



With the Disc

Tutorial files:

- Assassin_Run.FBX
– compatible with
MotionBuilder 2010 onwards

Learn how to

- ✓ Quickly create mocap cycles
- ✓ Work effectively with mocap actors and sets
- ✓ Use MotionBuilder to set up a cycle ready for animating

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info



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Personal portfolio site
www.gameanim.com

Location Canada

Software used
MotionBuilder

Expertise Making interactive characters and worlds ever more believable

Master blend cycles in MotionBuilder

Assassin Sprint 2012

“Here we will learn how to create the Sprint Impulsion acceleration cycle, an animation that captures the Assassins’ free spirit”

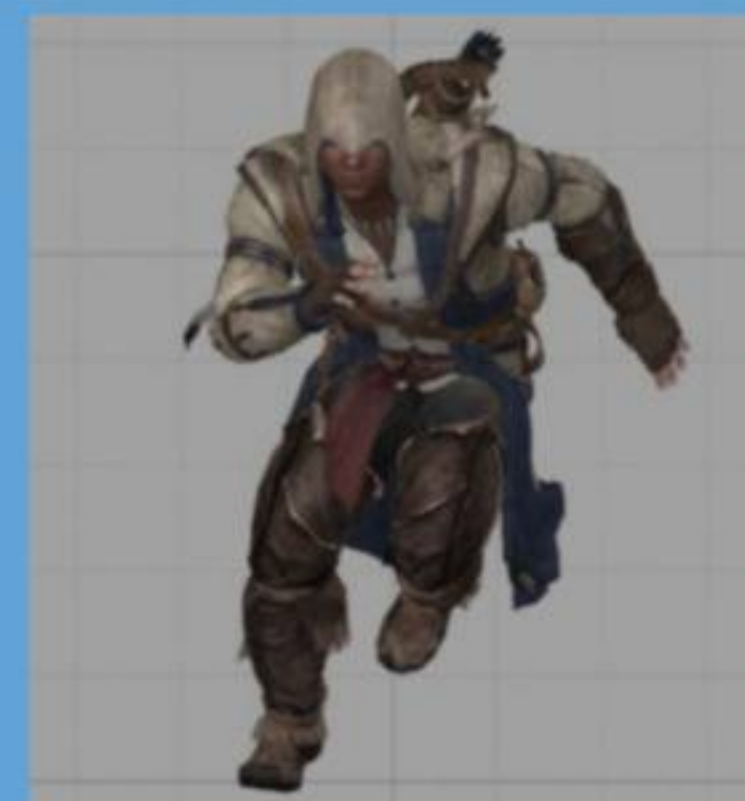
Jonathan Cooper is an animation art director at Ubisoft Montreal

To achieve *Assassin's Creed's* style of animation, we require a vast amount of animation cycles and transitions, bringing the assassin to life for even the simplest ground movement before we layer on cutting-edge technology such as reactive physics and IK.

Here you'll learn the process for making a flawless run cycle using motion capture, as well as a relatively quick and simple looping technique that can be applied to any kind of motion where seamless cycling is required. For this example we're using Autodesk MotionBuilder but the same techniques can be applied in any software that has the ability to blend sections of animation with one another.

Concept

Starting with a longer shot of a mocap actor running, we're going to be extracting a section in order to create a perfectly looping cycle. This can then be used for animating a game character, such as Connor Kenway.

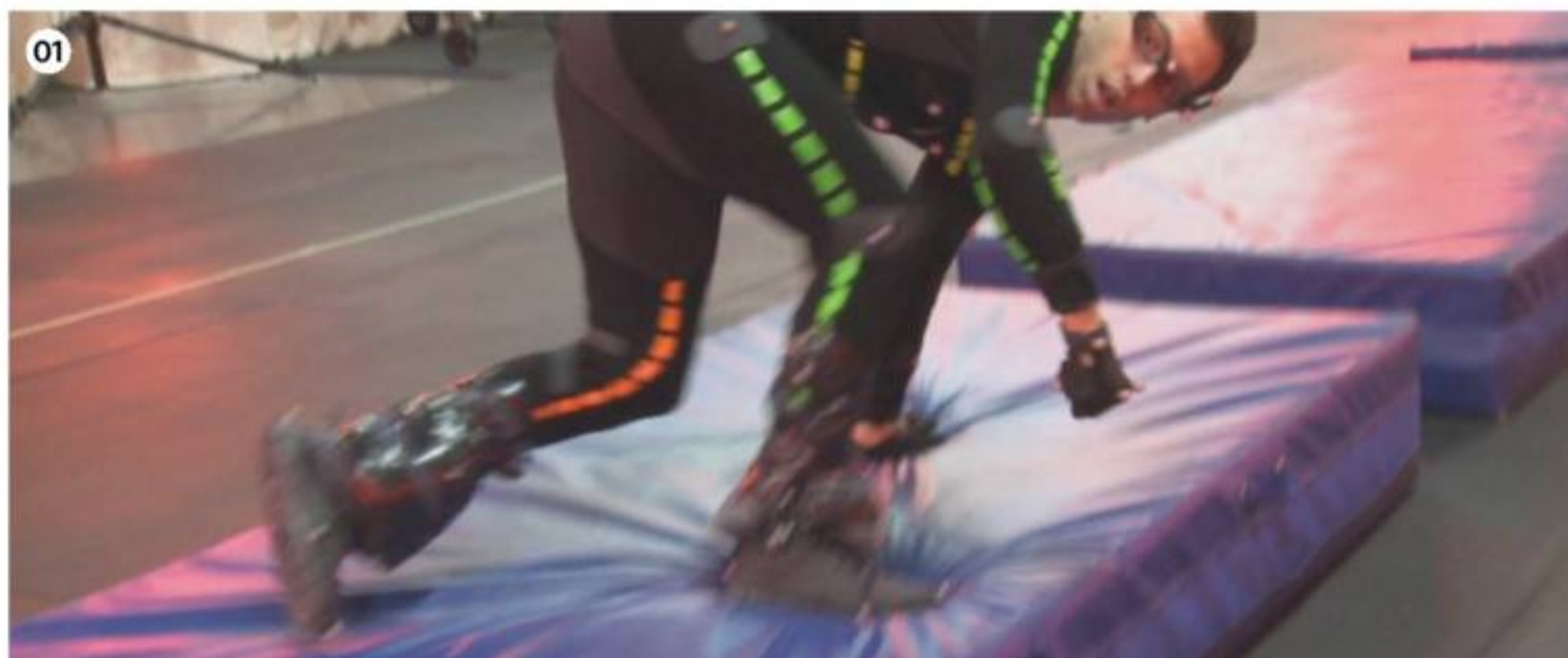




Direct your mocap

Great mocap starts with good acting, so get the most out of your actors

01 Inspire your actor's imagination Because the run cycle is perhaps the single most important animation in your game, ideally you should have several to choose from, covering a variety of attitudes, speeds and intensities. An essential tip here is not to ask an actor to simply run fast, but instead to give him or her visual direction in the form of: 'you are chasing after a stolen purse', or 'you are escaping a burning building' and so on. Employing visual references is more likely to provide a range of performances rather than simply adjusting the speed of the capture. You can even try tying weights to legs, if your actor is willing, or modifying the terrain for wildly varied motion styles.

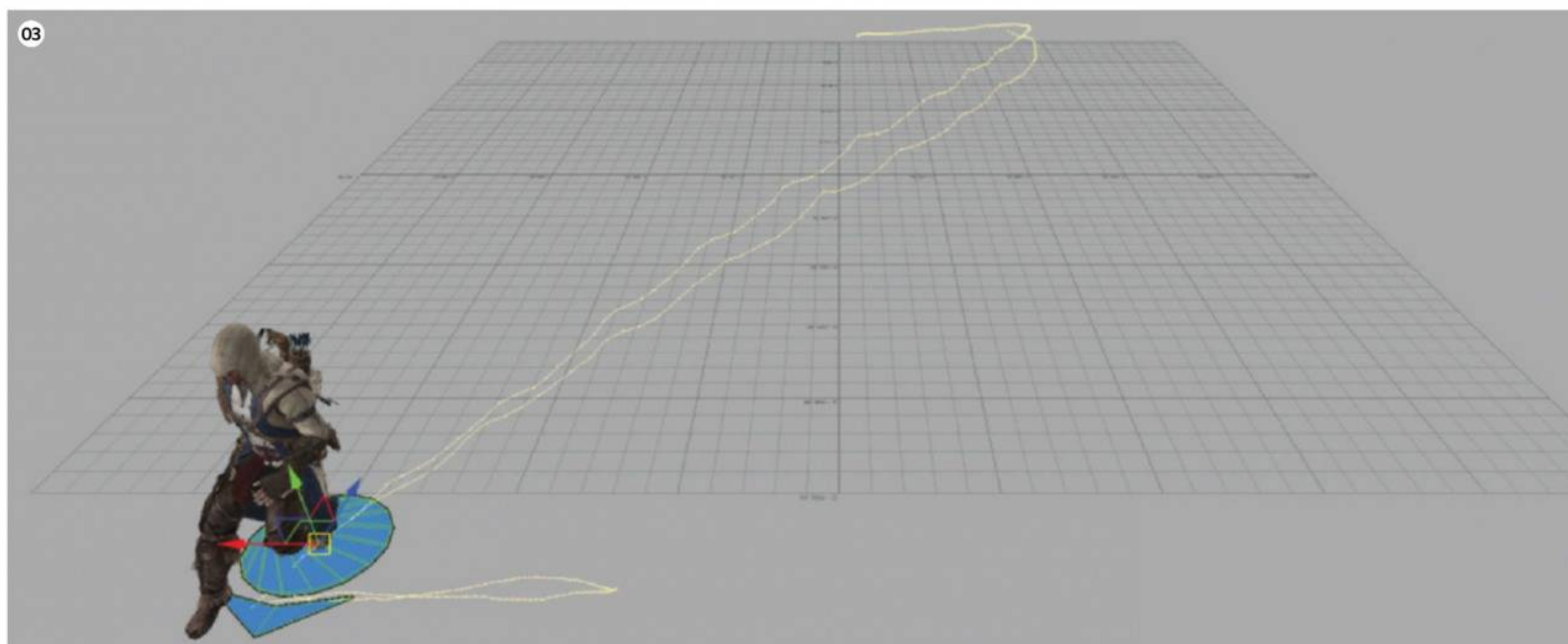


02 Be kind to the talent Don't leave high-energy actions like running to the end of the day's mocap recording, especially if your actor is more thespian than stuntman, or is not in the peak of physical condition. This will avoid fatigue creeping into your recordings. Additionally, starting with a quick burst of action is often a fun and energising way to start off a session. Remember, never criticise a performance, because actors are emotional beasts that require encouragement and inspiration to bring something amazing to their performances. The same can be said for animators in general.

Acting is for actors

Often an animator's first approach when directing actors is to show the action themselves, but this is severely limiting. We pay actors a lot of money to bring their talents to our session, so why not use them? Performances are much better when an actor feels as though they are more involved in the process. The direction you provide should be broad enough to enable them to come up with their own interpretation of what you originally wanted. Nine times out of ten you will find that this will be much better than what you originally envisioned.

03 Use all of the volume Unlike stationary actions, running requires you to maximise the use of the mocap volume – the space the cameras can record – as even large studios typically have only enough room for a dozen or so footsteps. Ensure your actors run diagonally across the volume for maximum recording distance, having them run out of the space before decelerating if possible. This minimises wastage of mocap data when on a budget and gives you as wide a range of footsteps to choose from as possible. However, it's easy to reposition and realign performances, as we shall see later.





Set up your scene

Before editing, it's important to ensure you have a cleanly set-up scene



04 Convert to the control rig Once your mocap is delivered, the real fun begins! Before we can edit anything in MotionBuilder, we must move the motion from the skeleton to the control rig. Do this by selecting Bake(plot)>Bake(plot) to Rig from the large blue character button. You may also want to deselect Constant Key Reducer in the Options box to retain maximum fidelity. Hit Ctrl+A to display the control rig in the viewport if it isn't visible already. Get into the habit of plotting between the rig and skeleton often, for an easy before/after comparison between changes.

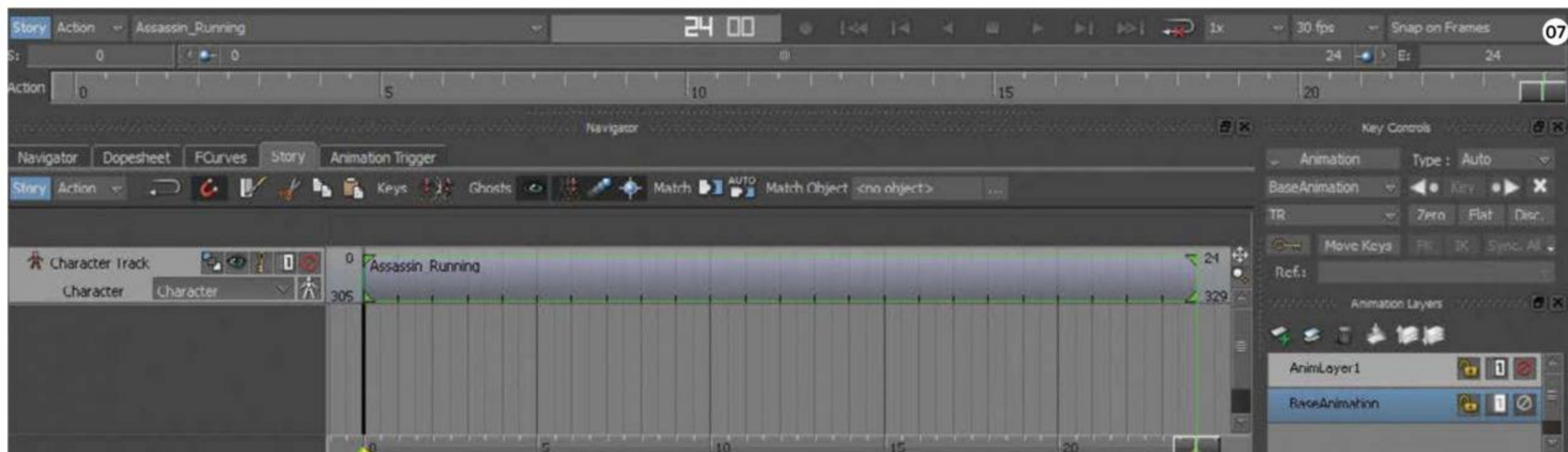


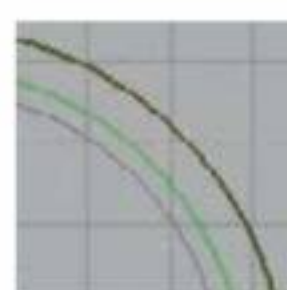
05 Enable the Story mode In order to broadly manipulate the motion, we'll use MotionBuilder's Story mode. While mostly used for editing cinematic cutscenes, Story mode is also a powerful blending tool. Open the Story tab in the Navigator and turn Story mode on if it isn't already. Right-click the space to the left of the timeline and choose Insert>Character Animation Track. Choose your character from the Character dropdown menu, then right-click in the empty timeline next to your newly created character track and select Insert Current Take.



06 Select a segment From the variety of examples, you're looking for one that best suits the personality of your character, keeping the rest as backups for other characters. You'll want to select a range of at least three steps that have a constant momentum. Ignore the acceleration and deceleration likely captured at the extents and avoid noticeable actions that would stand out in a repetitive loop. Using the Assassin_Run.FBX file we'll drag the edges of the clip to frames 305-329. You'll want to start and end cycles on a passing pose, with one leg up, to make similar poses most recognisable.

07 Scrub your animation Moving the clip back to zero, you can make scrubbing through keys more readable by zooming to the extents in the timeline. Do this by manually typing in the start/end times in the S: and E: boxes at either side of the timeline, as well as in the story by clicking on your clip and hitting F. Note that the Story timeline differs from the viewer's - the one that you're editing and one that you'll see when you press Play. You can jump back and forth one frame at a time by hitting Ctrl, then the left/right arrow keys.





Refine and repair

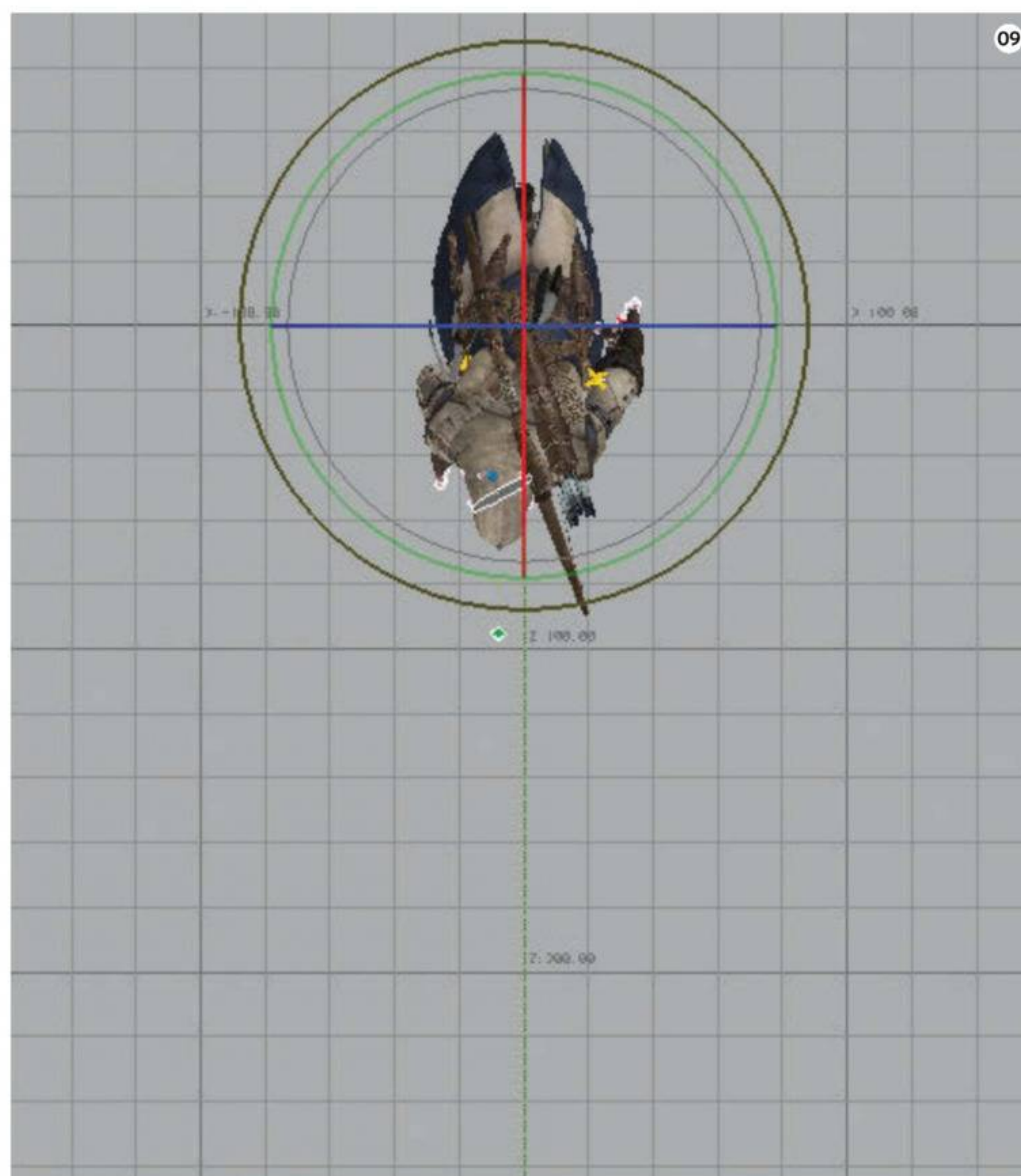
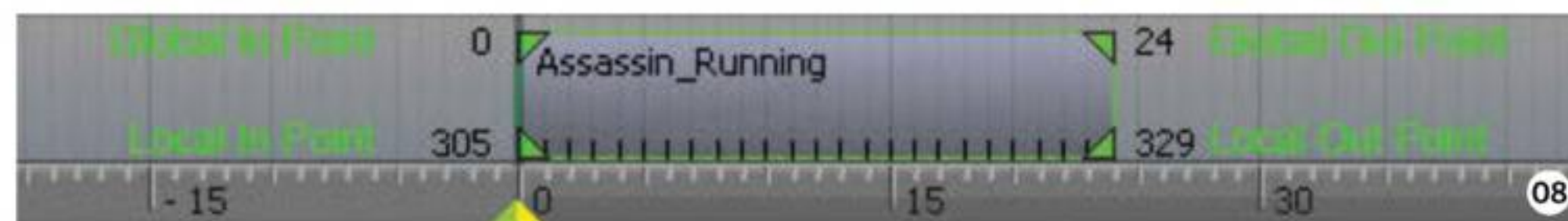
Clean up your clips and locate the ideal join

08 Clean up your scene With the clip at zero, notice that the numbers above and below it are out of sync. The top numbers are scene-based and the bottom are internal to the clip, which can cause issues on earlier versions of MotionBuilder when copying and pasting clips. Plot to the rig by right-clicking it and selecting Plot Whole Scene To Current Take. Right-click and delete your original Story clip and plot back from the rig to the Story tab once more. This resets the clip's local timeline and is a good habit to get into to better understand the real length of clips when you move them around. The Global In/Out indicator is the clip's position in the scene, whereas the Local In/Out setting is local to the clip.

09 Align to an axis Now that you have isolated what you want and because we captured the motion at an angle, we must align to an axis to make the looping workable. You can edit the position and rotation by clicking on the Show/Hide Ghost (eye) button in your character track. With the clip highlighted, you should now see a green line that represents your character's travelling motion. On the first frame of your range, select the Translation tool and enter '0.00' into the X,Y and Z fields. Now select Rotation tool and manually rotate the orientation to have the green line best match the Z axis. The Top view, via Ctrl+T, is the best angle to rotate to the axis. Hit Ctrl+E to return to the Perspective view.

Rapid iteration is key

Working in this manner to quickly create cycles enables us to see them where it counts – in the game engine. An animation is never done until it's fully playing and blending in real-time with all the other cycles and transitions. Only then can we tell whether the action is good enough and fits the character's personality. Videogame animators often have many animations being worked on at once and make adjustments before exporting, review while playing, then rinse and repeat in this manner until the game not only looks good but feels good with the controller in our hands.



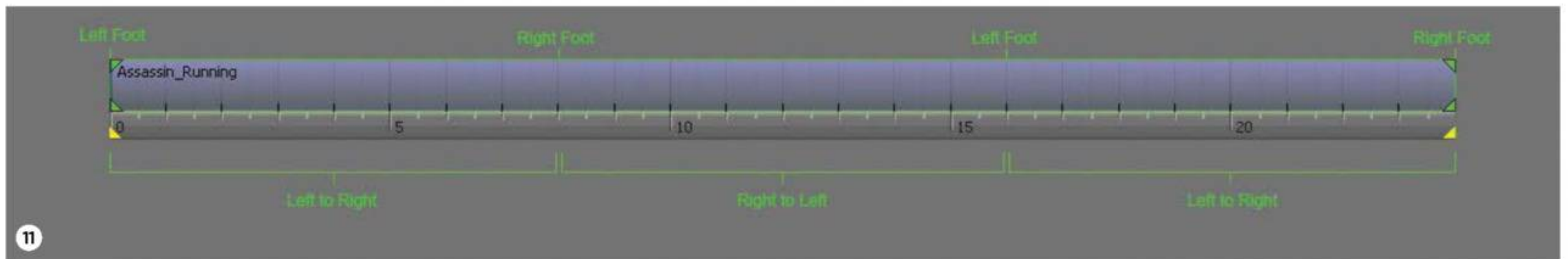
10 Find the best join

This is the key element of what we are trying to achieve, making the join seamless and unnoticeable. It's important to identify two complete footstep actions – not just single key poses – that are most similar. In our example we chose only three steps, so notice the first and third steps are the two similar actions. We will be using the latter two as the basis for our cycle. This means that frame 8 will then be our starting pose. Here we've identified the second passing pose as our best join frame.



Blend the motion

The crux of this process is choosing to match motions rather than poses



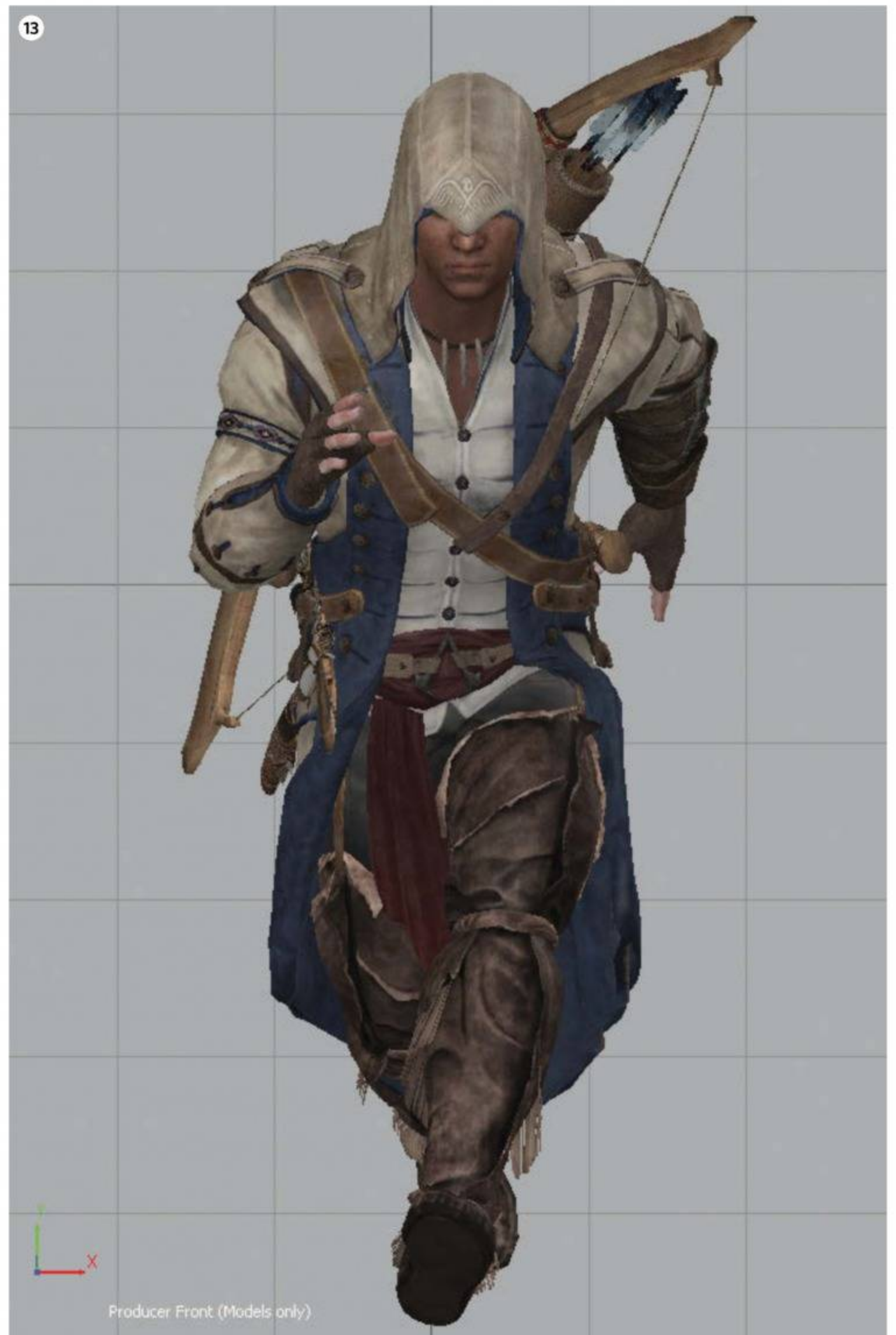
11 Loop the footstep Now we are going to blend back across one full step to ensure the looping motion is seamless, with the momentum of every body part retaining constant velocity throughout. We need to avoid the noticeable hitch that would occur if we simply pose-matched the first and last frames. What we're essentially doing here is, over the duration of the final footstep, blending back into the keys before the starting footstep, so we end our cycle at exactly the same pose as the start, with all the same momentum as the first frame. In our three steps, there are two similar left-to-right actions we can blend across.

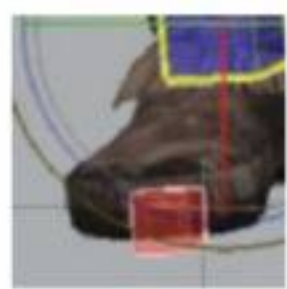
12 Blend the motion back onto itself With passing-pose 2 (frame 8) as our desired start frame, shrink the clip start to reflect this. Now right-click the clip, select Copy, move the timeline slider to exactly after the clip, right-click the track and select Paste. We now have two identical clips immediately following one another. Ignoring forward movement for a second, jump into the Front view via Ctrl+F. Select the second clip and drag its start half-way across the original. The X shape in the Story tab shows the original clip blending back across the keys prior to its first frame.

13 Adjust the blend duration Now set the timeline to be the length of the first clip only, (8-24). Ensure looping is enabled via the Loop button to the right of Play and hit Play. You now have a seamless loop. Play around with how long you blend back across the cycle to itself. Longer durations provide the most seamless results but will increase foot-sliding, whereas shorter durations are most stable but will increase the visibility of the join. Only use the Front view at this stage in order to see the seamless looping.

Cycling on the spot

Never remove the forward (Z axis) movement keys from your character's root/pelvis bone to see your character cycling on the spot, unless you want them to plane forward in an unnatural manner when you key them forward again. We don't move linearly in real life and instead push a little with each step in a rhythmic fashion. To see a stationary cycle, add a second layer and key the character backwards linearly, removing the layer again later if required for exporting into your game engine.





Close the loop

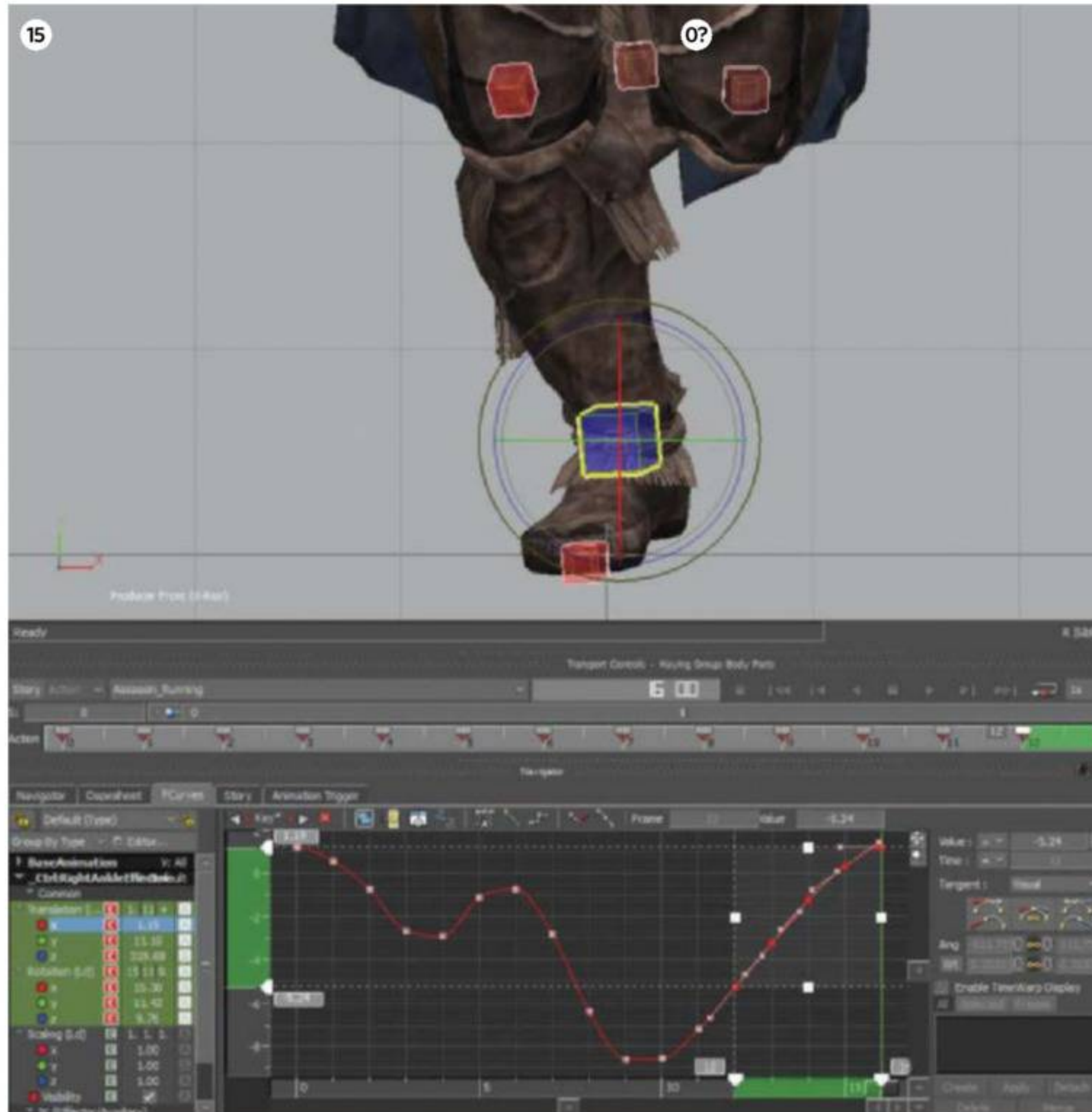
All that remains is to clean up the action to make it game-ready



14 Match the forward position Moving back to the Perspective view, we still have the issue of the clip returning to its starting forward position. Rectify this by selecting the Translation tool once more, entering the Side view via Ctrl+R and repositioning the second clip forwards or backwards until you reduce foot-sliding, which is bound to occur during the blend anyway. MotionBuilder has an Auto Match button in Story mode, but because we only want to match the forward position and not the up/down and left/right we can avoid it here. You can use the handy Ghost skeletons to line up your clips with minimal guesswork.



16 Improve the silhouette From this point onwards it's important to retain the cycling motion while editing. In *Assassin's Creed* everything we avoided in this tutorial, such as asymmetry, acceleration and deceleration, was re-created in the game engine to give personality and a sense of effort. How much work you have remaining depends on how close your original mocap was to the desired result, but now that we have a flawless cycle an animator is free to begin the real creative work of adding appeal and personality. Remember that while videogame animations need to look good from 360 degrees, runs are seen mostly from the rear.



15 Clean up the foot Plot from the Story to the rig and back while deleting old clips to produce one clean clip, which you should reposition back at the origin. Plot the Story edit onto the rig one last time and turn off Story mode. You'll likely have some lateral foot-sliding remaining that occurs across the blend, so eliminate this by modifying the offending keys, ensuring you don't change the initial or final pose. Cleaning up the minor foot-sliding is easy with MotionBuilder's FCurves. In the Front view, select the left foot controller and open the FCurves window in Navigator. Select the Translation X curve and modify the foot inwards before it lands.

Not just for running

This technique can be used for any cycling action you wish as long as you blend across two similarly large motions rather than two subtle ones. This masks the blend more effectively and reduces the foot-sliding and other cleanup work that follows. *Assassin's Creed* required many cycles to blend between in real-time – sometimes only for a few frames at a time. With this handy technique, your own projects can also have many quickly created cycles, but how creatively you use them is up to you!

17 Final adjustments Let's quickly raise the shoulders for a more heroic posture. Turn on AnimLayer1 and the AutoKey (key) buttons, as well as selecting Full Body in the Body Parts dropdown menu, all under the Key Controls tab. Next set Reach R to 100% for the head and shoulder controllers under the Character Controls in the upper right. This enables us to blanket keys across the entire animation unhindered. Finish off by pulling the shoulders up and back and tilting the head down slightly on your cycle's first frame for that classic *Assassin's Creed* look. Now we're ready for a first pass in the game engine – many more remain!

