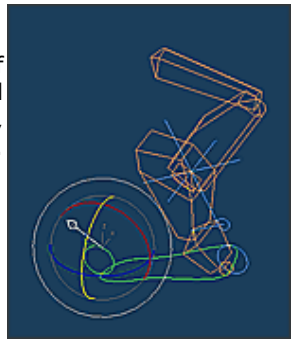
IK leg and foot setup with 3dsmax5.

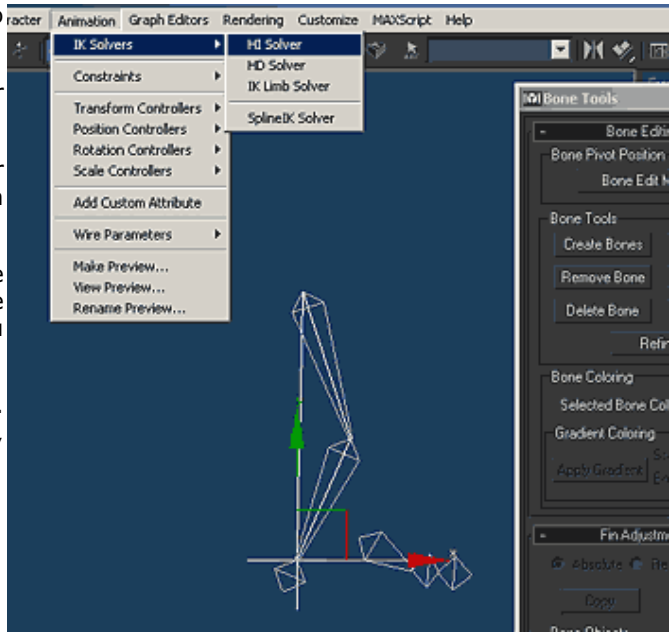


After many tests about easy and ergonomic controls for the foot, I've finally found IK-Joe, the setup of Danile Martinez Lara, wich was exactly what I was looking for. Then I've tried to redo it from start, and after some hair teared off, I've finally understood how it was done and I've decided to write this article, after contacting Daniel, to explain it. I invite you to immediately have a look at his site, www.pepeland.com.

1) IK chains.

Usualy, leg and foot are the same chain. Here we will begin by making two bone chains. One for the leg, the other for the foot.

In the left view, go create two bone chains, then attribute an HI Solver for the leg like this : (keep the final bones on each chain)



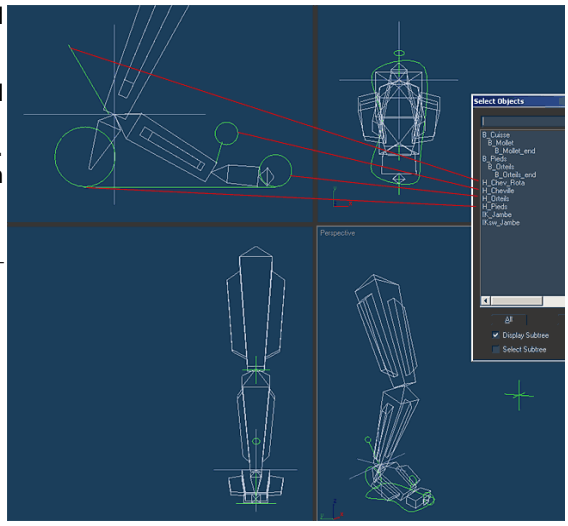
You can now give a more morphological look to your bones. Then align (x,y,z pivot/pivot) the foot chain with the IK Goal IK Chain01.

Now it's time to rename your bones. Name them like this : B_Leg_Upper, B_Shank, B_Shank_end for the leg, then B_Foot, B_Toe, B_Toe_end for the foot. You should add _R or _L for the side, but no matter here.

You will now put a point helper in front of the knee. This point will be the SwivelAngle of the leg IK Chain, so name it IKsw_Leg and attribute him as it.

2) Helpers.

We will now create the splines that will be used as helpers for moving the leg and foot. This should be why your are following this article hey !



In the left view, create three circles, at the end of the foot, at the heel level, and between the foot and the toes. In the top view, draw a footstep with a spline.
Select the heel circle, convert it to editable spline, and attach the footstep spline to. Finish helpers by creating a small circle in front view, on top of the heel. Keep in mind you can personnalize all of those ,-)

You will have then to place and name them as follow (click to enlarge the img) : (B_ stands for Bone, and H_ for helper ,-)).

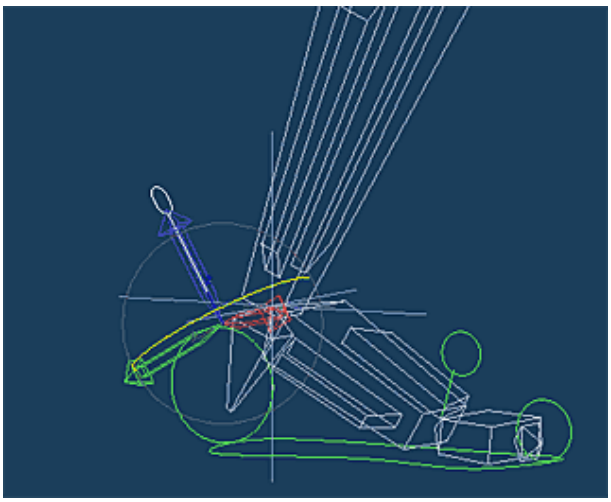
(see full image at the end)

3) Now the links !

Here comes the time to link all those stuff ! Time for rigour !

Link in order : (link the first to the second, the second to the third, etc...)

- IKsw_Leg --> H_Ankle_Rota --> H_Foot
- IK_Leg --> H_Ankle --> H_Toe --> H_Foot
- B_Foot --> B_Shank_end



Then select the B_Foot bone, go into Animation | Contraints | Orientation Contraint, and clic on the IK_Leg IKgoal to link their orientations. (If the foot got a 90° rotation, then check "keep initial offset")

Then adjust some setup into the link info panel :

Still with this B_Foot, uncheck the inherited rotate on x,y,z.
Lock the translations of H_Ankle and H_Ankle_Rota. Lock the rotations on x and y of H_Ankle_Rota. Be sure to have the pivot point of H_Ankle aligned to the pivot point of B_Toe.

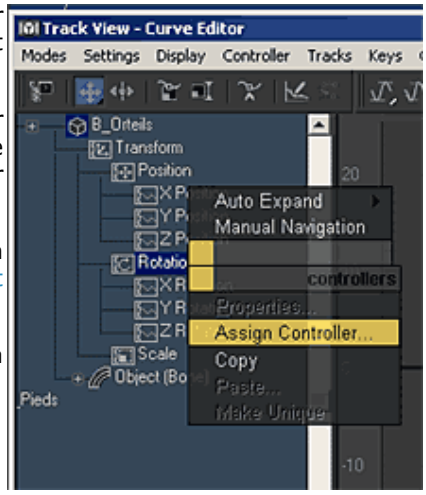
At this time, all controls should work nicely apart from H_Ankle.

4) Wiring.

Ok, go for the last step, the wiring ! Actually the H_Ankle Helper don't act like it should. It should rotate the foot from the toe, but the toe shouldn't rotate. We will use wiring to put the opposite rotation to the toe to make it not rotating. But the H_Toe helper must still rotate the foot, so we will put two rotation controllers on B_Toe.

You can change the controller into the curve editor, or into the Motion panel. Select B_Toe.

Start changing the actual controller for a rotation list one. It assign automatically a first Euler controller. Select the "available" parameter, right click, select assign controller, and finally select a second Euler controller.



Now go into Motion panel (or maybe stay there if you're already into). In the PRS Parameter rollout, select "rotation" . You now see your two Euler controller. Click on the second one (below), then click on "Set active". This means that this second Euler controller will be used for viewport manipulations.

Now, select the H_Ankle helper, righ click on, select "wire parameters" into the quad, then transform, rotation, Z-rotation. Click on B_Toe, then Transform, Rotation, Euler XYZ (the first one !), Z Rotation.

In the Parameters Wiring window, create a link from H_Ankle to B_Toe (unique direction), put a "-" ahead Z_Rotation into the expression, and click Connect.

Now, all should work fine ! You can easily move the foot from different way ,-) So , go animate !

Nicolas Genette,
25/08/2002,
From IK Joe setup,
by Daniel Martinez Lara (with authorisation)
www.pepeland.com