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The imaging process calls for two images of each sheet to be captured and processed.

One image is with conventional front lighting. This is shown above on the left.

The second image is captured, without moving the page, with back lighting. This is shown above on the right. The backlighting is from a 1 mm thick electroluminescent sheet placed under the leaf. When the light sheet is connected to the mains supply, the chemicals in the laminated sheet are excited and glow. No appreciable heat is generated.

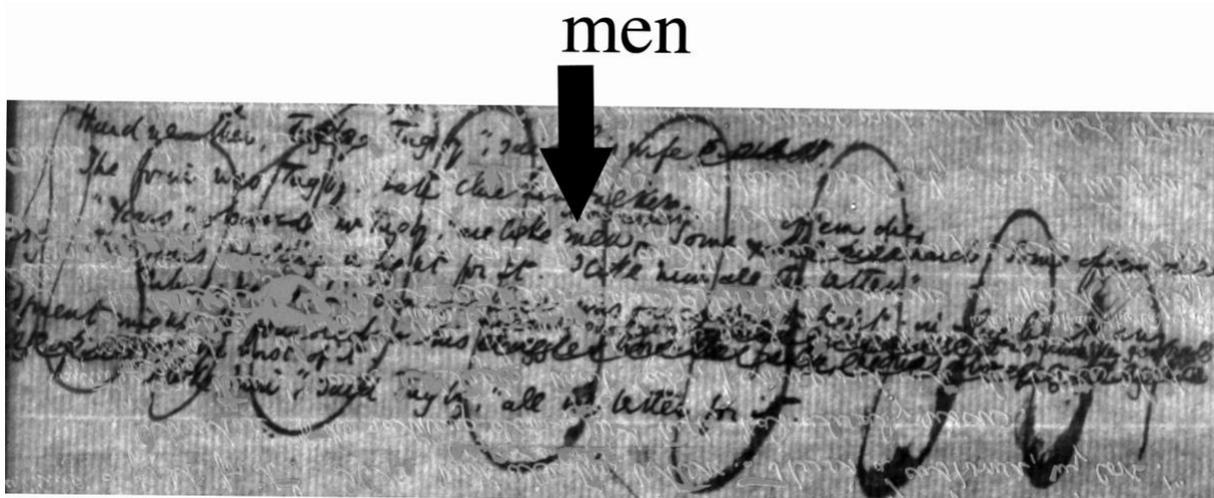
Electroluminescent sheets are available in any size.

The front lit image records front surface writing (which is not needed). The back lit image records the same front surface writing (which is not needed), as well as writing on the back surface (which is needed). The task is to subtract the front lit image from the back lit image, thereby leaving only the writing on the back surface.

The process relies on making writing which occurs on both images cancel itself out. The first step is to prepare one data file (typically with Photoshop) which holds both images. The two images are placed on their own layers. The resultant single (Photoshop .psd<sup>i</sup>) file thus records both images perfectly superimposed. Use Photoshop as follows:-

1. Under Image / Mode choose Greyscale.
2. In the 'Layers' control panel select the upper layer.
3. Use Image / Adjustments / Invert. This makes dark greys light and vice versa.
4. In the 'Layers' control panel reduce the opacity of the upper layer until all unwanted writing disappears = self-cancelling.
5. Flatten the layers. This means that there is now only one image / layer. Unwanted data has been removed by self-cancellation.
6. Adjust levels so as to improve appearance.

This is the Multiple Images with Zero Movement (MIZM) process. Here is the result of applying MIZM to the lower part of leaf 54:-



Note that the image above starts with 'Hard weather ..' and ends with 'all the better for it.'

The word 'men' is indicated and is discussed more fully below.

The printed text is found in the Fourth Quarter:-

*"Hard weather indeed," returned his wife, shaking her head.*

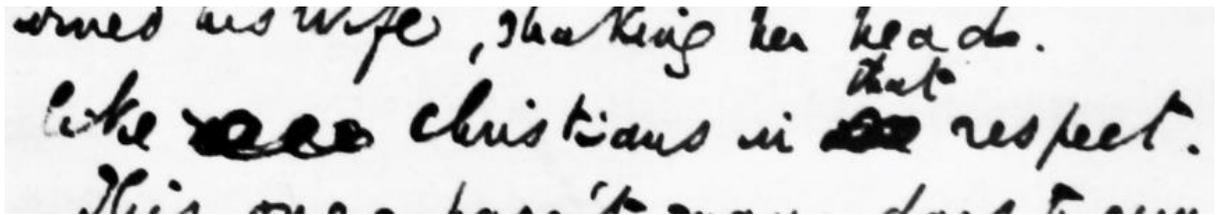
*"Aye, aye! Years," said Mr. Tugby, "are like christians in that respect. Some of 'em die hard; some of 'em die easy. This one hasn't many days to run, and is making a fight for it. I like him all the better. There's a customer, my love!"*

The back of the manuscript (as shown above) has numerous differences from the printed text.

In the third line, for instance, there is the word 'men' (as shown above) as opposed to

'Christians' in the printed text:-

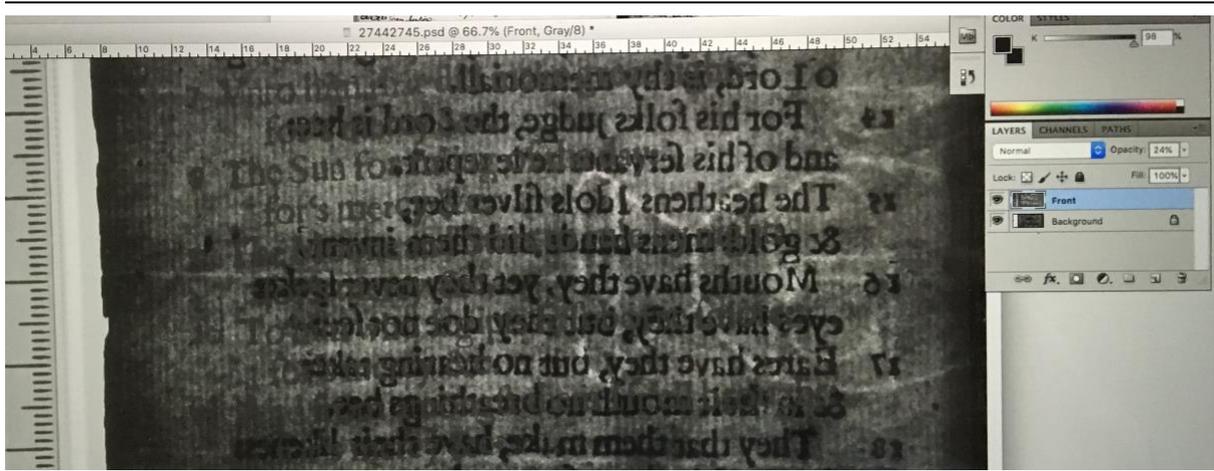
Here, by way of comparison, is the front lit portion, which is also in the printed text:-



This demonstrates how the MIZM process can reveal previously hidden texts. The full set of images is now held at the V&A and is available to researchers. It also demonstrates how such revelations can lead to further questions. For instance why did Charles Dickens, with his well known social sensitivities, choose to change the wording? Evidently he wavered.

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<sup>i</sup> The following image is a screen grab of a .psd Photoshop file. It shows the same image by front lighting (Layer Front) and by back lighting (Layer Background). The original colour images had been converted to Grayscale Mode. The upper layer (Layer Front) had been inverted, so shades of grey had been inverted. The opacity of the upper layer (see the opacity slider) had been progressively reduced, (in this case to 24 percent) so as to eliminate as far as possible the print on the front of the page. This means that the content of the front of the page had been digitally ‘subtracted’ from the image obtained by back lighting. The watermark revealed is part of the jug given above in CASE STUDY 7 – Travails of Religious Books - Béarn and British North America.



[RETURN TO TEXT](#)