

PRIMATTE S-100
for
AVID/Softimage|DS*

Manual/Tutorial
Version 7.02/7.03**
March 22, 2004

***Includes NITRIS support**

****7.02=Main DS System/7.03=RPS Systems**

Photron

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1. Installation Information

The version of Primatte for AVID|DS 7.x uses the MacAddress method of licensing the product. To get a temporary license, you must install Primatte on your C:\ drive. You may have received Primatte for DS 7.x in either of two formats:

- **If you received a CD from Photron**, it should autorun when the CD is inserted. If it doesn't, execute the **Setup.exe** file on the CD. **If you downloaded the file**, it will be in zip format. Unzip the file to a temporary folder and execute the **Setup.exe** program. Follow the onscreen instructions and Primatte for DS 7.x will be installed onto your system.
- Once installation is complete, go to **Start\Program Files\PHOTRON USA\Primatte for DS v7.0\License** and execute the **GetMac.exe** program. This will open a window showing your machine's NIC or MacAddress (this has nothing to do with Apple Macintosh computers). A MacAddress looks like this **00:08:04:36:3a:6d** and is a unique identifier of your system.

NOTE: Please confirm that you get the same MacAddress if you run the **GetMac.exe** program a second time.

NOTE: Both of the above procedures must be executed on the same machine that you run Avid|DS 7.x on.

- Send this MacAddress to sgross@photron.com and you will get an e-mail reply with a Primatte Registration License. A temporary Primatte Registration License will have 30 characters in it and look something like this **5874ae0b14029774|0700+20010418**. A permanent Registration License will have 21 characters in it and look something like this **10a234547e007974|0700**.

NOTE: The **|0700** section of the license indicates the version of Primatte that the license is registered to. Make sure that it matches the version number on your Primatte CD or downloaded file.

- Once you have your license, go to **Start\Programs\PHOTRON USA\Primatte for DS v7.0\License** and execute the **RegLic.exe** program. Enter the Registration License that was e-mailed to you in the window area provided (it is usually easier to copy/paste the license from your e-mail to avoid transcription errors). Click on the **Registration** button and the **RegLic.exe** program will save the license as **C:\Program Files\PHOTRON USA\Primatte for DS v7.0\license\Dprim.lic**.

NOTE: Please do not change the name or location of the Primatte **License File:** field. The license will not be recognized if you do.

- Check the message at the bottom of the window. If you see **Registration Complete** there, Primatte for DS 7.x. is unlocked and activated. If you do not see **Registration Complete**, please e-mail sgross@photron.com and tell Scott the error message that appears.
- Exit the **Reglic.exe** application and launch Avid DS 7.

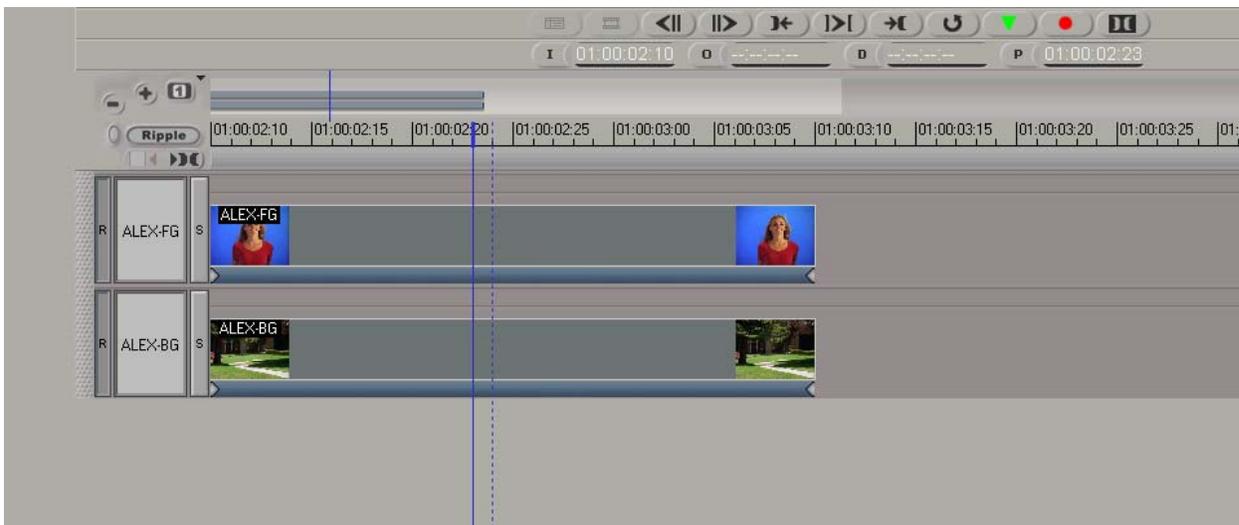
2. Accessing the Primatte plug-in from DS

- Start up DS.

There are several methods to apply the Primatte keyer; we shall describe three of them below. The operation of the keyer is the same regardless of the method used to actually implement it in DS.

Keying in the Compositor using the Layer method:

- Select the Compositing layout by pressing F6 or by clicking on the Compositing icon  in the left hand margin.
- This operation will display the DS timeline in the lower right of the DS window and the Layer View on the left screen.
- Change the folder in the browser directory on the top left screen to find the clips you wish to use in the composite.
- Drag the background clip to the empty track on the timeline.
- Drag the foreground clip (the blue or greenscreen clip to be keyed) to the timeline ribbon to make a new track and layer. The initial track settings should now appear as shown below.
- Align the playhead so that the vertical blue 'current time' line crosses over both a section of the foreground and background images as shown below.



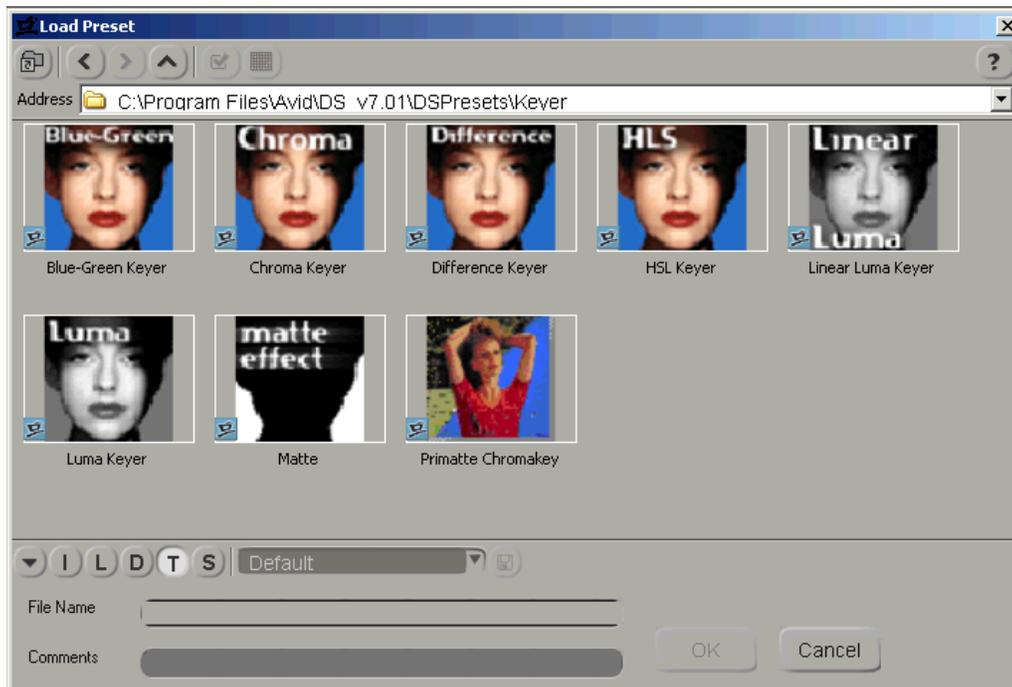
- Looking at the layers view should show your two layers as below.



- Click on the button labeled as Key button in the Compositing area on the foreground image. It will show a checkmark next to it after you have selected it (as shown below).



- The default DS Blue-Green keyer window will be loaded, and its PPG will open up.
- Click on the Load Preset icon  in the upper right corner of the Blue-Green keyer window.
- You will be presented with the Load Preset window (the actual folder you are presented with will depend on your last used directory)...



- Navigate to the Keyer folder in the factory DSPresets folder.

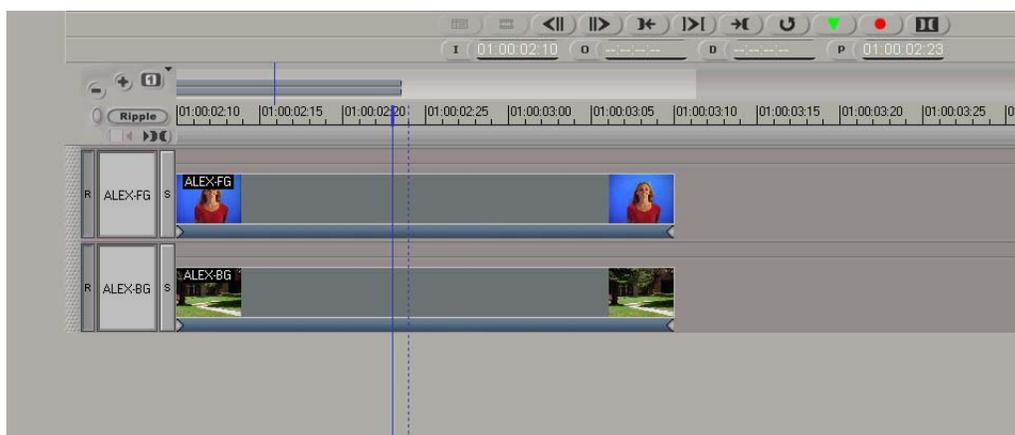
- Click in the picture of the Primatte keyer icon  , or its name, if you do not have Thumbnails view selected, and select the OK button at the bottom of the Load Preset window. Primatte is now loaded as a layer keyer.

Keying in the Compositor using the Tree method:

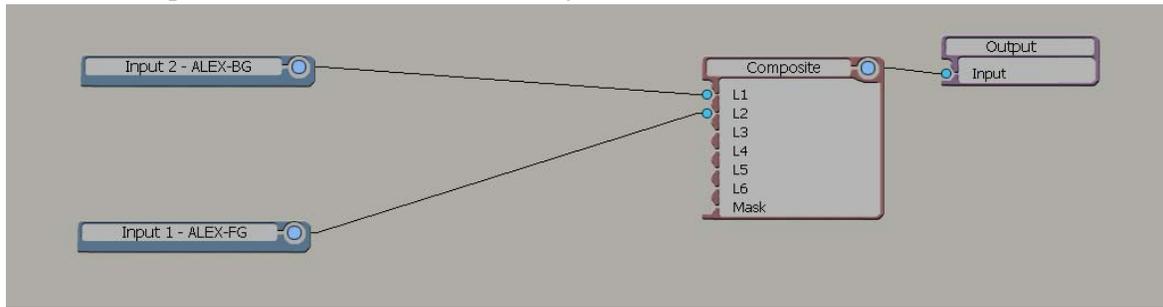
- Select the Compositing layout by pressing F6 or by clicking on the Compositing icon  in the left hand margin.
- This operation will display the DS timeline in the lower right of the DS window and the Layer View on the left screen.
- Use the Avid Explorer on the left screen to find the clips you wish to use in the composite.
- Drag the background clip to the empty track on the timeline.
- Right-click drag the foreground clip (the blue or greenscreen clip to be keyed) to the timeline ribbon to make a new track and no new layer. The initial track settings should now appear as shown below.



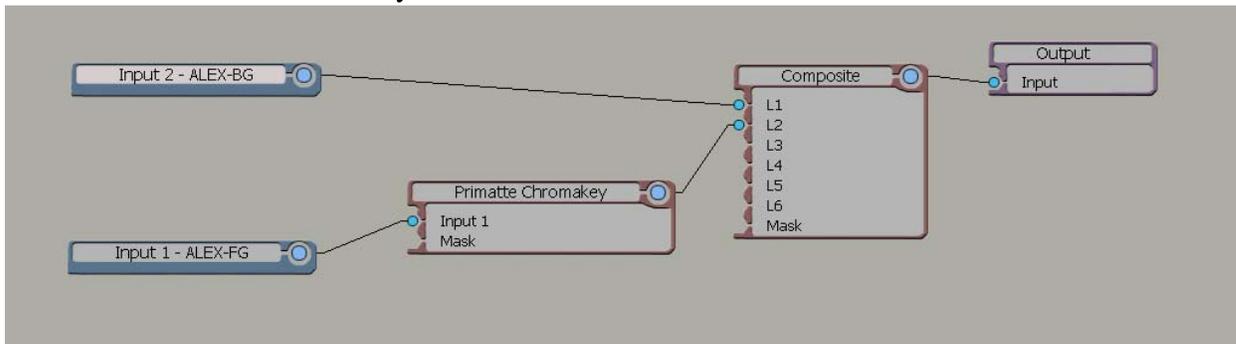
- Align the playhead so that the vertical blue line crosses over both a section of the foreground and background images as shown above.
- Using the Track Selector drag the Foreground image into the tree area at the bottom of the left screen.



- Load a composite node and feed the two layers as shown below:

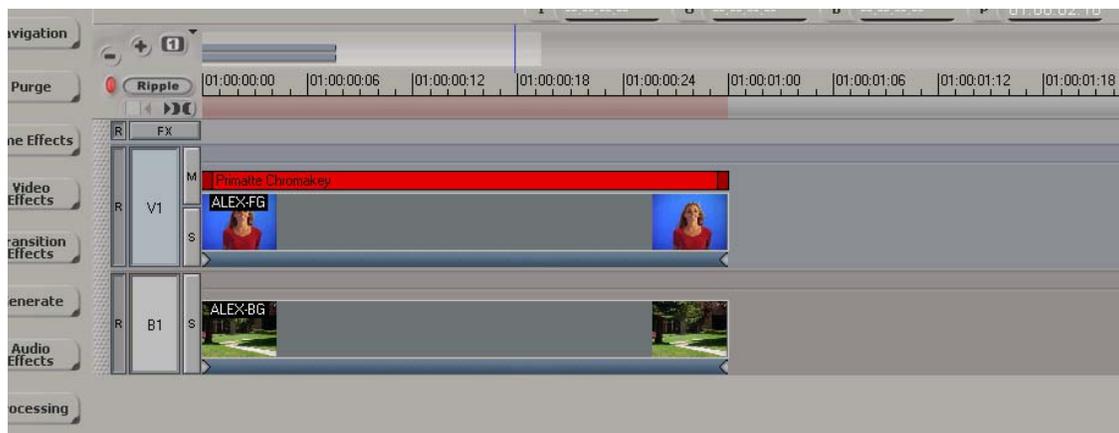


- Now load the Primatte keyer as a node between the foreground image and L2 of the compositor as shown below:
- Primatte is now loaded as a keyer within a tree.



Keying on the Timeline using Video Tracks (Layering).

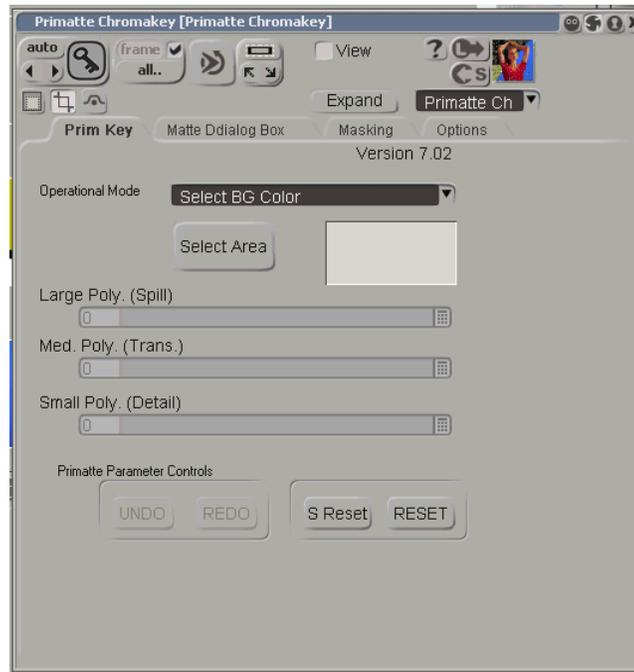
- With your background image loaded on a video or background track, drag your blue or greenscreen image to the timeline ribbon on the timeline to place the clip onto a new Video track.
- Select the foreground clip and apply a clip effect to it (the quickest way to apply a clip effect is by pressing the apostrophe key. Note: check your keyboard mapping).
- Navigate to the DSPresets\Keyer folder and select the Primatte Chromakey.
- Primatte is now loaded as an Video Track Clip Effect.



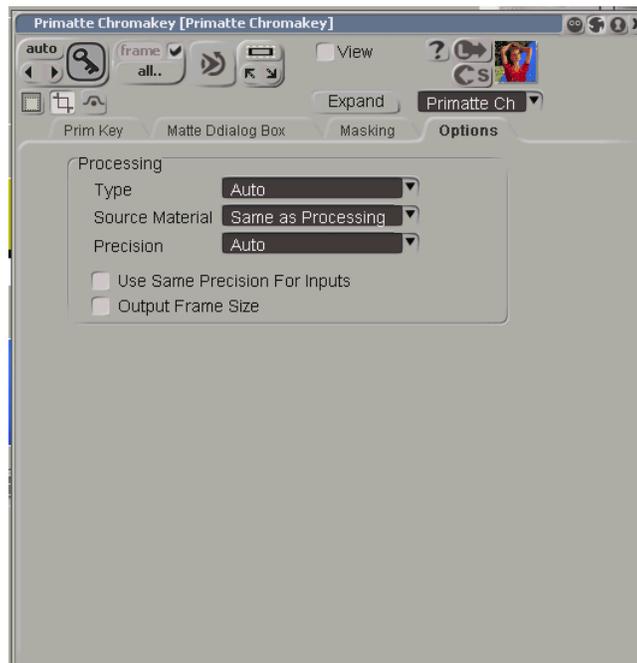
3. Primatte plug-in operation

NOTE: The next section describes the operation of the Primatte plug-in. The remainder of this tutorial is the same whether you are using Primatte as a 'keyer' or as a 'filter'. A more detailed explanation of how the Primatte algorithm works can be found in Section 6 of this manual.

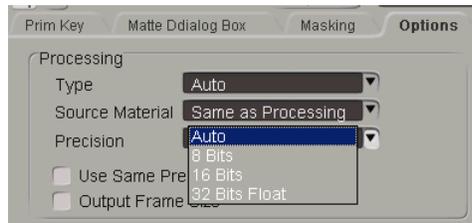
- The Primatte plug-in interface area will appear as shown below.



- First click on the **Options** tab. The interface will then look like this...



- Then click on the **Precisions** pop-up and choose the desired bit-depth; 8-bit, 16-bit or 32-bit float.



Note the following limitation: This version of Primatte for DS 7 does not support **superblack** and **super-white**.

Note the following limitation: Primatte generates 16-bit mattes in the floating mode. The alpha blending is calculated in floating precision but the alpha itself is restricted to 16-bit.

- After selecting a precision, click on the **Prim Key** tab to continue.
- The basic functionality for the Primatte plug-in interface is centered around the Operational Mode

selector:  The top field indicated here by the Select BG Color  option is the Operational Selector where the user selects which operational mode he wants to be in.

- There are four main steps to using the Primatte plug-in and Select BG Color is the first step. This comes up as the default mode when the plug-in is first accessed.

- Press the “Select Area” button on the PPG  and position the cursor in the bluescreen area (or whatever background color you are using), near the foreground object. Select a rectangular area to sample the targeted background color. Release the mouse button and the Primatte will start the compositing process. If the foreground shot was done under ideal shooting conditions, Primatte will have done 90-95% of the composite in this one step.

TIP: If you made a large rectangle in the blue area, Primatte averages the multi-pixel sample to get a single color to adjust to. Sometimes Primatte works best when only a single pixel is sampled instead of a range of pixels. The color selected at this point in the procedure is critical to the operation of the plug-in from this point forward. Should you have difficulties further along in the tutorial after doing a range of blue shades, try Select BG Color again with a single dark blue shade or single light blue shade.

TIP: If the foreground image has a shadow in it that you want to keep in the composite, do not select any of the dark blue pixels in the shadow and it will come along with the rest of the foreground image.

- The second and third steps in using Primatte require viewing the alpha channel of the image in the main DS viewer. Click on the View Alpha  button. The display window will show a black and white view of the matte being created by Primatte.

TIP: If you are working in an Overlay track you will need to solo the track to see the alpha.

TIP: If you are working in a tree you will have to “View” the Primatte node to see the alpha.

- Change the Operational mode from Select BG Color to Clean BG Noise . If there are

any white regions in the dark, 'bluescreen area', it is noise and should be removed. If it isn't selected, click on the Select Area button. Then make rectangles in the whitish noise regions. Each time you let up on the mouse button, Primatte will process the data and eliminate the noise. Repeat this as often as necessary to clear the noise from the background areas. Sometimes increasing the brightness of your monitor or the screen gamma allows you to see noise that would otherwise be invisible.



Before Background noise removal



After Background noise removal

TIP: When clearing noise from around loose, flying hair or any transitional area, be careful not to select any of areas near the edge of the hair. Leave a little noise around the hair as this can be cleaned up later in the Fine Tuning (Sliders) procedure.

TIP: Most pixels displayed as a dark color close to black in a matte image will become transparent and virtually allow the background to be the final output in that area. Consequently, there is no need to eliminate all noise in the bluescreen portions of the image. In particular, if an attempt is made to meticulously remove noise around the foreground object, a smooth composite image is often difficult to generate.

- If there are dark regions in the middle of the mostly white foreground object, that is, if the key is not 100% in some portion of the targeted foreground, choose Clean FG Noise **Clean FG Noise** from the Operational Mode pop-up menu.
- Use the same techniques as for Clean BG Noise, but this time sample the dark pixels in the foreground area until that area is as white as possible.



Before Foreground Noise Removal



After Foreground Noise Removal

- These were the steps necessary to create a clean matte or key view of the image. With this key, the foreground can be composited onto any background image. However, if there is 'spill' on the foreground object from light that was reflected off the background, a final operation is necessary to get a more natural looking composite.

- For the fourth step in the Primatte operation return the display monitor to the Composite view by again clicking on the View Alpha  icon in the upper right corner of the DS interface window (and deselecting track solo/view node if applicable). This will return the view to the Composite view.
- The sample image on the next page has gone through the first three steps and has examples of spill. Notice the blue fringe to her hair and a blue tint on her right cheek, arm and chest.



- There are two ways to remove the spill color. The simple method is to select the Spill Sponge  mode from the Operational Mode selector and then sample the spill areas away. By just positioning the cursor over a bluish pixel and selecting it, the blue will disappear and be replaced by a more natural color. This can be done numerous times on the image to remove all traces of the background color.

Note: If the spilled color was not been totally removed using the above procedure, a fine-tuning operation should follow for more subtle and sophisticated removal of the spilled background color.

- Select the Fine Tuning (Sliders)  mode under the Operational Mode selector.
- Using the zoom and pan capabilities of the AVID|DS application, zoom into an area that has some blue edges.
- Using the cursor, sample a range of the blue pixels that you want to remove. When you let up on the

pen or mouse button, Primatte will register the average of the colors selected in the Color Chip



. For most images, the Fine Tuning (Sliders) slider is all that is required to remove any remaining bluespill. The more to the right the slider moves, the more background screen color will be removed from the sampled pixels. The more to the left the slider moves, the more the selected pixels will move toward the original foreground image's color. The Color Chip lets you monitor the amount of spill being removed from the sampled color. As you move the slider to the right, the sampled color in this color chip changes in real time, accordingly. When you have the color you want in this chip, release the pen or mouse button. Primatte recalculates the adjustments and automatically updates the image on the monitor. Repeat this technique as necessary to eliminate all remaining bluescreen regions from the composited image.

TIP: It is better to make several small samples to the blue areas than a single major one.

- You can use the other two sliders in the same way for different key adjustments. The Small Poly. (Detail) slider controls the matte softness for the color which is closest to the background color. For example, you can recover lost, rarefied smoke or a wisp of hair in the foreground by selecting the area where the detail has been lost in the Fine Tuning (Sliders) operational mode and moving the Small Poly. (Detail) slider to the left. The Medium Poly. (Trans.) slider controls the matte softness for the color which is closest to the foreground color. For example, if you have thick and opaque smoke in the foreground, you can make it semi-transparent by selecting an area of it and moving the Medium Poly. (Trans.) slider to the right.

TIP: If the foreground image changed color dramatically during the fine tuning process, you can recover the original color by selecting an area of the off-color foreground image and moving the Large Poly. (Spill) slider slightly to the left.

- If these final operations have changed the final compositing results, and you can see some transparent areas in the Mask Out view, you can use the Matte Sponge option in the Operation mode menu to clean up the mask. Select the Matte Sponge option and then click the left mouse button and make a rectangle around on the dark areas. These colors will be moved to 100% foreground, but will still retain the spill suppression settings you gave it.
- If these final 'spill suppression' operations have changed the final compositing results, you may have to return to earlier operations to clean up the matte. If the Composite view looks good, but a 100% foreground area has become slightly transparent, you can select that area in the Matte view and then using Fine Tuning (Sliders), move the Medium Poly. (Trans.) slider slightly to the left. This will move that color region from 0-99% foreground with spill suppression to 100% foreground with spill suppression and should solve the problem. See the section near the end of this manual for a description of how the Primatte algorithm works.

4. Primatte plug-in Tools and Buttons

Operational Popup Menu

- **Select BG Color** 

When this mode is selected, the auto set-up operation will be computed by sampling the target background color within the image window. For keying operations, this is the first step and should be followed by the fine tuning operations.

- **Clean BG Noise** 

When this mode is selected, the sampled pixels within the image window will be pixels known to be 100% background.

- **Clean FG Noise** 

When this mode is selected, the sampled pixels within the image window become 100% foreground. The color of the sampled pixels will be the same color as in the original foreground image.

- **Fine Tuning (Sliders)** 

When this mode is selected, the color of the sampled pixel within the image window is registered as a reference color for fine tuning. To perform the tuning operation, sample a color region on the image, select a slider option from the Primatte event window and move the slider to achieve the desired effect.

- **Spill Sponge** 

When this mode is selected, the background color component (or spill) in the sampled pixels within the image window is keyed out and removed. This tool can only be used once for each color region selected. For repeated or more accurate spill suppression, a Tune Color Selection operation should follow or be used instead.

- **Matte Sponge** 

When this mode is selected, the sampled color within the image window becomes 100% foreground. However, if the sampled color is already keyed out and removed, it leaves the current 'suppressed' color. It only affects the key information.

- **Make FG Trans.** 

When this mode is selected, the opaque foreground color region sampled in the image window becomes slightly translucent. This operation is useful for the subtle tuning of foreground objects which are otherwise 100 percent covered with smoke or clouds.

- **Restore Detail** 

With this mode selected, the completely transparent background region sampled in the image window becomes translucent. This operation is useful for restoring lost hair details and the like.



- **Large Poly. (Spill)**

When this mode is selected, the cursor motion in the Decolor slider performs a color adjustment of the sampled color against the background. After sampling a color region from the image, the more to the right the cursor moves, the less of the background color component (or spill) will be included in that color region. The more to the left the cursor moves, the closer the color component of the selected region will be to the original foreground image.



- **Medium Poly. (Trans.)**

Adjusts the transparency of the matte against the sampled color. After sampling a color region from the image, the more to the right the cursor is, the more transparent the matte becomes in that color region.



- **Small Poly. (Detail)**

Determines the transparency of the sampled color, which is closer to the background color. The Tune Value slider in this mode is useful for restoring the color of pixels that are faded because of a similarity to the background color.



- **Defocus Mask**

Determines the defocusing level being applied to the matte.

Note: With using this feature, foreground details and smoothness of motion blur may be adversely affected. Set it to 0 for optimum results.



- **Shrink Mask**

Determines the degree of background penetration into the foreground around the silhouette of the foreground object.

Note: With using this feature, foreground details and smoothness of motion blur may be adversely affected. Set it to 0 for optimum results.

Miscellaneous Menu Buttons:

- **Tuning Color Display or Color Chip**



Shows the color selected by Decolor selection procedure.



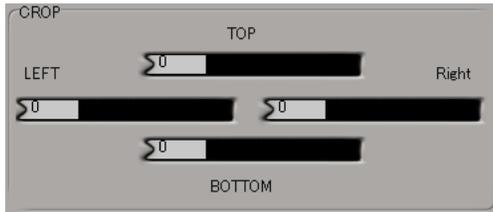
- **Undo**

Cancels the previous operation. Up to 2000 levels of Undo/Redo are supported.



- **Redo**

Redoes the previous operation. Up to 2000 levels of Undo/Redo are supported.



- **Crop Sliders**

These sliders control a rectangular 'garbage matte' feature that restricts the Primatte operation to a rectangularly-shaped portion of the image.



- **Soft Reset**

Resets the key control data back to the state it was before Spill Suppression. This would be after the **Select BG Color**, **Clean BG Noise** and **Clean FG Noise** operations, but before the **Spill Sponge** or **Fine Tuning (Sliders)** operations.



- **Full Reset**

Resets all of the key control data.

Options tab:

- **8-bit precision**

Selects 8-bit precision in all calculations.

- **16-bit precision**

Selects 16-bit precision in all calculations.

- **32-bits float precision**

Selects 32-bit floating precision in all calculations.

5. Troubleshooting Guide

Problem: Regarding anti-aliasing, the matte seems to be anti-aliased, but not the composite?

Possible Solution: If the matte has gray pixels that are not either 0% nor 100%, the value should be used to weigh-average the foreground and background for smoother compositing. You can check this capability by taking a blue background image and painting an airbrush stroke across it and then compositing it to another background.

Problem: After the composite is complete, I have some stray pixels in the background area that are not 100% background. I select 'matte view' and the pixels show up as completely black. How can I get rid of these?

Possible Solution: In the **Fine Tuning (Sliders)** mode, click on one of these pixels and then move the **Small Poly. (Detail)** slider to the right a little bit, .05 - .10 should be enough in most cases. This will move those pixels closed to the original background color.

Problem: After doing the 'fine tuning' procedure, I get a yellowish tint on the foreground object in the final composite. How do I fix this?

Possible Solution: You may have done too much decoloring in the 'fine tuning' stage. It is best if you do several small incremental changes rather than one large decoloring. To recover from this problem, you can use the **Fine Tuning (Sliders)** mode to remove the over-corrected areas. Re-click on the image area that contains the yellowish tint and move the **Large Poly. (Spill)** slider to the left slightly to return that color region closer to the original colors. This should return that color region back towards the original color and remove the yellowish tint. You may have to go back in and do some more fine-tuning, but this time select only the pixels that contain some background color and make them small areas. Adjust the slider to the right only a small amount.

Problem: I get a red halo around the foreground object after compositing.

Possible Solution: This could be because of non-linearity in the foreground image color distribution. For PRIMATTE to deliver the best results, the foreground image should not have any pre-processing done to it. This leaves the edges of the image with a linear color distribution and allows PRIMATTE to do an excellent composite. If the foreground image was pre-processed, the soft-keying will produce a false-color processed foreground and result in a 'halo' effect that cannot be avoided.

Possible reasons for having a non-linear color distribution:

- 1) Edge enhancement filtering (a detail filter in the video camera) may have been applied to the original foreground when it is scanned from film. [Solution] Please re-scan the film without any filtering.
- 2) Poor filtering in the D1 4:2:2 to RGB decoding process. [Solution] Use a higher quality D1 decoder.
- 3) Inappropriate picture gamma value. [Solution] Change the RGB gamma (or Red gamma only) and save it. Use this image to composite in Primatte. After using Primatte, apply the inverse gamma value to recover the original picture tone.

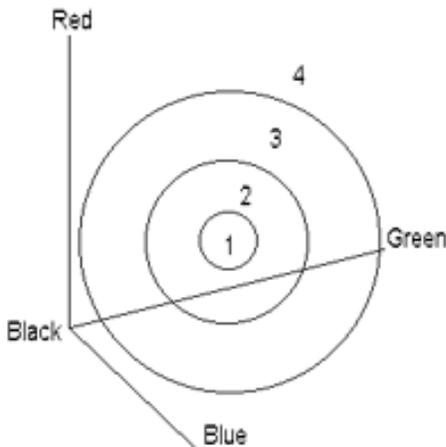
6. More about the Primatte Polyhedral Slicing Algorithm

Explanation of how Primatte works...

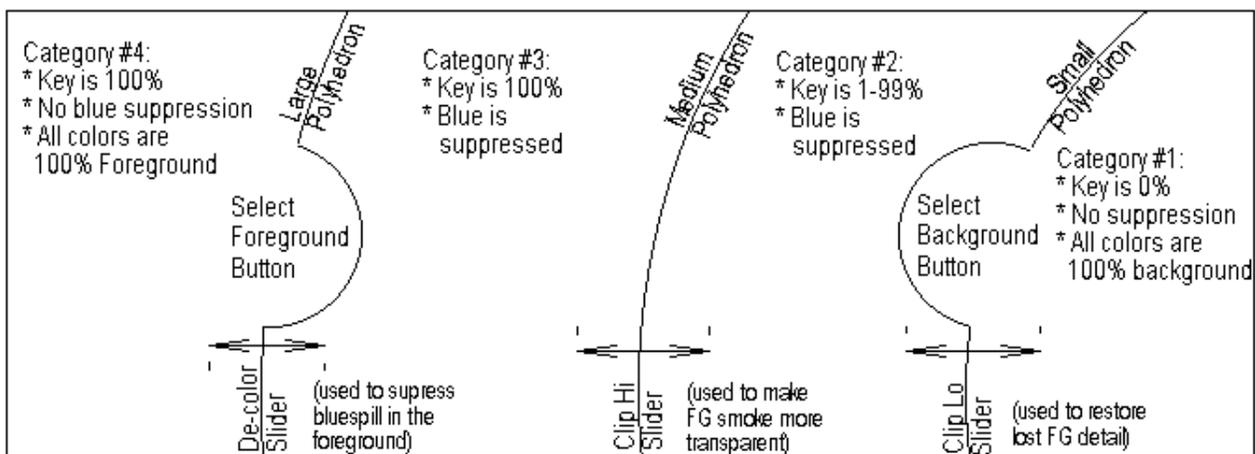
The Primatte algorithm operates in 3D RGB Color Space. Some users may want to be able to see a visual representation of the algorithm and how it works.

The patented Primatte Polyhedral Slicing Algorithm is at the heart of the Primatte for DS plug-in. To use Primatte most effectively, it sometimes helps to understand how the algorithm works. This is a brief explanation, but to get a more extensive understanding, please contact Photron USA for a **Primatte White Paper** which explains the algorithm in much more detail.

Basically, Primatte separates all of the pixels in the foreground image into one of four separate categories. It does this by creating a 3D RGB color space for the foreground image and building three concentric polyhedrons, one within the other. By doing this, we separate all the colors in the foreground image into one of four areas:



While the polyhedrons are displayed as circular shapes in the above drawing, in reality, they are more like globes made up of 128 surfaces that can be distorted into many different shapes to accommodate the color regions in each unique foreground image. Looking at the four regions that are created by these polyhedrons we can see that each region has a particular property.



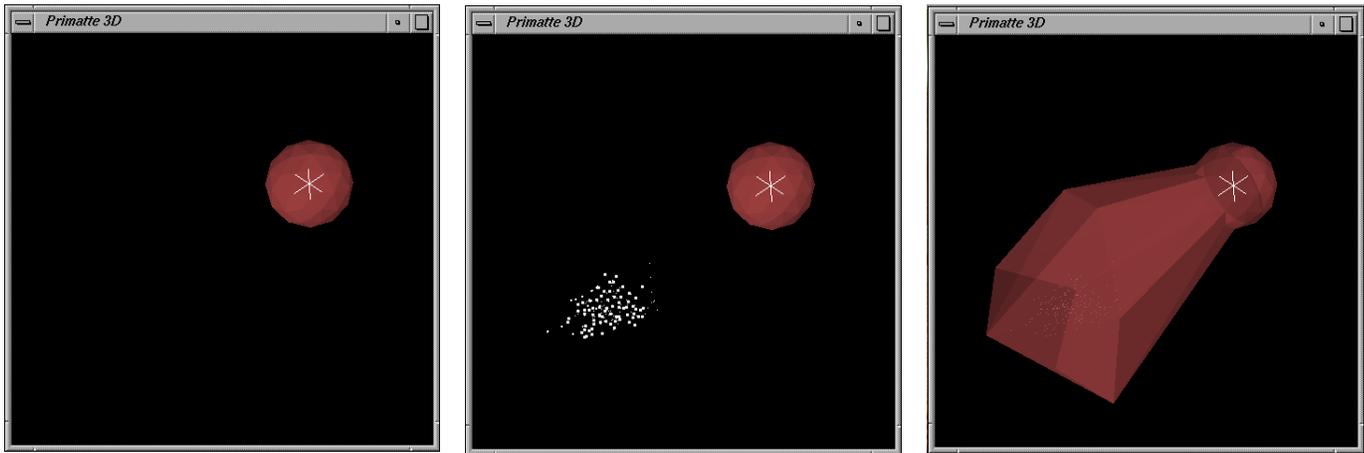
Category #1 is the small polyhedron and contains all of the pixels in the foreground image designated as 100% background. This means the foreground colors in the small polyhedron will be replaced completely with background pixels.

Category #2 is the region between the small polyhedron and the medium polyhedron. These foreground pixels are designated as the transition pixels between the foreground and the background. These pixels are where Primatte blends the original background pixels with the foreground. Foreground object edges, wisps of hair and smoke pixels are found in this region.

Category #3 is between the medium and large polyhedrons. These pixels are 100% foreground, but have background 'spill suppression' applied to them. This is for pixels in the center of the foreground object where you want the bluespill suppressed, but you don't want background pixels blended in.

Category #4 is reserved for 100% foreground pixels that are unchanged from the original image. All the foreground colors that are outside the large polyhedron are exactly as they were in the original foreground image.

When in the **Fine Tuning (Sliders)** operational mode, the **Large, Middle and Small Poly** sliders do not increase the entire circumference of the polyhedron, they just bulge or dent it in the particular color region that you registered prior to moving the sliders. All colors in the foreground image are forced into one of the four categories. After you have selected a bluish pixel in the **Fine Tuning (Sliders)** mode and are moving the **Large Poly (Spill)** slider to the right, you are bulging the large polyhedron and moving the registered color region from **Category #1** to **Category #2**. This will leave the color region as 100% foreground, but suppresses the blue or green tinge. It will affect all similar colors in the foreground image.



As another example, when you are in the **Clean Bg Noise** mode, every time you designate a region of white noise, the small polyhedron enlarges slightly in that direction, encompasses those pixels and makes them 100% background. The left-hand image above shows what the small polyhedron would look like if you selected a single green pixel from the greenscreen area of the foreground image in the **Select Bg Color** mode. The center of the polyhedron is the color of green that you selected and by making a small globe, we also grab a few other shades of green that are near the shade of the selected pixel. The middle image shows the shades of green (the white dots) that might be selected in the **Clean Bg Noise** mode. These would be milky white areas in the background of the foreground object. The right-hand picture shows how the small polyhedron automatically bulges itself to enclose those new shades of green. Once they are inside the small polyhedron, they are classed as 100% background pixels and are replaced by the corresponding pixels from the background image. If you selected a second milky, white area, the small polyhedron would expand to encompass those

shades of green.

When you lose some smoke or hair detail, you can dent the small polyhedron using the **Restore Detail** operational mode. This operations dents the small polyhedron in that area and releases the previously missing smoke or hair into the visible area between the small and medium polyhedron.

Between the medium and the large polyhedron (**Category B**) are the pixels in the center of your foreground objects. These have to stay 100% foreground, but do need blue suppression applied. The last category (**Category A**) is outside the large polyhedron. These are foreground pixels that are 100% foreground and do not need blue suppression.

All Primatte manipulations involve moving foreground pixels between these four categories. A passive graphical display can be used to show the Primatte polyhedrons interactively. To see the Primatte algorithm in action, proceed to the next chapter in this manual.

7. If you have trouble...

Please contact our technical support person (below) or your reseller:

Scott Gross

Phone: 1-530-677-9980

FAX: 1-530-677-9981

Cell: 1-530-613-3212

E-mail: sgross@photron.com

Note: Standard support times are between the hours of 9AM and 6PM (Pacific Time), but he will try to help you anytime, if possible. Leave a message or a return phone number at the phone number of 1-530-677-9980 and he will get back to you as soon as possible.

Primatte License Key Application Form for the Softimage DS Product

Please include the following information:

Company Name: _____

Company Address: _____

City: _____

State/Prov.: _____ Zip Code: _____ Country: _____

Contact Name(s): _____

Contact Phone Number: _____

Contact FAX Number: _____

Contact E-mail Address: _____

Mac Address Number: _____ (See 1. Installation Information above)

DS Version Number: _____

Desired Format: CD-ROM I'll get it from the web site

Then post this information via E-mail to sgross@photron.com or FAX it to Scott at 1-530-677-9981. We will e-mail or FAX your license key back to you. Thank you.