

Paint, Roto, and Puppet

Exploring Paint, Roto Brush, and the Puppet tools.

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▽ Getting Started

Copy the **Lesson 10-Paint, Roto, and Puppet** folder from this book's disc onto your hard drive, and make note of where it is; it contains the project files and sources you need for this lesson.

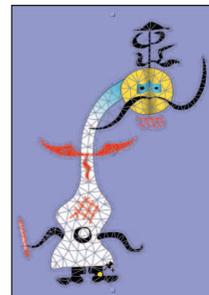
This lesson will focus on advanced techniques for manipulating and enhancing layers: Paint, Roto Brush, and the Puppet tools.

After Effects Paint is based on a simplified version of Adobe Photoshop's paint tool, with the added element of time. It allows you to paint nondestructively onto a layer, and to reveal or erase parts of an underlying image; Paint can also clone from one area of an image to another, as well as from a different frame. Paint only works in the Layer panel, but every single stroke is exposed in the Timeline panel, allowing you to retime, edit, and animate the brush settings and location of the stroke after the fact.

Roto Brush is an intelligent paint tool that helps automate the time-consuming process of separating a foreground object (such as an actor) from its background, allowing new imagery to be placed behind it. To accomplish this, you draw simple strokes that define the foreground and background, and After Effects determines the boundary between the two.



The **Puppet** tool provides an alternate way to warp layers. Imagine your image being printed on a sheet of rubber, which is automatically trimmed to the outline of your layer. Then imagine pushing pins through areas of that layer, such as where feet and hands are. Then imagine dragging some of those pins around...



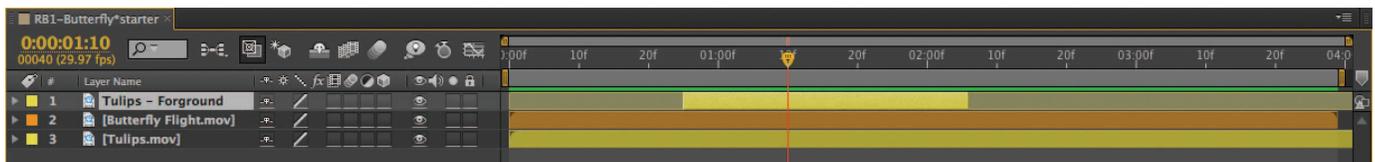
Roto Brush

Roto Brush is an intelligent paint tool that helps automate the process of creating an alpha channel for an object (the *foreground*) to separate it from the rest of the image around it (the *background*). To accomplish this, you draw simple strokes that define the foreground and optionally the background, and After Effects determines the boundary between the two. After Effects then uses motion estimation to track how this boundary changes over time, with help from you in the form of corrective brush strokes. It's not perfect, but it's often better than trying to paint or mask every frame by hand.

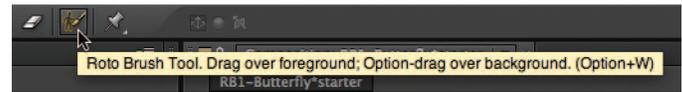
We'll start with a simple task so you can gain familiarity with Roto Brush's basic tools. We'll move on to a more challenging exercise, guiding you through the preferred workflow for achieving optimal results. Mastering this workflow will provide you with a far more rewarding experience than simply applying Roto Brush at its default settings.

Instant Gratification

- 1 Close any previous compositions and open **Comps > RB1-Butterfly*starter**. RAM Preview; a butterfly wafts over a tulip garden. The problem is that the butterfly looks unnatural flying in front of all the flowers – from this camera angle it should be behind the foreground tulips. To make this happen you need to cut out the foreground flowers and paste a copy of them in front of the butterfly.
- 2 Select **Tulips.mov** and press **⌘ D** (**Ctrl D**) to duplicate it. Press **Return** to highlight the duplicate layer's name and change it to "**Tulips – Foreground.**" Press **Return** again to accept the new name.
- 3 Using Roto Brush can be time consuming and tedious, so you don't want to use it on more frames than necessary. Scrub the current time indicator until you reach the frame where the butterfly's wing first touches a tulip petal. With **Tulips – Foreground** selected, press **⌘ I** (**Alt I**) to trim the layer's in point. Then scrub the time indicator to the last frame where the butterfly touches a petal and press **⌘ O** (**Alt O**) to trim the layer's out point.



- 4 In the Timeline panel, drag **Tulips – Foreground** above **Butterfly Flight.mov**. Place the current time indicator at 01:10; the foreground clip currently obscures the butterfly.



The Roto Brush tool is to the right of the Paint tools. Like the Paint tools, it must be used while in the Layer panel.

factoid

Rotoscoping

The term *rotoscoping* was originally used to describe the process in which the movement of live actors was traced to create an animation. It is now commonly used to describe the process of cutting out a foreground object (such as an actor) from its background.

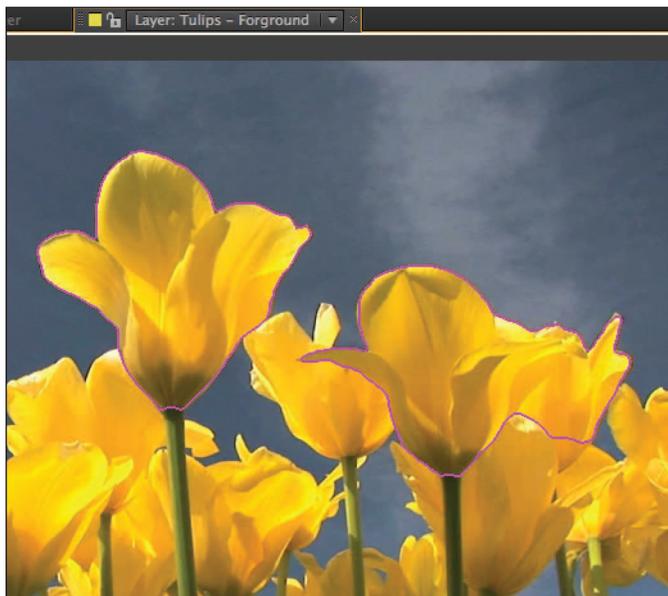


- 1 The goal is to make the butterfly fly behind the foreground flowers without having to paint or mask every single frame. Tulips courtesy Artbeats/CrackerClips CC-FH101-74; butterfly illustration courtesy Dover.

- 4 Trim a duplicate of the background to cover the time span you wish the flowers to be in front of the **Butterfly Flight** layer.



7–8 Drag the Roto Brush Foreground tool inside of the area you wish to keep. Add as many strokes as necessary to fully define your desired foreground (above). After Effects will draw a pink Segmentation Boundary between what it believes to be the foreground and the background (below).



9 The short yellow bar is your Base Frame (right) where you initially drew strokes to define the foreground and the background. The Roto Brush Span indicates how many frames before and after the Base Frame this information will be propagated. The thin green bar indicates which frames Roto Brush has calculated; it must calculate them in sequential order.

5 Make sure the Comp panel’s Resolution is set to Full; this is required to work accurately with the Roto Brush tool. Then double-click **Tulips – Foreground** to open it in the Layer panel: As with Paint, Roto Brush must be used in this panel so you have an unaltered view of your source layer.

6 Select the Roto Brush tool (it’s the icon of a little man being tickled by a big paint brush!). Move the cursor over the Layer panel; a green circle with a + symbol in the middle will appear. As with the Paint tools, you can resize this brush by pressing **⌘ (Ctrl)**, then clicking and dragging. Set it to be roughly twice the width of the foreground tulip stems.

7 Click near the top of the middle petal of the foreground tulip and drag downward toward the base of the petals. You don’t need to be precise, but it’s essential that your brush touches only the flower petals (the foreground) and not the sky (the background). Release the mouse and a pink *Segmentation Boundary* will be drawn around this flower’s petals. The Effect Controls panel will also open with a Roto Brush effect applied to this layer.

8 Remember that the butterfly’s wings touched more than one flower. Click and drag through the petals of the second foreground flower to the right; a Segmentation Boundary will also surround it.

9 Turn your attention to the Layer panel’s timeline. You will see a short yellow bar at its time marker. This indicates a *Base Frame*, which contains the foreground and background definitions Roto Brush will use to guess motion in the rest of the clip. Now look for the gray bar with arrows pointing away from the Base Frame: This defines the *Roto Brush Span*, which is how far before and after the Base Frame After Effects will try to “propagate” your strokes. Note that it does not completely cover the trimmed segment for this layer.



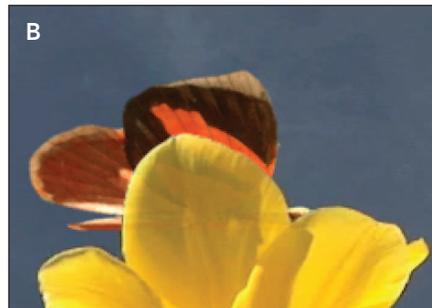
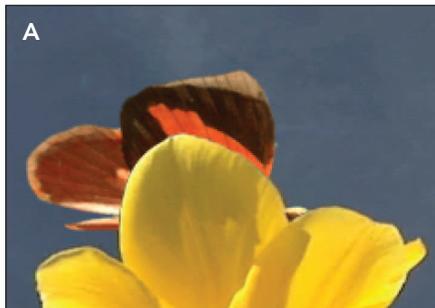
Just as with the Paint tools, the **1** and **2** keys may be used to step backward and forward in the Layer panel when the Roto Brush tool is active. Press **2** to step forward: After a pause, a green bar will extend from the Base Frame to the time marker's location. This indicates After Effects has calculated any movement between frames and has updated the Segmentation Boundary to match. Refining this propagation is the secret to achieving good results with Roto Brush; we'll discuss this at length in the next exercise.

10 Click the Composition panel's tab to bring it forward. The butterfly is behind the flower petal – hurray! But before you get too excited, RAM Preview: After a pause for Roto Brush to calculate each frame, the butterfly disappears briefly starting around 02:00. This is because your Roto Brush Span did not last for the duration of this layer.

11 Click the Layer panel's tab to bring it forward again and locate its time marker just after the Roto Brush Span ends. The Segmentation Boundary will surround the entire frame. Since Roto Brush seemed to be working fine up until this point, you can drag the right end of the Roto Brush Span to the right until it covers the entire trimmed segment for this layer. Bring the Comp panel forward again and RAM Preview; the butterfly will now fly behind the foreground flowers as desired.

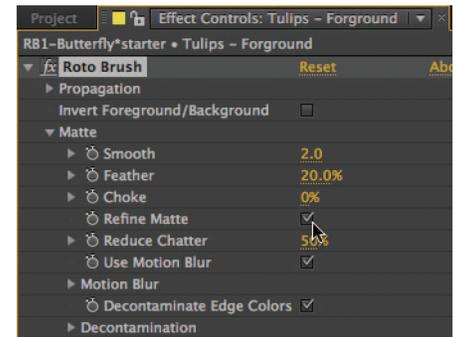


11 If necessary, trim the Roto Brush Span to extend it for the desired number of frames.



12 Move the current time indicator to 01:12 and closely observe the edge between the petal and wing: A faint black “matte line” is visible. To improve this, enable Refine Matte for Roto Brush in the Effect Controls panel. This engages the second half of the Roto Brush effect that deals with color “contamination” plus calculates motion blur. As a final touch, slightly reduce the Opacity for **Tulips – Foreground** to make the petal translucent.

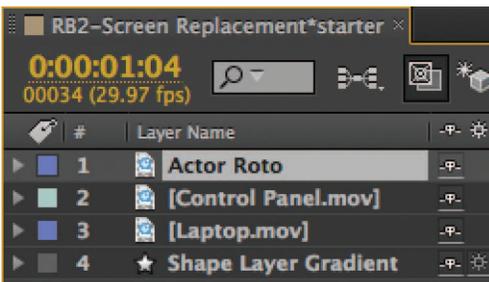
Trust us, using Roto Brush is rarely this easy – but now you have a taste for what is possible and why it's worth learning this tool. So let's move on to a more typical, challenging example.



12 Initially, Roto Brush may create hard edges around your foreground shapes such as the flower petal here (A). Enable its Refine Matte section (center) to improve this. In **Comps_Finished > RB1-Butterfly_final**, we also reduced the layer's opacity to make the petal translucent (B).



We want to replace the original word processor screen with a far sexier data control screen (above). To do so, you'll need to cut out the hands and arm so they reappear in front of the monitor (below). Screen courtesy Artbeats/Control Panels 2; footage Artbeats F129-02.



2 Duplicate the main footage (**Laptop.mov**), rename it (**Actor Roto**), and drag it above the layer it is supposed to appear in front of (**Control Panel.mov**).

Screen Replacement Roto

This next exercise is based on replacing the screen graphics on a computer. The screen replacement part is relatively easy; we've already done it for you using mocha (introduced in Lesson 9). The challenge is that the actor obscures part of the screen – and that just won't do.

Workflow

Although the details will vary with each job, there is a general workflow to follow with Roto Brush to achieve optimal results:

- Identify the foreground you wish to separate from its background.
- Choose a representative Base Frame where the maximum amount of the foreground is visible.
- Define the Base Frame using a collection of Foreground and Background Roto Brush strokes.
- Move a few frames away from the Base and tweak the Propagation parameters to optimize Roto Brush's tracking of the shot.
- Return to the Base frame, then step away from it one frame at a time, adding Foreground and Background Strokes as needed.
- Tweak the Matte parameters to refine the resulting alpha channel.

Creating a Base Frame

1 Open Comps > **RB2-Screen Replacement*starter**. This comp contains three layers: the already tracked replacement screen (**Control Panel.mov**), the original shot (**Laptop.mov**), and **Shape Layer Gradient** to control the blur across the screen. Scrub the current time indicator through the shot, noting which parts of the actor are obscured by the new screen: his hands as well as portions of his right wrist and upper arm.

2 Your goal is to create a version of the original shot that contains just the obscured sections to paste in front of the new screen. Duplicate **Laptop.mov**, rename it "**Actor Roto**," and drag it above **Control Panel.mov** in the Timeline panel.

3 Double-click **Actor Roto** to open it in the Layer panel. Scrub the Layer panel's time marker through the clip to become familiar with it.

An optimal Base Frame is where the foreground is most clearly revealed. Roto Brush finds it easier to propagate its Segmentation Boundary when details disappear (for example, when gaps between individual fingers close), compared with the sudden appearance of new details (such as separated fingers).

You may create multiple Base Frames during the course of a shot. In this case – where there are multiple instances when the gaps between fingers open then close again – we’ll pick one instance to work on for now. The frame at 01:04 is a good candidate, as there is a gap between the index and middle finger of the left hand and we can still see most of the little finger on the right hand.

4 Select the Roto Brush tool. Move the cursor over the Layer panel, press  (Ctrl), then drag to resize the brush to be just smaller than the right wrist.

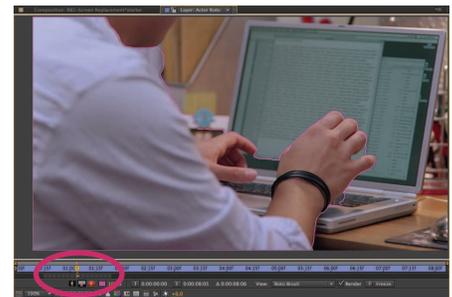
Our focus is to create a good matte (alpha channel) for the hands and right sleeve, as they actually move in front of the screen. Since we’re going to grab part of the sleeve, we need to go ahead and select the entire shirt as our foreground element; otherwise, the resulting matte edge may cause visual artifacts if just part of the shirt is grafted back on top of the original shot. Fortunately, we don’t need to be as critical in cutting out the rest of the shirt as we have to be with the hands.

5 Click near the top of the actor’s middle three fingers and drag a continuous stroke along the arm and up across the shoulders. The green color indicates you are drawing a Foreground stroke. When you release the mouse, a pink Segmentation Boundary will loosely surround the actor where Roto Brush detected edges between foreground and background.

6 Roto Brush initially defined too much of the clip as the foreground; you need to teach it which areas are actually part of the background. Resize the brush smaller, then hold  (Alt): The brush will turn red with a – sign in the middle, indicating you’re about to draw a Background stroke. Starting in the background area, drag through areas that are supposed to also be in the background (not included in the cutout), including the laptop’s frame and keyboard. Chances are some of the foreground will now be selected as background. The next step is fine-tuning this distinction.



3 The frame at 01:04 should make a good Base Frame, as we can see most of the hands plus gaps between individual fingers.



5 Drag a broad green Foreground stroke along the arm and shirt (left). The Segmentation Boundary will loosely enclose the actor, and a Base Frame plus Roto Brush Span will be created in the Layer panel’s timeline (right).



6 Hold  (Alt) and drag a red Background stroke to remove the laptop from the Segmentation Boundary; notice that the stroke starts in the background area when extending the background.