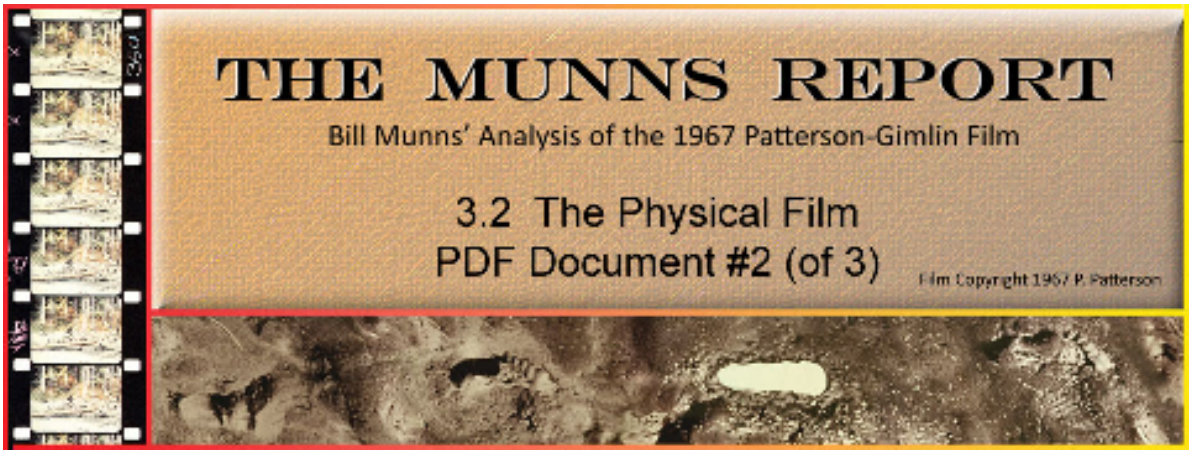


The Physical Film

This section is divided into three (3) PDF documents
PDF 3.2 #1 has sections 3.2.1, 3.2.2, and 3.2.3
PDF 3.2 #2 has section 3.2.4
PDF 3.2 #3 has section 3.2.5

3.2.4 Reference Material

3.2.4.1 - Film Type, Basic Film Specifications, Full Frame and Cropping

Film Type

Relevance - The film type used by Roger Patterson becomes important in discussions of the film processing timeline (Section 3.5.5.2, Hoax Analysis Notes), because Kodachrome is harder to get processed on a weekend rush order than Ektachrome, and questions of how the film was processed linger over the film's history.

The Patterson-Gimlin Film (PGF) is generally believed to have been filmed with Kodachrome film, but because the camera original is not available for inspection, there is no conclusive verification of this I am aware of. However, it is generally accepted by both advocates for the film's authenticity and advocates for the film being a hoax, so there actually isn't any real disagreement of this presumption that Kodachrome was the camera film.

The copying of the film tends to be consistent with copy processes for Kodachrome, masking off the sprocket areas to allow the copy stock film's latent image to show, as compared to Ektachrome copying where the sprocket areas are printed through to carry over the camera stock's edge numbering onto the print stock, for editing assistance. So that issue of copies tends to support a Kodachrome original. The image quality of the original was superb, also suggesting a Kodachrome stock, because the Kodachrome was one of the finest films of the time.

So while it seems to be near universally accepted that the original was a Kodachrome film stock, it isn't actually proven in a manner I can cite, even after 2 1/2 years of intense research into the

film. As noted above, the relevance of this issue is primarily when the processing timeline is debated, and it is indeed problematic in some ways, which often prompts claims or suggestions the film was actually shot on some day earlier than the stated Friday, Oct. 20, 1967.

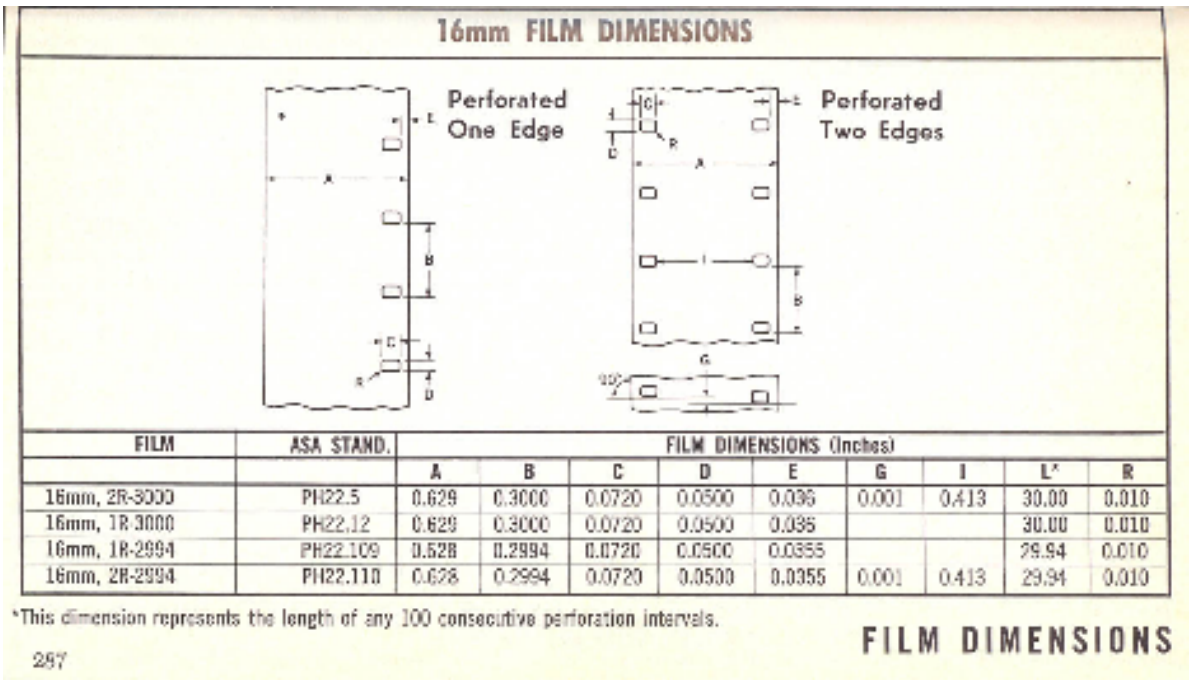
For more about the processing timeline controversy, see section 3.5.5 in the Hoax Analysis Notes, part two.

Basic 16mm Film Specifications.

Relevance - Finding the height of the filmed subject has been an ongoing challenge, and measuring the subject in relation to the film frame size is part of that equation. So understanding basics about 16mm film specifications can help if you take an interest in that issue.

The American Cinematographers' Society in Hollywood published a fine reference book called the ACS Manual, and the second edition was published in 1966, so it has proven to be a fine reference for films, cameras, lenses and processes available at the time the PGF was filmed (1967). This manual provide basic general specifications for 16mm film.

In the Manual, a standard 16mm frame size is stated as 0.402" wide and 0.292" high, allowing a frame separation line of 0.008". The full frame contact print of the PGF I have scanned conforms closely to this standard.



FILM	ASA STAND.	FILM DIMENSIONS (Inches)								
		A	B	C	D	E	G	I	L*	R
16mm, 2R-3000	PH22.5	0.629	0.3000	0.0720	0.0500	0.036	0.001	0.413	30.00	0.010
16mm, 1R 3000	PH22.12	0.629	0.3000	0.0720	0.0500	0.036			30.00	0.010
16mm, 1R-2994	PH22.109	0.628	0.2994	0.0720	0.0500	0.0355			29.94	0.010
16mm, 2R-2994	PH22.110	0.628	0.2994	0.0720	0.0500	0.0355	0.001	0.413	29.94	0.010

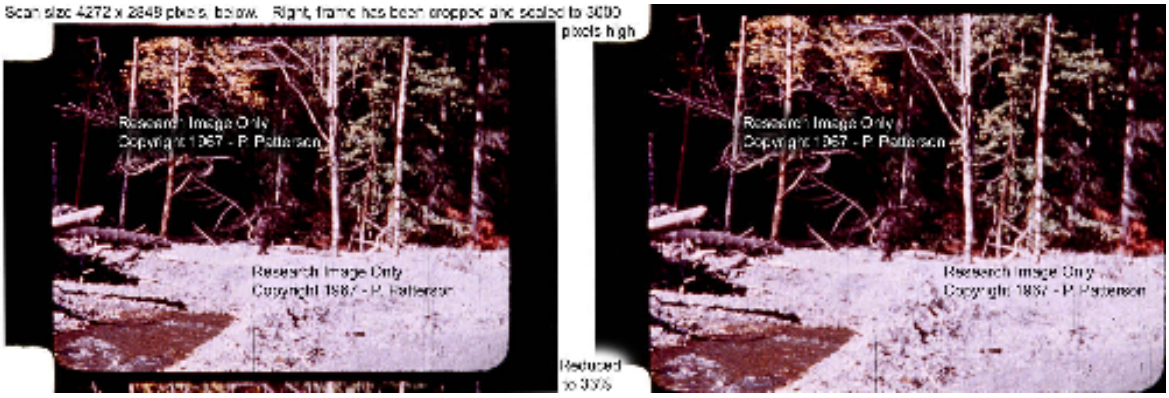
*This dimension represents the length of any 100 consecutive perforation intervals.

Curiously, when John Green filmed his re-enactment of the PGF using Jim McClarin walking a similar path at the Bluff Creek site, the camera he used produced an image 0.450" wide x 0.292" high, with significant exposure of image data in the left side sprocket area. This is consistent

with a novel wide screen version of a 16mm film picture called "Ultra 16mm". It isn't an actual factory design aspect, but rather a DIY (do it yourself) conversion of a regular magazine type camera, to open up the camera aperture window to a wider size, and then allow the magazine aperture (which it 0.450" x 0.292") to define the exposure and produce a wider image. This will be discussed further, in section 3.2.5.3 (In PDF #3).

One basic but important step in that height analysis process is to reliably measure the size or height of the filmed subject in the film, and so the film image scan must be scaled to some real world dimensional measure.

High resolution scans of a superior full-frame version of the film were made, with the scan image size of 4272 x 2848 pixels, as shown below left. This was a slight overscan, which included more than the actual frame image. For analysis purposes, the original scan needed to be cropped to exactly one frame in height, and then the image needed to be rescaled to a size of 3000 pixels high, to correspond with the film specification (above) of a measurable distance of 0.3000" for the distance from sprocket hole edge to next sprocket hole edge, and thus the frame height (including any frame separation line). So below right shows the same film frame cropped and re-scaled for analysis, and by this scaling, one digital pixel equals 0.0001". (The images, as shown here, were scaled down to 33% for this PDF document) This makes measuring the physical size of something in the image (as it was on the actual film itself) a simple process. Based on this system, something 475 pixels high, for example, has a true measurement on film of 0.0475" using the actual research analysis frames that are a true 3000 pixels high.

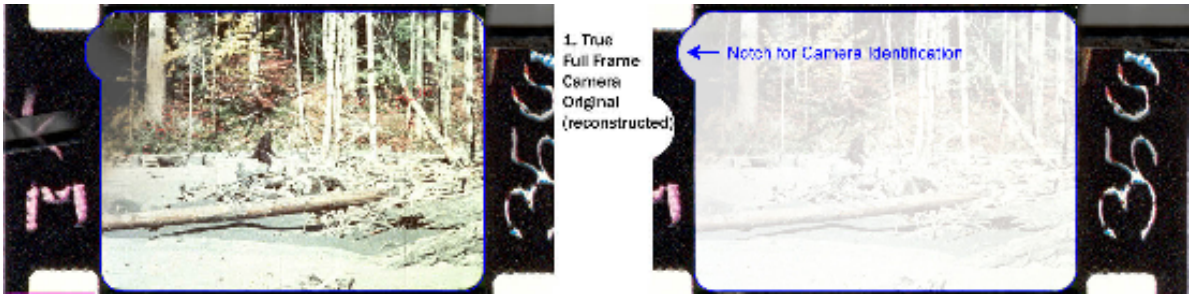


Full Frame and Cropping

Relevance - In a Photogrammetry analysis, which includes both building a high quality digital model of Bluff Creek and for solving the height issue, a true full frame version of the film is necessary. Cropped versions can be used for most study of the filmed subject, but it helps to know how much of the picture you are actually looking at. It is important for a researcher to know what kind of version is being studied. This cropping guide illustrates the options.

For the charts that follows, the images shown represent various croppings as compared to true full frame:

#1 - True full frame for a Kodak K-100 camera, including edge notch (the curved image area in the upper left of the frame, going out under the sprocket hole area).



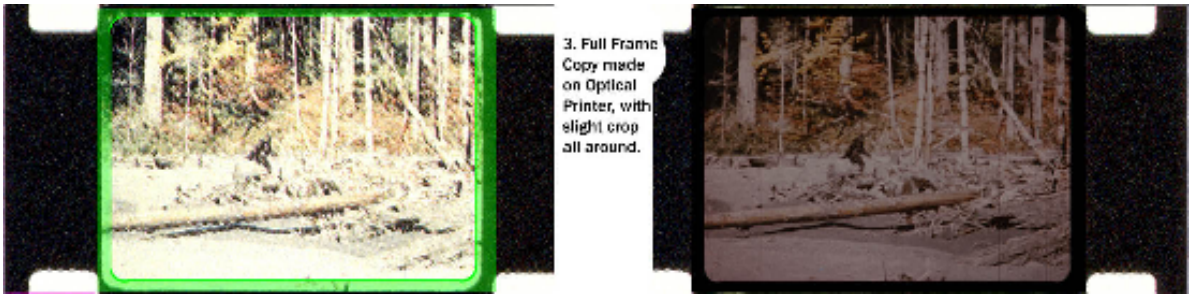
The above version of the PGF has only been seen on the 4" x 5" transparencies of several individual frames, taken off the camera original by Roger Patterson soon after he began showing his film. These transparencies are currently in the possession of Mrs. Patterson. (Note the chart is a representation of how such transparencies look, to illustrate a true full frame plus edge Camera ID notch. The actual transparency of the look-back sequence is 2 frames later in the film)

#2 - True full frame, contact printed (cutting off most of the notch, but the overall image frame is otherwise intact.) Shown below. This is the form the Patterson Archive Copy (PAC) had, as verified by the recent scan of that copy.

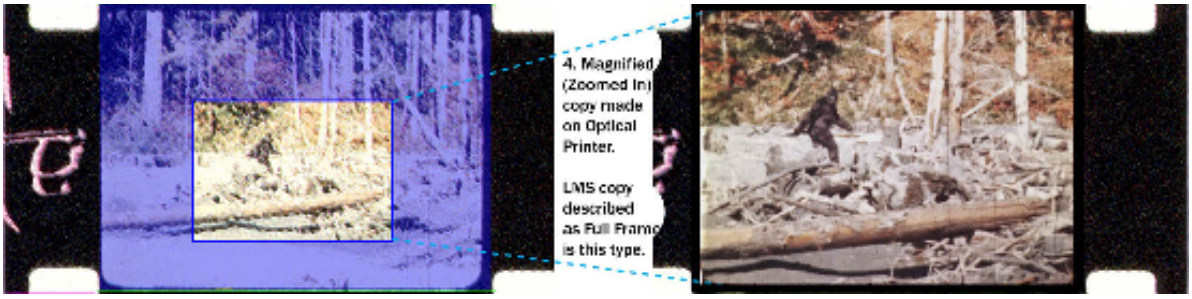
The purple borders on the left show what is masked off in printing from a Kodachrome original, and the masking allows the latent image of the copy film stock to show, so the copy stock can be identified. The masking shown here only affects the camera ID notch in the upper left, clipping most of that notch, as seen below right.

Interestingly, when copies are made from an Ektachrome original, the sides are not masked off in this manner, because Ektachrome has edge code numbering that prints through to help in film editing, Kodachrome doesn't have the edge numbering, since it is generally intended for direct projection of the original by the film maker, and isn't usually copied, as Ektachrome is, for editing. So on some of Roger's other documentary film work (before Bluff Creek), he used Ektachrome, and copied it, and the K-100 camera ID notch is still fully seen.

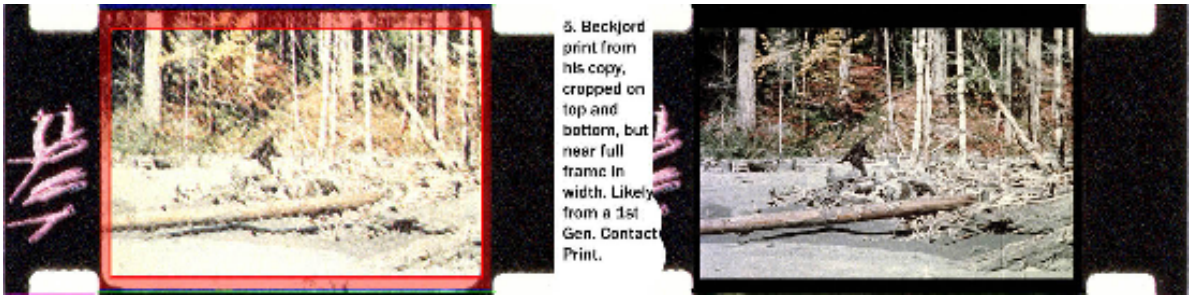
#3 - Optical printing copy, which has a aperture gate window on the camera side of the printer, slightly smaller than the original full frame, thus cropping a small percentage of the frame border areas. My scan of John Green's film is this version. The green border below shows what was lost in this type of copying.



#4 - Zoomed Optical Printing, which enlarged the center area by about 2x, making a "zoomed in" copy. This is the LMS version which is credited as being "Full Frame" in the LMS DVD. It was apparently mistaken to be full frame because the image spanned the width of the film and showed the sprocket holes, so the video scan was a full frame scan of this zoomed in version. The blue area, below left, was lost in this type of copying, and the center was magnified to double it's original size.



#5 - A frame 352 still (which is actually frame 353, not 352) widely circulated on the internet as a "full frame" version, but it is slightly short of full width, and very short of full height. It comes from a frame scan of a film copy Erik Beckjord possessed, possibly a true 1st generation copy. What was lost in the Beckjord scans is shown below left in red.

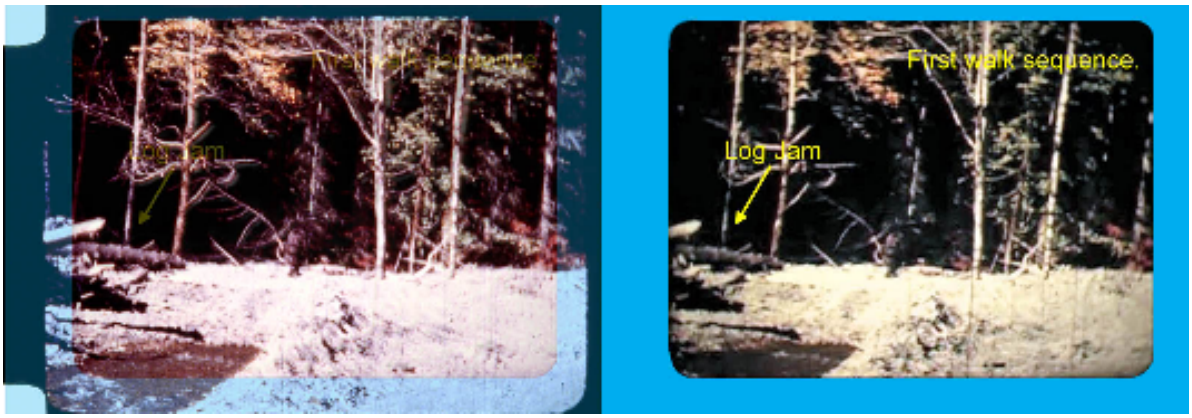


#6 Rick Noll Scans - Researcher Rick Noll scanned the film from one of John Green's copy inventory in 2004, and used a microscope camera attachment to focus his images close up on the filmed subject. Below shows the image area that his scans included, at a scan resolution of 3072 x 2048 pixels. On left, there's a black box indicating the scan area, in the center. On right, below, you can see the scan size itself, with the lost part of the frame whited out partially.

#7 Odd Crop - The image below is one of several frame images taken from the following website:

http://www.artistfirst.com/bigfoot2008.html

It has an odd crop, possibly done on an optical printer, but it has lost considerable image area and has very pronounced distortion as compared to any other copy I have studied. Investigation into the origin of this copy version is ongoing, but a source hasn't been determined yet. It is likely that a copy held by some researcher was the source, probably one of the many copies made from John Green's optical print set, but the level of distortion and the odd framing and cropping suggest it was a poorly made copy. It also suffers significant contrast buildup, suggesting a copy many generations from the original (because contrast tends to build up with each copy generation).



The blue border at right is the crop edge, and at left, above, you can see it overlaid on a true full frame, to see how much is cropped out.

For each of the above examples, on the left side is any indication of the cropping areas, and on the right is the same image showing how it appears once it is cropped.

3.2.4.2 - Inventory of Materials, Copies, and Prints

Relevance - Some image materials are limited in their analysis potential, so knowing what type of material you are seeing is useful to define the analysis potential.

Everyone who has interest in this film starts with the film itself, or still images from frames of the film. The common misconception is that all this material is equal, when it actually is not. The second misconception is that all the material is readily and equally available to one and all, and this is not so either. So this topic will give you a basic understanding of the various forms the film and still image material are in.

1. Film Versions - There are several versions of the film shown or seen, and they vary in image cropping and quality. The camera original was proportedly 16mm Kodachrome film, a high quality film stock which, when developed, is a direct positive image (like still photograph slides or transparencies), with no negative. The camera original was projected quite a lot in the first few months after the film was made, as people tried to analyze the film's subject. As a result, the original got scratched up somewhat from the projection process.

A common question is "Where is the original film now?". Sadly, the common answer is "we don't know". There are varied reports the true original film was held in a business venture Roger was associated with, and when this venture failed financially, its assets were sold, and the buyer of those assets unknowingly acquired the camera original. The more common current report is that it is held by lawyers representing the new owner, and is in Florida. Occasionally, people have tried to investigate this further, and even tried to buy the film. Apparently no one has succeeded in doing so thus far. There are also reports that the original film is lost, and even the rightful owner does not possess it. I cannot attest to the fact of any of this, personally, other than to say this is what I have been told by various sources. I would hope that it will surface one day and be available to the research community, but my expectation is not very high. This issue, the whereabouts of the original, does come up in the real vs fake debate, when an issue called the "provenance of the film" is discussed.

Before the original "became unavailable" (see above), it was copied, and those copies were copied, and so on, so the various copies known to exist may be first, second, third or even fourth generation. The copying history is somewhat confused, as I have found out in trying to study the genealogy (the family tree, so to speak) of the various copies.

The film copies divide into two general groups, a true full frame contact print (which essentially shows everything the original camera master shows, but with some lesser quality caused by the copy process) and optically printed copies which may appear full frame (but are slightly cropped) or zoomed in to enlarge the subject in the film.

The most widely seen and often studied version is the LMS version, (A documentary called "Legend Meets Science", available on DVD) with a zoomed in version digitized for TV showing.

People often do screen captures of still frames from that DVD for analysis, and the pale blue lettering saying "Copyright 1967 P. Patterson" is usually quite conspicuous in the frame. Even though this has been reduced to standard TV resolution (which is far lower than the true film), the image quality of the subject is actually quite clear.

The LMS Video - Frame captures are done from the LMS (Legend Meets Science) DVD and shown on various internet discussion boards. These usually have the Patricia Patterson Copyright in blue lettering shown in the frame. These images are from a zoomed in film version, so the subject figure has been magnified in the film copying, and the result is no image detail loss for that particular copy generation (because the copy film stock has four times the grain detail of the source copy, so if anything, it might actually look sharper, not more blurry). But that extra sharpness is a subtle false perception of greater detail, and not reliable for detail analysis of small aspects of the subject's body(like fingers, the lips or other facial features, etc.) Plus, the LMS version, while the film source is high quality, the digitizing to video reduces the quality down to standard D1 TV resolution. a reduction in detail. The DVD itself does provide a good image source for general analysis.

However, depending on how the frame image is captured from the DVD, you may need to rectify it's aspect (height to width proportions). I used a software called Power DVD to show the LMS program on my computer and capture some frames, and they were stretched horizontally in the capture image. The capture resulted in an image which was 720 x 480 pixels, but it needed to be

resized to 660 x 480 to actually have the correct proportions as compared to film scans which are correctly proportioned.

Below shows the original capture at left, and the rectified image (correct proportions) at right.

If this rectifying isn't done, the frame capture has a false width which could distort any analysis of the body proportions and features. So any researcher doing frame captures from a video or DVD should first determine if the capture image is correct in proportion, or stretched horizontally, and needs to be rectified.

Image Stabilized Film Versions - Occasionally researchers have tried to image stabilize the film, because Roger's movements and the irregular ground result in a lot of camera motion. Image stabilizing means that each frame of film has been repositioned to keep the subject figure centered and on a level path, essentially reversing the camera shakes and motions. These were usually done by individual researchers, and Mrs. Patterson did not have a copy for her media kit that she licenses.

I have been working with her for the past few months to make an image stabilized version for her archives, one she can license to media programs. So there is some expectation that this image stabilized version may soon be seen in new documentaries, through her licensing.

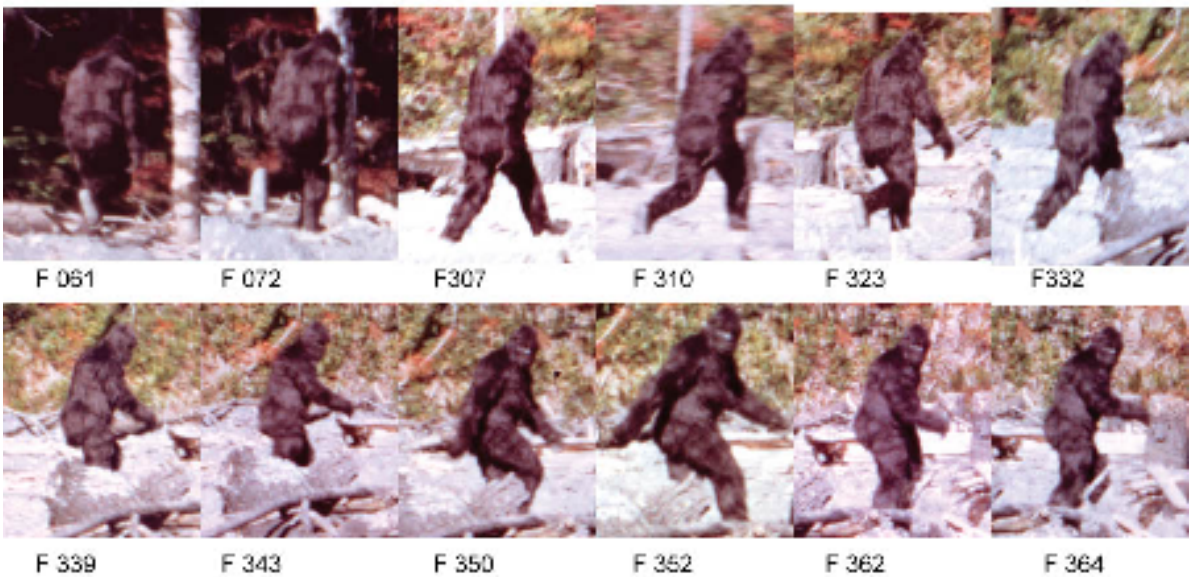
2. Still Images from the Film - From the very start, still images have been taken off of the film to aid in studying the subject figure in the film. The first effort was to have Kodak make 4x5" color transparencies from the camera original, for selected frames, and Mrs. Patterson possesses these as part of her archive of film material. They are certifiably taken from the camera original because there is a curious film marking, called a Camera Identification Mark, which is intact on these transparencies, and not seen on any known film copy. That mark indicates the transparencies were made off of the true camera original film. The transparencies were never made public, but occasionally shown to individual researchers. I have seen and scanned them, so I can testify to their current existence, and fine condition.

The Cibachromes - The second effort to copy still frames are the 12 Cibachromes made by Rene Dahinden and Bruce Bonney. The Cibachrome process produces both paper print and transparency images, high quality transparencies for display purposes. Twelve individual frames

from the film, all showing the subject figure quite clearly, have been published and are readily available to view from varied sources. They are, perhaps the finest quality images of the subject that one can view.

However, there is a concern that the process of enlarging the subject image to the larger Cibachrome image format, may have introduced a false perception of detail which doesn't actually exist in the true 16mm film. There is also a question about the prospect that some re-touching of the Print versions may have been done. These issues deserves further study. The Cibachromes are numbered for the film frame number they were taken from, and this numbering system is widely accepted throughout the research community. That numbering system is apparently wrong, by two frames, but this issue is not finalized yet, so the standard frame numbers are still used widely.

The 12 Cibachrome prints from the film (identified here by their traditional frame numbering designations)



The actual Cibachrome transparencies themselves, are not currently confirmed as to location or possession (the general presumption being they are in the possession of Mr. Erik Dahinden, son of the late researcher, Rene Dahinden). But copies and scans of them are common and widely used in research discussions. All twelve are published in Chris Murphy's book, "Meet the Sasquatch".

The Noll Frames - Researcher Rick Noll copied many of the frames which show the subject figure (about 200 frames just show trees, the subject being behind those trees) using a camera and a microscope attachment, because the subject figure on the actual film is only about 1mm tall (less than 1/16th of an inch tall). Commonly called "the Noll Frames", they were done for his personal research.

There is no official distribution process for one to obtain them, but some researchers do possess copies. They do not have the image detail of the Cibachromes, but there are far more image frames, allowing the study of body features which occur repeatedly in multiple frames.

The Munns Scans (yes, that's me) - I have scanned two complete copies of the film, one copy held by researcher John Green, and the master archive copy held by Patricia Patterson, as well as scanning selected frames from the beginning, middle, and end, of a copy Bob Gimlin holds. I have permission to use some scans for my research, but in general, the material is considered the property of Mrs. Patterson, and she authorizes any distribution of the scan data.

Unidentified Frame Copies - Occasionally I come upon a frame image copied in an unusual crop (as noted above, crop example #7) or a frame that doesn't have a copy source known. They are curiosities that I hope will aid in a final copy genealogy of the film. But they are not used in any significant research effort.

Googling the Patterson Film Images - If you do an internet image search (using Google or one of the other popular search engines today) and type in "Bigfoot Patterson Film" as the search words, you will get some of the images from the film.

3.2.4.3 - Copy Quality and Genealogy

Relevance - Copy quality affects the quality of any analysis, so an appraisal of any copy's quality is important, in relation to the type of analysis being performed, and the film's genealogy (copy family tree, so to speak) will be useful for future studies of this film, by helping finalize copy quality determinations.

The Value of a Copy

This following phase of the Report simply describes ways a copy can be graded for quality. The larger issue of how copies factor into the claims the film was hoaxed are described in far greater detail in section 3.5 The Backstory, part 3.5.5.4 "Provenance and Copies".

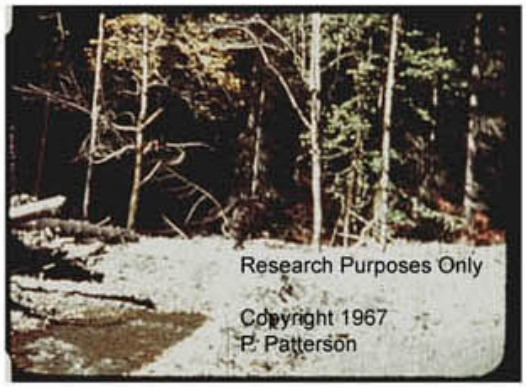
If an original is considered 100% reliable, a copy may be thought of as having a percentage of that reliability. For film, we can actually test and measure sample films copied repeatedly to determine what loss of image detail the copying process causes. The true issue is not that the copy is less perfect than the original (it usually is somewhat less perfect) but what affect the copied form may or may not impact on the analysis process? Does the copying process affect the data in a way which alters or impedes the analysis?

For example, a film copy that is contact printed is dimensionally identical, but has a small percentage of fine image detail lost, and may have slight alterations of color or contrast. A film copy, optically printed, may be dimensionally altered, and may be distorted, depending on the lens alignment. So we could reasonably say a contact print film copy is superior to an optically printed copy, as one example of evaluating a copy's degree of reliability. Aside from determinations of copy type (contact print or optical print) two studies in the comparison of copies will illustrate some of our methods for appraising copy quality.

Studies of Copy Quality

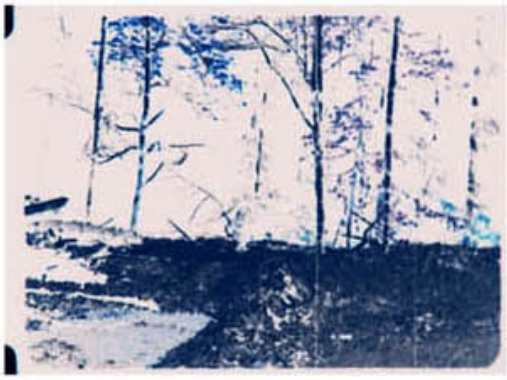
First is the study of spatial accuracy, or lack of distortion. To explain the technique, a copy generally regarded as superior and complete in image frame area (such as the Patterson Archive Copy and abbreviated PAC) is used as a baseline standard. Another copy (in the example below, from a scan of one of John Green's copies) is compared.

The following charts illustrate and explains the comparative process.



Comparing two copies, with Patterson Archive Copy (PAC) above left, and John Green (JG) copy above right.

2. The JG Copy is color-inverted, like a negative, at right.



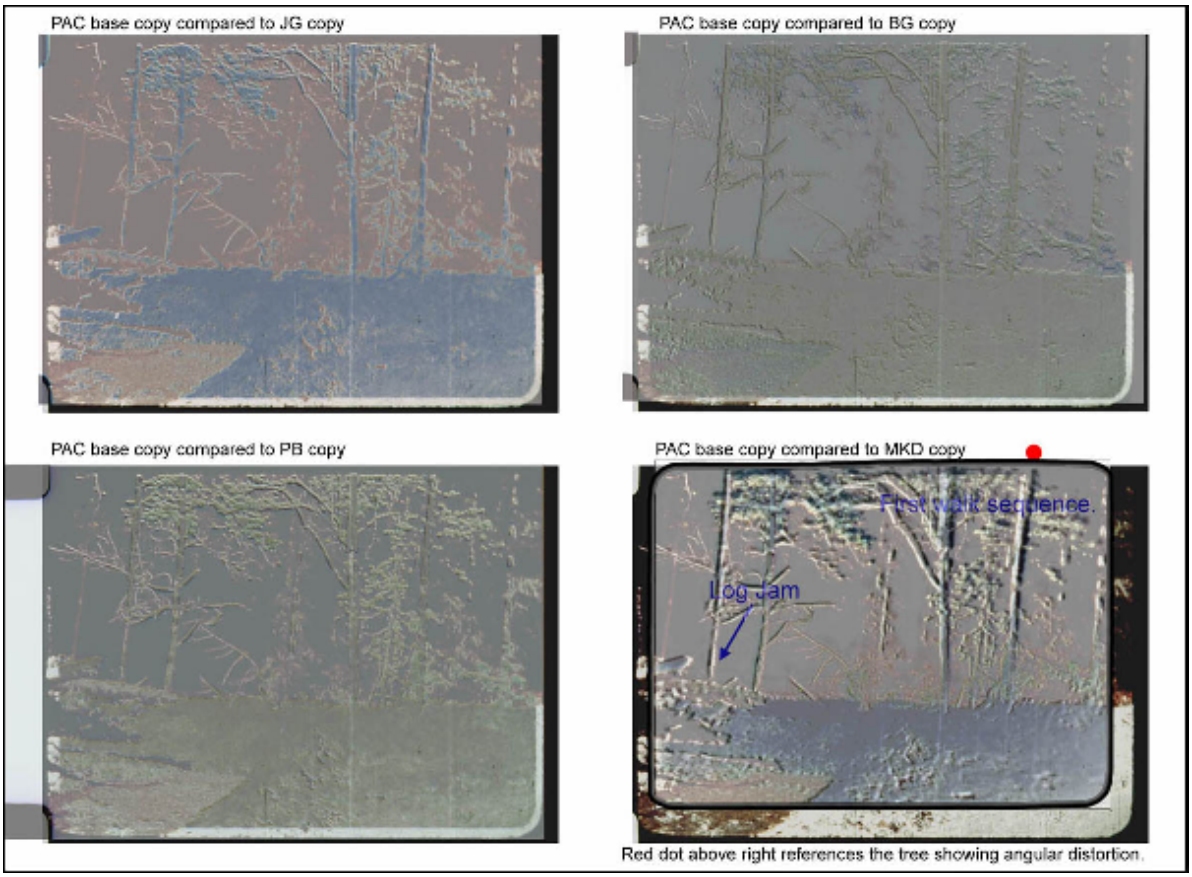
3. The JG copy is then set at 50% transparency, as at right.

4. Then the JG copy is moved to overlay the PAC, shown below in progress.

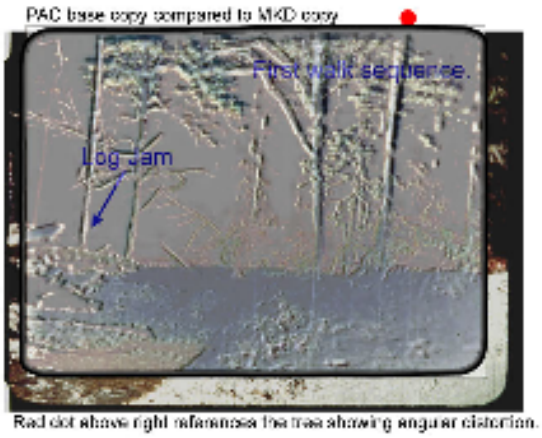
5. Once there is an alignment of the two copies, they tend to neutralize each other into greyish tones, indicating good alignment.

Solid black and white elements, like the white trees, or black shadows in the terrain, will show as side-by-side black/white lines if there is mis-alignment or distortion of one copy.

Now we look to several copies of the film compared by the same process, each to the PAC.



Three of the four comparisons above show an optically printed copy (cropped slightly inward of full frame, as evidenced by the white border seen on the bottom and side edges). These three copies show a general level of spatial similarity (no noticeable distortion) and varied color/contrast balances, as expected in various copies. The copy labeled MKD (lower right) is shown here as it was obtained from the website located at:
http://www.artistfirst.com/bigfoot2008.html



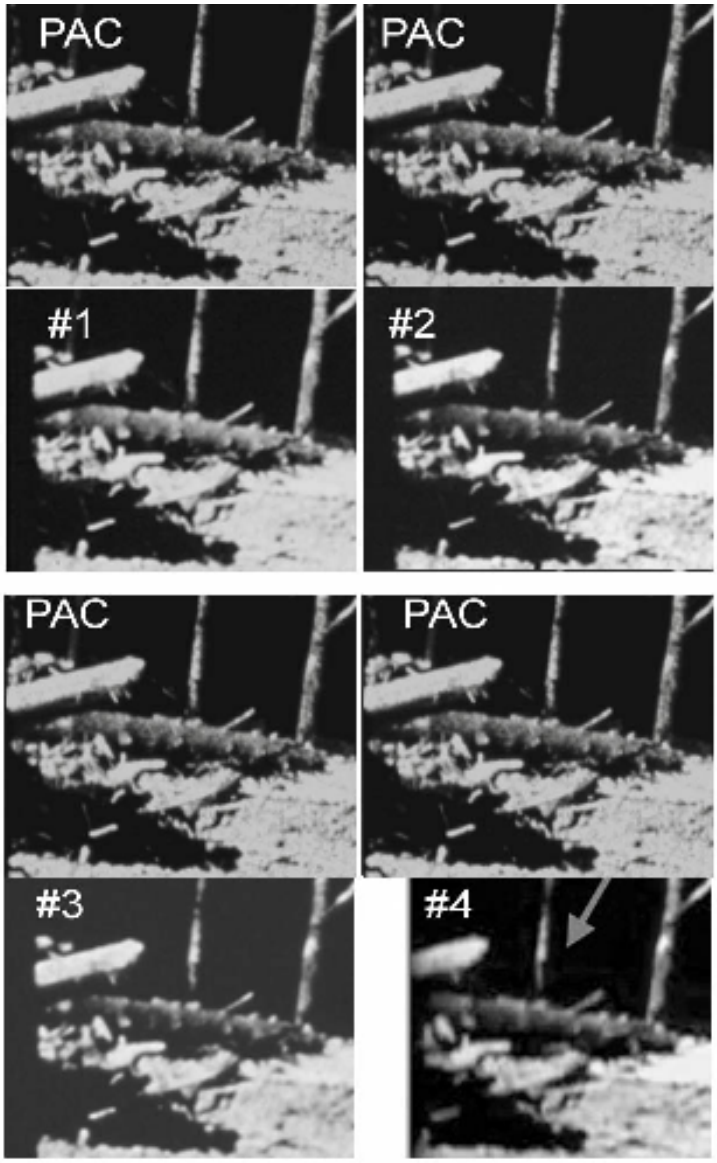
This frame, (above) represents the poorest copy compared by far. It is cropped very much off center, and exhibits low detail and a very pronounced distortion of the tree shapes (one tree highlighted in the chart by a red dot above it shows the MKD copy of that tree, in black, warps considerably to the right of the white line, the PAC copy tree, as it goes up the frame). This copy was poorly made by an optical printing methodology (a projector and camera configuration to make copies, and if these are mis-aligned, the distortion is compounded significantly), but poorly done, to result in so much distortion and the mis-alignment of frame positioning.

A second comparison is image sharpness and detail, as illustrated below, using a cropped portion of the frame from five copies, and the PAC as baseline standard.

Image Quality
Sharpness

Top: PAC reference copy.

Right: Comparing PAC to 4 other copies, with #4 being the poorest in sharpness.



So the MKD copy (#4 above) is useless for analysis such as a photogrammetry study, as one example, or a comparative anatomy study (because of the distortion) as a second example. And in terms of image sharpness and detail, again, copy #4 fails as the poorest copy.

Developing a Methodology of Grading Copy Quality

I am currently using the accumulated material on the PGF to develop a reliable method for grading the quality of PGF copies. To my knowledge, no one has done this before, and I believe it has significant value in future research. It is still a work in progress, because I want it to be as comprehensive as possible, and more copies of the film should be scanned to build up the sampling database. So what is shown below is simply an illustration of the type of work being done, and progress so far toward that goal.

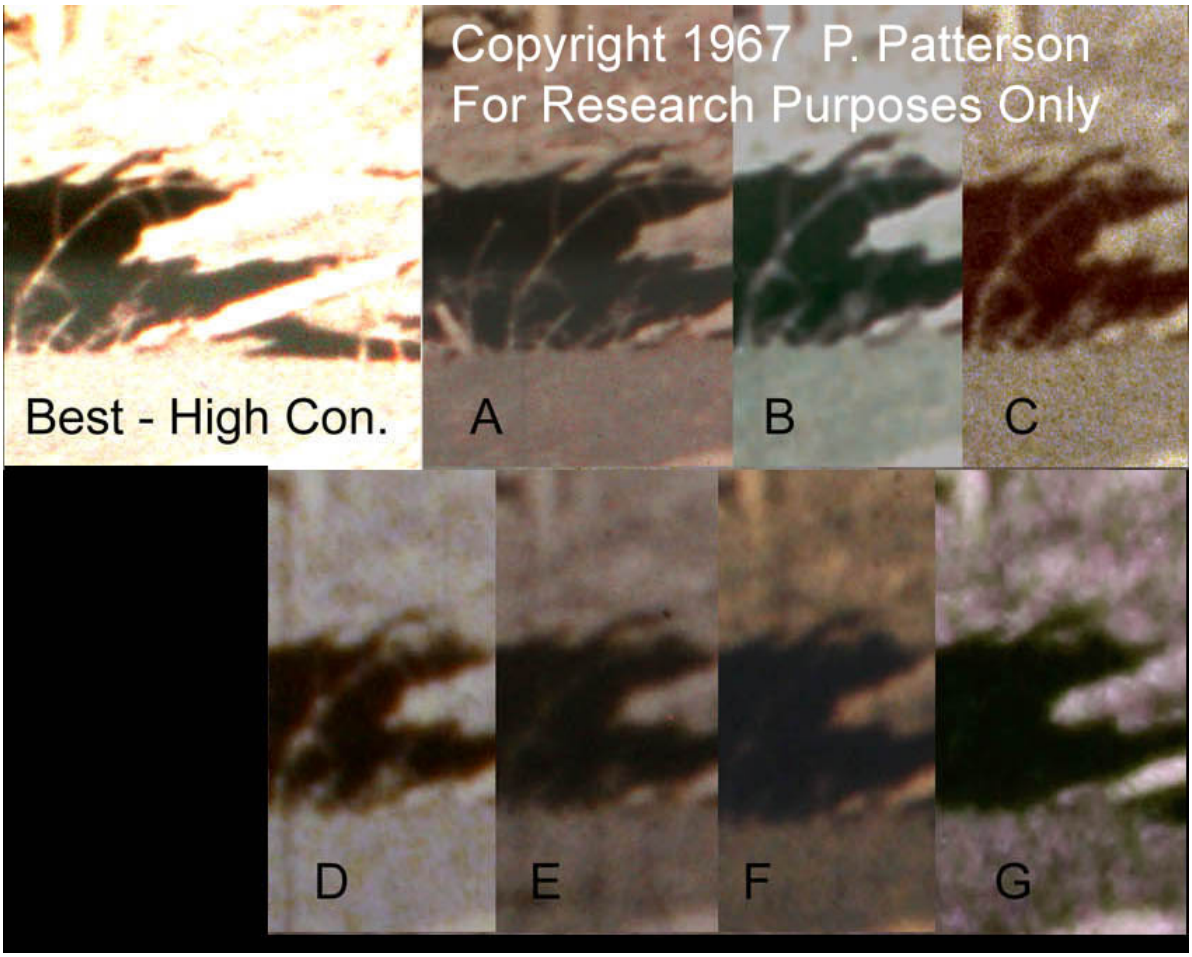
Grading copies requires multiple scans of the same film frame, and then small portions of the image are chosen where the detail is most likely to degrade in a noticeable way as copy generational loss accumulates.

Currently I have done this with two distinct portions of the full frame version of the middle "lookback" sequence landscape. But because a whole set of copies are the zoomed in versions, and my selected landscape elements are outside the zoom version frame, I will need to also select some landscapes within the zoom in image area. But since I don't have any scans (at 4K resolution) yet for zoomed in versions, that part of the copy grading analysis is on hold until those scans are done.

The following shows a full frame, and the two analysis areas are highlighted, while the other frame areas are slightly whited out.

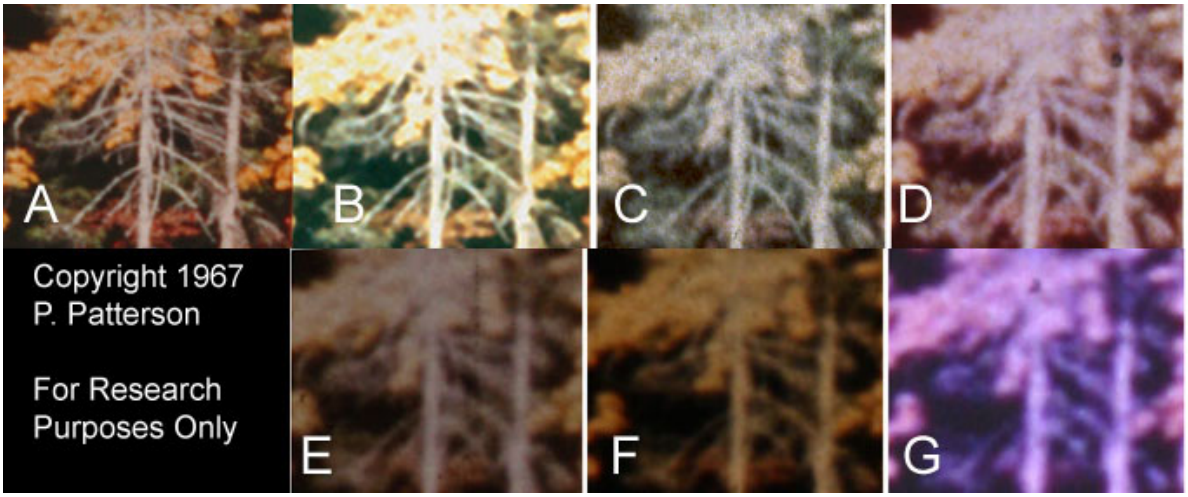
Seven copies thus far have been assembled into each comparative example, and quality is sorted with best on the left (A), and the poorest, on the right (G).

For the plant stems and branches we see in the darkened hollow of one of the fallen logs (the lower right example highlighted in the full frame above), this display below shows the best three examples on top, enlarged, and then the other examples so far compared, and these plant stems essentially disappear as quality is lost and contrast builds up. The High Contrast top left shows the best quality, contrast increased to show you the plant stem structure clearly.



Obviously, enlarged versions of each image make the comparison more clear, and once the copy quality grading scale is completed and released, it will feature much higher quality examples of each, probably about 3x more detailed than shown here.

Similarly, in the study of the tree branches and foliage, we see the branch definition fading to more and more blurred, some branches disappearing, as the copy quality degrades the image.



Best version is at top left (A), poorest version is at bottom right (G).

Another study of the copies is genealogy, or copy relationship. The discussion in the PDF Release 1H - Part One, explains the detail in so far as this work has progressed. As nothing more has been added to this since, I simply reference it rather than repeat it here.

A brief summary of this effort is noted here. Both generational quality and scratch marks will be used in this analysis to try and develop a "family tree" for the copies to better identify which copies are made from which source versions. This work is also in progress, and will require more scans to be complete.

CONSIDERATIONS IN USE OF A COPY

Reliance on a copy of a film, as compared to using the camera original, presents several reasonable concerns which must be addressed.

A. What is the extent of the loss of image data from master to copy, and does any such loss weaken the image data's potential for analysis?

B. Can the film be altered in the copying process in any manner which would diminish or discredit the potential of the image data from being analyzed in a reliable manner for a responsible determination?

C. Are there any known discrepancies in the various copies of the film which would cast suspicion on the integrity of any copy?

3.2.4.4 - Analysis Processes, including Image Stabilization and Animated GIF's

The usage of computer imaging software to analyze the film frame images from the PGF has greatly expanded our capabilities and allowed us to discover things about the film we might never otherwise have noticed or been able to document. As noted above, in discussing the camera starts, and also in the section comparing copy quality, we are using tools that Roger Patterson could never have imagined would exist, much less be applied to analyzing his film and trying to settle the issue of whether or not it is authentic.

In that sense, these new technologies are revealing aspects of the film which are far less likely to be hoaxed or falsified data, because we would not expect a person perpetrating a hoax to falsify things which the technology of the time could not analyze.

This section explains the basic process of these new analysis methods, and their potential for analyzing the film.

Image Stabilization

In essence, when the PGF was filmed, the camera was hand held and the unsteady motions of the camera, tilting up/down, turning left/right, as well as rolling clockwise and counterclockwise, do make it harder for us to watch the film and concentrate on the subject walking through the picture. Image stabilization is a process which repositions each frame image in relation to the previous one to effectively reverses these camera motions so the picture remains steady, as if it were on a tripod. This allows us to study the walking subject with greater clarity.

The basic process is quite simple: Start with one frame of film, and then bring up the second frame into an image editing software (like Photoshop, which is what I use). The second image is copied and pasted over the first image, and then set at a 50% transparency, and the color is inverted so the image looks like a film color negative.

Above, in the section on Studies of Copy Quality (about 5 pages back) this is illustrated and so won't be repeated. But the prior example was setting up two different copies of the same frame for comparison. Now, for image stabilizing, we are setting up two subsequent frames of the same copy, but the method up to this point is identical (Paste second image over first image, set 50% transparency for top layer, invert color of top layer).

Then we examine the two images compared one atop the other, and look for misalignment, where one image doesn't match the other. We expect some type of misalignment, if either the camera was moving, or the filmed subject was moving, maybe both.

Once the misalignments are corrected, the top frame is reverted to it's normal color and opacity, and saved to the stabilized frame sequence in it's new position and rotation, and then the next frame is brought up and the stabilization process repeated.

Finally, when all the frames of the sequence are stabilized in relation to each other, the frames are rendered into an animation or video file for viewing in a media player. You may appreciate

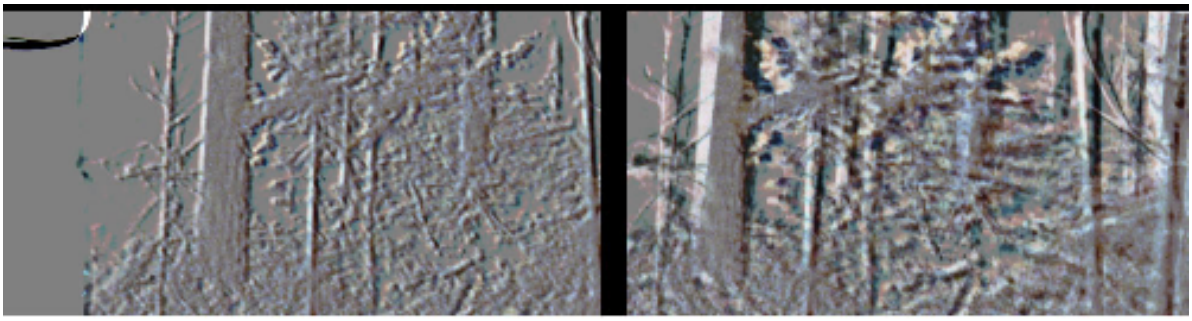
that stabilizing the entire film (953 frames) is a rather formidable task, and one setup I did took me over a month. Shorter segments for specialized study purposes take less time.

One Note of Clarification should be made. Some of the examples to follow show inverted colors and grey tones. This color rendition can be used for some analysis processes, but for the most part, it is a example of the work in progress, toward an end result of restoring the normal colors. But since this PDF document can't show the finished animations or videos, I've chosen to illustrate some of the concepts using the inverted colors to hopefully highlight the process.

Types of Mis-Alignment

#1 - Rotational Alignment

First, we test for rotational alignment. We look for an object which has some type of continuous line (the side of a tree trunk works nicely, and the film is filled with trees) and we look to see if the light and dark tonality lines from the two images seem to run parallel, holding the same apparent width.



Object lines Parallel

Object Lines Not Parallel, indicating a rotational mis-alignment.

If these lines aren't parallel, we have rotational mis-alignment, so this we correct first. In the software, we use a tool usually under "Edit/Transform/Rotate". Selecting this tool, we get a bounding box with control handles in the corners, allowing us to rotate the top layer image. Apply the rotation, and compare the two image layers again. Once we have the black and white lines running parallel, we can proceed to the next step, which is positional alignment.

#2 - Positional Alignment

Positional alignment is the left/right and up/down position of the frame. Whereas the rotational alignment has one best solution, the positional alignment actually doesn't. Instead, there are several possible alignments depending on the analysis goal. And these different analysis goals dictate what in the scene we must use as our "anchor", our chosen fixed reference point or shape that the top and bottom image will share.

Even though there have been some stabilization efforts previously done on the film, I've never seen this issue properly explained before, and if done improperly, it can skew the analysis. So we need to understand the types of positional alignment we can do.

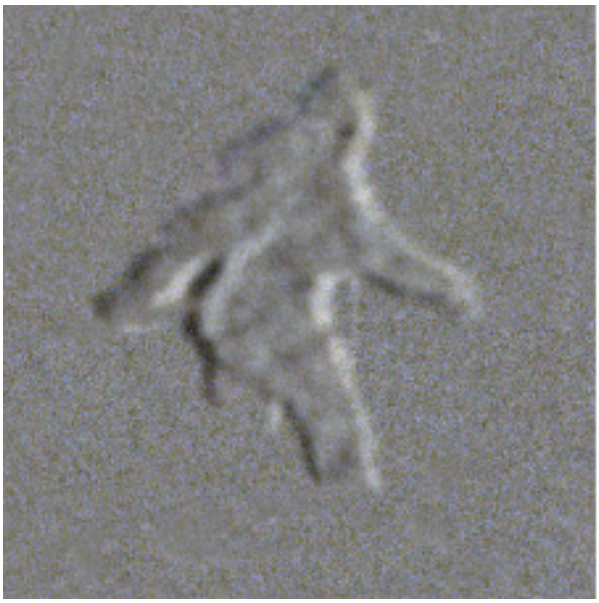
Above left, the two layered images were stabilized to the film frame itself, simply for illustrative purposes. The frameline edges align, but the images don't, because the camera panned to the right. Above right shows the images stabilized with the landscape as the anchor. The camera turned a bit to the right and up, which is why we see black and white frame lines around the image. The subject walking is seen in black and white, because the subject is in two different positions in the two frames. The landscape is mostly tonalities of grey, because it aligns well.

So how we choose to anchor the second image to the first, this will determine what types of analysis can best be accomplished by the stabilization. Considerations in choosing where to anchor, and various types of stabilization, are now described.

2A. Camera Lockdown Stabilization - If we seek to simply make the appearance of a truly stable camera, or study motion of the subject, we stabilize to a fixed set of non-moving objects in the landscape. Then, any motion of the subject walking will appear as it would biologically occur. In the PGF, the subject would move left to right, across the screen.

The landscape is anchored so fixed objects in the landscape stay in exactly the same place when the sequence is rendered as an animation. The Subject moves across the screen. This is best for truly studying the subject's motions in relation to the terrain, but limited to the angle of view, which may be only a portion of the total scene.

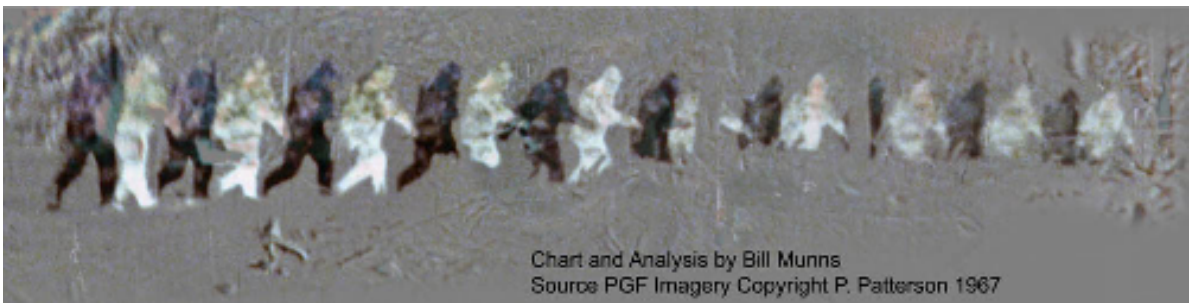
When the landscape is the anchor point (as shown below in a closely cropped image of the filmed subject) and we have the layers in reversed color tonalities, the fixed landscape tends to grey out and disappear, and only things changing position (from one image to the next in the sequence) show strongly in contrasting tonalities (black and white, in this case, because the subject is very dark, near black, in color in the film images used). The grey landscape tone is the best indicator of good alignment of the two images. In this case, the forward motion of the walking subject is shown clearly, the white and black representing the body's forward movement (what the body parts are moving toward and how fast, is determined by the thickness of the white and black regions).



One of the benefits of using image stabilization is that when two different frames of the film are overlaid, with the top layer color-inverted and set at 50% transparency, and then the backgrounds perfectly aligned, the background turns to neutral grey, leaving black and white indications of the subject's motion very clear.

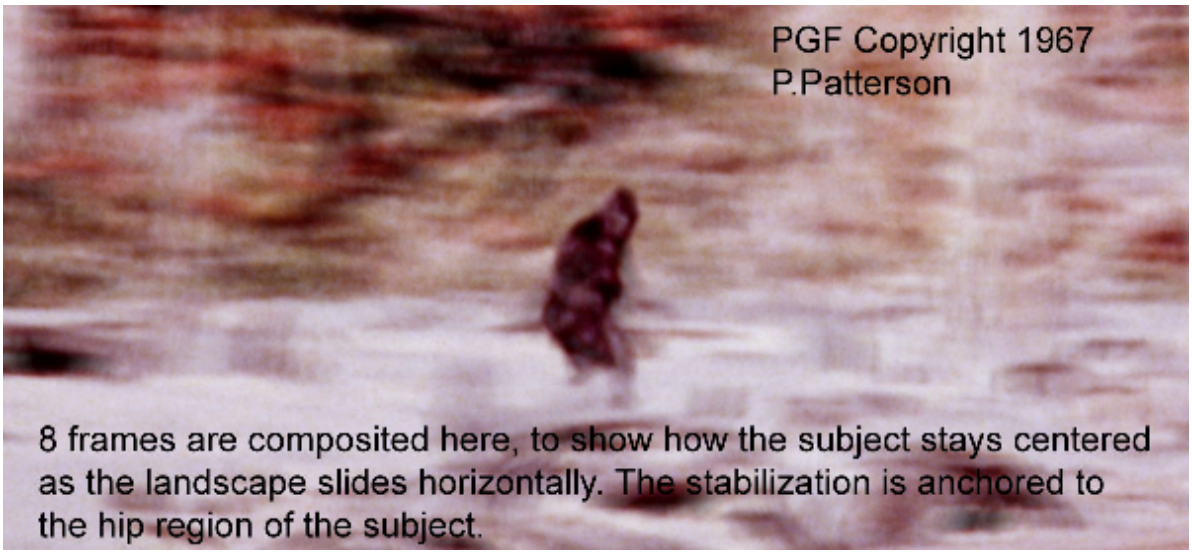
Note: As is, the early frame is normal color and the later frame is set for inverted color. If we set the opposite (early frame had inverted color, later frame had normal color) we would see black in front and white behind the subject. Either method would still be a valid analysis, because it is the thickness of the white or black which indicates extent of motion or positional change, not which color is shown.

A second example of the benefit of stabilizing the fixed landscape is in this composite walk analysis, below, where each right and left step are opposite colors, and the landscape greys out so we can focus entirely on the subject walking, step by step.



2B. Camera Pan Stabilization - If the camera pans (rotates left/right, usually to follow a moving subject), and we choose to follow that move, then the stabilization should align with fixed landscape objects on the vertical plane, but should shift the fixed objects a consistent amount in the horizontal plane, in the opposite direction the subject is moving, to keep the subject generally centered. By this method, the subject can be kept in frame for study longer, and gross body motions are still accurate, but care must be taken to insure the background left-right offset is exacting in its change from frame to frame.

As an example, the image below shows 8 frames overlaid, so the body was centered and anchored at the subject's hip, in terms of left/right position, but the landscape was locked to a vertical constraint, ideal for analyzing how obvious the walk (gait) is.



This is probably the most common type of stabilization done with the PGF. When rendered as an animation or video, the sequence gives an exceptionally good view of the subject in motion.

2C. Camera Position Changes - Aside from the camera simply rotating on a fixed position, we have in the PGF examples where Roger actually shifted his standing position to the side as he filmed, and when that occurs, the foreground landscapes shift in relation to the background landscapes. So we cannot anchor to the whole landscape, and must instead choose a part of the landscape, near or far, to anchor to.

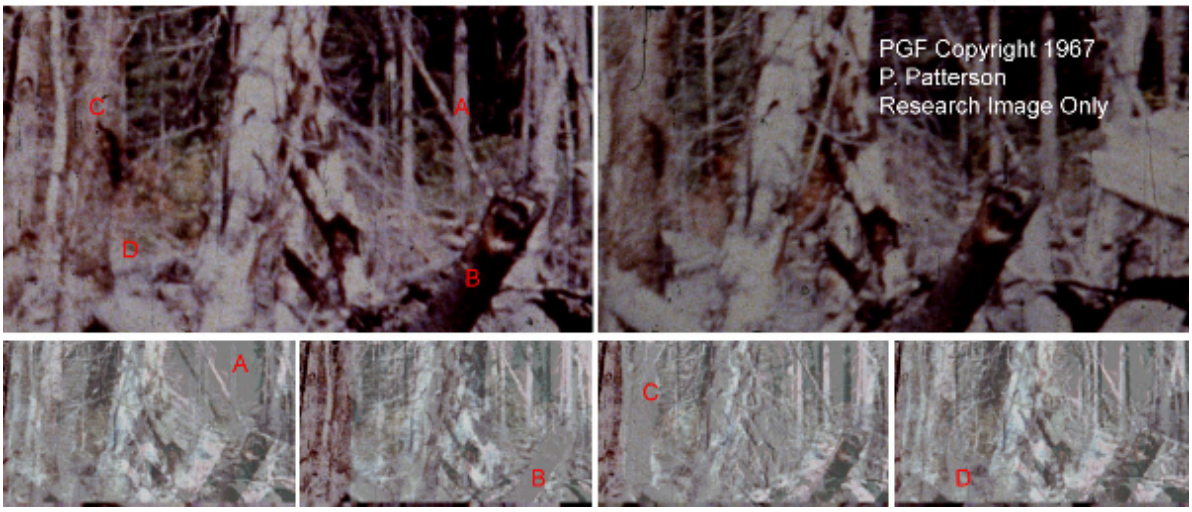
This proved valuable in evaluating a claim by some researchers that they could see things in the film which are not widely accepted to exist. Specifically, there were claims of seeing a second "creature" and a "shooter" (a human with a firearm).

I did a stabilization of this brief sequence (about 50 frames) and the camera was moving sideways looking through trees. This presented a choice of whether to anchor on close foreground trees or distant background trees, to better identify the entities claimed. I found the preferred solution was to anchor to the trees near the supposed subject, which are more distant trees, so in this stabilization, the foreground trees shifted while the background trees remained stable. So if a stabilization is done with a camera which shifts its horizontal position, you would need to choose which landscape elements to anchor to, because foreground and background landscapes shift in relation to each other.

The result of this particular analysis was that the claimed "second creature" was just shadow elements in the foliage, nothing more, and the "shooter" was simply a shadow on the side of a tree, not a human with a firearm. This did however, provide a very nice stabilization of the true subject of the film, walking away from camera, as seen through the trees before Roger shifts to

his final filming position. To my knowledge, this brief (about 3 second) sequence had never before been stabilized and zoomed in.

If the camera moves side to side, the anchor point may be near or far, depending on the analysis goal.



The above diagram shows the first and last frame of this sequence, zoomed in quite a bit to see the suspicious shapes more clearly. The four bottom row images show four options of anchor point. The actual stabilization I rendered out was anchored to point "A", the distant tree in the upper right part of the image, because the claimed "shooter" was supposedly in that region. The other images simply show how other anchors could be chosen (labeled B, C, and D), depending on the analysis goal. None of them aligns all the landscape parts well, because of the camera position shift left to right while filming.

So, selecting the object (to anchor each frame image to) will impact on the analysis and first should be properly selected by the analyst to insure an accurate result, and second, should be openly disclosed whenever the material is presented, so viewers and other analysts do know the anchoring criteria.

Depending on the intent of the analysis, we have other examples of various anchoring choices, and the following explains what types of analysis they are conducive to.

Gross Body Stabilization

This method picks a generally consistent point on the body and anchors the images, horizontally and vertically, frame after frame, to that point. I have done this with the pelvis, and it works well. The result is a fine way to study motions of body parts, like the arm swing and leg walk cycle. The one drawback to this is that if there is any up/down motion of the pelvis during the walk cycle, this method nulls that vertical motion out, and may give a false perception of a very smooth walk. In reality, the body parts tend to cycle up and down as the legs bend and straighten in the walk cycle.

There has been a lot of talk of a "compliant gait" (a walk cycle with knees always bent and a gliding motion of the torso), as compared to more normal walk cycles where legs bend and

straighten, and the torso goes up and down a bit while moving forward. The best analysis for a study of any possible compliant gait would be the above Camera Stabilized Pan, which would yield a better analysis video than a Gross Body Stabilization. But the Gross Body Stabilization has value in studying other body motions, especially studies of how the body mass and surface highlights and shadows tend to shift or flex during the walk.

Extremity Body Stabilization

This method would anchor to one specific extremity body part for study, a fine example being the head. The torso leans forward and back, shifts slightly up and down, in the walk cycle, and the head is of course attached to the most mobile part of that torso, so the head shifts position even if the torso were stabilized at the hip. But if you wanted to study the head, anchoring the head for a specific stabilization would be valuable. Another example would be anchoring at the shoulder, to study the arm motion in greater detail. So a researcher can anchor the images to any body part, depending on the analysis goal.

NOTE OF IMPORTANCE - In looking at any stabilization effort, the person doing so should be willing to disclose the anchoring point or object, so you would know what body motion studies would be best served by the effort.

Animated GIFs

The animated GIF has gained widespread usage in PGF analysis. It is a simple way of creating animated images, the most common example being to take two pictures and overlay one atop the other, and switch the top one on and off, so we see whatever is different about the two pictures quite vividly. More than two pictures can be used as well.

It doesn't display well in a PDF document,but is quite widespread on the internet, in forums, websites and discussion boards.

Like the Image Stabilization, the key to a successful GIF display is the choice of what point in the base image the next one or more images are anchored to.

3.2.4.5 - The Camera used, and Camera identifications

Roger Patterson used a 16mm film camera, specifically a Kodak model K-100 single lens camera (there is also a 3 lens turret version), which holds a 100' roll of film. The camera is spring driven (no motor) and can run approximately 1 minute at 24 fps filming speed, or about 1 minute, 20 seconds at 16 fps filming speed. At either filming speed, the PGF film (Bluff Creek segment of 953 frames) could have been captured with one full spring winding pressure, without Roger needing to rewind the spring at any point in his filming at Bluff Creek.

Images courtesy of Chris Murphy

This camera takes a "C" Mount lens (a common thread specification for 16mm cameras), and the viewer is a parallel viewfinder with a separate lens which Kodak makes to matching focal lengths. So, for example, with the 25mm standard lens, there is also a 25mm lens for the viewfinder. If you change to a 15mm lens for filming, you normally change the viewfinder lens to 15mm also. The three lens turret model actually has 6 lenses on it, three for the camera and three for the viewfinder.

The filming speed is a dial the operator turns to a setting from 16 fps to 64 fps. As the dial is a continuous turn, you can theoretically get filming speeds other than the numbers displayed on the dial, anything between the 16fps and 64 fps range. Some researchers think the PGF was actually taken at about 18 fps. The camera allows this option.

The camera trigger to film has four positions for the trigger lever (described in detail above, in the study of camera starts).
Reviewing here, the positions are:
Horizontal - off;
Up - single frame;
Down One - camera runs until the trigger is let go;
Down Two - camera runs even when the finger is removed, running until the lever is specifically pushed up, or the spring tension runs too low.

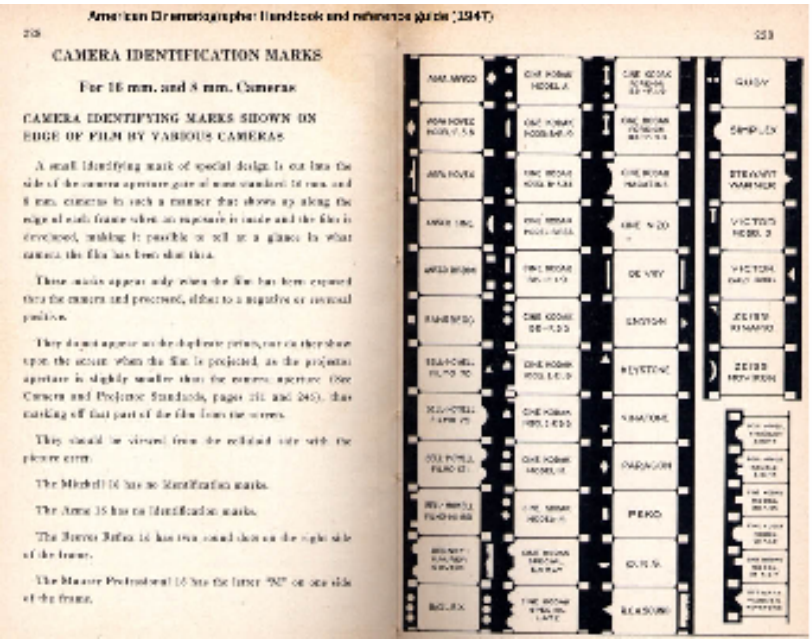
The trigger is on the camera body right side, so the person filming generally uses the right hand on the trigger, the left hand holding the camera. A standard 1/4-20 thread on the base allows for attachment to a tripod or to a pistol grip. Roger reportedly used a pistol grip on his.

Documentation about the camera rental has long been used as the source of identifying Roger's camera, but the rental occurred in May 1967, and the Bluff Creek segment was filmed in October 1967. In that respect, the rental documents weren't actually "proof positive" that the PGF was taken with a K-100 camera. But for many years, that was simply the best proof anybody had.

In my research, and my interest in seeing true full frames of the film, I came upon a curious development in 16mm camera technology which many camera manufacturers participated in, and that is the "Camera Identification Notch", a small hole, notch or other irregular shape on one side of the regular film aperture opening, which causes an exposure on light in the sprocket zone area that will not show when the film is projected. This exposure is apparent when the film itself is examined, and essentially records proof of the type of camera used.

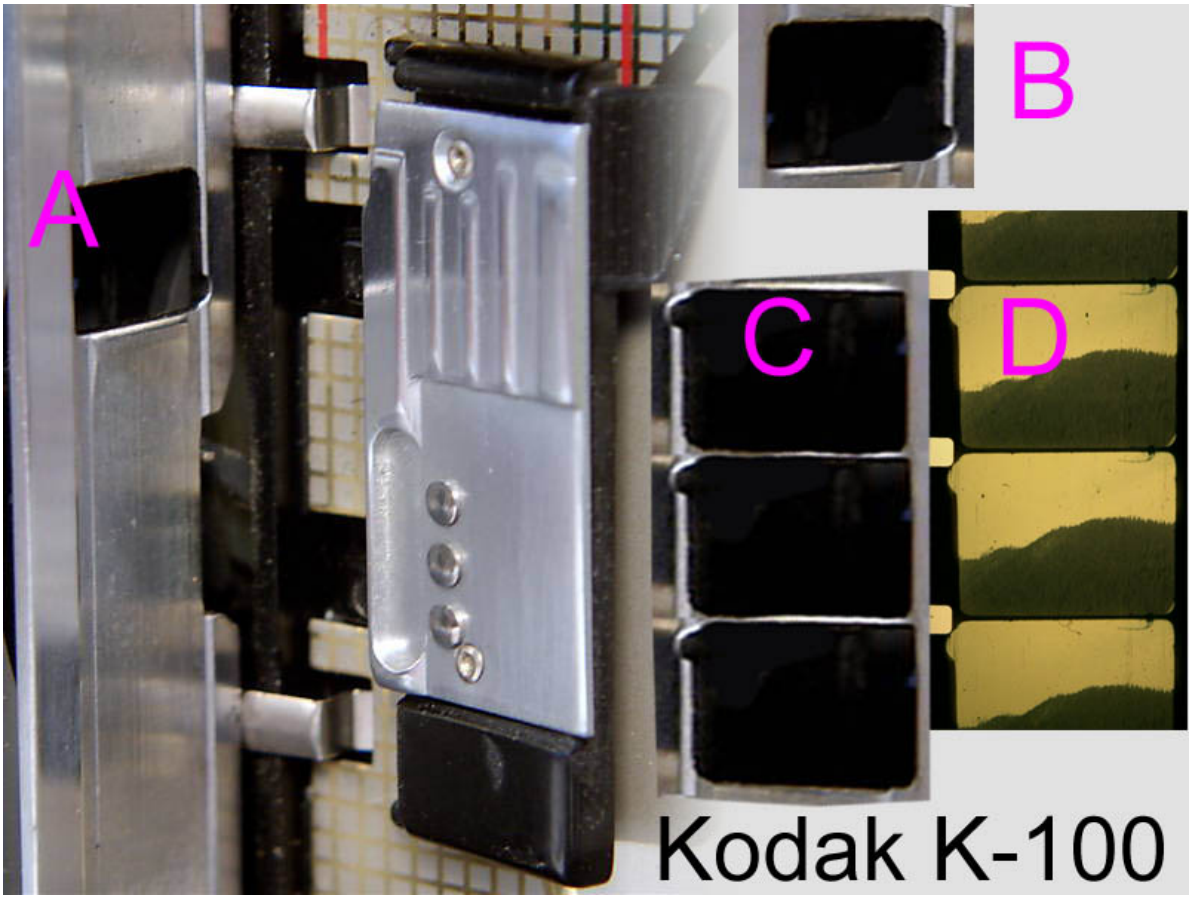
The documentation we have about this Camera ID system is a chart from the 40's, published in a Cinematographer's Guide, and it shows the various notch patterns of many camera makes and models.

Chart is shown below.



Looking into the K-100 camera, we can see the curved notch on the bottom right of the aperture opening that exposes the film. Note that the lens actually inverts the image striking the film, so

when we look at the exposed film, we will see the notch exposed with picture detail in the upper right of the frame. But the same curved notch is quite apparent.



In the above image, the lettered parts are as follows:

A - is the actual camera aperture plate, and the rounded notch is in the lower right corner.

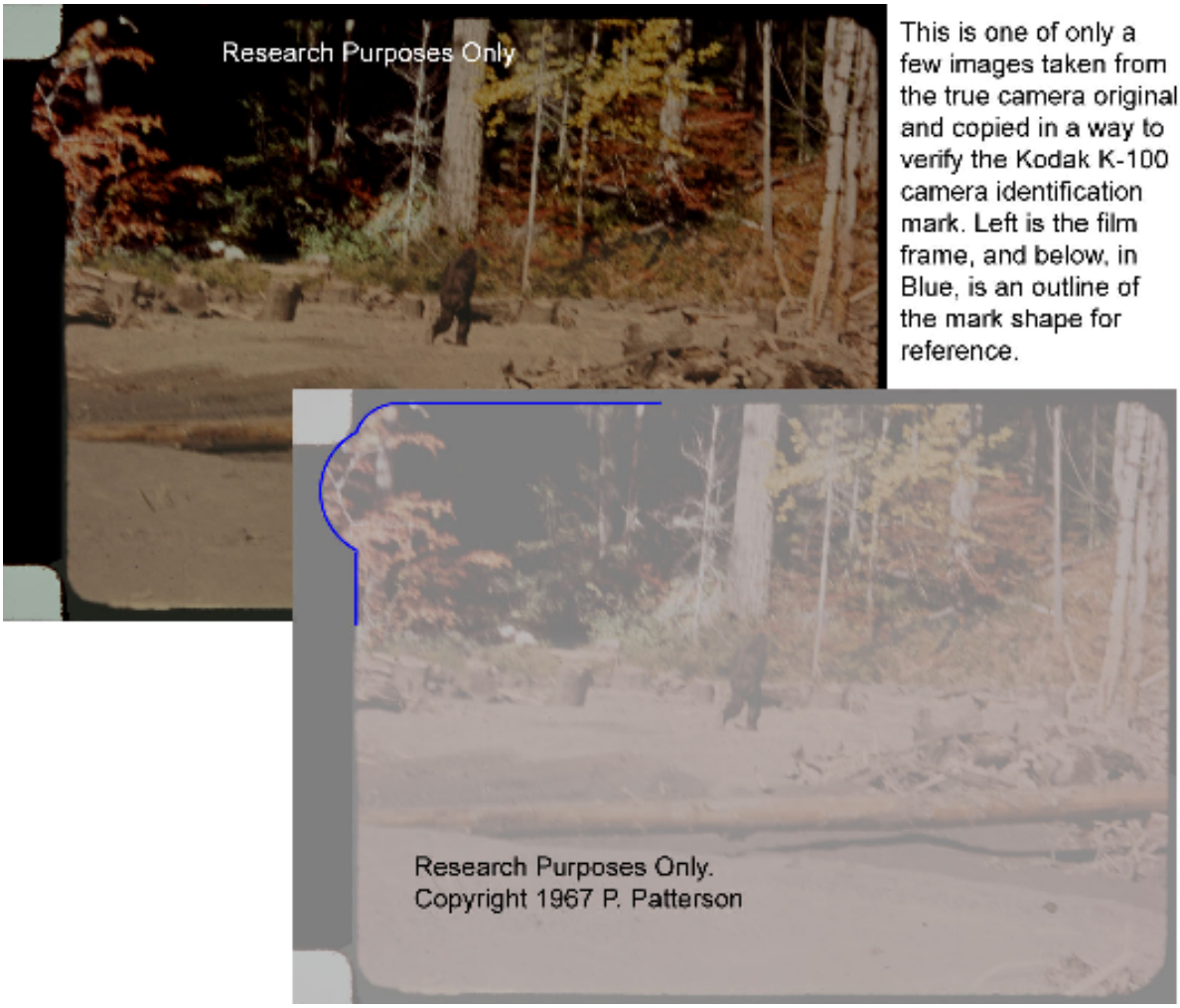
B - Is a rectified image of the aperture opening and notch, corrected to reverse the odd viewing angle of the photograph of the camera parts (which makes some edges appear to go diagonally).

C - Is a composite of three openings (rotated 180 degrees, to how they would appear on film, with the notch in the upper left, instead of lower right).

D - Is a sample film scan from Roger's documentary footage, showing the notch area exposed on the film, directly below each sprocket hole. This identifies the camera used as being a Kodak K-100 model 16mm camera.

With the PGF, most people in the last 42 years have been studying the cropped copies, and especially the copies which enlarge the subject and exclude the surrounding areas of the scene. All these copy versions exclude the notch entirely. So essentially, almost nobody saw it, and the few who may have didn't know what it was. I was only able to verify the remnants of the notch

on some first gen contact print copies last year, and didn't actually see a true copy with the notch fully intact until I saw, and scanned, some of the 4" x 5" transparencies Mrs. Patterson held, which were made from the true camera original, and represent the highest image quality we have access to for studies of the PGF. This has been described in greater detail, above, in the section on cropping.



This is one of only a few images taken from the true camera original and copied in a way to verify the Kodak K-100 camera identification mark. Left is the film frame, and below, in Blue, is an outline of the mark shape for reference.

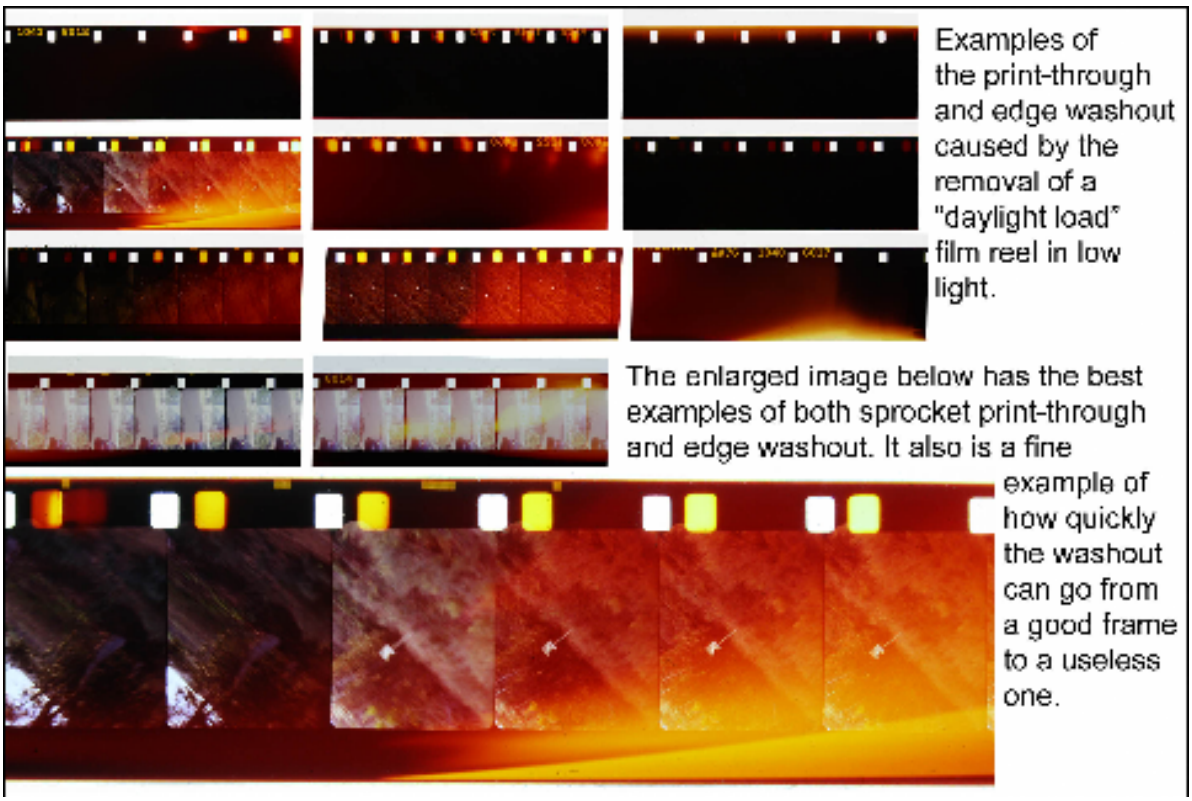
The value of this is two-fold. One value is that it truly verifies for the first time an absolute identification of the camera used, because the rental documents simply proves Roger rented such a camera in May 1967, but doesn't actually prove he used that camera at Bluff Creek. Now that we have more of Roger's other documentary filming scanned for study, we can verify that he did indeed use a second type camera for some of his filming, and that would have made the rental document alone ever weaker proof of the camera used at Bluff Creek. Thankfully, the camera ID data is the absolute verification.

Second, by verifying the camera to absolute certainty, we are in a better position to study the lens issue, because we know the K-100 camera takes a "C" Mount lens, and so we can test various lenses which are of the "C" Mount design.

3.2.4.6 - Camera Runouts and End of Roll Film Washout

The description of how much film Patterson had left on his 100' roll, when he encountered the Filmed Subject (PFS) at Bluff Creek, si sometimes challenged. **(Note: He had at least 23.825 feet left because that's the exact calculated length of 953 frames. However, the phrase "about 23 feet" is commonly reported in various books, and is an approximation of footage)**

The Kodak K-100 camera holds a 100 foot "daylight reel", a film reel which has solid phlange sides and allows the roll to be loaded and unloaded without the need for a pure dark chamber, darkroom or changing bag. When loaded or unloading in subdued lighting, like open shade outdoors (or under a poncho, as Patterson reported), generally only the outermost layer or two of the film will get any exposure to ambient light and be washed out. If that outer layer of film is not tight against the reel, some light may spill onto the next layer under, often on one side of the film moreso than another, because one side is "up" (toward to camera door, and thus toward to light source). So a common result of changing reels (to remove a roll that has run out of footage after filming), is to cause a washing out of the outer layer of film, and sometimes a washing out of one side of the film the next layer under. Examples are shown below.



A second result of changing rolls in a low light (non-darkroom) condition is that light passes through the sprocket holes of one layer and exposes patterns of light similar in shape and spacing to the sprocket holes on the film layers beneath. If the outer layer of film is a bit loose, allowing light to spill onto the edge of the next layer under, that looseness also likely shifts the position of the sprocket holes from one layer to the next under, and so light shining through the sprocket

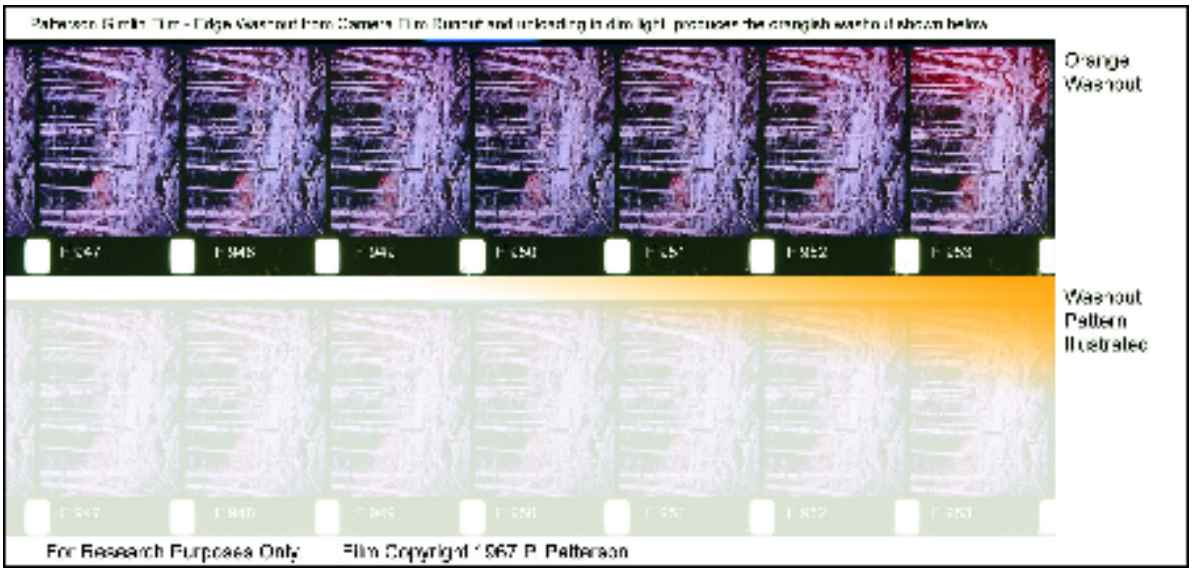
holes of one layer may likely expose spots of the next layer shifted to a space between the sprocket holes. So if a film has the washout spill effect from unloading in dim light, some trace print through of sprocket hole-shaped light flares should also be evident.

Examples of both are shown on the above sampling of various runout and unloading effects from other rolls of film used on various filming tests related to this PGF study.

The presence of both indicates after the scene with those washout exposures was taken, the film was unloaded from the camera, and thus substantiates a claim of a film runout during that last scene filmed.

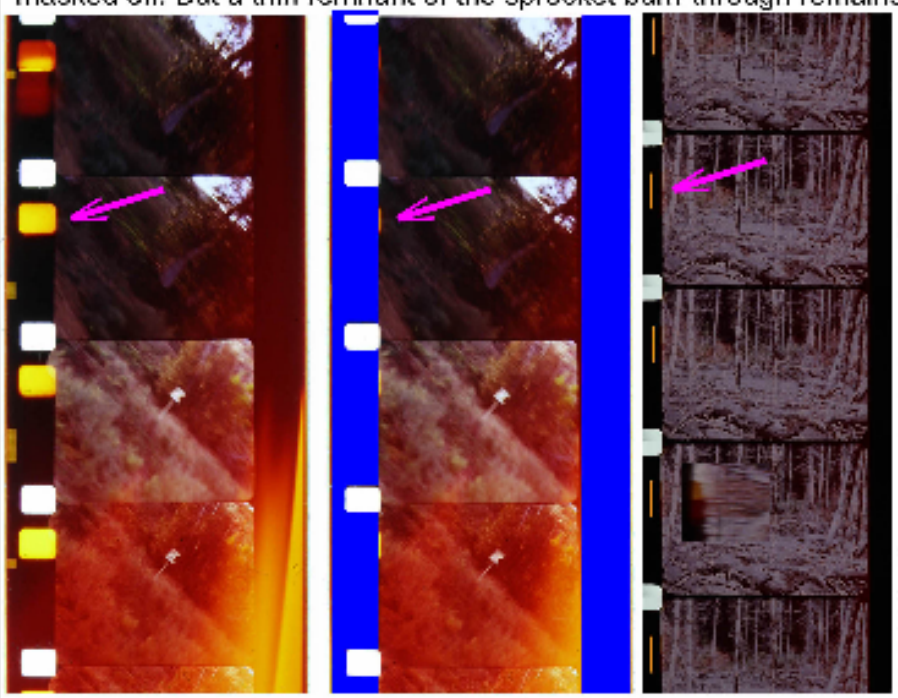
The PGF has both indications of a typical camera film runoff, and subsequent unloading of the reel in a low light situation.

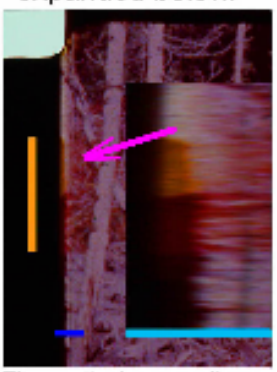
For the PGF, the following image sequence from the frames ending in Frame 953 show the washout progressively increasing in orangish tone on the top side of the film.



On the one contact print I have scanned, the remnants of the sprocket hole burn-through are seen as well. The chart below shows the general indications of such.

On a camera original film version, the sprocket burn through effect is like what you see below LEFT, If a contact print copy is made, the blue margins (below, second left) are masked off. But a thin remnant of the sprocket burn-through remains. That is what we see on a contact printed copy of the PGF, as shown here, and shown expanded below.





The vertical orange lines above and left, in the black sprocket zone, are markers I added to help locate the sprocket burns

PG Film for Research Purposes Only Copyright 1967 P. Patterson

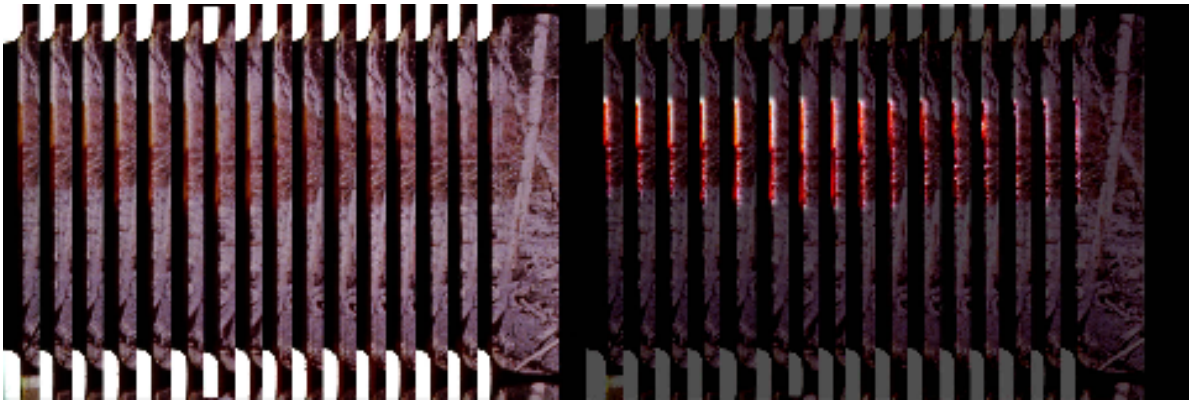
Now enlarging the portion of the PGF where one sample sprocket burn is evident, the enlargement below shows it in greater detail.

At least 13 frames of the PGF have evidence of sprocket burn-throughs and the spacing of these burn-throughs as well as their width are consistent with sprocket hole spacing and size.

And they show the exact clipping to be expected from the process of making a contact print film copy on 16mm.

The orange bar in the black zone is an indicator I added to better illustrate where the burn-through is. It is not on the film copy.

Finally, 13 frames were put in sequence with the small remnant of the sprocket flare visible, and you can see the flare is in the same place even as the image content shifts somewhat from the hand held camera motions. At left, below are the actual frames, and at right, the color has been adjusted to highlight the orangish burn effect.



The combination of the washout edge effect, and the remnants of several sprocket hole burn through effects on the very end of the PGF show reasonable evidence that after the PGF Bluff Creek sequence was filmed, the camera was opened and the film roll was removed, the presumption being to change to a new fresh roll of film for more filming.

The washout pattern also shows a progression of increasing washout that makes it reasonable to presume the next frame after F953 was even more washed out, and the decision to cut the film off at that point was a reasonable and arbitrary decision to remove any ending footage that was simply too washed out to have any research or illustrative value.

So any suspicion that there might be additional footage after frame F 953 showing things of any analytical value is a baseless suspicion.

Continued Discussion

This discussion of the Physical Film, and the reference material, is in two additional PDF documents. #1 has previously discussed the basic physical film analysis, and the next one, #3 discusses other footage related to the PGF analysis

For more information, in case you may have received this PDF file from another person, you can find the source material at:

www.themunnsreport.com (The Munns Report . Com)

and more information about my career and background either on that website or:

www.billmunnscreaturegallery.com (My Creature Gallery website about my work in makeup, special effects, museum exhibit models, and wildlife art).