Instructions and Samples

Thank you for taking the time to read these instructions. It will save everyone involved a bunch of time and ensure that your shots look as good as they possibly can. Unfortunately, not just any old Maya move will open in Kuper. In order for your Maya moves to work in Kuper, we need a few things from you. The following pages will outline what we need and give you all the tools you need to create files that will work.

If you are importing a Kuper move into Maya Instructions start on page 13.

For Technodolly CG Resources, visit: http://pacificmotion.net/?p=2394

WHAT WE NEED:

- First, the move has to be created using our rig models and speeds, accelerations, and range of motion can't exceed the limitations of the real-world rig. Remember, in the real world, physics apply. We have to move a camera with weight, with a rig with limitations in acceleration, top speed, and range of motion.

  Choose the appropriate rig from the "Maya Resources" folder. There are models of the Impala, Gazelle, Graphlite, and Zebra. Each rig can be configured with either a pan/tilt, or a pan/tilt/roll head. For the Gazelle and Zebra, there are two different rig models (with either type of head). The Impala and Graphlite models can be configured in Maya to have either type of head. Choose the proper rig based on your equipment quote. If the rig that was bid for the job will is not appropriate for your move, please call Pacific Motion immediately. We need to ensure that the proper rig is available for your shoot dates.

  Some of the rigs can be configured with risers and arm extensions, and all allow for track length to be configured. Please call Pacific Motion before adding risers or arm extensions, as we will need to ensure that the additional equipment is available for your shoot. Also, risers and arm extensions can make the rig slightly less stable and should only be used when necessary.

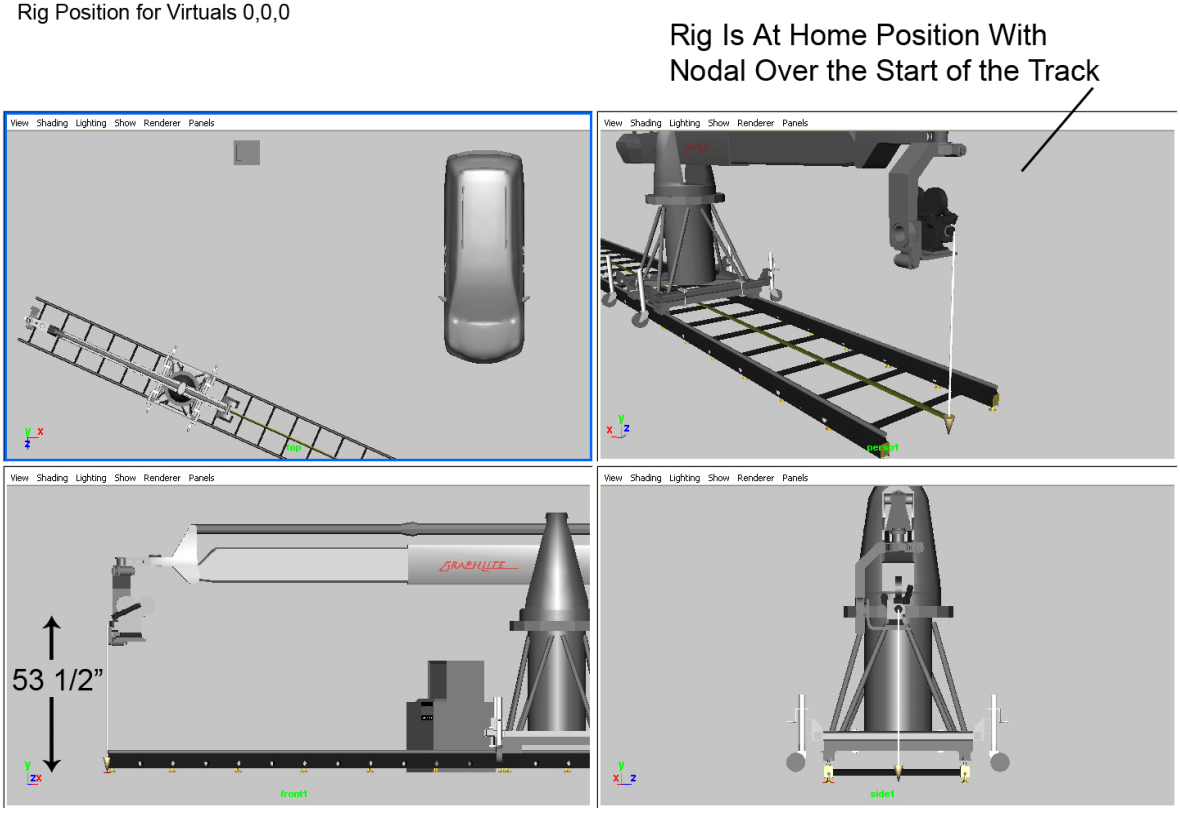
  The standard package for each rig includes 36' of track (allowing for around 28' of track motion). Please notify Pacific Motion as soon as possible when creating moves with more than 36' of track, as we have to verify availability. Longer track lengths will add additional rental costs and will increase setup and wrap times. Longer track lengths may require additional manpower, which will increase labor costs.

- Next, your Maya scene must be created with the proper settings (measurement units, orders of rotation, etc.). See instructions below.

- Rig zero has to be established. We need an overhead view of the rig in the Maya scene, with measurements for track placement. Rig zero should represent the rig with the arm in the center of the track, arm level, and the head level and looking straight ahead. This allows us to place our rig on set in the same place and configuration in the real world. This position needs to be established prior to creating your camera move, in order to ensure that the rig can actually perform the move. Send

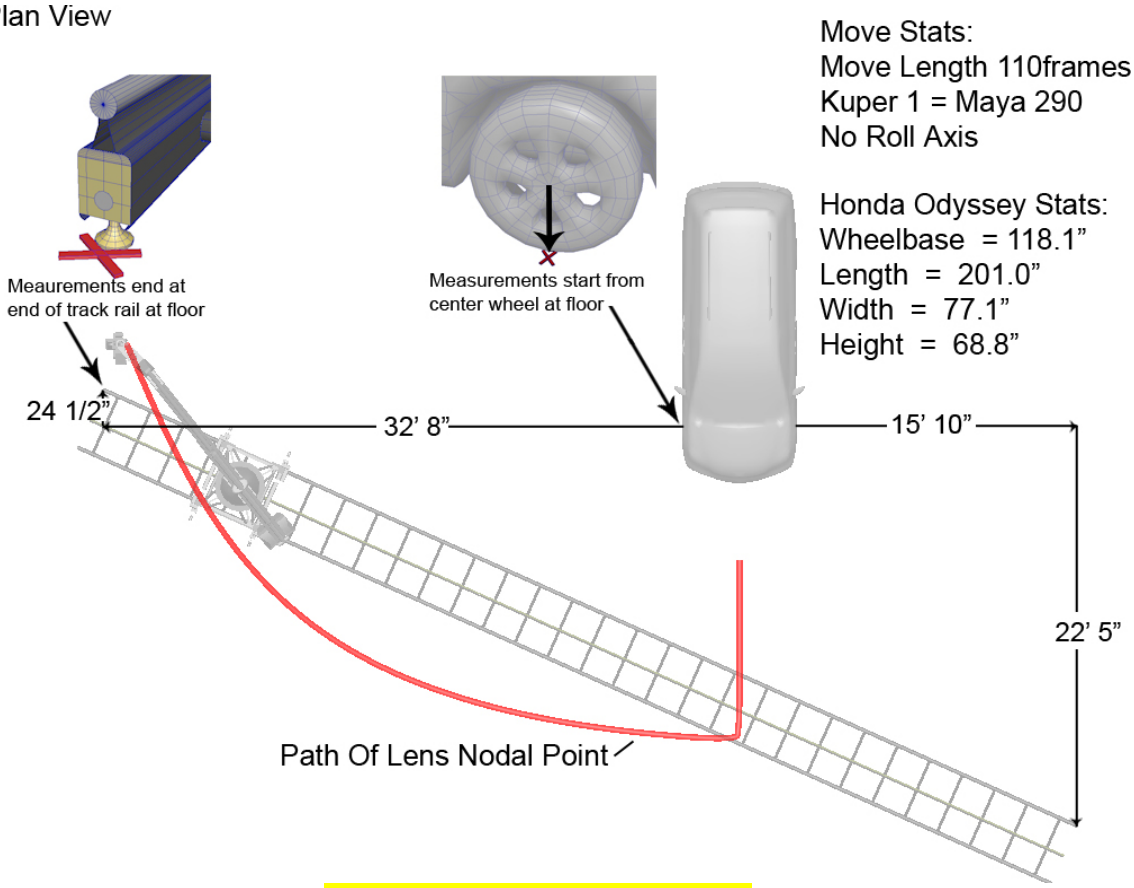
screenshots of all rig zero, track layout, and the move path. See the full-size sample images in the folder labeled “Pictures”.

Rig Position for Virtuals 0,0,0



Pictures/Honda Rig Zero.jpg

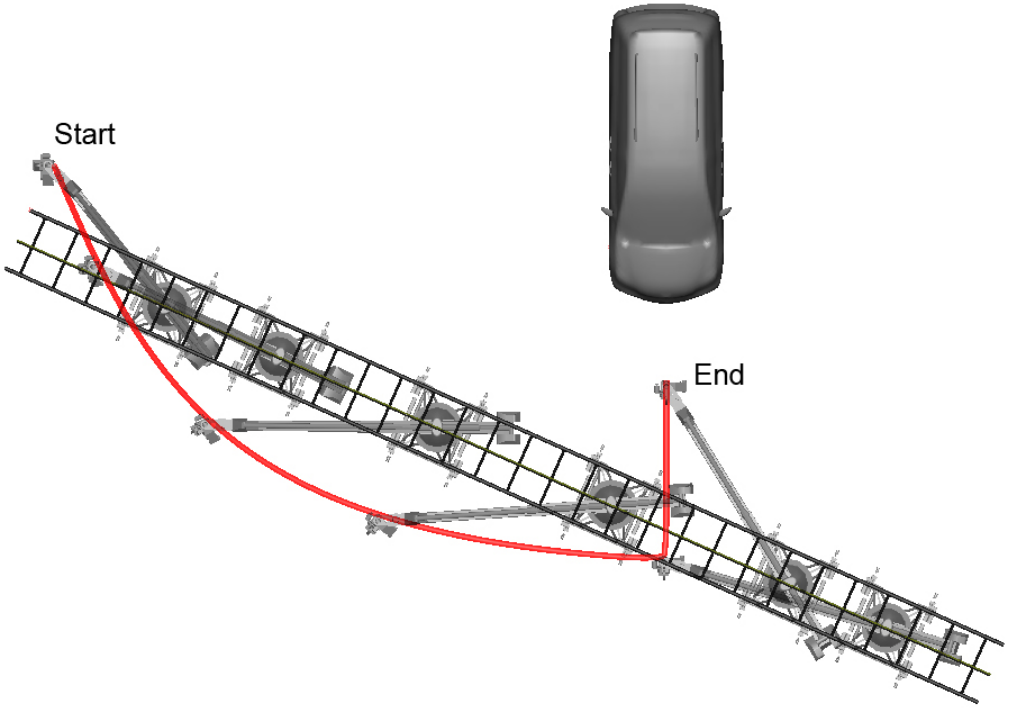
Plan View



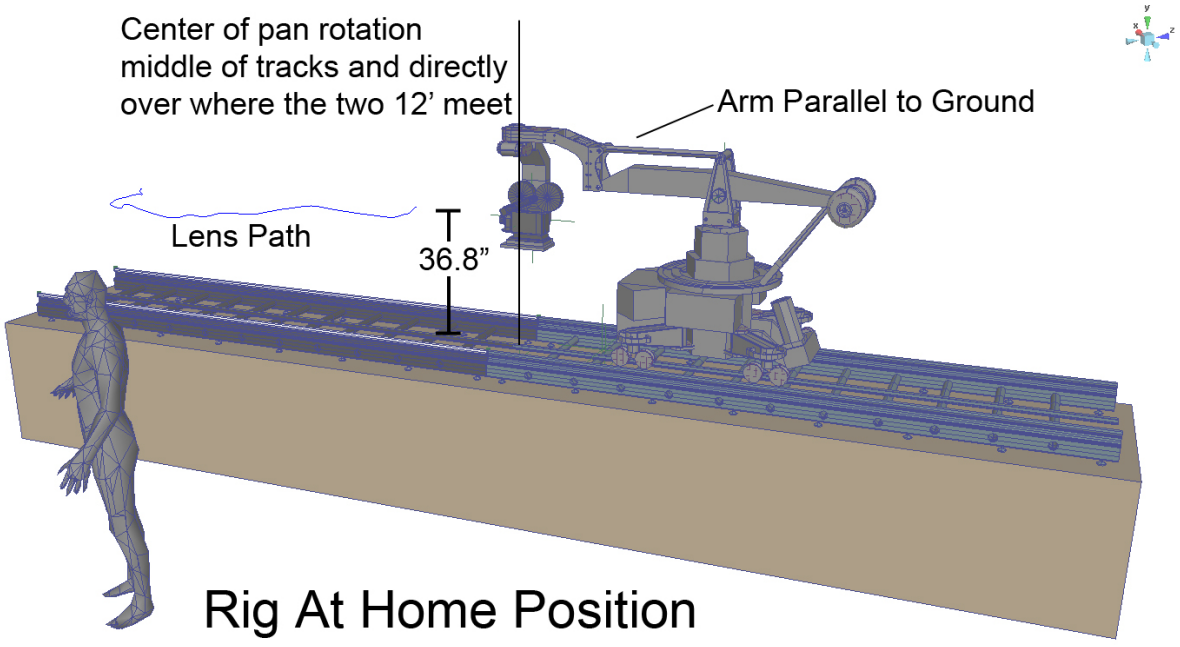
Pictures/Honda Track Layout.jpg

Nylon: Honda Odyssey Graphlite Camera Move

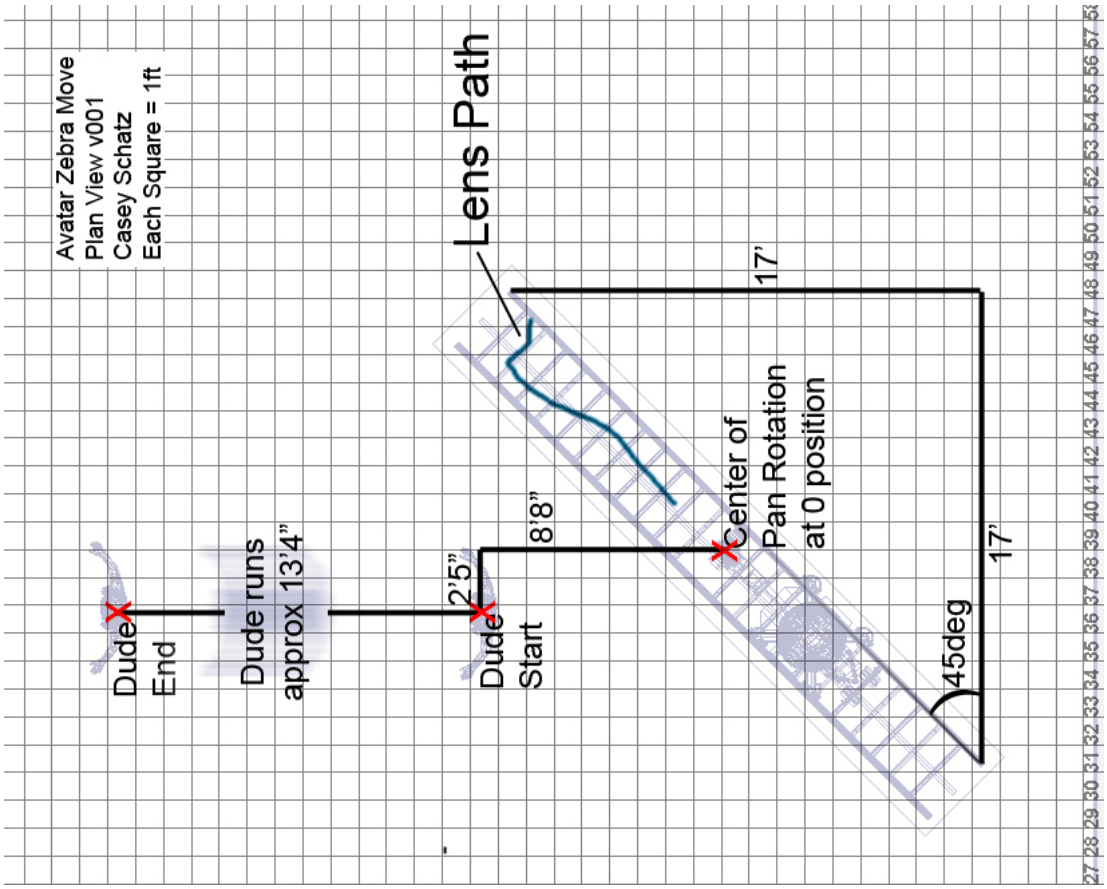
Muybridge View



Pictures/Honda Move.jpg



Pictures/McDonalds Rig Zero.

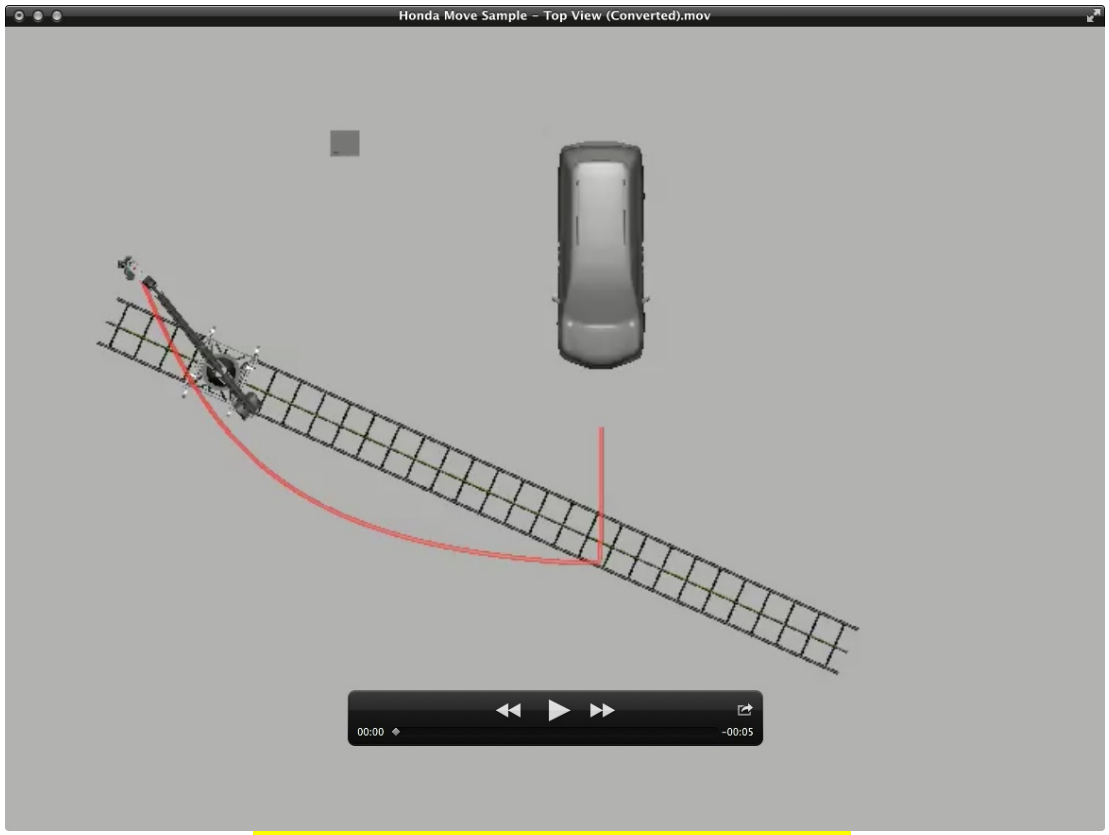


Pictures/McDonalds Track Layout.jpg

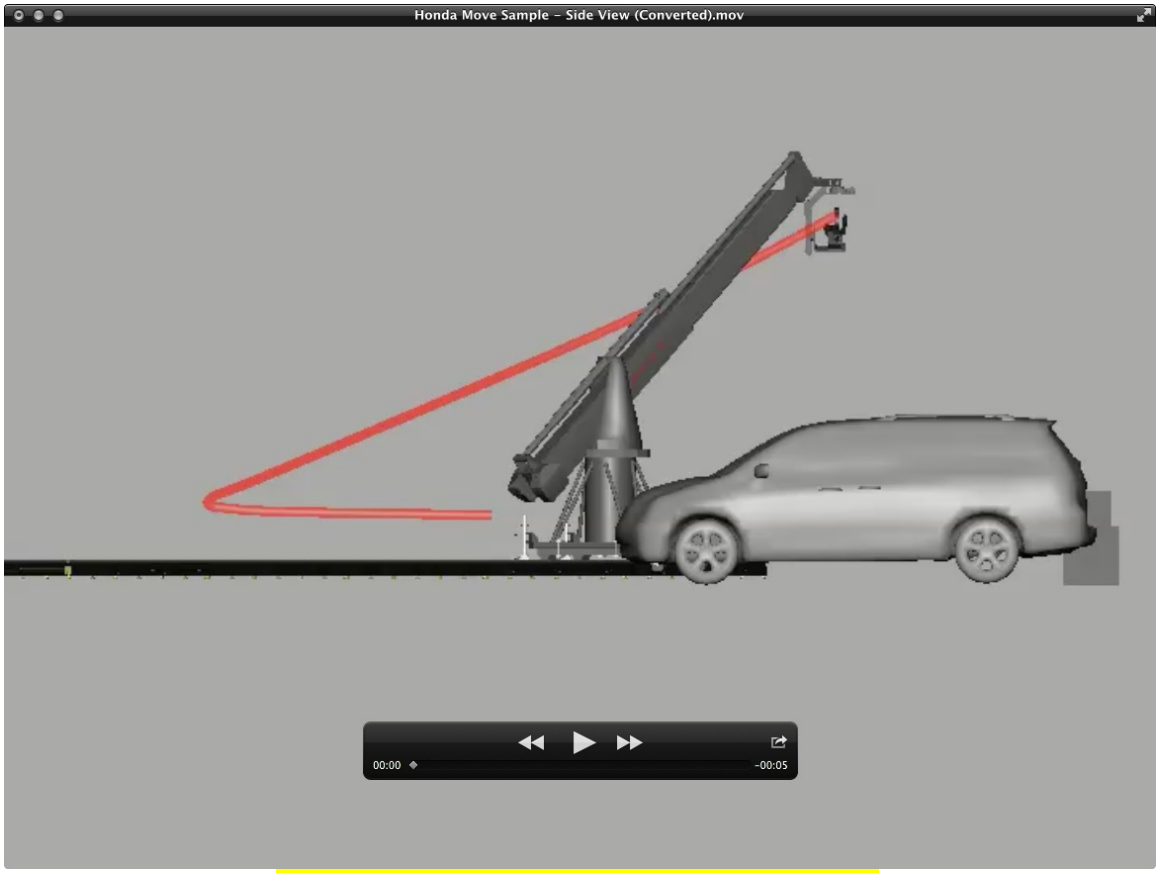
- The camera has to be attached to the rig in Maya. If the rig isn't moving when the camera is moving, you have missed this step.

- We need a properly formatted ASCII data file. After you have created your move, it needs to be exported as an ASCII data file for import into Kuper ("ASCII Text/Super Duper Kuper Move.asc" is a sample. It is located in the "ASCII Text" folder). Once a text file has been saved, you need to open it in a text editor (TextEdit or Notepad), append a properly formatted header that includes the axis names and order ("ASCII Text/ASCII Header.txt" file is in the file labeled "ASCII Text" in download package).

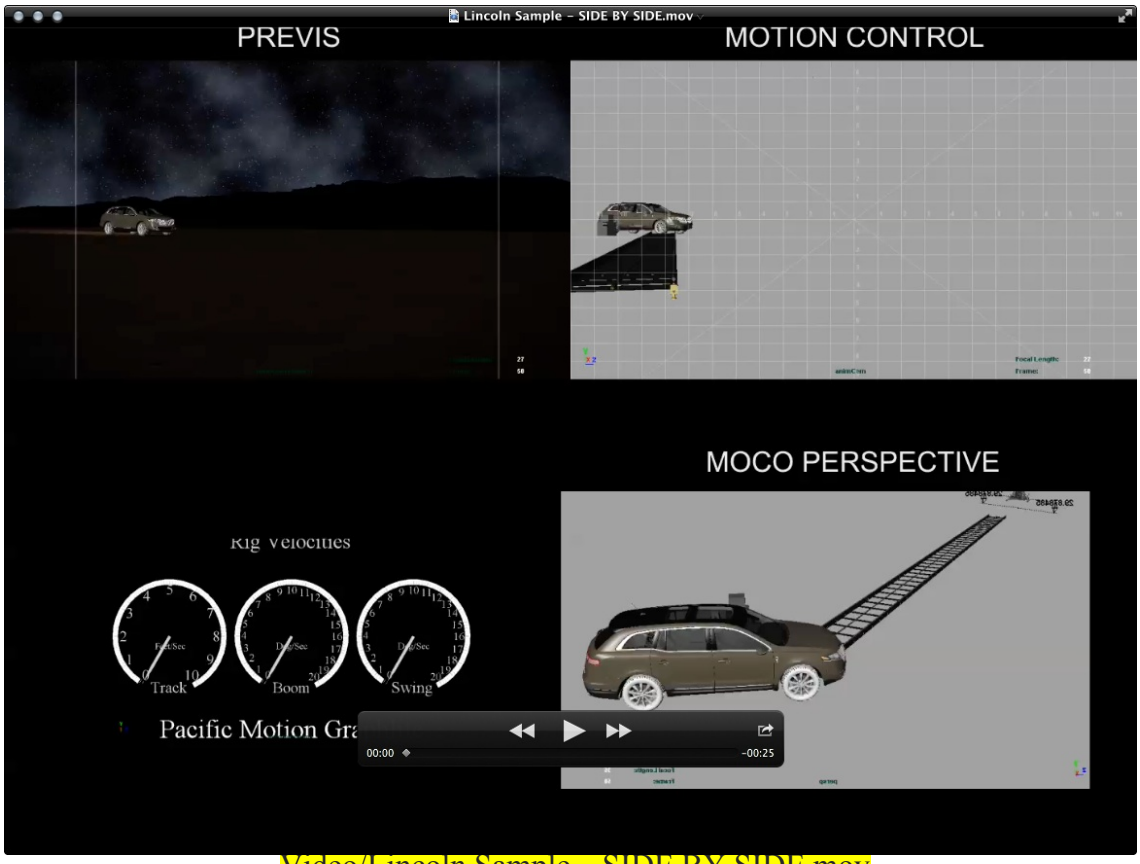
- Finally, we need sample videos showing the move. We need some way of verifying that the rig is actually doing what you want it to do. An overhead view, side view, motion control camera view,and side by side view (showing speedometers, camera view, and overhead or other angles) are really helpful. Take a minute to view the sample videos in the folder labeled "Videos".



Videos/Honda Move Sample – Top View.mov



Videos/Honda Move Sample – Side View.mov



Video/Lincoln Sample – SIDE BY SIDE.mov

NOTES:

First of all, a couple of details about the difference between the Kuper and Maya coordinate systems.

- Kuper Axes and directions, with all rotations at Zero.
    - VTrack (Z axis) – looking straight through the lens, parallel to the track
    - VEW (Y axis) – Horizontally to the camera
    - VNS (X axis) – Vertically to the camera
    - VPAN (Y Rotation)
    - VTILT (X Rotation)
    - VROLL (Z Rotation)
- Kuper Axes names are grounded in more traditional camera animation. The axes names are different than in typical 3D animation. Here is a correlation:

Kuper Axis Name	Maya Axis Name	Positive Direction (at 0 Rotation)
VTRACK	Z-Translation	Behind the camera
VEW	X-Translation	To the right of the camera
VNS	Y-Translation	Above the camera
VPAN	Y-Rotation	Camera rotating to the Right
VTILT	X-Rotation	Camera rotation Up
VROLL	Z-Rotation	Camera Rotating Counter Clockwise

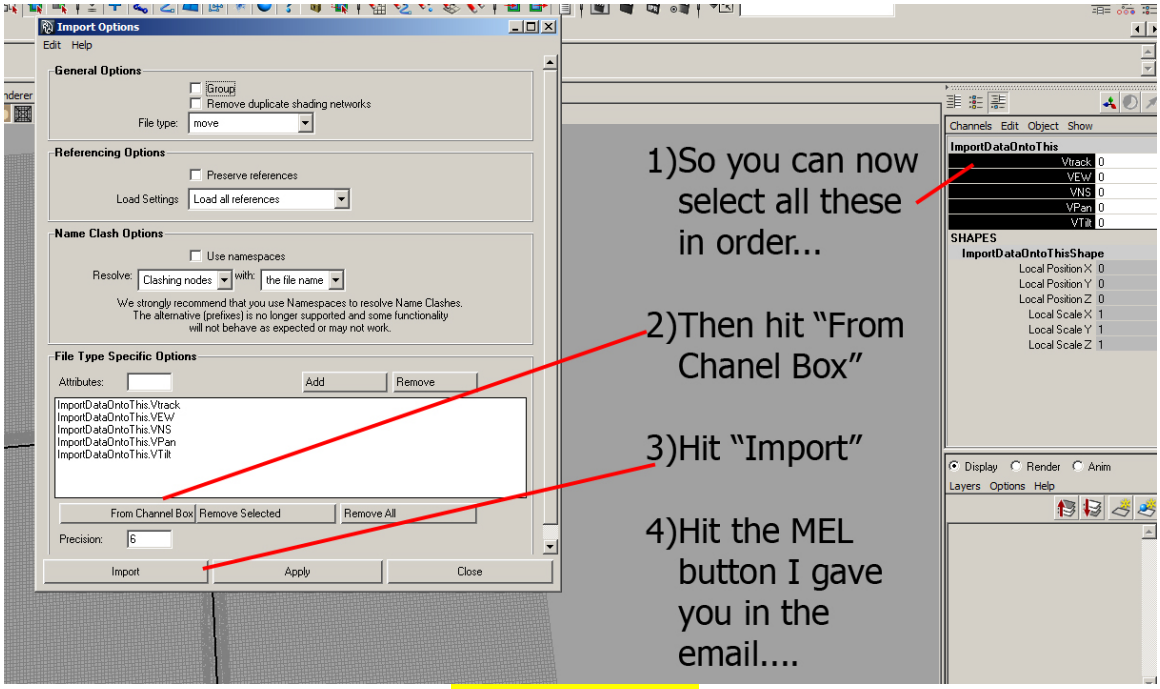
    - PLEASE NOTE: Maya's axis rotation is according to "right hand rule of rotations". Kuper's VPAN, or Y-Rotation is opposite this. So if the Kuper operator hasn't corrected for this before exporting the text file, it will be necessary to Scale the Maya Camera's Y-Rotation by -1.

- Kuper's Origin (X=0, Y=0, Z=0) is a point in space that is dictated by the mechanical camera device Kuper is controlling, usually some kind of crane system. Kuper's math requires that the mechanical system be "Zeroed", or "Homed" in a particular way to ensure proper mathematical corrections of the actual motor positions. The Home position is with the crane arm parallel to the track, with the camera level and pointing straight down the track. This means that the VNS / Y-Translation Home position will usually be somewhat off the physical ground plane. To place the Y data's origin on the ground plane, the data must be offset. The amount of offset differs from rig to rig, depending on the particular mechanical configuration used.

INSTRUCTIONS:

1) Import the KuperImportNode.ma (in the Maya Resources Folder) into your scene....
2) Confirm your scene is in inches and at 24fps
3) File -> Import, then follow the instructions on the jpg image
4) then make a mel button from the following code (Maya Resources/MEL.txt). This will patch the channels correctly to AnimateMe.....

```
//********Begin code:*********
//Mirror the pan keys scaleKey -scaleSpecifiedKeys 1 -timeScale 1 -
timePivot 0 -floatScale 1 -floatPivot 0 -valueScale -1 -valuePivot 0
ImportDataOntoThis.VPan;
//Properly patch the channels onto AnimateMe connectAttr -f
ImportDataOntoThis.Vtrack AnimateMe.translateZ; connectAttr -f
ImportDataOntoThis.VEW AnimateMe.translateX; connectAttr -f
ImportDataOntoThis.VNS AnimateMe.translateY; connectAttr -f
ImportDataOntoThis.VPan AnimateMe.rotateY; connectAttr -f
ImportDataOntoThis.VTilt AnimateMe.rotateX;
//********End code:*********
```



Pictures/Import.jpg

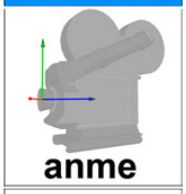
Pacific Motion Maya Simulation Version 2.0

Thank you for using the Pacific Motion Maya Rig. The purpose of these are to help the customer with creative and efficient planning of a motion control shoot. Enjoy and feel free to contact Craig of myself with any questions.

allthrottle@sbcglobal.net caseyschatz@hotmail.com

Maya Shelf:

Home
Sends lens back to home position.

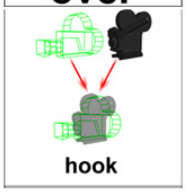


Animate Me
This is the node that you will either animate or hook to your own camera.

Move Rig
Orients the rig in world space. After hooking, this orients the rig while maintaining the lens position.

Underslung
Puts the head in underslung mode (default). This is the preferred mode of operation.

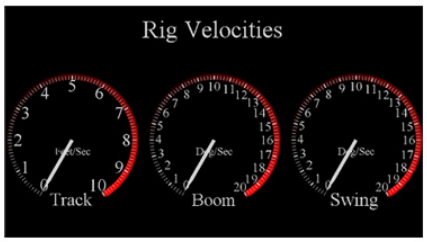
Overslung
Puts the head in the overslung position. This helps you reach a higher maximum height, but has stability drawbacks. Consult Craig if you are using this option.



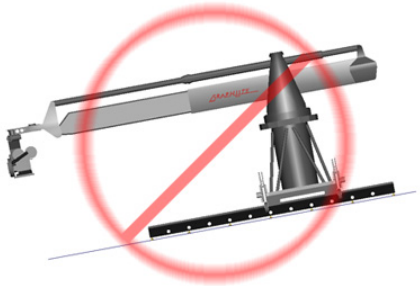
Hook
Select your camera, shift select "Animate Me" and hit this button. Hooks the motion control rig to your Maya camera.

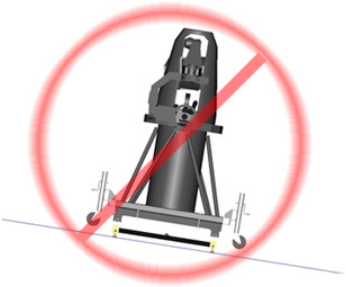
Special Notes:

Maya units should be in inches.



Use the Speedometers to verify you are within the speed limits of the rig.
(found under Panels>Orthographic)





The Move Rig node should almost never be rotated on X or Z axis. Consult with Craig if you are doing this.

Pictures/Maya Notes.jpg

KUPER MOTION CONTROL AXES DIRECTIONS

You are a cameraman standing behind the camera with your eye looking through the lens...

VTrack (+) Track BACK, Pull Away From Subject
VTrack (-) Track FORWARD, Push In Toward Subject
- Zero position is arbitrary or set at start of shot -
("VTrack" is usually equivalent to the **Z**-axis, and is calibrated in decimal inches.)

VEW (+) Swing the crane, arm or move RIGHT
VEW (-) Swing the crane, arm or move LEFT
(Perpendicular to the track)
- Zero position is parallel to track or dolly chassis -
("VEW" is usually equivalent to the **X**-axis, and is calibrated in decimal inches.)

VNS (+) Boom, Lift or Move UP
VNS (-) Boom, Lift or Move DOWN
(Perpendicular to the ground plane)
- Zero position for boom arm is level, otherwise arbitrary or ground level -
("VNS" is usually equivalent to the **Y**-axis, and is calibrated in decimal inches.)

VPan (+) Pan the camera RIGHT
VPan (-) Pan the camera LEFT
- Zero position is parallel to boom arm or track, otherwise arbitrary or perpendicular to dolly track or set wall, etc. -
("VPan" is usually equivalent to the **rot-Y** axis, and is calibrated in degrees.)

VTilt (+) Tilt the camera UP
VTilt (-) Tilt the camera DOWN
- Zero position is level -
("VTilt" is usually equivalent to the **rot-X** axis, and is calibrated in degrees.)

VRoll (+) Roll the camera COUNTERCLOCK or LEFT
Top of image slants to the RIGHT
VRoll (-) Roll the camera CLOCKWISE or RIGHT
Top of image slants to the LEFT
- Zero position is level -
("VRoll" is usually equivalent to the **rot-Z** axis, and is calibrated in degrees.)

From Mike Leben

Pictures/Kuper Axes Directions.pdf

Exporting Maya Moves to Kuper ASCII Data Files

1. Open Maya Scene (.MA file) in Maya

2. In the main view window select “Panels” and click “Perspective” to select the actual camera view. The name will vary. If the motion control camera is not available in “Perspective”, open the “Outliner” window by clicking “Window” and “Outliner” . Select the Motion Control Camera.

3. In the main view window, click “View” and “Select Camera” to select the camera.

4. Verify that you have selected the correct camera by playing and then stopping the animation, while watching the numbers in the “Channel Box” to verify that the numbers are changing as the camera moves.

5. CHANGE UNITS TO INCHES AND DEGREES –

- Open the “Preferences” window (in the lower right hand corner of the screen) - Select “Settings”
- Under “Working Units” change “Linear” to “Inches” and change “Angular” to “Degrees”.
- Click “Save”.

6. In the “Channel Box” highlight all the axes for the camera – (Translate X, Translate Y, Translate Z, Rotate X, Rotate Y, Rotate Z).

7. Click “File”, “Export Selected”.

8. Name the file and select the destination. 9. Select “Move” or “.mov” as the file type.

10. In “File Type Specific Options” click the “From Channel Box” button to import all of the selected camera channels – If there are already channels in there, remove them first, then add the channels “From Channel Box”.

11. Highlight all of the channels and export the file.

12. Open the .mov file in a text editor and add the Kuper header (“ASCII Text/ASCII Header.txt”)

Maya Axes relate to Kuper Axes as follows:

- Translate X – VEW
- Translate Y – VNS
- Translate Z – Vtrack
- Rotate X – Vtilt
- Rotate Y – Vpan
- Rotate Z – Vroll

Importing a Kuper Text file into a Maya Camera

By Don Canfield, 7/6/11

Importing Kuper move data into Maya is really pretty simple. In fact, I am using almost everything I know about Maya to write this. I really don't know much about Maya at all – I'm just starting to learn it. All references to instructions in Maya are based on my experience with Maya 2010.

First of all, a couple of details about the difference between the Kuper and Maya coordinate systems.

- Kuper Axes and directions, with all rotations at Zero.
  VTrack (Z axis) – looking straight through the lens, parallel to the track
  VEW (Y axis) – Horizontally to the camera
  VNS (X axis) – Vertically to the camera
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- Kuper Axes names are grounded in more traditional camera animation. The axes names are different than in typical 3D animation. Here is a correlation:

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VTILT	X-Rotation	Camera rotation Up
VROLL	Z-Rotation	Camera Rotating Counter Clockwise

  PLEASE NOTE: Maya's axis rotation is according to "right hand rule of rotations". Kuper's VPAN, or Y-Rotation is opposite this. So if the Kuper operator hasn't corrected for this before exporting the text file, it will be necessary to Scale the Maya Camera's Y-Rotation by -1.
- Kuper's Origin (X=0, Y=0, Z=0) is a point in space that is dictated by the mechanical camera device Kuper is controlling, usually some kind of crane system. Kuper's math requires that the mechanical system be "Zeroed", or "Homed" in a particular way to ensure proper mathematical corrections of the actual motor positions. The Home position is with the crane arm parallel to the track, with the camera level and pointing straight down the track. This means that the VNS / Y-Translation Home position will usually be somewhat off the physical ground plane. To place the Y data's origin on the ground plane, the data must be offset. The amount of offset differs from rig to rig, depending on the particular mechanical configuration used.
- Kuper may be set up to output in any linear units the operators choose. Rotations are always in degrees. Be sure you have the linear units on Maya set to match the Kuper ASCII.

Kuper Data Files

Kuper ASCII text files are very simple. They consist of a header with columns of numbers – each column is an axis, each row is a frame. The overall format is "space delimited ASCII" or "Tab Delimited ASCII". In fact, the overall format of the numbers is exactly the same as a Maya .MOV file (a Maya MOVE file – a text file, not to be confused with a Quicktime movie file).

The columns each correspond to an axis listed in the header, and each row is a frame. If it's necessary to edit the text file, Kuper text files may be imported into a spreadsheet, manipulated, and then exported from the spreadsheet as a Space or Tab delimited text file.

Kuper puts a header on the text file which is always in a form like this:

Axes = Axis1, Axis2, Axis3

where the list of axes is in the same order as the columns of axis data. An actual Kuper Text file of a move built in Virtual Axes would probably have a header like this:

Axes = VTRACK, VEW, VNS, VPAN, VTILT, VROLL

There may be more axes like focus or zoom or model movers. It's important to keep a record of this list so you know the order of the axes, because Maya requires you to specify the import order in the Import Options Dialog.

Importing to Maya

You will get a file from Kuper that is named something like KUPER.TXT, or KUPER.ASC (the operator has control of this name and extension). If you open it with a text editor, you will see the header and the columns of numbers. The first things you need to do to use it with Maya is to strip the Kuper axes header out and then rename it as a Maya move file. I usually do this by opening it in a text editor (DOS EDIT or Windows NOTEPAD work well. Mac TEXTEDIT adds formatting junk to the file), and deleting the first line. Then I "Save As…" the new file name – something like KUPER.MOV.

In Maya, select the camera to which you wish to import the Kuper move data. For the purposes of this explanation, I've created a camera in Maya from the CREATE menu, by clicking Create>Cameras>Camera. This resulted in a Camera named camera1 appearing on my screen.

To import the Kuper move file we've created, select the camera (in my case I clicked on the camera in the screen, and the channel list shows "camera1" and all its axes. (The order of the axes in the list is, I believe, "hard wired" into Maya, so you cannot change it. We will be loading the Kuper data into the Translate and Rotate axes. The Scale and Visibility don't matter to us for importing… at least to my knowledge.)

Open the Import Options screen by clicking on the File menu. Find the "Import…" option and click on the box at the end of its row. In the "General Options" section, select "move" as the File Type. In the "File Type Specific Options" section, select the axes listed in the box, then click "Remove Selected" (middle button at the bottom of the box) to clear the axes, or just click "Remove All". This is done so you may "Add" the axes back in the correct order. Now look at the header of the Kuper file to determine the import order of the axis data. If the Kuper header is "Axes = VTRACK, VEW, VNS, VPAN, VTILT" then you will add Maya camera axes to the File Type Specific Options

list box in that order. You can add them one at a time, or in groups, or by adding some and deleting others, just as long as the final list is in the correct order. You do this by selecting the axes in the "camera1" channel box in the correct order then clicking the "From Channel Box" button at the bottom of the box. For the above mentioned "Axes = …." list, you should end up with a list like this:

Camera1.tz
Camera1.tx
Camera1.ty
Camera1.ry
Camera1.rx

Now click Apply at the bottom of the import Options Box. A file selection window opens, and you select the Kuper .mov file you created that has the header removed from it and click "Import". You should then be able to run the move on camera1.

If you need to reverse the pan because it wasn't done before import, you can do it like this (there must be other ways, but I don't know Maya very well, so bear with me). Select the camera1. In the Channel Box, select Rotate Y. Click EDIT in the Channel Box menu bar. Click Graph Editor in the menu list. In the Graph Editor, select "camera1_rotateY" in the list at the left. Click EDIT in the Graph Editor menu. Find Scale, and click on the box to the right of the word Scale. This opens the Scale Keys Options window. I use these settings to reverse the action of the pan…

Time Range: All (default, I think)
Method: Scale / Pivot
Only Scale…: Checked (I don't know what this does. Default, I think)
Time Scale: 1.000 1.000 (default, I think)
Value Scale: -1.000 1.000 (this is the one that makes it happen)

Click Apply and you will see the curve flip, and when you run the move the motion will be reversed.

Anything else you want to do, like offset, camera lens stuff or fitting this camera move into your scene, you're on your own. This exhausts my current knowledge of Maya!!!

Good luck.