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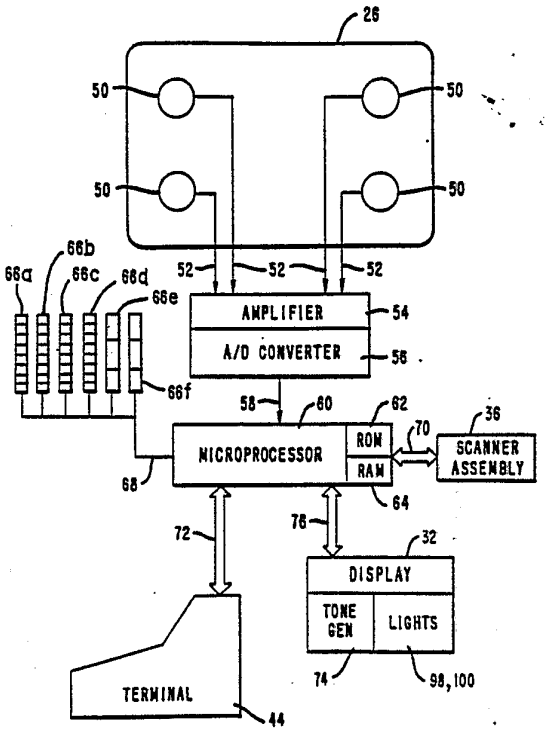
(54) Title: METHOD OF CHECKING MERCHANDISE ITEMS

(57) Abstract

A method of checking merchandise items utilizes scanning means (36) for scanning coded data on the items for generating data signals identifying the items, and an electronic scale (22) for weighing the items, the price of a scanned item or the weight of a weighed item being displayed on a common display (32). A first indicator (100) is activated when a successful scanning or weighing operation has taken place, and a second indicator (98) is activated when an unsuccessful scanning or weighing operation has taken place. Both of the indicators (100, 98) are maintained in an unactivated condition while a scanning operation is in progress. In order to prevent conflict in use of the common display (32), a weighing operation is initiated when either one of the indicators (100, 98) is activated and a steady representation of the weight of an item is generated by the scale (22).



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METHOD OF CHECKING MERCHANDISE ITEMS

Technical Field

This invention relates to a method of checking merchandise items of the kind utilizing a system having scanning means for scanning coded data on said items and for generating data signals identifying said items.

Background Art

A method of the kind specified is disclosed, for example, in U.S. Patent No. 4,086,476. Such known method includes the steps of activating first indicating means when a successful scanning operation has taken place, activating second indicating means when an unsuccessful scanning operation has taken place, and displaying on display means the price of an item in respect of which a successful scanning operation has taken place.

In addition to scanning devices, electronic scales are widely employed in supermarkets and other types of commercial establishments for the processing of items which are being sold on a "price per unit of weight" basis. Such scales and scanning devices frequently constitute parts of a point of sale terminal system which may also include a data terminal operated by a cashier. Such point of sale terminal systems normally form part of a check-out operation at which customers queue up for paying for merchandise items before leaving the store. A known check-out system employing a scanning device and electronic scale has included separate displays for the scanning device and scale, which has disadvantages from the points of view of expense and lack of compactness.

Disclosure of the Invention

It is an object of the present invention to provide a method of checking merchandise items using a scanning device and an electronic scale, which method makes use of a compact and economic check-out system and which also makes use of a system of indication that is consistent for both the scanning device and the scale.

According to the invention there is provided a method of checking merchandise items utilizing a system having scanning means for scanning coded data on said items and for generating data signals identifying said items, the method including the steps of activating first indicating means when a successful scanning operation has taken place, activating second indicating means when an unsuccessful scanning operation has taken place, both of said first and second indicating means being maintained an unactivated condition during the time that a scanning operation is in progress, and displaying on display means the price of an item in respect of which a successful scanning operation has taken place, characterized by the further steps of initiating a weighing operation utilizing an electronic scale when either said first indicating means or said second indicating means is in an activated condition and when a merchandise item to be weighed is present a said scale and a steady representation of the weight of said item is generated by said scale, displaying the weight of said item on said display means, and activating said first indicating means or said second indicating means depending on whether a successful weighing operation has, or has not, taken place respectively.

Brief Description of the Drawings

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a check-out system which includes a scanning device and an electronic scale for weighing purchased merchandise items;

Fig. 2 is a schematic representation of the check-out system of Fig. 1;

Fig. 3 is a functional block diagram of the check-out system of Fig. 1;

Fig. 4 is a plan view of a customer display showing the display of price information of a scanned merchandise item;

Fig. 5 is a plan view of the customer display showing the display of the weight of a purchased item;

Fig. 6 is a block diagram of a RAM memory unit showing the memory location of storage registers associated with the method for controlling terminal display indication;

Fig. 7 is a diagram showing how Figs. 8A, 8B and 8C are assembled; and

Figs. 8A-8C inclusive together constitute a block diagram of a display process in accordance with the present invention.

Best Mode for Carrying Out the Invention

Referring now to Fig. 1, there is shown a perspective view of a merchandise check-out system generally indicated by the numeral 20 in which a scale 22 is utilized to weigh a purchased item. The scale is located within a check-out counter 24 and includes a scale lid or load plate 26 movably mounted flush with the top surface 28 of the check-out counter 24. The scale lid 26 includes an aperture 30 through which a scanning beam from a scanner assembly 36 (Fig. 2),

mounted beneath the scale, is projected for scanning a bar code label (not shown) on a merchandise item positioned on the scale lid 26 in a manner that is well known in the art. Mounted adjacent the scale lid 26 on the surface 28 of the check-out counter 24 is a housing member 31 in which is located a customer display 32 which displays the price of a merchandise item scanned and also the weight of an item as the result of a weighing operation. Located adjacent to either side of the display 32 within the housing 31 are a pair of signal lights 98 and 100, one red and one green, respectively, which are operated to indicate whether a weighing operation or a scanning operation has been successful or not. Opposite the housing 31, on the surface 28 of the counter 24, is a housing 38 in which are located a pair of photo-electric cells 40, 42 which detect the entrance and the exit of the merchandise item on the lid 26. A pair of light emitting diodes (not shown) located in the housing member 31 direct light beams at the cells 40 and 42 in a manner that is well known in the art. Mounted adjacent the check-out counter 24 is a data terminal device 44 for processing the transaction, which includes a keyboard 46 and a display 48. The display 32 is an alphanumeric LCD display and can be operated automatically or by the manual operation of keys on the keyboard 46.

Referring now to Fig. 2, there is shown a schematic representation of the check-out system 20 (Fig. 1) in which the scale 22 includes four load cells 50 which are secured to the scale lid 26 and which output identical analog signals over lines 52 to an amplifier 54 in response to the placing of a weighted item on the lid 26. The amplified analog signals are then transmitted to an analog-to-digital converter 56 which outputs digital signals at regular intervals over line 58 to a microprocessor 60 which

includes a ROM memory unit 62 in which is stored a program for controlling the terminal display indication and a RAM memory unit 64 in which data used in the terminal display indication control process is stored, as will be described more fully hereinafter. The microprocessor 60 is connected to six banks of switches 66a-66f inclusive over cable 68; to the scanner assembly 36 over bus 70; and to the terminal 44, the display 32, the signal lights 98, 100 and a tone generator 74, over bus 76. The microprocessor 60 monitors the operation of the scanner assembly 36 over bus 70. When the scanner is in operation, the microprocessor 60 controls the display 32 to display the item price or total sale (Fig. 4) in response to data received from the terminal 44. The microprocessor 60 will also control the display 32 to display the item weight (Fig. 5) in response to a scale operation. The microprocessor 60 further controls the signal lights 98, 100 and the tone generator 74 in response to the operation of the scanner and the scale indicating a valid or invalid operation.

Referring now to Fig. 3, there is disclosed a more detailed functional block diagram of the check-out system 20 in which the scanner assembly 36 (Fig. 2) includes a laser light 78 which outputs a light beam 80 through a shutter assembly 82 to a rotating optical assembly 84 which in turn directs the reflected light beam through the aperture 30 (Fig. 1) in the scale lid 26. The scanning light beam scans the bar code label on a merchandise item positioned on the lid 26. The light beam is then reflected from the bar code label back through the aperture 30 to a photo-detector 86 which outputs an analog signal, representing the coded data read, over the bus 88 to an analog circuit section 90 where the signals are amplified and transferred to a digital circuit section

92. The digital circuit section 92 converts the analog signals to digital data signals. The data signals are then transferred to a scanner microprocessor 94. The microprocessor 94 also receives signals over bus 95 from the enter item gate 40 and the exit item gate 42 indicating the presence of a merchandise item. In response to receiving the signals for the item gate 40, the microprocessor 94 operates the shutter assembly 82, allowing the laser beam to scan the merchandise item. A signal from the exit gate 42 turns off the shutter assembly.

The microprocessor 94, using the data received, determines whether a good or bad read operation has occurred. If a bad read operation has occurred, the microprocessor 94 outputs a control signal over bus 70 to the microprocessor 60, which operates the red lamp 98, by transmitting the appropriate signal over the bus 112, a communication interface 104, and bus 76 to the lamp 98. The red lamp 98 (Figs. 1 and 3) indicates to the operator that the merchandise item should be rescanned. If a good read has occurred, the green lamp 100 is illuminated and the tone generator 74 is operated to output a sound signal indicating to the operator that a good read has occurred. For a complete disclosure of the operation of the item gates 40, 42 and the lamps 98, 100, reference should be made to the previously mentioned U.S. Patent No. 4,086,476.

The data signals received by the microprocessor 94 identify the merchandise item being scanned. This information is transmitted over bus 102 to the communication interface 104 which transfers the data over bus 106 to a remote processor 108. The processor 108, using this data, retrieves the price of the item from a look-up table (not shown) located within the processor 108 and transmits the price of the item to the microprocessor 94 through the

interface 104 and bus 102. The price of the item is then transmitted over bus 76 and is displayed in the customer digital display 32 and is transmitted over bus 72 to the display 48 (Fig. 1) in the terminal 44.

The scale 22 includes the load plate 26 (Fig. 1), the load cells 50 (Fig. 2), the microprocessor 60, the ROM memory unit 62 in which are stored the programs for zero balancing and calibrating the scale, and a digital circuit section 110 by which the memory unit 62 interface with the microprocessor 60.

When a scale operation is required, the operator places the item to be weighed on the load plate 26 (Fig. 2) which transfers the load to the load cells 50. The cells 50 output the analog voltage signals to the amplifier 54 (Fig. 2) and thence to the A/D converter 56 (Figs. 2 and 3). The microprocessor 60 computes the weight from the digital signals outputted by the A/D converter 56, utilizing reference data stored in the switches 66a-66d, and actuates the digital display 32 to display the weight. The weight data is also transmitted over bus 112 to the communication interface 104 which transfers the data to the terminal 44 over bus 72. The terminal obtains the price per pound data from the remote processor 108 through the interface 104 and computes the item price, prints the item price on the customer receipt, displays the item price in the terminal display 48 (Fig. 1) and transmits the item price data to the scanner microprocessor 94 which displays the price in the customer digital display 32. The microprocessor 94 operates the green lamp 100 and the tone generator 74 through the microprocessor 60 if the operation is a good weighing operation and operates the red lamp 98 if it is a bad weighing operation. Power to the system is provided by a power supply 114.

In a point of sale terminal system which includes a display used by both a scanning device and

a scale, it is advantageous to use a common set of indicators to indicate successful or unsuccessful scanning and weighing operations and to have these indicators function in the same general manner for both types of operations, in order to avoid confusion of the operator of the terminal system. Thus, following a successful scanning or weighing operation, the green light 100 is illuminated, and following an unsuccessful scanning or weighing operation, the red light 98 is illuminated. While either a scanning or a weighing operation is in progress, both lights 98 and 100 are extinguished. It is also necessary to prioritize the scanning and weighing operations in order to avoid conflicts between scanning and weighing which could result in incorrect information being transmitted to the terminal and displayed on the display.

The method for achieving these desired results is shown in the flow diagram of Figs. 8A, 8B and 8C, and will now be described.

The process may be considered to commence at the "start" symbol 124 in Fig. 8A. At the beginning of the process, a scale mode register 122 (Fig. 6) is set equal to zero and a scanner mode register 120 is set equal to one, as represented by the block 126 of Fig. 8A. These registers are located in the RAM memory 64 of the microprocessor 60. These settings of scanner mode equal to one and scale mode equal to zero mean in effect that the scanner is in control and commands the display 32 and the lights 98, 100.

The process then continues to a decision block 128 in which a determination is made as to whether or not the scanner mode is set equal to one. This determination is necessary because prior to the process reaching the decision of block 128 a return loop is provided via a circled "1" symbol 130 and a path 132.

An inquiry is next made, as represented by block 134, as to whether the scanner requests a red light 98, to indicate an unsuccessful scan. If so, the process proceeds to block 136 to turn on the red light 98. If not, the process proceeds to block 138 to keep the red light 98 off. In either event, the process continues to block 140 for an inquiry as to whether the scanner requests a green light 100, to indicate a successful scan. If so, the process proceeds to block 142 to turn on the green light 100. If not, the process proceeds to block 144 to keep the green light 100 off. In either event, the process continues to block 146 for an inquiry as to whether the terminal is sending a display message. If so, the message is displayed (block 148). This message remains on the display so long as any weight on the scale remains unchanged, or if the weight is removed. It changes if a new, different weight is placed upon the scale.

In either event (that is, whether or not a message has been sent by the terminal), the process next inquires as to whether a stable, non-zero weight is present on the scale, as represented in block 150. If not, the scale mode is set equal to zero (block 152), and the process is returned over circled "1" symbol 130 to the beginning of the process. If such a weight is present, the process next inquires (block 154) as to whether the scale mode is equal to one. If so, the process returns to the beginning over circled "1" symbol 130. If not, the process continues to block 156, in which an inquiry is made as to whether the scanner has requested a red lamp. If so, the process continues by setting the scale mode to one; setting the scanner mode to zero; turning the scanner off; and turning both the red and green lights off, all as represented in block 158. If the scanner has not requested a red light, an inquiry is next made as

to whether the scanner has requested a green light (block 160). If not, the process returns via the circled "2" symbol 162 to the block 146. If a green light has been requested, the process continues to the previously described block 158.

From block 158, the process displays the weight (block 164) that was ascertained in block 150 to be present. The display will continue showing this weight as long as it remains on the scale. If a display message is sent from the terminal (block 166), the display of weight will be interrupted for a brief period, say one second, to display the terminal message as represented in block 168, after which the display will return to displaying the weight.

If there is no terminal message, the process continues with an inquiry (block 170) as to whether there is still a stable weight; and, if so, whether it is a zero weight (block 172). If not, an inquiry is next made as to whether there has been a weight request from the terminal (block 174). If not, the weight continues to be displayed, as represented by path 176.

Returning to block 170, if the inquiry there as to the presence of a stable weight is answered in the negative, the display is blanked and the scale mode is set to zero, as represented in block 178, after which the process is returned via circled "1" symbol 130 to the beginning of the process.

Returning to block 172, if the inquiry as to a zero weight is answered in the affirmative, the process causes a "0.00 lb" to be displayed, and causes the red light 98 to be activated, as represented by block 180. Following this, the scanner is turned on (block 182), and the process returns via the circled "1" symbol 130 to the beginning.

Returning to block 174, if the inquiry as to whether a weight request has been received from the

terminal is answered in the affirmative, the process causes the weight information to be sent to the terminal and the green light 100 to be turned on, as represented by block 184. Following this, the scanner is turned on (block 182), and the process returns via the circled "1" symbol 130 to the beginning.

Returning now to block 128, if the scanner mode has been set to zero, as in block 158, the process continues over path 186 to an inquiry as to whether the scanner requests the red light 98, as represented in block 188. If there is such a request, the process continues over path 190 to the block 146, and proceeds from there. If no such request is made, the process continues to block 192, in which an inquiry is made as to whether the scanner has requested the green light 100. If so, the process continues over path 190, as previously described. If no such request is made, this is indicative that the scanner is in the process of a scanning operation, and consequently the scanner mode is set to one, as represented in block 194, and the process is returned to the beginning, via the circled "1" symbol 130.

It will thus be seen that a control process for a display for a combined scale and scanner has been described which provides consistent operating signals for both the scale and the scanner to the cashier operating the combined system, and which provides a resolution for potential conflicts which might otherwise occur if both the scale and the scanner attempted to control the display at the same time.

CLAIMS

1. A method of checking merchandise items utilizing a system having scanning means (36) for scanning coded data on said items and for generating data signals identifying said items, the method including the steps of activating first indicating means (100) when a successful scanning operation has taken place, activating second indicating means (98) when an unsuccessful scanning operation has taken place, both of said first and second indicating means being maintained an unactivated condition during the time that a scanning operation is in progress, and displaying on display means (32) the price of an item in respect of which a successful scanning operation has taken place, characterized by the further steps of initiating a weighing operation utilizing an electronic scale (22) when either said first indicating means (100) or said second indicating means (98) is in an activated condition and when a merchandise item to be weighed is present on said scale and a steady representation of the weight of said item is generated by said scale, displaying the weight of said item on said display means (32), and activating said first indicating means or said second indicating means depending on whether a successful weighing operation has, or has not, taken place respectively.

2. A method according to claim 1, characterized in that, during a weighing operation, both said first indicating means (100) and said second indicating means (98) are maintained in a deactivated condition.

3. A method according to either claim 1 or claim 2, characterized by the step of transmitting

information representing the weight of an item being weighed to a data terminal (44) associated with said scanning means (36) and said electronic scale (22).

4. A method according to claim 3, characterized in that the step of initiating a weighing operation deactivates said scanning means (36), said scanning means being again activated after the transmission of information representing item weight to said terminal (44).

5. A method according to either claim 3 or claim 4, characterized in that during a weighing operation said visual representation of the weight of the item being weighed may be interrupted temporarily by a message from said data terminal (44).

6. A method according to any one of the preceding claims, characterized by the step of setting a scanner mode register (120) to a representation of a first scanning mode or to a representation of a second scanning mode, said scanning means (36) being in control of the operation of said display means (32) and of said first and second indicating means (100, 98) when said scanner mode register is set to a representation of said first scanning mode, and said scanning means (36) being deactivated when said scanner mode register is set to a representation of said second scanning mode.

FIG. 1

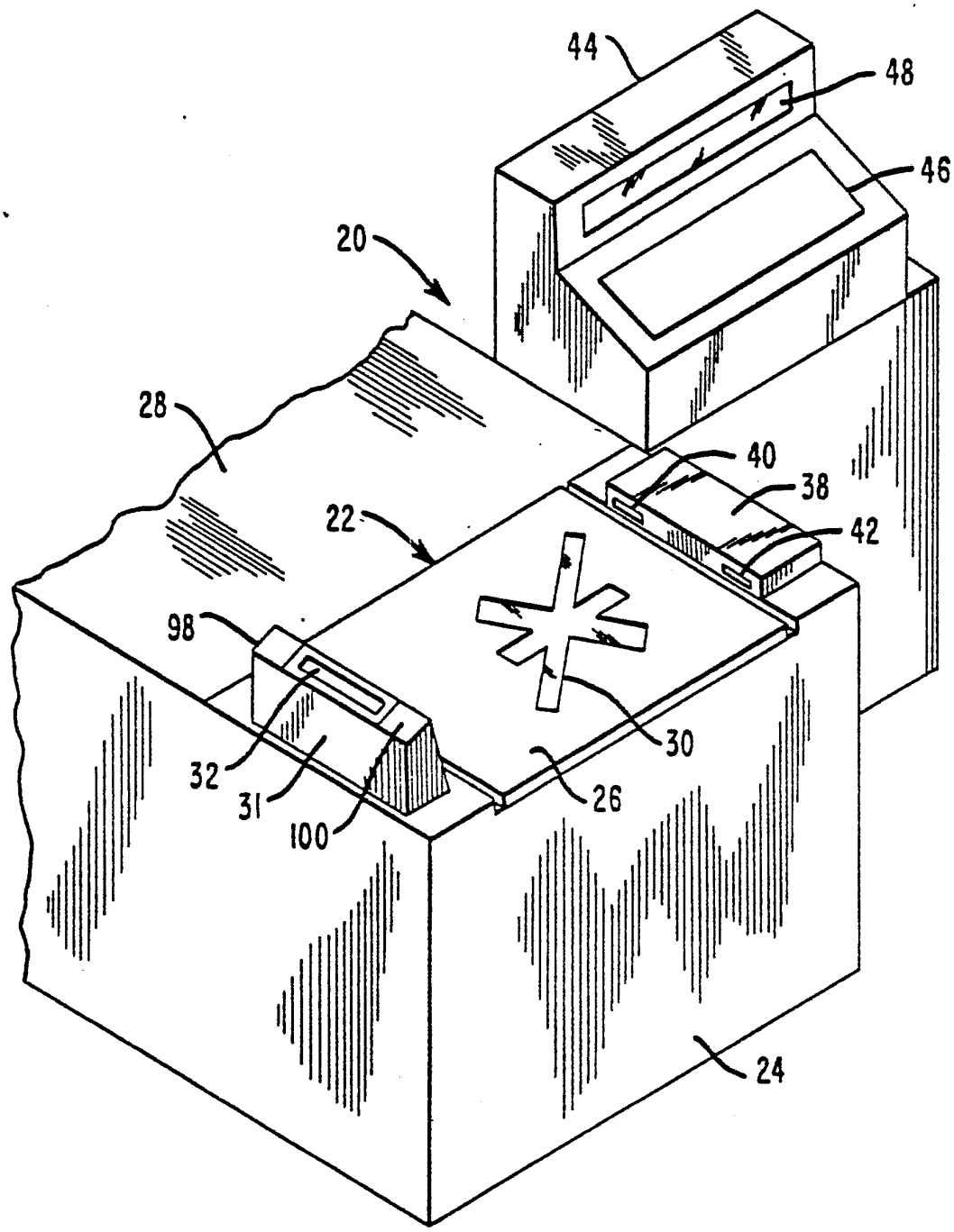
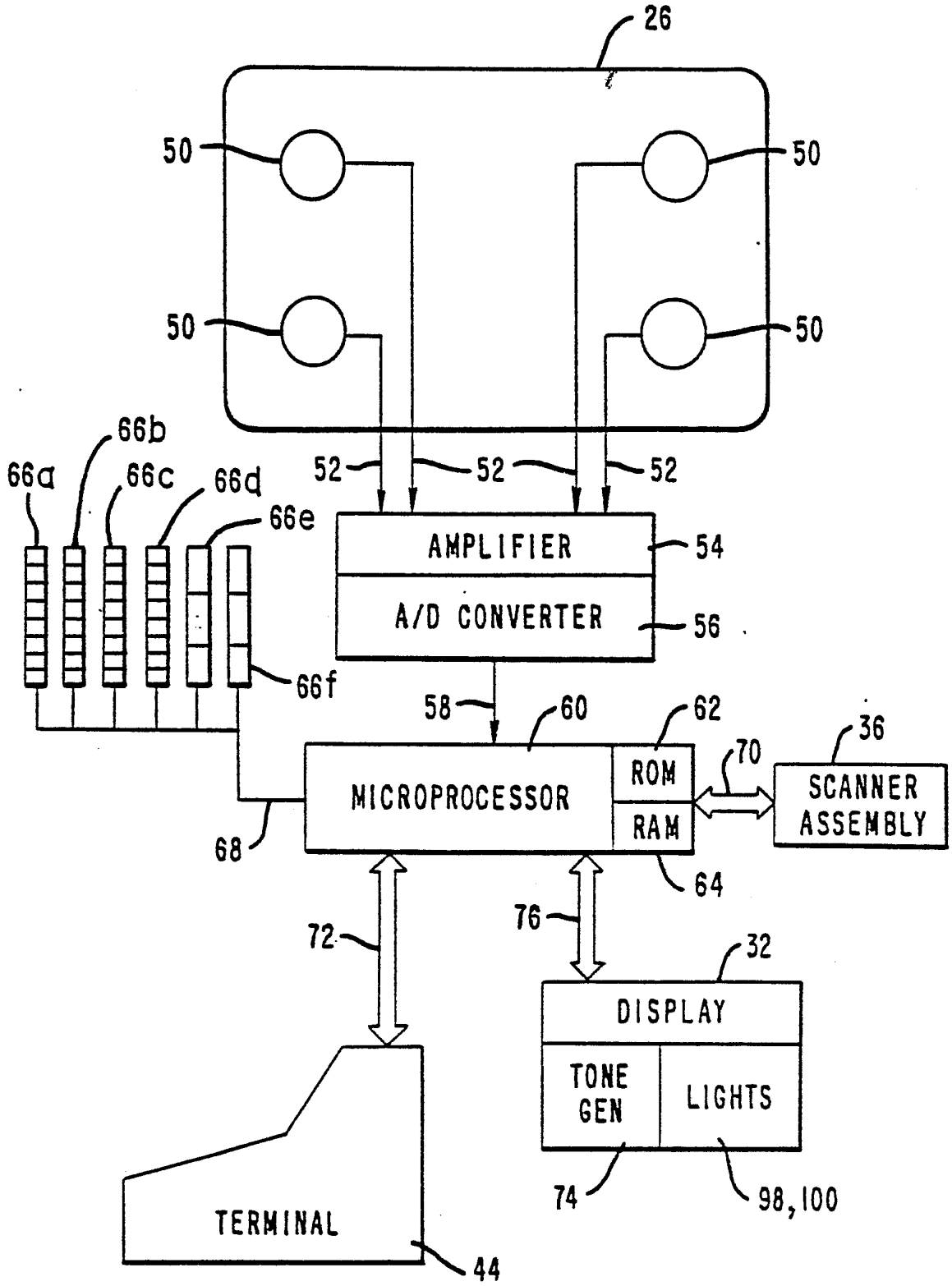


FIG. 2


26
50
50
50
50
66a
66b
66c
66d
66e
66f
52
52
52
AMPLIFIER
54
A/D CONVERTER
56
58
60
62
MICROPROCESSOR
ROM
RAM
70
36
SCANNER ASSEMBLY
68
64
72
76
32
DISPLAY
TONE GEN
LIGHTS
74
98,100
TERMINAL
44

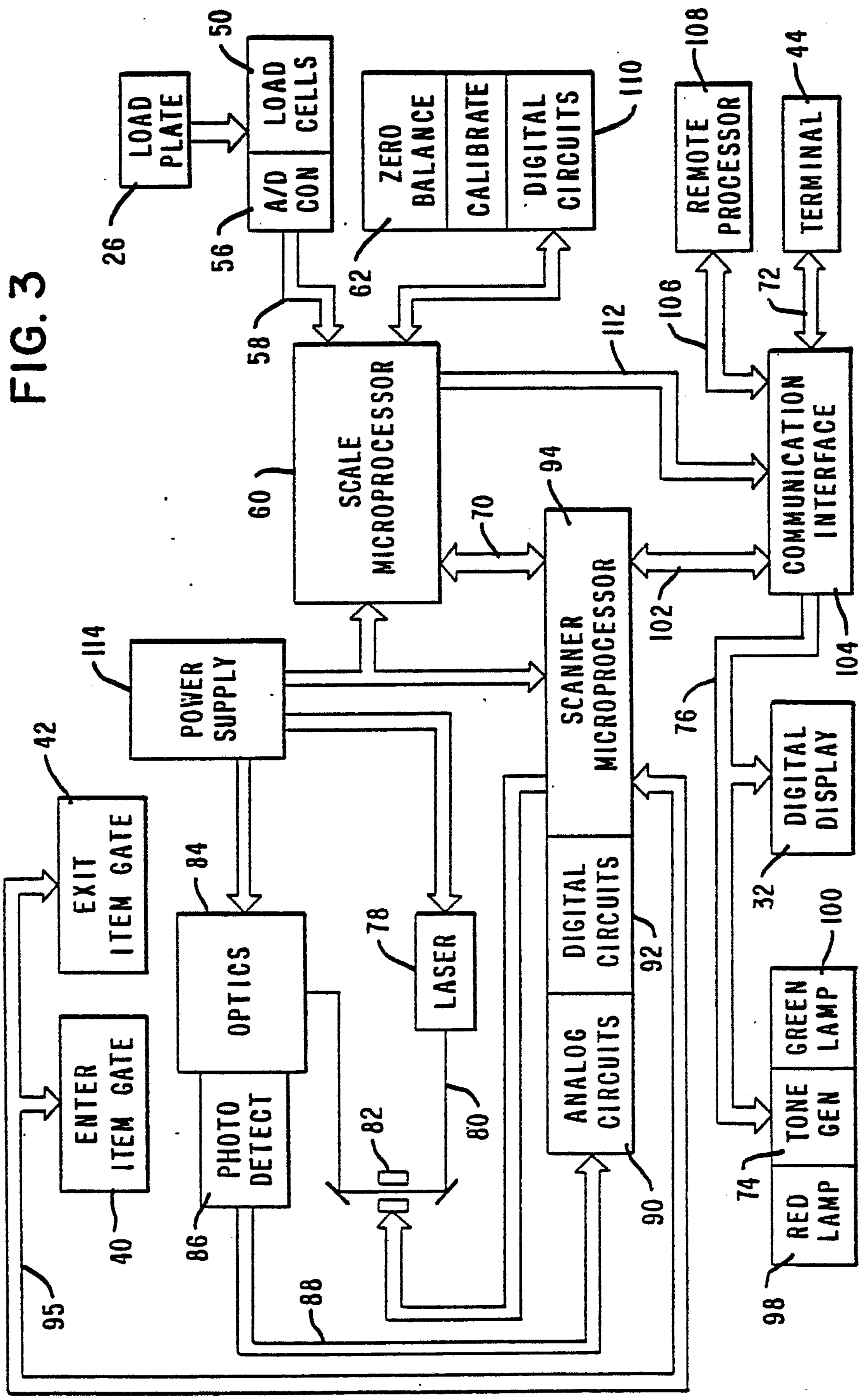

LOAD PLATE
LOAD CELLS
A/D CON
ZERO BALANCE
CALIBRATE
DIGITAL CIRCUITS
REMOTE PROCESSOR
TERMINAL
SCALE MICROPROCESSOR
COMMUNICATION INTERFACE
SCANNER MICROPROCESSOR
POWER SUPPLY
DIGITAL DISPLAY
EXIT ITEM GATE
ENTER ITEM GATE
OPTICS
PHOTO DETECT
LASER
DIGITAL CIRCUITS
ANALOG CIRCUITS
GREEN LAMP
TONE GEN
RED LAMP
26
50
56
58
62
110
108
44
106
72
112
60
70
94
102
104
114
76
42
84
78
32
100
92
82
80
74
40
86
90
98
95
88
FIG. 3

FIG. 4

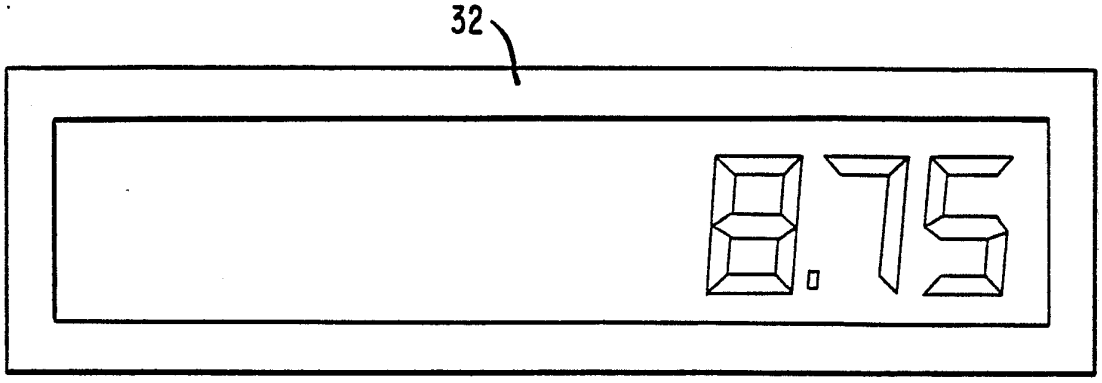


FIG. 5

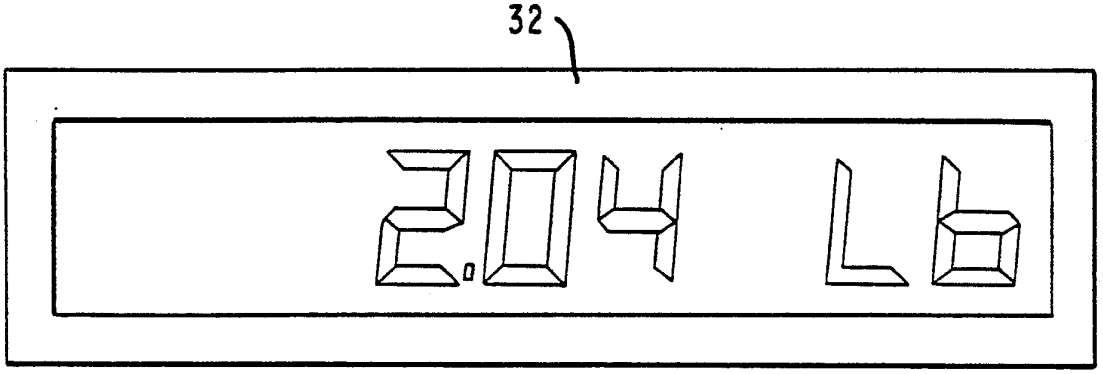
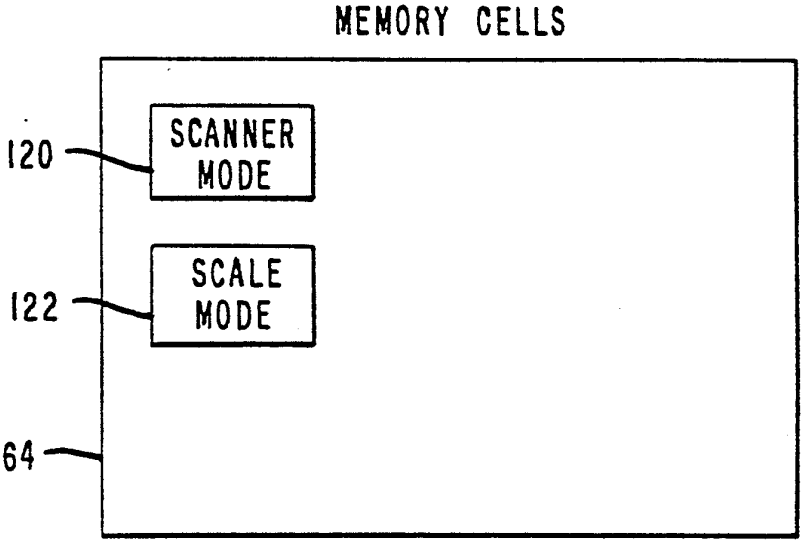


FIG. 6



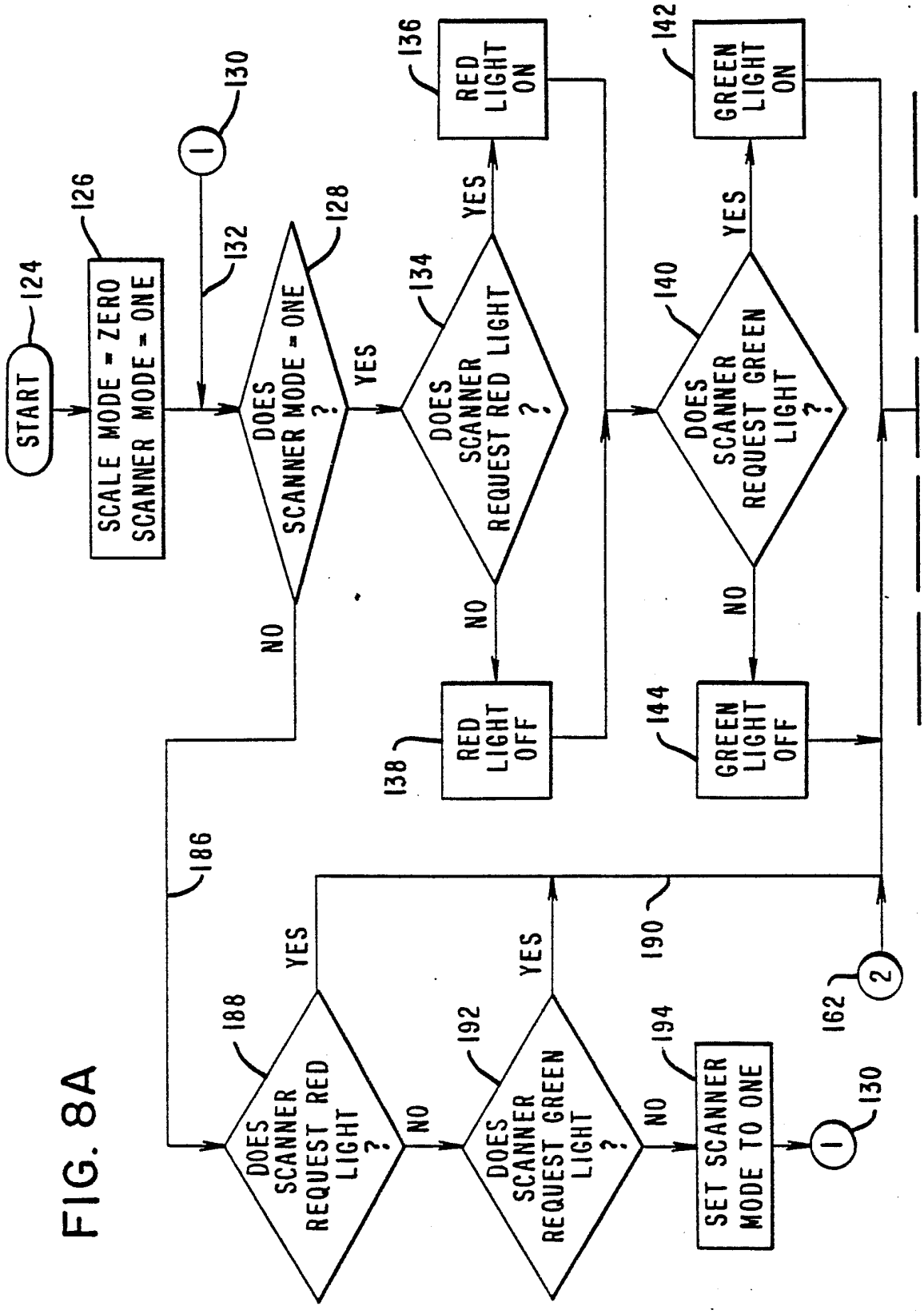

START
124
SCALE MODE = ZERO
SCANNER MODE = ONE
126
1
130
132
DOES SCANNER MODE = ONE ?
128
YES
NO
DOES SCANNER REQUEST RED LIGHT ?
134
YES
NO
RED LIGHT ON
136
RED LIGHT OFF
138
DOES SCANNER REQUEST GREEN LIGHT ?
140
YES
NO
GREEN LIGHT ON
142
GREEN LIGHT OFF
144
186
DOES SCANNER REQUEST RED LIGHT ?
188
YES
NO
DOES SCANNER REQUEST GREEN LIGHT ?
192
YES
NO
190
SET SCANNER MODE TO ONE
194
1
130
2
162

FIG. 8A

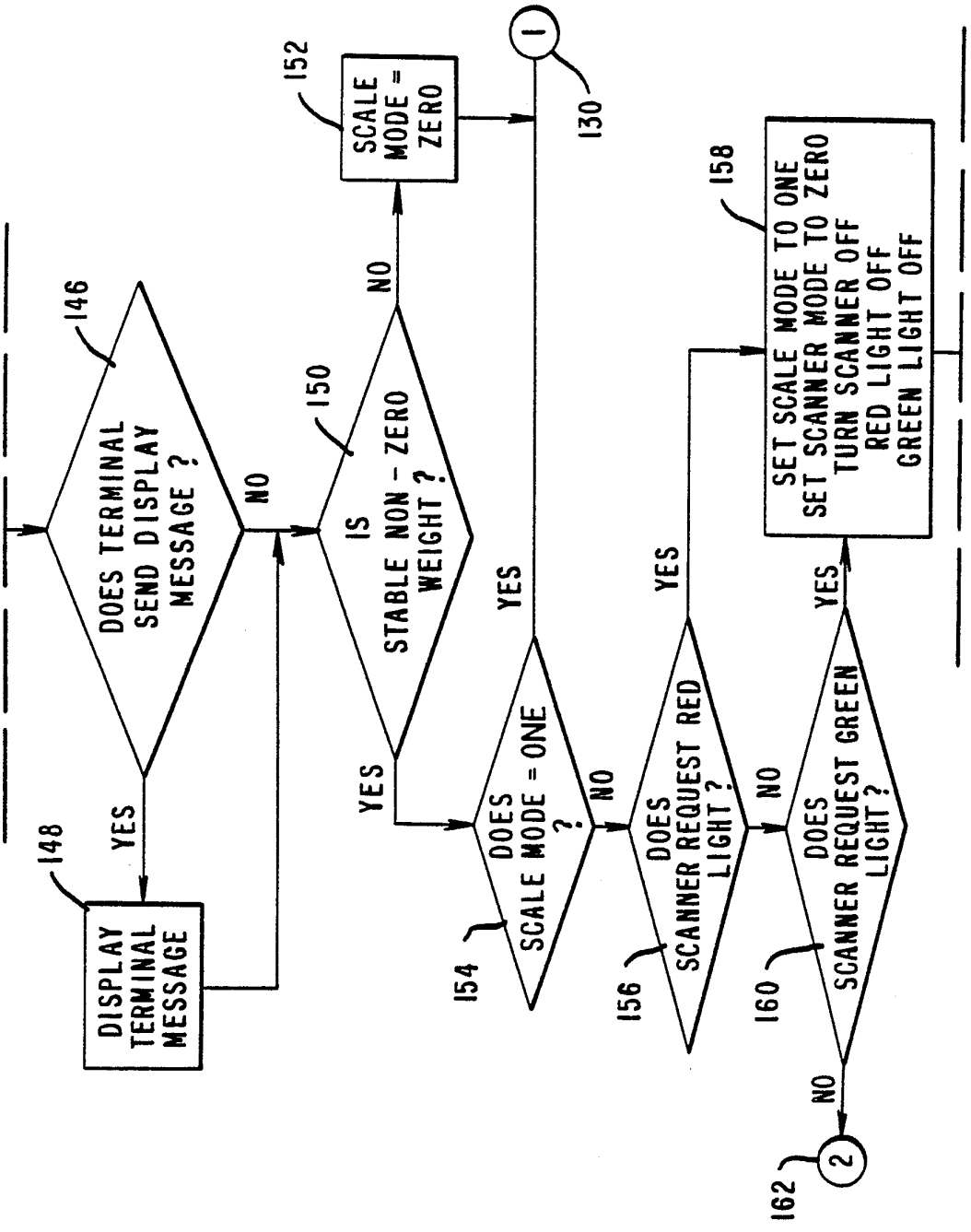


FIG. 8B

FIG. 7

FIG. 8A	
FIG. 8B	
FIG. 8C	

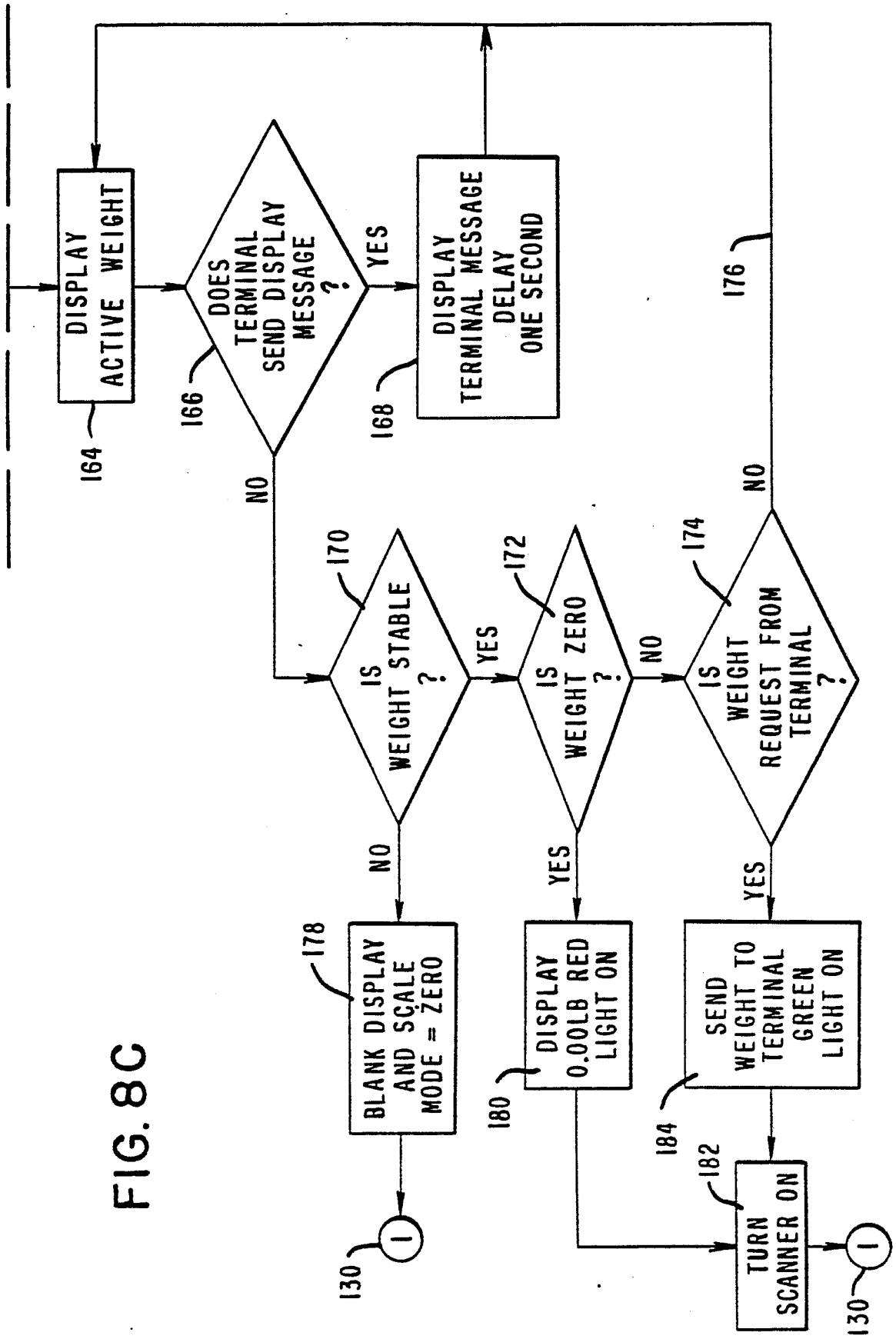

DISPLAY ACTIVE WEIGHT
164
DOES TERMINAL SEND DISPLAY MESSAGE ?
166
YES
DISPLAY TERMINAL MESSAGE DELAY ONE SECOND
168
NO
176
IS WEIGHT STABLE ?
170
YES
IS WEIGHT ZERO ?
172
NO
IS WEIGHT REQUEST FROM TERMINAL ?
174
NO
NO
YES
YES
BLANK DISPLAY AND SCALE MODE = ZERO
178
DISPLAY 0.00LB RED LIGHT ON
180
SEND WEIGHT TO TERMINAL GREEN LIGHT ON
184
TURN SCANNER ON
182
1
130
1
130

FIG. 8C

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 87/01157

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: G 07 G 1/00; G 01 G 19/413; G 06 K 17/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	G 07 G; G 01 G; G 06 K

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	US, A, 4086476 (NCR) 25 April 1978 see the whole document (cited in the application)	1
Y	US, A, 4325441 (SHARP) 20 April 1982 see figure 2; abstract	1
Y	US, A, 4071740 (GOGULSKI) 31 January 1978 see figures 1-5; abstract; column 5, line 4 - column 6, line 63; column 7, line 23 - column 8, line 13	1
A		2-5
A	GB, A, 2068132 (CLYNE et al.) 5 August 1981 see figures 1-6; abstract; page 2, line 98 - page 5, line 63	1,2,4
A	BE, A, 899019 (AGEMETAL) 18 June 1984 see figure 2; page 5, lines 6-27	1

./.

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28th August 1987	25 SEP 1987
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	L. ROSSI

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	US, A, 3681570 (ZELLWEGER) 1st August 1972 see column 2, line 7 - column 4, line 41	1
A	Patent Abstracts of Japan, volume 3, no. 129 (E-147), 26 October 1979, see the whole document & JP, A, 54107650 (CASIO KEISANKI K.K.) 23 August 1979	1,6

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/US 87/01157 (SA 17518)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 14/09/87

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A- 4086476	25/04/78	FR-A,B	2360134	24/02/78
		DE-A,C	2733766	02/02/78
		JP-A-	53017027	16/02/78
		GB-A-	1563568	26/03/80
		CA-A-	1080359	24/06/80
US-A- 4325441	20/04/82	JP-A-	55147755	17/11/80
		US-A-	4435767	06/03/84
US-A- 4071740	31/01/78	None		
GB-A- 2068132	05/08/81	US-A-	4373133	08/02/83
BE-A- 899019	18/06/84	None		
US-A- 3681570	01/08/72	NL-A-	7001595	29/09/70
		DE-A,C	2003800	08/10/70
		FR-A-	2037997	31/12/70
		CH-A-	504907	31/03/71
		GB-A-	1293465	18/10/72
		BE-A-	745883	16/07/70
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