(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 626 334 A2**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **94105252.4**

(51) Int. Cl.[5]: **B66B 3/02**

(22) Date of filing: **05.04.94**

(30) Priority: **05.04.93 FI 931524**

(43) Date of publication of application:
30.11.94 Bulletin 94/48

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(71) Applicant: **KONE OY**
Munkkiniemen Puistotie 25
SF-00330 Helsinki 33 (FI)

(72) Inventor: **Juntunen, Asko**
Ketunkatu 9
F-05460 Hyvinkää (FI)
Inventor: **Ekholm, Ralf**
Lepolantie 27 as 6
SF-00660 Helsinki (FI)

(74) Representative: **Zipse + Habersack**
Kemnatenstrasse 49
D-80639 München (DE)

(54) **Indicator device for an elevator and procedure for controlling the display of an indicator device.**

(57) Of the LED units used as picture elements (V50...V61,V63,V64,V65,V67,(RM,RN)) in an indicator device for an elevator, at least one is capable of emitting under appropriate control at least two light radiations of substantially different colours. The colour to be displayed by the picture element is selected or mixed from the colours of the LEDs in the LED units. In the procedure, at least one of the LED units is caused to emit at least two light radiations of different colours, and the LED unit is caused to emit at least one of the colours of the LED for short periods of a preset length at intervals of a preset length.

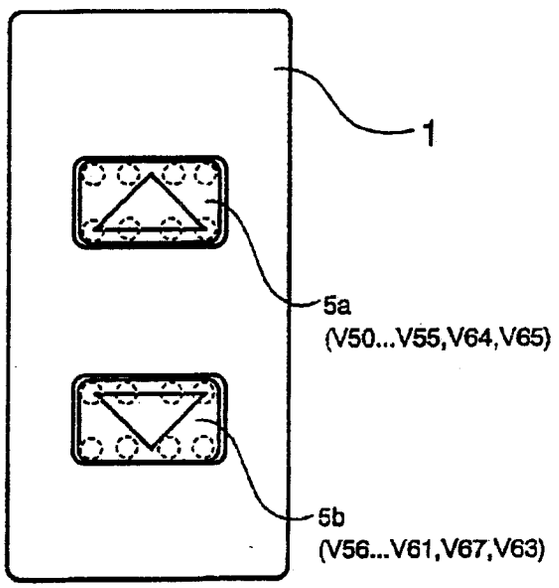

Fig. 2

EP 0 626 334 A2

The present invention relates to an indicator device as defined in the preamble of claim 1 and to a procedure for controlling the display of an indicator device as defined in the preamble of claim 4.

The indicator devices of an elevator and their operation are subject to various requirements. The requirements relating to the outward appearance of an elevator have become more and more significant in the elevator market. This also applies to the floor indicators, indicator lights and equivalent. The indicators must be clear and capable of imparting enough information, and they must fit to their environment and comply with the regulations of each country, both in respect of external design and the signs, figures and colours presented. To meet these requirements, several different parallel models of floor indicators and other devices are needed, and this tends to increase the unit prices of elevators and may involve problems e.g. with the delivery times of equipment. Requirements concerning variability of the external appearance of an elevator result in increased costs and may also cause problems in elevator deliveries.

To provide a solution to the problems and requirements mentioned above, a new type of indicator device is presented as an invention. The indicator device of the invention is characterized by what is presented in the characterization part of claim 1, and the procedure of the invention is characterized by what is presented in the characterization part of claim 4. Other embodiments of the invention are characterized by the features presented in the other claims.

The indicator device of the invention may be e.g. a floor indicator or a direction arrow indicator in an elevator car or at a landing, a signal light indicator placed in the car call or landing call buttons or in connection with them, or some other kind of indicator connected to an elevator system for the display of information, e.g. a display placed in an elevator lobby to guide arriving passengers.

The advantages achieved by the present invention include the following:

- The various symbols can be displayed in a desired colour by means of a single hardware version.
- The colour to be displayed can be selected as one of the nominal colours of the light emitted by the display elements or as a mixture of these colours.
- In certain embodiments of the invention, it is possible to display figures in two or more colours.
- The brightness of the display can be adjusted to a suitable level with respect to the brightness of illumination in the environment.
- The display colour and brightness are adjusted by means of parameters which can be altered when necessary. This allows suitable brightness and colour settings according to the environment e.g. for indicator units on different floors.

In the following, the invention is described in detail by the aid of some of its embodiments by referring to the attached drawings, in which

Fig. 1 presents the circuit diagram of the display unit of a landing call device according to the invention.

Fig. 2 presents a landing call device placed in push buttons with a display, and

Fig. 3 presents a matrix display device according to the invention.

Fig. 1 presents the circuit diagram of the display unit 2 of a landing call device 1. A processor 3 comprised in the landing call device 1 sends control signals to the controller 4 of the display unit along signal lines UPRED, UPGREEN, DWRED, DWGREEN. The processor may also handle other functions besides those relating to the control of the display unit. The display 5 of the display unit is made up of two-colour LED units V50...V61,V63,V64,V65,V67. The other functions of the landing call device 1 are not described here. The display of the landing call device 1 is generally only used to display simple figures, such as stylized up-arrow and down-arrow, so the figures can be formed by appropriately positioning the LED units V50...V61,V63,V64,V65,V67. Alternatively, the figures can be formed by using a partially transparent display surface and illumining it by means of LED units placed behind it.

Fig. 2 shows a landing call device 1 with a display 5 divided into two parts so that the up-arrow 5a is contained in the up-call button and the down-arrow 5b in the down-call button. In this case, the two-colour LED units V50...V61, V63,V64,V65,V67 are so placed in the display that the up-arrow contains LED units V50...V55,V64,V65 while the down-arrow contains LED units V56...V61,V67,V63. Each LED unit V50...V61,V63,V64,V65,V67 contains LEDs emitting red light (between pins 1 and 2) and LEDs emitting green light (between pins 3 and 4). Based on the control signals received via the signal lines UPRED, UPGREEN, DWRED, DWGREEN, the controller 4 turns the red and green LEDs in the LED units of the up- and down-arrows on and off.

In the circuit of our example, the controller 4 is implemented using a commercially available IC, ULN2803A, which contains 8 transistors. In the following, only the operation of the up-arrow is described. The transistor with its base connected to pin 1 of the controller 4 is turned on by a pulse supplied via the UPRED line, producing a pulse at pin 18 which is further transmitted to the base of another transistor, the one connected to pin 2 of

the controller, switching it into conduction. In this way, a current path is established between the ground GND and the +15V power supply via pin 17 of the controller and the LED chains connected to it. There are two LED chains in parallel, each containing four LEDs connected in series. The current in the LED chains is limited by resistors R97 and R83 connected in series with the chains. When the transistors are not conducting, the voltage at pins 17 and 18 is pulled up to the supply voltage via a resistance which is large as compared with the resistance of the LED chains. The voltage at pin 17 is monitored via line UPDIAC1. The voltage data UPDIAC1 tells the processor 3 whether the red up-arrow is functioning according to the control. The operation of the red down-arrow and the green arrows is implemented in a corresponding manner and will not be described here in detail.

Fig. 3 presents a block diagram representing a display unit 101 included in the signal devices for the elevator car. The display unit comprises a two-colour 16x16 LED matrix display 105 in which each picture element consists of a two-colour LED unit having rows R1...R16 and columns, the latter consisting of green and red columns C1G...C16G and C1R...C16R. Individual picture elements in the matrix display 105 can be designated using row/column coordinates (RM,CN), which indicate the location of the picture element unambiguously as the position at row M, column N. The LEDs in the picture elements of the matrix display 105 are lit by feeding each one of them with a current supplied by the controller unit 104 in accordance with control signals received by the controller unit via signal lines A1...AN. Connected between the column inputs 17...48 of the matrix display 105 and the controller 104 are resistors R62...R93. The matrix display 105 may be e.g. the commercially available MD251BC-ARG.

The LEDs in the LED units of both the display 5 and the matrix display 105 are controlled with a constant current so that they emit light for short periods of a preset length and are extinguished during the intervals between these periods. The repetition frequency of these short periods is at least a few tens of times a second, causing the human eye to perceive the picture element as being continuously lit. The magnitude of the feeding current is preferably equal to the nominal current of the LED unit, in which case the pulse ratio of the control signal for each LED can be kept at a relatively low value in each LED unit without impairing the readability of the display. The repetition frequency and the frequency of the supplying mains are not multiples of each other, which means that e.g. the periodic variations in the light intensity of a fluorescent lamp will not cause disturbing contrast variations which could be perceived as 'flicker' of the display or a part of it or as dimness of some of the picture elements. The brightness of a given colour in the LED unit is controlled by varying the pulse ratio between the light emission period and the subsequent interval (or vice versa), and tone control is achieved by varying the ratio of the durations of the emission periods of LEDs emitting different colours in the same LED unit. In simple applications where only the colour and brightness are selected, the pulse ratio for each basic colour of the LED units is set in connection with installation. The brightness and colour of the display can also be controlled according to the illumination conditions of the environment and/or according to a programmed schedule. In indicator devices according to the invention, in which the LED units can be controlled separately, it is easy to produce multicoloured figures.

It is obvious to a person skilled in the art that different embodiments of the invention are not restricted to the examples described above, but that they may instead be varied within the scope of the claims presented below. For example, the invention is not restricted to the use of red-green LED units, but the colours of the LEDs in the LED units can be chosen differently and the number of colours in the LED units can be larger than two. In addition to having an external appearance adapted to the environment, the disply can be used to present additional information to elevator passengers. For instance, in car call buttons a dim red light can be used to indicate locked floors while the call buttons for other floors are lit with their ordinary colour. Similarly, landing calls pertaining to the elevator can be indicated in a manner differing from car calls, enabling the passenger to recognize and anticipate stoppages due to landing calls as well. It is further obvious to the skilled person that the displays of indicator devices implemented according to the invention can easily be dimmed during low elevator traffic to prolong their useful life.

Claims

1. Indicator device (1,101) having a display (5,5A,5B,105) with picture elements (V50...V61,V63,V64,V65,V67(RM,RN)) consisting of LED units, at least one of which is so designed that it can be caused to emit at least two light radiations of substantially different colours in short periods and in which LED unit the ratio of the durations of the transmission periods for different colours is set so as to achieve a desired colour, **characterized** in that the perceivable brightness of the LED unit is set by means of the ratio of the durations of the light emission periods of the LEDs in the LED unit to the duration of the intervals be-

tween the emission periods.

2. Indicator device (1,101) according to claim 1, **characterized** in that each one of the LED units used as picture elements (V50...V61,V63, V64,V65,V67(RM,RN)) in the display of the indicator device can be caused to emit at least two light radiations of substantially different colours.

3. Indicator device according any one of the preceding claims, **characterized** in that the display (105) of the indicator device consists of at least one dot matrix display module containing several LED units as picture elements (-(RM,RN)).

4. Procedure for controlling an indicator device (1,101) for an elevator, the picture elements (V50...V61,V63,V64,V65, V67) of the display of said indicator device (1,101) consisting of LED units as at least one of which is so designed that it can be caused to emit at least two light radiations of substantially different colours in short periods, and in which LED unit the ratio of the durations of the transmission periods for different colours is controlled so as to achieve a desired colour, **characterized** in that the brightness of the LED unit of the display (5,5a,5b,105) of the indicator device (1,101) perceivable at each instant of time is controlled by setting the ratio of the durations of the light emission periods of the LED unit LEDs emitting different colours to the duration of the intervals between the emission periods.

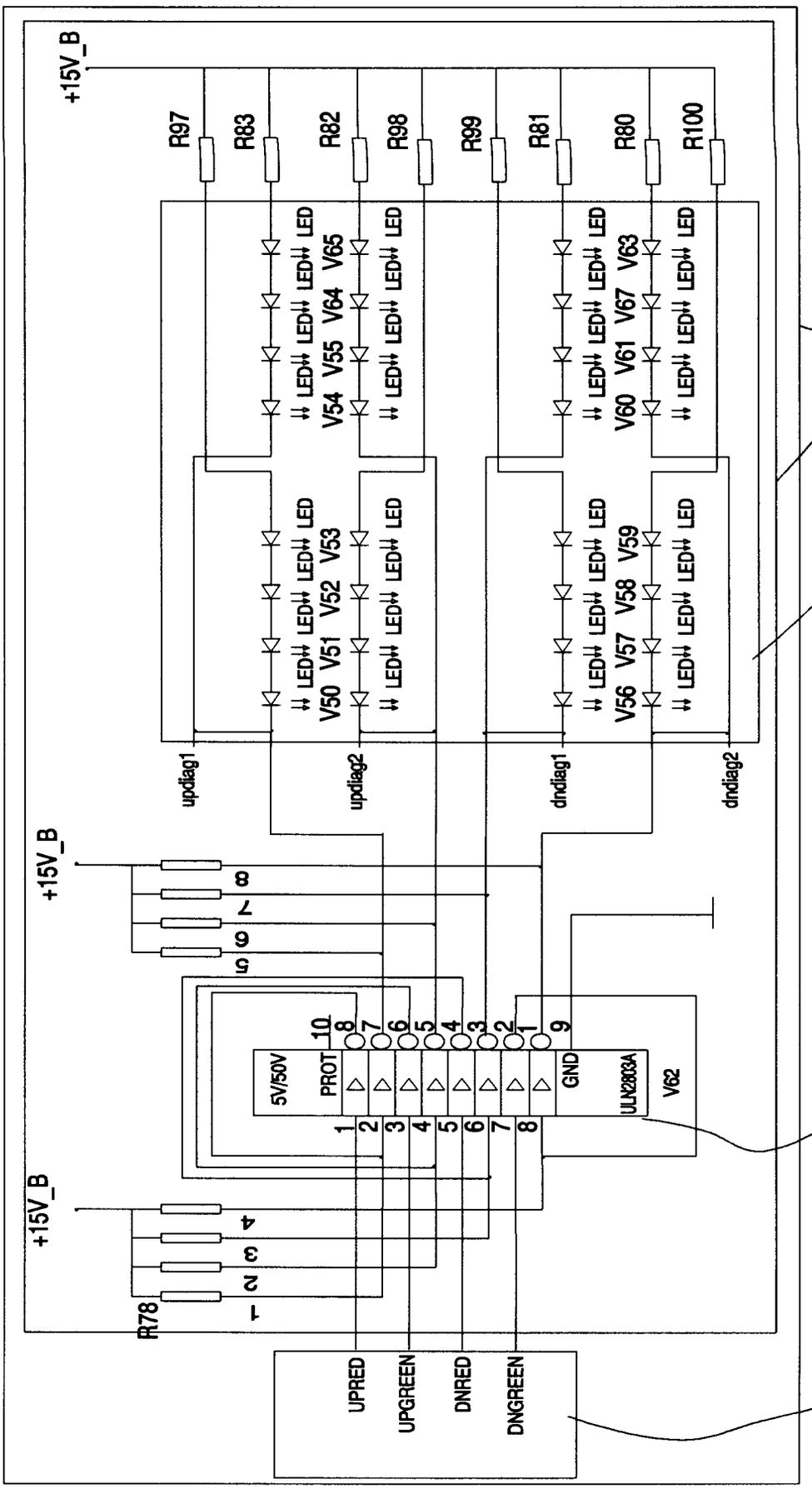
+15V_B
R97
R83
R82
R98
R99
R81
R80
R100
LED
V54 V55 V64 V65
V50 V51 V52 V53
V60 V61 V67 V63
V56 V57 V58 V59
updiag1
updiag2
dndiag1
dndiag2
R78
5V/50V
PROT
GND
ULN2803A
V62
UPRED
UPGREEN
DNRED
DNGREEN
1
2
3
4
5

Fig. 1

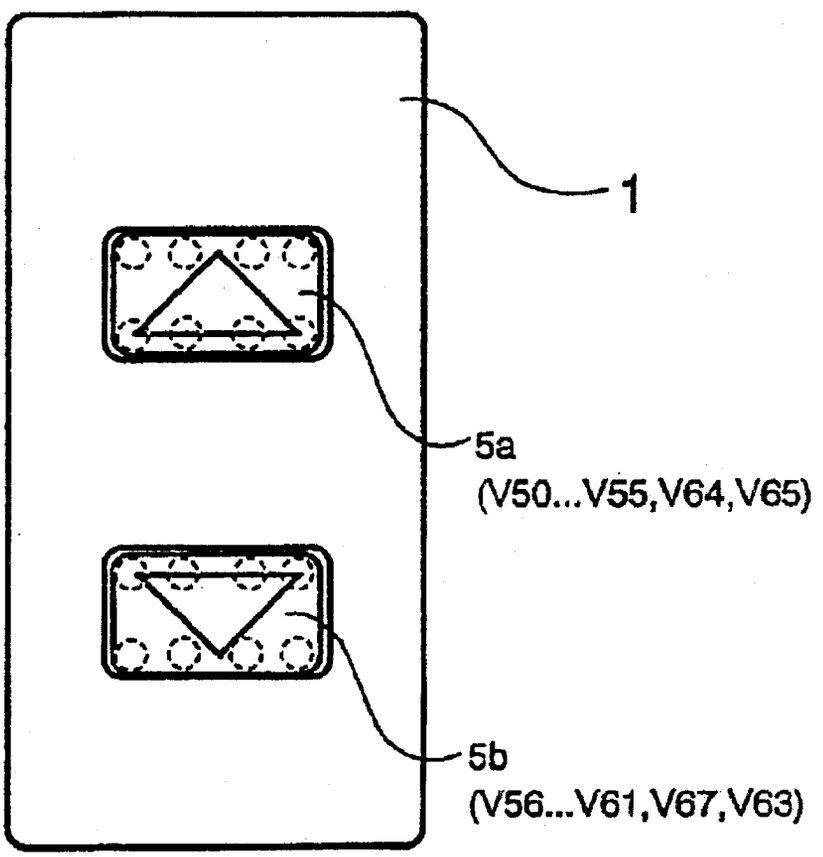

Fig. 2

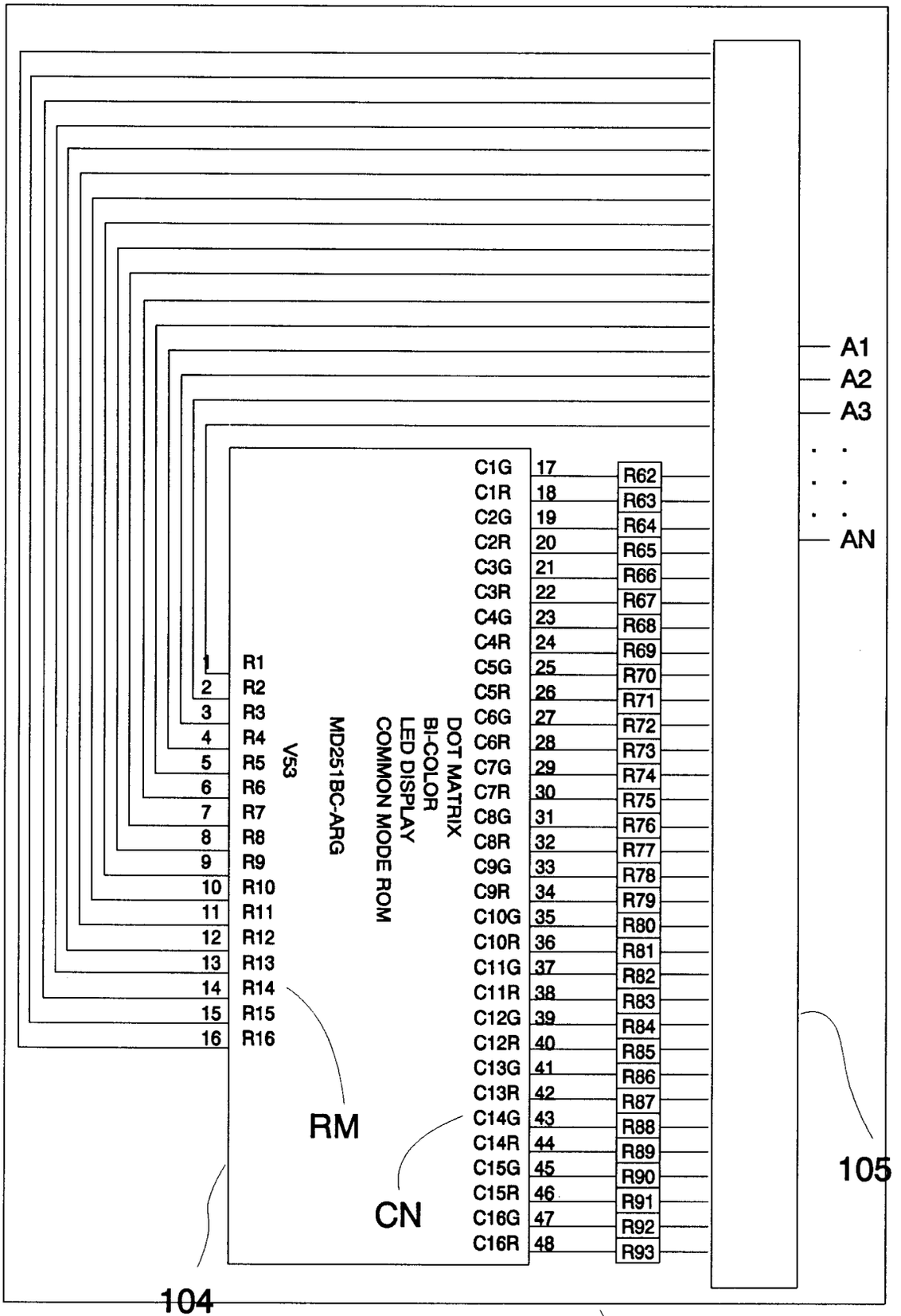
A1
A2
A3
AN
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
V53
MD251BC-ARG
COMMON MODE ROM
LED DISPLAY
BI-COLOR
DOT MATRIX
C1G 17
C1R 18
C2G 19
C2R 20
C3G 21
C3R 22
C4G 23
C4R 24
C5G 25
C5R 26
C6G 27
C6R 28
C7G 29
C7R 30
C8G 31
C8R 32
C9G 33
C9R 34
C10G 35
C10R 36
C11G 37
C11R 38
C12G 39
C12R 40
C13G 41
C13R 42
C14G 43
C14R 44
C15G 45
C15R 46
C16G 47
C16R 48
R62
R63
R64
R65
R66
R67
R68
R69
R70
R71
R72
R73
R74
R75
R76
R77
R78
R79
R80
R81
R82
R83
R84
R85
R86
R87
R88
R89
R90
R91
R92
R93
RM
CN
104
105
101

Fig. 3