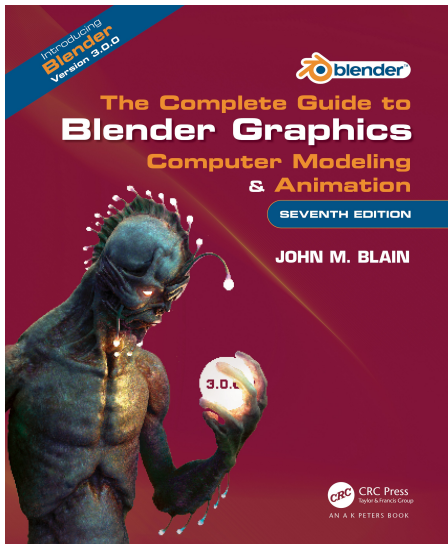# Rigging – Rigify - Animbox

Rigging-Rigify-Animbox is offered as a **FREE** supplement to:

## The Complete Guide to Blender Graphics, 7th Edition

Rigging or to be precise **Character Rigging** for posing Characters when Animating a subject included in the book. The **Add-on, Rigify** has been briefly mentioned as one method of obtaining a pre-constructed Armature to be used when posing a Character.

Animbox is also an **Add-on** for Blender which automatically generates a humanoid walk cycle for Animation.

There are Video Tutorials on the Internet describing the implementation of **Rigify** and **Animbox**.

The examples and instruction often make the assumption that the viewer is conversant with Blender and has a reasonably advanced knowledge. It is, therefore, felt that a beginner may this article beneficial

Blender is continually being developed with new features being incorporated and improvements made. In writing an instruction book it is difficult, if not impossible, to keep pace with the developments. The lead time from completing a manuscript to publication to release, prohibits some features from being included. **Rigify and Animbox** were feature not included in the book and are, therefore, offered as a supplement to the book and free to to those who are interested.
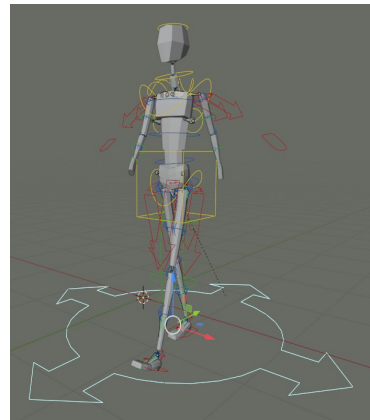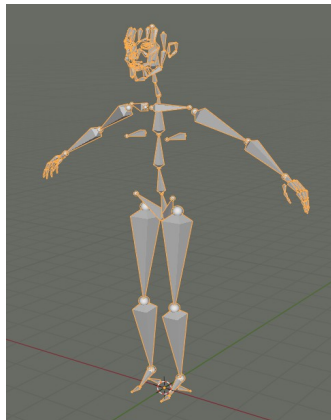
Rigging – Rigify – Animbox

The title, **Rigging – Rigify – Animbox** represents the progression when Rigging a humanoid Character and Animating the Character to walk using the Blender Add-ons**, Rigify** and **Rigify Animbox**.

Note: The Add-on named **Rigify Animbox** has been designed to be used with the Add-on named **Rigify**. When activated, Rigify provides several preconstructed **Armature Assemblies** with the Bones in the Armatures linked in **Child Parent Relationships** resembling a bone skeleton. Rigify will automatically create **Control Handles** for the Armature Assembly which is then known as the **Armature Control Rig**. Rigify Animbox automatically generates an **Animation** of a **Walk Cycle** for the the Character. When the Animation is played the Character is seen to walk.

Since an Armature Control Rig is specific to the original Armature Assembly, to use Rigify Animbox with a custom Armature Assembly, the custom assembly must conform to Armature Assemblies provided by Rigify.

Important: The Add-on **Rigify Animbox** is designed to be used with an Armature assembly provided by the Add-on, **Rigify**.

The prerequisites to using the Add-ons are: You must have a **Model** of a humanoid figure and you must have the Add-ons **Rigify** and **Rigify-Animbox** installed on your computer **and activated**. If you are not conversant with installing and activating Add-ons into Blender, see the instructions at the end of this paper.

Rigify

Rigify provides a collection of preconstructed **Armatures** which are assembled with the Bones connected in Child-Parent Relationships.

Rigify and **Rigify Animbox** will be demonstrated using the **Human Armature**.

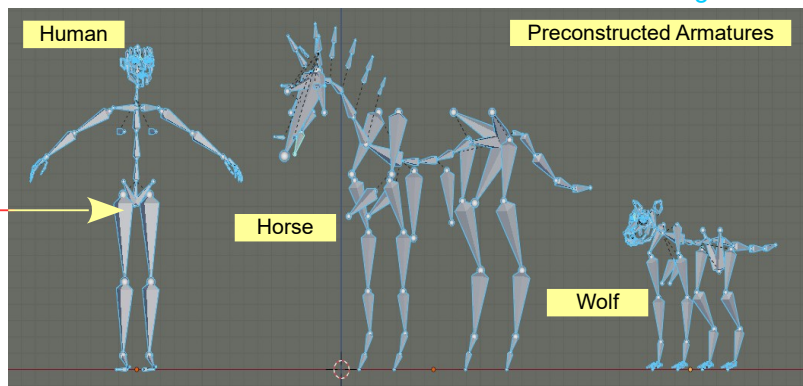The Human Armature is named **Human (Meta-Rig).**

Figure 1.1

Human

Preconstructed Armatures

Horse

Wolf

Remember: The objective is to demonstrate the process of Rigging a humanoid Character and Animating the Character to walk using the Blender Add-ons **Rigify** and **Rigify Animbox**.

Obtaining and Preparing a Model

You may construct your own Model of a Human Figure or Character bearing in mind, the Model has to be a Mesh Model with the Mesh inclusive of an adequate number of Vertices in the Mesh.

You may also download Models from the internet but again the Model has to be a Mesh Model with sufficient Vertices.
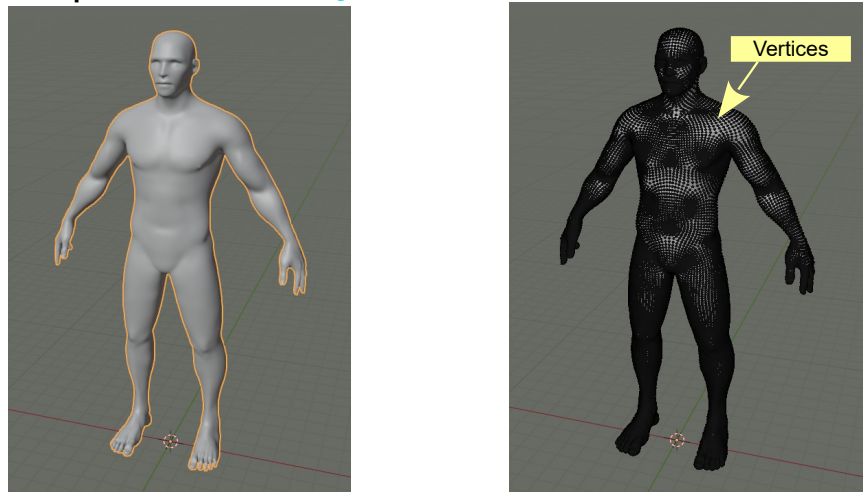
One source of downloads is: **https:// blendswap.com/**

If you elect to use a Blendswap Model be aware that all models are NOT equal. For example;

Https://www. blendswap.com/blends/view/18749 Figure 1.2
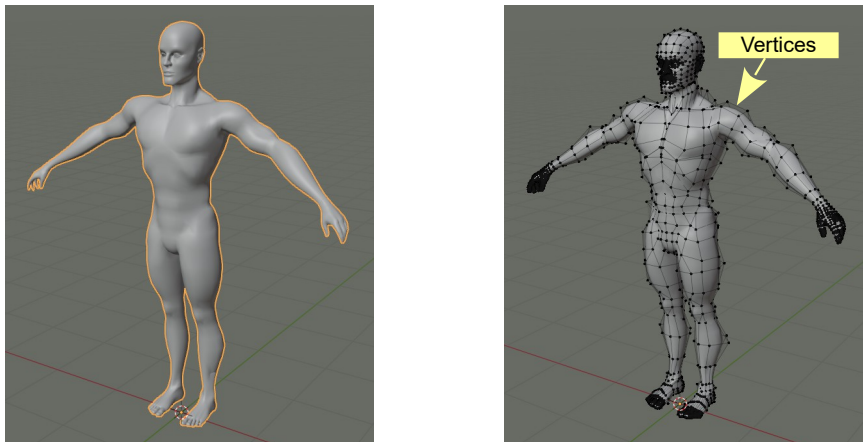
https://blendswap.com/blend/3543 Figure 1.3

In Figure 1.2 attempting to rig Blend Swap 18749 failed, due to the lack of Vertices in the Mesh.

Another source for a Human Model is the Program, **Make Human** (open source). By exporting the default Human Model as a **Wavefront .obj** file from Make Human you can import the Model into Blender (**see how at the end of the paper**).
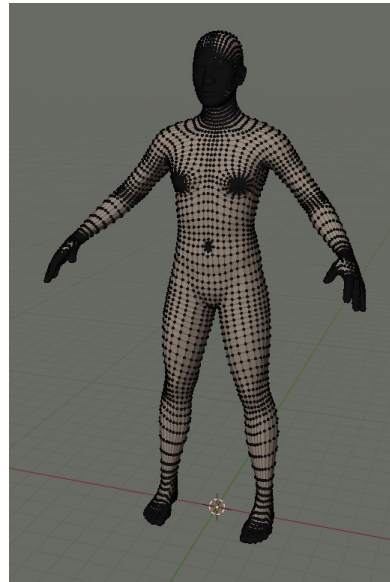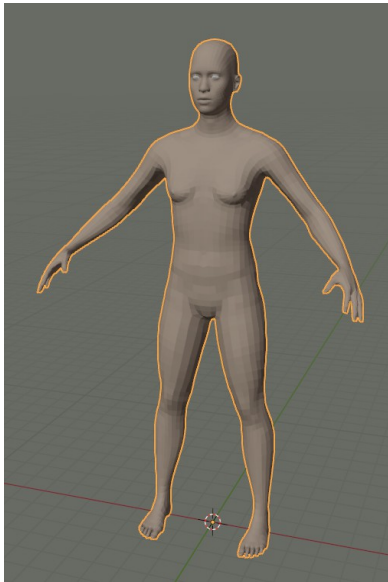
http://www.makehumancommunity.org/content/downloads.html

The Model imported from the Make Human program (Figure 1.4) has less Vertices in the Mesh than the Blend Swap file 3543 but is adequate for Rigging and Animating. You may modify the Figure while in the **Make Human Program** if you wish, but for this demonstration the default Model, as shown above, will be used.

The Armature Assembly

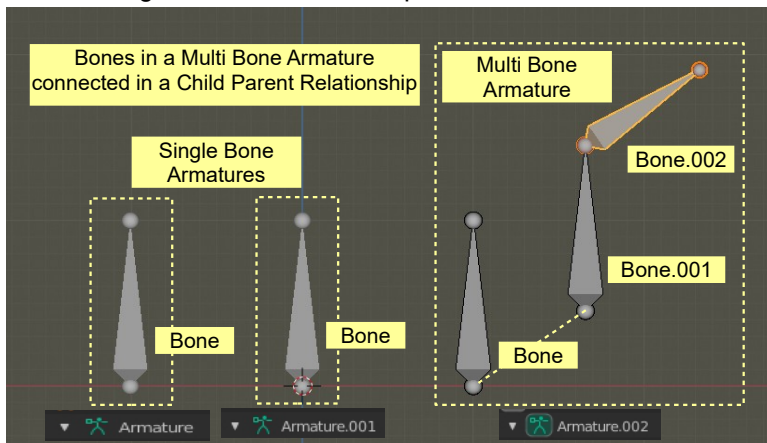An Armature can be a single Bone or have multiple Bones.

Figure 1.5

Bones in a Multi Bone Armature connected in a Child Parent Relationship

Multi Bone Armature

Single Bone Armatures

Bone.002

Bone.001

Bone

Bone

Bone

Bone

Armature   Armature.001   Armature.002

The **Rigify Armature Assembly** is a **Multi Bone Armature** preconfigured to suit a Humanoid Model. To enter a Rigify Armature Assembly in the Scene, click **Add – Armature – Human Metarig** in the 3D Viewport Header**.** The Armature Assembly is named **Metarig**.

The Human Metarig (Armature Bone Skeleton) displays nestled between the Model's legs (Figure 1.6). With the Armature selected, in Object Mode, Scale the Armature up to suit the Model (Figure 1.7).

Figure 1.6   Figure 1.7
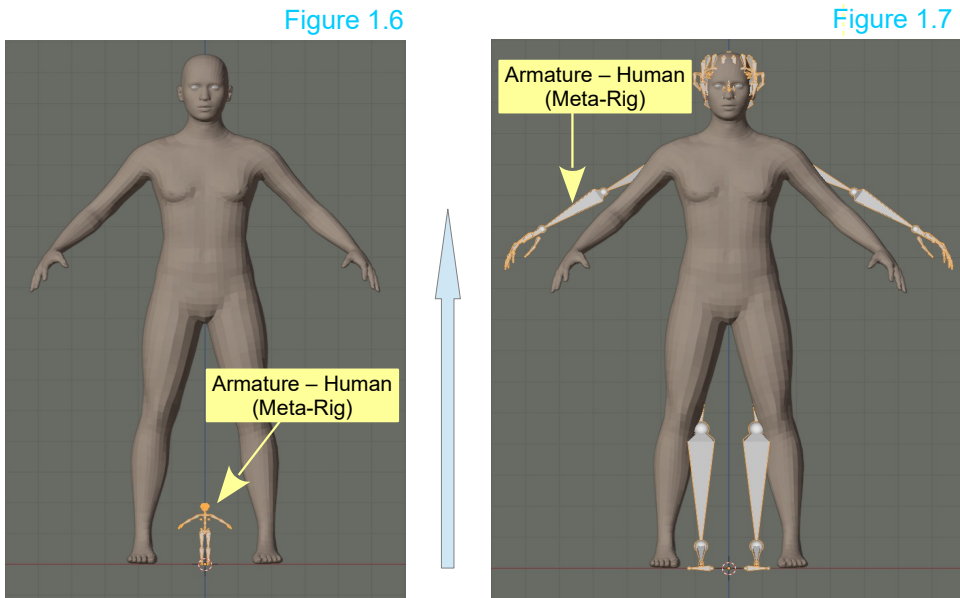
As you see the Armature is partially hidden inside the Model. To see the full Armature, go to the **Properties Editor, Object Data Properties** for the **Metarig** and in the **Viewport Display Tab**, check <u>**In Front.**</u>

Figure 1.8   Properties Editor

Figure 1.9

Object Data Properties

Check In Front
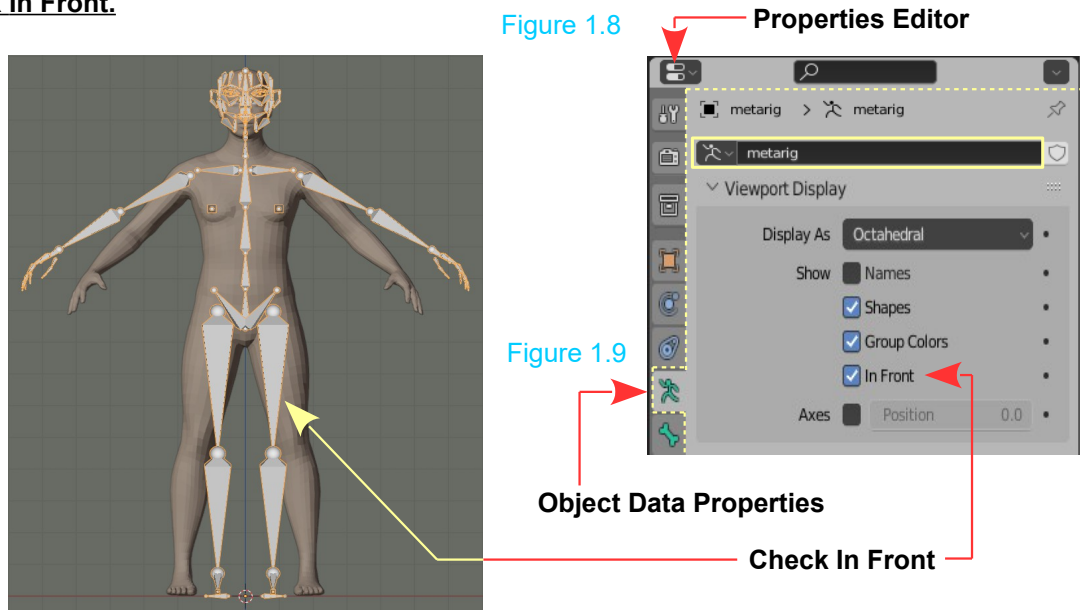
Important: When the Model was Imported into the Scene its Scale Value was 1.000. You see the value by pressing the **N Key** to display the **Object Properties Panel** (Figure 1.10)

When the Metarig is entered in the Scene it also has a Scale Value: 1.000 even though it displays as a minute size. When the Metarig is Scaled up to fit the Model its Scale Value will increase to something like 8.345.

Both the Model and the Metarig must have the same Scale Value. With the Metarig selected press **Ctrl + A Key** and select **Apply – All Transforms** to reset the Metarig"s Scale to 1.000. All transforms = Translation, Rotation and Scale.

Alternatively; you could manually change the **X, Y and Z Scale Values** in the Object Properties Panel.

Clarification: The Armature Assembly obtained from Rigify is named Metarig. The Armature Assembly is a Multi Bone Armature. Armatures in Blender may be displayed in the 3D Viewport Editor in Object Mode, Edit Mode and Pose Mode.
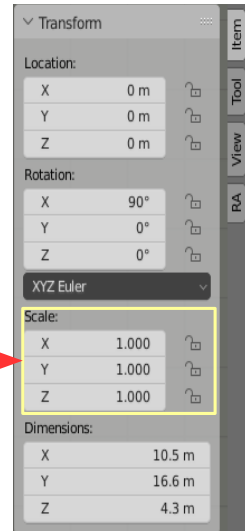
Align the Armature Assembly with the Model

The Armature has to be aligned with the Model such that the Bones are placed inside the Mesh.

With the Armature selected **Tab to Edit Mode**. To assist in the alignment activate **X Axis Mirror** in the upper right hand corner of the 3D Viewport (Figure 1.11). Click on **X**.

With **X Axis Mirror** activated (highlighted blue), when a right hand **Bone** in the Armature is positioned the left hand **Bone** automatically follows.

The Bones in the Armature are connected in **Child Parent Relationships** such that when Parent Bones are moved Child Bones follow. The Child Parent Relationship is only applied with the Armature in **Pose Mode**.

Positioning Bones to fit the Model is performed in **Edit Mode**. Bones are selected and moved to fit inside the Model's Mesh. Moving Bones in Edit Mode does not disconnect the Bones from the Armature. The Bones remain connected and the Child Parent Relationship is retained which is active when the Armature is in Pose Mode.

Armature Bones may be Parented to Vertex Groups in the Mesh but when using the Armature Assembly obtained from Rigify, a **Control Rig** is generated and Parented to the Mesh utilising the position of the Armature Bones to make the association.
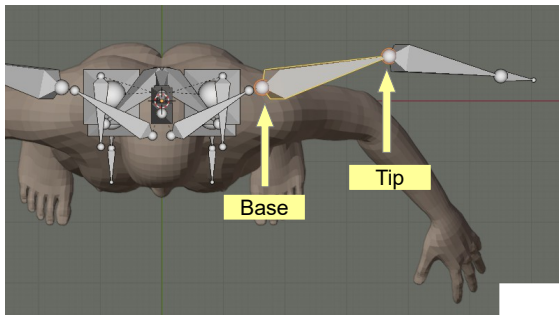
The Armature Assembly (Metarig) provided by Rigify has detailed Bones for the face, ears and hands. To simplify the demonstration these will be deleted.

To delete Bones, have the Armature selected in Object Mode then Tab to Edit Mode. Using the Circle select (press C Key) highlight the face, ear and hand Bones, X Key, Delete. Rotate the view to make the selections.

While remaining in Edit Mode select Bones and position them inside the Mesh Model. Press Num Pad 1 and 3 to see front and side views Num Pad 7 for top view.

The following Figures show the alignment of the Upper Left Arm Bone. In Edit Mode select the **Tip** and the **Base** of the Bone separately and G Key (Drag) to position relative to the Model. You may also select a Bone Body and Translate, Rotate and Scale.

Upper Arm Bone Before Positioning   **Upper Arm Bone After Positioning**
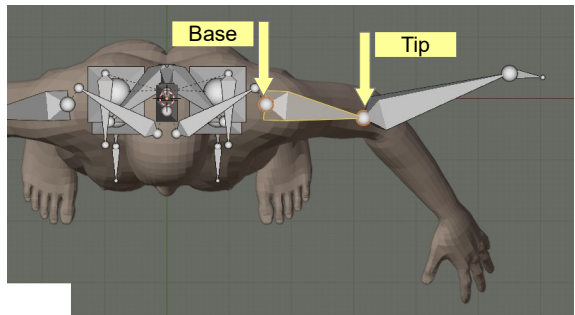
Figure 1.12
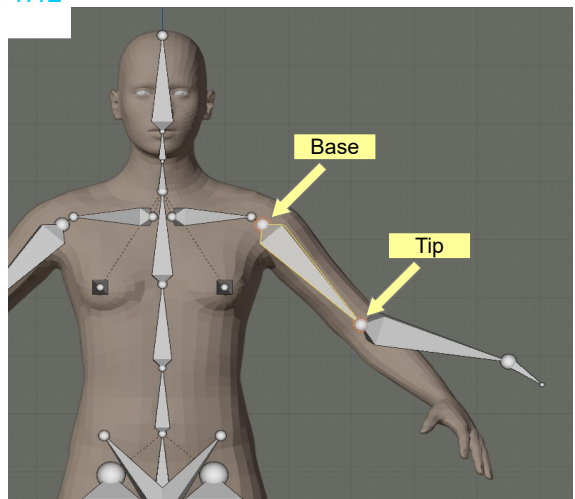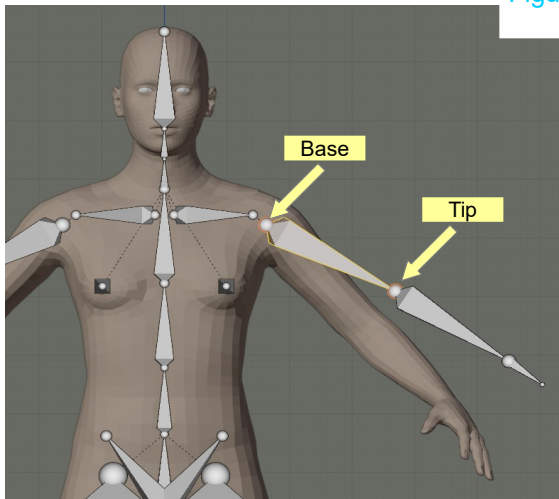
Go over the whole Model, aligning the Armature Bones. You do not have to create an anatomical skeleton. The aim is to position Bones inside the Mesh Model such that the Mesh may be Parented to the Control Rig (see following) using the Bone alignment. The Face and Hand Bones may be deleted to simplify the alignment since your objective is generating a Walk Cycle. Hand and facial Animation will certainly add character and realism but require detailed alignment.

With the Bones aligned, Tab to Object Mode, press **Ctrl + A Key** and **apply All Transforms again**.

Cleaning Up

An anomaly which can cause an error when generating a **Control Rig** is a Bone named **face** residing inside the Head Bone, **spine.006**. This is a residual after deleting Face Bones
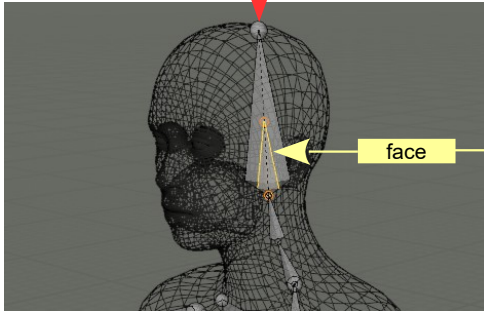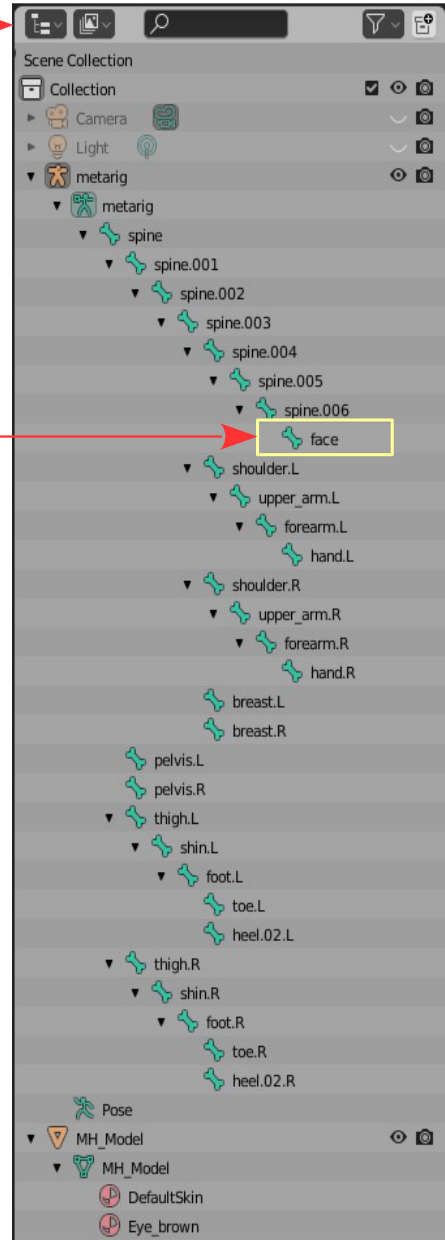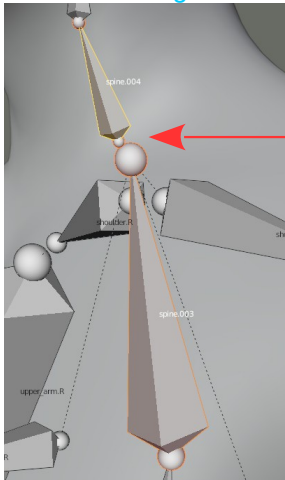
Figure 1.14

face

You will see the Bone listed in the Outliner Editor when the **Metarig** entries are expanded.

Select **face** in the **Outliner Editor, X Key, Delete**.

Figure 1.15

Another anomaly which occasionally occurs and is apt to cause an error is the misalignment of Bones.

The base of Bone spine.004 may not be aligned with the tip of Bone spine.003.

To correct the issue, Tab to Edit Mode, select spine.004, delete, then select the Tip of spine.003 and Extrude a new Bone up to the Base of spine.005. The new Bone will be automatically named spine.004.

With the Bones aligned, Tab to Object Mode, press **Ctrl + A Key** and apply **All Transforms** again.

Generate the Armature Control Rig

To clarify the foregoing procedure; a Model has been entered in the Scene and an Armature named Human Metarig has been aligned with the Model.

Note: At this point the Mesh Model has not been Parented to the Armature. Moving a Bone in Pose Mode will not cause the Mesh to follow. Instead of Parenting the Armature Bones to the Mesh Model a Control Rig will be generated for the Armature Metarig and Parented to the Mesh using Bone positions. Posing (Moving) Control Handles in the Rig will cause components of the Mesh to follow.
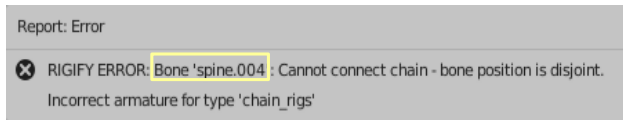
With the Metarig Armature selected in **Object Mode** click **Generate Rig** in the **Properties Editor, Object Data Properties, Rigify Buttons Tab.**

Armature Metarig (human)-Object Mode   Figure 1.16
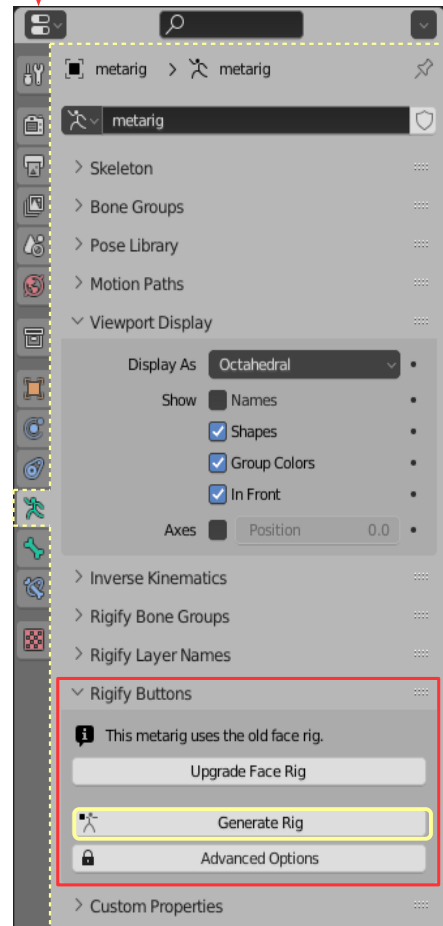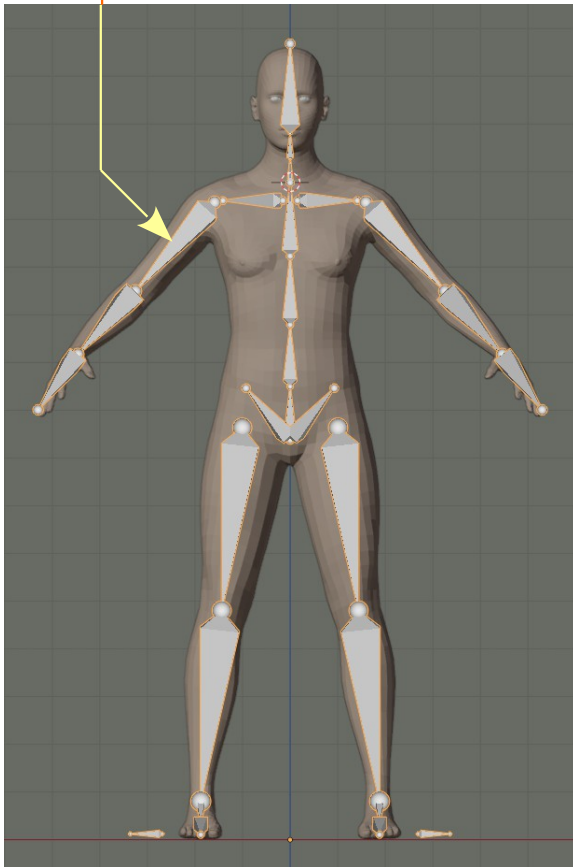
Blender will probably take time to compute the Rig, depending on your PC, and all being well you will see the Control Rig shown in Figure 1.18 (following).

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If an Error Message displays (Figure 1.17). Bone misalignment has occurred as previously described. Figure1.17
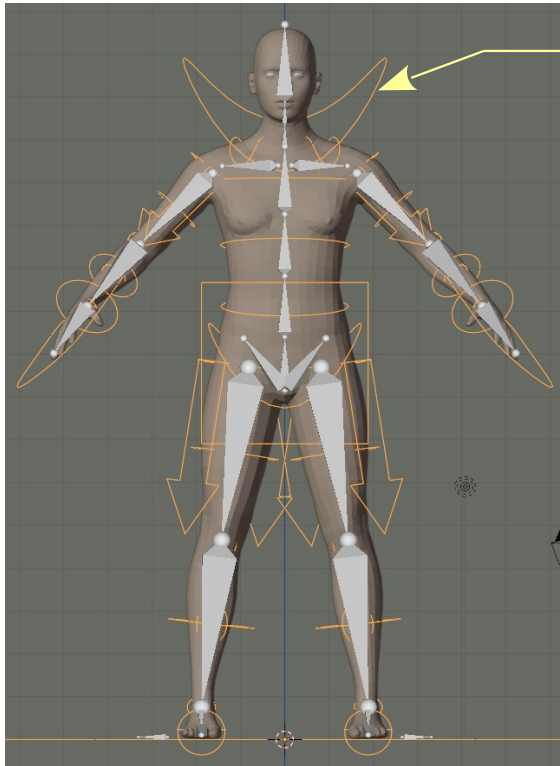
Figure1.18

The Control Rig is generated and displays in Object Mode.

Note: The Control Rig with Control Handles is arranged in accordance with the position of the Bones in the Armature Metarig.

The Armature Metarig and the Control Rig are NOT Parented to the Mesh Model.

You select individual Control Handles with the 3D Viewport Editor in **Pose Mode** but at this point, moving a Control Handle will have no effect on the Mesh.

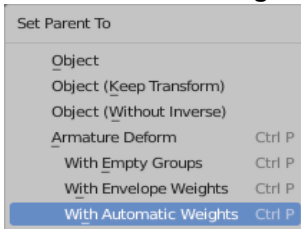Deselect the Control Rig (LMB Click in the Viewport).

Figure 1.19

Mesh Model
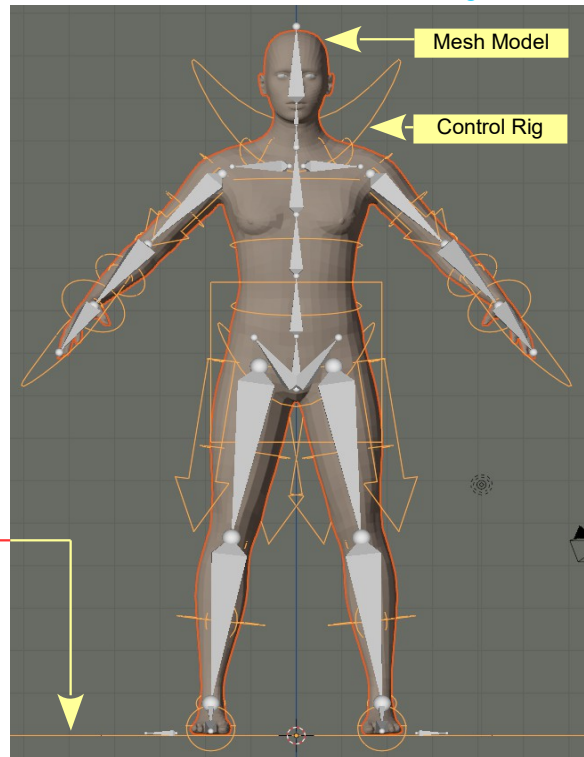
Control Rig

To **Parent the Control Rig** to the Mesh Model, remain in Object Mode, select the **Mesh Model** then Shift Select the **Control Rig** (Figure 1.19).

Press, **Ctrl + P Key** and select **Set Parent To: With Automatic Weights**.

Figure 1.20

Set Parent To

Object
Object (Keep Transform)
Object (Without Inverse)
Armature Deform   Ctrl P
  With Empty Groups   Ctrl P
  With Envelope Weights Ctrl P
  With Automatic Weights Ctrl P

Control Handle
Moves Everything
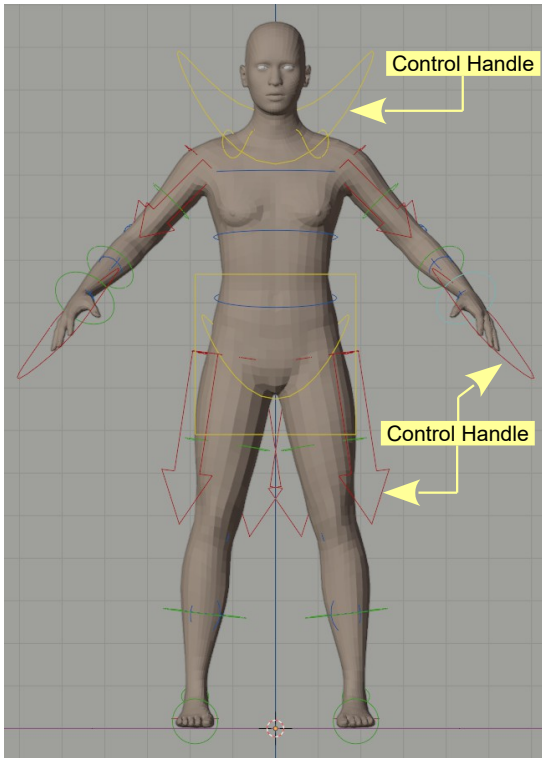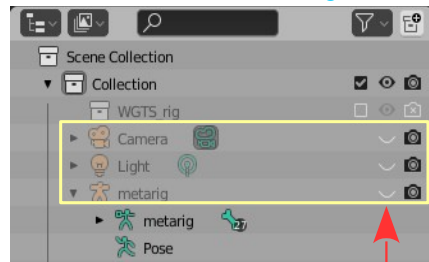
Control Handle

Control Handle

Figure 1.21

In **Pose Mode** the Control Rig Handles display in the 3D Viewport Editor in different colors.

In Object Mode go to the Outliner Editor and hide the Armature Metarig. You may also hide the Camera and the Light (Lamp) (Figure 1.22).
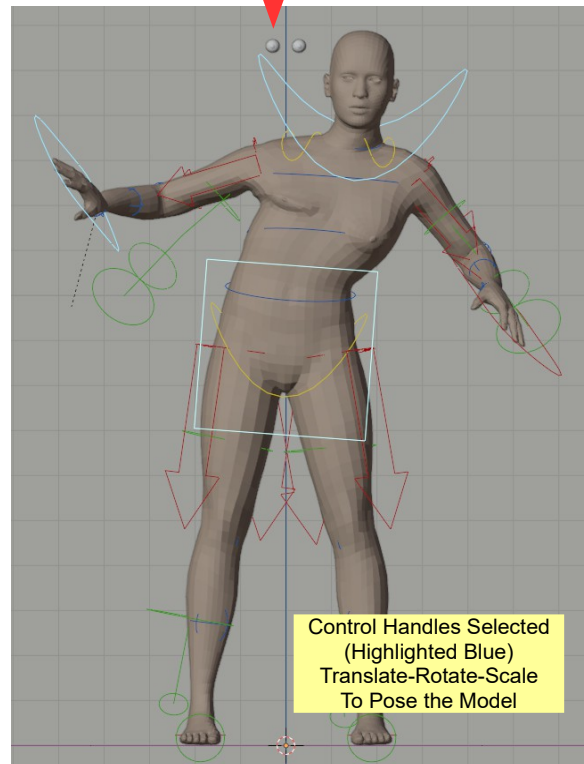
Figure 1.22

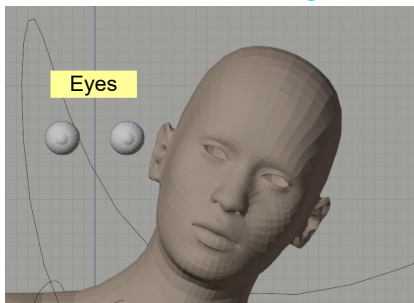**Click the Eye Icons to Hide**

Something Strange? Figure 1.23

Figure 1.23

By selecting (LMB Click) Controls Handles they display blue. Press G Key (Grab), S Key (Scale) or R Key (Rotate) manipulating the Handles, to Pose the Mesh Model (Figure 1.23).

You would normally Pose the Figure (Mesh Model) in different Poses at different Frames in the Animation Timeline to produce an Animation but with the magic of **Animbox** the Figure can be automatically Animated to walk.

Figure 1.24

Eyes

With the Head moved, Eyes do not follow?

Control Handles Selected
(Highlighted Blue)
Translate-Rotate-Scale
To Pose the Model

11

It appears the Make Human Model is Imported into Blender without the Eyes being Parented. Also, by activating X-Ray in the 3D Viewport Editor while in Object Mode it appears that the model has a Pallet built into the mesh.
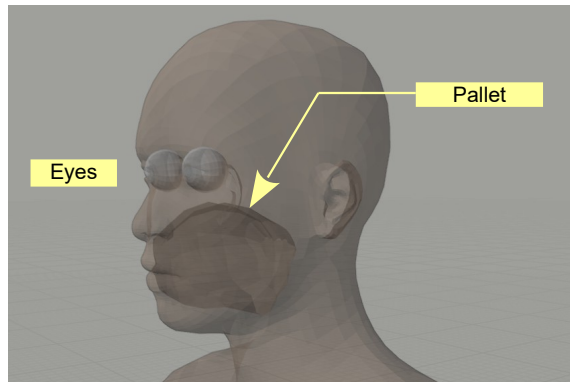

Figure 1.25

The anomalies in regard to the Eyes and Pallet are mentioned here to make you aware that such occurrences may be present when Importing from other programs.

The Magic of Animbox

Animbox is a Blender Add-on designed to be used in conjunction with Metarigs supplied from the Add-on **Rigify**.

Remember: A **Metarig** supplied by **Rigify** is a multi Bone Armature assembly with Bones connected in Child Parent Relationships.

The **Animbox Add-on** generates a Control Rig similar to that previously described but also provides the facilities to generate Rigs for Animal Metarigs. At the same time, Animbox will also generate a Walk Cycle Animation sequence. The Add-on includes a variety of options such as the RigBox Eye Controls and Motion Paths. In the following exercise a Model of a Human Figure will be Animated in a Walk Cycle . This is intended as a starter only. Once familiar with the basic sequence to implement the Add-on, you will have to experiment to discover the full potential of Animbox.

Figure 1.26

The first step, in using Animbox is to ensure that Rigify and Animbox are activated in the Preferences Editor. Animbox must be activated in the Preferences Editor, Add-ons to display the Controls in the 3D Viewport Editor (Figure 1.26).
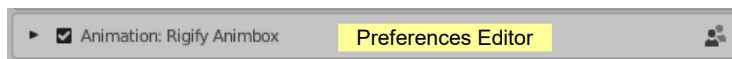
Note: The 3D Viewport Editor Controls for Animbox display in the **RA Tab** of the **Object Properties Panel** in the upper RH corner of the 3D Viewport Editor (Press the N Key to Toggle the Object Properties Panel On/Off). The **RA** (Rigify Animbox) Tab only displays when **Rigify Animbox** is activated in the Preferences Editor.

12
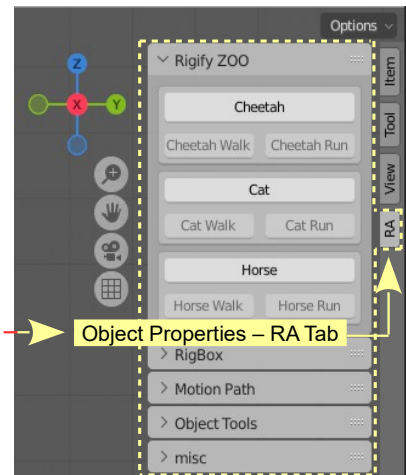
The second step in using Animbox is to have a Mesh Model in the 3D Viewport Editor with a Metarig added from Rigify, scaled up and positioned to suit the Mesh (Figure 1.27).

Don't forget to Apply Transforms after scaling the Metarig.

For simplicity delete Face and Hand Bones and the hidden face bone inside the Head Bone. To prevent an error occurring delete the spine.004 Bone and extrude a new Bone. (see previous instruction).
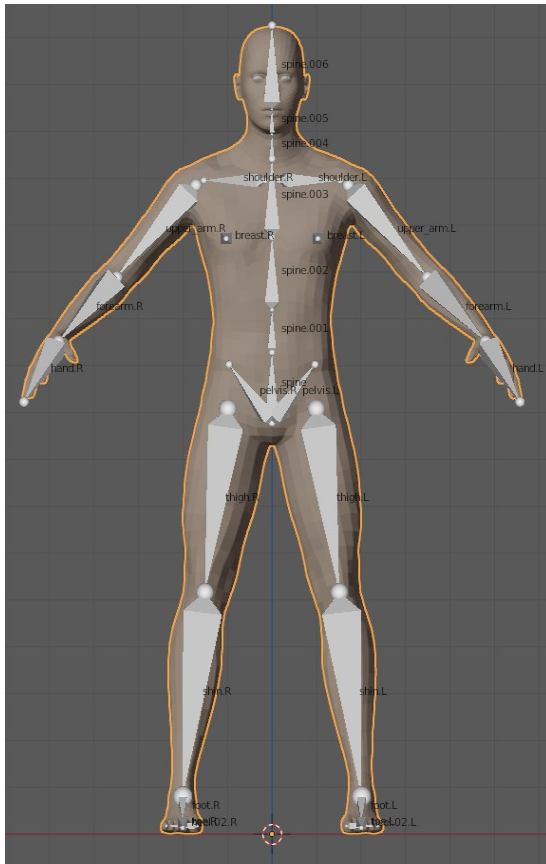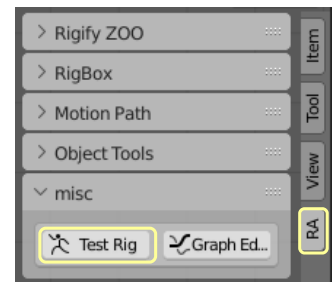

Figure 1.27

In Object Mode deselect the Metarig and the Model. In the 3D Viewport Editor, in Object Mode press N Key to display the Object Properties Panel (Figure 1.28). In the Panel Click the **R.A.** Tab – Click the **misc** Tab followed by **Test Rig**
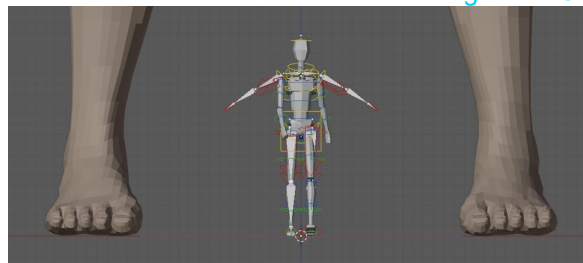
Figure 1.28

(**Note:** The Armature disappears from view).

The Test Rig displays between the feet, selected in Pose Mode.
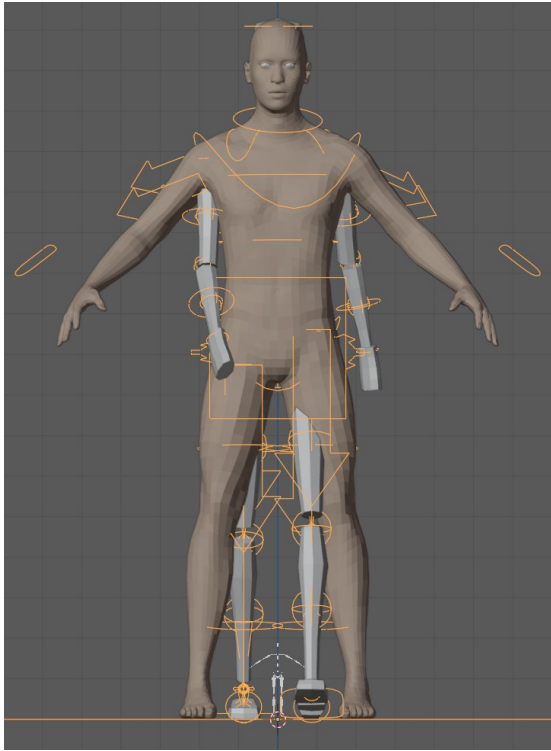
Figure 1.29

The Test Rig is very small in comparison to the Model but as you will see with the 3D Viewport Editor in Object Mode, the Scale Values for both are; 1.000.

In Properties Editor, Object Data Properties, Viewport Display Tab for the Rest Rig, Check **In Front.**

Zoom Out on view

With **Test Rig** selected in **Object Mode**, Scale the Rig up to fit the Model (Figure 1.30).

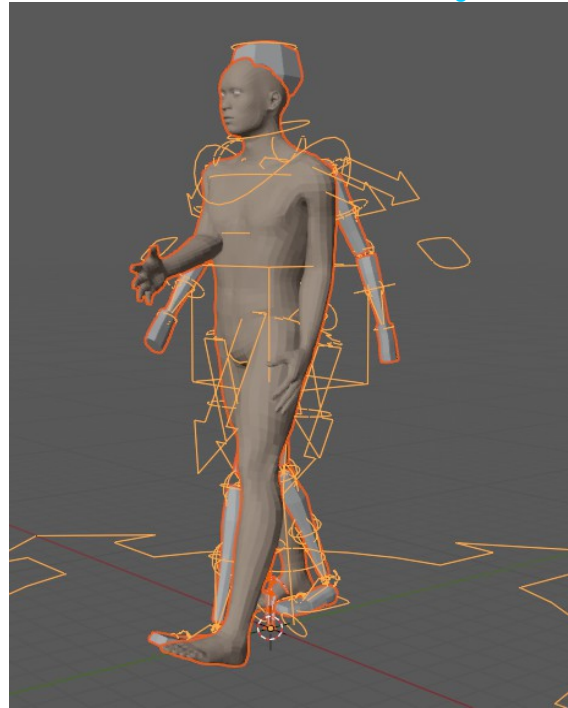**Deselect the Rig.** There is no need to Apply Transforms.

Select Model – Shift select Rig – Press **Ctrl + P** – **Parent to With Auto Weights** – Wait awhile for the computer to perform calculations.
Figure 1.30

The Model is Posed at the start of the Walk Cycle (Figure 1.31).

Figure 1.31

Remember the Parenting is being calculated based on the position of the Bones in the Armature Metarig which has disappeared from view.

Change to **Pose Mode** and press **A Key** to select the entire Test Rig (Turns blue) - Scale and Grab to fit Model (If required).

Press **Ctrl + A** (**Apply Visual Transforms** to the Pose).

At this point the 3D Viewport Editor is cluttered with Controls and Rigs. To unclutter the Scene, hide **metarig.001**, and **Rig_Mesh** in the Outliner Editor.
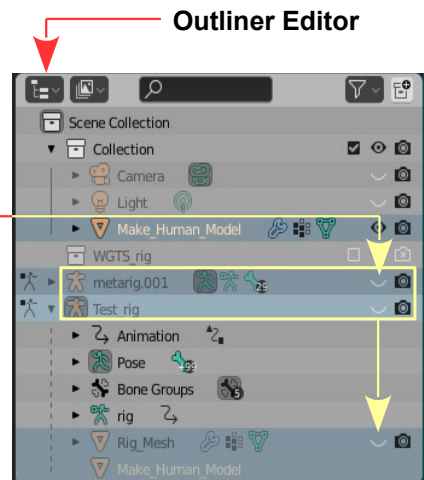
Figure 1.32

Outliner Editor

Click Eye Icons to Hide

Animate the Model to Walk

In the **Outliner Editor** right click on Test_rig and click **Select**.

Have the 3D Viewport Editor in **Pose Mode**.

Press the **A Key** to have the entire **Test_rig** selected (highlighted blue).

Figure 1.33

In the **Object Properties Panel** in the 3D Viewport Editor have the **RA Tab** selected and expand **Rigify Walk / Run** (Figure 1.33).

Under **Rigify Walk Run** you will see the options to have the Model Walk or Run. In either case you select a number to play the Animation for a prescribed number of Frames, i.e. 18 Frames will see the Animation play for 18 Frames then repeat over and over.

In the **Timeline Editor** the Animation **End Frame** will be 18.

You may now hide **Test-rig** in the **Outliner Editor** to see the Model walk (Figure 1.34) when you press the Play button in the Timeline Editor.

If you wish to change the Animation from Walk to Run or alter the Animation Length, unhide Test_rig in the Outliner Editor to display the Rig in the 3D Viewport Editor. With the Mouse Cursor in the 3D Viewport Editor (Pose Mode), press A Key to select the Test_rig (highlights blue). Doing this reactivates the options in the Object Properties Panel.
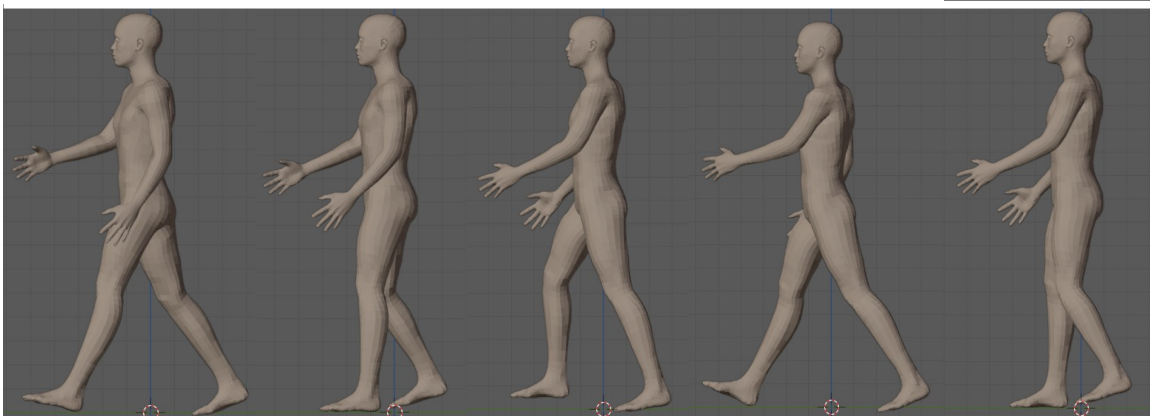
Make your changes and hide Test_rig.

Replay the Animation.

Note: see Rigify Animbox Update
https://youtu.be/7bGqRA3rC4Q

Animation Walk Cycle   Figure 1.34

Installing Add-ons in Blender

Installing an Add-on is as simple as ABC. To explain how, the Add-on named **Rigify Animbox** created by VALANGDANCE will be used,

Congratulations to VALANGDANCE for this fantastic addition to Blender.

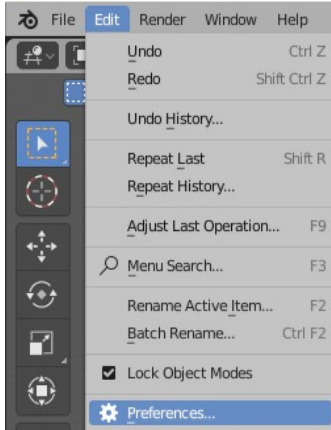The download process is a little convoluted but you will eventually get the ZIP file rigify_animbox
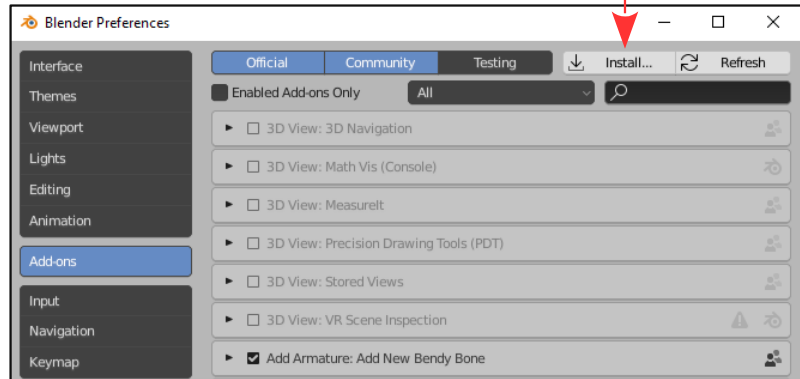

rigify_animbox
DO NOT UNZIP THE FILE

B

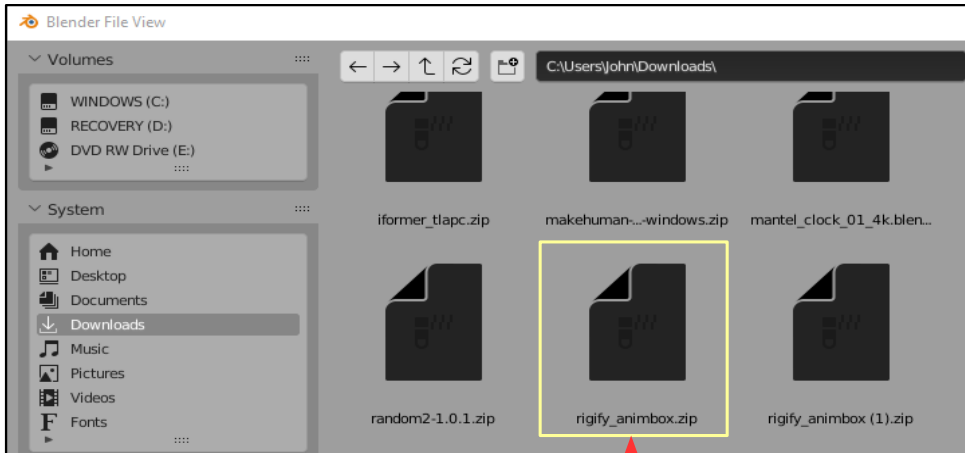Open **Blender** to install the Add-on. In the Blender Screen Header select **Edit – Preferences**.

Select **Add-ons** in the **Preferences Editor** and click the **Install** button in the Header.

Clicking the Install button opens **Blender File View** where you navigate and find the **rigify_animbox.zip** File.
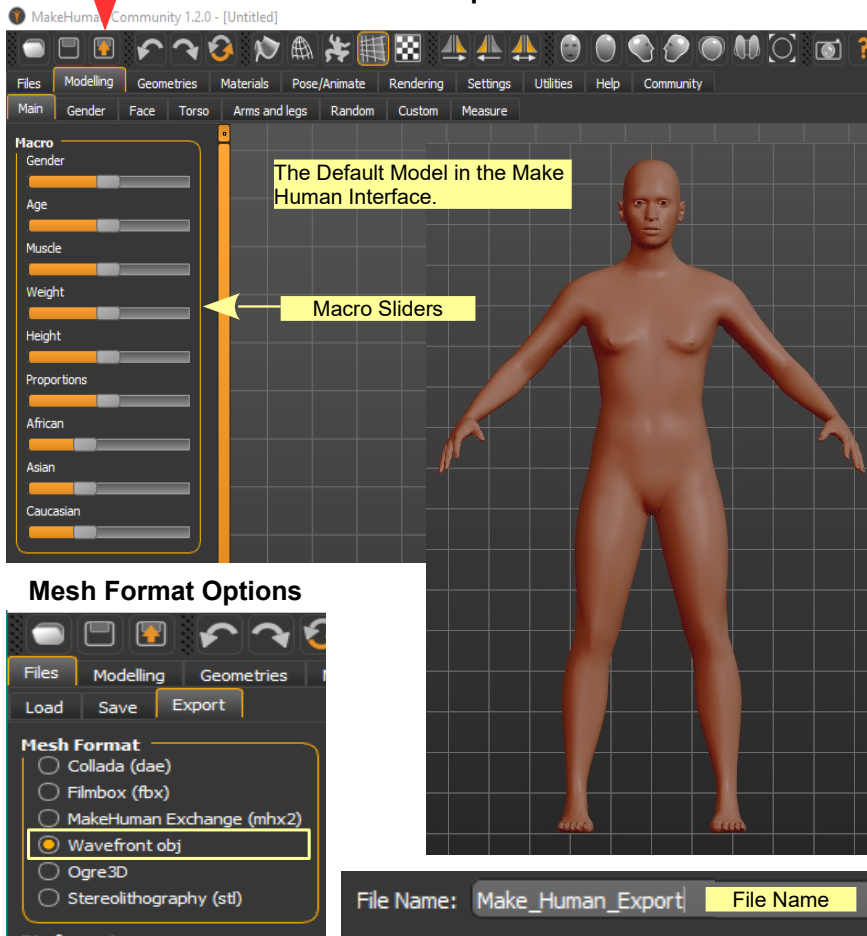

Click to select the File

C

Click Install **Add-ons**.

Important: To use the Add-on, don't forget to **Activate** it in the **Preferences Editor.**

Make Human Export

Click the Export Button

The Default Model in the Make Human Interface.

Macro Sliders

Ammend the model before exporting by adjusting the sliders in the **Macro** panel.
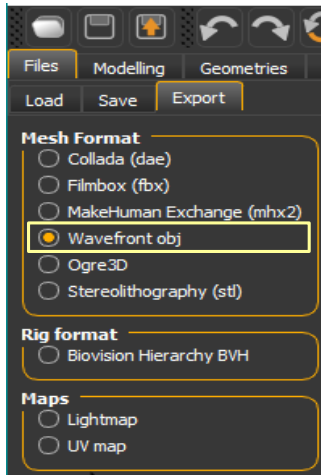
To export the model click the **Export button** to display the **mesh format options**.

For Blender select **Wavefront obj**

Enter a file name in the header, select a folder to export to then click **Export**.
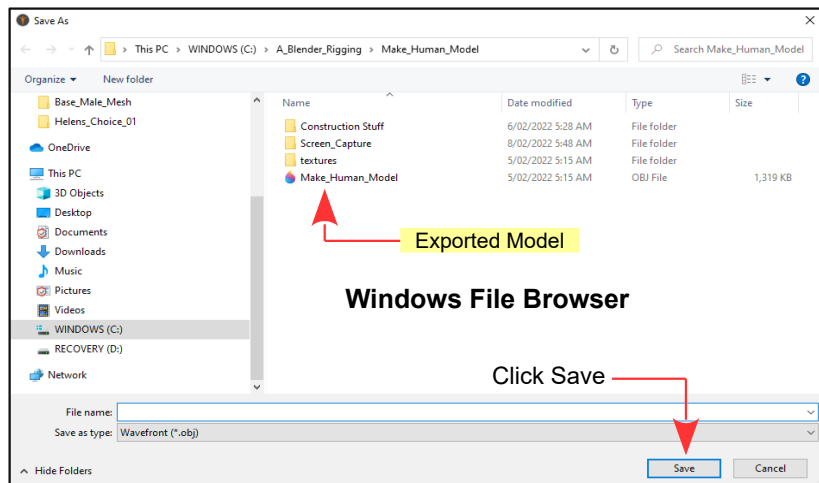
Click **Save** in your pc's file browser.

Mesh Format Options

Click to select Export Folder

Click Export

File Name: Make_Human_Export   File Name   ...   Export

Exported Model

Windows File Browser

Click Save