

## Getting Down with Pulldown

The best way to deal with footage that has 3:2 pulldown.

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A substantial number of clips in the Artbeats library originated on film. Film is usually associated with a frame rate of 24 fps (frames per second). However, all Artbeats NTSC and high-definition clips are provided at a rate of either 30 or 29.97 fps. How do they resolve this difference?

It is possible to shoot film at 29.97 or 30 fps, as long as the camera was set up to do so ahead of time. Also, some clips - such as abstract backgrounds, or special effects shots - hold up just fine if you speed them up from 24 fps to 29.97. Most PAL footage that originated on film is sped up from 24 fps to 25 fps, including motion pictures they see on TV.

The remaining shots are saved using a process known as “3:2 pulldown.” Most of the time, you can treat these clips just as if they were normal interlaced video footage. However, there are occasions when it is useful to undo the pulldown process and get back to the original frames and frame rate. Here’s how to do it.

### What is Pulldown?

Before we remove pulldown, we should understand what it is and

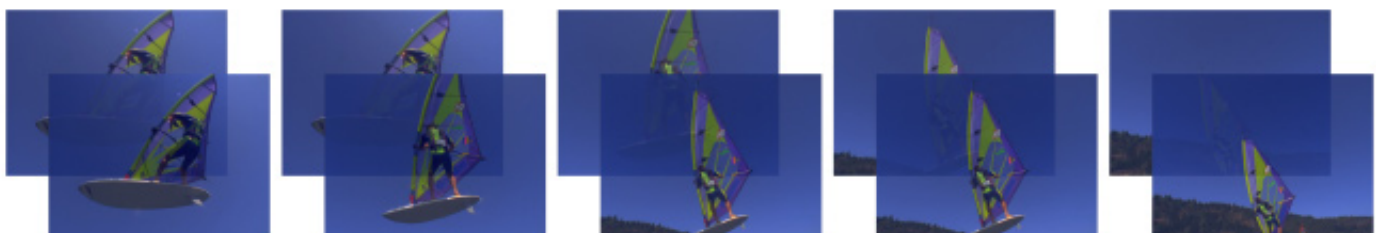
Figure 1a

*The 3:2 pulldown process involves spreading 4 frames of film across 10 field of video by repeating one frame over two fields, then the next frame over 3 fields. This process is repeated until the end of the clip. This clip - ES132 from Extreme Sports - was made available for free to registered users who receive the Artbeats eNewsletter.*

### film:



### video:



where it came from. As mentioned, film is typically shot at 24 fps, while NTSC video is played back at 29.97 fps. To resolve this difference, two things are done to the film footage. First, it is slowed down by 0.1% to 23.976 fps, which is the same difference as between 30 fps and 29.97 fps video. As a result, we now have 4 frames of film for every 5 frames of video - so the second step is figuring out how to make 4 go into 5.

An individual frame of video is capable of having two sub-images known as fields, which are “interlaced” together (alternating lines from each are used) to create a frame. Fields come from different points in time; indeed, the field rate is twice the frame rate. As a result, you can think of 5 frames of video as actually having 10 fields of video.

Knowing this, the new challenge becomes spreading 4 frames of film across 10 fields of video. This is how it’s done: The first film frame is repeated for 2 video fields. The next film frame is then repeated across 3 video fields. This “3/2” process is repeated, yielding 10 fields for 4 frames of film. Virtually every movie and prime time television program we view in the United States has been transferred using this process, and it is the same process Artbeats uses for their clips saved with pulldown.

How can you identify whether or not a clip has pulldown? Artbeats notates this in the Specifications for each of their clips. You can view this online by clicking on the “i” icon for a clip, or offline by looking at the preview cards that come with their collections. Look under the Field Rendering section for the notation 3:2 pulldown.

Another way is to step through the clip frame by frame. If you see a pattern where some frames are progressive and do not have fields (known as a “whole” frame), while other frames are interlaced and do have the visible comb-teeth pattern of fields (known in 3:2 parlance as a “split” frame), then the footage has pulldown.

## Removing Pulldown

If you are creating a straight video edit, you don’t need to worry about pulldown - just treat footage with it like any other footage or Artbeats clip.

However, if you find yourself having to work with individual frames of pulldown footage - for example, to track it or mask it - life will be much easier if you remove pulldown and get back to the original 24 or 23.976 frames per second, rather than having to deal with 59.94 or 60 fields to track or mask per second. Also, pulldown footage has a different “feel” to its motion; if you are adding animations such as moving text on top of it, you may prefer to perform this new animation at the same frame rate as the underlying imagery so that the feel of their motions match.

Removing pulldown in Adobe After Effects is a simple task. Once you’ve imported it, select it in the Project panel and open its Interpret Footage settings by typing cmd+F on Mac, or ctrl+F on Windows. Click on the Guess 3:2 Pulldown button, and After Effects will separate the fields and select the correct Remove Pulldown “phase”

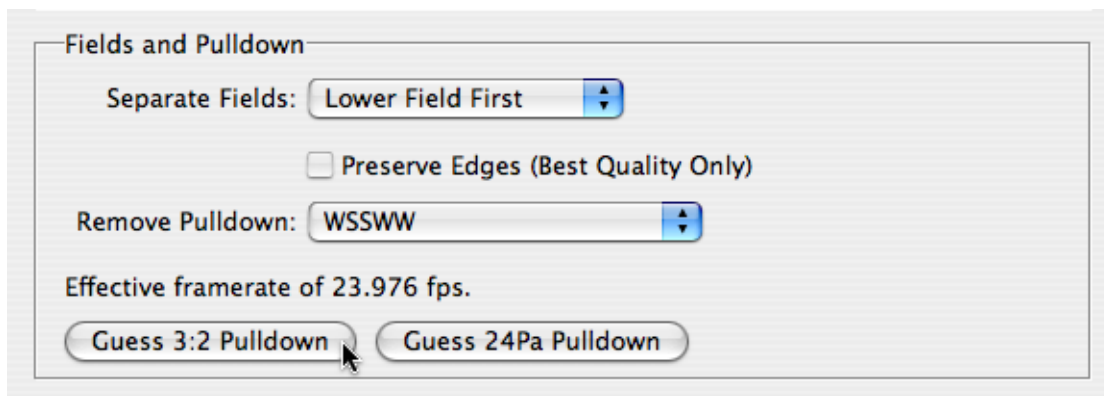
set ([www.revisionfx.com/rsfk.htm](http://www.revisionfx.com/rsfk.htm)).

## Zooming Out

Pulldown is becoming a more common part of our lives. In addition to select Artbeats clips, more and more video cameras are also offering the ability to shoot at 24 or 23.976 fps and deliver a videotape at 29.97 fps with pulldown already added in. If you want to dive deeper into the subject, we’ve included a chapter on it in our book *Creating Motion Graphics Volume 2*, and an extensive online video training module for it will be available through [StudioDaily.com](http://StudioDaily.com). But when it comes to dealing with the already cleanly prepared footage Artbeats provides, the information here should be enough to get you going!

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*Figure 2: For cleanly shot footage - such as Artbeats clips - you can remove pulldown using the Guess feature in the After Effects Interpret Footage dialog.*

This should work most of the time with clean footage such as that from Artbeats, although occasionally After Effects can guess wrong - so it is always good to double-check the result. If you see fields in your After Effects comp after guessing, then you will need to figure out the correct pulldown phase yourself by selecting a different option in the Interpret Footage window’s Remove Pulldown menu until you don’t see fields any more. (Your comp should be in Full Resolution while testing.)

Not all programs give users the ability to easily remove pulldown. In that case, there are some third-party solutions. For example, RE:Vision Effects has a Pulldown plug-in as part of its excellent FieldsKit