USING PRESENTER 3D TO CREATE A FLOCK OF BIRDS

CREATED BY PERRY B. MARKS

Inspired by computer animated effects in Motion Pictures, I often found myself asking the question "How could I do that?" Recently after seeing *Fly Away Home,* I set out to model and animate a flock of geese with the goal of simulating their organic shape and natural fluid movement.

STEP 1 - Create the Goose Model - With a bird reference book as a guide to anatomy and the mechanics of bird flight, I used VIDI's powerful spline-based modeling capability to create the master goose model. The organic shape created in Presenter 3D's well-known four window interface is shown in Fig. 1.
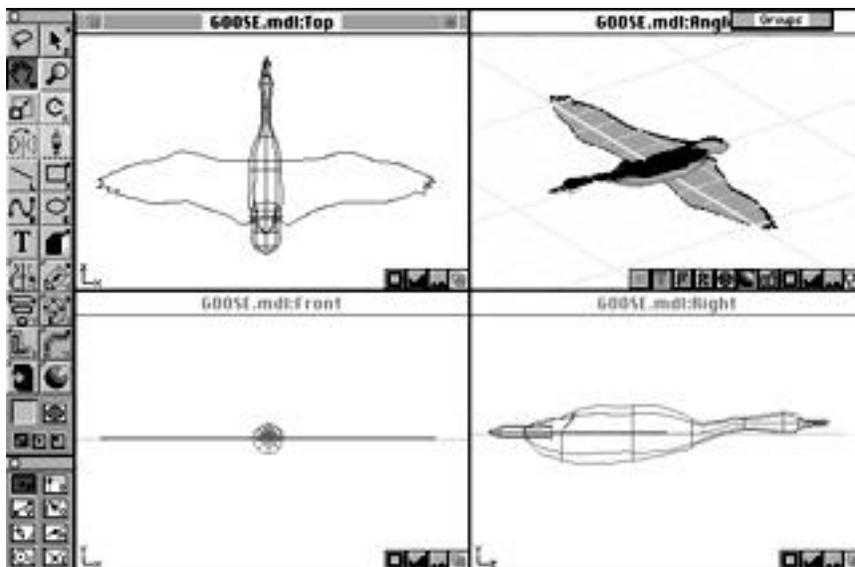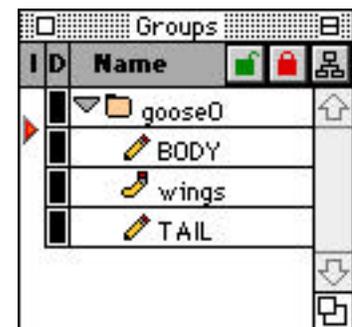
Fig. 1-Goose model   Fig. 2-Group Palette

STEP 2 - Create the Wing Targets - Using Presenter 3D's Multi-Target Morphing™ feature, I was amazed to find that I could completely produce the fluid motion of the wings flapping with only two targets. The wing component of the model was selected and converted to a morph object by selecting it and then selecting the Morph Object command under the Group menu. The wing symbol changes from a straight pencil symbol to a bent one to indicate a morph object, as shown in Fig. 2.

Clicking once on the Wings group brought up the Morphing Parameters dialog seen in Fig. 3. Clicking twice on the Add button produced two target candidates. Using Presenter 3D's Digital Clay™ sculpting capabilities, the wing master target shown in Fig. 3 was first shaped in a wide-U shape to form the first target, Fig. 4, and then shaped in a wide arc to form the second target, Fig. 5. The smooth curvature required would have been very difficult to form with a polygonal modeler, but made easy with the spline modeling capabilities available in Presenter 3D.
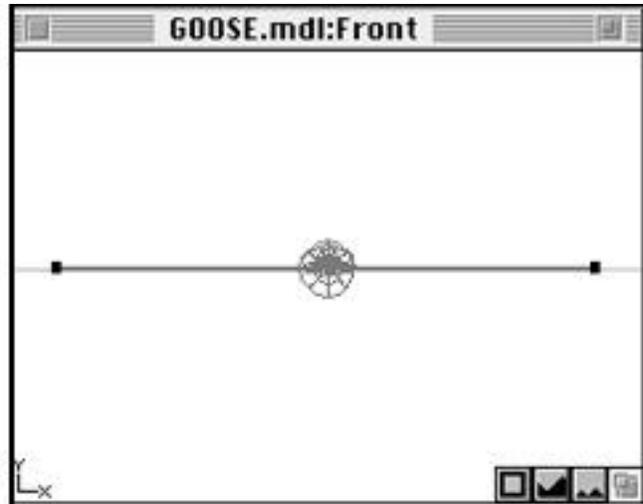
Fig. 3-Master Target
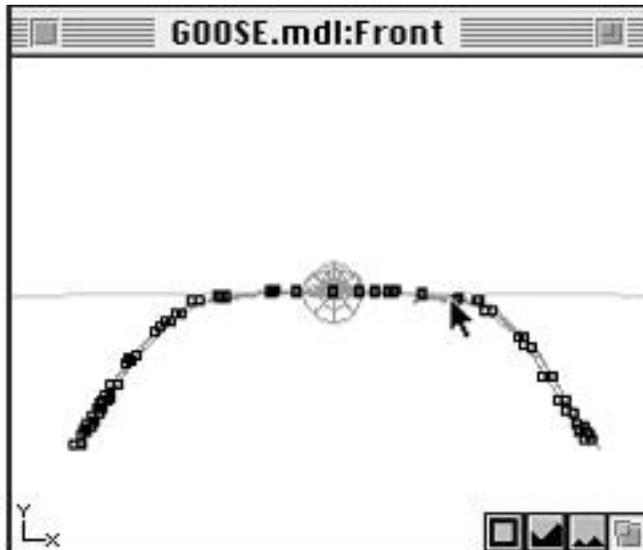
Fig. 4-First Morph Target
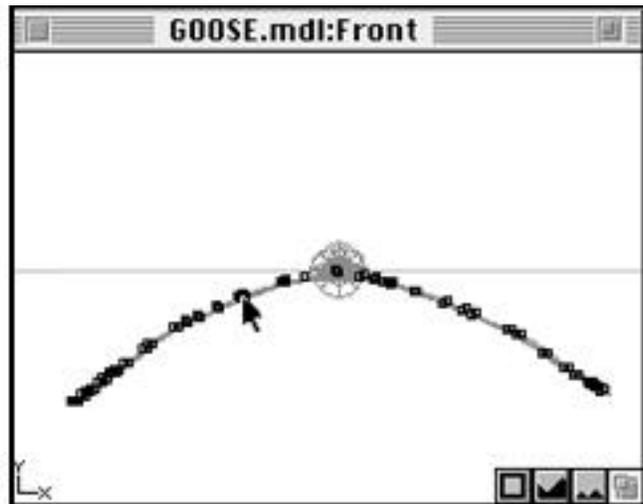
Fig. 5-Second Morph Target

Now create a folder called Flock, make six copies of goose0 named goose 2 through goose 7, and place them in the Flock folder, as shown in Fig. 6. Drag each goose into position to make a loose "V" formation, as shown in Fig. 7. To complete the model, add a ground plane, a sky plane, a path for the geese to follow, and a simple object to serve as the target lead.
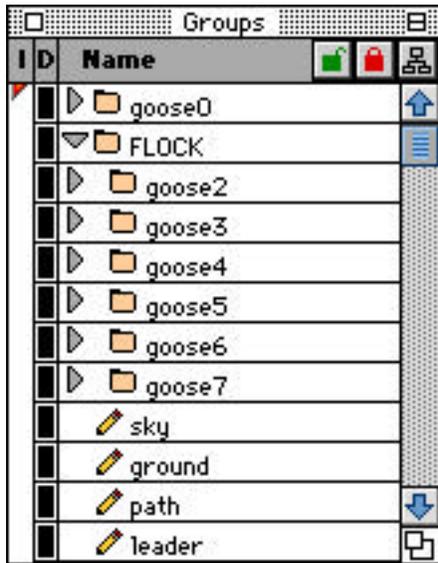
Fig. 6-Group Palette

Fig. 7-ModelPro Top View

STEP 3 - Fine Tune The Wing Motion - Open the flock model in the Presenter module. In the script window, open the goose0 folder and double-click on the wings object. Select Attributes under the Windows menu. This brings up the Attributes dialog. Click and hold on the Attributes type pulldown. You'll see the four types of external attributes that Presenter 3D supports. These include motion Animators, RenderMan Shaders, PICT images and QuickTime movies, and Sound effects. Select Animators to display all the available motion effects plug-ins. Drag the Morph icon to the attributes area in the Wings object info window shown in Fig. 8.
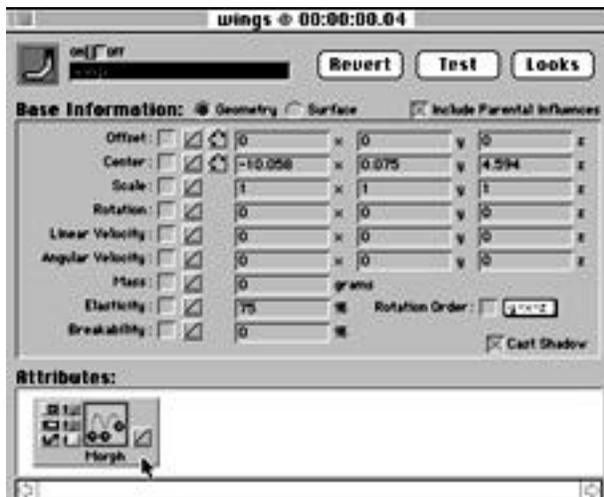
Fig. 8-Wings Object Info Window
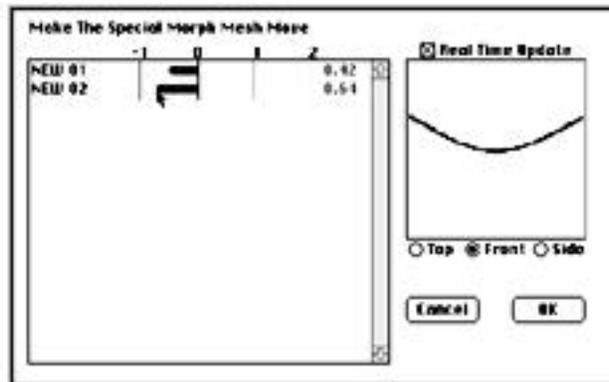
Fig. 9-Morph Control Window

Double-click on the newly placed Morph icon. This brings up the Morph dialog, Fig. 9. Moving the control bars allowed me to set just the right blend of the two targets set in Modeler. Figs. 9, 10, and 11 show how the Real Time Update window is used to fine tune the exact wing movement for each point in the flight script. Moving the control bars to the left makes the wings arch smoothly upwards, as seen in Fig. 9.
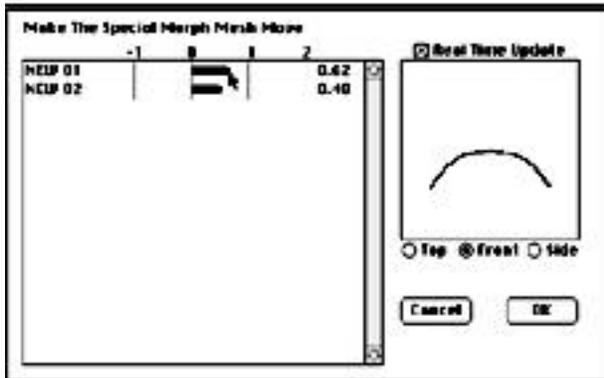
Fig. 10-Morph Control Window   Fig. 11-Morph Control Window
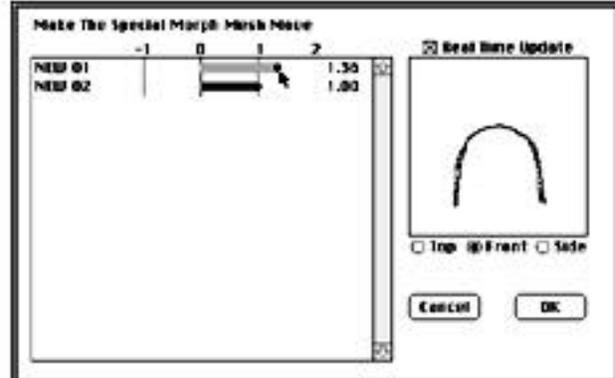
The Real Time Update window lets me fine tune the exact wing movement for each point in the flight script shown in Fig. 12. Click in the box at the top of the wing to enable the real-time display. Each of the square red boxes next to the Wings object in the Script Window represent the point on the timeline where a morph combination of the two targets was selected to produce a specific position of the wing.
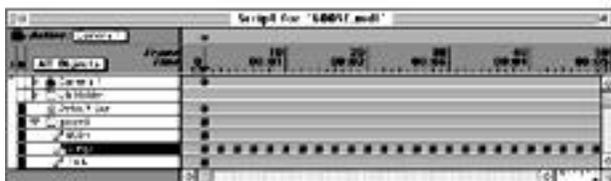
Fig. 12-Script Window   Fig. 13-Script Window
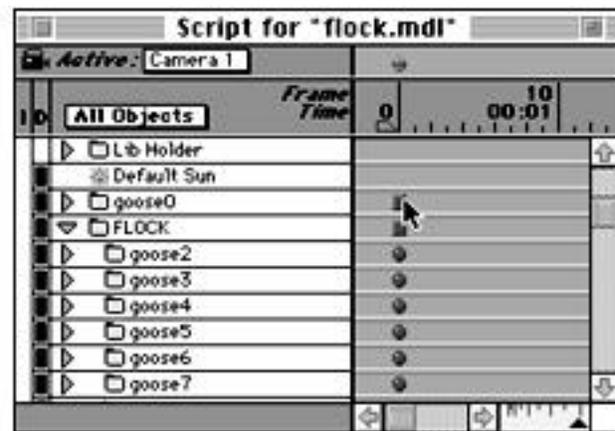
STEP 4 - Put The Flock in Motion - Once the flight movement is set up for goose0, the leader, it is time to assign a wing motion to the rest of the geese in the flock. First close the goose0 folder, then open the Flock folder, as shown in Fig 13. Open each of the other goose folders one at a time, assign the Morph attribute icon and adjust the wing movement as done in step 3, but give each goose a different flapping rhythm. To have them fly in unison, just select all the event markers, copy and paste them for each bird. Easy but boring.

STEP 5 - Keeping The Leader On Track - Presenter 3D's KineMagics™ plug-ins provide a variety of group motion control effects. In this example, we'll use the Path and Flock plug-in animators to define the flight of the lead goose. The Path and Flock animators are in the same Animators dialog as the Morph animator.

We could assign the lead goose directly to the path, but then it wouldn't have the same freedom of random motion as the rest of the flock. Instead, we'll assign the object called leader to the path, and have goose0 flock after it.

Double click on the leader object in the Script window and drop the Path animation icon from the Attributes dialog. Double-click on the newly placed Path icon. This brings up the Path dialog, as shown in Fig. 14. Click on the path name pulldown next to Path near the top-left of the dialog Select the path object as the path to be followed by the leader object. Select Snap To Path, 8 as the number of seconds to move along the path, and Constant speed along the path. The time to traverse the path is determined by how many frames you want the animation to cover. So if your animation is played at the rate of 10 frames per second, eight seconds will give you 80 frames of animation.
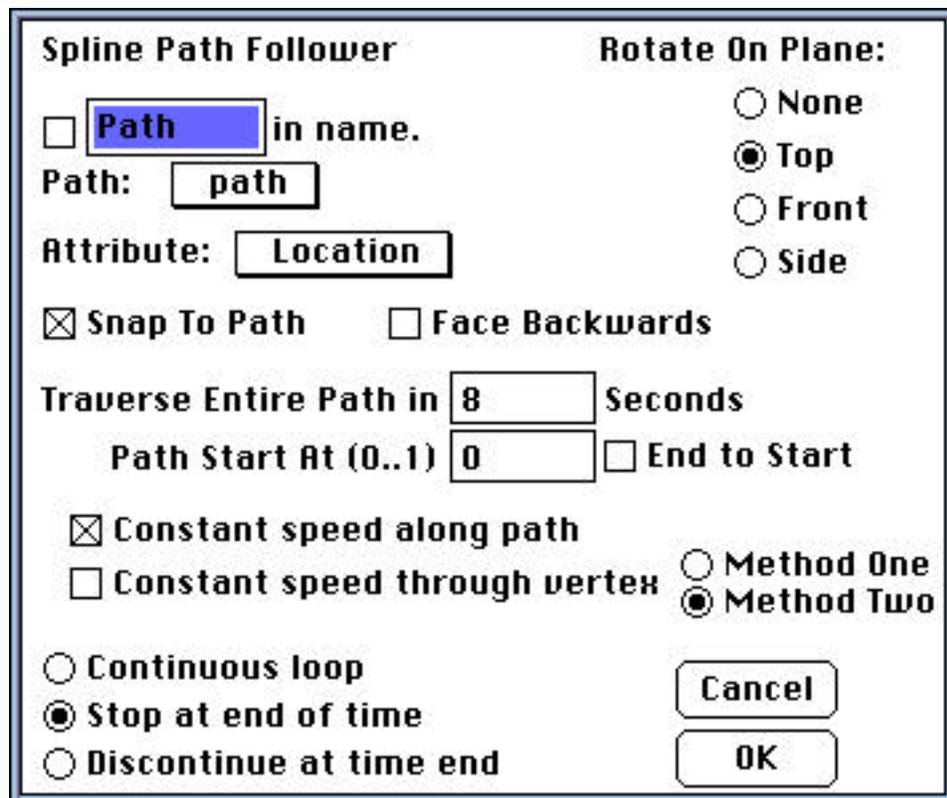
Fig. 14-Path Dialog

To have the lead goose follow the leader, select the Flock animator icon and drop it into the flock group attributes window. Set the desired Formation, Speed and other settings to control how the birds move in relation to each other and to the leader. As shown in Fig. 15, leader is identified as the Group Leader. Missle was selected so that

the lead goose would try to keep up with the lead object. The turn rate, speed, and acceleration values were selected by some trial and error to represent the rather high mobility of geese. Faster birds would have higher values and slower, less mobile birds would have lower values. A random motion factor of 4 was selected because geese do not vary much in their flight pattern.

```
╔════════════════════════════════════════════════╗
║             Locking Parameters                  ║
╠════════════════════════════════════════════════╣
║ F.L.O.C.K. - Follow a Leader Over Course in Kind ║
║                                                  ║
║ ☒ Leader Name: Lead                              ║
║                                Modeled Orientation║
║ Group Leader:  leader                            ║
║                                       ●          ║
║  ○ Formation - Stay In Initial Orientation   |   ║
║  ◉ Missle - Try to catch the Leader   ○- Top View -○║
║                                          |       ║
║   Speed Units: Inches Per Second         ○       ║
║                                                  ║
║ Maximum Turning Rate: 90    °ps ☒ Banking        ║
║      Maximum Speed: 264         ips              ║
║ Maximum Deceleration: 88        ipss             ║
║ Maximum Acceleration: 176       ipss             ║
║                                                  ║
║   Deviation From Perfect Flight                  ║
║                                                  ║
║   Side Slippage% 0                               ║
║   Vertical Bounce% 0           [ Cancel ]        ║
║ Lazy (10) Crazy (1) 4          [  OK  ]          ║
╚════════════════════════════════════════════════╝
```

Fig. 15-Flock Dialog

STEP 6 - Keeping The Flock In Formation - To have the rest of the geese follow the lead goose, select the Flock animator icon and drop it into the Flock group attributes window as shown in Fig. 16. Set the same settings as used for the lead goose, except you put goose0 as the Group Leader and select Formation as the positioning selection, as shown in Fig. 17. Now the geese will follow the leader and yet stay in the same relative formation. Using the Control Room's 3D window, click on the Play button to view a preview of e flight. You can go and make changes to the wing motions or you might want to add some more birds.

STEP 7 - Rendering The Flight - Select the render parameters shown in the render palette and click on the motion camera to start the animation shown in Fig. 16.

Using these settings, Presenter 3D will produce a ray traced, anti-aliased image, with shadows for each animation frame.

Motion Camera

Fig. 16-Render palette

IN CONCLUSION

With Presenter 3D's powerful spline-based modeling capabilities, Multi-target morphing, and KineMagics motion control animators, this project literally took flight. The fluid movement I wanted was achieved with only two morph targets. This together with the real time preview saved me a lot of time and made it an enjoyable and educational experience. Fig. 17 is a frame from the movie I generated.

It's true that "Less is More"

Less Time Spent

More Powerful Results

Fig. 17-Flocking Scene