# Safe areas for widescreen transmission

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***There are not yet any accepted definitions for the "safe areas" in widescreen television production. This was a matter of pressing concern in the UK so the UK broadcasters together drew up an ad-hoc standard for immediate use in the UK.***

***The basic concepts behind dual-standard transmissions and the approach taken to achieving compatibility, are outlined here. The reasoning for setting the safe areas at the chosen values are then given.***

## Background

Widescreen television offers the programme maker much more choice in framing the image. This produces images that are much more appealing to the viewer. However we live in a world where those pictures must be shown on standard screens – and this leads to compromises.

In the UK, the broadcasters have considered the options and drawn up a number of standards for safe areas, when making widescreen programmes.

## Widescreen display

There are a number of ways that a widescreen programme can be viewed. It is easiest to divide these viewing options into three groups:

- **Analogue viewers on a 4:3 service.** In this case the programme is viewed in a way chosen by the broadcaster. Normally, the aspect ratio will be converted in the master control area to a format that is appropriate for the material.
- **Widescreen-service viewers with a widescreen television.** In this case the programme is transmitted in full widescreen. If the viewer has a widescreen television then it is reasonable to assume that the whole 16:9 frame is being shown, barring an amount of overscan.
- **Widescreen-service viewers with a standard television.** This is the most difficult of the cases to deal with, as the viewing conditions depend on the choices made by the viewer. Of course in many cases, the choices will not be made but systems will be left at the factory default settings. In the UK, with current set-top boxes, the settings are either letter-

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box (showing all the image) or "centre cut-out" showing only the central 4:3 part of the image, although we expect that the next generation of boxes will support 14:9 letterbox.

## Standard-TV safe areas

For standard television, the safe areas are 10% *graphics-safe* and 5% *action-safe*. This means that there should be, on both sides, 10% of the image left free of graphics and 5% of the image left free of important action.

This ensures that most viewers will be able to see all of the important information in the image. The figures were selected as a compromise based on the factory settings of a range of television sets.

## Widescreen safe areas

The simple solution is to follow the guides drawn up for the standard televisions. However, this fails to take into account the demands of the viewer watching on a standard television. The following factors come into play:

- Widescreen televisions are shipped with the image over-scanned on the screen, although the amount of over-scan is much reduced compared with that at the time when the previous safe-area decisions were made.
- The standard aspect-ratio viewer cannot necessarily see all the image.
- If the viewer is watching in letterbox mode, then the upper and lower edges of the image are clearly visible. Thus any untidiness at the edge (booms in shot, or wipe patterns not reaching to the last line) are visible.


**Figure 1**
**Letterbox image with subtitles at 10% graphics-safe area. Notice how the subtitles appear to take over the image.**

- When viewed in letterbox, any captions and open subtitles that are framed for a 10% graphics-safe area look much too high in the frame (see *Fig. 1*).

This leads to contradictory requirements which any successful standard for safe areas must address wisely.

## Shoot and protect

*Shoot and protect* is a technique to ensure that the main action is held within a defined area. The image is composed so that the action is held within a specific area, which means that those watching on standard televisions will be able to see the important part of the picture – while still giving the true widescreen viewer most of the benefit of the wider aspect ratio.

Thus, in effect, a shoot and protect policy provides a "super safe area" to allow for the large over-scan when viewing on a standard television set.

See the side panel on the next page for a full explanation of shoot and protect, giving its advantages and disadvantages.

## Designing the safe areas

With these requirements in mind, representatives of the UK broadcasters jointly designed safe areas for the delivery of programmes, by defining three standards – one for full widescreen, one for widescreen with centre cut-out (4:3) shoot and protect, and one with 14:9 shoot and protect.

### *d) Widescreen only*

In order to make sense of the decisions required in the two shoot-and-protect standards, it was important to have the basic widescreen standard in place. The numbers for this were chosen while bearing in mind the following considerations:

- All the television manufacturers say that they aim to have a maximum overscan of 3.5% on each edge.
- The overscan needs to be as little as possible on the bottom edges.
- At the side of the image, viewers watching on a standard television may well have a large overscan. Thus there needs to be a wider margin at the side of the image – especially for the graphics, which look very poor if cropped by the overscan.
- To make the most of the widescreen action, it is important to allow those with modern sets to have as wide an image as possible. This was felt to be a more important factor than ensuring that **all** action was safe for the letterbox viewer.

Thus the figures were set as in the table below:

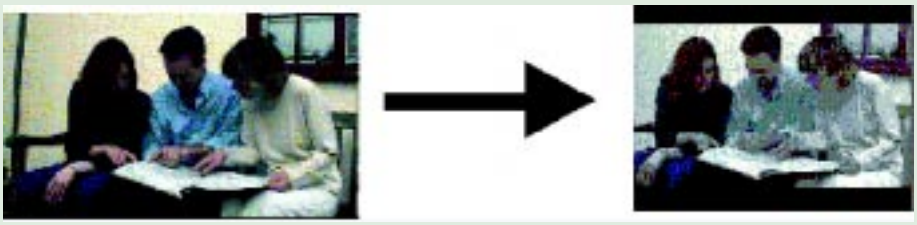
| | Vertically | Horizontally |
|---|---|---|
| **Action Safe** | 3.5% | 3.5% |
| **Graphics Safe** | 5% | 10% |

**16:9 image on a 16:9 raster.**

# Options for shoot and protect

## Option 1 – 16:9 letterbox

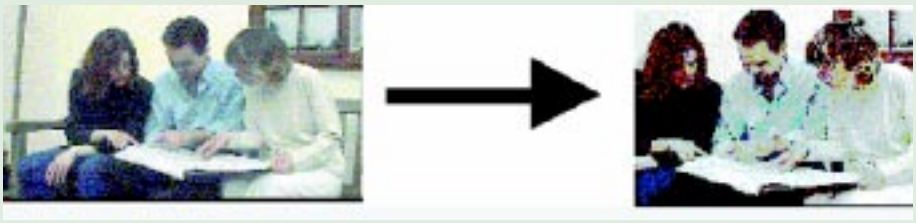
showing the whole widescreen picture as a "deep" letterbox.



| | For the 4:3 viewer | For the broadcaster |
|---|---|---|
| **Advantages** | Whole of original picture reproduced.<br>Suits some movie fans. | Simple to shoot material to fit this scheme. |
| **Disadvantages** | Thick black bands top and bottom of the screen.<br>Many viewers positively dislike deep letterbox for all genres, particularly for sport. | Many viewers complain vociferously if compelled to watch deep letterbox. |

## Option 2 – 4:3 centre cut-out

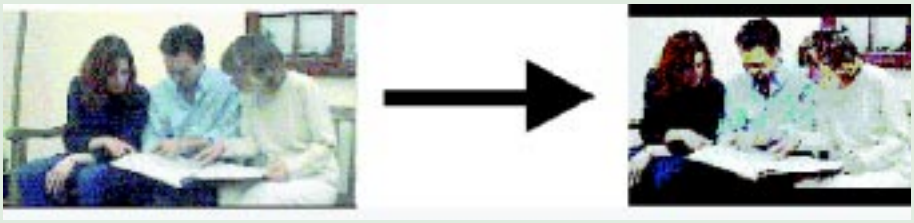
showing only the centre portion of the widescreen picture



| | For the 4:3 viewer | For the broadcaster |
|---|---|---|
| **Advantages** | Picture fills screen on 4:3 set. | |
| **Disadvantages** | Edges of original picture missing results in poor picture composition if programme is "pure" widescreen. | Difficult to compose picture satisfactorily for viewing on both screen shapes: if composition is correct for 16:9 then important detail is lost at edge. If composition works on 4:3 screen, then large areas of "waste" occupy edges of 16:9 picture. Very difficult for drama, movies or placing of full-screen graphics. |

## Option 3 – 14:9 letterbox

a "half-way house" compromise between options 1 and 2



| | For the 4:3 viewer | For the broadcaster |
|---|---|---|
| **Advantages** | Black bands top and bottom of frame much reduced.<br>Picture loss at edges much reduced; viewer sees most of benefit of widescreen picture composition. | Viewer tolerance much greater: broadcaster receives very few complaints.<br>Production for viewing in both full 16:9 and 14:9 letterbox is much simpler, as compromises in picture composition are much reduced. |
| **Disadvantages** | Minor – only a few viewers dislike the thin black bands. | There are still some compromises required, but these are minor irritants. |

### e) *Widescreen with shoot and protect for the centre cut-out.*

- ⇨ The safe areas need to be as wide as possible for the widescreen viewer.
- ⇨ The safe area for the 4:3 viewer must be consistent with the 3.5% maximum overscan for modern sets.
- ⇨ The vertical settings are the same as for the last case, as people may be viewing this image in letterbox.

Thus the safe areas were set to be 3.5% for the 4:3 viewers and 7% for graphics safe. As we decided to set all numbers with respect to the 16:9 frame, after rounding, the figures are as shown in the table below:

| | Vertically | Horizontally |
|---|---|---|
| **Action Safe** | 3.5% | 15% |
| **Graphics Safe** | 5% | 17.5% |

**16:9 image on a 16:9 raster: shoot and protect 4:3.**

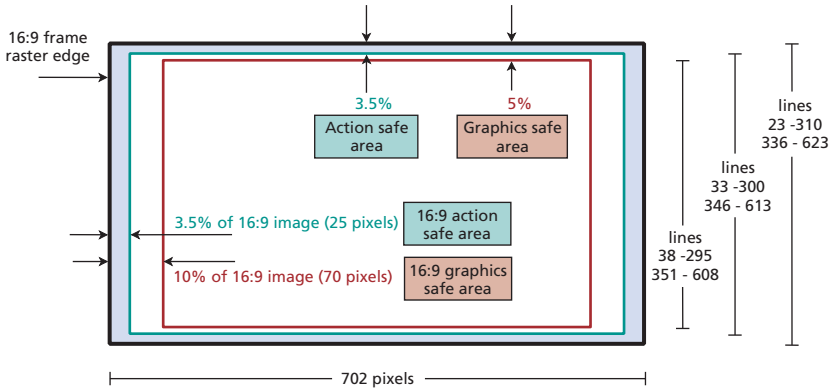



**Figure 2**
**16:9 full image, defining the action- and graphics-safe areas.**

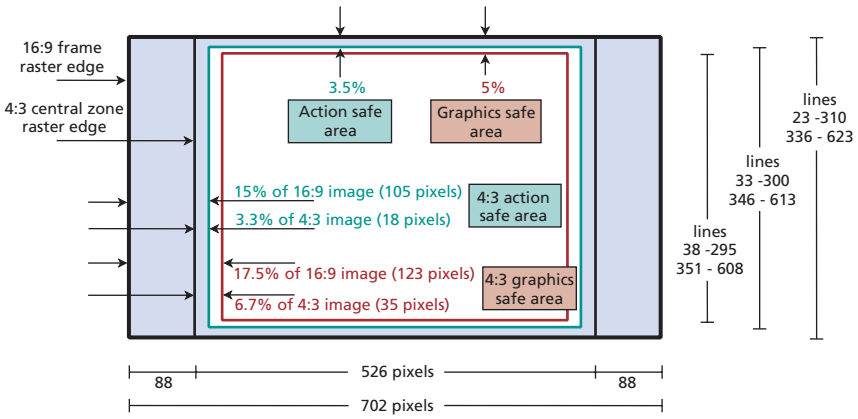



**Figure 3**
**16:9 shoot to protect 4:3, defining the action- and graphics-safe areas.**

### f) *Widescreen with shoot and protect for 14:9*

14:9 is a compromise standard that allows most of the widescreen picture to be shown to 4:3 viewers, while minimizing the effect on the framing of the widescreen image. The present generation of set-top boxes does not support this format, although

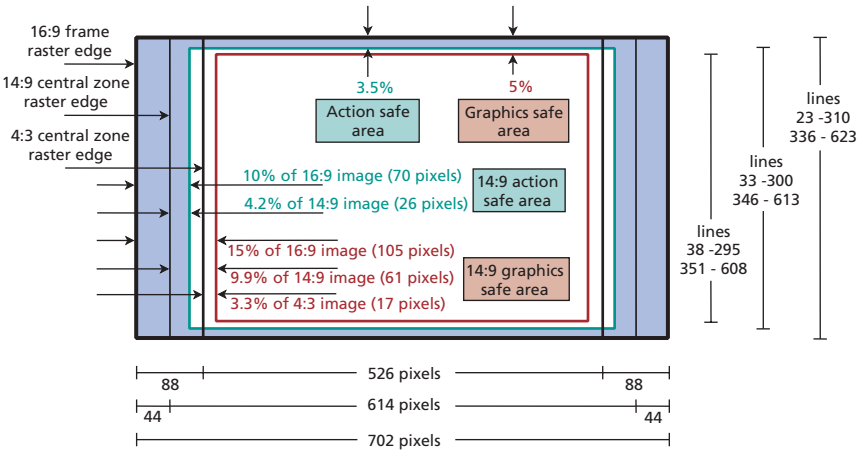



**Figure 4**
**16:9 shoot to protect 14:9, defining the action- and graphics-safe areas.**

the UK broadcasters use the format on their analogue services, where the aspect-ratio conversion can be performed by the broadcaster.

The safe areas are set so that:

- The vertical safe areas are the same as for the other two standards, as the same considerations apply.
- The graphics-safe area is set so that it should be visible for viewers watching on set-top boxes set to centre cut-out (i.e. within the 3.5% maximum limit).
- The action-safe area is set to be consistent with the 3.5% overscan for a standard set when viewing a 14:9 letterbox.

After rounding the numbers are therefore as shown in the table below.

| | Vertically | Horizontally |
|---|---|---|
| **Action Safe** | 3.5% | 15% |
| **Graphics Safe** | 5% | 17.5% |

**16:9 image on a 16:9 raster: shoot and protect 14:9.**

## Conclusions

The full drawings for windscreen-safe areas are as shown in *Figs. 2 - 4*. The numbers are a compromise and other broadcasters may wish to give greater priority to other considerations. However, these safe areas give good results in the UK. The reasons for settling on these numbers have been explained and they cover most situations that are likely to arise.

## Acknowledgement

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