United States Patent

Howard

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[54] **CHARACTER GENERATOR**

[72] Inventor: **Lawrence K. Howard,** 14812 Addison Street, Sherman Oaks, Calif. 91403

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[21] Appl. No.: **186,697**

[52] **U.S. Cl.**.....**178/30,** 178/18

[51] **Int. Cl.** **G08c 21/00**

[58] **Field of Search**.....178/18, 20, 21, 23 R, 30, 79, 178/80, 81, 87; 179/90 R, 90 K; 340/365 R, 365 S

[56] **References Cited**

UNITED STATES PATENTS

39,296	7/1863	Livermore	178/30
3,523,161	10/1970	Lewin	179/2 DP
3,099,711	7/1963	Foley et al.	178/30

Primary Examiner—Kathleen H. Claffy
Assistant Examiner—Kenneth Richardson
Attorney—Walton Eugene Tinsley

[57] **ABSTRACT**

A manually operated device for generating alphanumeric character information for an output device such as a printer or a display or a transmission line. An insulating plate with one or more character units, each comprising inner and outer sets of four contact segments, with the operator moving a stylus or finger over the plate and segments to selectively actuate control circuits for the output device. An eight bar character including four bars forming a rectangle and four bars radiating from the center to the corners of the rectangle.

11 Claims, 9 Drawing Figures

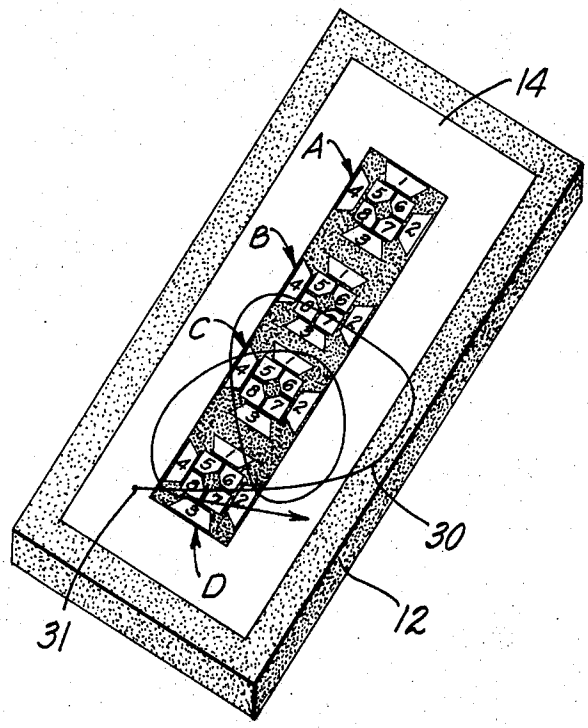


FIG. 1.

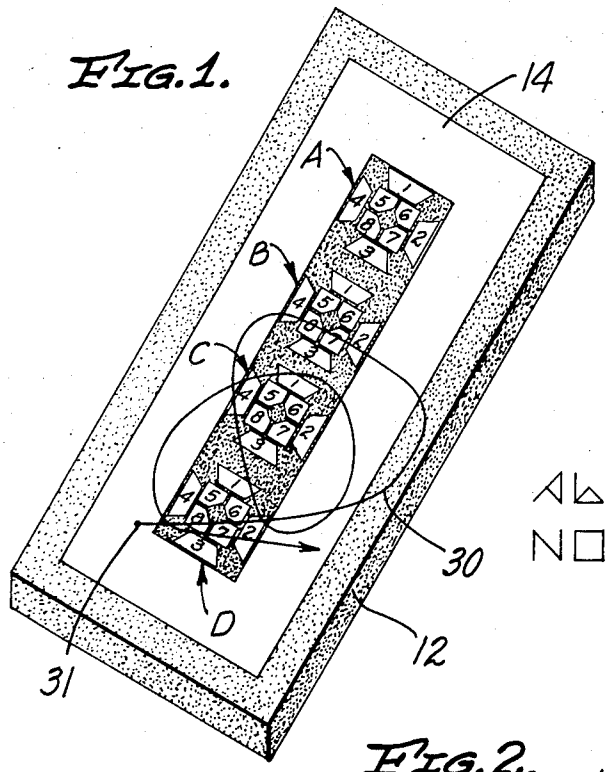


FIG. 3.

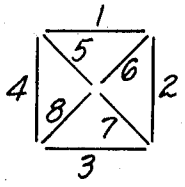


FIG. 4.

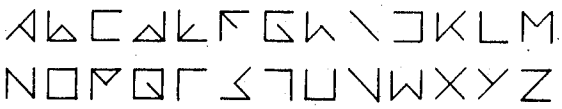


FIG. 2.

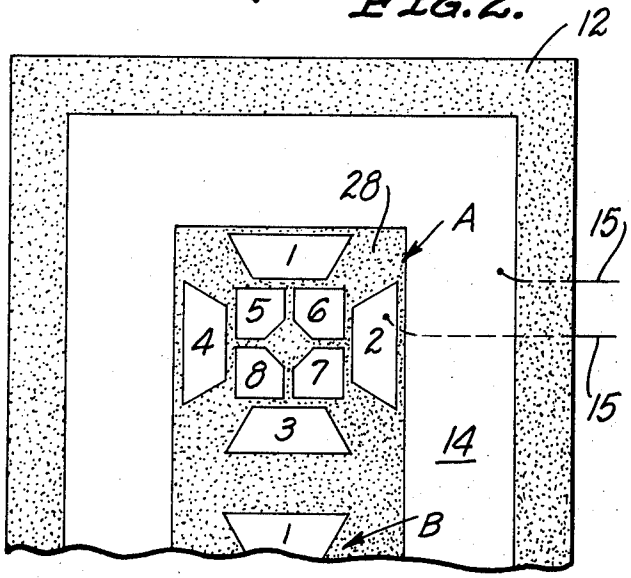


FIG. 5.

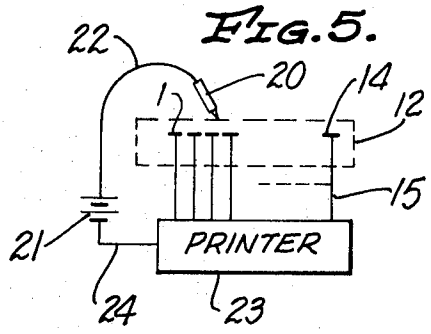


FIG. 6.

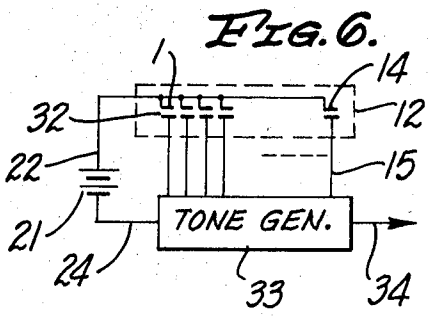


FIG. 7.

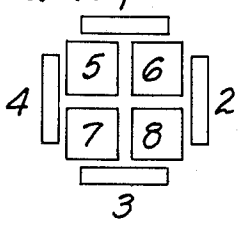


FIG. 8.

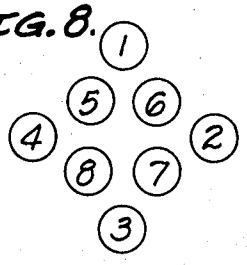
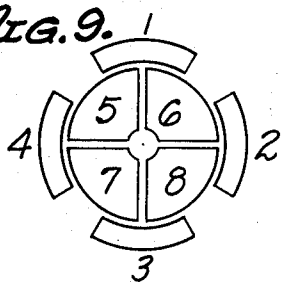


FIG. 9.



CHARACTER GENERATOR

This invention relates to character generators for producing electronically coded alphanumeric characters for output devices such as printers, displays, tone generators and the like. A keyboard such as is used in a typewriter, is the principal form of character generator now in use and while satisfactory for many situations, does suffer certain disadvantages. A separate key is required for each character resulting in a large device calling for both hands for efficient operation. Also, there is no simple way of introducing additional characters once the keyboard has been completed, and today there is considerable demand for mathematical and other symbols and special characters from foreign languages.

The present invention contemplates an eight bar character format with four of the bars forming a rectangle and with four of the bars radiating from the center to the corners of the rectangle, with various combinations of the bars providing the various characters. The character generator provides a small plate of insulating material with electrical contacts at the surface thereof, with the contacts corresponding to bars of a character, with the operator moving his hand or a stylus over the surface of the plate selecting certain of the contacts and generating control signals for actuating the output device.

Some stylus operated devices have been utilized in the past, including those shown in U.S. Pat. Nos. 1,231,821 and 400,141. However, none of the known prior art devices relate to a bar character matrix and accordingly it is an object of the present invention to provide a new and improved character generator which is small, compact, simple to operate and one having few moving parts and only eight elements in the character matrix. A further object is to provide such a character generator which may utilize a single character unit for all of the characters available and readily providing for generation of new characters and symbols as desired.

It is an object of the invention to provide such a character generator which may be utilized with a variety of different output devices providing printout on paper or visual displays or electrical signs or computer input or the like. An additional object is to provide such a device which may be desk mounted or installed directly on a piece of equipment or be hand held, as desired.

Other objects, advantages, features and results will more fully appear in the course of the following description. The drawing merely shows and the description merely describes preferred embodiments of the present invention which are given by way of illustration or example.

In the drawing:

FIG. 1 is a perspective view of a plate with four character units incorporating a preferred embodiment of the present invention;

FIG. 2 is an enlarged partial view of the top of plate FIG. 1;

FIG. 3 is a diagram of the eight bar character format of the invention;

FIG. 4 illustrates an English alphabet which may be produced with the character generator of the invention;

FIG. 5 is a diagrammatic illustration of the interconnections between the plate and stylus of the character generator and a printer;

FIG. 6 is a diagrammatic illustration similar to that of FIG. 5 showing switches and a tone generator in place of the stylus and printer, respectively; and

FIGS. 7, 8, and 9 illustrate alternative configurations of the contact segments of a character unit.

A plate 12 of electrical insulating material, typically a molded plastic, carrying character units A, B, C, D therein is shown in FIG. 1. The character units may be identical and character unit A is shown in greater detail in FIG. 2.

Each character unit comprises eight electrical contacts 1–8 carried at the surface of the plate 12, preferably being embedded in the plate to provide a smooth overall surface. The contact segments 5–8 are disposed in an inner set, preferably in a cruciform configuration. The contact segments 1–4 are disposed in an outer set about the inner set, also preferably in a cruciform configuration. An additional contact segment 14 may be provided adjacent the segments 1–8, and preferably extends around all of the character units, as seen in FIG. 1. The contact segments 1–8 and 14 are electrically isolated from each other by the plate 12, and electrical connections may be made to the contact segments by conventional wire or strip conductors 15, which may be molded in the plate 12.

While a preferred form of the character generator will incorporate a plurality of the character units, typically four as seen in FIG. 1, the character generator may utilize only a single character unit if desired. Normally where two or more character units are used, the contact segments of like numbers will be electrically interconnected, either within the plate or externally of the plate.

The stylus 20 with an electrical conducting tip is provided for manually tracing patterns on the surface of the plate 12. In one configuration, the conducting tip of stylus 20 may be connected to a power source 21 via cable 22, with the power source connected to an output device such as a printer 23 by cable 24. The contact segments of the plate are also connected to the printer via the conductors 15.

Various conventional output devices may be utilized, including those shown in U.S. Pat. Nos. 3,099,711; 3,112,693; 3,108,673; 1,906,960; and 3,453,648. By way of example, the printer 23 may be similar to a printer shown in the aforementioned U.S. Pat. No. 3,099,711, incorporating eight printing elements arranged in the eight bar pattern of FIG. 3, with each printing element driven by an electrical solenoid actuated by engaging the stylus 20 with the corresponding contact segment to connect the power source 21 to the solenoid. In use, one or more of the eight segments of an eight character unit are contacted by the stylus selectively actuating the printing solenoids to print a particular character, after which the stylus is moved onto the peripheral segment 14 which actuates another solenoid for advancing the printer to the next character position.

The eight bars of the diagram of FIG. 3 are numbered 1–8 to correspond to the eight segments of a character unit as shown in FIG. 2. That is, touching segment 1 of a character unit with the stylus will cause the

printer or other output device to produce the bar or line 1 of FIG. 3. One of the important features of the character generator is the ability to produce an entire alphabet with the eight bars, one form of the 26 letter alphabet being illustrated in FIG. 4. It is readily seen that numbers, symbols, and characters from other alphabets such as those required for the Russian language, are readily generated.

The curved line 30 on the plate in FIG. 1 illustrates the use of the character generator in generating the phrase "A WORD." Any of the character units may be used to form a character and the operator may choose one or more of the character units which are most convenient to the stylus at the time. Starting at point 31, the stylus passes over segments D8, D7, D6 and D2 to form A. The stylus then passes over segment 14 signalling the completion of a character and the output device is advanced one character space. The stylus moves off segment 14 and back on to segment 14 signalling completion of another character, which is a blank or a space, and the output device advances another character space. The stylus then passes over B2, B7, B8 and B4 to form W, and then on to 14. The stylus then contacts C4, C3, D1 and D2 to form O and then on to 14. Next the stylus passes over C1 and C4 to form R and then on to 14. Finally the stylus contacts D3, D8, D7 and D2 to generate D, and then on to 14. Stylus patterns for forming other characters will readily be apparent. The contact segments are so arranged that the operator may move the stylus in a continuous circular motion in forming the characters, and may form two characters in a revolution.

An alternative embodiment utilizing a separate switch for each contact segment in lieu of the stylus and conductor, is shown in FIG. 6, where elements corresponding to those of FIG. 5 are identified by the same reference numerals. A switch 32 is provided for each segment, typically a capacitance type switch which functions to close a circuit when a portion of a human body is positioned adjacent the switch. With this arrangement, the operator traces the pattern with his finger, operating switches at selected segments and providing control signals to the output device.

The embodiment of FIG. 6 shows a tone generator 33 in place of the printer 23 of FIG. 5. The tone generator may provide tone bursts of various frequencies on output line 34, with a different frequency for each segment of a character unit. The tone generator utilized by the telephone company as a substitute for the dial pulses is suitable for this purpose.

The tone generator functions as an encoder, and the tone bursts may be transmitted and decoded in conventional equipment to provide signals for actuating a printer or a display or for manipulation in computer or data handling equipment.

Referring to FIG. 2, the set of segments 1–4 is in cruciform configuration, with a vertical axis, and the set of segments 5–8 is in a similar configuration with an axis at 45° to the vertical. This oblique orientation of the axes of the inner and outer sets of segments is a preferred configuration for ease in operation in forming various characters. Also in the preferred configuration for the segments, each outer segment overlaps two inner segments, and a gap or alley is provided between adjacent outer segments. Referring to FIG. 2, outer segment 1 overlaps inner segments 5 and 6, and gap 28 provides an alley or path of insulating material between outer segments 1 and 2, preferably of a width the same order of magnitude as the width of an inner segment. This configuration provides access paths to and from the inner segments of equal accessibility over or between outer segments as desired.

In the most preferred configuration of FIG. 2, the oblique sides of segments 2 and 4 are at 30° to the horizontal and if extended would intersect at the center of the pattern. Similarly, the oblique sides of segments 1 and 3 are at 30° to the vertical and if extended would intersect at the center. Also, the three inner sides of each of segments 5–8 are of equal length.

One alternative configuration for the outer set of segments 1–4 and the inner set of segments 5–8 is shown in FIG. 7. Other alternative configurations for the segments are shown in FIGS. 8 and 9.

While exemplary embodiments of the invention have been disclosed and discussed, it will be understood that other applications of the invention are possible and that the embodiments disclosed may be subjected to various changes, modifications and substitutions without necessarily departing from the spirit of the invention.

I claim:

1. In a character generator for producing electronically coded alphanumeric data for transmission to an output device, the combination of:
   - a plate with a surface of electrical insulating material;
   - at least one character unit carried in said plate, said character unit having electrical conductors at the surface of said plate comprising a first set of four inner segments and a second set of four outer segments disposed about said first set;
   - output circuit means for coupling each of said segments to the output device in controlling relation; and
   - control means for selectively energizing said output circuit means to actuate the output device as the operator traces a pattern over the surface of said plate.

2. A character generator as defined in claim 1 wherein the segments of said first set are disposed in a cruciform pattern with a first axis, and the segments of said second set are disposed in a cruciform pattern with a second axis, and with said second axis oblique to said first axis.

3. A character generator as defined in claim 2 wherein each of the outer segments overlaps two of the inner segments, with a gap between outer segments providing an insulated access path to the inner segments.

4. A character generator as defined in claim 1 including an additional segment carried in said plate adjacent an outer segment to provide an advance signal for advancing the output device to the next character position.

5. A character generator as defined in claim 1 including a plurality of said character units carried in said plate adjacent one another.

6. A character generator as defined in claim 5 including an additional segment carried in said plate about said character units to provide an advance signal for advancing the output device to the next character position.

7. A character generator as defined in claim 1 wherein said control means includes a stylus with an electrical conductor for contacting selected segments as said stylus is moved over the surface of said plate.

8. A character generator as defined in claim 7 including a printer having a printing element for each segment of said first and second sets and means for actuating each element in response to a control signal produced by said stylus contacting a corresponding segment of a character unit.

9. A character generator as defined in claim 1 wherein said control means includes a switch for each segment, with a switch being operated as the pattern is traced over the corresponding segment.

10. A character generator as defined in claim 9 including a tone generator having a different tone for each segment of said first and second sets and means generating a specific tone on an output line in response to a control signal produced by a switch operation in said control means.

11. A character generator as defined in claim 1 wherein the alphanumeric data comprises characters in an eight bar matrix including four bars forming a rectangle and four bars radiating from the center to the corners of the rectangle,

with said four outer segments of a character unit corresponding to the four rectangle forming bars and with said four inner segments corresponding to the four radiating bars.

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