THE WALK CYCLE

Start with a simple rigged figure. This is our box extrusion figure from CMPM25 with a basic armature. We’ll create a walk cycle with it.

A conventional walk cycle is made up of four frames, called

Contact
Low, Down, or Recoil
Passing
High, Up, or High Point
Looking at the illustration above, we see these are repeated and mirrored to make up the cycle.

These are the features of each pose:

Contact: the heel of the front foot and toe of the back foot contact the ground. Be careful of the stride length; the character is only walking. The angle of the legs should be about the same, and the arms swinging to counterbalance the opposite leg. The front arm is slightly bent, the back is straighter.

Low: the back foot is just off the ground, the body is moving over the front leg. Because the front leg is now taking all the weight the body sinks down a bit. The arms move slightly higher than in contact, if at all.

Passing: the legs are passing each other with the load-bearing leg almost straight and the passing leg bent slightly. The center of gravity of the body is over the load-bearing leg, so the torso may be leaning slightly towards it. The arms are passing the body and slightly bent.

High: the front leg is now rotated ready to enter the Contact position. The back leg is straight and lifted up on a toe. The arms are swinging to counterbalance the legs.

Let’s create the left, first Contact position. With the armature selected, go to Pose mode and create the pose. To begin with, it’s best to bring in an image as a guide.

Once it’s done, we need to add the pose to the Pose library. Hit A once or twice to select all the bones.
Then hit Shift-L. You add a new pose to the Pose Library under the Armature tab in the Properties window and hitting the + button. It’ll come in as Pose. Rename it to Contact-L (the left leg of the figure is contacting the ground). To be sure the pose is set go back to the 3D Window, press Shift-L, and this time replace the pose from the list.

We’re now going to make our Low or Recoil pose from Contact-L, but to do this we have to make a new pose or there is a danger of overwriting the previous one. Hit the + button again and rename the new pose Down-L.

Move the image in the background so that the Down pose is aligned with the figure and create the pose. When it’s done, select all the bones and use Shift-L to overwrite the Down-L pose in the library. Make the Passing and Up poses the same way.

Blender offers a Copy Pose (Control-C) and Paste X-Flipped (Control-Shift-V) option but I have never found this reliable. However, if it works with your figure it will be an easy way to create the same four poses for the right leg.

Once you have all eight poses created, scroll through them by hitting Control-L and spinning the mouse wheel, or you can choose just one with the PageUp or PageDown arrow keys, then Enter to select.
A relaxed walk cycle takes around three and a half seconds to complete, let’s say eighty frames at 24 fps. Go to Frame 1 and select Contact-L by using Control-L and the PageUp or PageDown keys, then Enter. Select all the bones and hit I, then Whole Character at the foot of the options list.

There are eight poses in our cycle before it repeats. Move the timeline cursor to Frame 81 - not Frame 80 - and hit E to make the animation that length. We’ll place one pose every ten frames.

Move to Frame 11, put the character into Down-L pose, select all the bones, and make a Whole Character keyframe. This is how they should be placed:

Frame 1   Contact-L
Frame 11  Down-L
Frame 21  Passing-L
Frame 31  Up-L
Frame 41  Contact-R
Frame 51  Down-R
Frame 61  Passing-R
Frame 71  Up-R
Frame 81  Contact-L

You’ll notice that Frames 1 and 81 are identical. The second Contact-L pose needs to be there in order for the walk cycle to continue properly after Frame 71, but we don’t want two identical frames at that point in the cycle or the action will stutter. Go to Frame 80 and hit E to end the walk cycle there. Test the cycle with Alt-A and refine it as needed.

**The Non Linear Action editor**

When the walk cycle is done, save your file, and then replace the 3D Window with the NLA Editor. You’ll see your action as a series of red bars, with diamonds to indicate the key frames.

Click the double downward arrow in the left panel to freeze the keyframes into an Action.

Now, if you look at the Timeline (if the armature was selected in the 3D Window), you’ll see that the keyframes have disappeared. You get them back by editing the action track. To edit an action, select it with the right mouse button and hit Tab - the same as editing a mesh. The track will turn green, and the keyframes reappear. Use Tab again when you have finished editing.
Still in the NLA Editor window, hit N to bring in the right hand fly-in. Here you can rename the walk cycle action, scale it (ie, change the time it takes to run) and repeat it. You can also layer actions over one another, so that as the character walks he can turn his head or wave. These secondary actions can happen any time and can repeat once or many times entirely independently of the continuing walk cycle.

Layering actions

Click on the small speaker icons in the left panel in the Action Editor so that the sound icon disappears and they look like they do on the left. Silencing a track means that it no longer influences the animation. When we go back to the 3D window the figure doesn’t move, frozen at the point in the animation it was when we silenced the track. Move to Frame 1 with Shift-LeftArrow.

Select the two bones of one of the arms and make Rotation keyframes for them (not Whole Figure). Then move to Frame 10, bring the arm up to head height, and again make Rotation keyframes for the two bones. Finally go to Frame 20 and return the arm to its original position.

Go back to the NLA Editor and shorten the animation in the Timeline to 21 frames, then make it into an action. Rename it Wave or something similar. It will be on top of the Walk track, so even when you make the Walk track active by clicking on the speaker icon, the wave will hide the walk. We need to change a couple of things.

First change the Extrapolation to Nothing. The Wave action will no longer do anything after it finishes. Next, change the Blending to Replace (the arm will no longer swing as it waves), and finally blend the wave into and out of the underlying walk. The figure will now continue to walk during the arm wave.

The NLA Editor can be used to create complex sequences of overlapping, editable actions just like working with image sequences in the Video Sequence Editor.