

# **Dark Animation Tools**

**version 1.00**

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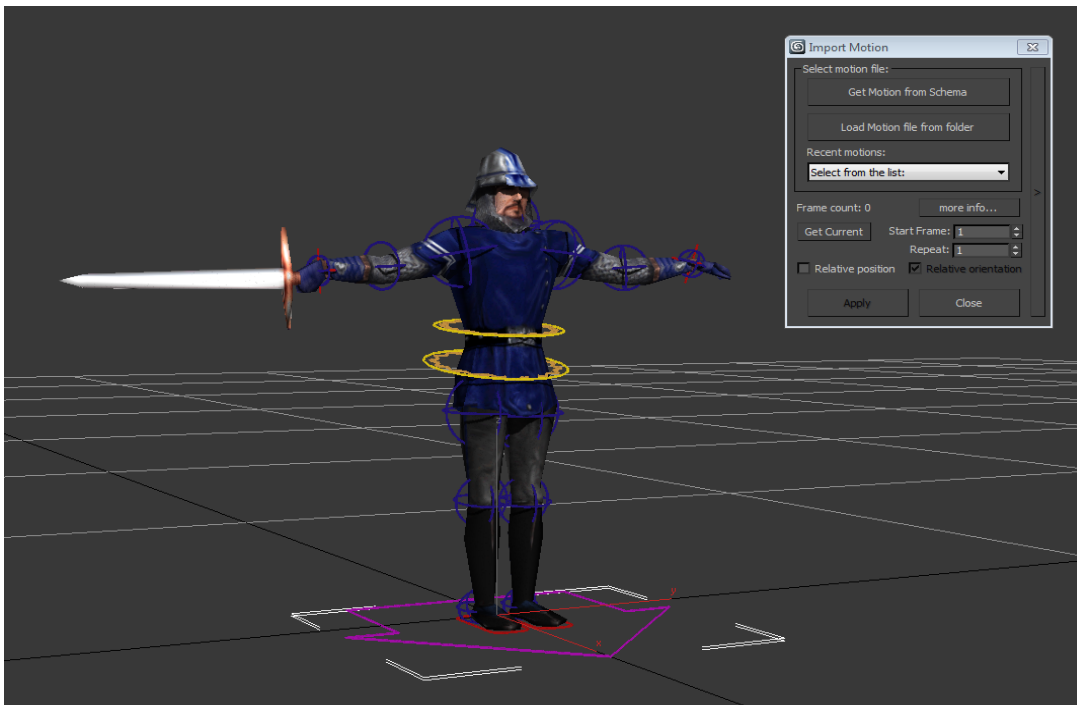
## 1. Overview

Dark Animation Tools is a first part of a scripted toolset called **Dark Max Tools** for 3dsmax. The intention of these tools is to make creating content for Dark Engine based games, such as Thief 1 or 2 or System Shock 2 easier and faster.

With Dark Animation Tools (DAT), you are able to:

- 1) import character (AI) mesh and joint definition files (.bin and .cal) directly into 3dsmax. The result is a textured, rigged and skinned mesh, ready to be animated.
- 2) import motion files (.mi and .mc) onto the DAT character rig
- 3) create motions in an intuitive way, using the FK/IK blend rig
- 4) export motion files to Dark Engine's native file formats (.mi and .mc).

Note: in the version 1.00, DAT fully supports only biped (humanoidal) characters. Other types of creatures will import, but the rig may not work properly. This is on a TO DO list for the next version.



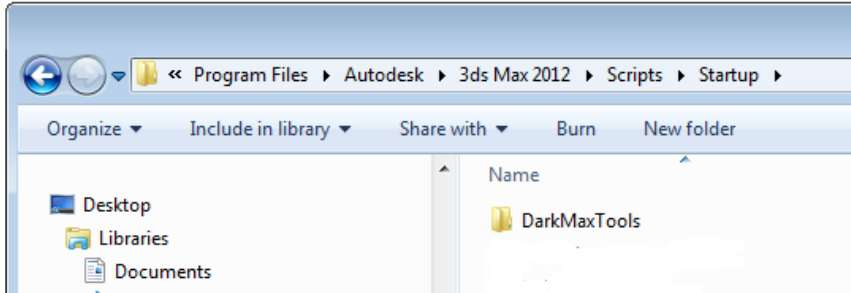
*A Thief 2 character imported and a motion import UI shown.*

## 2. Installation:

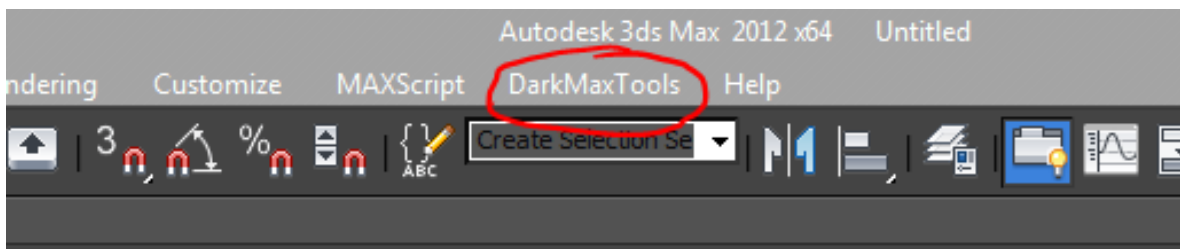
DAT requires 3dsmax 2010 or higher. It has been developed on 3dsmax 2012 and been tested on 3dsmax 2010 as well as 3dsmax 2016.

The downloaded archive contains **DarkMaxTools** folder. Unzip entire folder into your **Scripts\Startup** folder in your 3dsmax folder, e.g.:

**C:\Program Files\Autodesk\3ds Max 2012\Scripts\Startup**

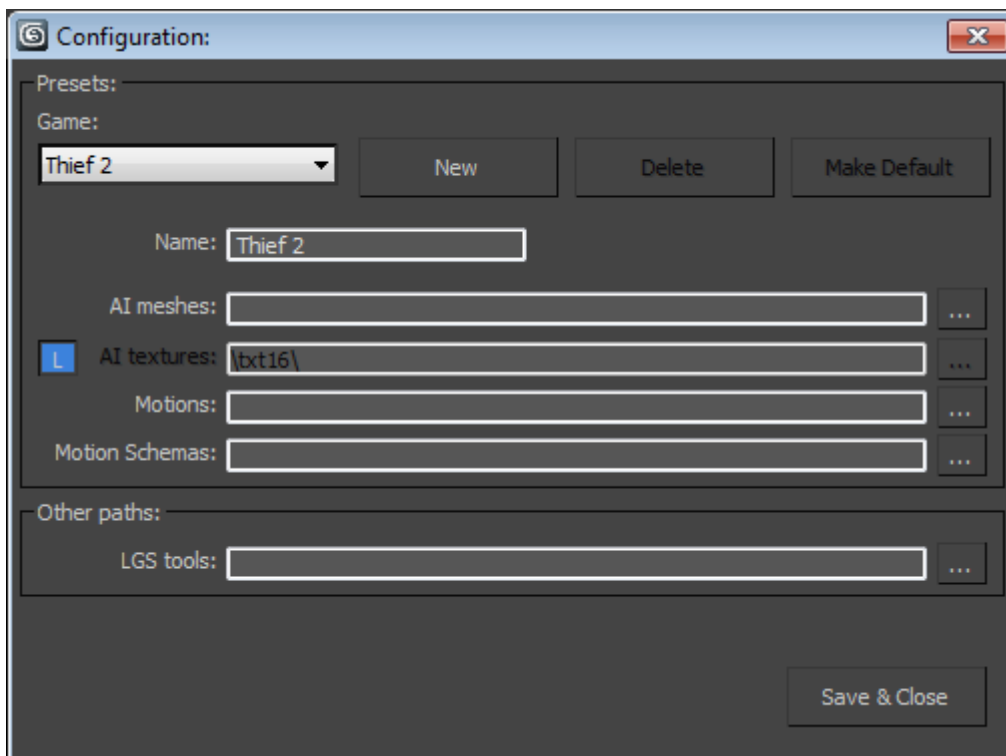


When you launch 3dsmax, the scripts will run automatically. If the scripts install correctly, you will see an extra menu item on the main menu toolbar, named **DarkMaxTools**



### 3. Configuration:

First thing you need to do is to set up a few paths, which the tools rely on. Go to DarkMaxTools menu and choose **Configuration...**



#### 3.1 Presets:

You can work on assets for more than one game/mod at a time, so you can organize them into presets. By default there's one preset created called 'Thief 2' with all the paths blank.

<b>Game</b>	Choose the preset you're modifying
<b>New</b>	Create new preset
<b>Delete</b>	Delete the current preset (it cannot be the default one)
<b>Make Default</b>	Make the selected preset the default one, when you launch the Import tools
<b>Name</b>	You can change the name of your preset here
<b>AI meshes</b>	Specify a path to a folder, where you keep all the .bin and .cal files for your AI for a particular game/fanmission. If you're working on original meshes, they need to be extracted from the mesh.crf file
<b>AI textures</b>	Specify a path to a folder where you keep the textures for your characters.
<b>L (Lock)</b>	You can 'lock' the <b>AI textures</b> folder to be a \txt16 subfolder inside the AI meshes folder. This is the default location of AI meshes' textures
<b>Motions</b>	Specify a folder, where you keep all the .mi and .mc files. These files need to be extracted from the motions.crf file, if you work on the original motions. You would normally have to extract them to a certain location anyway, if you plan on rebuilding your motion database.
<b>Motion Schemas</b>	Specify a folder, where you keep your motion schema files - .mos and .moc files. These are part of the Shadowspawn's Motion Database Editor and you need them if you plan on rebuilding the motion database. Dark Animation Tools make use of these files, so you can browse through motion files in a more intuitive way - by browsing through motion types, schemas and motion tags, rather than just by file names.

### 3.2 Other Paths:

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<b>LGS Tools</b>	Currently not in use. The tools at some point were making use of the LGS mesh and bin tools, like <b>n3ds2bin.exe</b> , etc., but currently none of them use them. Kept for potential integration in the future.
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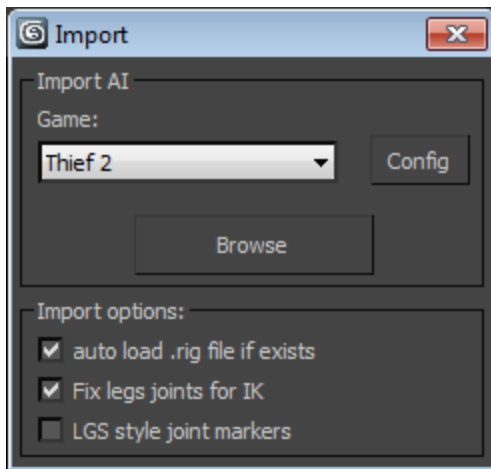
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To save your changes, press **Save & Close** button at the bottom corner. The settings are stored in your **Documents\DarkMaxTools** folder, in a file called **DarkAnimTools\_Settings.ini**. If you install these tools in another version of 3dsmax, your settings will be seen automatically.

Once you specify your paths, you are ready to go!

## 4. Character import:

To import a character into 3dsmax, go to **DarkMaxTools > Import...** The dialog will show up:



### 4.1 Import AI:

<b>Game</b>	Choose a game/mod/fanmission preset you're working on
<b>Config</b>	Brings up the Configuration dialog
<b>Browse</b>	Opens up File Open dialog. Location defaults to your AI meshes folder. Just select the character .bin (or .cal) file and the importing process will start.

### 4.2 Import options:

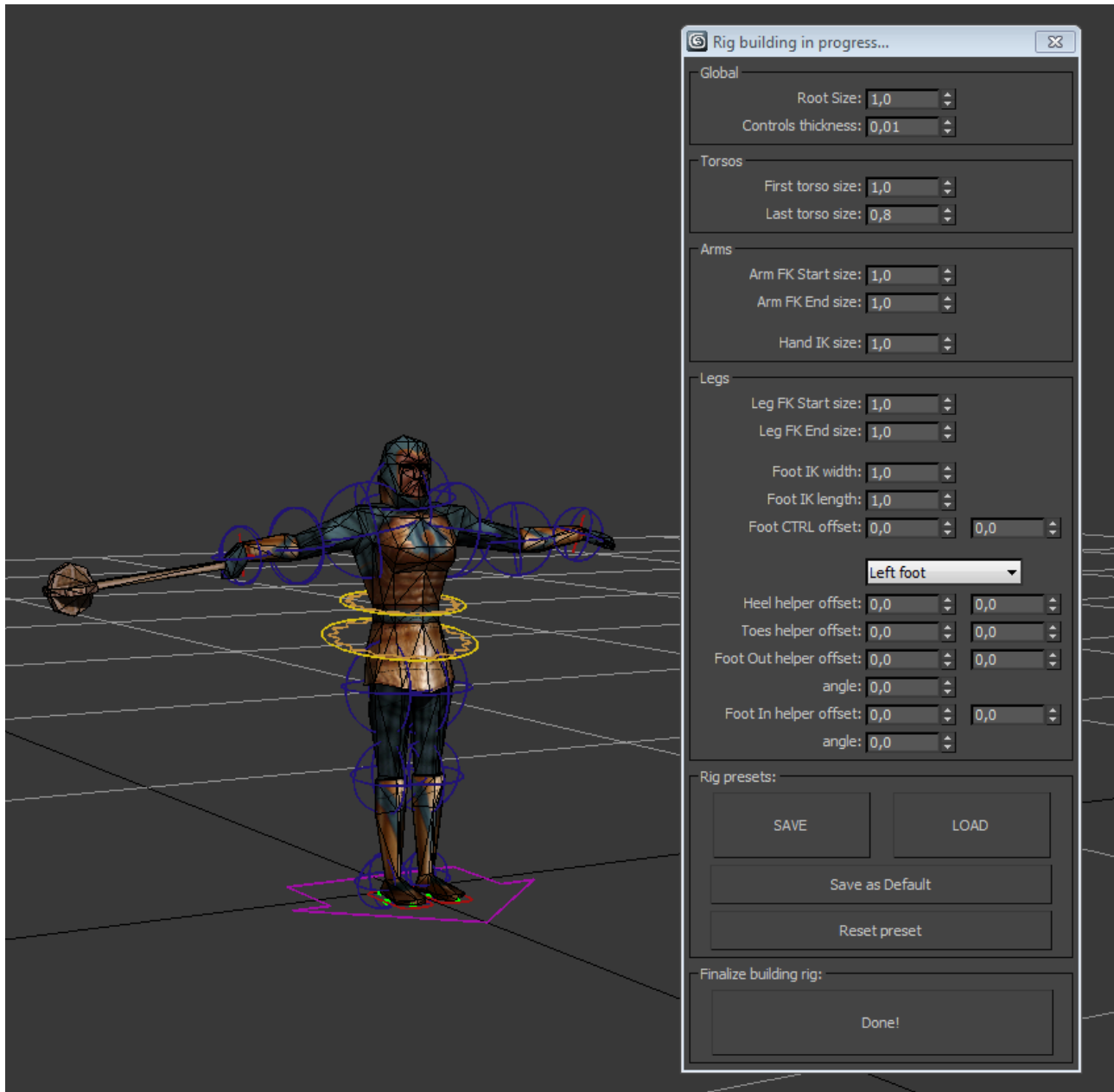
<b>auto load .rig file if exists</b>	If the importer finds a .rig file, which is an auxiliary file, created during the first import of a character, it will be loaded automatically. This just speeds up the importing process and makes it a one-click solution. Default 'on'. More on .rig files in the next section
<b>Fix legs joints for IK</b>	Location of joints in the original LGS files is somewhat random. (e.g. joints are not symmetrical). As a result, sometimes leg bends 'inwards', when in IK mode, which is not acceptable. The script fixes this by relocating the offending knee joint slightly, so the rig can work in IK mode correctly. Keep it on, unless you don't want to animate your character.
<b>LGS style joint markers</b>	DAT can optionally create joint markers (cubes) similar to the ones found in converted .3ds AI meshes files. Might be useful if you need it for a reference, but they're not needed for the DAT to work properly.

### 4.3 Importing a character for the first time:

When you import a particular character for the first time, you need to do a few adjustments first. Some of them are crucial for the IK mode to work correctly (foot pivot points), some are mainly for convenience (size of animation controls). The tools try to scale the controls based on the creature size, however it's not possible in every case, hence the adjustments needed.

Once these adjustments are done, they can be saved in a **.rig** file, for future use.

When you press **Browse** in the Import AI dialog and choose some **.bin** file, the script will import a character mesh, build a rig partially and stop the process, waiting for your adjustments to be completed. You will be presented with such a GUI:





Here's what all the settings are:

## Global:

<b>Root size</b>	Root is the main control of a character – the pink arrow at the bottom of the feet. Depending of the character size, it may need to be scaled up or down.
<b>Controls thickness</b>	Global thickness of the animation controls. Small creatures may need these to be thinner.

## Torsos:

<b>First torso size</b>	First torso usually refers to the yellow circle control around the pelvis. It's the second most important control, as it is used to move the character as well as rotate whole body.
<b>Last torso size</b>	Last torso usually refers to the abdomen torso – also the smaller yellow circle. So far, only one of the player's hand has more than two torsos, (which is not supported in ver.1.0 anyway)

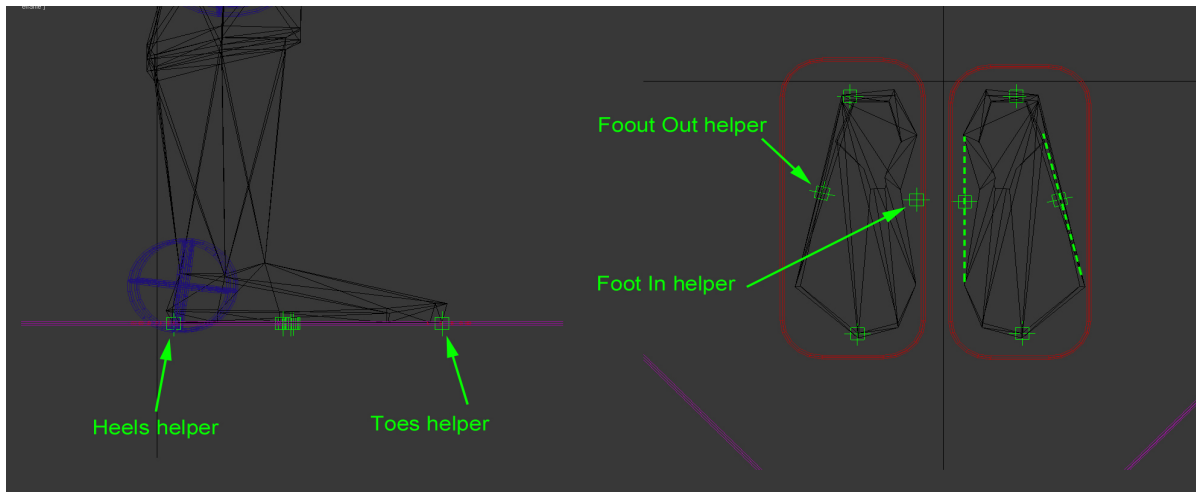
## Arms:

<b>Arm FK Start size</b>	This is the arm control in biped characters – the blue triple circle. Change the spinner to make it smaller or bigger.
<b>Arm FK End size</b>	This refers to the last blue control in an arm chain – a wrist control in biped characters. The middle (elbow) control gets size interpolated between the shoulder and wrist control.
<b>Hand IK size</b>	This changes the size of an IK control – a red cross located at the wrist

## Legs:

<b>Leg FK Start size</b>	Similarly to arm controls – this is the hip control size.
<b>Leg FK End size</b>	This is the ankle control size. The knee control's size gets interpolated between the hip and ankle controls.
<b>Foot IK width</b>	Width of the foot IK rectangular controls
<b>Foot IK length</b>	Length of the foot IK rectangular controls
<b>Foot CTRL offset</b>	X and Y offsets of the IK control. Use them to center the rectangle under the foot
<b>Left foot (Right foot)</b>	This affects values of the following GUI spinners. Choose which leg's foot helpers you're working on. This is relevant only, when you change them through these UI controls. When you adjust them in the viewport, you don't need to touch this.
<b>Heel helper offset</b>	Essential - This specifies position of the heel pivot point for advanced foot IK controls. <u>It can be adjusted in viewport by moving the green cube</u>
<b>Toes helper offset</b>	Essential - Position of the toes pivot point for the foot IK controls. <u>Can be moved in the viewport.</u>
<b>Foot Out helper offset</b>	Essential - Pivot point for the foot banking outwards. <u>Can be moved in the viewport.</u>
<b>angle</b>	Essential - Angle of the pivot point. <u>Can be rotated in the viewport.</u>
<b>Foot In helper offset</b>	Essential - Pivot point for the foot banking inwards. <u>Can be moved in the viewport.</u>
<b>angle</b>	Essential - Angle of the pivot point. <u>Can be rotated in the viewport.</u>

Below is an illustration showing correct alignment of foot helpers. They should be placed at the most extreme points or edges, around which the foot will pivot or bank. The foot in/out helpers can be rotated, as their orientation matters. The heels and toes helpers – only placement along the X axis is important (along the length foot).



#### 4.4 Rig presets:

When you're done with your settings, save the presets, so you don't have to adjust them again. Presets are saved as **.rig** files, with the same name and in the same location as your character, which you are importing.

<b>Save</b>	Saves the settings. Name and location is automatic.
<b>Load</b>	You can load existing .rig file. Useful, when you're working on a similar character to the one you have already set up.
<b>Save as Default</b>	You can save the current settings as the default ones for a particular creature type. (Note: this feature is not currently fully supported, as only one type of creature can be imported anyway. It will be more useful in the future.)
<b>Reset preset</b>	Reset all the changes and tweaks you've done and bring back the default values.

Note: .rig files can be shared with others, so if you create a character and share it with the community, you can include the .rig file in the distribution package.

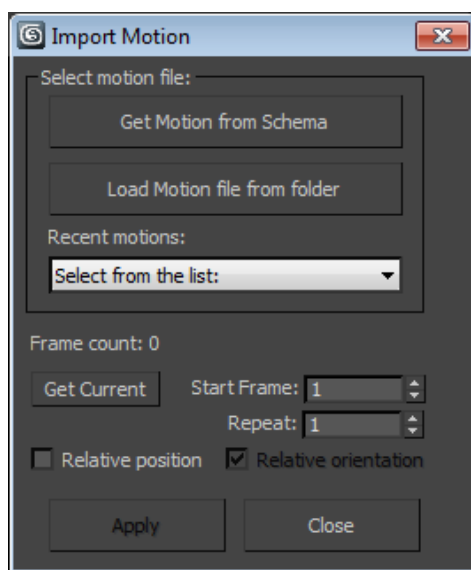
#### 4.5 Finalize buidling the rig:

<b>Done!</b>	When you have aligned the foot helpers and you're happy with the size of controls, press Done and the rig building will continue and finalize
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## 5. Importing motion files

➔ *To import a motion saved in original Dark Engine format (.mi and .mc files):*

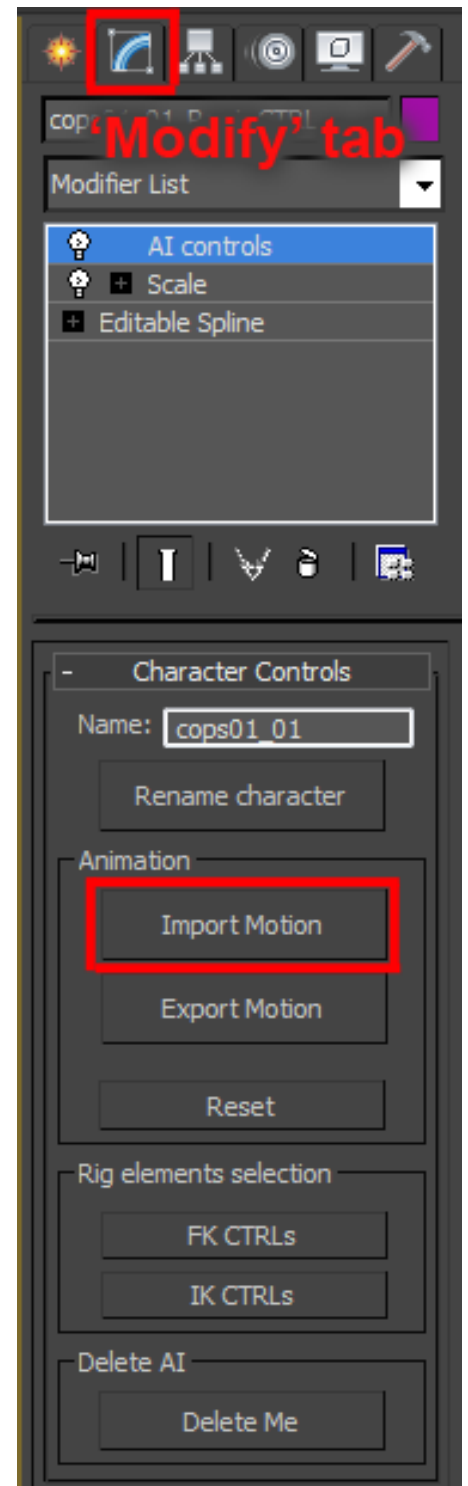
- 1) Import a character
- 2) Select a **Root\_CTRL** of your character (pink arrow under the feet)
- 3) Click on the 'Modify' tab on the left side of the screen.
- 4) The first modifier – **AI controls** – contains rollouts with some controls for your character. Click on the **Import Motion**.
- 5) An **Import Motion** dialog will pop up:



- 6) Select a motion file through one of three methods:
  - using Motion Schema browser
  - by selecting an .mi file from a folder
  - by selecting one of the recently imported motion file

These methods will be described in detail below.

- 7) Once you choose a motion file, the 'Apply' button becomes active and Frame count of the motion will display a correct value.
- 8) Set options like Start Frame, Repeat and Relative position, if necessary. (see below)
- 9) Press 'Apply' – the motion will be loaded onto a rig.

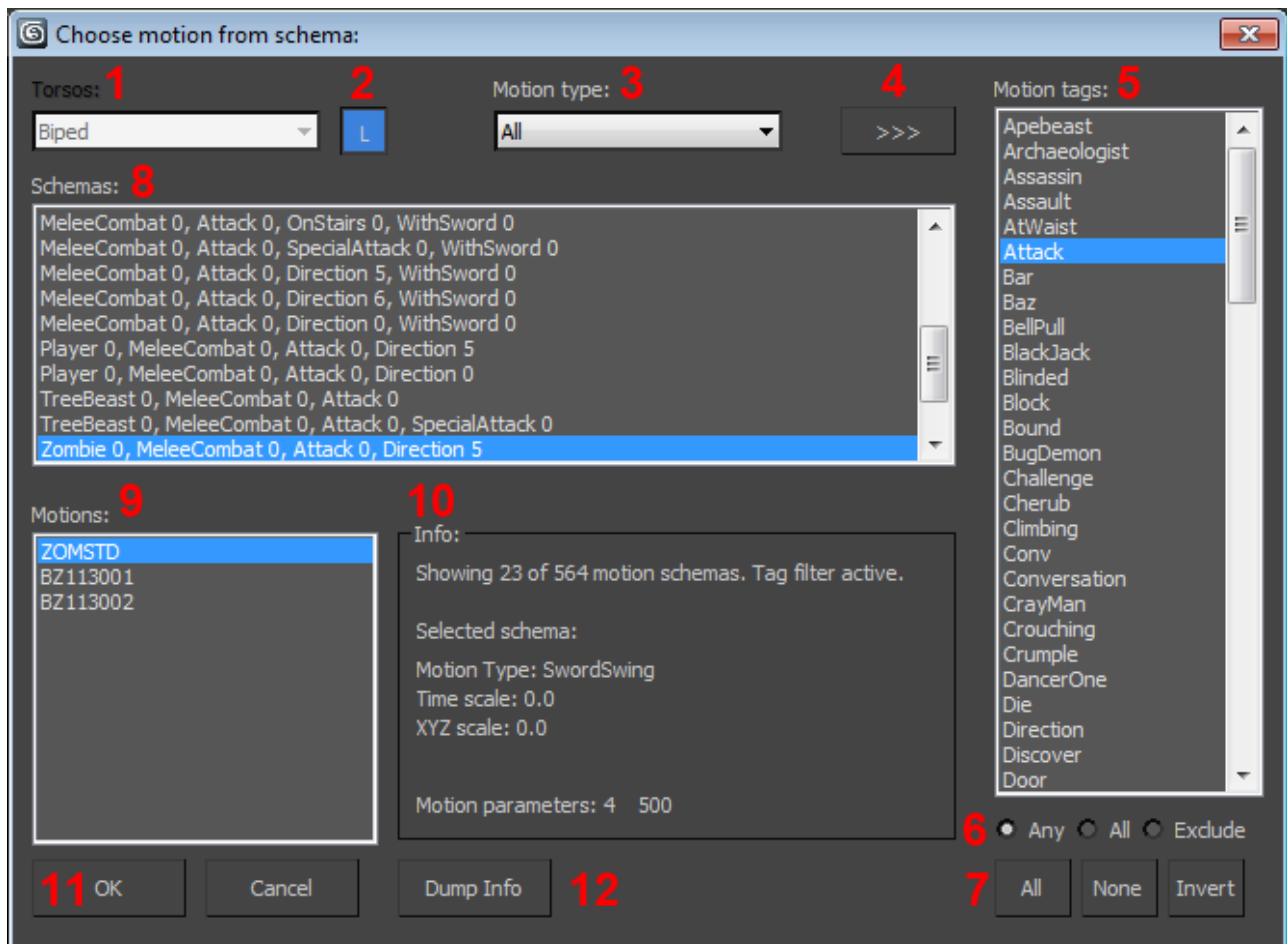


## 5.1 Selecting Motion files to import

### 5.1.1 Selecting using Motion Schema browser

When you press **Get Motion from Schema** a new modal dialog will appear, letting you browse through all the motion schemas and choosing an appropriate motion file.

Note: for the schema browser to work, you need to specify the 'Motion Schemas' folder in the Configuration window. If you update the schema files with your own motions and tags, the Schema Browser will update them when re-launched.



#### ➔ To select a motion:

- 1) Filter the **Schemas** (8) list using **Motion type** (3) filter and/or **Motion Tags** (4, 5, 6, 7) filter
- 2) Choose a schema from the **Schemas** list (8)
- 3) Pick a motion file from the **Motions** list (9)
- 4) Press OK (11)

### 5.1.2 Motion Schema Browser – UI

1	<b>Torsos</b>	This filter specifies a type of creature the listed schemas are designed for. By default it matches the AI type you're importing a motion onto, otherwise you'll get an error.
2	<b>L (Lock)</b>	This locks the Torsos filter, to prevent errors. If you want to experiment or you know that a particular motion was designed to a different creature than the meta information says in the .mi file, you can unlock it and change Torso to a different one.
3	<b>Motion type</b>	This filter lets you narrow down the schema list to a specific type of motions. By default it shows all types
4	<b>&gt;&gt;&gt;</b>	This selects all the tags present on the schemas currently listed.
5	<b>Motion tags</b>	This list lets you select tags to further narrow down your search. Tags filter filters the schema list using a logic specified at (6)
6	<b>Any / All / Exclude</b>	The logic operator for the selected tags. <b>Any</b> – any of them need to be present in the schema name <b>All</b> – all of the tags selected must be present in the schema name (at least one of the tag must be selected, otherwise ignored) <b>Exclude</b> – removes from the list all the schemas with tags selected
7	<b>All</b>	Selects all the tags
	<b>None</b>	Deselects all the tags
	<b>Invert</b>	Inverts the tag selection
8	<b>Schemas</b>	A filtered schema list. Choose a schema to select a motion file
9	<b>Motions</b>	This lists all the motions that are included by selected schema
10	<b>Info</b>	This displays a number of informations: 1 <sup>st</sup> line – number of schemas listed. If the schemas are filtered by tags 'Tag filter active' comment appears Next lines – parameters of currently selected schema Last line – parameters of currently selected motion
11	<b>OK</b>	Accepts currently selected motion file and closes the browser
	<b>Cancel</b>	Quits without selecting a motion
12	<b>Dump Info</b>	This is a 'bonus' feature. It saves out a CSV file with a meta data of all the motion files, including flags, and saves as <i>MotionInfoDumpExt.csv</i> file in the 'motions' directory.

### 5.1.3 Selecting files from folder

This is a straightforward method of selecting a file. It opens a standard File Open dialog pointing to your 'Motions' folder, which you had specified in Configuration window and let's you select a file.

This method is good when you know the exact file name you want to import (perhaps your custom one) or if you want to import an original motion, which was not included in any of the schemas.

### 5.1.4 Selecting recent motions

Any motion imported adds to the Recent Motions list. The list gets saved in the same file as all your configurations in the **MyDocuments\DarkMaxTools** folder.

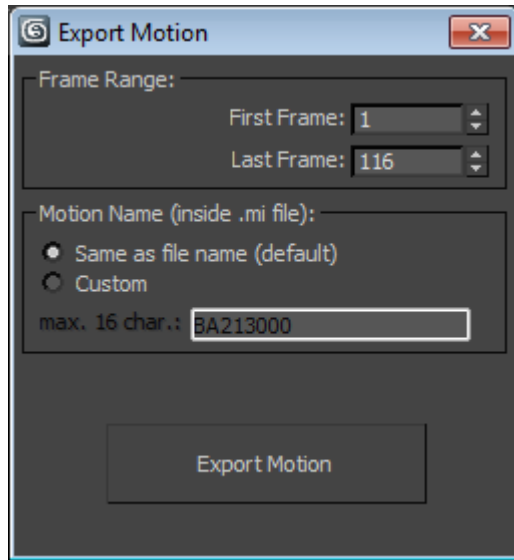
## 5.2 Import Motion options

<b>Get Current</b>	Set the Start frame to the current frame on the timeline. If you're joining more than one motions into a sequence, you may want to change the Timeslider to a desired position and press this button.
<b>Start Frame</b>	Specify manually the starting frame for the motion to be imported
<b>Repeat</b>	You can import a motion multiple times, forming a sequence
<b>Relative position</b>	When importing a motion multiple times, specify if the AI needs to start, where (s)he have finished in previous motion. Check this 'on' for motions where character moves in a certain direction, so (s)he can continue the movement.
<b>Relative orientation</b>	Additionally to the relative position, a character may start with the orientation in which the previous motion finished (rather than facing X axis, as in the neutral pose). Good for importing turning motions a couple of times.

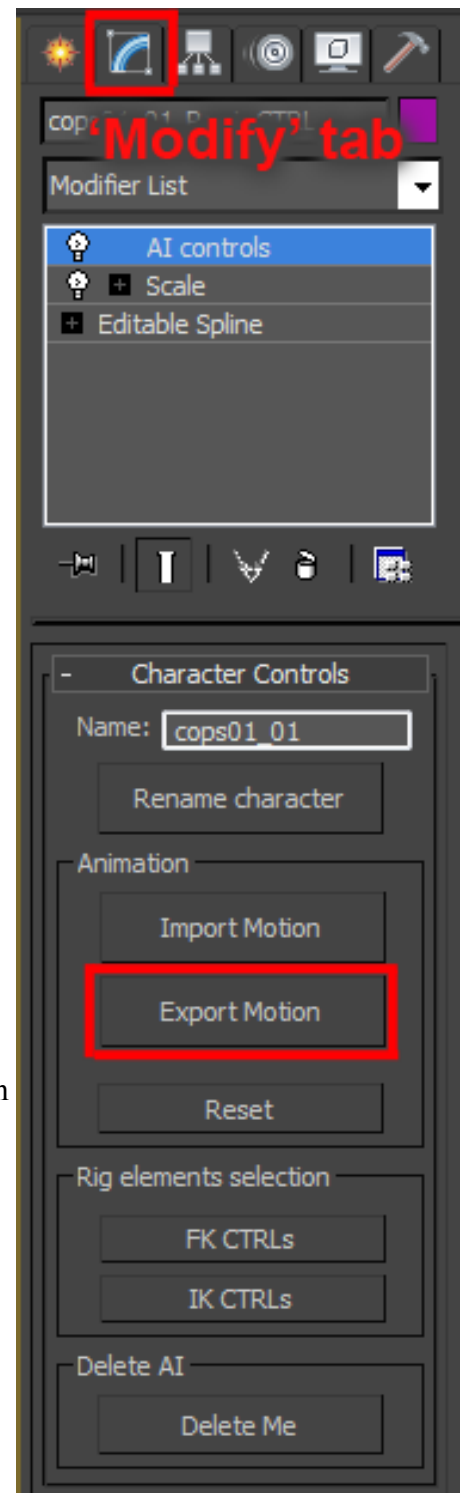
## 6. Exporting Motions

➔ *To export an animation to a Dark Engine format files, do the following:*

- 1) Select a **Root\_CTRL** of your animated character
- 2) Adjust the animation range on the Time Slider to the desired segment of frames. (not necessary, but handy)
- 3) Click on the 'Modify' tab on the left side of the screen.
- 4) On the **Character Controls** rollout press **Export Motion**  
An **Export Motion** dialog will pop up:



- 5) Set the Frame Range to desired one. It defaults to the current animation range, so it's good to set it beforehand, as in point 2)
- 6) Leave Motion Name settings as they are (Same as file name)
- 7) Press **Export Motion** button.
- 8) File Save dialog will open – choose a file to overwrite or type in a new name and press Save.
- 9) The .mi and .mc files are ready to be used. Follow the procedures of Motion Database Editor, to incorporate them in the motion database.

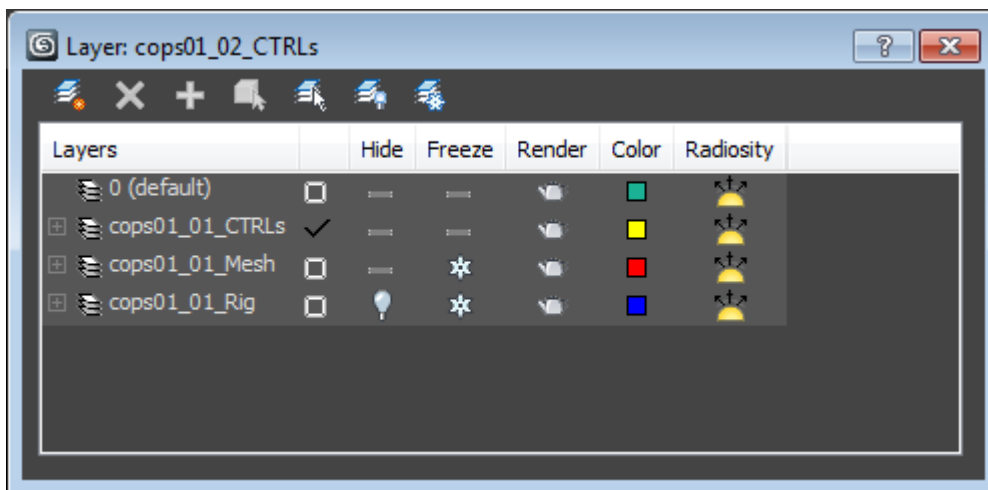


## 7. Rig hierarchy and layers

When a character gets imported, DAT creates 3 layers (+ 1 optional):

- **CTRLs** – contains all the animatable rig controls
- **Mesh** - contains geometry of an AI. This layer is frozen, to prevent from accidental interactions, when animating. If you need to work on the mesh, unfreeze it in the Layer Manager (star icon below)
- **Rig** – contains all the rig objects. It's hidden and frozen – changing any objects on this layer may potentially break the rig, so it's better to leave it hidden.
- **LGS\_Rig** – optional layer – it contains the joint markers (cubes) and gets created only when 'LGS style joint markers' import option is on

Besides, all the layers get name prefix after a character name, so each character gets its unique set of layers. This makes easier to manage a number of characters in a scene.



### 7.1 Selecting rig controls.

All the animatable controls form a hierarchy, independent of the rest of the rig. This prevents from accidental selecting rig elements, when selecting children of an object. In 3dsmax, double-clicking on an object selects its children, hence double-clicking on **Root\_CTRL** will select ALL of the animatable controls. Useful for mass-keying an entire pose or for removing all the keys at certain frame.



## 8. Rig Controls

Use standard 3dsmax tools to animate your characters. All controls are 'Splines', meaning they can be easily hidden by pressing 'S', independently of geometry. (useful to see the animated mesh only).

All controls can be rotated. Only the main torso – **butt\_CTRL** can be moved, as it changes AI position. **Root\_CTRL** can be moved and rotated, but it doesn't affect the animation.

Some of the controls have extra attributes, explained below.

### 8.1 Root\_CTRL

**Root control** is the main control of a character. You can move it around, i.e. in case you import more than one character, so they don't overlap.

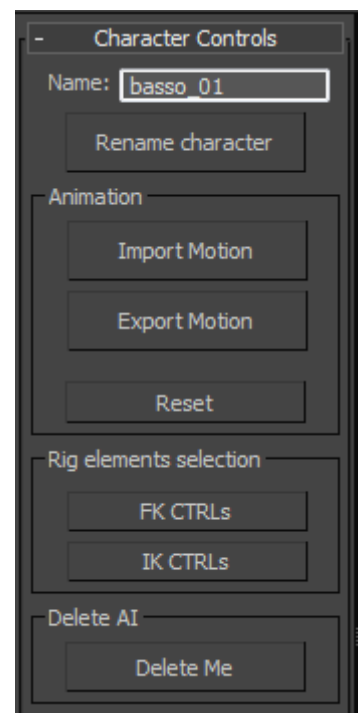
It holds a character name – by default it's derived from a file name plus an index number – in case you import more than one character of the same type, e.g. *Basso\_01*, *Basso\_02*, *Basso\_03* etc...

Note: the rig **is not** name dependant. You can manually rename any part, and it will still work, however it's recommended to use the control provided, if you need to change the name of it. This will ensure all the elements of the rig gets renamed.

**Root\_CTRL** also holds a few general animation controls as well as Flags editing tool.

#### 8.1.1 Character Controls

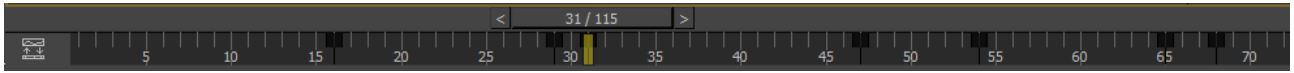
<b>Name</b>	Displays current name of a character. Type in a new one, if you want to rename it.
<b>Rename character</b>	Press the button to rename a character with a name typed in above.
<b>Animation:</b>	
<b>Import Motion</b>	Opens up Import Motion dialog, explained in section 5
<b>Export Motion</b>	Opens up Export Motion dialog, explained in section 6
<b>Reset</b>	Removes entire animation from a character and brings it back to an after-import state
<b>Rig elements section:</b>	
<b>FK CTRLs</b>	Selects all the FK controls
<b>IK CTRLs</b>	Selects all the IK controls
<b>Delete AI:</b>	
<b>Delete Me</b>	Deletes a character from a scene



### 8.1.2. Editing motion Flags

Motion flags are specific to Dark Engine and they provide meta information for the motion, such as when to play certain sounds etc..

When you import a motion, you will notice black key marks on the time slider – they specify location of the flags.

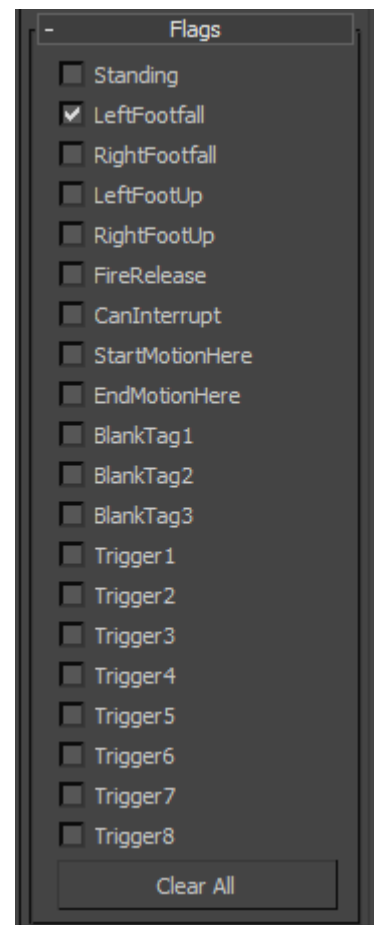


If you go to a frame with a flag, you will notice that at least one of the flag checkboxes is marked – **LeftFootfall** in the example below:

To set a flag, just check the box.

To unset a flag, uncheck the box.

**Clear All** button will clear all the flags for the current frame.



## 8.2 Foot\_CTRL

Foot controls are the red rectangles under the feet. They provide mainly IK controls for the feet.

When the foot is in IK (Inverse Kinematics) mode, it will try to stay attached to the **Foot\_CTRL** rectangle, even when you move entire character. This allows standing and walking animations to have feet stable on the ground.

You can blend between FK (Forward Kinematics) mode and IK smoothly, over a number of frames.

Below is a description of all the controls:



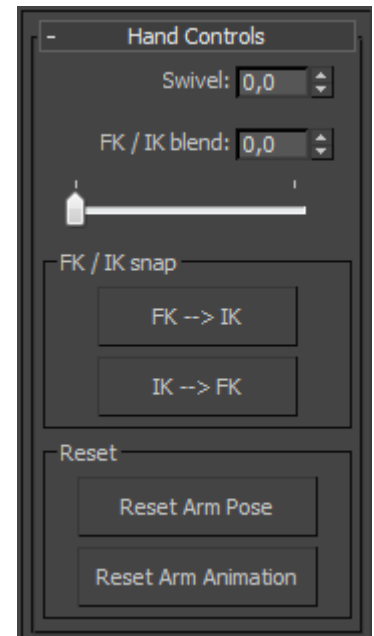
<b>FK / IK blend</b>	0 means FK mode, 1 – IK mode. It can be animated. You can use spinner or slider to control it.
<b>FK / IK snap:</b>	
<b>FK --&gt; IK</b>	Snaps FK controls to IK, so the leg assumes the same pose. Useful for animating the blend between modes.
<b>IK --&gt; FK</b>	Attempts to match IK pose to the FK one. Note: due to the complicated nature of IK controls, this may not be perfect. Further adjustments may be necessary (like Swivel angle)
<b>IK controls:</b>	
<b>Swivel</b>	Controls the angle of the leg plane
<b>Foot Lift</b>	Values between -1 to 1 lifts the foot either on the heel or on the toes. Animate these for the walking motion.
<b>Foot Banking</b>	Values from -1 to 1 banks the foot either inwards or outwards
<b>Heel Pivot</b>	Rotates the foot around the heel pivot on the ground plane
<b>Toes Pivot</b>	Rotates the foot around the toes pivot on the ground plane
<b>Reset:</b>	
<b>Reset Leg Pose</b>	Resets the leg pose to a default one

### 8.3 Wrist\_CTRL

Wrist (or hand) controls are represented by a red cross, located at the wrists by default.

Like the Foot\_CTRL, it lets you switch/blend between FK and IK mode.

<b>IK controls:</b>	
<b>Swivel</b>	Controls the angle of the arm plane
<b>FK / IK blend</b>	0 means FK mode, 1 – IK mode. It can be animated. You can use spinner or slider to control it.
<b>FK / IK snap:</b>	
<b>FK --&gt; IK</b>	Snaps FK controls to IK, so the arm assumes the same pose. Useful for animating the blend between modes.
<b>IK --&gt; FK</b>	Attempts to match IK pose to the FK one. Note: due to the nature of IK, this may not be perfect. Further adjustments may be necessary (like Swivel angle)
<b>Reset:</b>	
<b>Reset Arm Pose</b>	Resets the arm pose to a default one
<b>Reset Arm Animation</b>	Removes animation from entire arm



## 8.4 Torso controls

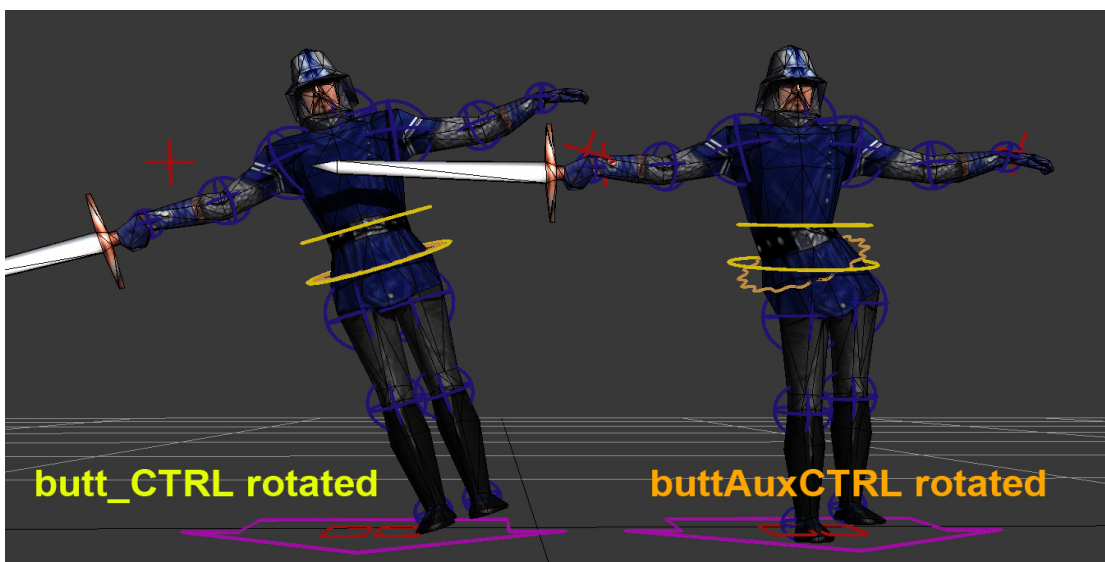
Note: term 'torso' is just an arbitrary term and means (in Dark Engine) a joint that can have multiple children. 'Butt' is technically a 'torso', as it has 3 children – 2 legs and 'abdomen' joint (which is another torso, btw). This is in contrary to 'limbs', which form single chains of joints.

All torsos have double controls:

- a yellow ring, which is a main control
- an auxilliary, orange wavy ring

The difference between them is that rotating the main control, rotates all the children joints (including auxilliary control). Rotating the **Butt\_CTRL** rotates entire body (when all limbs are in FK mode).

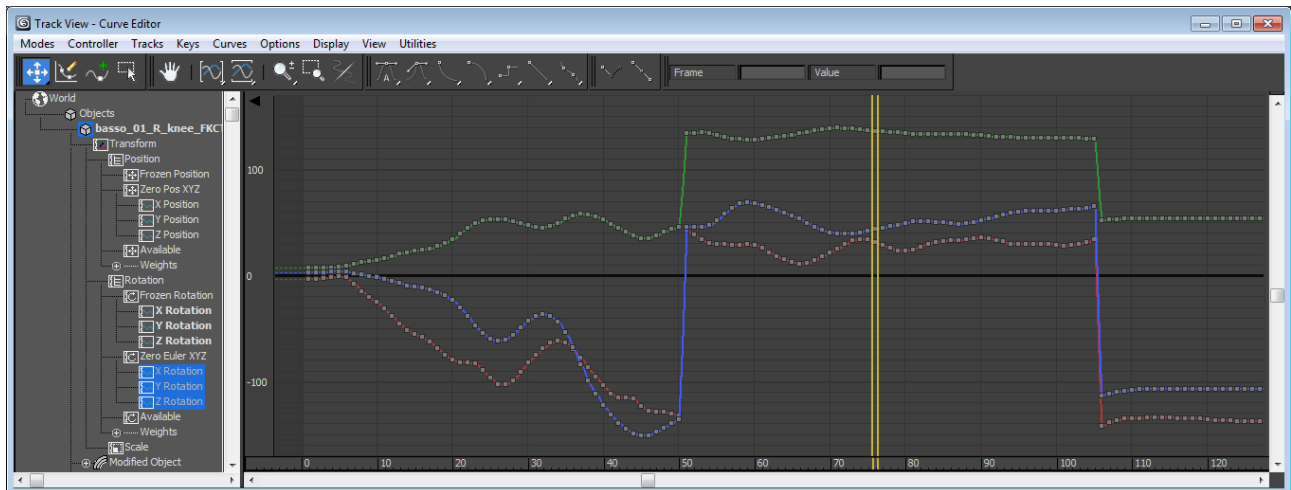
On the other hand, rotating the orange controls (e.g. '**buttAuxCTRL**') rotates only that torso, without rotating the torso's children. It's useful for fine-tuning a pose, without destroying the pose of limbs and the head.



## 9. Editing motions

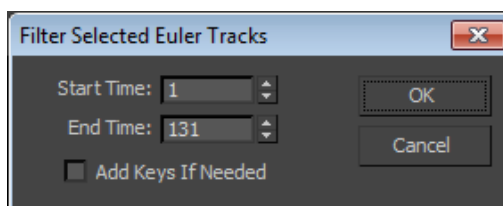
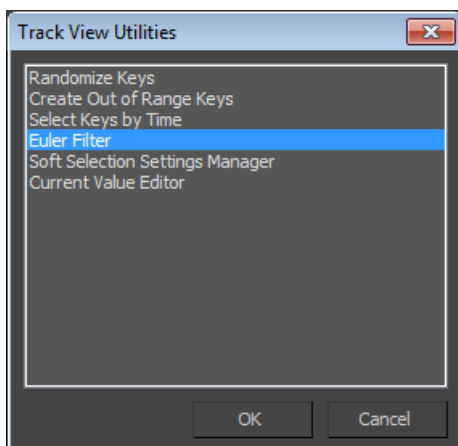
### 9.1 Fixing twitching joints

Sometimes, when playing back a motion, you may notice that certain joints twitch or flick. This happens only when you press 'Play' – not when you manually scrub through the timeline. It happens due to the fact that values in the .mc file are limited to 0 to 360 degree. (or -180 to 180). You can see on the graph below, that the curve switches between the extremes at some point. Technically, this is not an error – it's a nature of Euler Angles representation of rotations. However it can make editing the motion curve more difficult

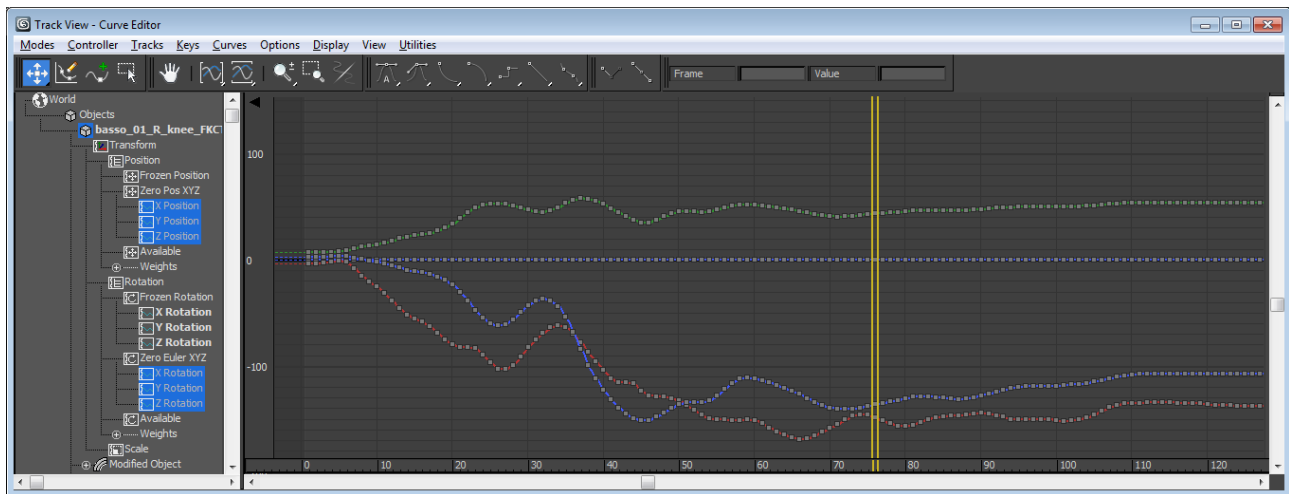


#### ➔ To fix it:

- 1) select the animation control of that „twitching” joint
- 2) open the Track View
- 3) Select X Y and Z Rotation channels (highlighted blue above)
- 4) Go to the Utilities menu in the Track View menu bar (first one on the right)
- 5) Select **Euler Filter** and press OK
- 6) Accept the default values (Start and End should include all the frames) and press OK



- 7) Now the curve should be fixed – continuous, without the abrupt changes. The motion will be identical:



## **10. Further documentation and tutorials**

You can find some video tutorials on 'Dark Max Tools – Tutorials' youtube playlist:

<https://www.youtube.com/playlist?list=PLxCqosMVZXAEyGsqrKx0HKtO1h7o0XT>

Happy animating!