EBU
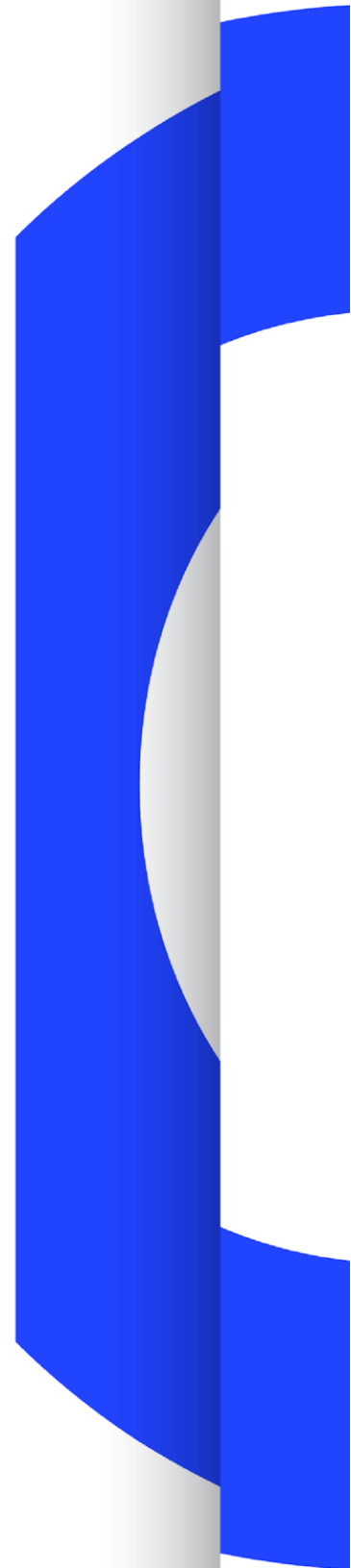
OPERATING EUROVISION AND EURORADIO

R 129

ADVICE TO BROADCASTERS ON AVOIDING IMAGE RETENTION ON TV PRODUCTION DISPLAYS

RECOMMENDATION

Geneva
November 2018

Conformance Notation

This document contains both normative text and informative text.

All text is normative except for that in the Introduction, any section explicitly labelled as 'Informative' or individual paragraphs which start with 'Note:'.

Normative text describes indispensable or mandatory elements. It contains the conformance keywords 'shall', 'should' or 'may', defined as follows:

'Shall' and 'shall not':	Indicate requirements to be followed strictly and from which no deviation is permitted in order to conform to the document.
'Should' and 'should not':	Indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others.
	OR indicate that a certain course of action is preferred but not necessarily required.
	OR indicate that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.
'May' and 'need not':	Indicate a course of action permissible within the limits of the document.

Default identifies mandatory (in phrases containing "shall") or recommended (in phrases containing "should") pre-sets that can, optionally, be overwritten by user action or supplemented with other options in advanced applications. Mandatory defaults must be supported. The support of recommended defaults is preferred, but not necessarily required.

Informative text is potentially helpful to the user, but it is not indispensable and it does not affect the normative text. Informative text does not contain any conformance keywords.

A conformant implementation is one which includes all mandatory provisions ('shall') and, if implemented, all recommended provisions ('should') as described. A conformant implementation need not implement optional provisions ('may') and need not implement them as described.

Advice to broadcasters on avoiding image retention on TV production displays

EBU Committee	First Issued	Revised	Re-issued
TC	2010	2018	

Keywords: Static image, burn in, image retention, image sticking

To minimise the risk of static image retention or premature ageing of displays, broadcasters and other content providers should take note of the following.

Broadcasters encounter 'static' images in a number of situations, including on-screen channel identifications, interactive application flags, banner displays, screens displayed when radio services are being received, programme guides as well as longer-term text inserts such as sports scores.

This type of content is likely to remain an editorial feature of many broadcasts. It should also be noted that if image retention issues occur in production or broadcaster environments, it can also occur on viewers' television screens.

Definition of static images

For the purpose of this document an image is deemed to be static if any part of the screen is occupied by any part of the image for more than a total of six hours in any 12-hour period on more than one occasion in a seven-day period.

Temporal - static images

If an image is not static the risk of a retained image being formed from it is low. To assist in ensuring that images are not static, certain specific practices might be considered, including:

- Moving the position of images on the screen from time to time in order that the definition of 'static' is not met.
- Instigating a time-out of static images where appropriate.

Level - static Images

The luminance or fully saturated chrominance (in the case of high colour static images) value of any static image should be restricted to a value equal to the average picture level of the screen in order to minimise the risk of forming a retained image.

Two alternative methods of achieving this are:

- To use a technique known as 'Linear–key mixing' that overlays the static image as a partly transparent image over the picture content. The 'added image volume' level that sets the apparent transparency should not be set any higher than a level necessary to make the added image acceptably visible.
- To limit the signal level of the static image to no more than:
  - 40% of *peak white* for standard dynamic range (SDR) static images
  - 47% of *reference white*[1] (i.e. 35% of peak white signal level) for Hybrid Log-Gamma (HLG) high dynamic range (HDR) static images

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[1] Rep. ITU-R BT.2408 "Operational practices in HDR television production"

Further, it is recommended that the use of saturated colour static images be avoided wherever possible and particularly where one is laid over the other.

Note   whilst image retention mechanisms differ considerably depending on the screen technology (and may be more evident as a short-term "image sticking"), these guidelines, which were originally drawn up with plasma displays in mind, should also avoid this problem becoming evident on other display types.

Note   HDR images will be displayed on screen in a fairly well defined way. How a display which is capable of higher peak brightness will handle conventional/SDR transmissions, quite possible stretching the image to fill the brightness that the display is capable of delivering, is a matter for manufacturers, but they might reasonably expect SDR transmissions to follow the requirements laid out in this advice.

The EBU acknowledges the work of techUK (UK trade association for the IT, telecoms and electronics industries) and the DTG (UK's Digital TV Group) in the preparation of this Recommendation.

Background

Over a decade ago, plasma screen technology was found to exhibit a similar vulnerability to that of CRT screens to localised, persistent 'image retention' which could result from the exposure of the screen to certain types of static elements within the displayed picture.

Experience has shown that OLED display technology and other display technologies, including LCD, are also potentially affected. The problem is characterised by a 'retained' vestigial image appearing on screen permanently after the signal causing it has been removed. It is often the edges of static images that are most noticeable in any retained image.

Manufacturers and retailers are aware of the issue

The screen impairment mechanisms are complex and differ with the screen technologies involved. Display manufacturers nevertheless believe that risks can be reduced if all parties were to adopt a co-ordinated approach to the challenge. To this end, manufacturers and retailers of screens have generally aimed at ensuring that:

- Good operational practice, clearly and emphatically stated, is provided to the end-user and this is maintained in the light of any new development.
- Technological measures are continuously developed to achieve greater tolerance to this type of potential damage, such as the implementation of display protection modes of operation.
- Commitment is maintained to the training of retail and installation staff in this area - including how to advise customers on appropriate setting of parameter levels aimed at minimising potential image retention problems.

Since 2010 it has been suggested that in addition to this on-going commitment to address the problem, broadcasters and other content providers should voluntarily limit the types of "problem image" that are presented to the screen, as recommended above.