst these tools have no effect on the playback of motions on the robot, can be used to deliver much more realistic animations.
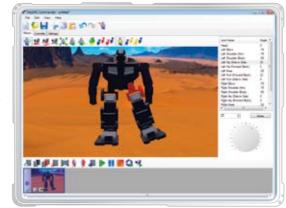
Reference to Chest:
This is the default reference point as it is probably the most easy to use. However, motions created with this reference point used in all frames are likely to give the illusion that the robot is floating in mid air. In the example below, the joint entitled Left Hip (side to side) has been selected. When the joint angle is adjusted the robot's left leg (and all of the joints connected below it) will move, while the robot's torso (and all other joints attached to it) remain stationary.

Reference to Left Foot:
The feet reference points are ideally suited to motions where the robot is shifting its balance from one foot to the other. Enable referencing to the left foot by clicking the Reference to Left Foot button. In the example below, the joint entitled Left Hip (side to side) has again been selected. Note that, this time, the robot's torso has been highlighted, rather than the hip joint. This is because the part of the body which is highlighted in the 3D window represents the first component in the chain of parts that will move when the joint is rotated. Last time the torso stayed stationary while the leg rotated. This time, when the joint angle is adjusted the robot's torso (and all of the joints connected to it) will move, while the robot's hip (and all other joints attached to it down to the left foot) remain stationary.

Reference to Right Foot:
Clicking on the Reference to Right Foot button has exactly the same effect as clicking on the Reference to Left Foot button, but on the other foot.

The MechRC robot is capable of storing up to 16 sound samples. In order for the robot to play back audio files, they must be in the correct format. To convert audio files to the correct format, follow these steps.

Open a .WAV format file in Windows Sound Recorder.

1

Go to File>Properties to view the file format.

2

Click on the "Convert Now" button in the properties window.

3

Select the format: PCM, 8.000 KHz, 8 bit, mono, Click the OK button and then save the file.
Note, unless you rename the file, the original file will be overwritten.

4

Windows Vista Users

Windows Sound Recorder under Windows Vista no longer includes the functionality described on this page. However, MechRC recommends Power Sound Editor Free for creating WAV files that are compatible with the robot.

Power Sound Editor Free includes advanced editing features that will be of use to all Windows users and even includes text-to-voice functionality that will give your robot the power of speech.

Power Sound Editor Free is available for free download from:

www.free-sound-editor. com

To download your audio files to the robot you will need to access the "Audio" tab from the "Settings" screen.

Tool Strip

Track List
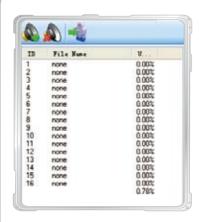
Test Buttons

Icon Key:

Add audio file

Delete audio file

Download playlist to robot

Click on one of the 16 memory locations available on the robot shown in the track list plane. Click the Add Audio icon and select the file you wish to add from the file window. The percentage of the robot's memory used by the audio files is shown in the memory usage column of the track list.

Files can be deleted from the track list by clicking on the track and then clicking on the Delete Audio icon.

①

To download the track list to the robot, first ensure that the robot is powered up and that a connection to the PC has been established, then click on the Download to Robot icon. Note that downloading high volumes of data can take some time. When downloading is complete a dialogue box will appear to notify you. Do not attempt to disconnect the robot during downloads or data could be corrupted or lost.

②

Once downloaded, audio files can be played back on the robot by clicking on any of the 16 buttons representing the robot's audio memory locations.

③

You can save your play list by clicking on the Save icon on the universal tool bar. The file will be saved as a .MRCPL file in the MechRC Data\Audio\ Playlists\Shadow Stalker folder in My Documents.
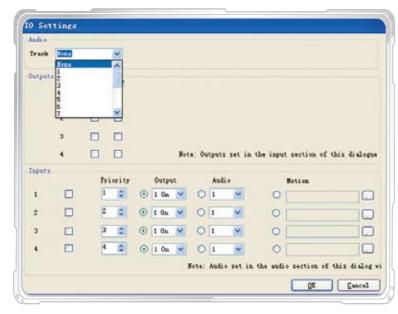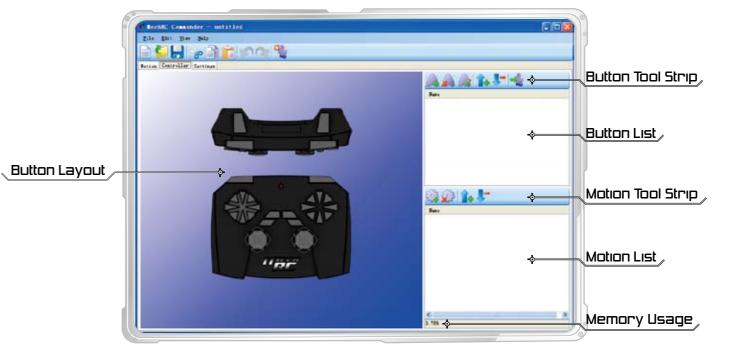
④

To add audio playback to your motion sequences follow these simple steps.

Open a motion sequence file that you wish to add audio to. Locate the action frame where you would like the audio file to start playing and click on the I/O icon for that frame.

1

Click on the track pull down list and then select the memory location from which the robot should play back audio.

2

The robot plays back motion sequences according to the button(s) pressed on the handset. In order for motion files to be activated from the remote control, they must be built into a controller configuration and downloaded to the robot. Controller configurations are edited under the Controller tab in the main program window, the layout of which is shown below:

Button Tool Strip

Button List

Motion Tool Strip

Motion List

Button Layout

Memory Usage

Icon Key:

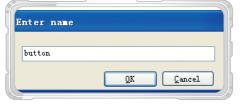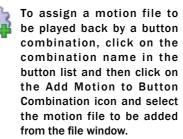|		
Add Button Combination	Add Motion to Button Combination	Move Item Down in List
Delete Button Combination	Delete Motion from Button Combination	Download to Robot
Edit Button Combination Name	Move Item Up in List	

Enter name

button

OK   Cancel

Clicking the Add Button Combination icon creates a new item in the button list that can be named to help you remember its functionality at a glance.

1

Click on the button combination in the button list and then click on the button you wish to assign to this item on the handset image in the Button Layout window. Buttons may be deselected by clicking on them a second time.

2

To activate a motion sequence by pressing more than one button, simply select multiple buttons in the Button Layout window.

3

Name
button

Name
Death Slap.MRCMot

0.78%

To assign a motion file to be played back by a button combination, click on the combination name in the button list and then click on the Add Motion to Button Combination icon and select the motion file to be added from the file window.

4

Bow.MRCMot
Left Ball Kick.MRCMot
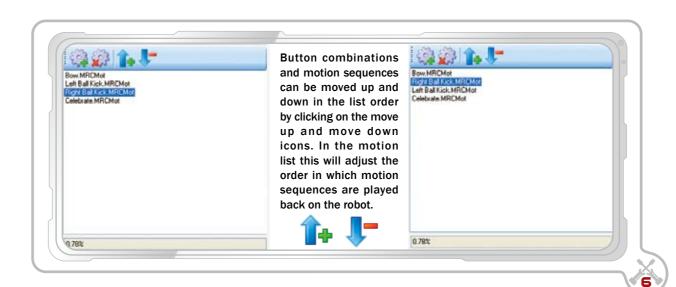Right Ball Kick.MRCMot
Celebrate.MRCMot

0.78%

A button combination can be used to trigger playback of multiple motion sequences one after the other. To add further motions to a combination's motion list, simply repeat the procedure given in Step 4.

5

Bow.MRCMot
Left Ball Kick.MRCMot
Right Ball Kick.MRCMot
Celebrate.MRCMot

0.78%

Button combinations and motion sequences can be moved up and down in the list order by clicking on the move up and move down icons. In the motion list this will adjust the order in which motion sequences are played back on the robot.

Bow.MRCMot
Right Ball Kick.MRCMot
Left Ball Kick.MRCMot
Celebrate.MRCMot

0.78%

6

Button combinations and motion sequences can be deleted from lists by selecting them and clicking on the corresponding Delete icon.

Button combinations can also be renamed by selecting an item from the button list and then clicking on the Edit Button Combination Name icon.

7

Part III: Advanced Features

To download the controller configuration to the robot, first ensure that the robot is powered up and that a connection to the PC has been established, then click on the Download to Robot icon. Note that downloading high volumes of data can take some time. When downloading is complete a dialogue box will appear to notify you. Do not attempt to disconnect the robot during downloads or data could be corrupted or lost.

8

When downloading is complete, click on the Disconnect from Robot icon to end the connection and release control to the robot.

9

Finally, remove the serial jack plug from the socket on the control module. Your robot is now ready to be controlled from the remote handset as described in Section I.

11

You can save your controller configuration by clicking on the Save icon on the universal tool bar. The file will be saved as a .MRCtl file in the MechRC Data\Controllers\Shadow Stalker folder in My Documents.

10

Due to the engineering of a servo, no two are ever manufactured quite the same. This will be a familiar concept to those that have been previously involved with RC racing or flying. When a servo is powered up for the first time after coming off the production line and it is told to go to zero degrees, it may be offset by several degrees. This means that, if these "raw" servos were taken and assembled into the structure of robots, all of the robots would stand in their home positions slightly differently as their joints would each be referenced to a different real life zero position (although internally they believe they are at zero). If the robots then tried to stand on one leg, there would be a good chance that some of them would fall over because instead of leaning 10 degrees to one side they may be leaning 5 degrees to the side due to the ankle servo having a -5 degree offset.

By adjusting the "trim" of each servo, these offsets can be compensated for so that when each robot is powered up it will be in an identical position. We have already "trimmed" the robot for you at the factory, however, should you ever have need to adjust this trim data or re-enter it, please access the "Trim" tab from the "Settings" screen and follow these instructions carefully.

Tool Strip

Joint List

Current Joint Angle

Servo Dial

Icon Key:

Set all trim data to zero

Upload trim data from robot

Download trim data to robot

1 Connect the data cable to the PC and robot, power up the robot and click on the Connect to Robot icon on the universal tool bar.

The robot will now move to the crucifix position displayed on the screen with all servos set to their true factory zero position.
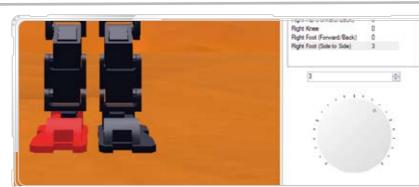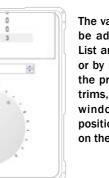
2 Clicking the Upload Trim Data From Robot Button will read the data currently stored in the robot's trim memory and display it in the joint list. The robot will also move slightly (if the trim values stored in the robot's memory are not all set to zero) to their trimmed positions.

3 It is advisable to save your existing trim configuration at this stage by clicking on the Save icon on the universal tool bar. The file will be saved as a .MRCTRM file in the MechRC Data\Trim\ Shadow Stalker folder in My Documents.

4 The value of each joint's trim position can now be adjusted by selecting a joint in the Joint List and typing values into the Joint Angle box or by rotating the Servo Dial. Note that due to the precise requirements for setting the robot trims, the joint dragging function in the main window has been disabled. A guide to the position that joints should be in can be found on the following pages.

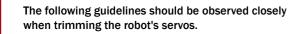**5** Your new trim settings can now be downloaded to the robot by clicking on the Download Trim Data to Robot button.

6 Clicking on the Zero Trim button at any time will reset the offsets on all joints to zero.

The following guidelines should be observed closely when trimming the robot's servos.

Head:
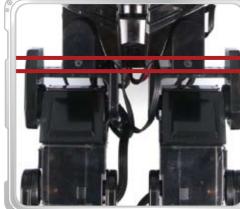The line of the head (front to back) should sit perpendicular to the line running across the width of the torso.

1

Arm (body):
The frame holding the servo in the upper arm should sit vertically. This can be lined up against the join between the front and back of the torso.

2

Upper Arm and Elbow:
These two servos should sit in a straight line along the length of the arm.

3

Hips (side to side):
With the robot lying in a horizontal position (with its back to the floor) so as to avoid the effects of gravity, the robot's legs should be set so that the straight part at the front of the servo frame at the top of the hip lies parallel to the side of the torso.

4

Legs:
With the robot lying in a horizontal position (with its side to the floor) so as to avoid the effects of gravity, the robot's legs should be set so that the Servos are aligned in a straight line along the length of the legs. This can be aided by aligning the straight edge of the servo with the straight edge of the servo frame adjacent to it.

5

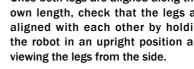**Feet (side to side):**
Adjust the feet so that the top of the foot decoration runs parallel to the Servo frame connecting the forward/backward ankle joint to the leg.

6

Once both legs are aligned along their own length, check that the legs are aligned with each other by holding the robot in an upright position and viewing the legs from the side.
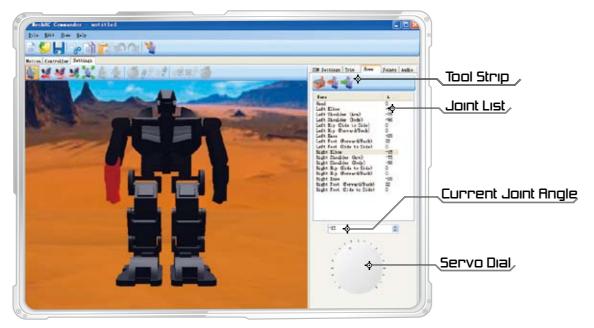
7

Setting the correct home frame for the robot is very important. This is the position that the robot will move to when it is turned on and the default set of joint positions that will be assigned to the first frame in a new motion file.

The default home position that comes pre-loaded on the robot has been designed to be a good universal starting point for a wide range of motions, however under certain circumstances you may need to alter this. In this case please access the "Home" tab from the "Settings" screen and carefully follow the instructions on the following pages.

Tool Strip
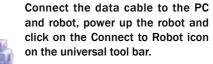
Joint List

Current Joint Angle

Servo Dial

Icon Key:

Set home position to factory default.

Upload home position from robot

Download home position to robot

Connect the data cable to the PC and robot, power up the robot and click on the Connect to Robot icon on the universal tool bar.

The robot will now move to the home position displayed on the screen.

1

Clicking the Upload Home From Robot Button will read the data currently stored in the robot's home memory and display it in the joint list.

2

It is advisable to save your existing home configuration at this stage by clicking on the Save icon on the universal tool bar. The file will be saved as a .MRCHOM file in the MechRC Data\Home\Shadow Stalker folder in My Documents.

3

The value of each joint's home position can now be adjusted by selecting a joint in the Joint List and typing values into the Joint Angle box or by rotating the Servo Dial. Alternatively, the joints of the robot can be selected by clicking on the 3D representation of the robot on screen and moving the mouse pointer up and down as you would in the motion editor screen.

Note that the other items displayed on the viewer tool bar in the home editor screen function in the same way as they do in the motion editor screen.
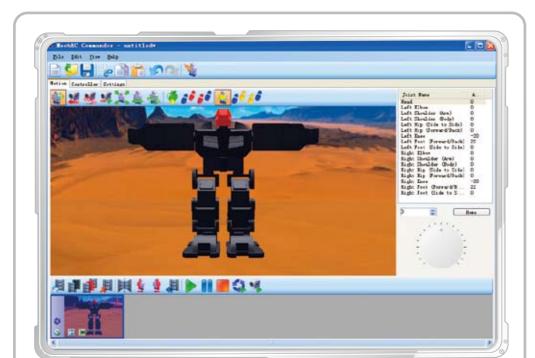
4

Your new home settings can now be downloaded to the robot by clicking on the Download Home Position to Robot button.
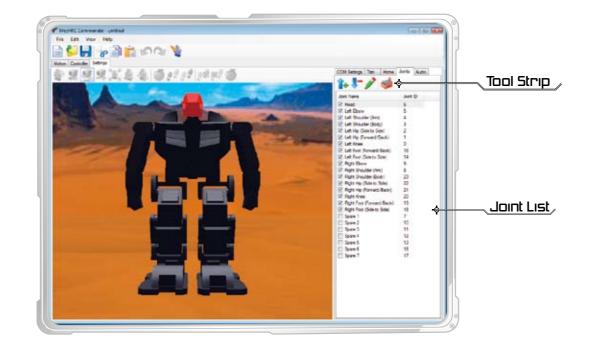
5

Clicking on the Use Default Home button at any time will reset the positions of all joints to the values set at the factory which can then be downloaded.

6

Once a new home position has been created. All new motion files will automatically be created with the joint positions in the first frame set to the positions specified in the Home screen.

7

If at any time you wish to add additional servos to your robot then you can use the Joint Editor on the "Joint" tab from the "Settings" screen to add a new servo or new servos to the Joint List as it appears on other screens. You can then use the tools on this screen to rename the new joint or joints appropriately or to edit the name of existing joints should you wish. Finally, you may also rearrange the order in which Joints appear in the Joints List.

Tool Strip

Joint List

Icon Key:

⬆ Move Joint Up

✏ Rename Joint

⬇ Move Joint Down

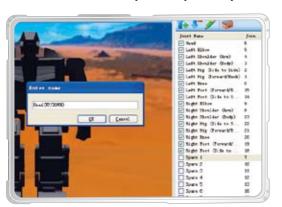🏭 Use default joint names.

Adding a New Joint:
By checking the tickbox next to one of the spare joints in the Joint List, the new joint will be added to the Joint List on other screens. Ensure that the ID number of the joint that you add corresponds to the socket that the new servo has been plugged into.

Editing the Name of a Joint:
First select a joint from the Joint List and then click on the rename joint icon. This will open a dialogue box allowing you to edit the name associated with the joint selected. When you are happy with the new name of the joint, click the OK button and your newly named joint will appear in the Joint List on other screens.
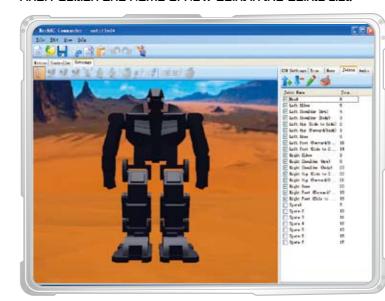

Moving a Joint Up and Down in the Joint List:
First select a joint from the Joint List and then click on the Move Joint Up or Move Joint Down icons to change the order in which the joint appears in the list.

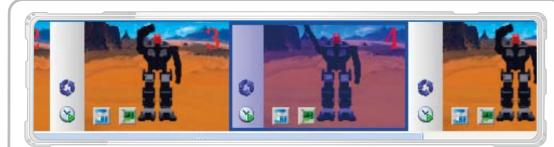## Final Position and Name of New Joint in the Joints List:

If you have obtained a MechRC Input or Output upgrade kit for your robot, you may incorporate this functionality into your motion files by following the instructions on the following pages.

Setting Outputs:

Open a motion sequence file in which you wish to set the state of an output. Locate the frame where you would like the output setting to take effect and click on the IO icon for the frame.
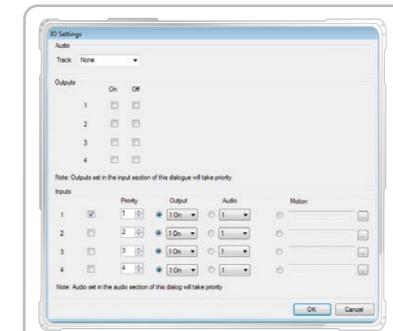
1

In the IO dialogue window you can select which outputs you would like to set as being either on or off when the associated frame is reached during playback of the motion file. This is done by checking the appropriate box next to the output number in the Outputs section of the dialogue box. If neither the On or Off box is checked for an output, then that output will remain in whichever state it was in the preceding frame.

2

Acting on Inputs:

Open a motion sequence file in which you wish to check the state of an input. Locate the frame where you would like the input setting to take effect and click on the IO icon for the frame.

1

In the IO dialogue window you can select which inputs you would like to test as being active when the associated frame is reached during playback of the motion file. This is done by checking the box next to the input number you wish to test in the Inputs section of the dialogue box.

You can then specify what actions to take if those inputs are set. These options include: setting an output to be on or off, playing an audio track or jumping directly to another motion file without completing the current motion.

In the case shown here, the radio button for the input is checked to set Output 1 to be on. The output to be set and the state to which it is to be set can be selected from the pull down menu.
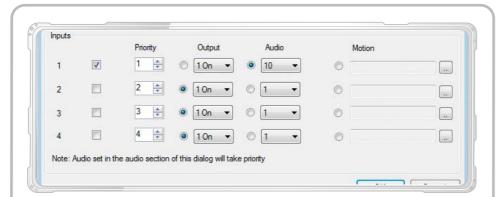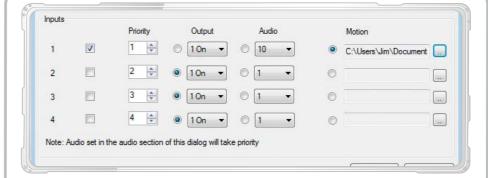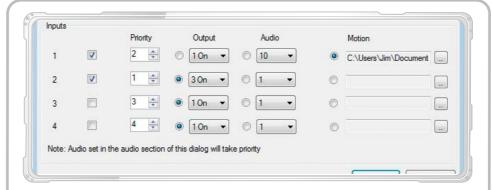
2

In the case shown here, the radio button for the input is checked to set Output 3 to be off.

3

In the case shown here, the radio button for the input is checked to play audio track 10. The track to be played is simply selected from the pull down menu.

4

In the case shown here, the radio button for the input is checked to jump out of play-back of the current motion file and start playing another motion file from the start. The motion file to be initiated is selected by clicking the file browser button to the right of the Motion field and then locating the desired motion in the file browser.

5

Inputs will be tested and acted on in priority order. If, in one particular frame, you are testing more than one input then you may wish to adjust an individual input's position in the priority list. This can be done by clicking on the up and down arrows to the right of the Priority field. 1 is the highest priority and 4 is the lowest.
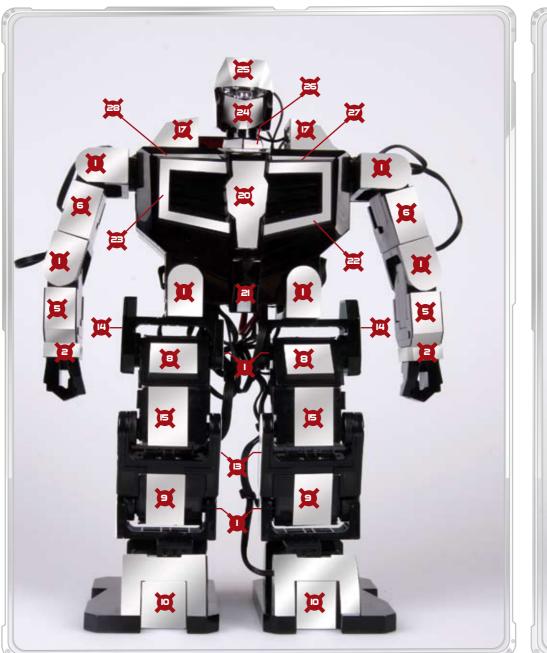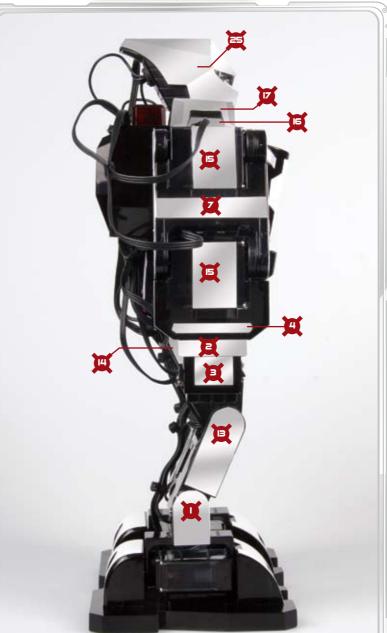
6

Appendix A: Decal Application

Get customising

We have provided you with a great selection of decals to apply to your robot so that you can give it that personal touch.
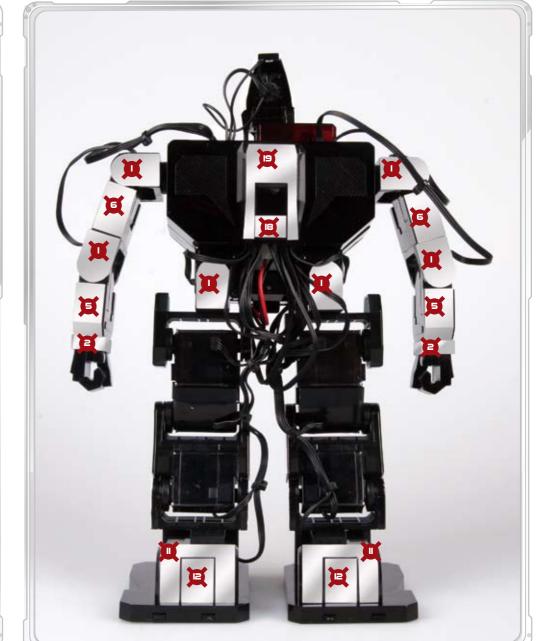
Simply apply the decals from the supplied sheets according to the numbers on the pictures to the right.

We have also supplied a range of numbers, emblems and logos that you can apply anywhere you like on your robot to give it that little bit more identity.

Less is more!

You don't have to apply all of the decals to your robot. Some of the best effects can be achieved by using just a handful of decals, or trimming them down with scissors to accentuate key features of your robot.

Check out what other MechRC users have done to customise their robots on the MechRC community website:

www.pimpmybot.com

MECH RC ™

www.mechrc.com

from a concept by Kablamm Ltd

KABLAMM

www.kablamm.com

for technical support:

please visit WWW.MECHRC.COM