Oct. 25, 1966 W. E. EVANS 3,281,822

CHARACTER ALIGNMENT AND PROPORTIONAL SPACING SYSTEM

Filed Aug. 30, 1963 3 Sheets-Sheet 1

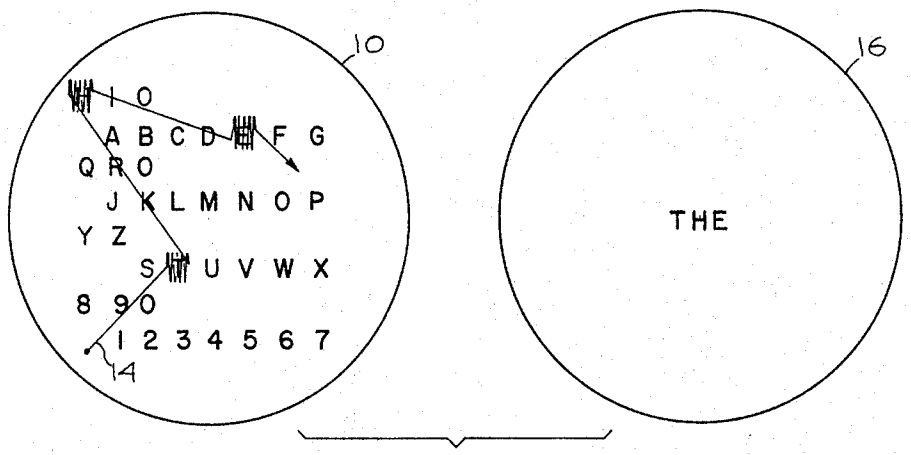

Fig. 1

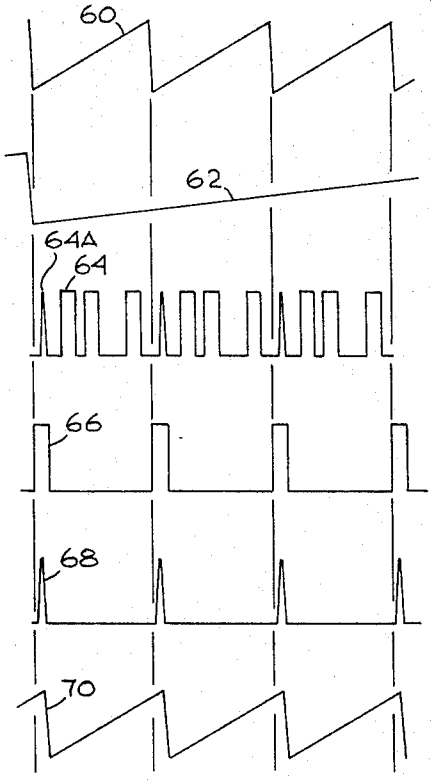

Fig. 4

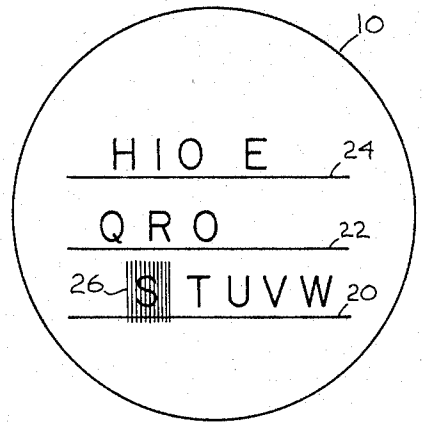

Fig. 2

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CHARACTER ALIGNMENT AND PROPORTIONAL SPACING SYSTEM

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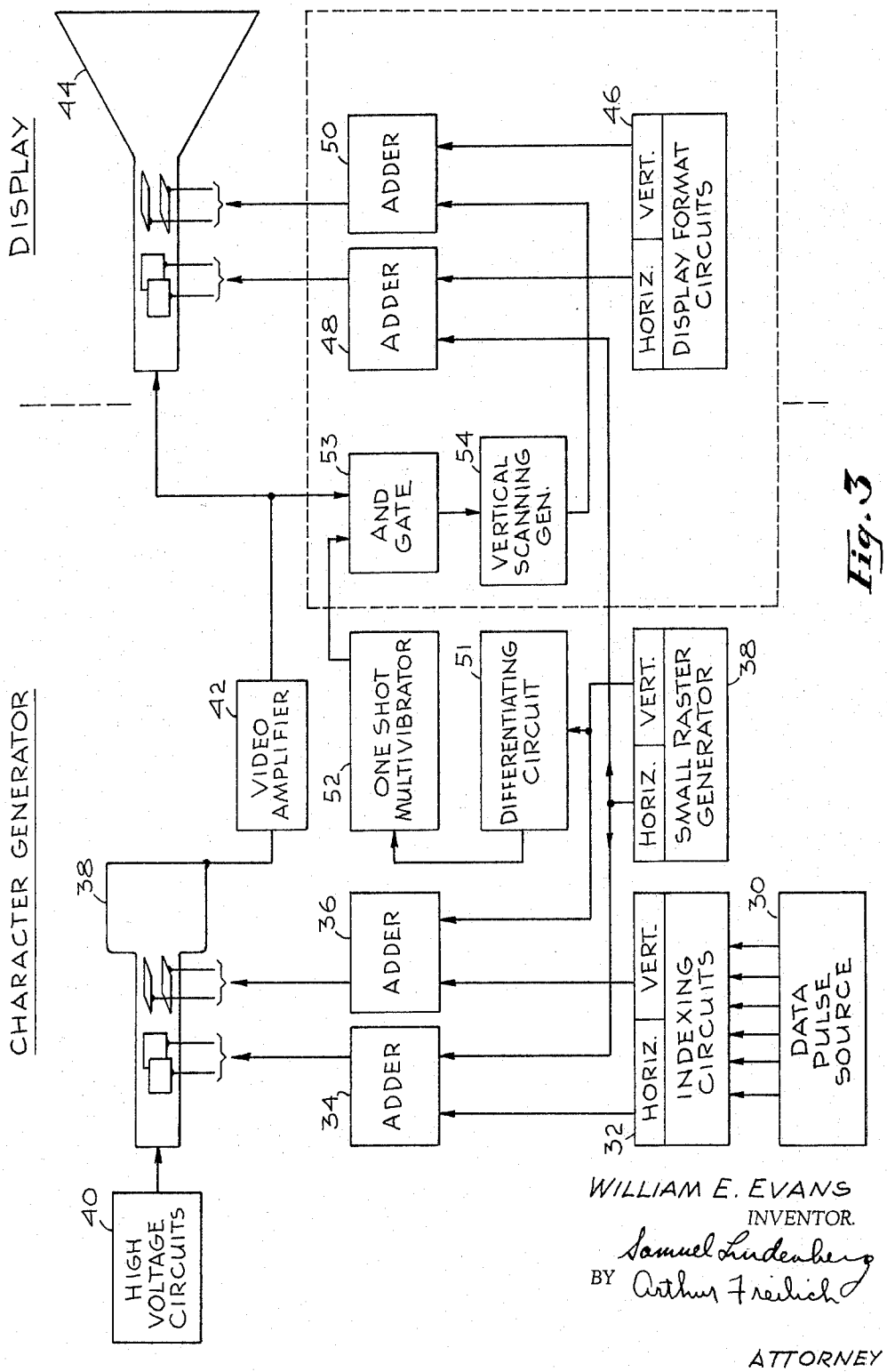

Fig. 3

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CHARACTER ALIGNMENT AND PROPORTIONAL SPACING SYSTEM

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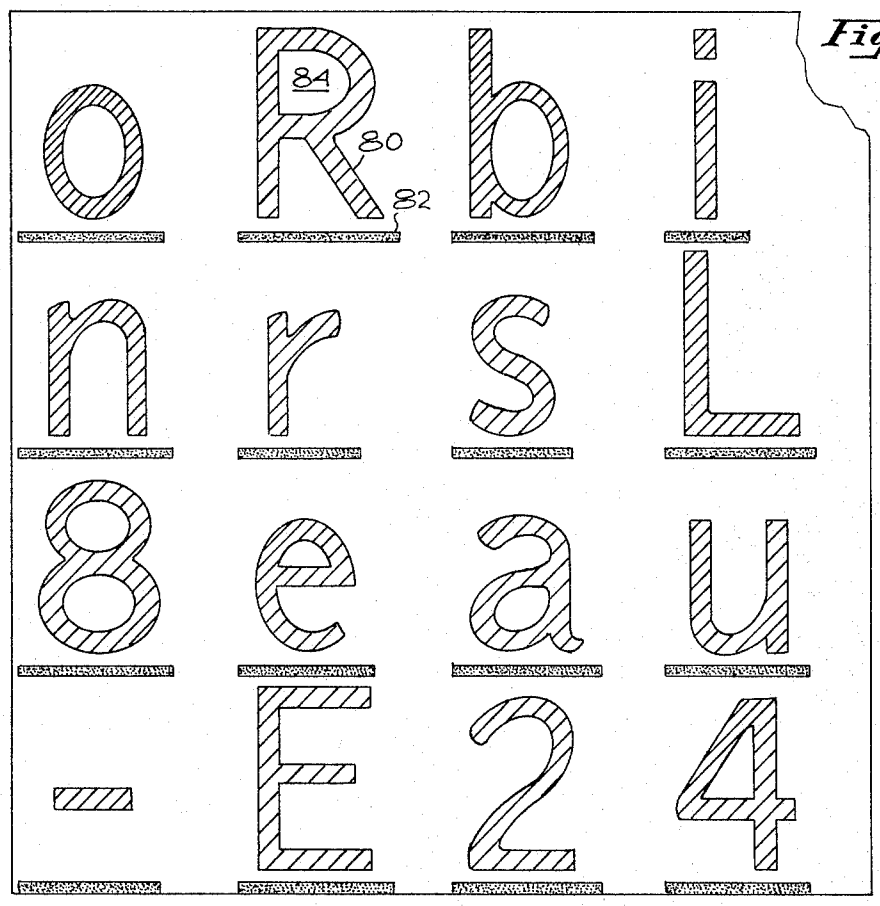
Fig. 5



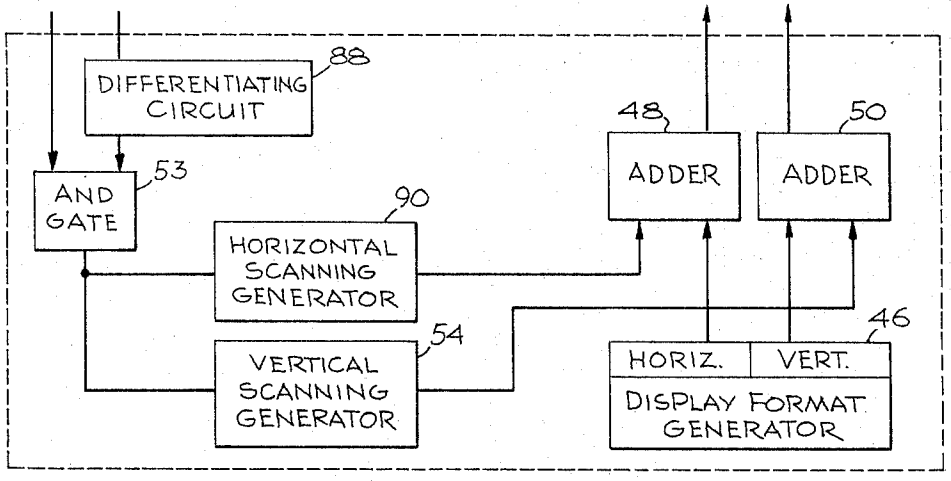


Fig. 6

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3,281,822

CHARACTER ALIGNMENT AND PROPORTIONAL SPACING SYSTEM

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Filed Aug. 30, 1963, Ser. No. 305,879
12 Claims. (Cl. 340—324)

This application is a continuation-in-part application of U.S. patent application Serial No. 195,255, filed May 16, 1962 and entitled "Character Alignment System."

This invention relates generally to a system for generating and displaying or printing characters and more particularly to means in such a system for aligning and for proportionately spacing such characters.

Prior art systems, for example, as is shown in U.S. Patent 3,017,625 to Evans et al., teach apparatus for electronically generating video signals representative of characters. These video signals may thereafter be processed, either by way of a cathode ray tube which displays them as characters, or by way of electrostatic printing apparatus, which prints the characters on paper.

At least two different devices are available for generating these video signals. One such device is a flying spot scanner and the other a monoscope tube. Each of these devices generates character representing signals by use of a cathode ray tube together with means for causing the cathode ray tube beam to scan selected characters on a target. The flying spot scanner makes use of a scanning light spot generated by the cathode ray tube electron beam striking a phosphorescent tube face. The light spot is focused on a target consisting of regions of transparent and opaque areas each region representing a character. By focusing the light spot on a selected region and causing the spot to scan that region, properly positioned light sensitive means can develop video signals, representing the character therein.

The monoscope tube consists of a cathode ray tube which has a secondary electron emitting target, such as an aluminum target, in the form of a flat sheet. The target is covered with a substance, such as carbon, which does not emit secondary electrons. The carbon is removed to expose the underlying aluminum to the cathode ray tube electron beam in a pattern which has the shape of the character for which video signals are desired to be generated. Several or all of the characters for which video signals are desired can be formed on the monoscope target. Deflection signals are applied to the monoscope tube to move the electron beam to the region of the character desired to be displayed in subsequent apparatus. Then, scanning-raster signals are applied to the monoscope tube to cause the beam to scan the character. Secondary electrons emitted from the exposed aluminum during the scanning operation are collected and constitute the desired video signal.

Where a cathode ray tube is used to display the characters being scanned in the monoscope tube, the characters are usually displayed in the form of words or numbers in a line extending horizontally across the cathode ray tube face. Since the scanning-raster in the character generating tube (i.e. monoscope of flying spot scanner) and the display cathode ray tube scanning-raster are in the prior art made to occur at the same time, small errors in indexing of the character generating tube scanning beam are reflected as corresponding position errors in the characters displayed by the cathode ray tube. Indexing errors resulting in errors in vertical positioning of the displayed characters are most noticeable since it is very easy for the eye to detect when the lower portions of a sequence of characters in a printed or displayed message are not aligned. While error of a few percent (less than 10) in

vertical alignment are permissible in displays intended primarily for information transfer, in systems where aesthetic quality is important, the vertical alignment must be more precise.

Consequently, an object of this invention is the provision of an inexpensive arrangement for improving the alignment of characters displayed or printed by a cathode ray tube and derived from a character generating cathode ray tube.

In addition to desiring precise vertical alignment of displayed characters, aesthetic qualities can be further enhanced by proportionately spacing the various characters; that is, by attributing different spaces i.e. proportional to the width of the character, to different characters along a line as is done in conventional printing. For example, more space along a line should be provided for the character "*r*" than for the character "*i*" and similarly, more space should be provided for the character "R" than for the character "*r*." For high quality presentation significant width variations must be tolerated even where all characters to be displayed are of the same font. Where different fonts are employed, considerably greater variations are introduced. In addition to differences in total width assigned to each character space, for optimum aesthetic qualities, variations in left and right guard spaces must be tolerated with non-symmetric characters in order to align the center of gravity of the character with the center of gravity of the character space. For example, the character "L" should have more guard space on its left than on its right.

Consequently, another object of the present invention is the provision of means for attributing different spacings to different characters derived from a character generating cathode ray tube to be displayed or printed by a cathode ray tube.

Still another object of this invention is the provision in a character generating cathode ray tube apparatus of means associated with each character for storing width and guard space information regarding that character.

Briefly, in accordance with the invention, the target of a character generating cathode ray tube is provided with means for permitting the tube beam to scan the target and develop electrical signals which not only identify the character scanned but in addition represent position information determining the position to be assumed by the character in a display or printed product relative to previously processed characters.

In the disclosed preferred embodiment of the invention, a monoscope tube is incorporated in a display system. It is to be understood however that the teachings of the invention are not restricted to this type of character generating tube and the system in which it is incorporated need not be a display system, but can for example be a printing system. In the preferred embodiment, the objects of the invention are achieved by providing a horizontal guide bar beneath each character on the monoscope target. Apparatus is provided for vertically positioning each character on the display in accordance with the precise distance (which is the same for all characters) established between the character and its associated guide bar on the monoscope target. In addition, the apparatus attributes a total horizontal space to each displayed character which is proportional to the length of the guide bar associated therewith on the monoscope target and introduces left and right guard spaces as determined by the relative positioning between the character and guide bar. The target is divided into a plurality of regions with each region including first and second areas, comprising the character and guide bar, which have a first secondary emission characteristic. A third area comprising the remainder of the target area

has a second secondary emission characteristic and envelops the character and extends between the character area and the guide bar area. The character scanning raster, consisting of a series of vertical scanning lines, of the monoscope tube is sufficiently large so that each scan of the monoscope tube beam is initiated in the third area and each scanning line extends into the guide bar area. The display cathode ray tube raster is not synchronized with the monoscope tube raster but instead a timing signal developed by the monoscope tube when the beam passes from an area having a first secondary emission characteristic to an area having a second secondary emission characteristic is used to initiate each vertical sawtooth scan of the scanning raster for the display cathode ray tube just before a line of video signals is generated by the monoscope tube. The timing signal is separated from the video signals by gating means which are enabled only during an initial portion of each vertical scan. The timing signal is not reflected in the display since the display raster is initiated in response to and therefore subsequent to its occurrence. This same timing signal is applied to a horizontal scanning raster generator to incrementally move the display cathode ray tube beam horizontally. Consequently the display tube beam is moved a distance proportional to the length of the guide bar and each character displayed will be vertically aligned since its vertical alignment is determined by the precise distance between the lower portion of a character and associated guide bar rather than by indexing circuits.

The novel features that are considered characteristic of this invention are set forth with particularly in the appended claims. The invention itself both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 shows, by way of example, a monoscope target and the scan path required to produce the word "THE";

FIGURE 2 shows a monoscope target to which guide lines have been added in accordance with a first embodiment of the invention;

FIGURE 3 is a block schematic diagram showing the manner in which the first embodiment of the invention can be employed in a character generating and displaying system;

FIGURE 4 is a waveform diagram shown to assist in an understanding of the invention;

FIGURE 5 shows a monoscope target to which guide bars have been added in accordance with a second embodiment of the invention; and

FIGURE 6 is a block schematic diagram illustrating the manner in which the system apparatus of FIGURE 3 can be modified in order to be employed with the second embodiment of the invention.

Reference is now made to FIGURE 1, which illustrates a monoscope target, and by way of example, the scan of the characters required to generate the word "THE" for display. The monoscope target **10** is provided with a plurality of character regions, each region including character identity information in the form of an area whose shape corresponds to the shape of the character desired to be displayed. Assume that the cathode ray beam of the monoscope tube is deflected over a path for the selection of the characters "THE," which is represented by the line **14** superimposed on the target. The cathode ray beam starts from some "at rest" position and moves to a position to the left of the letter "T." There the beam is deflected to provide a small raster scanning pattern. This is made up of a fast, linear sawtooth, which moves the beam from the bottom to the top of the character, and a slow, linear ramp, which moves the beam across the selected character from left to right. In present practice, the vertical deflection of the display cathode ray tube is in exact synchronism with the vertical deflection in the monoscope tube. Thus, the scan on the monoscope target **10** provides the display shown in the representation of the display cathode ray tube face **16** in FIGURE 1.

After completing a scan of the letter "T," the cathode ray beam is next deflected to scan the letter "H," and thereafter the letter "E." Since in the prior art the scanning rasters of both monoscope and display tubes are made to occur in exact synchronism, any error in positioning or indexing of the monoscope scanning raster will appear on the display. The most common difficulty is in the vertical indexing of the scanning raster of the monoscope tube, whereby the alignment of the characters being displayed on the display tube is improper.

In accordance with one aspect of this invention, the proper alignment of the characters displayed on the display tube is achieved by initiating the scanning raster of the display tube only when the scanning raster of the monoscope tube is at a predetermined location relative to the character being scanned, whereby compensataion is introduced for any indexing error in the monoscope tube. Thus, in accordance with a first embodiment of this invention, as shown in FIGURE 2, character position information in the form of relatively narrow guide lines **20, 22, 24** is added to the monoscope target between the rows of characters. The vertical amplitude of the scanning raster is increased so as to be on the order of 20 percent greater than the maximum vertical dimension of the characters and the scanning raster is positioned by the conventional indexing circuits so that the bottom portion of the raster always traverses the horizontal guide line.

FIGURE 3 is a block schematic diagram of a system which employs the first embodiment of the invention. Only so much of the complete monoscope character generating and reproducing system is shown as will assist those skilled in the art to know where to locate structure required to modify the system in accordance with this invention. The input to the system is derived from a data pulse source **30**.

The data pulse source comprises a source of digital signals, which are capable of being converted to analog deflection voltages required for causing the monoscope cathode ray beam to be indexed to a desired character location. The output of the data pulse source is applied to indexing circuits **32**, which operate to make the necessary conversion of the pulse signals to horizontal and vertical deflection voltages for the monoscope cathode ray beam. The outputs of the indexing circuits **32**, consisting of horizontal and vertical deflection signals, are applied to two adding circuits, respectively **34, 36**. Also applied to these adding circuits, to be combined with the deflection signals, are the small raster signals from a small raster generator **38**. This generator, at the proper time, generates the requisite horizontal and vertical raster signals, whereby the character scanning raster for the selected character is achieved. Thus, the horizontal and vertical raster signals are added in the respective adders **34** and **36** to the respective horizontal and vertical deflection signals. The outputs of the two adders **34, 36** are applied to the proper deflecting electrodes of a monoscope tube **38**. The requisite operating voltages for the monoscope tube are derived from the high voltage circuits **40**, which are symbolically indicated as being applied to the monoscope tube **38**.

The video signal output of the monoscope tube is applied to a video amplifier **42**. These signals are thereafter applied to the cathode ray beam control electrode of a display cathode ray tube **44**. As has been the practice heretofore, the cathode ray beam of the tube **44** is deflected in response to horizontal and vertical deflection signals, which are derived from display format circuits **46** and, also, from the small raster generator **38**. In the first embodiment of the invention, the horizontal deflection signals from the display format circuits **46** are added

together with the horizontal signals from the small raster generator **38** in an adder circuit **48**. In accordance with the prior art, the vertical deflection signals which are applied to the display cathode ray tube comprise the output of adder circuit **50** which adds the vertical deflection signals from the display format circuits **46** and the vertical signals from the small raster generator **38**. The outputs of the respective adders **48** and **50** are respectively applied to the horizontal and vertical deflecting electrodes of the display cathode ray tube **44**.

The system which has thus far been described in FIGURE 3 is the one which is presently employed for displaying characters on the face of a cathode ray tube in response to digital signals. In accordance with a first embodiment of this invention, the output of the video amplifier, besides being applied to the display cathode ray tube to control the cathode ray beam, is also applied to a gating circuit, which, upon also receiving a signal from the small raster generator, provides a synchronizing or timing signal **68**.

The gating circuits can comprise any suitable circuits for accomplishing the required function. By way of example, a vertical retrace blank signal is obtained from the small raster generator **38** and is differentiated by a network **51**. The output of network **51** is connected to a one shot multivibrator **52**, which, in response to the differentiated retrace blank signal provides gating signals. These gating signal are applied to one input of a two input And gate **53**. The other input to this And gate comprises the output of the video amplifier **42**. The multivibrator circuit output is the enabling input for the And gate **53**, whereby the And gate output will comprise only the synchronizing signals represented by the waveshape **68**, shown in FIGURE 4. Alternative to the one shot multivibrator circuit, a blocking oscillator circuit can also be used.

In response to a synchronizing signal, a vertical scanning generator **54** produces a vertical scanning raster signal which is applied to the adder circuit **50**, to be added to the vertical deflection signal from the display format circuits **46**. The vertical scanning generator output is employed in place of the vertical output from the small raster generator **38**.

For a better understanding of the operation of the first embodiment of the invention, reference is made to FIGURE 4, which illustrates waveforms derived from the system shown in FIGURE 3. The sawtooth waveshape **60** represents the vertical scanning signals of the small raster generator **38**. The waveshape **62** represents the horizontal scanning signal of the small raster generator **38**. Now, regarding FIGURE 2, assume that the indexing circuits have provided the horizontal and vertical deflection signals for selecting for scanning the letter "S." As previously indicated, in accordance with this invention, the vertical amplitude of the output of the small raster generator **38** is approximately 20 percent greater than the maximum vertical dimension of the characters, with the result that the bottom portion of the raster always traverses the horizontal guide line **20**. The resulting video signal waveform is represented in FIGURE 4 at **64**. Because the guide line is relatively narrow, it appears as a positive going spike **64A**, just ahead of the character information. In a properly operating character generator, this spike will always occur within an initial portion (approximately the first 10 percent) of the vertical scan, and thus can be separated from the completed video signal by means of a properly timed gate. The gate timing is derived, e.g., from the vertical retrace blank pulse provided by the raster generator **38**. If the trailing edge of this spike, which is passed through the And gate **53**, is used to initiate the generation of each sawtooth of the vertical sawtooth scan signal provided by the vertical scan generator **54**, then a sequence of characters will be presented on the face of the display cathode ray tube, which will always be properly aligned, irrespective of the presence of small indexing errors in the monoscope.

In FIGURE 4 the gating signal which is provided by the multivibrator **52** is shown by the waveform **66**. The separated synchronizing signal used to trigger generator **54** is represented by the waveform **68**. The output of generator **54** comprising the display small raster vertical component which is applied to the display cathode ray tube is represented by the waveshape **70**. Since no vertical deflection of the display cathode ray tube beam occurs prior to the derivation of the synchronizing signal **68**, the component **64A** in the video signal will not be displayed on the face of the cathode ray tube. Only the video signals derived from the characters themselves, and no signals from the guide lines will therefore actually affect the display.

In accordance with a second embodiment of the invention, a monoscope target of the type shown in FIGURE 5 is provided. The monoscope target of FIGURE 5 differs from the target of FIGURE 1 principally in the respect that information stored on the target not only is utilized for the purpose of vertically aligning characters to be displayed, but in addition is utilized to proportionately space characters so that the space provided for each character in a displayed line of characters will be a function of the width of the character. In other words, whereas the space provided along a line of displayed characters in accordance with the first embodiment of the invention was the same for each character, in accordance with the second embodiment of the invention, different characters will occupy different amounts of space along a displayed line of characters.

The target of FIGURE 5 includes a plurality of character regions, which for the sake of simplicity are arranged in a 4 x 4 rectangular matrix. Instead of each row of characters having a single guide line extending beneath all the characters in a row, the target of FIGURE 5 utilizes a single guide bar for each character. The guide bars so employed have a length proportional to the space which it is desired to dedicate to the associated character when displayed and are positioned relative to the characters to precisely define left and right guard spaces. Each guide bar is positioned a precise distance below the lower portion of its associated character thereby permitting character alignment to be accomplished in accordance with the teachings of the first embodiment.

More particularly, each character region consists of what may be considered as three different areas. Initially, a first area **80** shaped to identify a particular character is incorporated in each region. The first area has a first secondary emission characteristic. For example, let it be assumed that the first area is defined by exposed aluminum. Spaced below the character identity information area **80** is a second area **82** which constitutes the previously referred to guide bar constituting character position information. The upper surface of the guide bar area **82** is spaced from the lower portion of the character area **80** by a precise distance which is the same in all character regions on the target. The second area **82** has the same secondary emission characteristic as the first area **80**. A third area **84** comprises the remainder of the target area and envelops the character area **80** and extends between the character area **80** and the guide bar area **82**. The third area can be considered as a guard area and has a secondary emission characteristic different from that of areas **80** and **82**. For example, if it is assumed that areas **80** and **82** are defined by exposed aluminum, then area **84** can be defined by carbon covered aluminum.

It will be noted that although the distance between the area **82** and the lower surface of the character area **80** is identical in each character region, the length of the areas **82** vary considerably from region to region. For example, note the difference in length between the area **82** beneath character "*i*" and character "*r*." Then note the difference in length of area **82** beneath character "*r*" and

character "R." The lengths of the areas 82 are made equal to the horizontal space along a displayed line of characters that the character associated with each guide bar area 82 should occupy. Proportional spacing is accomplished by causing the monoscope tube electron beam to initiate each scan of a character immediately to the left of the guide bar area 82. Note that the left end of the guide bar area 82 is similarly positioned in each of the character regions. Thus, the monoscope tube will provide no output so long as the beam is swept vertically in the area 84 and does not intersect the guide bar area 82. Only when the beam passes from the guide bar area 82 into the guard area 84, will the monoscope tube provide an output signal. By utilizing this output signal to control a horizontal scanning generator coupled to the display cathode ray tube, the display tube beam will move in the horizontal direction only so long as the guide bar area 82 is being scanned. When the right end of the guide bar area 82 is reached, the horizontal scanning generator coupled to the display cathode ray tube will stop and wait until the next character is scanned.

In order to incorporate the proportional spacing feature into the character generating and displaying system of FIGURE 3, the system apparatus is modified by replacing the apparatus enclosed within the dotted line box in FIGURE 3 with the apparatus illustrated in FIGURE 6. More particularly, in lieu of connecting the output of video amplifier 42 directly to And gate 53, a polarized differentiating circuit 88 is provided therebetween for applying a signal to And gate 53 representative of the beam emerging from the upper edge of bar 82. Additionally, instead of connecting the horizontal output of the small raster generator 38 to the adder 48, a horizontal scanning generator 90 is provided. The horizontal scanning generator 90 is triggered by the same synchronizing signal provided by And gate 53, which is utilized to trigger the vertical scan generator 54. Consequently, in accordance with the second embodiment of the invention, the display format circuits 46 selectively position the beam in the display cathode ray tube which is then held in position until the vertical or horizontal scanning generators 54 or 90 are triggered. Note that as the monoscope tube beam scans each character region, it will initially scan solely in the area 84 and subsequently will intersect the guide bar area 82. The beam will trace several scanning lines in the guard area 84 prior to traversing the character area 80. During this interval, the display cathode ray tube beam will be deflected but nothing will be displayed by the display cathode ray tube inasmuch as the video amplifier 42 will provide no video signal to the cathode ray tube control electrode. The character will be displayed by the display cathode ray tube during those intervals in which the scanning lines traced intersect the character area 80. Subsequent to these intervals, the monoscope tube electron beam will again trace several scanning lines in the guard area 84 without scanning the character area 80 and thereby move the display tube beam horizontally without providing any video signal to the display tube 44.

There has thus been described and shown herein a novel and useful improvement in an electronic character generating and displaying circuit, whereby indexing difficulties which occur in the character generator portion of the circuit are compensated for so that the display output does not reproduce these defects. In addition, improvements in monoscope tube targets have been illustrated which permit information defining total character space width and guard space width to be stored on the target and utilized to correspondingly space the characters when displayed.

Although the invention has been described with the scanning raster having a higher vertical deflection frequency than the horizontal deflection frequency, this should not be considered as a limitation upon the invention since the same inventive principles apply to a system wherein a scanning raster has a higher horizontal deflection frequency than vertical deflection frequency. Also, it is again pointed out that the invention is not restricted to monoscope tubes and display systems but can be equally as well applied to flying spot scanners and printing systems.

What is claimed is:

1. In a system for displaying characters on a cathode ray tube from electronically derived character signals wherein video signals representative of desired characters are derived from a monoscope tube by successively indexing the cathode ray beam of said monoscope tube to the regions of the target of said monoscope tube on which one of said characters is scribed, and thereafter applying vertical and horizontal scanning raster signals to scan said character, and the video signals derived thereby together with said vertical and horizontal scanning raster signals are applied to said cathode ray tube, apparatus for compensating for defects in the indexing of said monoscope tube comprising means for generating timing signals just before each vertical traverse of a character by the cathode ray beam of said monoscope tube, means for generating vertical scanning raster deflection signals for said cathode ray tube only in response to said timing signals, means for applying said timing signals to said means for generating vertical scanning raster deflection signals, and means for applying the output of said means for generating vertical scanning raster deflection signals to said cathode ray tube.

2. In a system for displaying characters on a cathode ray tube from electronically derived character signals, wherein video signals representative of desired characters are derived from a monoscope tube by successively indexing the cathode ray beam of said monoscope tube to the regions of the target of said monoscope tube on which one of said characters are scribed, and thereafter applying vertical and horizontal scanning raster signals to scan said character, said video signals together with said vertical and horizontal scanning raster signals thereafter being applied to said cathode ray tube, apparatus for compensating for defects in the indexing of said monoscope tube comprising means for generating timing signals just before the video signal derived by each vertical traverse of a character by the cathode ray beam of said monoscope tube, means for generating vertical scanning raster deflection signals for said cathode ray beam only in response to said timing signals, gating means to which said timing and video signals are applied for separating said timing signals from said video signals, means for applying said gating means output to said means for generating vertical scanning raster deflection signals, and means for applying the output of said means for generating vertical scanning raster deflection signals to said cathode ray tube.

3. In a system as recited in claim 2 wherein said means for generating timing signals includes a horizontal line scribed on the monoscope tube target below each character at which it is desired to correct for defects in the indexing of said monoscope tube.

4. In a system as recited in claim 2 wherein said gating means for separating said timing signals from said video signals comprises an And gate having a first input to which said timing signals and said video signals are applied and an enabling input, means to generate enabling signals from the vertical scanning raster signals applied to said monoscope tube, and means to apply said enabling signals to said And gate enabling input.

5. In a system for displaying characters on a cathode ray tube from electronically derived character signals wherein video signals representative of desired characters are derived from a monoscope tube by successively indexing the cathode ray beam of said monoscope tube to the regions of the target of said monoscope tube on which one of said characters is scribed, and thereafter applying vertical and horizontal scanning raster signals to scan said character, and the video signals derived thereby together with said vertical and horizontal scanning raster signals

are applied to said cathode ray tube, apparatus for compensating for defects in the indexing of said monoscope tube comprising means for establishing for each character scribed on said target of said monoscope tube a linear region on said target having a predetermined location with respect to each of said characters, means for sensing when the cathode ray beam of said monoscope tube has traversed the linear region of a predetermined character being scanned, means for generating vertical scanning raster reflection signals for said cathode ray tube responsive to said means for sensing only after the cathode ray beam in said monoscope tube has traversed a linear region of the monoscope target which has a predetermined location with respect to a predetermined character being scanned, and means for applying said generated vertical raster scan voltage to said cathode ray tube.

6. A character display system including a character generating cathode ray tube, means for generating an electron beam in said character generating cathode ray tube, a target having a plurality of discrete regions thereon, each of said regions having character identity and character position information formed therein, means for selectively deflecting said character generating cathode ray tube electron beam to one of said regions, a first vertical scanning raster generator, a first horizontal scanning raster generator, means coupling said first vertical and horizontal scanning raster generators to said character generating cathode ray tube for causing said electron beam to successively trace scanning lines across said one of said regions, means responsive to said character generating cathode ray tube electron beam scanning said character position information in said one of said regions for developing timing pulses, means responsive to said character generating cathode ray tube electron beam scanning said character identity information in said one of said regions for developing a video signal, a display cathode ray tube having a display face, means for generating an electron beam in said display cathode ray tube, means for deflecting said display cathode ray tube electron beam to a selected position on said display face, a second vertical scanning raster generator, a second horizontal scanning raster generator, means coupling said second vertical and horizontal scanning raster generators to said display cathode ray tube for causing said display cathode ray tube electron beam to traverse said selected position in response to each of said timing pulses, and means for controlling said display cathode ray tube electron beam in response to said video signal.

7. The system of claim 6 wherein said character generating cathode ray tube is a monoscope tube and said character identity and character position information in each of said regions is represented by areas which have a first secondary emission characteristic and the area therebetween in each of said regions has a second secondary emission characteristic.

8. The system of claim 7 wherein said timing pulse is developed in response to said scanning monoscope tube electron beam passing from an area having said first secondary emission characteristic to an area having said secondary emission characteristic during an initial portion of each successive traversal of said one of said regions.

9. A character display system comprising a character generating monoscope tube including a target having a plurality of discrete regions thereon, each of said regions including a first area having a first secondary emission characteristic and of a shape defining a character, a second area having a first secondary emission characteristic and of a length defining the total width of said character, a third area having a second secondary emission characteristic enveloping said first area and extending between said first and second areas, means for generating an electron beam, means for causing said beam to trace successive scanning lines across one of said regions, means for developing a video signal in response to said beam scanning said one of said regions, means for developing a timing pulse from said video signal in response to said beam passing from an area having said first secondary emission characteristic to an area having said secondary emission characteristic during an initial portion of each of said successive scanning line traces across said one of said regions, a display cathode ray tube having a display face, means for generating an electron beam in said cathode ray tube, means for deflecting said cathode ray tube beam to a selected position on said display face, means responsive to each timing pulse for causing said cathode ray tube beam to trace a scanning line across said selected position, and means for controlling said cathode ray tube beam by said video signal subsequent to the development of each of said timing pulses.

10. In a system for displaying characters on a cathode ray tube from electronically derived character signals wherein video signals representative of desired characters are derived from a monoscope tube by successively indexing the cathode ray beam of said monoscope tube to the regions of the target of said monoscope tube on which one of said characters is scribed, apparatus for compensating for defects in the indexing of said monoscope tube and for displaying each of said characters in a space proportional to the region in which the character is scribed on said monoscope tube target comprising means for generating timing signals just before each vertical traverse of a character region by the cathode ray beam of said monoscope tube, means for generating vertical and horizontal scanning raster deflection signals for said cathode ray tube only in response to said timing signal, means for applying said timing signals to said means for generating vertical and horizontal scanning raster deflection signals, and means for applying the output of said means for generating vertical and horizontal scanning raster deflection signals to said cathode ray tube.

11. In a system as recited in claim 10 wherein said means for generating timing signals includes a horizontal line having a length proportional to said space in which said character is to be displayed scribed on the monoscope tube target below each character.

12. In a system for displaying characters on a cathode ray tube from electronically derived character signals wherein video signals representative of desired characters are derived from a monoscope tube by successively indexing the cathode ray beam of said monoscope tube to the regions of the target of said monoscope tube on which one of said characters is scribed, apparatus for compensating for defects in the indexing of said monoscope tube and for displaying each of said characters in a space proportional to the region in which the character is scribed on said monoscope tube target comprising means for generating vertical and horizontal scanning raster deflection signals for said cathode ray tube only after the cathode ray beam in said monoscope tube has traversed a linear region of the monoscope target which has a predetermined location with respect to a predetermined character being scanned, and means for applying said generated vertical and horizontal raster scan voltage to said cathode ray tube.

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