

CAPTION BLACK EDGE SYSTEMSINTRODUCTION

The object of this information sheet is to outline the techniques used when a caption is to be inserted into a video signal. In particular the principles of black edging are discussed together with the variations to permit coloured edge operation.

1. CAPTION INSERTION

With monochrome video sources caption insertion was a relatively simple process. Captions could be superimposed onto a video signal with any picture information in the background scene being effectively removed by the action of the peak signal clipper. (With bright background scenes however caption legibility is poor as the letters do not contrast sufficiently with the background). With colour working superimposition is not possible, the clipper does not clip chrominance detail and so the chrominance from the background appears to 'show through' the caption letters, although in a de-saturated form.

Captions used with colour sources are therefore keyed into the background scene by an electronic switch rather than superimposing them. The result of this is to remove completely any background information from those parts of the picture to be occupied by the letters.

A typical caption insertion system is shown in figure 1.

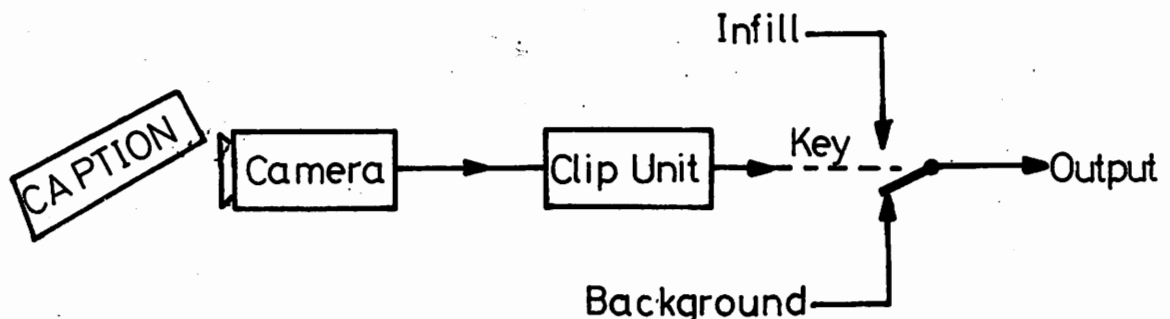


Figure 1: Caption Overlay System

The electronic switch is so biased as to normally select the background video. When the caption camera produces an output, i.e. from the caption letters, the switch changes over to the second input. Any signal appearing on this input will therefore appear as part of the composite output picture, however it will of course be displayed with the shape of the caption. This is illustrated in figure 2.

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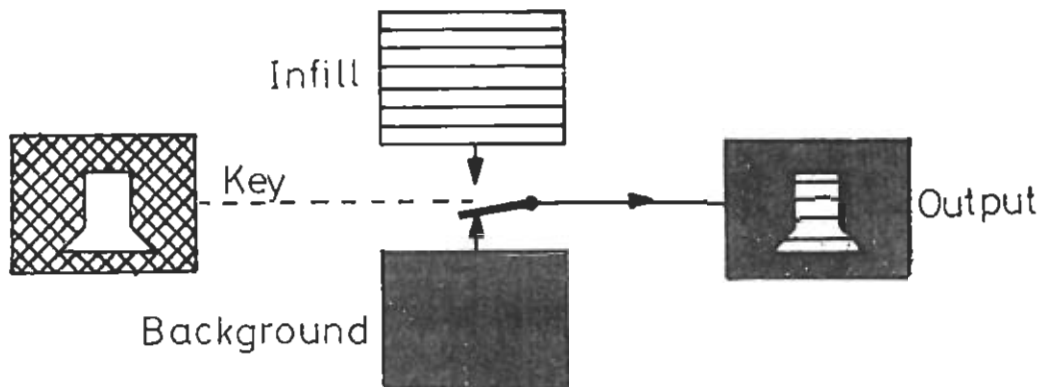


Figure 2: The Appearance of an Inserted Caption

The second input to the switch is usually called an 'Infill' input, as the signal applied to it effectively "fills-in" the holes cut out of the background scene by the caption keying source.

The only other component shown in figure 1 is the clipper. This device clips the caption video around mid-grey level to produce a clean, two-state key signal to operate the electronic switch. The action of the clipper is illustrated in figure 3:

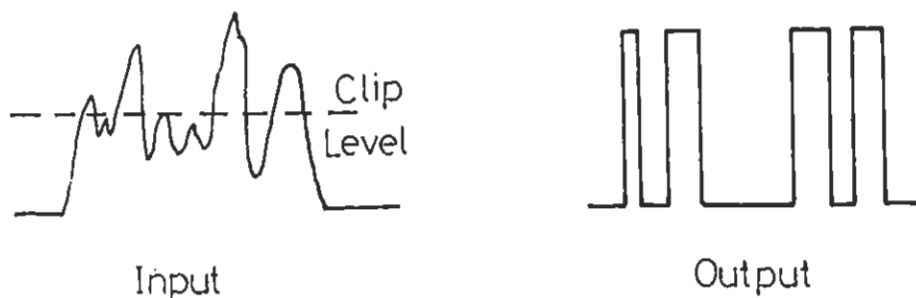


Figure 3: Operation of the Clipper

If the electronic switch is one of the fast cross-fading types it is possible to insert a fader into the key drive to the switch after the clipper. With no caption key faded up the electronic 'switch' will pass only background video. As the key signal is progressively faded up the switch will pass more caption infill and less background video until, when the key is fully faded up, the switch will be passing all infill and no background. In this manner captions can be conveniently faded up even though colour sources are involved.

2. BLACK EDGING

Black edging is a simple development of the caption insertion process, and greatly improves the legibility of the inserted caption by bordering it with a narrow black edge.

The principle of black edging is simple: the 'hole' that is cut into

the background scene by the caption key is made wider than the original letter. The infill signal is the original white on black caption, suitably timed to coincide with the centre of the widened key signal. When the switch selects the infill input not only will the original white letter be keyed in but a small portion of the black background surrounding it.

This is illustrated in figure 4.

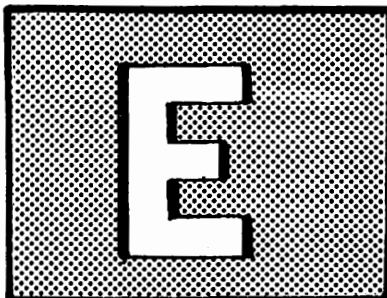


Figure 4: The Appearance of Horizontal Black Edging

The modification of the basic caption system to a black-edge variety is a relatively simple process. All that is required is a means of widening the key signal and re-timing the infill signal. This is achieved by two delay lines, arranged as shown in figure 5.

If the edging required is to be left and right then the delays are of the order of 100 - 150ns. For top and bottom black edging one line delays are used. Most black edgers use a combination of both techniques to achieve all round black edging.

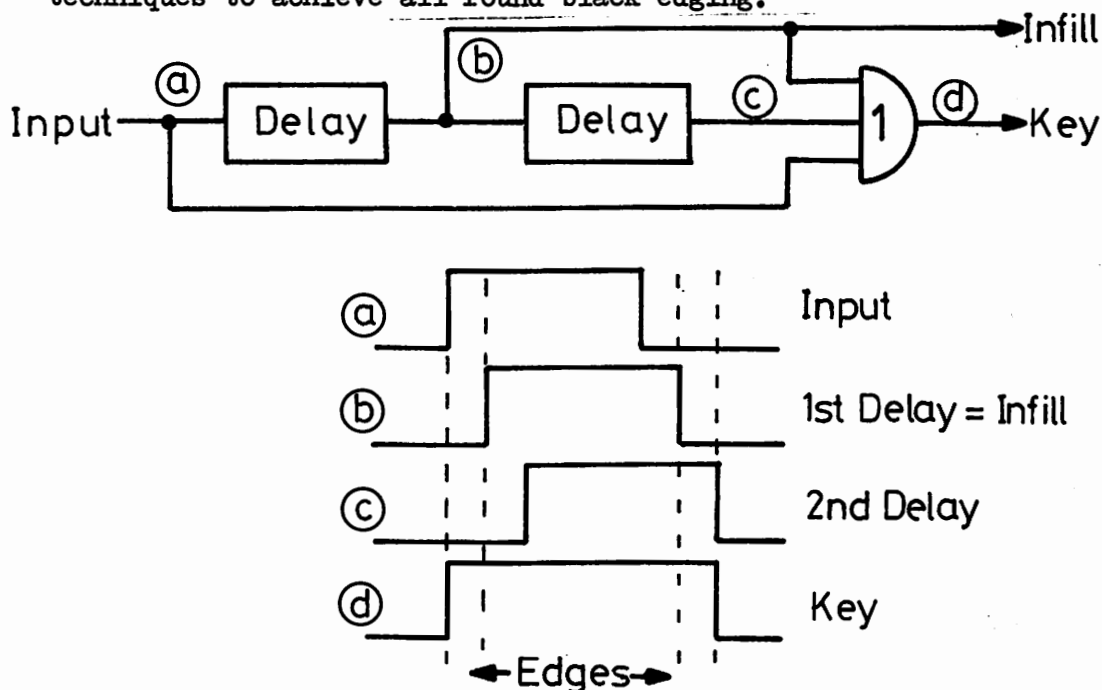


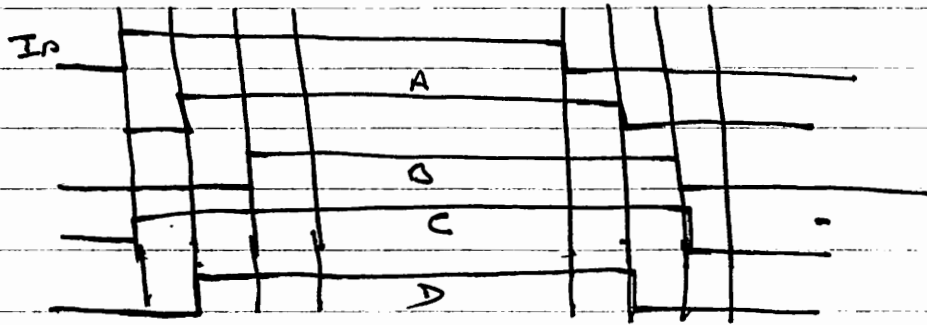
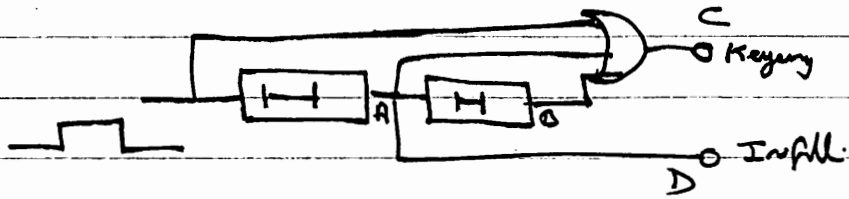
Figure 5: Generation of Horizontal Black Edges

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The last variation is that of coloured edging. When this is used the final inserted caption takes the form of a coloured letter with a narrow coloured border around it. This is achieved by routing the infill signal via a two level colour synthesiser. The synthesiser converts the white on black caption into a two colour caption. When this caption is inserted the switch will key in the letters and a small part of the coloured background, thus resulting in the coloured edges of the final display.

Unfortunately coloured edge captions are not always particularly effective, this is due to the limited resolution of the coding and decoding process. Consequently the system is often used to provide coloured letters but with conventional black edges.

Keying with black edges.



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