

# Dark Animation Tools

version 2.00 (beta)

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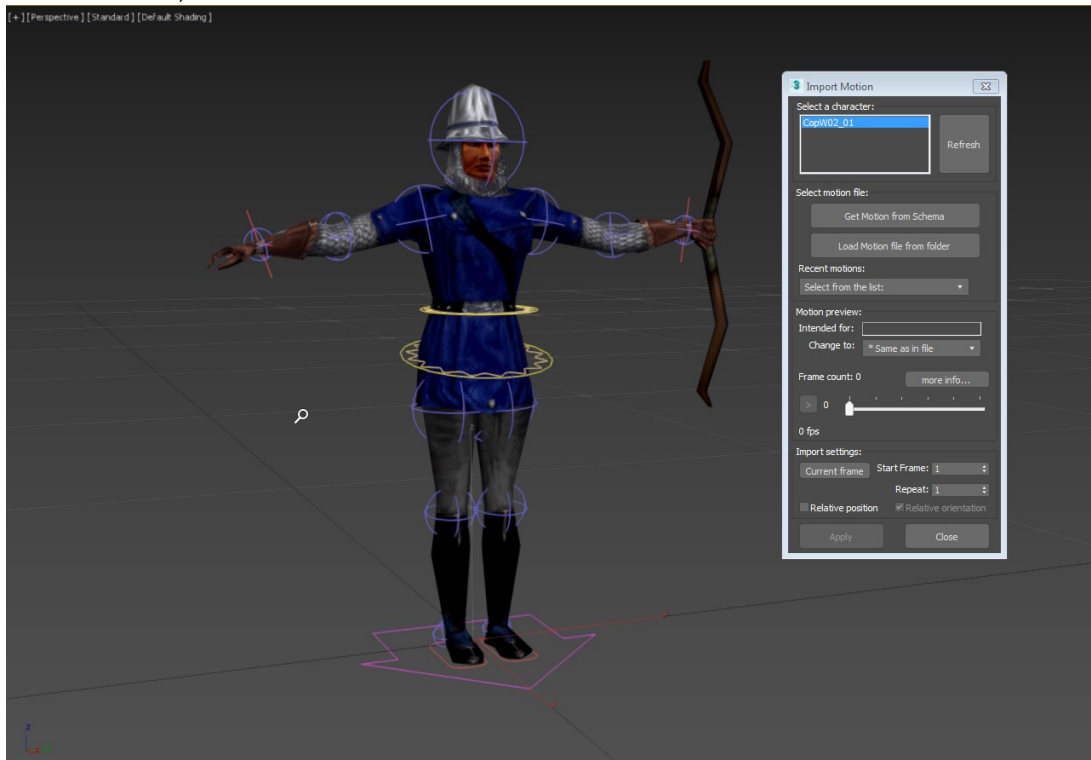
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## 1. Overview

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

As of version 2.0 of 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).
- 5) Add/edit motion schema and build Motion Database, using Shadowspawn Motion Database Editor, under the hood.



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

### 1.1 What's new in v2.0

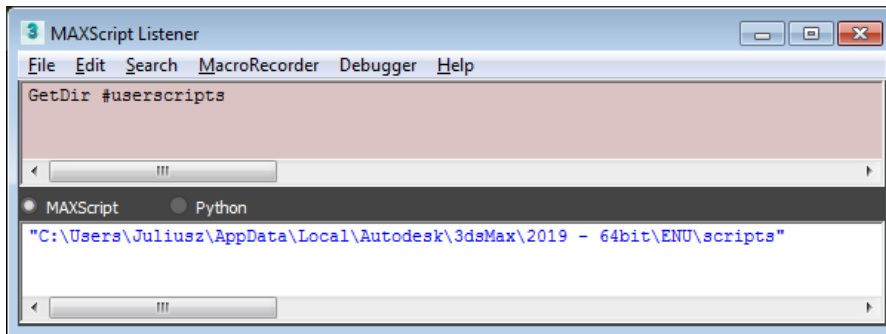
Version 2.0 is a substantial update compared to v1.00 released in 2015.

- added support for all creature types from all released DarkEngine games – Thief 1/Gold, Thief 2 and System Shock 2. This includes player arms, spiders, Constantine, Overlord and others
  - Note: exporting motions for Rope is not fully supported, you can still import the rigged mesh though.
- Ability to browse motions and preview them interactively, before applying to AI
- Flexible animation import – work with multiple characters at the same time and also import motions intended for a different creature type
- revamped Motion Schema Editor – a GUI layer for the Shadowspawn's Motion Editor tools
  - allows building motion database from 3dsmax, without editing text files and typing the commands manually
- Additional animation controls, such as bone twisting controls or basic Torso controls
- removed bugs and inconsistencies with motion import, export occurring in certain cases.

## 2. Installation:

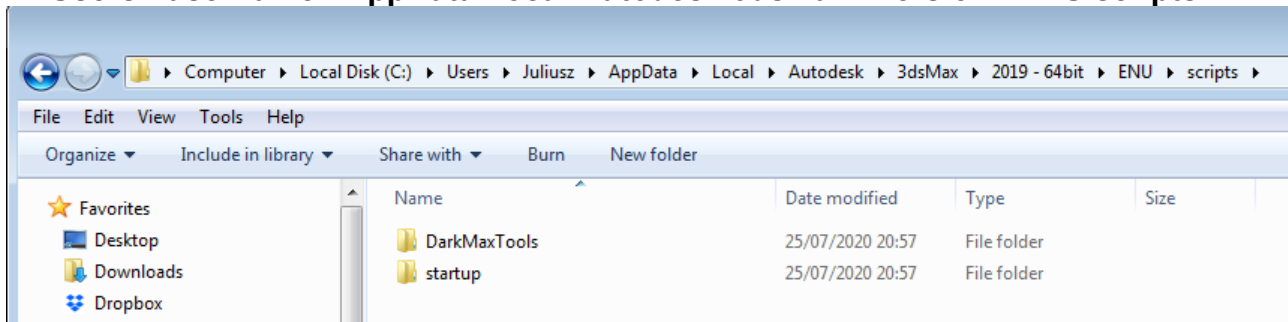
DAT has been developed on 3dsmax 2012, 2016 and 2019. It's been also tested in version 2021.

From the downloaded archive, unzip **DarkMaxTools** and **startup** folders into your *user scripts* folder. The exact path can be obtained by typing the following MaxScript command in the MaxScript Listener dialog:

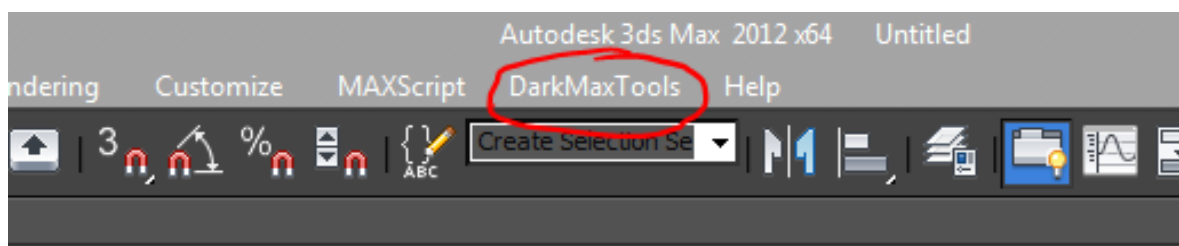


usually the pattern is:

**C:\Users\<username>\AppData\Local\Autodesk\3dsMax\<version>\ENU\scripts**



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



### 2.1 Reloading the tools

If you encounter any bug (please report by sending email!) or take some action, that the tools were not designed to handle, what helps is to **Reload** the tools. You'd need to close any open dialogs first, as they become obsolete.

**Reload** command is available through menu **DarkMaxTools**.

## 2.2 Uninstallation

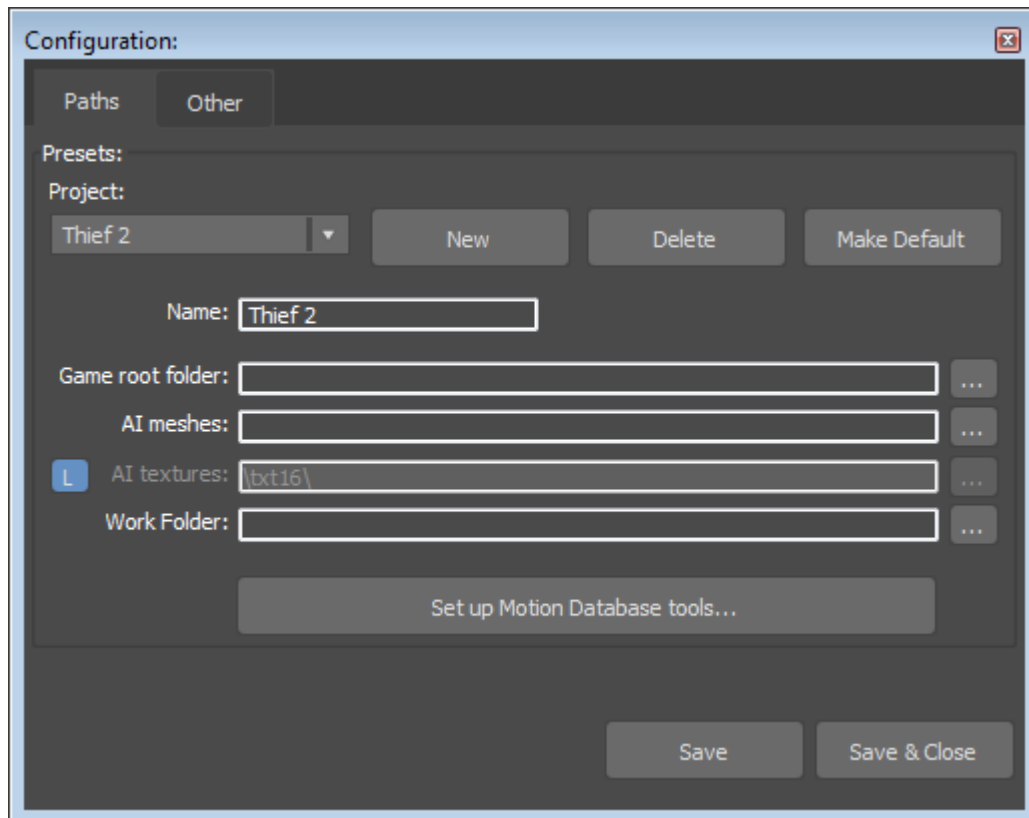
If you want to remove the tools from your 3dsmax, go for the **DarkMaxTools** menu, **Uninstall...** option. This will remove the installed scripts, custom menu as well as associated macroscripts (menu commands).

This will NOT remove the configuration file (see chapter 3), in case you want to simply re-install the tool.

The configuration file is located in your **Documents/DarkMaxTools** folder, and is named **DarkAnimTools\_Settings.ini**. You can remove it manually, if you want to get rid of the toolset completely.

### 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...**

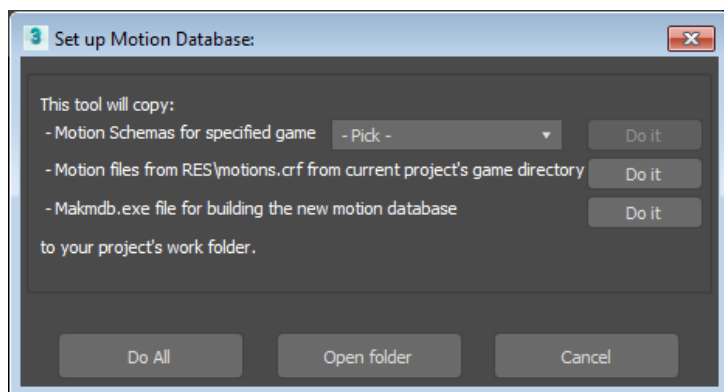


#### 3.1 Paths tab:

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. You can customize them or create a new project/preset.

<b>Project</b>	Choose the preset you're modifying, from the list
<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 project here – this can be either main game or your FM or mod
<b>Game root folder</b>	This needs to point where the game exe file is located
<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 manually extracted from the mesh.crf file into RES folder
<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 <b>\\txt16</b> subfolder inside the AI meshes folder. This is the default location of AI meshes' textures
<b>Work Folder</b>	The work folder is where your working <b>motions</b> and <b>Motion Schema</b> folders will live. Also this is where the Makmdb.exe file will operate from.
<b>Set up Motion Database tools...</b>	This brings up a new dialog – see below for details

### 3.2 Set up Motion Database tools:



This is a once-off action, that speeds up preparation of motion files, in case you want to browse or build your Motion Database later on. The tool essentially copies certain files to the working directory:

<b>Motion Schemas for specified game</b>	The tools come with a few sets of Motion Schema files (courtesy of Shadowspawn) for each of LGS game, including the Thief 2 Extended set. This will be your starting point for adding your custom motions to the motion database.
<b>Motion files from RES\motions.crf</b>	Based on your choice above, the tool will attempt to unzip motions.crf file and copy them to motions subfolder in your working directory
<b>Makmdb.exe</b>	Again, courtesy of Shadowspawn, DAT tools come with his Motion Database editing tools. This action will place the file in working folder, which will facilitate automation of the process of building database.
<b>Do it / Do All</b>	Pressing these will perform either one or all of the above actions.
<b>Open folder</b>	Opens your working directory

### 3.3 Other tab:

<b>Advanced mode</b>	When ON, this will display some additional controls, aiding tool development and troubleshooting, usually not needed for majority of users
<b>Max recent motions</b>	Number of motions displayed in the Import Motion dialog
<b>Max recent AIs</b>	Number of recently import AIs – in Import AI dialog
<b>Backup Motion Database on export</b>	Whether to back up the motion database, when exporting the new database to the game itself. Options are: Never, Ask before, Always. <i>NOTE: export to the game folder is currently disabled, so this option is not used.</i>
<b>Text Editor</b>	Once specified, it will be used to open .mos files from Motion Database Browser/Editor

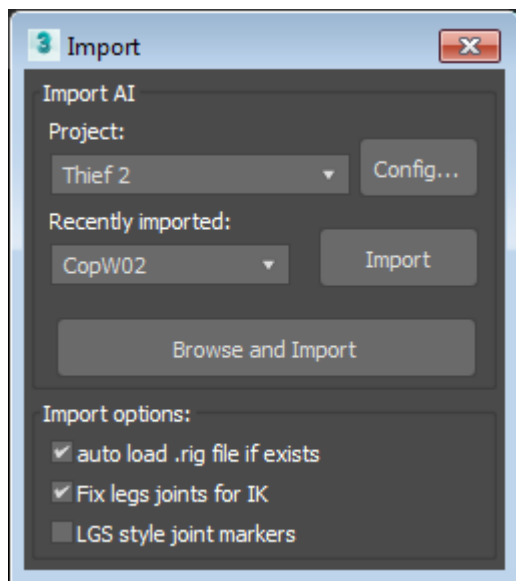
To save your changes, press **Save** or **Save & Close** button at the bottom corner. The settings are stored in your **Documents\DarkMaxTools** folder, in a file called **DarkAnimTools\_Settings.ini**. If you install these tools in another version of 3dsmax, your settings will be seen automatically.

Once you finish configuration, 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>Project</b>	Choose a game/mod/fanmission preset you're working on
<b>Config...</b>	Brings up the Configuration dialog – for convenience
<b>Recently imported</b>	Pick a character from a list of recently imported ones, for a quick import
<b>Import</b>	Quickly import the selected recent AI
<b>Browse and Import</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:

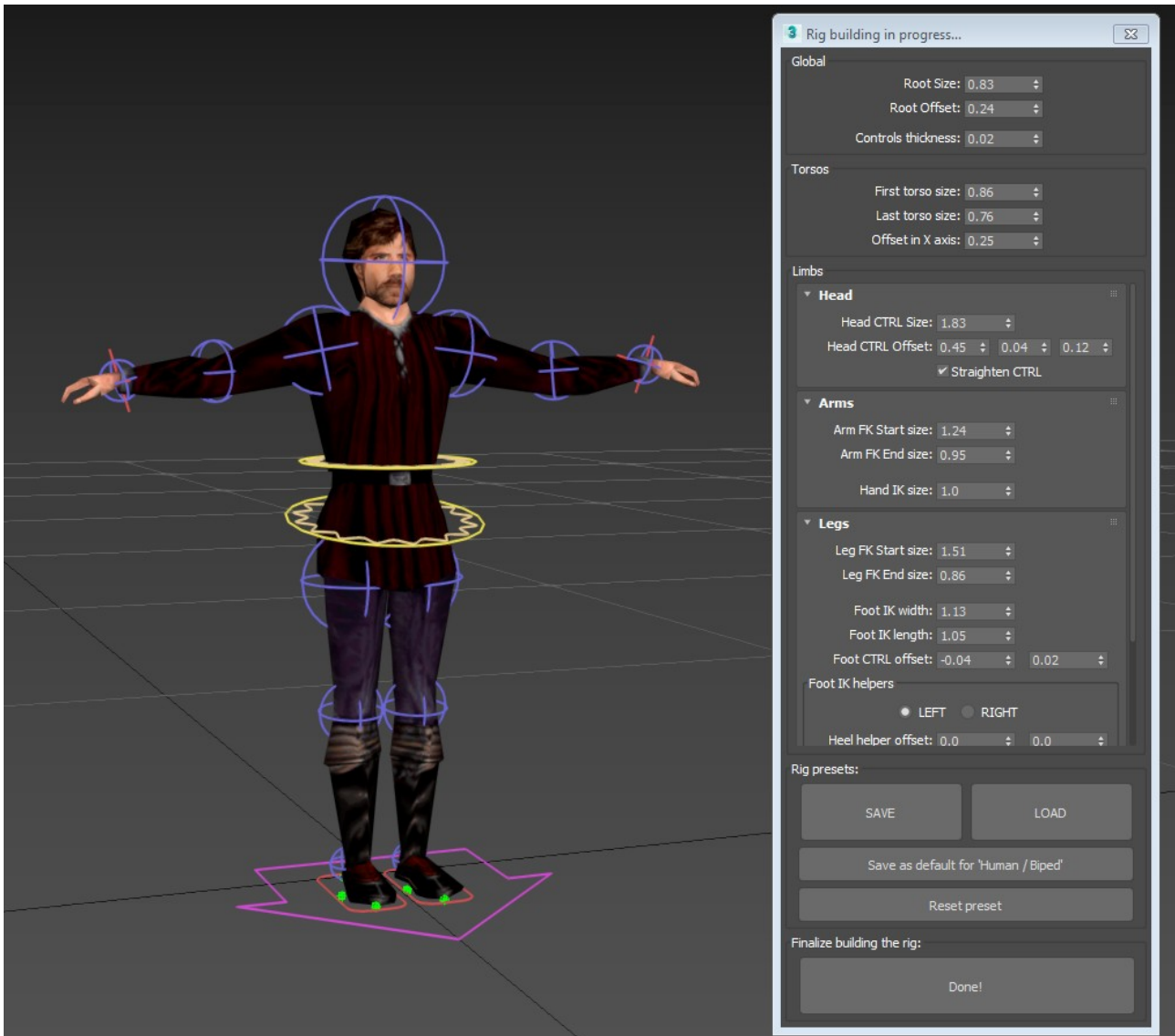
<b>auto load .rig file if exists</b>	If the importer finds an auxiliary .rig file, created during the first import of a character, it will be loaded automatically. This just speeds up the importing process and makes it a one-click solution. Default 'on'. More on .rig files in the next section
<b>Fix legs joints for IK</b>	Locations of joints in the original LGS files are somewhat random. (e.g. skeletons 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, just 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 to the animation rig and controls first. The tool by default tries to scale the controls based on the skeleton size, however the guess won't always be right, as the mesh volume is different for every character. Some of the tweaks needed are crucial for the IK mode to work correctly (foot pivot points), some are mainly for convenience (size of animation controls).

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

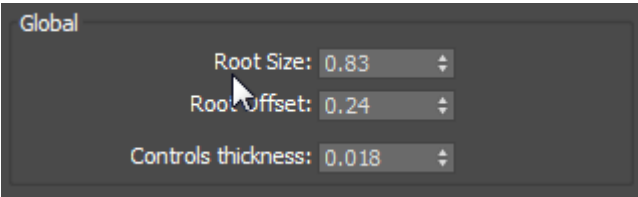
When you press **Browse and Import** in the Import AI dialog and choose some **.bin** file, the script will import a character mesh, build a rig partially and stop the process, waiting for your adjustments to be completed. You will be presented with a GUI, that looks like this:



The GUI is divided into a few sections. The **Limbs** section has a dynamic content, since it depends on the creature type.

Here's what all the settings are:

*Global:*

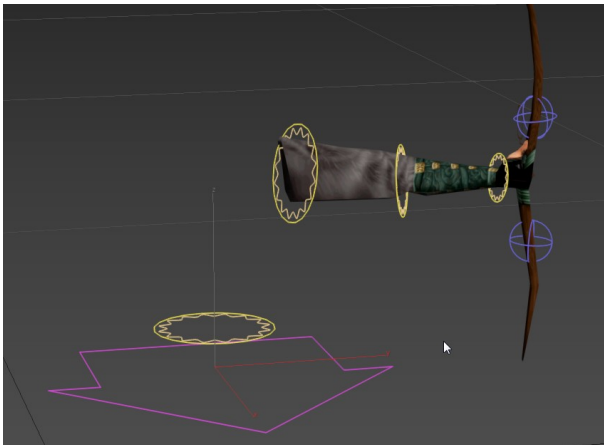


Root Size	Root is the main control of a character – the pink arrow at the bottom of the feet. Depending of the character size, it may need to be scaled up or down.
Root Offset	This offsets root forwards or backwards in relation to the character
Controls thickness	Global thickness of the animation controls. Small creatures may need these to be thinner, larger – thicker.

*Torsos:*

First torso size	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.
Last torso size	Last torso usually refers to the abdomen torso – also the smaller yellow circle.
Offset in X axis	This offsets all the torsos in the front/back axis, allowing you to center around the actual body mesh, rather than around the joints, which are located along the spine.

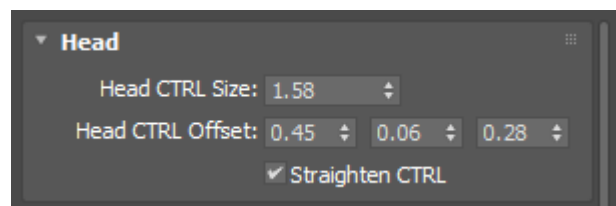
**NOTE:** Player Bow Arm and Crayman have torsos controls for the arms as well – this is not a bug. This is how the Dark Engine's skeleton system works – torsos are the only type of joints, that can split into other joints, which is a case with bow's parts and Crayman's claws.



## Limbs:

Limbs is a dynamic section, that depends on the creature type. There are five main types of limbs: *Head*, *Arms*, *Legs*, *Spider legs*, *Generic Limb*.

### Head:

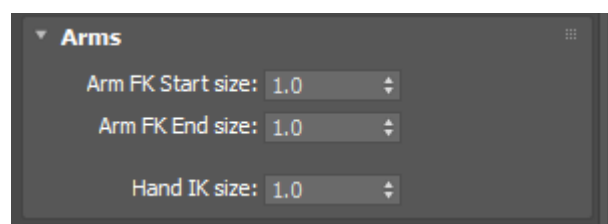


<b>Head CTRL Size</b>	size multiplier of the head control
<b>Head CTRL Offset</b>	Head control is usually located around neck. You may move it towards the head itself for easier access by adjusting this offset in 3 axes.
<b>Straighten CTRL</b>	Default orientation of head depends on the angle between neck and top of the head joints, which are usually misaligned in the LGS rigs. Tick this off, to straighten the shape, so it doesn't look odd



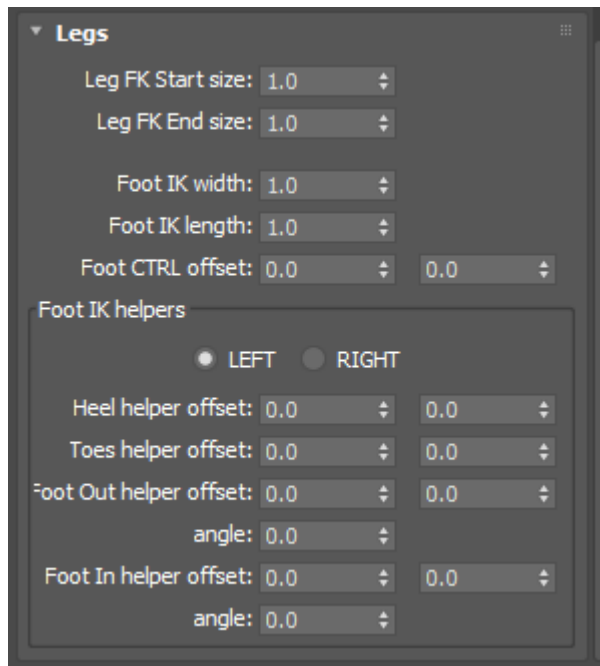
*Head\_CTRL with default settings, size and offset adjusted and with Straighten option ON.*

### Arms:



<b>Arm FK Start size</b>	This is the arm control in all kind of characters – the blue triple circles. 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:

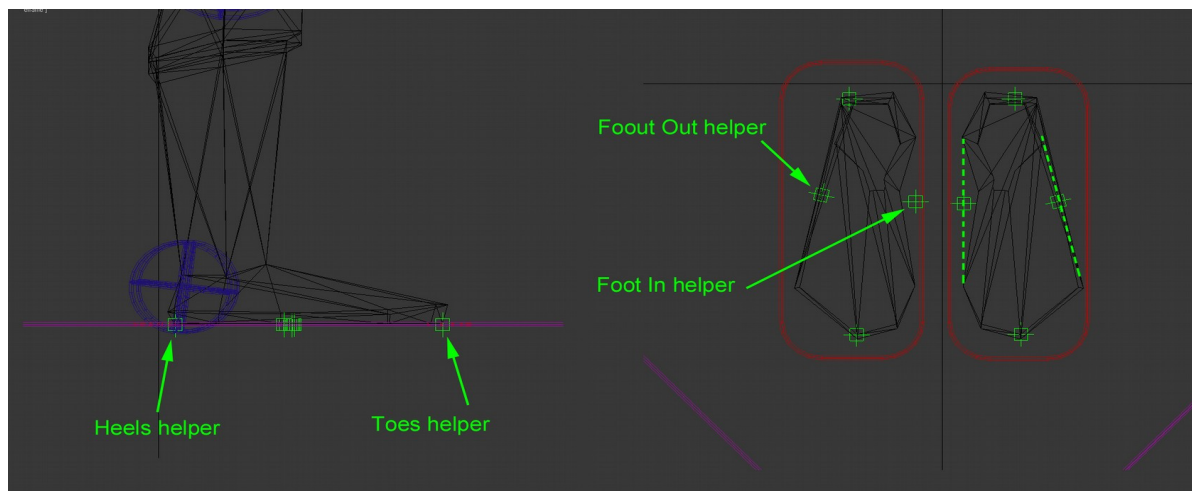


<b>Leg FK Start size</b>	Similarly to arm controls – this is the hip control size (start joint of the joints chain)
<b>Leg FK End size</b>	This is the ankle control size. The knee control's size gets interpolated between the hip and ankle controls.
<b>Foot IK width</b>	Width of the foot IK rectangular 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>Foot IK helpers</b>	The group of spinners below control the placement of the green helper boxes around the feet.
<b>LEFT / RIGHT</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>	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>	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>	Pivot point for the foot banking outwards. <u>Can be moved in the viewport.</u>
<b>angle</b>	Angle of the pivot point. <u>Can be rotated in the viewport.</u>
<b>Foot In helper offset</b>	Pivot point for the foot banking inwards. <u>Can be moved in the viewport.</u>
<b>angle</b>	Angle of the pivot point. <u>Can be rotated in the viewport.</u>

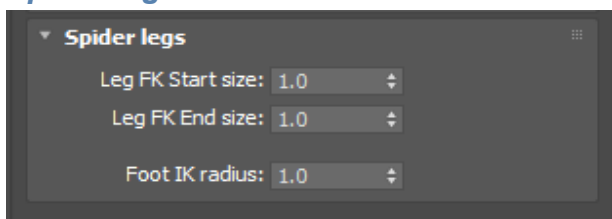
**NOTE:** Correct adjustment of **Foot IK helpers** is essential for the IK rig to work correctly – that is, to match the feet mesh volume.

**TIP:** Placement of these helpers is more intuitive directly in the viewport – these are the only elements of the rig, that you can actually manipulate in the viewport, at this stage. You can move and rotate them and the values will update in the UI.

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



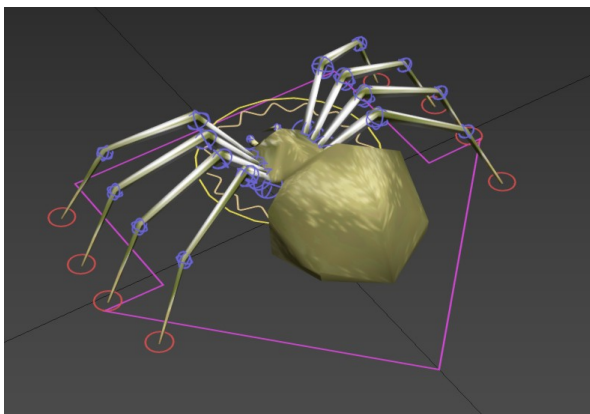
### Spider legs:



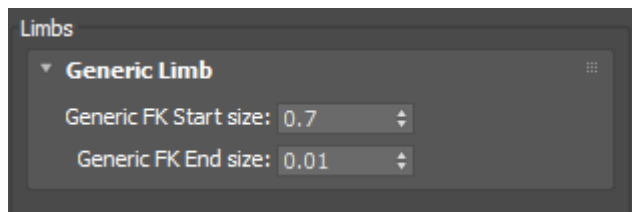
Spider legs are simpler than human legs, as they only touch the ground in one point – don't have 'feet'.

<b>Leg FK Start size</b>	Size of the first FK control in a chain
<b>Leg FK End size</b>	Size of the last FK control in a chain. Controls in between get interpolated.
<b>Foot IK radius</b>	This changes the size of the IK control – a red circle located at tip of the spider leg.

**NOTE:** Spiders import oriented backwards! Their animation still have to point towards the Root control's direction.



## Generic Limb:



This is a simple limb, that has only FK chain and no IK. It's present in Player Arm Bow or Spider.

<b>Generic FK Start size</b>	Size of the first FK control in a chain
<b>Generic FK End size</b>	Size of the last FK control in a chain. Controls in between get interpolated.

## 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, e.g. basso.bin → basso.rig

<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.
<b>Reset preset</b>	Reset all the changes and tweaks you've done and bring back the default values.

**TIP:** .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 your distribution package.

DAT toolset comes with a number of presets .rig files, so you can start importing some characters straight away, without spending too much time on adjusting your ones from scratch.

## 4.5 Finalize buidling the rig:

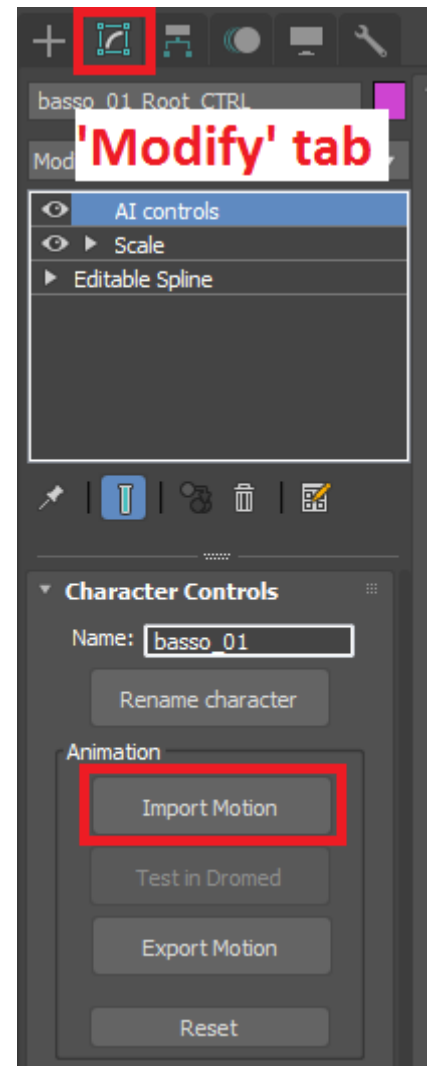
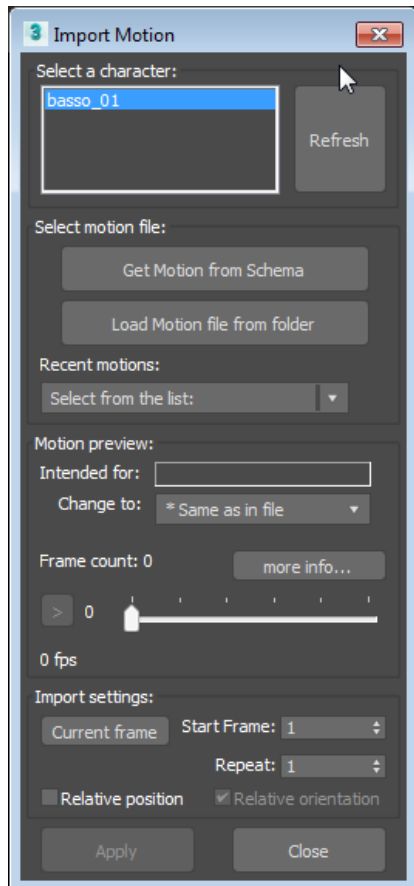
<b>Done!</b>	When you have aligned the foot helpers and you're happy with the size of controls, press Done and the rig building will continue and finalize
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**NOTE:** Always press Done! to close this dialog. Breaking the rig adjustment process by killing the dialog will leave the rig in an unstable state. You'd need to unfreeze all the layers and delete them manually.

## 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:



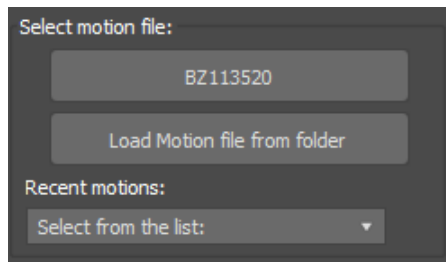
- 6) Select a motion file through one of three methods:
  - using Motion Schema browser
  - by selecting an .mi file from a folder
  - by selecting one of the recently imported motion file

These methods will be described in detail below.

- 7) You can preview motion by pressing PLAY button
- 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.



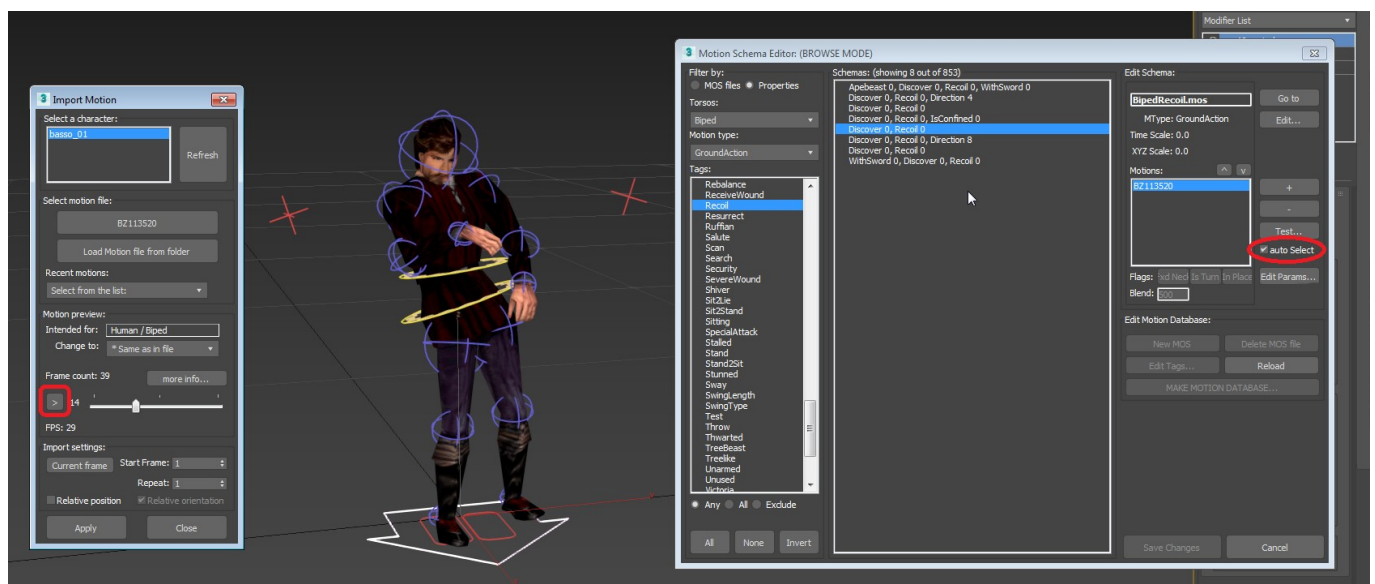
## 5.1 Selecting Motion files to import



### 5.1.1 Selecting using Motion Schema Editor

When you press **Get Motion from Schema** a **Motion Schema Editor** window pops up – it works in a BROWSE mode, which means, you can only select motions, but cannot modify the content.

More on the Motion Schema Editor in chapter 6 (?)



The best way to work with this tool is to press **PLAY** in the Motion Import for live preview.

Make also note of the **auto Select** option in MSE. If it's **ON**, the motion will change immediately, as you change the Schema while filtering or clicking in the central part of the dialog.

If it's **OFF** – the motion will change only when you explicitly click on a motion in the **Motions** list.

Once you're happy with the selection, simply press **Cancel**.

### 5.1.2 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.

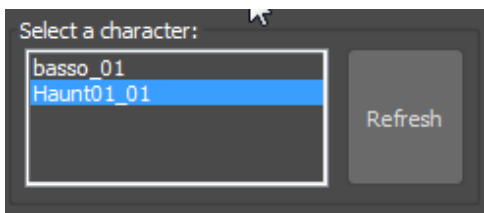
This method is good when you know the exact file name you want to import (perhaps your custom one) or if you want to import an original motion, which was not included in any of the schemas.

### 5.1.3 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 dialog options

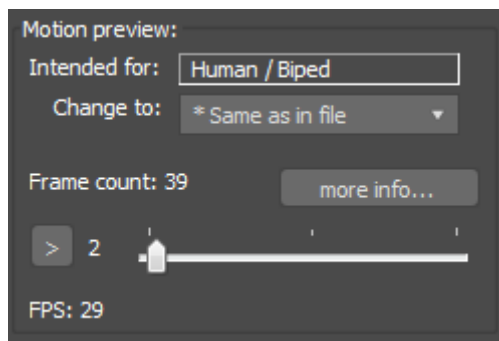
### 5.2.1 Select a character



Select a character which you want to import the motion onto. You can change it at any time, even during interactive playback.

If you import a new AI into the scene, just press **Refresh** to update the list.

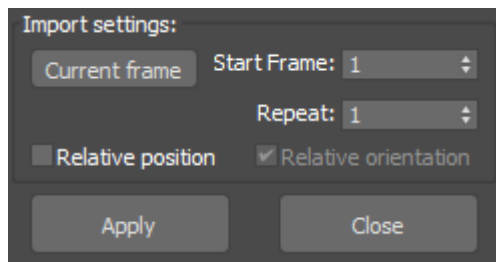
### 5.2.2 Motion Preview



<b>Intended for</b>	This displays an information on which skeleton this motion was intended for (information read from the file). Note – sometimes this information is inaccurate
<b>Change to</b>	<p>You can pick which skeleton the motion channels from the file will be mapped to. This way you can load motions for different types of creatures, as long as names of their bones match.</p> <p>There are two special options:</p> <ul style="list-style-type: none"><li>- Same as in file (default) – no re-mapping</li><li>- Current creature type – re-mapping changes based on the currently selected character</li></ul>

<b>Frame count</b>	Number of frames found in file
<b>More info...</b>	Meta-information coming from .mi file
<b>&gt; (PLAY)</b>	Enables interactive preview on the selected character. You can also scrub the time slider manually.
<b>FPS</b>	Gives you a feedback on the framerate. Framerate for more complex creatures like spiders can be noticeably lower.

### 5.2.2 Import Settings

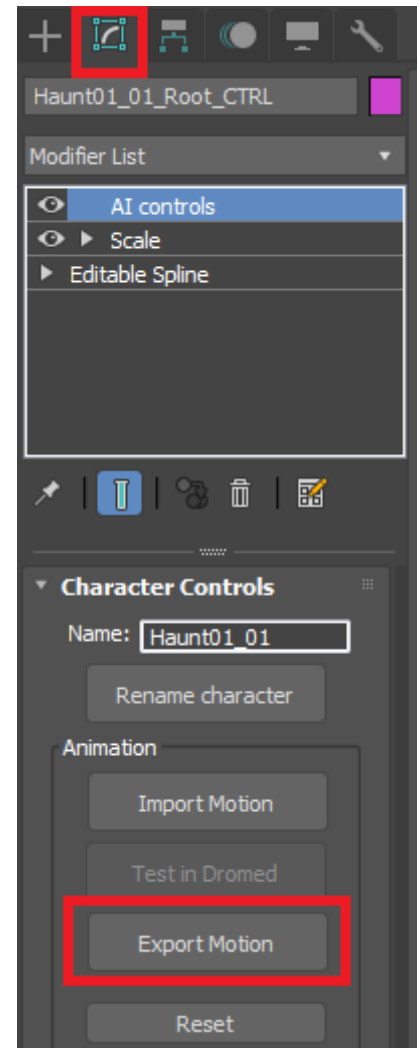
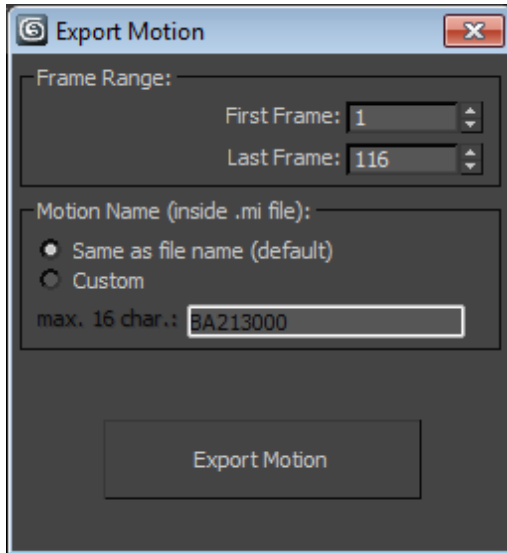


<b>Current frame</b>	Set the Start frame to the current frame on the timeline. If you're joining more than one motions into a sequence, you may want to change the Timeslider to a desired position and press this button.
<b>Start Frame</b>	Specify manually the starting frame for the motion to be imported
<b>Repeat</b>	You can import a motion multiple times, forming a sequence
<b>Relative position</b>	When importing a motion multiple times, specify whether the AI needs to start, where they finished in previous motion. Check this 'on' for motions where character moves in a certain direction, so they 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 example 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, in the motions folder of your Working Folder.

**NOTE:** In order to get them into the game engine, you need to:

- copy both .mi and .mc files to your FM's 'motions' folder
- create motion schemas and re-build the motiondb.bin file
  - you can do it in a text editor or using Motion Database Editor

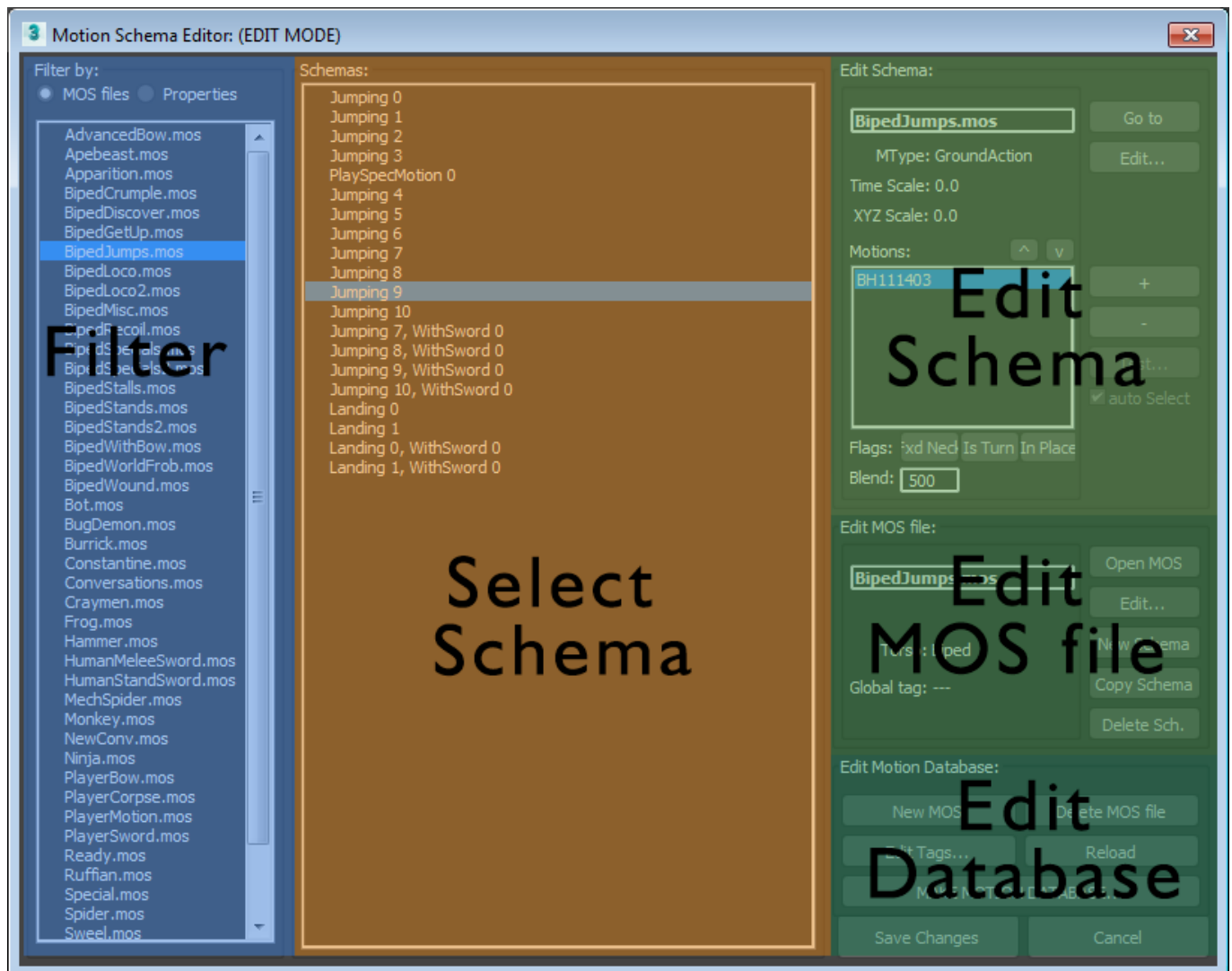
## 7. Motion Database Editor

**Motion Database Editor** replaced Motion Schema Browser from version 1.0 of DAT.

As the name implies, it can now also edit the motion database – thanks to Shadowspawn's Motion Editor tools, that are included (with author's permission) in DAT package.

The UI has changed and is divided into three main sections:

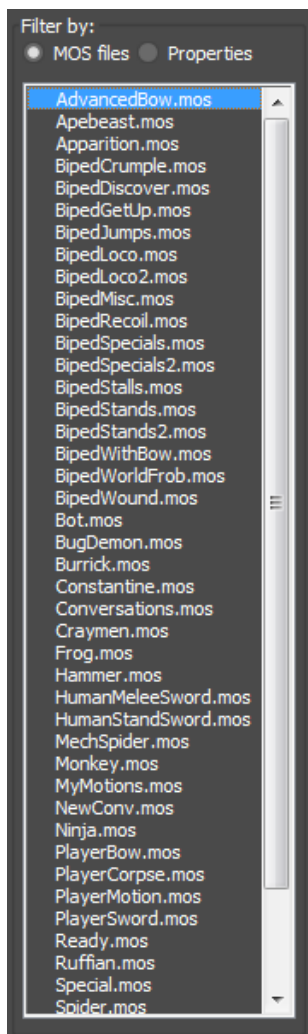
1. **Filter panel** – for narrowing down schema selection
2. **Schema list** – the list of schemas selected through filters
3. **Edit panel** – which allows you to inspect and edit all aspects of the database. It's divided further into 3 sections:
  - **Edit Schema** – allows you to edit selected schema's parameters as well as its motion list
  - **Edit MOS file** – visible only when filtering by MOS files is active. Allows you to add/delete schemas from MOS file as well as edit its global parameters
  - **Edit Motion Database** – you can add or delete MOS files or simply build new, modified motiondb.bin file



**NOTE:** For the Motion Database Editor to work, you need to have gone through the setup of your working folder, which includes copying the Motion Schemas folders into it.

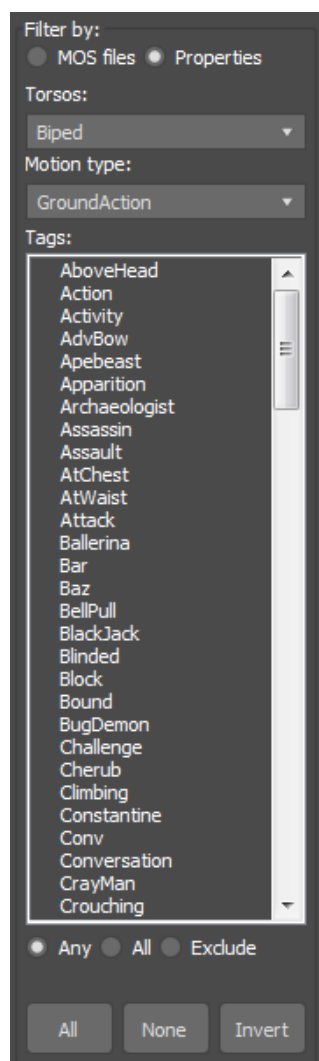
## 7.1 Filter Panel

You can filter schemas either by MOS files they belong to or by their properties.



In this mode, you can simply select one .mos file and the central panel will display list of schemas from that file.

In case you're not familiar with the way Motion Database Editor works, I recommmed having a look at the working folder – you will see a number of .mos files, which are text files containing schemas definitions.



Filtering by **Properties** is the best way to find a motion, if you don't know, which .mos file it lives in.

**Torsos** – this is a generalized type of skeleton, for which a particular schema was intended for.

**Motion Type** – schemas are categorized in certain groups, which allows you to be more specific in your search

**Tags** – tags are what make schema names actually (along with a parameter). This filter lets you select schemas, that contain specific tag in their name or – if you like – do not contain one.

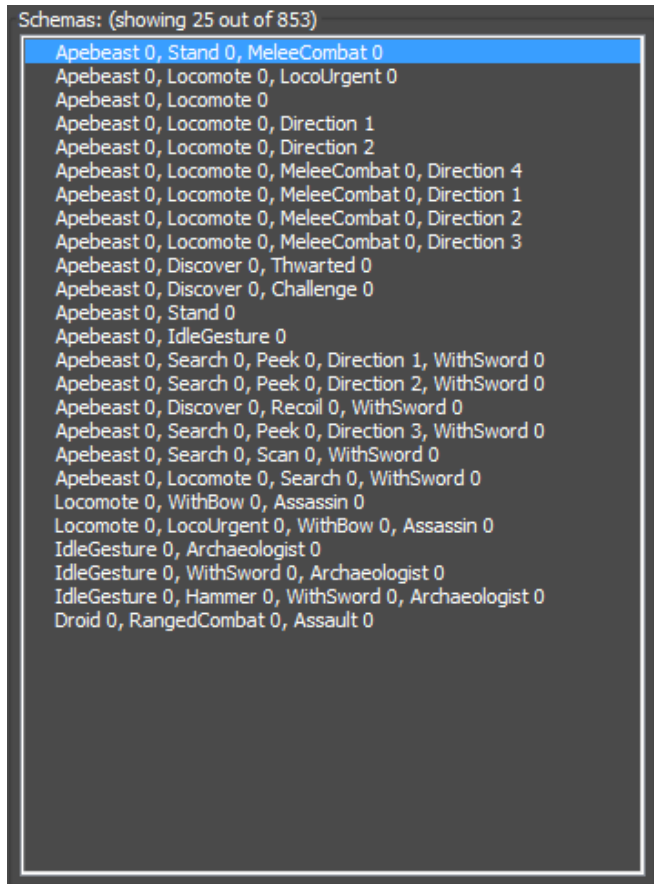
**Any / All / Exclude** – this specifies the logic of the search. **Any** means that schema needs to have at least one of the selected tags – the more tags you select, the more schemas will appear in the central panel. **All** means that all selected tags need to be present in a schema name, so the more you select, the fewer schemas you will see. **Exclude** – lists schemas, that do not contain a specific tag.

**All** – this button selects all the tags. Combined with 'Any' logic, this will effectively list all the schemas in the database

**None** – clears selection

**Invert** – inverts selection of tags

## 7.3 Schemas panel



This is a filtered list of schemas - names, that you can refer to in Dromed, for example in conversations.

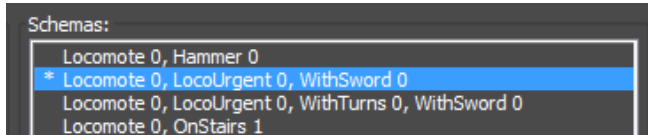
Each schema's name is a combination of a few tags with a parameter. The parameter's name is somewhat unclear – it seems to make sense only for certain tags, e.g. for a **Direction** tag, number 1 to 4 mean left, right, front and back respectively.

Simply select a schema to be able either browse its motions or edit its parameters and motions list.

## 7.4 Edit Panel

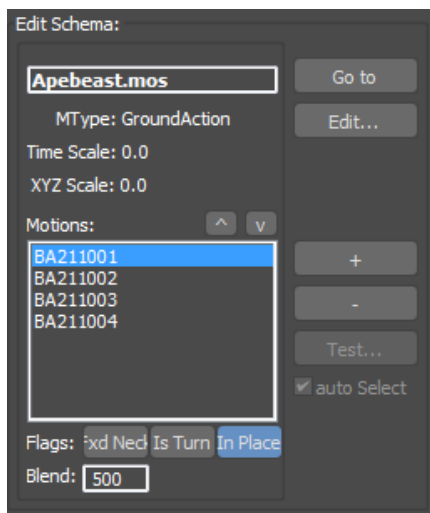
Most of the time, you'll want to edit only your own schemas – modifying the original schemas is not recommended, unless you know what you're doing.

Note, that modified schemas or Tags will have an asterisk displayed beside them – indicating a 'dirty' state.



Currently the Editor has no way of telling, which schemas come from original game, and which have been added by you – you need to keep tracking them – probably by creating your own .mos file and adding your own tags, as needed.

### 7.4.1 Edit schema



Displays info for the currently selected schema and a name of the .mos file it belongs to.

**Go to** – if you're filtering by **Properties**, this will switch to filter by **MOS files** and select the .mos file, in which the schema is defined.

**Edit...** - opens up a schema properties editing dialog – see below

**Motions** – select a motion to preview or to load it onto a character.

**Parameters** – these fields change for every motion selected. You can edit the parameters directly

- 1st – meaning of this one is unknown
- 2nd – the transition time in milliseconds

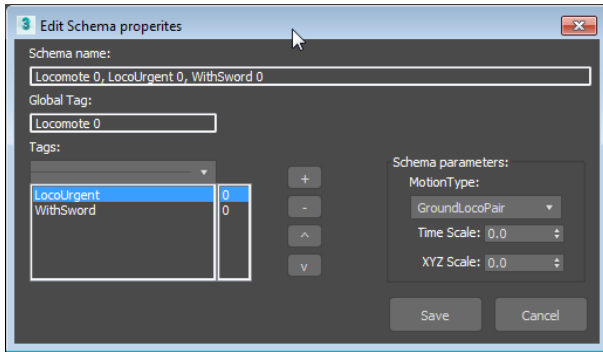
**+ / -** - use these to add or remove motions from the list. When adding a standard File Open dialog pops up, pointing at the motions folder inside your working folder

**^ / v** - these buttons let you change the order of motions on the list

**auto select** – this option is only for interactive playback. When ON, a first motion on the schema list will be automatically played, when you select a different schema



## 7.4.2 Edit schema properties



**Schema name** is not directly editable as one string – instead, it's a combination of existing tags paired with a number.

In addition, **Global Tag**, will be always prepended to the schema name. Global tag is a property of the .MOS file and can be changed there.

**Tags** – this is a simple list of tags and their value. You can add, remove and change the order of tags using the controls beside - + / - / ^ / v

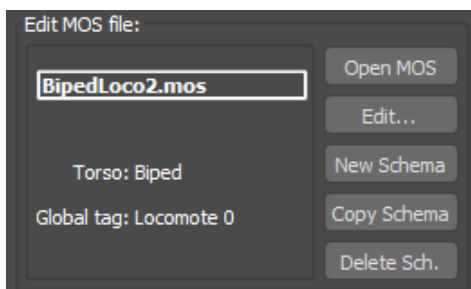
If you want to add a new (non existing) tag, it needs to be defined in the Edit Motion Database section first. Numbers are editable upon double-clicking on them.

**MotionType** – decide, what category your motion fits best. Categories cannot be changed/added.

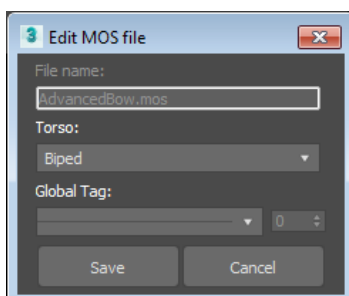
**Time Scale** – default 0.0 means the motion will play with original speed. Less than 1.0 makes it faster, greater than 1.0 makes it slower

**XYZ Scale** – numbers greater than 1.0 make motions more exaggerated, smaller than 1.0 – more subtle. 0.0 does not modify the motion.

## 7.5. Edit MOS file



Displays .mos file name and its properties: Torso and Global Tag



**Open MOS** – opens up a .mos file in a text editor of your choice (see Configuration)

**Edit...** - opens up a MOS editing dialog (see below)

**New Schema** – creates a new schema in the current MOS file (see Edit MOS file dialog below)

**Copy Schema** – duplicates current schema

**Delete Schema** – deletes selected schema from the MOS file

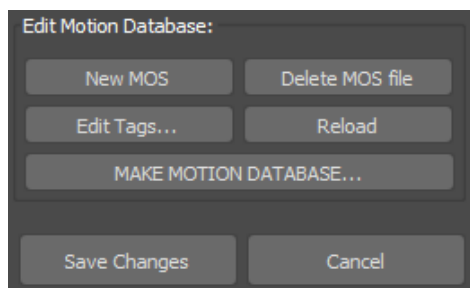
Mos files have only two properties:

**Torso** – this is mandatory – each mos file is a collection of schemas intended for one Torso only

**Global Tag** – this is optional and for convenience only. If you specify a Global Tag, it will be pre-pended to every schema's name inside this .mos file.

## 7.6. Edit Motion Database

This level of editing operates on MOS files as well as has some general MDB controls.



**New MOS** – creates new MOS file. Once saved, this will create a physical file in Motion Schema folder.

**Delete MOS file** – removes the MOS file from Motion Schema folder

**Edit Tags...** - click this to add custom Tags.moc

**Reload** – if you made any changes outside of this editor (i.e. directly in the text files), click this to reload them and update the list of schemas and motions.

**Make Motion Database...** - this will build a new **motiondb.bin** file, which you can include in your FM. **The file will be output in your working folder and will be actually called `dat_motiondb.bin` – you need to rename it manually to `motiondb.bin`. You need to copy it to your FM folder.**

**Save Changes** – saves any changes to the files. All schemas and tags marked with an asterisk will become clean.

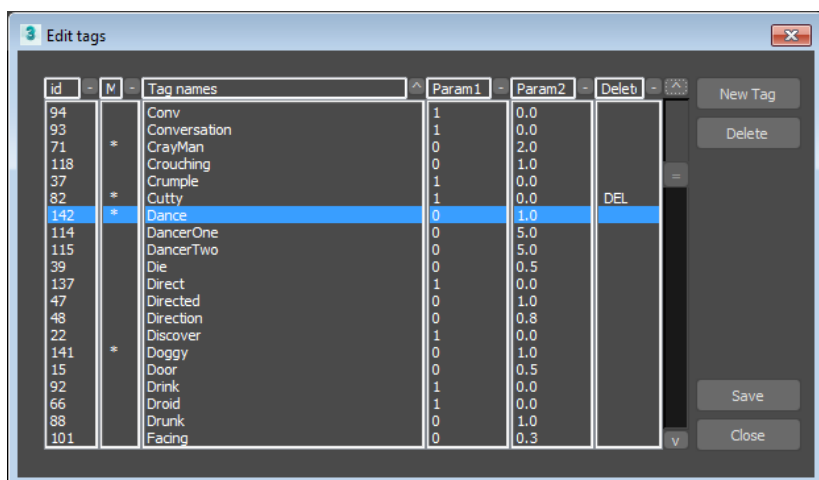
**Cancel** – this will close the editor, without saving changes.

**NOTE: currently there's no Undo/Redo system in this tool!**

### 7.6.1. Tags Editor

Changing existing tags is not recommended, but you can add and modify your own ones. Once added here, you can use them to name your schemas. This tool modifies tags.moc file in the MotionSchemas.

The dialog is resizable, and you can press on the  buttons to sort by that column. Some columns are also editable by double-clicking.



**New Tag** – name needs to be unique

**Param1/Param2** – meaning of these parameters is not exactly clear. For your new tags, go for values of a similar tag to yours.

**Delete** – mark Tag to be deleted. You cannot delete a Tag which is in use. (you'll be warned upon saving).

**Save** – saves your changes. Note – they will take effect only after you Save changes to the entire database.

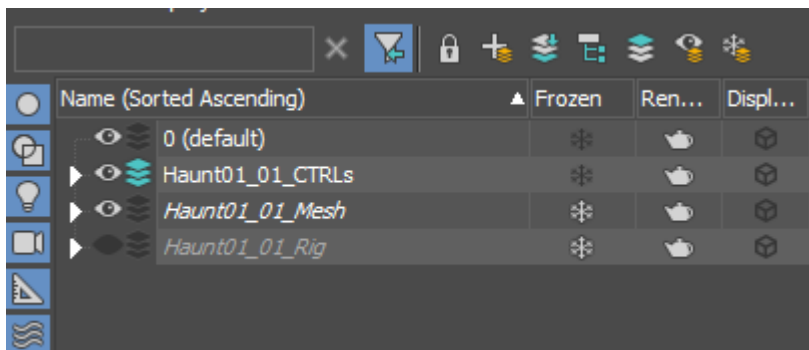
**Close** – discard changes done in this session.

## 8. 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.



### 8.1 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 etc...



## 9. Rig Controls

You can 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 additionally moved, as it changes AI position. **Root\_CTRL** can be moved and rotated, but it doesn't affect the exported motion.

Some of the controls have extra attributes, explained below.

### 9.1 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.

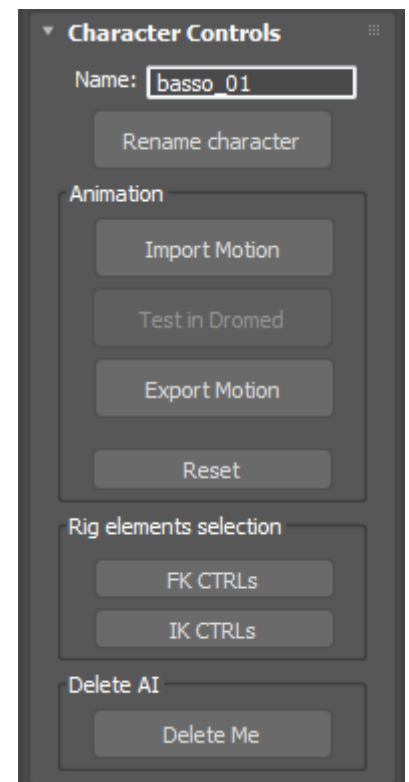
It holds a character name – by default it's derived from a file name plus an index number – in case you import more than one character of the same type, e.g. *Basso\_01*, *Basso\_02*, *Basso\_03* etc...

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.

#### 9.1.1 Character Controls

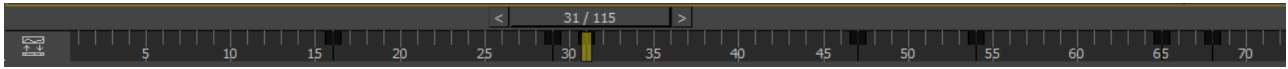
<b>Name</b>	Displays current name of a character. Type in a new one, if you want to rename it.
<b>Rename character</b>	Press the button to rename a character with a name typed in above.
<b>Animation:</b>	
<b>Import Motion</b>	Opens up Import Motion dialog, explained in section 5
<b>Test in Dromed</b>	(currently inactive) – will allow testing motion directly in Dromed (in future version)
<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



### 9.1.2. 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.

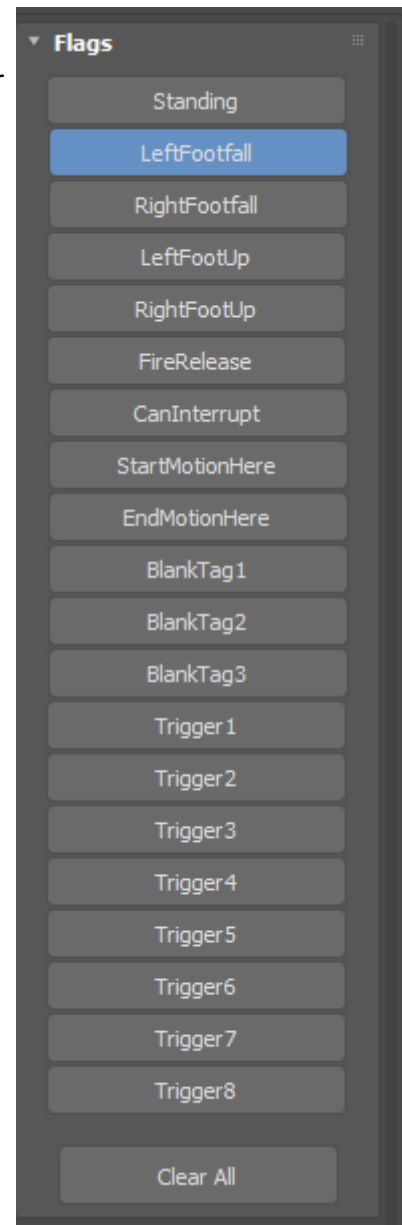


If you go to a frame with a flag, you will notice that at least one of the flag buttons is checked.

**LeftFootfall** in the example below:

Just press the checkbuttons to toggle the state of a flag for a particular frame of the motion.

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



## 9.2 Leg controls

**Foot\_CTRLs** 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:

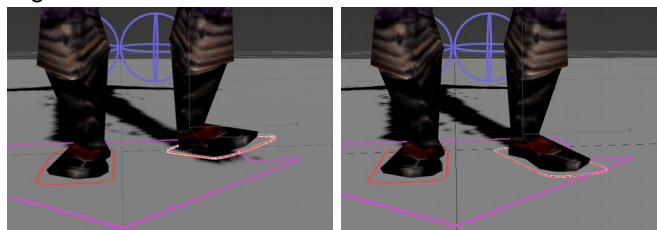
<b>FK / IK blend</b>	0 means FK mode, 1 – IK mode. It can be animated. You can use spinner or slider to control it.
----------------------	--

### *FK / IK snap:*

<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)

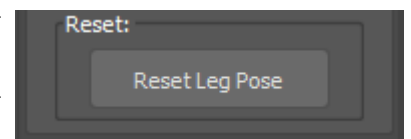
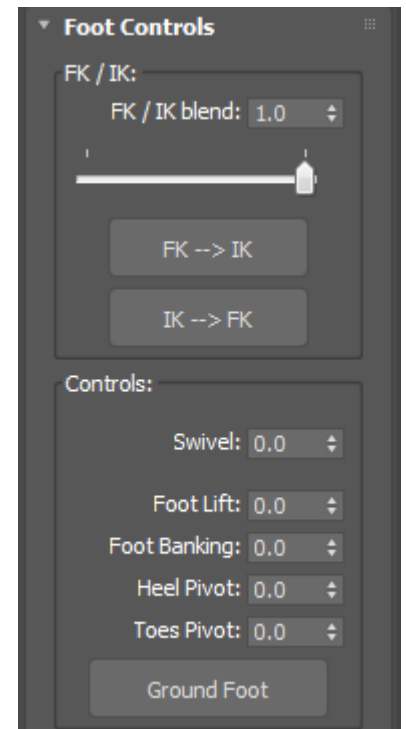
### *IK controls:*

<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>Ground Foot</b>	Projects the IK Foot_CTRL onto the ground, maintaining the angle of Z axis.



### *Reset:*

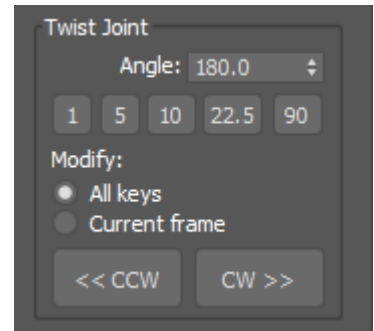
<b>Reset Leg Pose</b>	Resets the leg pose to a default one
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### 9.3 Twist Joint controls

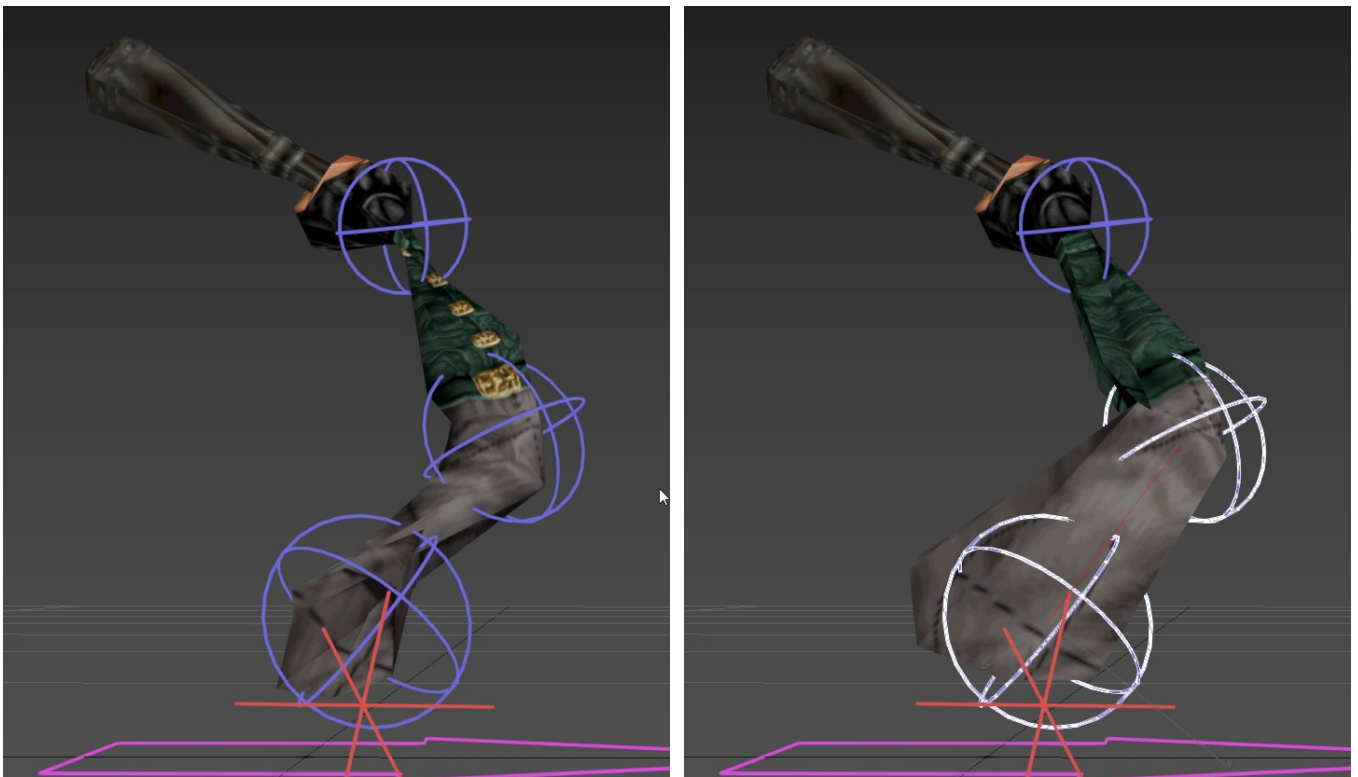
Twist controls are shared across all the limbs – arms, legs and generic limbs.

They can fix problems with certain motions that import with some joints twisted. Some of these twists are problems with the motion file itself – they can be observed in the game. Some are a result of conversion rotations from quaternions to eulers, which have two equivalent representations. In both cases the problems can be corrected, and once it looks good in 3dsmax viewport, it will look correct in the engine and on consecutive imports (the conversion from euler to quaternions does not expose the same problem).



*Example:*

Motion below had two selected controls twisted by 180.0 degree in CW direction.



Essentially, what twisting does it changes rotation of a control along its Z axis, without affecting child controls.

You can specify the degrees of rotation, its direction and whether this should affect entire animation or just a single frame. If correcting an imported motion, you want to use **All keys**.

## 9.4 Arm controls

**Wrist\_CTRLs** 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.

### IK controls:

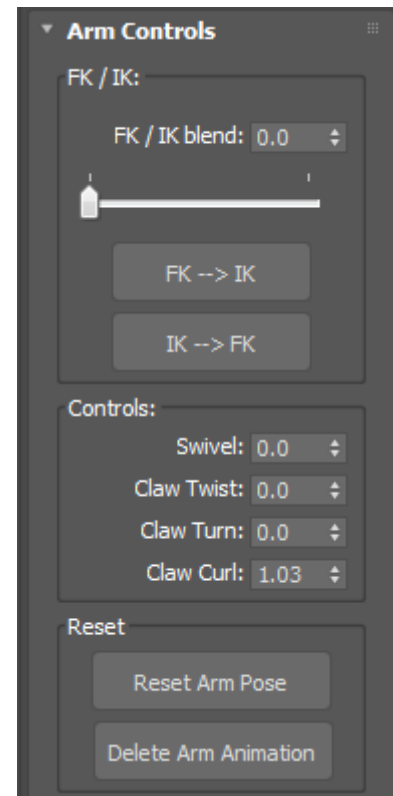
<b>FK / IK blend</b>	0 means FK mode, 1 – IK mode. It can be animated. You can use spinner or slider to control it.
<b>FK --&gt; IK</b>	Snaps FK controls to IK, so the arm assumes the same pose. Useful for animating the blend between modes.
<b>IK --&gt; FK</b>	Attempts to match IK pose to the FK one.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

### Controls:

<b>Swivel</b>	Controls the angle of the arm plane
<b>Claw Twist</b>	Controls the twisting of the bugbeast claw
<b>Claw Turn</b>	Controls the side turn of the bugbeast claw
<b>Claw Curl</b>	Controls the curling of the bugbeast claw

### Reset:

<b>Reset Arm Pose</b>	Resets the arm pose to a default one
<b>Reset Arm Animation</b>	Removes animation from entire arm



**NOTE:** Claw controls are available only for the bugbeast and have meaning only in the IK mode. Otherwise, an FK control is provided.



## 9.4 Torso controls

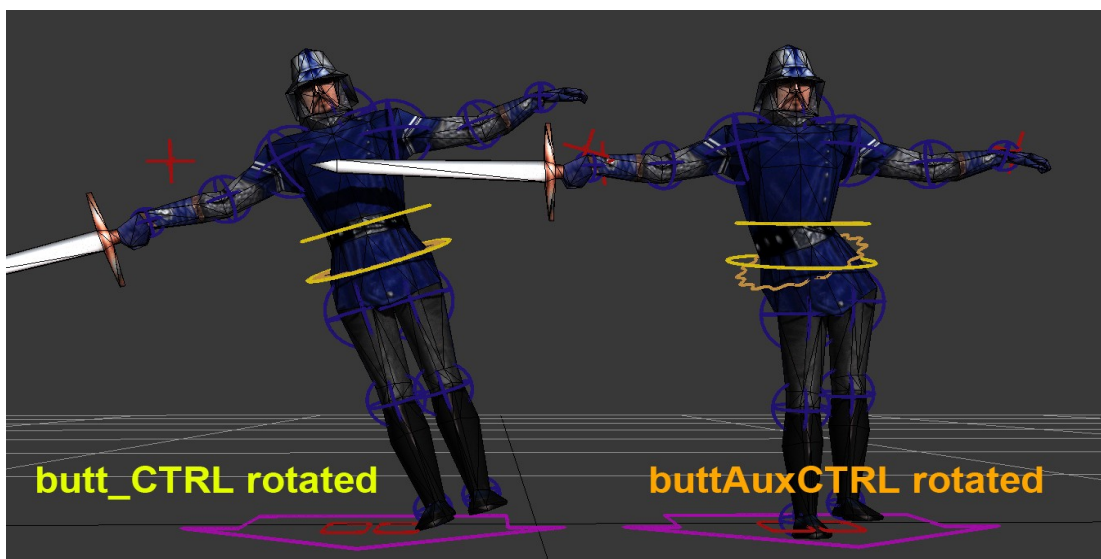
Note: term 'torso' is just an arbitrary term and means (in Dark Engine) a joint that can have multiple children. 'Butt' is technically a 'torso', as it has 3 children – 2 legs and 'abdomen' joint (which is another torso, btw). This is in contrary to 'limbs', which form single chains of joints.

All torsos have double controls:

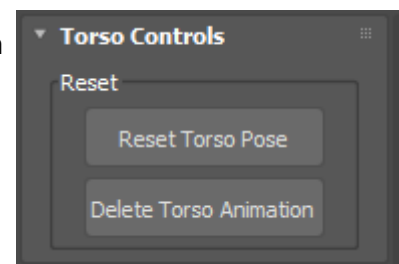
- a yellow ring, which is the main control
- an auxilliary, orange wavy ring

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.



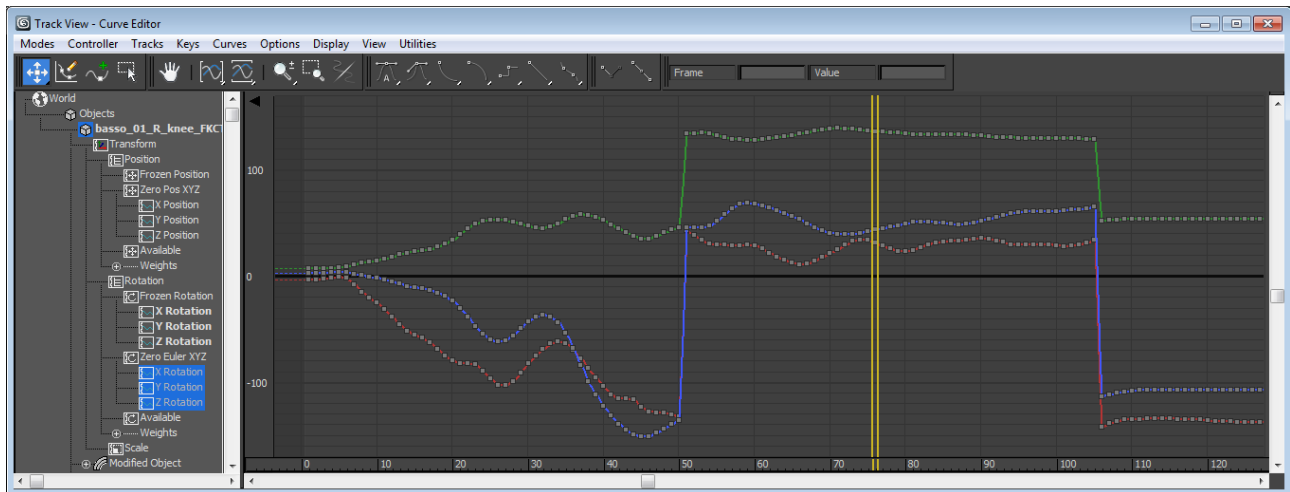
In addition, main Torso control has ability to **Reset Torso Pose** – which affects rotation of both torso controls and **Delete Torso Animation**, which removes all the keys from torso controls.



## 10. Editing motions

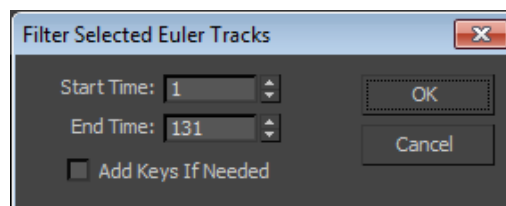
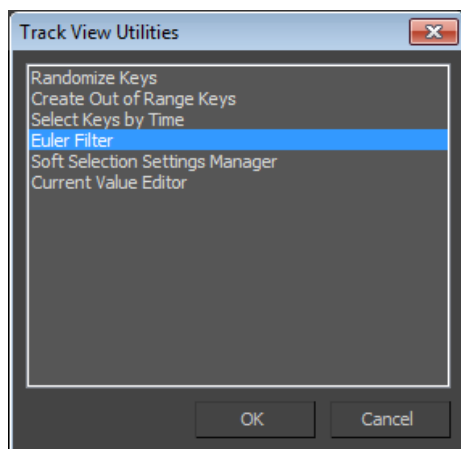
### 10.1 Fixing twitching joints

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 rotations stored as quaternions. However it can make editing the motion curve more difficult, after we convert it to euler angles (the X, Y and Z curves).

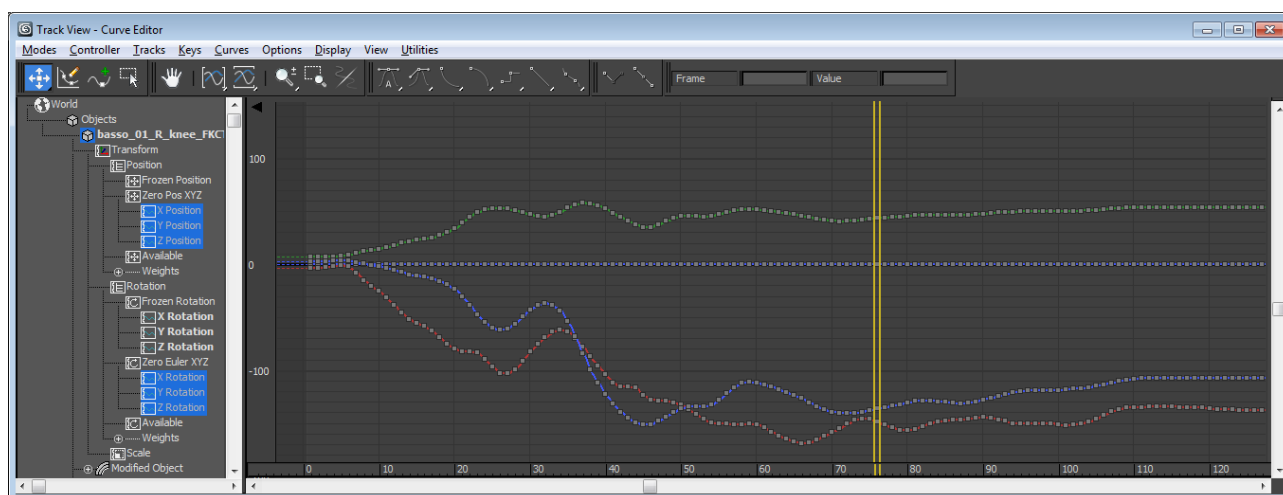


➔ To fix it:

- 1) select the animation control of that „twitching” joint
- 2) open the Track View
- 3) Select all or any of the X Y or 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 keyframes) 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

Video tutorials to be done later...

Happy animating!