



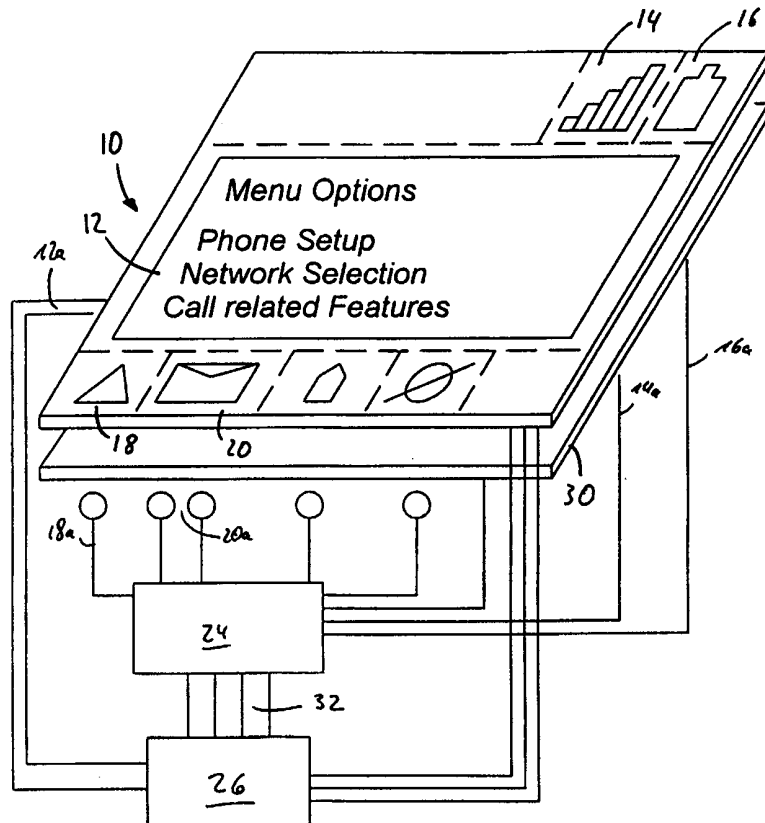
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : H04M 1/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 99/26389 (43) International Publication Date: 27 May 1999 (27.05.99)</p>
<p>(21) International Application Number: PCT/GB97/03148 (22) International Filing Date: 14 November 1997 (14.11.97)</p> <p>(71) Applicant (for all designated States except US): MAXON SYSTEMS INC. (LONDON) LTD. [GB/GB]; Maxon House, Honeycrock Lane, Salfords, Surrey RH1 5JP (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): MILLS, Stuart [GB/GB]; 9 Copsfield, Hurst Park, West Mosely, Surrey KT8 1SN (GB).</p> <p>(74) Agent: SCHMIDT, Steffen, J.; Wuesthoff & Wuesthoff, Patent- und Rechtsanwälte, Schweigerstrasse 2, D-81541 München (DE).</p>		<p>(81) Designated States: KR, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published With international search report.</p>

(54) Title: MOBILE HANDHELD TELEPHONE

(57) Abstract

A mobile electronic appliance such as a mobile handheld telephone comprising a display device (10) such as a liquid crystal display (LCD) for displaying alphanumerical or graphical information for a user of the mobile electronic appliance, the display device being provided with at least one illumination device (14a ... 20a), and a control circuit (24, 26) for providing drive signals for the display device and the at least one illumination device, is improved in that the display device being divided into a plurality of display areas (14 ... 20), at least one of the display areas being provided with an illumination device illuminating the display area in response to a drive signal from the control circuit. Thus, a reduced power consumption is achieved and the userfriendliness of the appliance is improved.



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MOBILE HANDHELD TELEPHONE

DESCRIPTION

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The present invention is related to a mobile electronic appliance comprising a display device such as a liquid crystal display or the like. A typical example of such an electronic appliance is a mobile handheld telephone.

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In order to allow the use of such an electronic appliance in a sparsely illuminated or dark environment, the display device is usually provided with background illumination. Alternatively, the display device is provided with several miniature light bulbs mounted at the edges of the display device illuminating the entire display device. The illumination of the display device is considered an significant factor of the user friendliness of electronic appliances such a mobile handheld telephones. Therefore, it is important to provide this functionality. On the other hand however, the electrical power for the operation of mobile handheld telephones and other electronic appliances is supplied by primary or secondary batteries having a restricted capacity. This battery capacity is mainly used to provide an extended operation time of the appliance (longer talk time and standby time). Nevertheless, additional functions like the illumination of the display device are considered to be an indispensable, mandatory features in userfriendly handheld telephones or similar devices.

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In view of the above, the object underlying the present invention is to maintain or even increase the number of functions related to userfriendliness, especially the illumination of the display device, while the power consumption of the electronic appliance (talk time and

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-2-

5 standby time in the context of a mobile handheld telephone)
should be affected to the least degree possible.

To achieve this, the invention teaches to provide a mobile
electronic appliance such as a mobile handheld telephone
10 comprising a display device such as a liquid crystal display
(LCD) for displaying alphanumerical or graphical information
for a user of said mobile electronic appliance, said display
device being provided with at least one illumination device,
and a control circuit for providing drive signals for said
15 display device and said at least one illumination device,
wherein said display device is divided into a plurality of
display areas, at least one of said display areas being
provided with a illumination device illuminating said display
area in response to a drive signal from said control
20 circuit.

The invention has realized the drawback of prior art mobile
electronic appliances where the background illumination or the
miniature light bulbs are provided to illuminate the entire
25 surface area of the display device irrespective of whether or
not information is displayed on the display, and in case
information is displayed on the display, the illumination is
not taking into account the location of the displayed
information on the display device.

30 According to the invention, only those areas of the display
device are illuminated in which alphanumerical or graphical
information for the user of said mobile electronic appliance
is displayed. This has the advantage of the power consumption
35 being reduced considerably. Moreover, the appearance of the
displayed information is even more userfriendly, as the
displayed alphanumerical or graphical information can be
"highlighted" in accordance to its relevance or importance to
the user. Hence, the invention also provides an improved way
40 of presenting alphanumerical or graphical information to the

5 user and an improved display device to carry out this presentation.

10 In a presently preferred embodiment of the invention, the or each illumination device is mounted at the side of the display device which is not visible to a user. Alternatively, it is also possible to provide the or each illumination device at the edge of the display device and to have segments of light conveying material provided on the surface of the display device visible to the user that feeds the light to
15 the respective area of the display device which is to be illuminated.

Preferably, the or each illumination device is a light emitting diode (LED) or an array of light emitting diodes. It is also possible to use miniature light bulbs to illuminate the display device. However, they have a relatively higher power consumption and are less reliable than LEDs.

25 According to the invention, each illumination device or groups of illumination devices are only activated by drive signals from said control circuit, when at the same the display device is activated to display alphanumerical or graphical information for a user in the display area the respective illumination device or group of illumination devices is associated with. This ascertains the minimum
30 consumption of power used to illuminate the display device while at the same time drawing the attention of the user the those fields or areas of the display device which presently contain information of importance or relevance for the user.

35 In order to more evenly distribute light emitted by said illumination device or said groups of illumination devices before said light passes through said display device, a scattering disk is provided between each illumination device or groups of illumination devices and said display device.
40

5 At least one of said illumination devices or groups of
illumination devices are arranged to provide visible light of
different wavelengthes responsive to drive signals from said
control circuit. This allows for the possibility to change
the background color of specific areas of the display device.
10 It is also possible to assign certain meanings to certain
colours (e.g. the display field of a mobile telephone where
the signal strength indicator changes its background light
colour from red to yellow to green with an increasing signal
strength, or the battery status indicator changes its
15 background light colour from green to yellow to red (and
blinking red) with a decreasing battery charging status.

Further features, advantages and possible modifications from
the above-described invention will become readily appparent
20 to a person skilled in the art upon studying the subsequent
description of a presently preferred embodiment with
reference to the drawing.

Fig. 1 shows a schematic three-dimensional drawing of a
25 display device of an electronic appliance, such as a handheld
mobile telephone including the invention.

A display device 10 such as a liquid crystal display (LCD) is
provided for displaying alphanumerical or graphical
30 information for a user of the mobile electronic appliance. In
the present embodiment, the electronic appliance is a
handheld mobile telephone. Hence, the display device 10 has a
field or area 12 for alphanumerical or graphical information
and a number of additional fields containing pictograms (14 =
35 signal strength indicator; 16 = battery charging status; 18 =
Roaming; Indicator 20 = Mail received etc.). The display
device 10 is provided with illumination devices 12a, 14a,
16a, 18a, 20a etc. Each of said illumination devices is
associated with the respective field 12 to 20 in order to
40 allow for illumination of the respective field or area 12 to
20. The illumination devices 12a to 20a are connected to a

5 control circuit 24 for providing drive signals for the
respective illumination devices.

In the present embodiment, the illumination devices are light
emitting diodes. In order to illuminate larger fields or
10 areas like the field or area 12 for alphanumerical or
graphical information, an array of light emitting diodes
having a number of light emitting diodes mounted in a plane
under the LCD-display and which are spatially separated from
each other (not shown in detail) can be utilised. In one
15 embodiment of the invention, each LED of such an array of
LEDs is provided to correspond to a different position of an
alphanumerical display field having one or more rows/columns.
The LED under a position of the alphanumerical display field
is activated only if an alphanumerical character is displayed
20 in the respective position field. If the user enters
alphanumerical data via a key pool (not shown), it is also
possible to illuminate the next position of the
alphanumerical display, where the next character to be
entered will be displayed. Thus, the user has a clear
25 indication of the important portions of the display field. As
shown in relation with field or area 20, it is also possible
to use two or more LEDs to illuminate the respective field of
the display device corresponding to these LEDs.

30 In other words, the illumination device or groups of
illumination devices associated with the fields in the
display device 10 are activated by drive signals from the LED
control circuit 24 when at the same the display device 10 is
activated by a LCD control circuit 26 to display
35 alphanumerical or graphical information for a user in the
display area. The LED control circuit 24 is activated by the
LCD control circuit 26 via lines 32 to drive the respective
LEDs which correspond to the fields of the LCD display.

40 Between the illumination devices or groups of illumination
devices and the display device, a scattering disk 30 is

5 provided to more evenly distribute the emitted light. This
allows also to use relatively small LEDs having a very low
power consumption.

10 In order to increase the awareness of the user to critical or
important information, LEDs capable of generating light
having different colours can be utilised. One example is the
battery status indicator field 16 which is illuminated with
green light when the battery is full, with yellow light when
15 the battery is half empty and with red when the battery is
90% empty and with red blinking light when the battery is 95%
empty. Another example is the Roaming indicator. Here, the
colour of the light illuminating the field can change
according to the prizes for a call the various service
20 providers in the country where the mobile telephone uses
vary.

As is apparent from the above, a reduced power consumption
is achieved and the userfriendliness of the appliance is
improved by the invention.

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5 CLAIMS

1. A mobile electronic appliance such as a mobile handheld telephone comprising

10 - a display device (10) such as a liquid crystal display (LCD) for displaying alphanumerical or graphical information for a user of said mobile electronic appliance,

-- said display device being provided with at least one illumination device (14a ... 20a), and

15 - a control circuit (24, 26) for providing drive signals for said display device and said at least one illumination device, characterized in that

- said display device being divided into a plurality of display areas (14 ... 20),

20 - at least one of said display areas being provided with a illumination device illuminating said display area in response to a drive signal from said control circuit.

2. The mobile electronic appliance according to claim 1, characterized in that

25 - the or each illumination device is mounted at the side of the display device which is not visible to a user.

3. The mobile electronic appliance according to claim 1 or 2, characterized in that

30 - the or each illumination device is a light emitting diode (LED) or an array of light emitting diodes (LEDs).

4. The mobile electronic appliance according to any of claims 1 to 3, characterized in that

35 - each illumination device or groups of illumination devices are activated by drive signals from said control circuit (24) when at the same the display device is activated to display alphanumerical or graphical information for a user in the display area the respective illumination device or group of
40 illumination devices is associated with.

- 5 5. The mobile electronic appliance according to any of
claims 1 to 4, characterized in that
- a scattering disk (30) is provided between each
illumination device or groups of illumination devices and
said display device to more evenly distribute light emitted
10 by said illumination device or said groups of illumination
devices before said light passes through said display device.
6. The mobile electronic appliance according to any of
claims 1 to 5, characterized in that
- 15 - at least one of said illumination devices or groups of
illumination devices are arranged to provide visible light of
different wavelenghtes responsive to drive signals from said
control circuit.

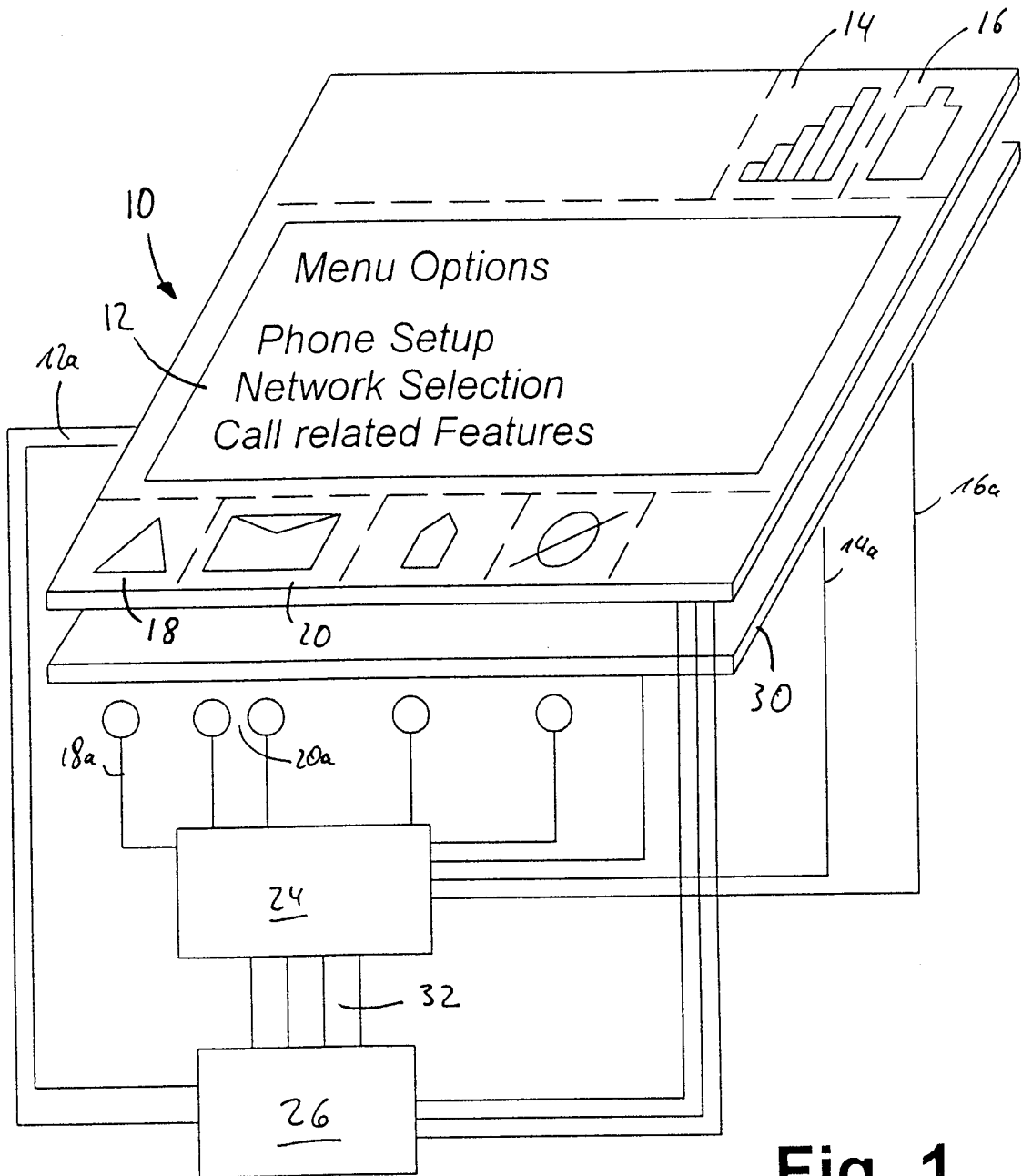


Fig. 1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/03148

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 H04M1/00				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC 6 H04M				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	PATENT ABSTRACTS OF JAPAN vol. 097, no. 007, 31 July 1997 & JP 09 062198 A (SANYO ELECTRIC CO LTD), 7 March 1997, see abstract ---	1		
Y	EP 0 797 310 A (NIPPON ELECTRIC CO) 24 September 1997 see column 1, line 55-58 see column 2, line 56 - column 5, line 43; example 1 ---	1-6		
Y	PATENT ABSTRACTS OF JAPAN vol. 015, no. 466 (P-1280), 26 November 1991 & JP 03 198026 A (HITACHI LTD; OTHERS: 01), 29 August 1991, see abstract ---	1-4		
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.				
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <p style="text-align: center; font-size: 1.2em;">Golzio, D</p>		

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/03148

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>PATENT ABSTRACTS OF JAPAN vol. 097, no. 006, 30 June 1997 & JP 09 050031 A (SEIKO EPSON CORP), 18 February 1997, see abstract</p> <p align="center">---</p>	5
Y	<p>US 4 975 694 A (MCLAUGHLIN KEVIN T ET AL) 4 December 1990 see column 2, line 45 - column 3, line 19; figure 1 see column 6, line 44 - column 7, line 21; figure 7</p> <p align="center">---</p>	6
A	<p>PATENT ABSTRACTS OF JAPAN vol. 017, no. 573 (P-1630), 19 October 1993 & JP 05 165411 A (KOUFU NIPPON DENKI KK), 2 July 1993, see abstract</p> <p align="center">---</p>	1-4
A	<p>PATENT ABSTRACTS OF JAPAN vol. 016, no. 053 (P-1309), 10 February 1992 & JP 03 253816 A (SANYO ELECTRIC CO LTD;OTHERS: 01), 12 November 1991, see abstract</p> <p align="center">---</p>	1-4
A	<p>PATENT ABSTRACTS OF JAPAN vol. 098, no. 001, 30 January 1998 & JP 09 230827 A (OKI ELECTRIC IND CO LTD), 5 September 1997, see abstract</p> <p align="center">-----</p>	1-4

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 97/03148

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