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C. G. SHOOK

3,213,441

READOUT DISPLAY SYSTEM WITH MEMORY

Filed June 27, 1962

2 Sheets-Sheet 1

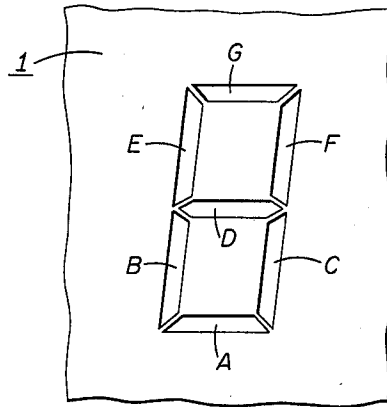


Fig. 1

| <u>DIGIT</u> | <u>APERTURES</u>    |
|--------------|---------------------|
| 0            | A, B, C, E, F, G    |
| 1            | C, F                |
| 2            | A, B, D, F, G       |
| 3            | A, C, D, F, G       |
| 4            | C, D, E, F          |
| 5            | A, C, D, E, G       |
| 6            | A, B, C, D, E, G    |
| 7            | C, F, G             |
| 8            | A, B, C, D, E, F, G |
| 9            | A, C, D, E, F, G    |

Fig. 2

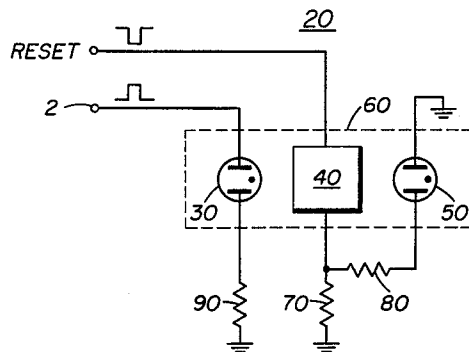


Fig. 3

INVENTOR.

CARL G. SHOOK

BY *W. J. Shanley Jr.*

ATTORNEY

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2 Sheets-Sheet 2

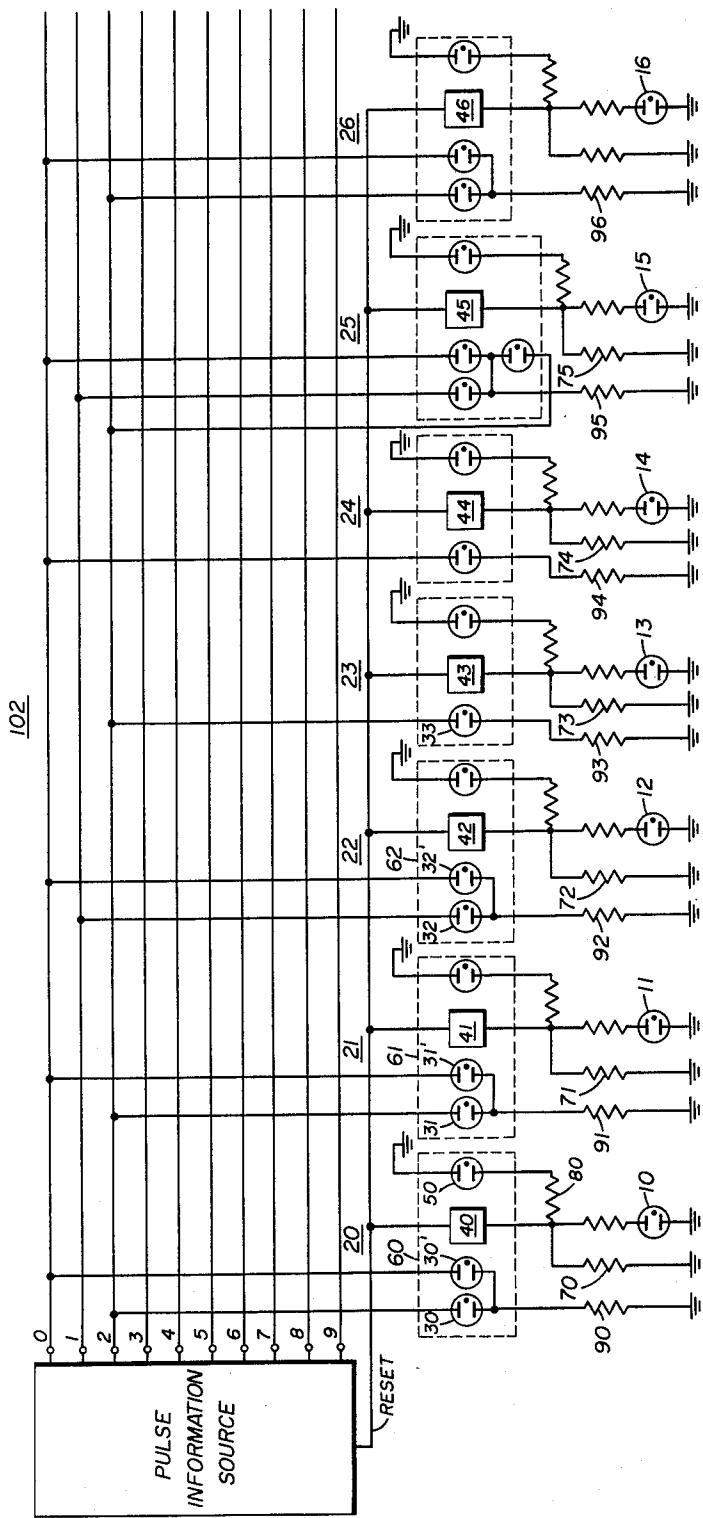


Fig. 4

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**READOUT DISPLAY SYSTEM WITH MEMORY**  
**Carl G. Shook, Rochester, N.Y., assignor to General Dynamics Corporation, Rochester, N.Y., a corporation of Delaware**

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3 Claims. (Cl. 340—324)

My invention relates to information display systems and, more particularly, to information display systems which register information applied thereto and simultaneously display the registered information.

In many types of data processing systems, output information is represented by momentary pulses on one of a plurality of output conductors. In order to display such information, it is necessary to encode each output pulse from the data processing system so that it will provide a code or pattern of output potentials upon a plurality of conductors which are utilized to selectively control display elements. The display elements are arranged in a particular pattern and the encoded information is utilized to selectively energize particular display elements so as to display the desired information. However, since the information is only momentarily present, it is necessary for the display system to have storage capabilities in order to provide a display which persists after the termination of the pulses representative of the information. Such prior art systems are needlessly complex and hence expensive.

It is, therefore, an object of my invention to provide a new and improved display system which is inexpensive and yet is capable of registering applied information to thus provide a persistent display of the information.

It is another object of my invention to utilize a plurality of bistable elements as a register associated with an encoding network for selectively energizing a plurality of display elements which are arranged in a pattern such that a plurality of different characters may be selectively created.

In accordance with the preferred embodiment of my invention, decimal digits are selectively displayed by selective energization of one or more individual display elements under control of an encoding network in response to the selective energization of one of ten input conductors. Selective energization of the display elements is provided by selective operation of one or more bistable devices which collectively act as a register for the encoded information which is applied to it by the encoding network. Upon selective operation of a bistable device, the associated display element is energized and maintained in its energized condition as long as the bistable device remains in its operated condition. Therefore, the information contained in the register will be displayed until the bistable devices are reset.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawings, of which:

FIG. 1 is a showing of the arrangement of the display elements, or apertures, which may be selectively energized in predetermined combinations to display a decimal digit;

FIG. 2 is a chart showing the various combinations of display elements, or apertures, which are to be energized to display the corresponding decimal digits;

FIG. 3 is a schematic diagram of the bistable devices of the system of my invention; and

FIG. 4 is a schematic diagram of the system of my invention.

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Referring now to FIG. 1, there are shown seven different apertures in panel 1, labeled A-G, respectively, which are arranged in a pattern such that selective illumination of predetermined combinations of the apertures will selectively display all of the decimal digits.

FIG. 2 shows the correlation between the decimal digits to be displayed and the combinations of apertures to be illuminated in order to display any predetermined decimal digit. For example, digit 4 will be displayed by illuminating apertures C, D, E and F. Illumination of each aperture is individually provided by an associated light source which is located behind panel 1 so that when it is energized only the corresponding aperture is illuminated.

Referring now to FIG. 4, neon lamps 10-16, which are respectively positioned behind apertures A-G, provide the source of illumination for their corresponding apertures. Each light source and its corresponding aperture will hereinafter be referred to as a unitary display element. Each display element is, in turn, individually associated with a bistable circuit which controls its operation. Thus, the operation of lamps 10-16 is respectively controlled by bistable devices 20-26 which are capable of assuming two stable states; the first stable state being its normal unenergized condition, and the second state being its operated or energized condition. When a bistable device is in its energized condition, its associated neon lamp has an energizing potential placed across it to thus cause illumination of its associated aperture.

The operation of the bistable devices utilized in the system of my invention will be described with reference to FIG. 3, which illustrates bistable device 20. In the normal unoperated condition of bistable device 20, photoconductor 40, which is enclosed in housing 16 to exclude ambient light, is dark and, consequently, the potential across resistor 70 is below the operating point for neon lamp 50, which is connected in series with resistor 80 across resistor 70. When an information pulse of sufficient magnitude is applied to terminal 2, it causes neon lamp 30 to flash and illuminate photoconductor 40. This results in lowering the resistance of the photoconductor to an extent necessary for the potential appearing across resistor 70 to cause lamp 50 to be energized. The light fed back from lamp 50 will, in turn, maintain photoconductor 40 in its low resistance state which will hereinafter be designated as the operated or energized condition of bistable device 20.

Thus, bistable device 20 will remain in its energized condition, once energized, until it is reset by lowering the potential applied to photoconductor 40 to extinguish lamp 50, or by opening the feedback circuit. Since it is desirable to be able to simultaneously reset all of the bistable devices of the system of FIG. 4, the bistable devices utilized in the system of my invention are reset by applying a negative-going reset pulse which results in extinguishing lamp 50.

Referring now to FIG. 4, the seven bistable circuits 20-26 are shown as being connected to encoding matrix 102 so as to encode the pulses representative of digits 0, 1 and 2 by causing the selective operation of those bistable circuits which are connected to input terminal 0, 1 or 2. The connection between input terminals 3-9 are not illustrated for the sake of simplicity, since it can be seen that reference to FIG. 2 will give the correlation between the digit to be displayed and the aperture to be illuminated and, consequently, will determine the connections to be made by matrix 102 between bistable circuits 20-26 and input conductors 3-9. For example, input conductor 4 should be connected in common to an input of bistable circuits 22-25.

The bistable circuit illustrated in FIG. 3 is illustrated as having a single input through neon lamp 30. However,

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since each bistable circuit will be connected by the matrix to more than one input conductor, separate input circuits for each conductor to which it will be connected must be provided. For example, bistable circuit 20 of FIG. 4 is connected to be operated whenever a pulse is present upon input conductor 0 or 2 by respectively connecting lamp 30' or 30 to these conductors. The ground return paths of each of these input circuits is provided in common by resistor 90. Correspondingly, resistors 91-96 provide the common return paths for the input circuits of bistable circuits 21-26, respectively.

Thus, in accordance with my invention, the system of FIG. 4 will simultaneously encode and store pulse information applied to one of its ten input conductors so as to selectively control the energization of the display elements to indicate the digit corresponding to the input conductor upon which the input pulse is applied. The encoded information which is stored in the bistable devices will be retained until the bistable devices are reset. Therefore, the pulse information source should provide a reset pulse to reset all the bistable devices to their normal unoperated condition before applying new information in the form of a pulse which is applied to one of the input conductors.

It will be apparent that in accordance with my invention, various types of information may be displayed in addition to decimal digits by changing the pattern of the apertures and correspondingly changing the encoding matrix.

I do not, therefore, desire my invention to be limited to the specific arrangement shown and described, and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What is claimed is:

1. A display system comprising a first plurality of neon lamps, said neon lamps being arranged in a predetermined pattern so that a plurality of N different characters may be selectively created by selectively energizing N different predetermined combination of said neon lamps, a second plurality of neon lamps each corresponding to a different one of said plurality of neon lamps, a source of potential

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for energizing said first and second plurality of neon lamps, a plurality of n photoconductors each connected in series with said source of potential and its corresponding one of said first and second plurality of neon lamps for maintaining its said corresponding ones of said first and second plurality of neon lamps energized only when illuminated, each of said photoconductors being in registry with its said corresponding one of said second plurality of neon lamps to thereby define a feedback light source therewith, and encoding means including a plurality of light producing elements each in registry with a selected one of said plurality of photoconductors for selectively illuminating predetermined combinations of said photoconductors for the duration of an applied pulse thereto.

2. The invention set forth in claim 1 further comprising means for individually enclosing each of said photoconductors, each of said corresponding light producing elements and neon lamps in registry with said photoconductor to exclude ambient light therefrom.

3. The invention as set forth in claim 1 further comprising means connected in cooperative relationship with all of said second plurality of neon lamps and said plurality of photoconductors for interrupting the potential across all of said second plurality of neon lamps for extinguishing said first plurality of neon lamps.

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NEIL C. READ, *Primary Examiner.*