IMPROVED ILLUMINATED DISPLAY UNIT

FIELD OF THE INVENTION

The present invention relates to improvements in display units such as display units used for displaying illuminated advertisements and so forth.

In particular, but not exclusively, the present invention is directed to the quality of illumination from very slim sign units, for example where the apparatus is of an overall depth of less than 85mm and is back-illuminated using fluorescent lamps.

Such units generally suffer from sharp variations in measured illuminance across their display (illuminance striping) as a result of the proximity of their light source to their display. Any intervention used to reduce illuminance striping is highly likely to introduce colour distortion to the display for the same reason (colour distortion striping).

Both forms of striping are undesirable for a product used to display advertisements.

BACKGROUND

The display of advertising posters affixed to permanent or semi-permanent display units, which may or may not be illuminated, has developed into a major segment of the advertising industry known as outdoor advertising. Outdoor advertising in the UK accounts for approximately 10% of total advertising spending including on newspapers, magazines, TV and radio. The most popular poster size in outdoor advertising is 1.2m x 1.8m, known in the industry as the 6-sheet size. Other sizes in widespread use include the 12-sheet, 48-sheet and 96-sheet sizes.

The main suppliers of outdoor advertising space, known as the outdoor media companies, typically acquire rights to advertising sites from private and public sector landowners. They then install advertising displays on these sites and sell the related advertising space, typically for periods of two weeks at a time, to media buying companies.

As the outdoor advertising industry has grown more sophisticated, there has been increasing demand from the outdoor media companies for advertising display units manufactured to a higher standard. An increasing number of displays are illuminated from behind ('back-lit') and there is increasing use of moving or 'scrolling' poster displays.

In the case of static back-lit displays, there is increasing demand for units of reduced depth from front to back. This is particularly so in the case of displays for use in indoor areas such as airports, surface and underground railway stations and retail stores. Not only are such units aesthetically more appealing, but in indoor areas they offer health and safety benefits as well since they are less constrictive of space, particularly in areas such as corridors and walkways. Use of a slimmer unit may also enable a larger number of units to be installed in a given area, thus increasing the potential revenue available to the outdoor media company.

The principal restriction on developing units of reduced depth has been the fact that where the lamps are less than a certain distance from the display face, highly undesirable variations in light intensity become visible on the front of the display, thus distorting the printed image displayed on the unit. A number of methods have been adopted in the sign industry to mitigate this distortion, typically by positioning one of a variety of diffusing materials between the fluorescent lamps and the display face.

When the space between the fluorescent light source and the front of the display is reduced to the very small interval envisaged by the current invention, a further

distortion arises in that the light emitted from the front of the display loses its balanced characteristics that represent the full spectrum of natural light from ultra-violet to infra-red, thus creating a colour distortion on the poster being displayed.

It is an aim of the present invention to provide a method and to define explicit parts which result in an illumination that is free from both illuminance striping and colour distortion striping in slim sign unit apparatus, for example of an overall depth of less than 85mm, and back-illuminated using fluorescent lamps.

It is a further aim of the present invention to ensure that in very slim illuminated advertising display units the intensity of illumination is spread evenly across the display surface without colour distortion.

SUMMARY OF THE INVENTION

In one aspect of the present invention there is provided a display unit as claimed in claim 1.

In this way, the aims of the present invention are met by adding an additional colour to the reflected light, so as to convert the spectrum of reflected light to one that resembles natural light.

Thus, the invention describes a number of changes to basic back-illuminated display principles in order that an illumination is created from a very slim enclosure that is even in illuminance according to measurements from a light meter, within Institute of Lighting Engineers guidelines, and at the same time free from visual colour distortion.

A back-illuminated display typically comprises long fluorescent lamps mounted close to a flat rear panel. The distance from the centre of the lamp to the rear panel is generally dictated by the size of the clip used to mount the lamp and also by the

constraints created by the larger diameter of the lamp end cap used to supply electricity. For a 26mm T8 fluorescent lamp, the centre of the lamp typically sits 19mm from the rear panel, meaning the front edge of the lamp sits 32mm from the rear panel. For a 16mm T5 fluorescent lamp, the centre of the lamp typically sits 12.5mm from the rear panel, meaning the front edge of the lamp sits 20.5mm from the rear panel.

To create an evenly illuminated display, it is usually necessary to have the front edge of the lamps situated a minimum distance from the medium being displayed. Failure to do this will result in the shape of the lamps being clearly visible from the front of the display, thus impairing the quality of the illuminated image. Lamp pitch, or the distance between lamps, also affects the extent of illuminance striping. It is beneficial to pitch lamps as close as possible in order that illuminance in the areas between lamps does not fall thus showing the bright stripe of the lamps. However, pitching lamps close together will mean that more lamps are required in a given enclosure, resulting in greater power consumption for the unit. Without further intervention, an apparatus comprising lamps pitched at about 250mm and with a depth from rear panel to display of about 250mm represents the limit below which substantial illuminance striping will be observed.

To reduce the depth of the unit whilst minimising illuminance striping, some further step is required. Traditionally, this involves positioning a sheet made of a diffuse transmitting opalescent material between the lamps and the front of the display. An alternative step involves fitting a diffuser lens directly in front of each lamp. In either case, the result is to divert light away from the region of the lamp by diffuse reflections, refraction or direct absorbing of light. The diffusing component may be made of translucent plastic (which may be printed in a reflective or absorbing colour), or opaque metal.

Use of different components for reducing illuminance striping as described above can be effective in creating an evenly distributed illumination, based on measurements taken with a light meter and according to Institute of Lighting Engineers guidelines,

while reducing the overall depth of the unit. The Institute of Lighting Engineers guidelines [Institute of Lighting Engineers (2003). Maximum Values for Sign Luminance: Comparison of the Limits in the Second and Third Editions. Rugby, ILE Report no 5 2nd Edition] stipulate that for an even illumination, the peak illuminance in the region of a lamp should be no more than 1.5 times the trough illuminance in the region between lamps.

If the depth of the unit, from back panel to the front of the display, is reduced to less than 85mm, then the front edge of a T5 lamp is a maximum of 64.5mm from the display. At this distance, the only effective means of reducing illuminance striping is to position an opaque diffuser lens directly in front of each lamp and as close to each lamp as possible. This diffuser lens may be made of a metal mesh of a dark colour, which thus absorbs light. This solution achieves the objective of bringing the peak illuminance in the region of the lamp down so that the peak-to-trough variance in illuminance is less than 1.5 times, as described above.

However, while the use of an opaque diffuser lens can achieve good results, according to the light meter, in a display unit of less than 85mm deep as described above, a different kind of striping in the form of colour distortion becomes visible in these circumstances due to the close proximity of display, lamp and lens. The colour distortion is observed as a stripe with a blue hue in the region of each lamp and a brown hue in regions between lamps. This colour distortion arises from the interaction between (a) the colour of the light from each lamp, (b) the colour and nature of the rear panel, and (c) the colour and nature of the opaque diffuser lens.

By achieving the correct synergistic interaction between the three factors referred to above that it is possible to design an illuminated display of less than 85mm depth and using fluorescent lamps that is free from both illuminance striping and colour distortion striping.

Further preferred features are disclosed in the accompanying subsidiary claims.

CLAIMS

1. A display unit for illuminating information media, comprising

(a) at least one fluorescent lamp; and

(b) an absorbing diffusing lens associated with each lamp;

wherein each lens is coated in a coloured finish, the colour of which is chosen so as to reduce illuminance striping and colour distortion striping of the displayed media.

2. A unit as claimed in claim 1, wherein the lamp(s) are mounted on a reflective panel such that the total distance between said reflective panel and the display is 85mm or less.

3. A unit as claimed in either claim 1 or claim 2, wherein the lamp(s) are either T8 or T5 lamps.

4. A unit as claimed in any preceding claim in which the rear reflective panel is finished in a white colour, with a plain finish to no less than 20% gloss.

5. A unit as claimed in claim 4, in which the white rear reflective panel has a textured finish in leatherette or sandpaper style no less than 20% gloss.

6. A unit as claimed in any one of claims 1-3 in which the colour of the rear reflective panel is off-white or yellow.

7. A unit as claimed in any preceding claim in which the absorbing diffusing lenses comprise metal mesh strips of width 150mm or less.

8. A unit as claimed in claim 7, wherein the mesh allows a predefined proportion of light through but absorbs and reflects a predefined proportion, thereby decreasing the available light in the unit around the region of the lamp(s).