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LIGHTWAVE™ PRO

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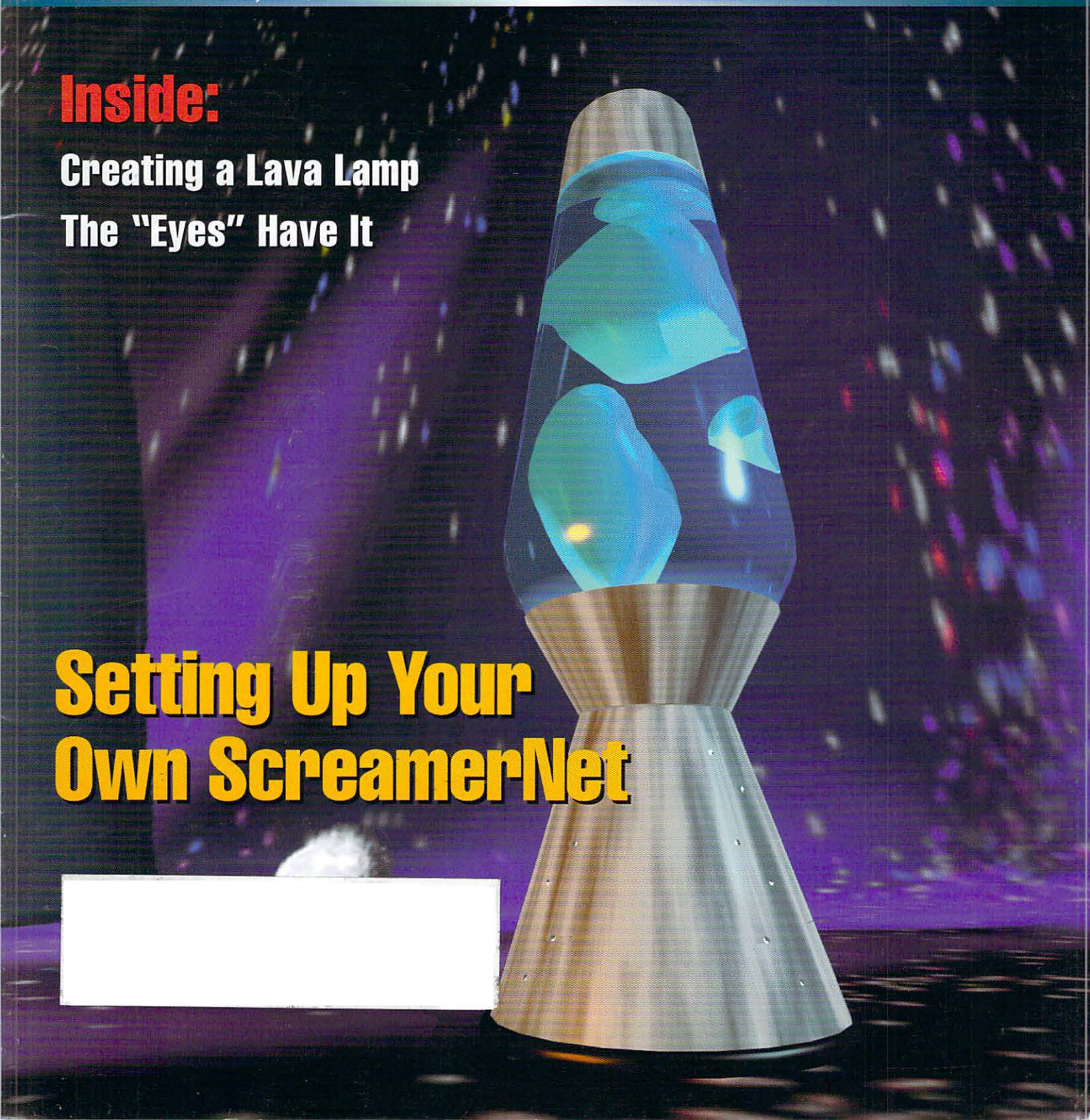

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EDITOR'S MESSAGE

by John Gross

Now that a lot of people have been upgrading to LightWave 4.0, it's probably time to talk about some of the issues involving the release. Since the Intel versions shipped first, there have been bug fixes and improvements. The final release version of Intel LightWave 4.0 is the Rev C version (it says the rev on the CD). Many Rev A's and Rev B's shipped, and to upgrade to the final Rev C, you have to get the right patch, Patcha.zip or Patchb.zip. Patches can be found on-line at ftp.newtek.com, America Online, CompuServe or a number of other places. It is also available on the *LIGHTWAVEPRO* Compilation book CD-ROM.

Here's some of the problems you may run into with the patch:

New plug-ins, such as HIIP, don't seem to work. I recommend removing all of the references to plug-ins in your LW.cfg and LWM.cfg files and then re-adding them. New plug-ins may not be recognized if there are new functions within them, as LightWave and Modeler will not add the new plug-in line to their config file if it already exists.

AVI Saving is not working properly with Windows 95. The LightWave install overwrites the avifil32.dll file found in the System directory. You can get functional AVI saving again by replacing the LightWave installed dll with the original found on the Windows 95 CD. To extract the original file follow these steps:

1. Put Windows 95 CD in drive.
2. Open a DOS shell and type "cd c:\windows\system" (no quotes).
3. Type "extract d:\win95\win95_08.cab avifil32.dll" (Where d: equals your CD drive letter).
4. Answer "Yes" when asked if you wish to overwrite the existing file.

After performing the above operations, the NewTek AVI and the hiipavi32 animation saver plug-ins should work.

LWPUsing HIIP AVI saving crashes LightWave. This one is a bug in

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This month's cover was created by LightWave animator Dan Ablan. The idea came from the new lava lamp that his soon-to-be in-laws gave him for Christmas, which adds the finishing touch to his desk. Dan's company, AGA Digital Studios, located in Chicago, uses LightWave to create animations for bradcast, cable, and corporate television. AGA Digital Studios has been expanding to create JAVA animations for the Internet. The Lava Lamp image was rendered at 2260–2260 resolution with trace refraction and trace shadows, in less than two hours on a Pentium 133, Windows NT workstation. Contact AGA Digital Studios at (312) 649-9391.

Let There Be Light

(Lava Light, That Is)

by Dan Ablan

I'm not one to be trendy, especially when it comes to this whole 1970s flashback thing. I grew up during the '70s, and frankly, once was enough. I have no flowered shirts or bell-bottoms, nor do I still have my Charlie's Angels posters on the walls. Yet, I have to admit that, over the past year or so, I've been intrigued by those ever-popular, ever-glowing lava lamps. When I first started seeing them in store windows, I laughed and thought of Greg Brady dressed up as Johnny Bravo. As time went on, it became very easy to see a nice bubbly lava lamp on my desk. Sure enough, Santa brought me one this Christmas. So, since I can't fully escape the '70s, I figured I would bring the era into a LightWave animation.

The blue lava lamp sits on my desk, off to the right of the PC monitor. It's an interesting contrast next to the thin, tube-shaped halogen light next to it. But, in an odd way, the lava lamp fits. Call it eclectic, I guess. I didn't think it would be too much trouble to model the lamp (which it wasn't). When it came to the oozing lava, I wasn't sure how realistic I could make it look. In the end, I came up with two good methods for animating the lava.

As with anything you're going to model, it's always best to have a photograph, or better yet, the actual object in front of you. The lava lamp I have is pretty basic in shape and was no trouble for Modeler. The only thing that gets tricky is making sure the angles are correct. If they're not, you'll still have a lava lamp, but something just won't look right. Take measurements of the lamp so you have a reference. Another good way to approximate the shape of the lamp, or any other cylindrical object, is to grab a frame of the object and use it as a background image in Modeler. I, on the other hand, winged it. I chose to model in four elements: the base, the base rim, the lava glass itself and the cap. The lava inside comes later.

Making the base and the glass is elementary Modeler, which goes back to the coffee mug tutorial from the manual in the early Toaster 1.0/2.0 days. We only need to make a vertical "slice" of the base. The lathe tool will take care of the rest.

- Starting with a 200 mm grid, create points starting at X = 0, Y = 1.4 m.
- Create the next point at X = 380 mm, Y = 1.4 m; then X = 220 mm, Y = 1.12m; then X = 460 mm, Y = 60 mm; and finally, Y = 360 mm, but X = 0 m.

You should now have a polygon that looks like Figure 1.

- From the Multiply menu, select the Lathe tool.
- Place the mouse at X = 0 and Z = 0 in Y view (Top).
- Select Numeric (n) on the keyboard, and change the sides to 24.
- Click OK, and hit enter. You should have something like Figure 2.

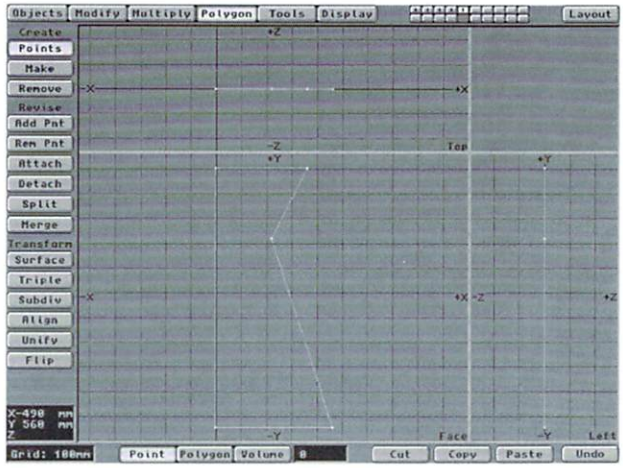

Figure 1

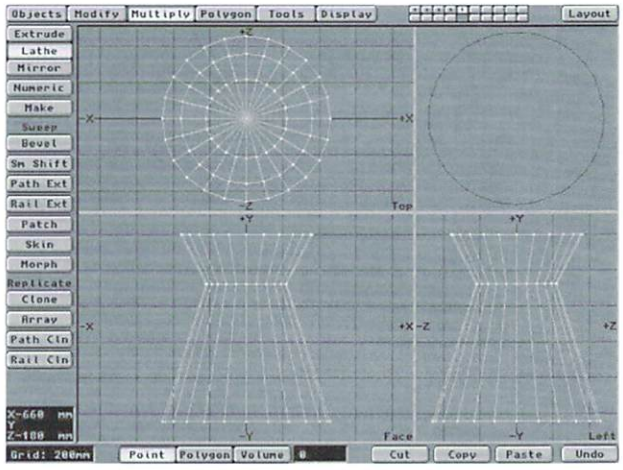

Figure 2

At this point, I chose to hollow out the center, which you don't have to for this tutorial. You won't render the inside, but, as in my case, if you decide to animate the glass being placed into the base, you'll need the base hollow, as it is in real life.

If you wanted to hollow out the center, you have two options:

- First, with the base we just created, copy the top section to another layer. Size it down about 5 percent, and with the smaller version of the base in the background, select the Boolean Subtract operation.

The other way is to go back and model the base without starting at the X = 0 location on the X-axis. Rather, you would duplicate your outside points a few millimeters in. This method is very similar to the above-mentioned coffee mug tutorial. Save this as "LL_Base.LWO", or similar. (Note: Even if you are only working on the Amiga version of LightWave, it's good to start forming a habit of saving objects with the .LWO extension, as well as .LWS extension for your scenes. You may get a PC version of LightWave sooner than you think, and this makes transferring old objects that much easier).

Next, on to the lamp glass. This part is built the same way as the base (not hollow).

- In a new layer, your first point should be at X = 0, Y = 2.82 m. Your next point should be at Y = 2.82 m, and X = 260 mm; then, X = 420

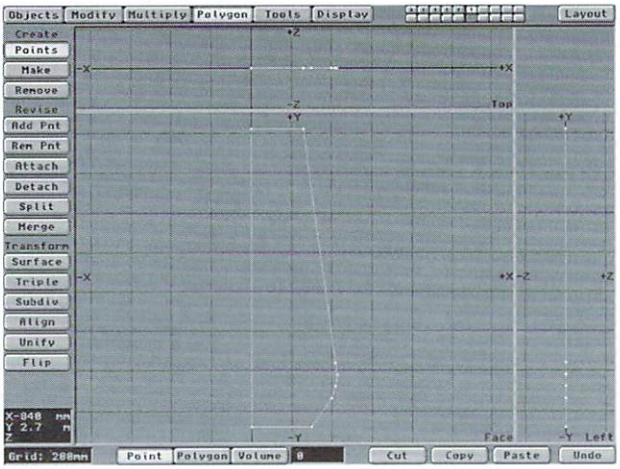

Figure 3

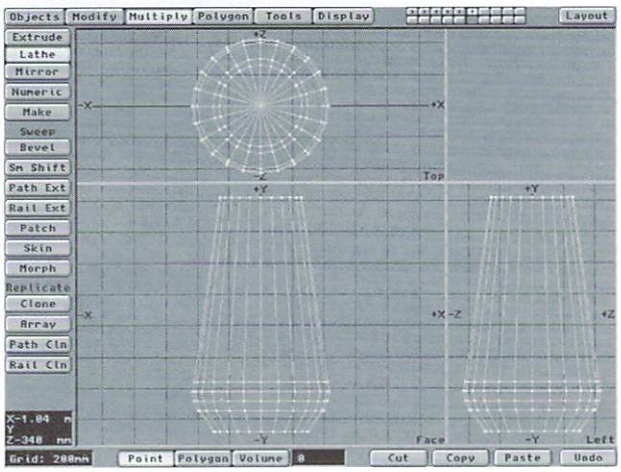

Figure 4

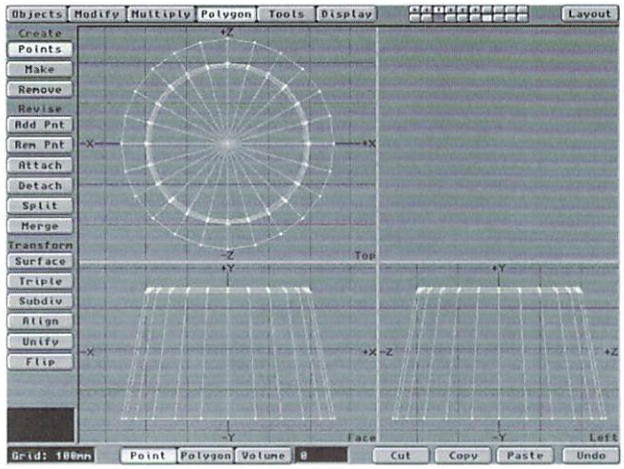

Figure 5

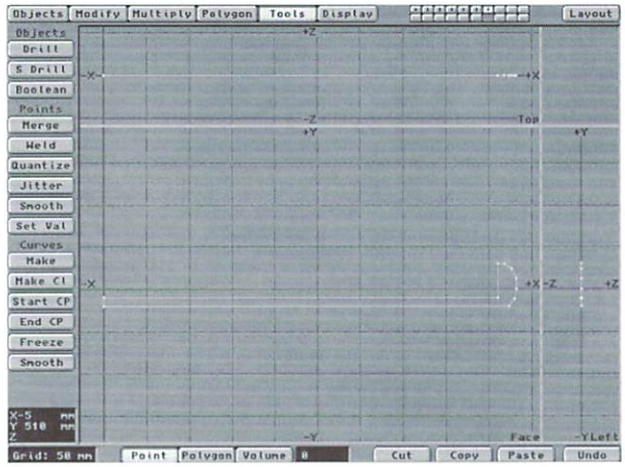

Figure 6

mm, Y = 1.64 m.

- Go out a little for the next point, at X = 440 mm, and Y = 1.58 m.
- Continue with X = 420 mm, Y = 1.52 m, and another at X = 400 mm, Y = 1.46 m. Your second-to-last point should be at X = 300 mm, Y = 1.32 m.
- Finally, place your last point at X = 0 m , Y = 1.32 m. Click (p) to make the polygon, and hopefully, you'll have a shape, such as the one in Figure 3. Again, lathe from the Top view, and change the number of sides to 24 (Figure 4).

The cap of the lava lamp could have been part of the glass we just modeled; however, it should look like a separate piece. For that, we'll model it separately.

- Using the same point system as above, start your first point at X = 0 m, Y = 3.15 m.
- Move the next point to X = 190 mm, and Y = 3.15 m, then out to X = 260 mm, Y = 2.83 m.
- Your last point is at X = 0 m, Y = 2.83 m.

I rounded the top corner on the cap I made to match the real lava lamp as much as possible. To do this, add a few points to the top corner. Then, lathe the cap, also with 24 sides, so you have something like Figure 5.

Now, it's on to the base rim of the lamp, which is sort of a rubber rim.

- Again, using the "slice" idea, plot points in the following order, with a 50 mm grid:
  X = 0 m, Y = 340 mm;
  X =460 mm, Y = 340 mm;
  X =460 mm, Y = 380 mm;
  X =470 mm, Y = 380 mm;
  X =475 mm, Y = 375 mm,
  X =480 mm, Y = 365 mm;
  X =480 mm, Y = 350 mm;
  X =480 mm, Y = 340 mm;
  X =475 mm, Y = 330 mm;
  X =0 m, Y = 330 mm.
- Click (p) to make the polygon (Figure 6). Then, lathe the polygon from the Y, with 24 sides.
- Select background layers with each of the lava lamp pieces and move individual objects accordingly, if they don't appear to line up.
- Place all four objects on one layer, and save the object.

You may want to select the lamp in a foreground layer, and with the cap in the background, use a Boolean add to join the objects. You can do the same with the base and the base rim. Once all of the elements are together, you should have something that resembles a lava lamp, as in Figure 7. Save the object. You'll notice that in my final version, I added small, offset holes in the base. Use the Boolean subtract to do this.

Now, it's on to the lava. There is more than one way to animate the lava:

- Choice number one is to make a few, differently sized balls, which are high in polygon count. Use a 50 mm grid. It's a good idea to place the lava lamp in the background to properly size the lava balls. I made four balls, all a bit different in size, and then pulled and stretched each one for a different look. These balls will be animated with a displacement map.
- Choice number two is to morph the lava. Start out by making a lava ball. Save this as "lava_1.lwo". Now, pull and stretch the entire object, using the Magnet tool, or by moving individual points. When satisfied, save this "lava_2.lwo". Continue this until you are satisfied with the shapes. Now, you'll have to set up morph sequences for each.
- Choice number three is to use a few bones in

see Let There Be Light, page 17

Windows to the Soul

Adding Emotion to Your Character Animation

by Jeff Scheetz

The recent success of *Toy Story* and *Reboot* seems to have validated computer-generated character animation as a mainstream art form. This comes as no surprise to LightWave animators—many of us have been creating characters for a while now. As with any success, there is sure to be a great deal of this work in the future. While visual effects and photo-realistic imagery provide fascinating challenges, there is also a Dr. Frankenstein-like rush that comes with making something you created come to life.

Newer character animators often concern themselves with walk cycles, lip sync, motion capture, modeling body parts and IK Bones. While these are all valid issues and should be addressed, the most important and often overlooked issue is emotion. The right look and the right expression can do more to bring a character to life and pull an audience into a story than the most sophisticated billion-dollar motion capture system ever will. And since emotion is found in the eyes, let's begin there.

By the end of this tutorial, you will have created a basic set of eyes you can use on a dozen different characters, customized through the miracle of elliptical parenting. Also, you'll see how Inverse Kinematics can be used to focus the eyes, and you'll have a chance to experiment with the wide variety of expressions available from simple motions and positions.

Creating the Basic Eye

My standard cartoon eye object is made up of a sphere and partial spheres parented together. As with all tutorials, this is only a place to begin. Once the basic form is complete, variations on sizes, surfaces, and accessories are not only allowed, but are encouraged. Before beginning, it's a good idea to set up a subdirectory called "Eyes" in the Images, Objects and Scenes directories inside your NewTek (or 3D) directory.

The Eyeball

- In Modeler, select Ball under the Objects panel.
- Select Numeric. In the Numeric requester, select Globe, 32 sides and 16 segments. Set the ball's size to X = 15 mm, Y = 15 mm and Z = 15 mm. Select OK and press the Return key to make. Pressing Shift–A will bring the object into view.
- In the Polygon panel, select Surface and apply the name "Eye_White.srf" to the ball.
- Save this object as "Eye_Ball.lwo" to the Eyes object directory. Now move on to the next layer.

The Pupil

- Make a second ball the same way you made the first, but set all three sizes to 15.2 mm.
- In the Front view, select all polygons except the top three segments. There should be 416 polygons selected. Type X to cut. You should now be looking at what essentially will be a contact lens that will be surfaced to look like the eye's pupil. The remaining polygons should be assigned a surface called "Eye_Cornia.srf".
- In the Top view, select the 32 polygons (Figure 1) in the center of what appears to be a bull's-eye. Apply a surface called "Eye_Center.srf".
- Deselect the polygons, and select Rotate (under the Modify panel) and Numeric.
- Set the rotation to 90 degrees on the X-axis and select OK.
- Save this object as "Eye_Pupil.lwo" and move on to the third layer.

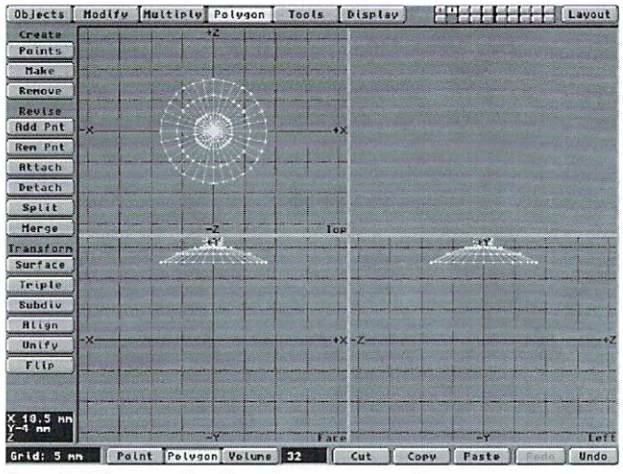

Figure 1: Selecting and applying the eye center surface.

The Lids

- Make another ball with all three sizes set to 16 mm.
- Select all polygons on the bottom half of the ball (256 polygons), and type X to cut. Essentially you now have a dome. Apply a surface called "Lid.srf" to the dome.

To add a nice touch, I like to put a small edge on the lid.

- To do this, select all 32 points on the base of the dome (or all points at 0 mm on the Y-axis) and copy them into the fourth layer.
- In the fourth layer, select each of the points counterclockwise around the circle. Type P to turn it into a polygon.

I also like to add a slight Bevel on this polygon to catch highlights in LightWave. The bevel should have both a Shift and Insert value of .08 mm.

- Apply a surface called "Lid_Edge.srf".
- Copy all the polygons in this layer back to layer three. Save this object as "Lid_Up.lwo".
- Rotate the object (again using Numeric requester) 180 degrees around the X-axis and save as "Lid_Down.lwo".

Resist the temptation to position the eyelids at this point.

- Close Modeler and enter Layout.
- In the Objects panel, load Eye_Ball.lwo, Eye_Pupil.lwo, Lid_Up.lwo and Lid_Down.lwo.
- In the main Layout window, parent the pupil and both lid objects to the Eye_Ball object.
- In the Surface panel, assign the following settings:

Eye_White.srf

Surface Color:	255, 255, 255
Specular:	100%
Glossiness:	High
Smoothing:	On

Eye_Cornia.srf

Surface Color:	0, 0, 200

Specular:	100%
Glossiness:	High
Smoothing:	On

Eye_Pupil.srf

Surface Color:	0, 0, 0
Diffuse:	0%
Specular:	100%
Glossiness:	High
Smoothing:	On

Lid.srf.

Surface Color:	210, 170, 150
(or make it the same as the face of your character.)	
Smoothing:	On

Lid_Edge.srf

Same as Lid.srf plus	
Diffuse:	50%

- In the Objects panel, select Save All Objects and save the scene as "Basic_Eye.lws".
- Rotate Lid_Up.lwo to 25 degrees on the pitch and set a keyframe at frame number 0. Rotate Lid_Down.lwo to -30 degrees on the pitch and set a keyframe at frame number 0. Hit F9 to render (Figure 2).

Pretty creepy, eh? But that's the basic eye. Keep in mind that eyes always look better when they are part of a head. If the eyes you want are supposed to be perfectly round, that's great. If not, this is where we get into elliptical parenting. Basically, the idea is to reshape the eye so that it fits a head, and that gives us options on how the character will look. By selecting Eye_Ball.lwo in Edit Object and selecting Stretch, we can reshape the eye.

Elliptical Parenting

- Under the numeric requester for Stretch, set the X-axis scale to .5 and the Z-axis scale to .3.
- Set a keyframe at frame 0. Now, as you rotate the eyelids (in the side view), you will see the lids go around the lid even though the lid is no longer spherical. The pupil object will also be able to roll around without being lost inside the Eye_Ball object.

Because the lids and pupil are parented to it, they will take on the deformation of the eye object. We could have done this in Modeler, but by doing it in Layout, we have retained the ability to have the pupil and lids rotate around the eye.

Eye K

Focusing the pupil objects are also an important part of giving your creation life. It's not enough to just point the eyes in the general direction of what it is seeing. Using IK, we can automatically target the pupil object to a null object that will serve as a focal point for your character.

- Clear LightWave and load up Basic_Eye.lws.
- In the Object panel, select Load From Scene and load Basic_Eye.lws again, without Lights.
- Move Eye_Ball.lwo (1) to -.017 on the X-axis and set a keyframe at 0.
- Move Eye_Ball.lwo (2) to .017 on the X-axis and set a keyframe at 0.
- Rotate both Lid_Up objects to 25 degrees on the pitch and set keyframes, and Rotate both Lid_Down objects to -37 degrees on the pitch and set keyframes. You should now have two complete open eye sets positioned next to each other.

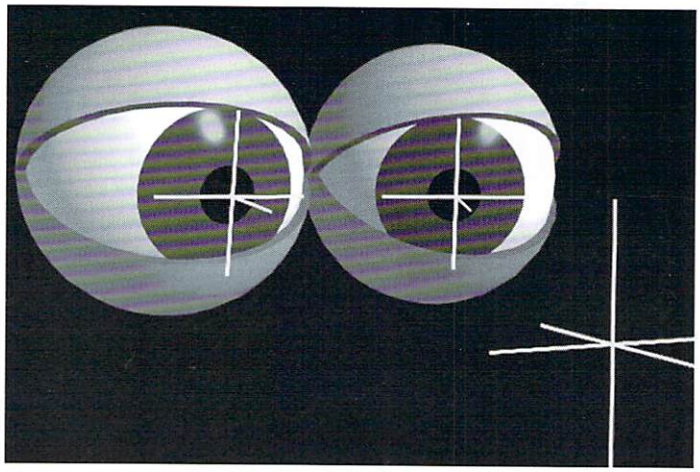

Figure 2: The rendered eyeball objects.

In any IK chain, the last object before the goal will not rotate on its own, so we need to add a pair of intermediate objects; in this case, two nulls.

- In the Object panel, select Add Null Object three times.
- Parent NullObject (1) to Eye_Pupil.lwo (1), move it to -.016 on the Z-axis and set a keyframe at frame number 0. This should put the null in front of the center of the pupil object. Next, parent NullObject (2) to Eye_Pupil.lwo (2) and move it to -.016 on the Z-axis. Set a keyframe at 0.
- Using the IK Opts panel, select Unaffected by IK of Descendants for both Eye_Ball objects.
- In the Object panel, select NullObject (3) and click Save Object. This will allow you to rename the null.
- Enter the name "Focal_Point" and hit OK.
- Close the Objects panel.
- To complete the chain, select NullObject (1) and IK Opts.
- Select the Focal_Point object under Goal. Repeat this step for NullObject (2).
- You should also turn off Bank rotation for both pupil objects or they will tend to spin.

Try moving the Focal_Point object around in front of the eyes. You should see that the pupil objects follow it. As the focal point gets closer, the eyes begin to cross. As the object gets further away, they even out, just like our eyes. Keep in mind, IK is just a positioning tool. Under 4.0, you still need to set keyframes to the pupil objects once they are in position.

- At this point, saving this scene as "Eye_Pair.lws" would be a good idea.

If your character needs to look directly into the camera, try this:

- Reset the camera's position to 0, 0, 0 and set a keyframe at frame 0. Parent the camera to the Focal_Point object. Now, instead of moving the camera, move the Focal_Point, and the camera will follow. The pupil objects will now maintain eye contact with the camera. Be sure to set each keyframe for the pupils on the same frame as the camera's. If you adjust spline controls for the camera, adjust them for the pupils as well.

The Next Step Is Yours

To complete this tutorial, try parenting both Eye_Ball objects to an object you think would make a good character. LightWave 4.0 includes a pop can, apple, crayon, bowling pin—or use one of your own. How about that cereal box from the *VTU* tutorial? Try adjusting the positions, shape and surfaces of the eyes. You will see just how easy it is to bring not only life, but emotion, to any character.

I have used these exact eyes for several different characters, including the matchstick, penny and watermelon found in the color pages. By stretching only the Eye_Ball object and experimenting with its rotation and surfaces, the same eyes look entirely different. The size ratio between the lids and eyes were also adjusted. Again, this is a starting point. Exactly how the lids and pupil objects are positioned completes the emotion. Figure 4 (color pages) shows the exact same alien head with different rotations on the lids. Notice how the lid and pupil position totally change your perception of the character's mood, intelligence and overall demeanor.

Remember you're doing animation, not just positioning. The next time you talk to someone, watch his or her eyes. Pay special attention to how often that person blinks, how and when he or she looks away, and how the lids change with each phrase to express emotions. I have seen reel after reel with eyes that never move. Characters meant to be friendly come across looking like zombies.

The pupil's movement is also an area worthy of further study. Eyes move fast. Watch a tape of someone talking (not into the camera) frame by frame. Unless they are wandering, the eyes focus from one thing to another in about two to three frames, and often move during a blink. The motion is generally without tension. When people move their heads to look at something, the eyes focus in that direction about two frames before the head moves. The eyes also reach their destination long before the head

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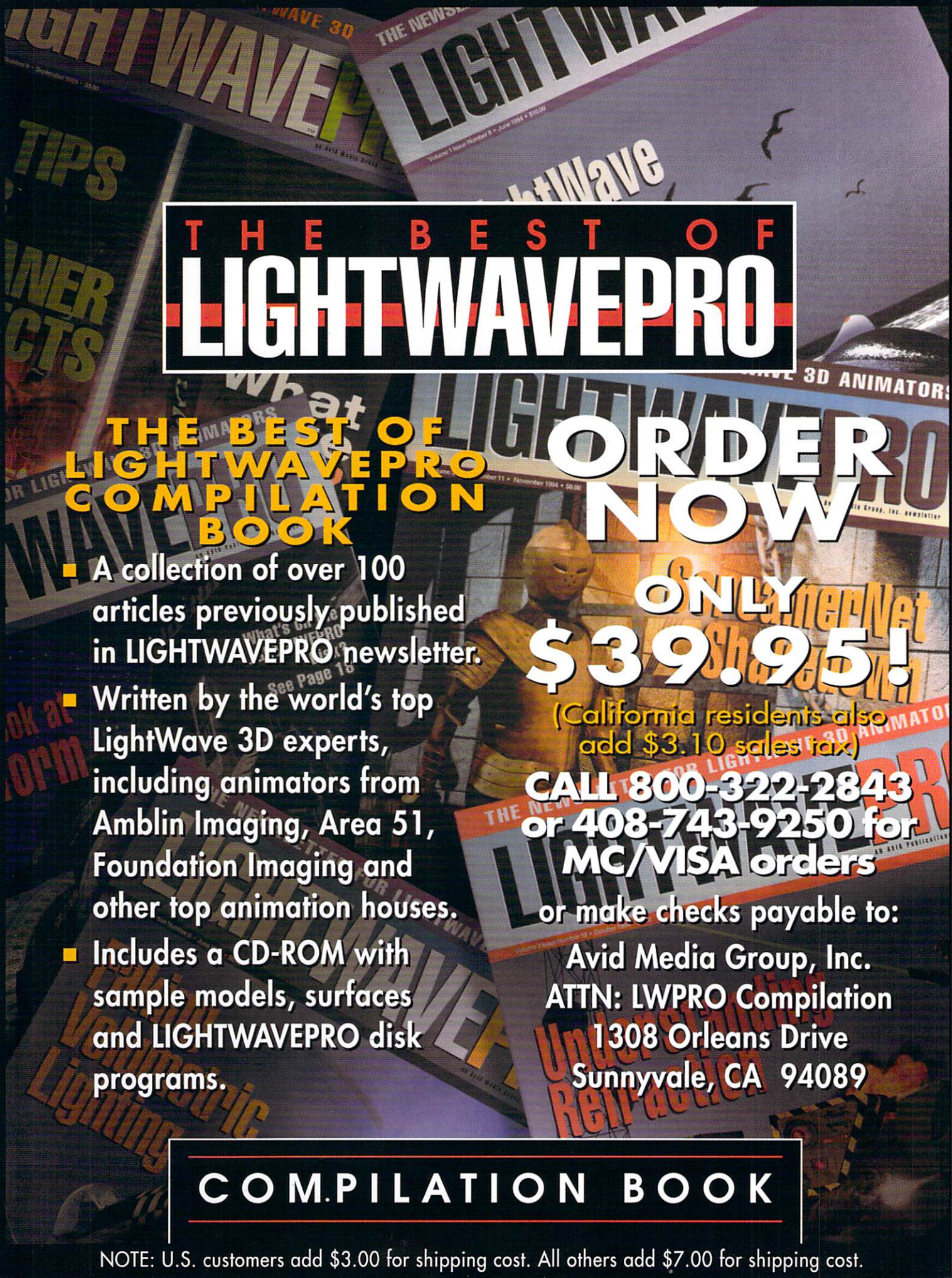
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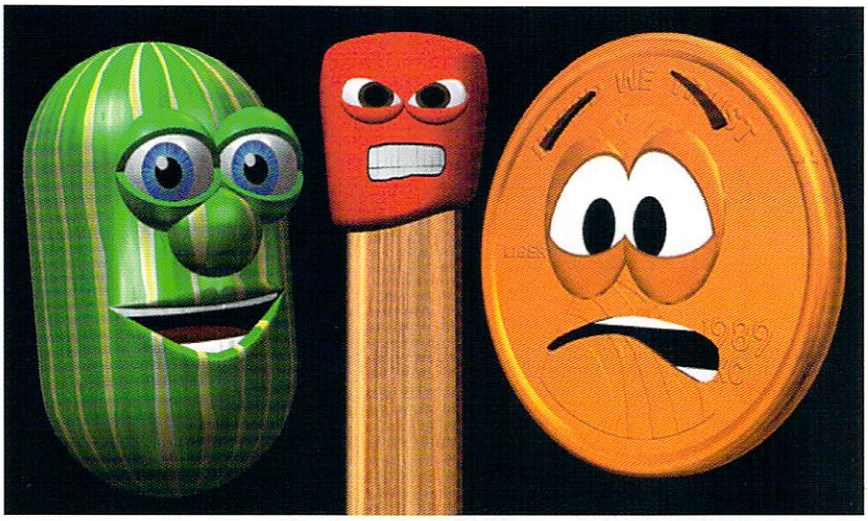

Figure 3
The same eye objects, sized differently and parented to different characters, demonstrate how versatile the looks of these eyeballs can be. See "Windows to the Soul," page 6.
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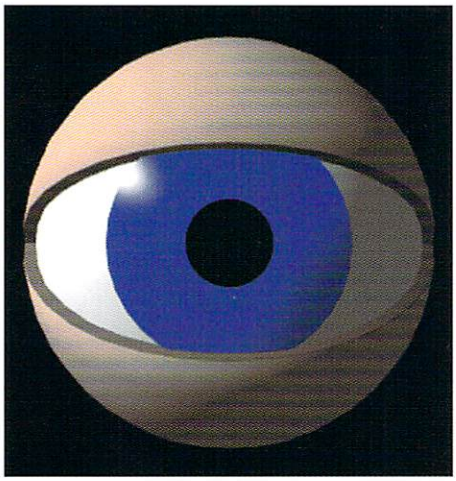

Eye See You
Remember, eyes always look better with a face. See "Windows to the Soul," by Jeff Scheetz.
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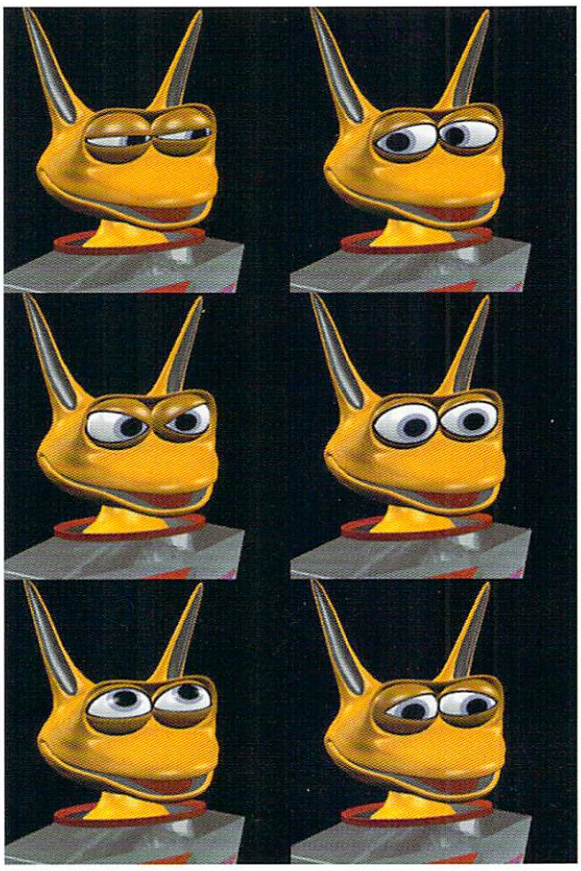

Figure 4
This image shows the same alien head with different rotations on the lids. Notice how the lid and pupil position totally change your perception of the character's mood, intelligence and overall demeanor. See "Windows to the Soul," by Jeff Scheetz.
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Painless ScreamerNetting

by John Gross

With the release of LightWave 4.0 comes a new version of ScreamerNet. For those of you unfamiliar with ScreamerNet, here's an introduction. The Screamer was a product that NewTek announced a few years ago. The idea behind it was to provide a faster, easier way of rendering than using the large, Amiga-based rendering farms. The original Screamer was designed to have four MIPS R4000 (or was it 4400?) processors and was controlled by an Amiga computer that would send the Screamers the files needed to render scenes.

A major limitation to the way the Screamer would render frames was that the Amiga had to send it the scene, object and image files necessary to render. After the frames were rendered, the Screamer would have to send the final rendered image back to the Amiga where it would then be saved out by LightWave. Needless to say, the transfer time was enough to make you almost not want to use a Screamer. If you wanted to render frames in film resolutions, you could forget it. The time for transfer was too long.

For various reasons, the Screamer never really got off the ground, but Raptors did. Soon, people were using ScreamerNet and Amigas to render frames faster (although somewhat painfully).

Let's jump forward to the release of LightWave 4.0. Now, LightWave has the original ScreamerNet plus a new and improved ScreamerNet II. ScreamerNet II has the much needed benefit of allowing individual machines on the network (up to 1,000) to render and save images to a network location. There is no longer a need for the control machine to act as the gateway between files. ScreamerNet II tells machines to render frames, and the machines deal with everything else.

I will show you how to set up and maintain a ScreamerNetwork for rendering your LightWave scenes. This article is geared to Windows users, but the same concepts apply for Amiga and SGI users.

Because the original ScreamerNet rendering method is somewhat outdated, those still using it will find little changes in the controls for this method (with the major exception that you can control up to 1,000 CPUs as opposed to only eight). This article also explains the new ScreamerNet II rendering method.

Here's what's needed in order for ScreamerNet II to work correctly:

- A copy of LightWave 4.0 and a dongle (for the control machine).
- A number of CPUs connected to a network. All of these "render nodes" must have access to common directories for loading scenes, objects and images, and saving out RGB files.

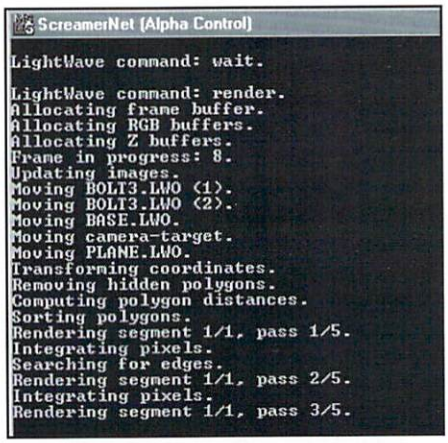

Figure 1: The ScreamerNet Node Feedback window.

- The LWSN (LightWave ScreamerNet) program appropriate for the type of CPUs on the network. This program will come with the version of LightWave that you purchase. If you buy MIPS LightWave, you get a MIPS LWSN program.

It is possible for a single control machine (using a Pentium processor, for instance) to control Intel, Alpha and MIPS CPUs on the network at the same time if the proper LWSN programs are running on each type of machine. This configuration isn't usually recommended as you may be using a shader or image filter plug-in available for one type of CPU, but not another. In this case, some images would render using the plug-in and others wouldn't. It's a good idea to use the same type of CPU for rendering.

Remember, ScreamerNet doesn't actually need a network to work. You can use it on a single machine to batch render up to 16 scene files. We'll go over the three cases of ScreamerNet use: single machine, two machines and more than two machines.

Setting Up a ScreamerNet Rendering Node

Setting up a node machine to render is the first thing to do. LWSN is a command line program, meaning that it has no real interface. You simply assign it a number and a place to look for job files, and the control machine will do the rest. If you don't follow the correct steps, however, you will have problems. In order to set up a ScreamerNet node, you must perform the following steps:

1. Make the program called "LWSN.EXE" (the name may be slightly different depending upon your CPU type) available to all machines that you wish to be render nodes. This can be done by copying this file to each machine, or placing it in a directory that is accessible to all CPUs. The latter is the easiest method and one I recommend.

2. Make sure there is a directory the control machine and all ScreamerNet nodes can see that will act as a common Command Directory. This location is where the control machine will send jobs to and the ScreamerNet nodes will send acknowledgment files to.

3. Open the SN panel and select the Command Directory button. When the requester opens, find and select the network accessible directory that is going to be used as the Command Directory. When you are asked if you would like to "Initialize Now?", choose No.

4. Quit LightWave, then copy the LW.cfg file (.lwrc on SGI machines and LW-Config on Amigas) to the place where you will be running LWSN.EXE from. (If this is the same directory that LightWave is run from, LW.cfg is already there).

Performing step 4. above assures that both the control machine and any machines running the ScreamerNet render module will be looking in the same place for commands. If you change your command directory on the control machine, you must also edit the LW.cfg file in the location of the

LWSN.EXE program to reflect the change of command directories. Also, if you make any major changes to the configuration file (such as the addition of plug-ins), you must also change the remote LW.cfg files (if any) as well.

ScreamerNet on One Machine

So, let's start out with our most basic setup: a single machine that will use ScreamerNet to batch render scene files. If you followed the normal LightWave install setup, you have the LWSN.EXE program located in your drive name: \NewTek\Programs directory. For the purposes of this example, let's say that your hard drive containing the NewTek directory is labeled as D:. There's no need to worry about common directories because you're only using one machine.

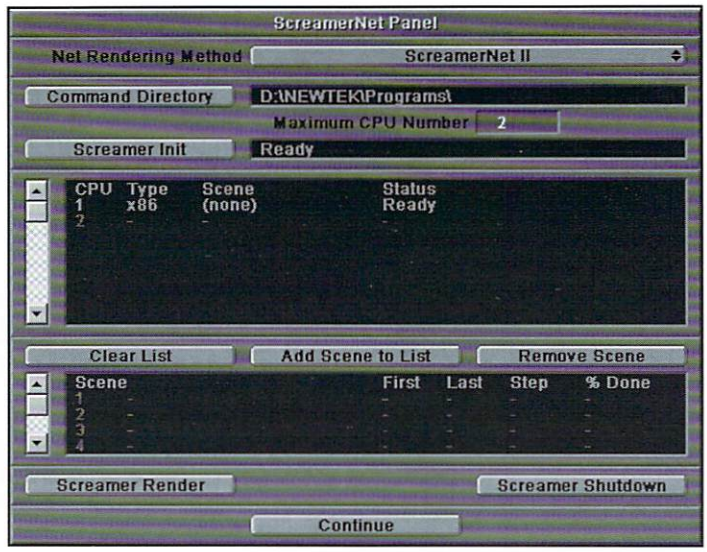

Figure 2: LightWave's ScreamerNet Control panel.

The process for rendering would be for you to start the LWSN program, then go into LightWave's SN panel and initialize the CPU so LightWave can find the render node. After this is done, list the scene files that you wish to render and hit the Screamer Render button. After all of the scene files have rendered, the programs (LW and LWSN) are sitting idle, waiting for more input.

There are two ways of starting the LWSN program. You can either type it in with all of its arguments into a command line, or you can create an icon that will launch it with all of its arguments. The second method is easiest and I will cover that in more detail, but to start LWSN from a command line, perform the following step:

1. From a DOS shell on the node machine, CD to the directory containing the LWSN program and type (all on the same line):

LWSN.EXE -2 D:\NewTek\Programs\job1 D:\NewTek\Programs\ack1

That's all there is to it. Let's break it down: LWSN.EXE is the command name. Make sure to replace it with the name of your ScreamerNet module if it's different. The -2 argument tells LWSN to use the ScreamerNet II rendering mode. If you were to use a -1 as this argument, LWSN would use the Original ScreamerNet method.

The second argument tells this node the full path name of the job file that will be reserved for this node. Notice that this is the full path of the command directory. Using a "job1" as the file name labels this node as CPU #1. If you used "job954", you would label this CPU as #954. It's important to not lead any CPU numbers with a 0. For instance, job1 is allright, but job01 is not correct.

The third and final argument is the complete path name of the acknowledgment file that LightWave uses to know what a render node is doing. This ack file must be numbered the same as the job file number.

Once the command and arguments are entered properly, a window will open that lists feedback for the render node. If this window opens briefly and closes, you did not type in the argument correctly. Note that this is true for NT machines, but if you are trying to run ScreamerNet on a Windows for Workgroups 3.11 machine (running WIN32s), I have heard that's exactly what happens. However, ScreamerNet is still active—you just don't have a feedback window.

To create an icon for the ScreamerNet render module that you can click on to start LWSN, perform the following steps (this assumes a Windows operating system):

1. Create an icon for LWSN by selecting a Program Group and then selecting New from the File menu. Choose Program Item, and then choose OK in the requester that appears.

2. In the Description: field, type "ScreamerNet Render" or something similar. This will be the name that appears with the icon.

3. In the Command Line: field, type the full path of LWSN.EXE, followed by the arguments listed above. In the case of our one-machine setup, it would be "D:\NewTek\Programs\LWSN.EXE -2 D:\NewTek\Programs\job1 D:\ NewTek\Programs\ack1".

4. For the Working Directory: field, type the path of where the LWSN program is located. In our example, it would be input as "D:\NewTek\Programs".

5. Select OK. You now have an icon that will run the ScreamerNet render module for that machine when it is double-clicked.

Using the ScreamerNet Panel

Now that you can get LWSN running on your machine, how do you control it? Let's talk about the different functions.

- Selecting the Command Directory button allows you to change this directory to another location. Again, the Command Directory is the shared directory where nodes will look for jobs and send acknowledgment files. The control machine will write job files here and look for acknowledgments from the nodes in this location. In our one-machine setup, the Command Directory is simply the NewTek\Programs directory. If you wanted to use another, you would need to select it here.
- It's important to note that when you change the Command Directory and then exit LightWave, LightWave will write the new location to the configuration file, LW.cfg. If your node machines do not have access to this file (i.e., LWSN is not run from the same directory or uses the same working directory), the machines may not look to the same command location. You'll know there's a problem if you initialize CPUs and they don't all show up.
- By changing the value in the Maximum CPU Number field, you can tell the control machine how many nodes it should check for. You can input a number up to 1,000, but I suggest keeping the value set to the number of available nodes to save time.
- After starting LWSN on the individual ScreamerNet nodes, you must select Screamer Init on the control machine to initialize all the nodes and prepare them to accept commands. After initialization is completed, you will receive a message stating how many ScreamerNet CPUs were found. Also, the available CPUs will be listed by node number and will give a status of "Ready".
- Once you see all of your available CPUs, click Add Scene to List and it will present a requester allowing you to select a scene that you wish to render over the ScreamerNet. You can add up to 16 scenes at any one time.
- Selecting Screamer Render will start rendering the scenes in order from the first added. At this point, the control machine is tied up controlling the machines and you cannot use LightWave. (You could minimize this version and start another LightWave process if you have enough RAM.)
- As the list is being rendered, each ScreamerNet CPU will list the scene and frame it is working on. In the Scene list, you can see what percentage of the scene is rendered.
- At this point, if you go and look at the individual ScreamerNet nodes, you will see a line-by-line status of what they are doing as they render away.

- The ScreamerNet panel also has commands for removing a scene in the list (the one currently at the top of the list) and clearing the entire list.
- Finally, if you want to abort a session in progress, hit the Escape key while the ScreamerNet info field reads "Waiting for CPUs to finish rendering." There may be a long pause before all of the ScreamerNet nodes are ready again—while they finish up their current task—and make the ScreamerNet panel available for more input.
- When all CPUs are finished rendering, selecting the Screamer Shutdown button will close all windows on all ScreamerNet nodes. To start a new session, you must restart ScreamerNet on each CPU and perform a Screamer Init from the control machine.

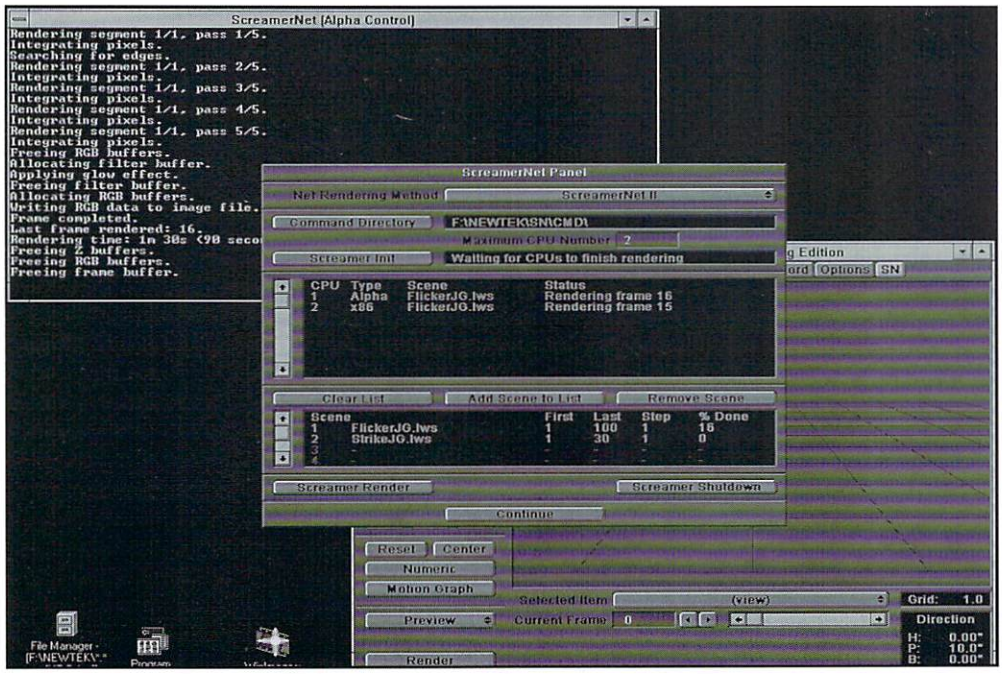

Figure 3: A typical one-machine ScreamerNet session.

ScreamerNet on Two Machines

Using ScreamerNet on more than one machine can get a bit more involved, but it's still pretty easy. Here's what you have to look out for:

If you read the config file for LightWave, you will see that the Command Directory is set to D:\NewTek\Programs (in our example above). Let's say that you have another machine networked to the first and you wish to use it for rendering. If you follow the directions above for setting up another node, you may end up with an icon that reads "D:\NewTek\ Programs\LWSN.EXE -2 D:\NewTek\ Programs\job2 D:\NewTek\Programs\ack2".

Notice that we changed the job and ack files to "2". If not, they would have interfered with the other machine.

There is still a potential problem here. You are telling the second machine to look for LWSN on the D: drive in the NewTek\Programs directory. This location may not even exist on the second machine! To get around that, you will need to connect to the first machine's D: drive using another drive letter (assuming that a D drive already exists for the current machine). Let's say you need to map the first machine's D drive as F: on this machine. Your icon Command Line: settings would now read "F:\NewTek\ Programs\LWSN.EXE -2 F:\NewTek\ Programs\job2 F:\NewTek\Programs\ack2" and the Working Directory: line would read "F:\NewTek\ Programs".

This will get the node up and running, but there is a major potential problem—the Content Directory and plug-in location descriptions are found in the LW.cfg file.

Because the Working Directory is set to F:\NewTek\Programs, LWSN will look for a LW.cfg file in that location so it knows where to find out the location of the Content Directory (the location where the scene/object and image files exist).

The problem with the above setup is that this second node will see a LW.cfg file (in F:\NewTek\Programs) that contains lines such as this:

ContentDirectory D:\NewTek

Plugin ImageSaver Alias(.als) D:\NEWTEK\Plugins\ LAYOUT\HIIPSAVE.P Alias (.als)

Plugin ImageSaver BMP(.bmp)D:\NEWTEK\ Plugins\LAYOUT\HIIPSAVE.P BMP (.bmp)

Plugin ImageSaver Cineon(.cin) D:\NEWTEK\ Plugins\ LAYOUT\HIIPSAVE.P Cineon (.cin)

Plugin ImageSaver IFF(.iff) D:\NEWTEK\ Plugins\LAYOUT\HIIPSAVE.P IFF (.iff)

Plugin ImageSaver JPEG(.jpg) D:\NEWTEK\ Plugins\LAYOUT\HIIPSAVE.P JPEG (.jpg)

The problem here is that the Content Directory and plug-in locations are all relative to the original machine (the one with LightWave installed). When another node sees lines like this and does not have this setup on its own D: drive, you can imagine its confusion. One way around this is to make a copy of the config file and change it so all the D: references read F:, and then place this copy in a different location and change the Working Directory: field in LWSN's icon to point to the place where the copy of the config file resides.

This, of course, can be confusing, especially when you add new plug-ins or change the Content Directory. This would require that you remember to make changes to the extra LW.cfg file located in the other location.

Perhaps a better way around this problem is to plan for it in the beginning. For instance, if you know you are going to have two machines, one with the full LightWave and one with a LWSN node, you may want to label your drives (when first setting up your machines) differently. For instance, let's say we have two PCs: one with LightWave running and one with just LWSN. One of the machines could be set up so that LightWave is located on a drive named F: (you can change drive letters in Disk Administrator). On the other PC, there may be two drives, C and D, and you would have it connected to a network drive called F: (which is the same drive as the other PC's F: drive). When you start a LWSN node on the non-LightWave PC, you should have its Command Line and Working Directories set to the F:\NewTek\Programs directory so it sees the same config file that the other machine sees. You can even run the same LWSN program found in the F: directory on both machines—just change the arguments so they use different CPU numbers.

This way ensures that both nodes would see the same Content Directory of F:\Newtek so they could both find the correct files. You would also most likely want to save to the F: drive as well, since that would be the "shared" drive that both nodes saw as F:.

ScreamerNet on More Than Two Machines

Finally, we come to our final setup, which after getting a good grasp on the two-machine setup, is easy to follow. When using ScreamerNet with more than two machines, you generally have one machine that is your server. This server is the machine (or location on the net) that contains all of your LightWave content files. In order for the greater-than-two setup to work most effectively, all render nodes need to be mapped to this common location using the

same drive letter. If the config file that a LWSN node reads says that the Content Directory is located at S:\Clients\Voyager, all render nodes must see this location the same way or you will have bad or missing frames in the final output. Remember, LWSN will look for the LW.cfg file in the location it is launched from or where the Working Directory: field is pointing to if the config file is launched from an icon.

Setting up a system this way would allow you to have an LWSN program located somewhere on the net, and every machine could start the program from there, using a different number for the job and ack files it will read/write. Also, you could have a common location for a config file that all nodes will see when launched. Remember, any plug-ins that you may be using to render with need to be found in a common location that the config file all the nodes read can see. If this isn't the case, you may get bad results when using plug-ins (including the HIIP savers).

Hopefully, this has gotten you up and running with a minimum of fuzz with ScreamerNet. Now, there shouldn't be any reason for your machine(s) to sit around every night doing nothing!

ScreamerNet Tips

- ScreamerNet will always save images to the paths found in the scene file. These paths are written anytime you save an RGB or Alpha image while setting up a scene. Remember that if you save an Alpha image once, the path will be written in the scene file and an LWSN node will attempt to save an alpha image to this location. If you don't want any alphas saved (or an RGB) delete the lines near the end of the scene file that make reference to the saving location and name.
- ScreamerNet will render the scene based on the First Frame/Last Frame values saved in the scene file. If you need to interrupt a ScreamerNet session and want to finish rendering later, you will need to edit the scene file's First/Last Frame values to reflect the new changes or ScreamerNet will re-render rendered frames when started again.
- If a scene was set up using a different Content Directory (Options panel) than currently listed for the ScreamerNet CPU's, you must change the Content Directory listing in the LW.cfg file located where the LWSN program is launched from. When a ScreamerNet CPU is first started, the window that appears tells you what the current Content Directory is.
- Only scenes sharing the same Content Directory can be batch rendered in the same ScreamerNet session.
- Even though LightWave contains a SN panel allowing you to control ScreamerNet CPU's, ScreamerNet control software is open to third party support, so expect to see other ScreamerNet control packages available.

Troubleshooting ScreamerNet

Occasionally, ScreamerNet may not perform as you may expect. Under these conditions, check for the following:

Problem: ScreamerNet node not being recognized by a Screamer Init command.

Solutions:

1. Manually shut down all ScreamerNet CPUs and delete all job and ack files from the command directory. Then, restart all CPUs and reperform a Screamer Init.

2. Make sure that the Maximum CPU Number value is equal to or greater than the highest numbered ScreamerNet node, then perform a Screamer Init.

3. Make sure that the command line arguments for an individual nodes are correct as outlined above.

4. Make sure that a LW.cfg file is located in the working directory of the LWSN program (usually the directory where LWSN is executed from) and the CommandDirectory line in this file matches that of the control machine.

Problem: After performing a Screamer Init, LightWave states that there is one more CPU available than the actual number and stays in a "busy loop."

Solution:

1. There was an extra ack file found in the command directory. You will need to end the LightWave task (Ctrl + Esc); delete all of the job and ack files in the Command Directory; stop all of the ScreamerNet CPUs and restart them. Finally, start LightWave again on the control machine and perform a Screamer Init.

Problem: ScreamerNet CPUs can't find object or image files it needs.

Solutions:

1. Make sure that the ContentDirectory setting in the LW.cfg file found in the Working Directory of the LWSN program is set to the same path LightWave used when the scene was created.

Tip: When you first start a ScreamerNet node, a message stating the "Current Directory" will appear. This is the directory that the ScreamerNet node is seeing as the Content Directory.

2. Make sure that all ScreamerNet nodes have the same access to the directories containing object/image files and that the location of these files is mapped the same for all nodes.

Problem: ScreamerNet nodes render, but no images are saved.

Solutions:

1. Make certain that you have save paths set up in the scene file. In order for this to happen, you must select Save RGB Images or Save Alpha Images (or both) in the Record panel and select a path and name for the saved images before you save the scene file. Make certain that the path can be found by all ScreamerNet CPUs.

2. The ScreamerNet node does not have the ability to write to the save directory or can not see it.

3. The ScreamerNet node does not have access to the HIIP loader/savers and you are attempting to save a HIIP format image.

Problem: ScreamerNet nodes render alpha images, but I didn't want to save them.

Solution:

1. At one point, before saving the scene file, you had selected a path and name for Save Alpha Images. Even if you turn this button off later, the path and name is still contained in the scene file. If you edit the scene file, and delete the line that starts with SaveAlphaImagesPrefix near the end of the scene file, you will tell LightWave not to save Alpha images when you load this scene and render with ScreamerNet.

Problem: ScreamerNet nodes do not save computer-animation files.

Solution:

1. Currently, ScreamerNet only saves single images —RGB and/or Alpha. You could render the images, then later compile them into the desired animation formats.

Problem: Plug-in shader, image filters, etc. are not being rendered on the ScreamerNet nodes.

Solutions:

1. ScreamerNet pulls its plug-in information from the configuration file found in its launch directory. If the plug-in information found here was not updated to reflect that of the original LW.cfg file, plug-ins will not be found and, therefore, not rendered.

2. The plug-ins themselves are not located on a shared drive. In order for all of the ScreamerNet CPUs to access a plug-in, it must be located in a place where the nodes can see it, and the LW.cfg file for the ScreamerNet CPUs must state this location properly.

3. Your scene was set up on a different CPU type than you are trying to render it upon, and the plug-ins do not exist for the type of CPU you are using.

Problem: No HIIP images are being saved from ScreamerNet nodes.

Solutions:

1. In order for the HIIP savers to function properly, they must be located in a HIIP directory that is found on the same directory level as the directory containing the LWSN program. For instance, by default, LWSN is run from the Programs directory and the HIIP Loaders/Savers are found in the HIIP directory that is located, along with the Programs directory, within the NewTek directory. If you were running LWSN from a directory called SN located in S:\LW, you would also want to copy the HIIP directory from NewTek to S:\LW. You will get an error message when the LWSN program tries to save a file if it can't find the HIIP stuff.

2. The HIIP DLLs need to be found in the path where LWSN is launched from (or the Working Directory). These include ERBUFIO.DLL, ERCORE.DLL, ERUTILS.DLL, HIIP.DLL and HIIPUNV.DLL, which by default, are found in the NewTek\Programs directory.

LWP

John Gross is the editor of LIGHTWAVEPRO.

Tip of the Month:

Making Waves With Ripples

Using the Ripples displacement map texture to create waves on water can give people fits. The problem has been that the Ripples displacement texture appears to move the object's points every which way but up and down (like one might expect) when it's applied to a water object (a grid of polygons) with anything close to the default settings.

Well, here's some info that might help:

The Ripples displacement map displaces an object's points radially from each of the Wave Sources.

That might not sound particularly enlightening, so here's an example:

- Create a grid of polygons that is 100 meters (X) by 100 meters (Z) and divided up into at least 5,000 polygons. More is better.
- Load the object into Layout, turn on Displacement Map and choose the Ripples texture.
- Leave the Texture Size at the default of 1, 1, 1. Leave the Texture Center at 0, 0, 0. Set the number of Wave Sources to 1. Set the Texture Amplitude to 2.0 and the Wavelength to 0.25. Don't worry about the Wave Speed.
- Close the Displacement Map and Objects panels, and look at the Layout window to see what happens.
- From a Top view, you'll notice that the points are displaced toward or away from the center of the object (where the Ripples Texture Center and the one Wave Source is located). If you look at a Side view, you'll see that the points are not displaced at all along the Y-axis.
- Now go back to the Displacement Map panel and set the Texture Center to 0, -1000.0, 0.

By moving the Texture Center quite far below the object, the points are now displaced mostly up and down along the Y-axis, with very little displacement in the X–Z plane. That's where the word "radially" comes in: it means the points are moved along a line that passes through the point in question and the Wave Source. By fiddling with the Texture Size, number of Wave Sources, Amplitude and Wavelength, you should be able to get a convincing bunch of waves.

Remember, too, that the Wave Sources (if there are more than one) are distributed randomly (or so I've read) in the area defined by the Texture Size—and if the Texture Size is too big, or the Texture Center is not far enough above or below the water surface, you'll still get significant lateral point movement.

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Nibbles & Bits
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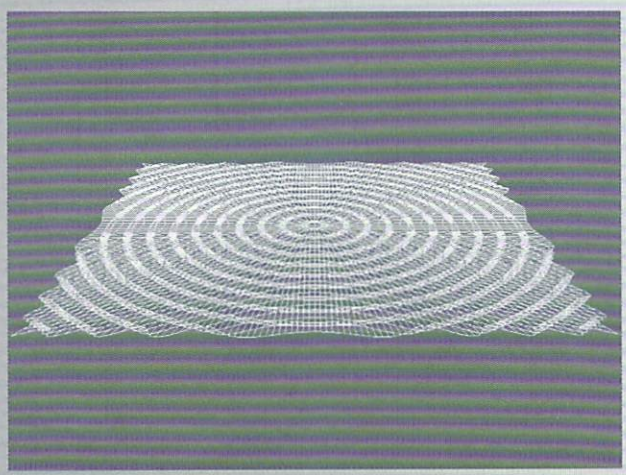

Figure 1: This camera view shows displacement with the Texture Center at 0, 0, 0.

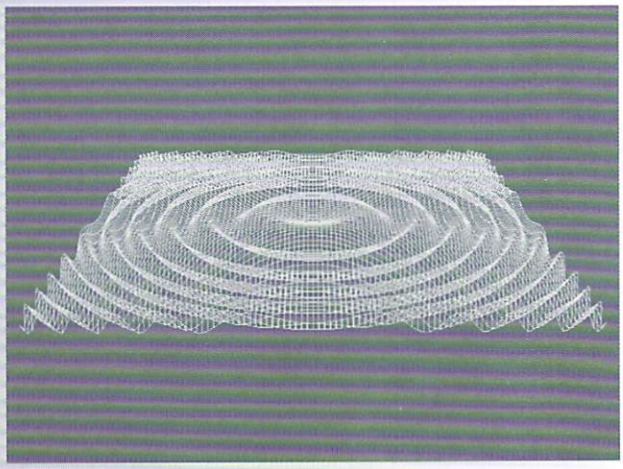

Figure 2: The same object with the Displacement Map Texture Center value changed to 0, -1000.0, 0.

Editor's Message

continued from page 3

LightWave (which will be fixed in the next version) that crashes LightWave when it is trying to render a scene that contains Save Animation information. In other words, if you choose Save Animation and choose either the HIIP AVI32 or HIIP AVI16 Animation Type, you can then render out your AVI with no problem. However, if you then save the scene with this information and quit LightWave and later reload it to render, LightWave will crash. The workaround is to either (1) not save the scene with the Animation Type information and just enter it before you want to render (make sure when you save the scene you clear out the info) or (2) edit the information out of the scene file before reloading it by deleting the lines that start with "SaveAnimationName" and "AnimationType".

Pennello Lite is not working properly. Find the LWPNLO.p plug-in. The PNLOLITE directory containing all of the necessary brushes and Pennello files must be located in the same directory as the LWPNLO.p plug-in.

True Type Modeler support. While they're not something that arrived with the patch, enough people have had problems with generating True Type fonts on Windows systems to make it worth mentioning here. Modeler's implementation of True Type fonts doesn't properly take into account the "hole" in the middle of a letter such as a "D". Modeler will create this as two polygons—one for the letter, and one for the hole. There is a simple workaround for this situation: Simply cut all of the holes and paste them in another layer, then perform a Drill (Tools panel) on the Z-axis to cut the holes into the outer letters.

OpenGL viewer plug-in. Fori's OpenGL preview plug-in mentioned in a previous issue can now be downloaded from NewTek's and other sites for Windows versions of LightWave. If you aren't running Windows NT with its built in OpenGL support, you will have to download the OpenGL32.dll and Glu32.dll files from the NewTek site in order to get the preview plug-in to work. These dlls should be

see Editor's Message, page 18

Let There Be Light

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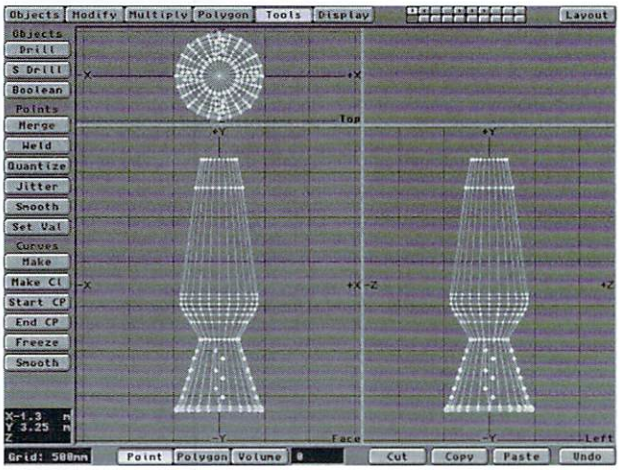


Figure 7

each lava ball to pull, stretch and size the lava over time.

For this tutorial, let's use choice number one and set up a displacement map:

- In Layout, load the final lava lamp object. If you elected to save the base separately, load that as well. Begin by loading the lava balls. I made six total, but only used four.
- Parent the lava balls to the lamp, and move them into position at the base of the lamp. Create keyframes for the lava balls at frame 0.
- Using a Fractal bump displacement map, set the size for the first lava ball like this:

Texture Size:	.3, X, Y, Z
Texture Amplitude:	0.1
Frequencies:	3
World Coordinates:	On

You can adjust the amplitude and texture size as needed. By moving the lava balls within the lamp, with World Coordinates turned on, the lava will move "through" the fractal bumps. This is a real time saver, since you won't need to calculate velocity.

Move the lava slowly from bottom to top, and back again. Make sure the lava doesn't push through the glass when setting keyframes.

The lava surface was a bit tricky. Here' s what I used:

Surface Color:	155, 225, 240
Surface Texture:	Fractal Noise
Texture Size:	.4, X, Y, Z
Texture Color:	75, 183,1 40
Frequencies:	2
Contrast:	0.5
Specularity:	30%
Glossiness:	High
Edge Transparency:	Opaque
Smoothing:	On

These settings can vary, of course, depending on your lighting and scene.

The glass of the lava lamp has the following surfaces:

Surface Color:	32,140,254
Luminosity:	30%
Diffuse:	85%
Specularity:	100%
Glossiness:	High
Transparency:	80%
Color Filter:	On
Refractive Index:	1.43
Edge Transparency:	Normal
Smoothing:	On

One other thing I've been doing when animating plastic or glass is reflecting that good old fractal reflections image by about 15 percent. The base is a silver metal surface, with my own reflection map made in Photoshop. If you don't have anything other than the default silver surface supplied with LightWave, use it, but with variation. Change the 100 percent reflection to about 45 percent, and change luminosity to about 55 percent. This gives it a bit more realism. You may want to add some fractal noise to dirty it up if you don't have an image map to do so. The cap is also a silver/metal surface, but I gave it a slight bump map to mimic plastic.

- Finally, in the Camera panel, select Trace Shadows and Trace Refraction.

Lighting this puppy takes two lights. A point light, set to around 200 percent, is placed in the base. Because I chose to cut holes in the base, the light will filter out.

The next light, set to 350 percent, is placed at the base of the glass lamp. I used a point light that was set as a bright aqua-blue color to match the real lamp.

From this point, you can vary your lighting as you see fit. At times, the main lava light was up to 450 percent, depending on what the background was. Remember, the lava lamp is glass, and you do see through it.

Although not complex in its design, the output can really spice up your demo reel. A lava lamp is something not often seen animated. Simple to build, simple to animate, but it looks cool. That's LightWave for ya! See you next time.

LWP

Dan Ablan is president of AGA Digital Studios in Chicago. AGA uses three LightWave workstations to create graphics and animations for video, corporate and broadcast productions and Internet graphics. Reach Ablan at dma@mcs.net.

Windows to the Soul

continued from page 7

does. I find studying human reference very valuable in all aspects of character animation. Once you have a character's motion and emotions grounded in reality, alterations and exaggerations are even more effective.

Whether you're using these objects or a method of your own design, the idea is the same. Slapping a set of eyes on any object will turn it into character, but exactly how and why you do it is what will make you shout, "It's Alive!"

LWP

Jeffery Michael Scheetz is a member of NewTek's Tech support division and can be reached at jscheetz@idir.net.

Editor's Message

continued from page 16

copied to your System directory. Make sure you look for the plug-in, once loaded in Modeler, in the Custom popup menu in the Tools panel as opposed to the one located in the Objects panel. There have been a few reports of the plug-in not showing up in either Custom popup menu. If this happens, check to see if you can access it in the Configure Keys requester. If so, assign it to a function key and don't worry about it. I assigned mine to the F9 key (like LightWave's test render shortcut). If it doesn't show up in the Configure keys requester and you did not change the name of the plug-in in any way before adding it, I don't know what to tell you. For some reason, on a few select systems, it will not show up.

How About the Amiga?

So what about the Amiga version? After much anticipation and frustration, final 4.0 for the Amiga has shipped as well as all the other platforms. There have been complaints about the slowdown in rendering versus the 3.5 Amiga version, which, unfortunately, you will find to be true. NewTek had to change compilers on the Amiga to produce 4.0 and the new compiler's optimizer is pretty buggy and produces some bad code. As a result, not all of LightWave is optimized, and because of this, a slowdown can be seen. Unfortunately, there is not an overabundance of Amiga compilers right now and no commercially supported ones that I currently know of. Hopefully, with the resurgence of the Amiga, this situation will soon change, and LightWave can be better optimized for the Amiga.

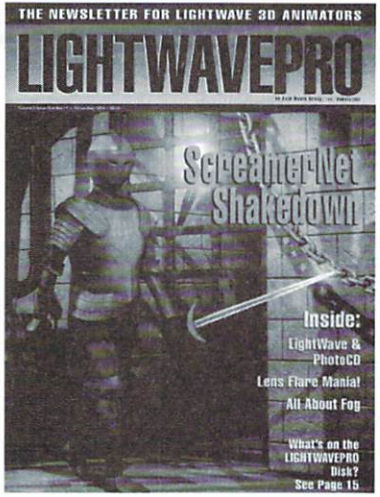
Speaking of the Amiga, one of the pleasant things about the newest version of LightWave for the Amiga is that ScreamerNet II is supported for Amigas that share network drives. It works the same as the version for Windows and for help in setting it up, see this month's Painless ScreamerNetting article.

Now that LightWave 4.0 has (finally) shipped, what do you think the LightWave development team is doing? Vacationing in Hawaii? Nope. They're working on the next version of LightWave! NewTek's keeping quiet about this one, as they've learned some valuable lessons about product shipment announcements in the last year. It has, however, been confirmed (by NewTek) that they are working on OpenGL support for both Layout and Modeler. You'll be able to see shaded feedback for objects with the ability to adjust surface color, diffuse level, specularity, glossiness, smoothing and light placement. Don't ask NewTek when it's going to ship because they won't tell you... even if you beg 'em to.

Finally, this issue of *LIGHTWAVEPRO* contains the article index for 1995. (It was supposed to go into the December '95 issue, but I forgot all about it, and it took the kindness of an e-mail message to remind me.)

John Gross
Editor

LWP



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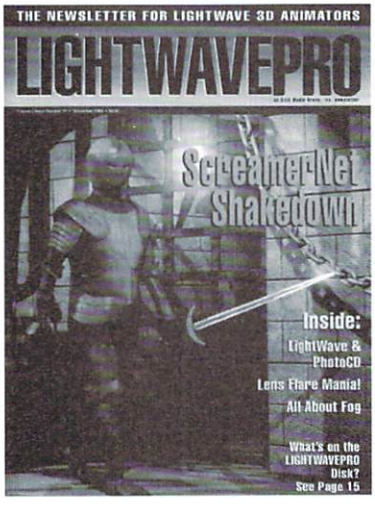

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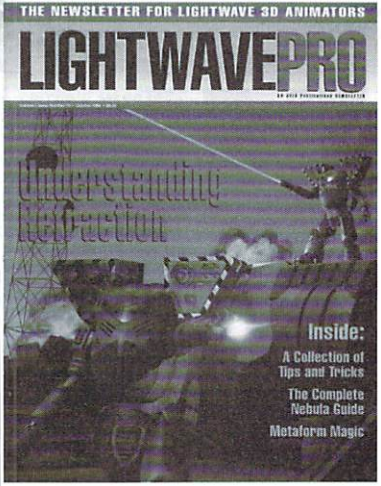

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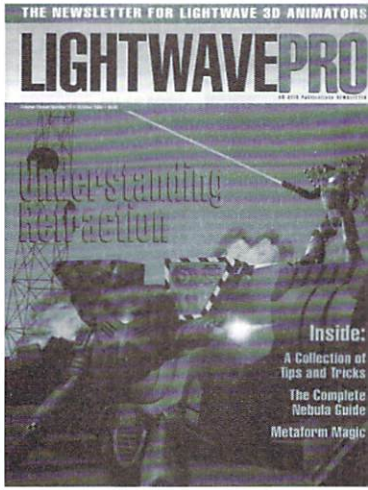

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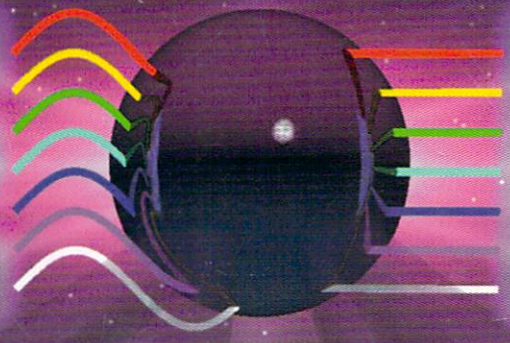

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