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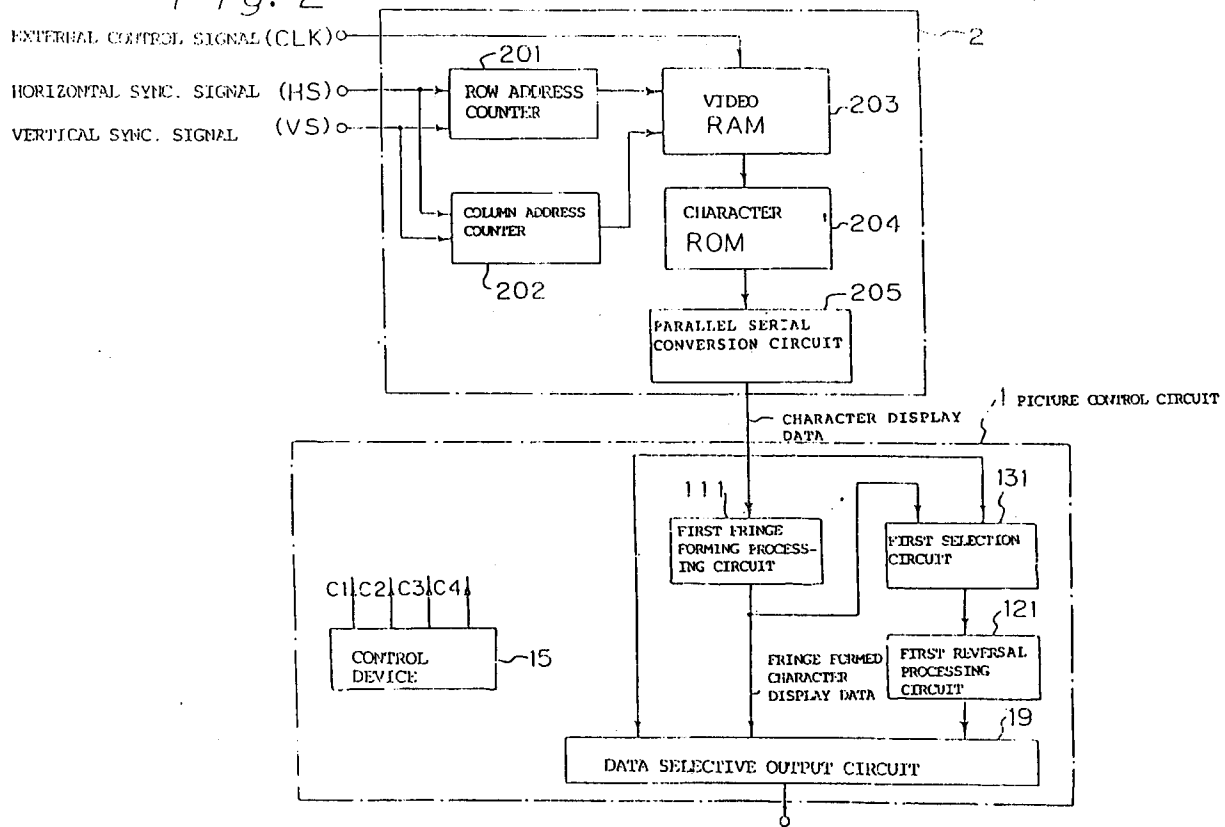
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METHOD AND APPARATUS FOR CONTROLLING IMAGE DISPLAY AND FOR DISPLAYING MERGED IMAGE.

In an on-screen display in which characters and figures are displayed on a screen, the edge-formation processing and the inversion processing are combined together independent of a simple selection processing, in order to diversify the character display patterns. The image display controller comprises image display means (2) which outputs one or more kinds of character display data on the basis of external control signals, first edge-forming means (111) which outputs edge-enhanced character display data on the basis of said character display data,

first selection means (131) which selectively outputs said character display data or edge-enhanced character display data, first inversion means (121) which outputs inverted character display data or edge-enhanced inverted character display data on the basis said character display data or edge-enhanced character display data, and control means (15) which controls the input and output of said image display means, first edge-enhanced means, first selection means and first inversion means.

Fig. 2



TECHNICAL FIELD

The present invention relates to a method of and an apparatus for a picture display control and a picture synthesis display. The method and apparatus according to the present invention are applicable, for example, to an apparatus for a fringe forming process for character data or a reversal process for character data such as an on-screen display controller, the method of carrying out these processes, and the apparatuses applicable for the above-mentioned apparatus and method.

BACKGROUND

Recently, in the field of video processing, such as for a computer and television, there has arisen a demand for a realization of higher and a greater multiplicity of functions of an OSD controller for displaying and processing characters and pictures in the display plane. According to a prior art on-screen display controller, where characters and pictures are synthetically displayed and processed in a display plane, a fringe forming process for supplementing a point between points of character data (character data, font data) constituting a character or a reversal processing for reversing a background color by a character display color is carried out, depending on a background color of the display plane and the like. In such a prior art apparatus, the character data read from the picture display circuit is processed by a fringe forming circuit, a reversal circuit, or the like, and the thus processed fringe formed character display pattern, reversed character display pattern, or the like is selectively output to be supplied to the next stage picture processing device or the like.

In some cases, however, cursor indications in a computer picture processing or a character displayed on a TV plane are affected by the background color or the like, and the cursor indications or the character cannot be clearly and definitely acknowledged. For this reason, there is a demand for a display of characters in a multiple manner, as required by a user. Also, a problem arises in the prior art display method using the fringe forming processing or the reversal processing in that a limitation of the character patterns to be displayed exists, and thus a desired character display cannot be realized. Therefore, there is a need for the development of an apparatus, method, and application apparatus by which the fringe forming processing and the reversal processing are properly handled and a multiple display of characters is realized.

An example of the character display pattern obtained by a prior art picture processing method is shown in Fig. 1, which illustrates a television

plane wherein broken line hatchings represent the character color and solid line hatchings represent the fringe forming color.

In Fig. 1, for example, due to the use of a fringe forming processing or reversal processing of the character display pattern P11' or the character display pattern P12', for which the character peripheral region is defined, of alphabet "O", a reversal character display pattern P31', peripheral region formed reversed character display pattern P32', and fringe formed character display patterns P21', P22' are obtained. The reversed character display pattern P31' is a pattern such that the data "1", i.e., a white color, of the character display portion of character display pattern P11' is reversed to "0", i.e., a black color. The peripheral region formed reversed character display pattern P32' is a pattern such that the data "1", i.e., white, of the character display portion of character display pattern P12' is replaced by the data "0", i.e., black, of the character peripheral region.

Thus, display processing in the display plane based on six kinds of character display patterns, including a non-processed character display pattern P11' and the character peripheral region defined character display pattern P12', can be carried out.

According to a prior art on-screen display controller and the like, in the synthetic display processing in the display plane of characters or pictures, the reversal processing for effecting a replacement of the background color and the character display color is carried out, and by this processing, the character dot pattern data read from the picture display circuit is data-processed by the fringe forming circuit or the reversal circuit, and the reversed character display pattern P31', P32', the fringe formed character display pattern P21', or the like is selectively output to be supplied to the next stage picture synthetic processing device or the like.

In some cases, however, the cursor display in the computer picture processing or the displayed character on the TV plane is affected by the background color or the like, and accordingly, cannot be clearly acknowledged. For example, if the background color is a whitish color and the displayed character pattern is also white, the character cannot be definitely acknowledged. Accordingly, a character display on a display plane that is not affected by the background color or the like, and is able to be definitely acknowledged, is desired. Also, as shown in Fig. 1, in the display method according to the prior art fringe forming processing or reversal processing, the character display patterns are limited to about six kinds thereof, and thus a satisfactory display of the character display patterns cannot be attained, and accordingly, an improvement

of the display method is desired.

DISCLOSURE OF THE INVENTION

In view of the problems in the above-described prior arts, an object of the present invention is, instead of the execution of the fringe forming processing and the reversal processing by using a simple selective processing, to provide a method of and an apparatus for a picture display control and picture synthetic display in which these processings are combined to produce many kinds of character display patterns, and accordingly, a multiple display of characters is realized.

According to a basic form of the present invention, there is provided a picture display control method by which a production processing of one or more kinds of character display pattern (P11, P12) is carried out, a producible processing of a fringe formed character display pattern (P21) based on a fringe formation of the character display pattern (P11, P12) is carried out, a reversal processing for replacing the display color and the background color of the character display pattern (P11, P12) or the fringe formed character display pattern (P21, P22) is carried out, and a selective outputting processing of the character display pattern (P11, P12), the fringe formed character display pattern (P21, P22), the reversed character display pattern (P31, P32), or the fringe formed reverse character display pattern (P41, P42) is carried out.

In an apparatus for carrying out the picture display control method according to the present invention, a picture display means (2), first fringe forming means (111), first selection means (131), first reversal means (121), and control means (15) are provided.

For example, when one or more kinds of character display data (D1) are supplied to the first fringe forming means (11) and the first selection means (131) by picture display means (2), the character display data (D1) is first fringe forming processed by the first fringe forming means (111), the processed data is supplied to the first selection means (131) as the fringe formed character display data (D2), the fringe formed character display data (D2) is reversely processed by the first reversal means (121) based on the selective processing of the first selection means (131), the character display data (D1) based on the selective processing by the first selection means (131) is reversely processed by the first reversal means (121), and the processed data is output as the reversed character display data (D3).

Accordingly, a selective outputting of the character display data (D1), the fringe formed character display data (D2), the reversed character display data (D3), or the fringe formed reversed character

display data (D4) is carried out.

Therefore, instead of the dependence of the fringe forming processing and the reversal processing on a simple selective processing as in the prior art, it is possible to produce many kinds of character display patterns by combining these processings, and thus the realization of many kinds of character displays becomes possible.

Also, in an apparatus for carrying out the picture display control method according to the present invention, there are provided the second reversal means (122), the second selection means (132), and the second fringe forming means (112).

For example, the reversed character display data (D3) is output by the second reversal means (122) based on the character display data (D1), the reversed character display data (D3) and the character display data (D1) are selectively processed by the second selection means (132). In this case, the selectively output character display data (D1) or the reversed character display data (D3) is fringe-forming processed by the second fringe forming means (112), and the processed data is output as the fringe formed character display data (D2) or the fringe formed reversed character display data (D4).

Accordingly, the production of many kinds of character display patterns becomes possible, and the realization of many kinds of character displays becomes possible.

Further, in the picture display control method according to the present invention, after the producible processing of the fringe formed character display pattern (P21) of step (S2), the reversal processing for replacing the display color and the background color of the fringe formed character display pattern (P21) is carried out.

Thus, the producible processing of the fringe-formed reversed character display pattern (P41), in which the display color of the character display pattern (P11) is the similar color as the background color of the character display pattern and the external peripheral portion and the internal peripheral portion of the character display pattern (P11) are surrounded by the fringe formed display of a color other than that similar color, becomes possible.

Where the background color is, for example, a whitish color, and the display character pattern is white, the external peripheral portion and the internal peripheral portion of the character display pattern (P11) are surrounded by the fringe formed display of a color other than the whitish color, such as the fringe formed display of a black color, and thus it is possible to enhance the degree of resolution, the degree of acknowledgement, and the like of the display character pattern. A similar effect can be attained, after the production processing of one or more kinds of character display pattern, the reversal processing for replacing the display color

and background color of the character display pattern (P11) is first carried out, and thereafter, the fringe forming and the interpolatable processing for the reversely processed character display pattern (P11) are carried out.

Also, by the combined processings of the reversal processing and the fringe forming and the interpolatable processing, it is possible to carry out the producible processing of many kinds of character display patterns.

Further, in the character synthesis display apparatus according to the present invention, picture display control means (1) and picture synthesizing means are provided, and the picture display control means (1) has first and second picture display control devices.

For example, eight or more kinds of character display data (D1, D2, D3, ...) such as character display data (D1), fringe formed character display data (D2), reversed character display data (D3), and fringe formed reversed character display data (D4) are selectively supplied from the first and second picture display control devices as the picture display control means (1) to the picture synthesizing means (5). In the picture synthesizing means (5), the character display data (D1, D2, D3, ...) and the external picture input data (D(INPUT)) are synthetically processed, and the synthetic picture output data (D(OUTPUT)) is supplied to the next stage display device such as a CRT device.

Thus, the execution of the display processing of character, picture, and the like, by the fringe forming color based on the background color of the display plane of the display device and the like, becomes possible, and accordingly, a multiple display of characters is realized, and the demands of the user can be satisfied. Namely, an on-screen display controller and the like for a character display processing of a high quality can be obtained.

Further, according to the present invention, it is possible to provide a picture display control apparatus comprising means (265, 267, 270) for outputting region display data indicating region color, picture display means (2) for outputting one or more kinds of character display data based on an external control signal, means for converting the character display data into the data of the same color as the region color, and first fringe forming means (11) for outputting the fringe formed character display data based on the converted character display data.

[Brief Description of the Drawings]

Figure 1 shows a character display pattern obtained by a prior art picture display method;
Figure 2 shows an apparatus for carrying out a picture display control method according to an

embodiment of the present invention;

Figure 3 shows a character display pattern obtained by a picture display control method according to the present invention;

Figure 4 illustrates a fundamental process of the picture display control method according to the present invention;

Figure 5 shows an example of the flow chart of the picture display control method according to the present invention;

Figures 6, 7, 8, and 9 illustrate examples of the signal waveforms in the picture display control method according to the present invention;

Figure 10 illustrates an example of the display plane to be displayed in the picture display control method according to the present invention;

Figure 11 illustrates examples of the peripheral region formation, the fringe formation, and the reversed character display pattern in the picture display control method according to the present invention;

Figure 12 shows the basic constitution of the picture display control apparatus according to the present invention;

Figure 13 shows the basic constitution of the picture synthesis display apparatus according to the present invention;

Figure 14 shows a picture synthesis display apparatus according to an embodiment of the present invention; and,

Figure 15 shows the constitution of the picture display control apparatus according to an embodiment of the present invention.

[Best Mode of Carrying Out the Invention]

An apparatus for carrying out picture display control method according to an embodiment of the present invention is shown in Fig. 2.

In Fig. 2, a picture display control apparatus as an on-screen display controller or the like for display processing the characters and pictures in a display plane includes a display control circuit 1 and picture display circuit 2.

The picture display circuit 2, which is an example of the picture display means, includes a row address counter 201, column address counter 202, video RAM 203, character ROM 204, and parallel serial converting circuit 205. The picture display circuit 2 outputs one or more kinds of character display data D1 based on a shift clock CLK as an example of the external control signals, a horizontal synchronization signal HS, a vertical synchronization signal VS, and a display control signals C1, C2, C3, ... from a control device 5. The character display data D1 is stored in a character ROM 204. As an example, an alphabetical character display

pattern "A, B, C, ... G" having 10×24 as a row address multiplied by a column address is shown in Fig. 10.

The display control circuit 1 includes first fringe forming processing circuit 111, first selection circuit 131, first reversal processing circuit 121, data selective output circuit 19, and control device 15.

The first fringe forming processing circuit 111, which is an example of the first fringe forming means, outputs a fringe formed character display data D2, based on the display control signals C1, C2, C3, ... and the character display data D1 from the control device 15.

The first selection circuit 131, which is an example of the first selection means, selectively outputs the character display data D1 or the fringe formed character display data D2, based on the display control signals C1, C2, C3, ... from the control device 15.

The first reversal processing circuit 121, which is an example of the first reversal means, outputs the reversed character display data D3 or the fringe formed reversed character display data D4, based on the display control signal and the character display data D1 or the fringe formed character display data D2 from the control device 15.

The data selective output circuit 19 selectively outputs the character display data D1, the fringe forming character display data D2, the reversed character display data D3, or the fringe formed reversed character display data D4, based on the display control signals C1, C2, C3, ... from the control device 15.

The control device 15, which is an example of the control means, controls the input and output of the picture display circuit 2, the first fringe forming processing circuit 111, the first selection circuit 131, the first reversal processing circuit 121, and the data selective output circuit 19.

The operation of the apparatus for carrying out the picture display control method according to an embodiment of the present invention is explained with reference to Figs. 6, 7, 8, and 9. The relationship between the character display pattern, the display signals W1, B1, and the display control signal C1 is illustrated in Fig. 6.

In Fig. 6, P11 represents a character display pattern displayed based on the character dot pattern data stored in the character ROM 204 of the picture display circuit 2. For example, the character display pattern portion of the character display pattern P11 which displays alphabet "O" on the display device or the like is white, and the peripheral region thereof becomes indefinite. That is, the white signal W1 in the raster direction X1-Y1 of the display pattern P11 becomes a HIGH level, and the black signal B1 becomes a LOW level. When these signals are displayed on the display device or the

like, the level of the display control signal C1 is caused to be a LOW level.

Thus, it is possible to display the alphabet "O" superimposed on the picture displayed by the display device or the like: The indefinite portion surrounding the displayed alphabet is the background color in the picture.

The relationship between the character display pattern, the display signals W2, B2, and display control signal S2, as an explanation of the reversal processing, is illustrated in Fig. 7.

In Fig. 7, P32 represents a peripheral region formed reversed character display pattern in which a white pattern is provided in the peripheral region of the character display portion. The peripheral region formed reversed character display pattern is such that the data "1", i.e., white, of the character display pattern portion for which the character peripheral region is defined is replaced, i.e., reversely processed, by the data "0", i.e., black, of the character peripheral region portion thereof. During the period for which the white signal W2 in the raster direction X2-Y2 of the display pattern P32 is at a HIGH level, the black signal B2 becomes LOW level, and during the period for which the white signal W2 is a LOW level, the black signal B2 becomes HIGH level. Also, the rising point and the falling point of the white signal W2 at the time of display in the display device or the like are controlled by a HIGH or LOW level of the display control signal C2.

Thus, it is possible to display alphabet "O", which is a black expression in the white region, superimposed on the display in the display device or the like.

The relationship between the character display pattern, the display signals W3, B3, and the display control signal C3, for explaining the fringe forming processing, is illustrated in Fig. 8.

In Fig. 8, P21 which is a fringe formed character display pattern has a fringe forming pattern in the external peripheral and the internal peripheral portion of the character display pattern portion. The fringe formed character display pattern P21 is a pattern such that a black fringe forming pattern data "0", i.e., black, is added, i.e., fringe forming processed, to the data "1" of the character display pattern portion of the character display pattern P11 shown in Fig. 6. That is, the HIGH levels of the black signal B3 are added to both sides of the period during which the white signal W3 concerning the raster direction X3-Y3 of the display pattern P21 is at a HIGH level. Also, when the produced signal is displayed on a display device, the display control signal C3 is caused to be LOW level.

Thus, it is possible to display alphabet "O" for which a fringe is formed in black superimposed on the display on the display device. In this case, the

external peripheral region is the background color of the picture displayed on the display device or the like.

The relationship between the displayable character display pattern, the display signals W4, B4, and the display control signal S4 is illustrated in Fig. 9.

In Fig. 9, P41, which is a peripheral region formed, fringe formed, reversed character display pattern, has a fringe forming pattern in the external and internal peripheral portions of the character display pattern having a white pattern in the peripheral region. The fringe formed reversed character display pattern P41 is such that a black fringe formed pattern data "0", i.e., black color, is added to data "1", i.e., white, of the character display pattern of the fringe formed character display pattern P21 shown in Fig. 8 and the pattern data of the peripheral region is made white. That is, HIGH levels of the black signal B4 are added to both sides of the HIGH level period-of the white signal W4 in the raster direction X4-Y4 of the display pattern P41. The rising point and the falling point of the white signal W4 in the display on the display device or the like are controlled by the HIGH or LOW level of the display control signal C4.

Thus, it is possible to display alphabet "O" for which a black fringe is formed in the white region, superimposed on the display in the display device.

Thus, when one or more kinds of character display data D1 are supplied to the first fringe forming processing circuit 111 and the first selection circuit 131 by the picture display circuit 2 based on the external control signal CLK, the horizontal synchronization signal HS, the vertical synchronization signal VS, and the display control signals S1, S2, S3, ... from the control device 15, the character display data D1 is first fringe forming processed by the first fringe forming processing circuit 111, and the produced signal is supplied, as the fringe formed character display data D2, to the first selection circuit 131. In this case, the fringe formed character display data D2 is reversibly processed in the first reversible processing circuit 121 based on the selectable processing by the first selection circuit 131. The processed data is output as the fringe formed character display data D4. Also, the character display data D1 based on the selective processing by the first selection circuit 131 is reversibly processed by the first reversal processing circuit 121. The processed data is output as the reversed character display data D3.

Thus, the character display data D1, the fringe formed character display data D2, the reversed character display data D3, or the fringe formed reversed character display data D4 can be selectively output.

Accordingly, instead of relying on the fringe

forming processing and the reversal processing in the simple selective processing as in the prior art, it is possible to produce many kinds of character display pattern by combining these processing, and thus a multiple display of characters is possible.

A flow chart of the picture display control method according to an embodiment of the present invention is shown in Fig. 5.

For example, where the peripheral region formed, fringe formed, reversed character display pattern P42 shown in Fig. 11 is to be obtained, in the flow chart of Fig. 5, a producible processing of the character display patterns P11, P12 of alphabet "O" is carried out in step S11, and based on the address produced by the row address counter 201 and the column address counter 202, a character display data D1 concerning the character display patterns P11, P12 of alphabet "O" is output through the video RAM 203, the character ROM 204, and the parallel serial converting circuit 205 (Fig. 2).

The fringe forming processing mode or the reversal processing mode is selectively processed in step S12. When the fringe forming processing mode is selected (YES), the process proceeds to step S13, and when the reversal processing mode is selected (NO), the process proceeds to step S15.

When the fringe forming processing mode is selected, in step S13, the producible processing of the fringe formed character display pattern P21 is carried out based on the fringe forming and interpolatable processing of the character display pattern P11. In the first fringe forming processing circuit 111, the fringe formed character display data D2 is output based on the display control signal C3 and the character display data D1 from the control device 15. With regard to the relationship between the white signal W3 and the black signal B3 of the fringe formed character display pattern P21 and the display control signal C3, reference should be made to Fig. 8.

Thereafter, the selective decision of the pattern synthetic processing is carried out in the step S14. When the synthetic processing is selected (YES), the process proceeds to step S18, and when the synthetic processing is not selected, the process proceeds to step S19.

When the reversal processing mode is selected, the reversal processing for replacing the display color and the background color of the character display patterns P11, P12 is carried out to producibly process the reversed character display patterns P31, P32 in step S15. In the first reversal processing circuit 121, the reversed character display data D3 is output based on the display control signal C2 and the character display data D1 from

the control device 15. For example, with regard to the white signal W2 and the black signal B2 of the reversed character display pattern P31 and the display control signal C2, reference should be made to Fig. 7.

In step S16, it is determined whether or not the process is to proceed to the fringe forming processing mode. When the process is to proceed to the fringe forming processing mode (YES), the process proceeds to step S13, and when the process is not to proceed to the fringe forming processing mode (NO), the process proceeds to step S17.

When the process proceeds to the fringe forming processing mode (YES), the producible processing of the reversed character display pattern P41 is carried out based on the fringe forming and interpolatable processing of the reversed character display pattern P32 in step S13.

The selectable decision of the pattern synthetic processing is carried out in step S14. When the synthetic processing is selected (YES), the process proceeds to step S18, and when the synthetic processing is not selected (NO), the process proceeds to step S19. When the process does not proceed to the fringe forming processing mode (NO) in step S16, the selective decision of the pattern synthetic processing is carried out in step S17. When the synthetic processing is selected (YES), the process proceeds to step S18, and when the synthetic processing is not selected, the process proceeds to step S19.

When the process does not proceed to the fringe forming processing mode (NO) in step S16, the selective decision of the pattern synthetic processing is carried out in step S17. When the synthetic processing is selected (YES), the process proceeds to step S18, and when the synthetic processing is not selected, the process proceeds to step S19.

Thus, the producible processing of the peripheral region formed, fringe formed, reversed character display pattern P41 is carried out based on the fringe formed character display pattern P21 and the reversed character display pattern P31 in step S18. In the first reversal processing circuit 121, the fringe formed reversed character display data D4 is output based on the display control signal C4 and the fringe formed character display data D2 from the control device 15. With regard to the relationship between the white signal W4 and the black signal B4 of the peripheral region formed, fringe formed, reversed character display pattern P42 and the display control signal C4, reference should be made to Fig. 9.

In step S19, the selective output processing of the patterns P11, P12, P21, P31, P32, P41, and P42 is carried out. In the data selective output

circuit 19, the character display data D1, the fringe formed character display data D2, the reversed character display data D3, or the fringe formed reversed character display data D4 is selectively output based on the display control signals C1, C2, C3, ... from the control device 15.

Thus, seven kinds of character display pattern including the peripheral region formed, fringe formed, reversed character display pattern P42 can be obtained. As shown in Fig. 11, in the peripheral region formed, fringe formed, reversed character display pattern P42, the display color, i.e., white, of the character display pattern P11 and the background color, i.e., white, of the peripheral region thereof are the same, and the external and internal peripheral portions of the character display pattern P11 are surrounded by the color other than white, such as for example, the display color, i.e., the black fringe formed display pattern. In this case, the background color is different from the cursor display in the computer picture processing or the background color displayed on the TV plane.

Thus, after the producible processing of the fringe formed character display pattern P21 of step S13, the reversal processing for replacing the display color and the background color of the character display pattern P12 is carried out in step S15.

Thus, as shown in Fig. 11, the producible processing of the peripheral region formed, fringe formed, reversed character display pattern P42, in which the display color and the background color of the character display pattern P1 are the same and the external and internal peripheral portions of the character display pattern P1 are surrounded by the fringe formed display pattern having a different color to the external and the internal peripheral portions of the character display pattern P1 can be carried out.

By using the peripheral region formed, fringe formed, reversed character display pattern P42, the cursor display in the computer picture processing or the character display in the TV plane can be clearly and definitely acknowledged without being affected by the background color or the like.

For example, where the background color is whitish and the display character pattern P11 is white, the external and internal peripheral portions of the display character pattern P11 is surrounded by a display color other than white, for example, the fringe formed display pattern is black. Thus, the resolution and the degree of recognition of the display character pattern can be enhanced.

An apparatus for a picture display control according to another embodiment of the present invention is shown in Fig. 15. In Fig. 15, the location of the fringe forming processing circuit is modified for first carrying out the reversal processing of the display character pattern P11.

In Fig. 15, 122 represents the second reversal processing circuit as the second reversal means that outputs the reversed character display data D3 based on the character display data D1. Also, 132 represents the second selection circuit as the second selection means that outputs the character display data D1 or the reversed character display data D3. Also, 112 represents the second fringe forming circuit as the second fringe forming means that outputs the fringe formed character display data D2 or the fringe formed reversed character display data D4 based on the character display data D1 or the reversed character display data D3.

In this apparatus for picture display control, the second reversal processing circuit 122, the second selection circuit 132, and the second fringe forming processing circuit 22B are provided in the display control circuit 1.

For example, when the reversed character display data D3 is output from the second reversal processing circuit 122 based on the character display data D1, the reversed character display data D3 and the character display data D1 are selectively processed in the second selection circuit 132. The selectively output character display data D1 or the reversed character display data D3 is fringe forming processed in the second fringe forming processing circuit 112, and the processed data is output as the fringe formed character display data D2 or the fringe formed reversed character display data D4.

Thus, after the producible processing of one or more kinds of character display pattern P11, first the reversal processing for replacing the display color and the background color of the character display pattern P11 is carried out, and thereafter, the fringe forming and interpolatable processing of the reversibly processed character display pattern can be carried out.

The basic constitution of an apparatus for a picture synthetic display method according to the present invention is shown in Fig. 13. The apparatus of Fig. 13 has a picture display control means 1 for outputting character display data, input picture producing means 4 for outputting input picture data such as background color, video data, or the like, and picture synthesizing means 5 for outputting synthetic picture data.

An apparatus for a picture synthetic display method according to an embodiment of the present invention is shown in Fig. 14.

In Fig. 14, the picture synthesizing processing apparatus such as the on-screen display controller or the like for the display processing of character or pictures on the display plane has a picture display control block 26, video synthesizing circuit 27, signal input block 28, vertical position control block 29, horizontal position control block 30, dis-

play size control block 31, and synchronization control block 32.

In the picture display control block, which is the picture display means, a picture display control device is incorporated. The picture display control block 26 outputs the picture display data D1, D2, D3, ... to the video synthesizing circuit 27 based on the external control signals CLK, CS, S1, the horizontal synchronization signal HS, and the vertical synchronization signal VS.

The picture display control block 26 has the display memory address counter 261 as an example of the column address counter 201, the read address counter 262 as an example of the row address counter 201, the switching circuit 263 for the switching operation, the display memory RAM 264 as an example of the video RAM 203, the timing generator 265 for controlling the timing of the outputs, the character generator ROM 266 as an example of the character ROM 267 as an example of the parallel serial converting circuit 205, the screen control register 268 for the character display control based on the external controls signals CLK, CS, C1, the blinking control circuit 269 for the blinking display control, and the display control circuit 270. The character generator ROM 266, the 8 bit shift register 267, and the display control circuit 270 produce region display data indicating the region color.

The video synthesizing circuit 27, which is an example of the picture synthesizing means 5, outputs a synthesized picture output data D(OUTPUT) based on the character display data D1, D2, D3, ... and the external picture input data D(INPUT).

The signal input block 28, which has the serial parallel converting circuit 281, the 8 bit latch circuit 282, the switching circuit 283, and the command decoder 284, carries out the serial parallel converting processing of the command data or the display data transferred in the 8 bit serial manner and supplies the blocks with the processed data.

The vertical position control block 29, which has the vertical position register 291 and the vertical position control circuit 291, controls the display start position in the vertical direction of the display plane based on the vertical synchronization signal VS.

The horizontal position control block 30, which has the horizontal position register 301 and the horizontal position control circuit 302, controls the display start position in the horizontal direction in the display plane based on the external control signal CLK produced based on the horizontal synchronization signal HS.

The display size control block 31, which has the vertical, horizontal character size register 311 and the vertical, horizontal character size control circuit 312, controls the size in the horizontal direc-

tion (lateral direction) and the vertical direction (longitudinal direction) of the display character based on the display control data.

The synchronization control block 32, which has the synchronization separation control circuit 321, the dot clock producing circuit 322, the synchronization detecting circuit 323, the synchronization signal generator 324, the simple video signal generator (NTSC) 325 and the color burst clock generator 326, separates and detects the horizontal synchronization signal HS and the vertical synchronization signal VS from the complex NTSC system synchronization signal, and produces the external control signal CLK as the reference signal for the character display. For example, the external control signal CLK is used for the control of the stopping or restarting of an oscillation of the color sub-carrier during a synchronization of the color phase of the video signal.

Using the simple video signal generator 325, from the clock signal of 7.15909 MHz generated in the color burst clock generator, the NTSC system synchronization signal, i.e., the horizontal synchronization signal HS and the vertical synchronization signal VS, and the internally produced video signal are produced.

In the apparatus of Fig. 14, the picture display control block 26, the video synchronization circuit 27, the signal input block 28, the vertical position control block 29, the horizontal position control block 30, the display size control block 31, and the synchronization control block 32 are provided, and the picture display control device is incorporated in the picture display control block 26.

For example, seven or more kinds of character display data D1, D2, D3, ..., such as the character display data D1, the fringe formed character display data D2, the reversed character display data D3, the fringe formed reversed character display data D4, and the like, are selectively output to the video synthesizing circuit 27 by the picture display control block 26 as the picture display control means 1, based on the external control signal CLK, the horizontal synchronization signal HS, and the vertical synchronization signal VS. In the video synthesizing circuit 27, the picture processed data D1, D2, D3, ... or the unprocessed character display data and the external picture input data D-(INPUT) are synthetically processed, and the synthesized picture output data D(OUTPUT) is output to the next stage display device such as a CRT device.

Thus, the display processing of the characters or the pictures by the fringe formed color based on the background color of the display plane of the display device or the like can be executed, and accordingly, the many kinds of character displays are realized, and it is possible to satisfy the de-

mands of the users. Also, an on-screen display controller for a high quality character display control can be obtained.

In the picture display control method and apparatus according to the present invention, the picture display means, the first or second fringe forming means, the first or second selection means, the first or second reversal means, and the control means are used, and the selectable outputting of the character display data, the fringe formed character display data, the reversed character display data, or the fringe formed reversed character display data can be carried out. Thus, instead of relying on the reversal processing in the simple selective processing as in the prior art, it is possible to produce many kinds of character display pattern by combining these processings. Accordingly, a multiple display of characters can be realized.

Also, in the picture display control method and apparatus according to the present invention, after the producible processing of the fringe formed character display pattern, the reversal processing for replacing between the display color and the background color of the character display pattern or the fringe formed character display pattern is carried out, or after the reversal processing of the character display pattern, the fringe forming and interpolatable processing of the reversibly processed character display pattern is carried out. Thus, by the combined processing of the reversal processing and the fringe forming and interpolatable processing, the producible processing of the peripheral region formed, reversed, fringe formed character display pattern can be carried out. Accordingly, it is possible to clearly and definitely recognize the cursor display in the computer picture processing or the characters displayed on the TV picture plane, without being affected by the background color or the like.

In the picture display control method and apparatus and the picture synthesis display, the picture display means, the picture synthesizing means, and the display control means are used. Accordingly, the display processing of characters and pictures by the fringe forming color based on the background color of the display plane of the display device or the like can be executed. Accordingly, a multiple display of characters is realized and the demands of the user can be satisfied. Also, a picture synthesis processing apparatus such as an on-screen display controller or the like for a high quality character display processing can be realized.

[Correspondence between Reference Numerals and Items]

1 picture display control circuit
 111 first fringe forming processing circuit
 112 second fringe forming processing circuit
 121 first reversal processing circuit
 122 second reversal processing circuit
 131 first selection circuit
 132 second selection circuit
 15 control circuit
 19 data selective output circuit
 26 picture display control block
 27 video synthesis circuit
 28 signal input block
 29 vertical position control block
 30 horizontal position control block
 31 display size control block
 32 synchronization control block
 4 input picture producing means
 5 picture synthesizing means
 P11 character display pattern
 P12 peripheral region formed character display pattern
 P21 fringe formed character display pattern
 P31 reversed character display pattern
 P32 peripheral region formed reversed character display pattern
 P41 reversed fringe formed character display pattern
 P42 peripheral region formed, fringe formed, reversed character display pattern

Claims

1. A picture display control method characterized in that:
 - one or more kinds of character display pattern are producibly processed,
 - a fringe formed character display pattern is producibly processed based on an interpolative processing,
 - a reversible processing for replacing a display color and a background color of character display pattern or fringe formed character display pattern is carried out, and
 - the character display pattern, the fringe formed character display pattern, the reversed character display pattern, or the fringe formed reversed character display pattern is selectively output processed based on the reversible processing.
2. A method according to claim 1, wherein, after a producible processing of one or more kinds of character display pattern, a reversible processing for replacing the display color and the background color of the character display pattern is carried out, and a fringe forming and interpolative processing for the reversibly processed character display pattern is carried out.

3. A method according to claim 2, wherein a combined processing of the reversible processing and the fringe forming and interpolative processing is carried out.
4. A method according to claim 1, wherein the display color of the fringe formed reversed character display pattern is a color similar to the background color thereof, and the external and internal peripheral portion of the character display pattern are surrounded by a fringe formed display pattern having a display color other than said similar color.
5. A method according to claim 1, wherein a process of peripheral region formation for forming a display of a peripheral region of a character is further provided.
6. A method according to claim 1, wherein a data of fringe formed reversed character display pattern for which a peripheral region is formed is output.
7. A picture display control apparatus characterized in that said apparatus comprises:
 - picture display means (2) for outputting one or more kinds of character display data based on an external control signal,
 - first fringe forming means (11) for outputting fringe formed character display data based on the character display data,
 - first selection means (131) for selectively outputting the character display data or the fringe formed character display data,
 - first reversal means (121) for outputting a reversed character display data or a fringe formed reversed character display data based on the character display data or the fringe formed character display data, and
 - control means (15) for controlling input and output of the picture display means (2), the first fringe forming means (11), the first selection means (131), and the first reversal means (121).
8. An apparatus according to claim 7, wherein said apparatus further comprises second reversal means (122) for outputting a reversed character display data based on the character display data, second selection means (132) for selectively outputting the character display data or the reversed character display data, and second fringe forming means (112) for a fringe formed character display data or a fringe formed reversed character display data based on the character display data or the reversed character display data.

9. An apparatus according to claim 7, wherein said apparatus further comprises a peripheral region forming means for forming a display of a peripheral region of a character.

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10. A picture display control apparatus characterized in that said apparatus comprises means (266, 267, 270) for outputting a region display data for indicating region color, picture display means (2) for outputting one or more kinds of character display data based on an external control signal, means for converting the character display data into a data indicating the same color as said region color, and first fringe forming means (11) for outputting a fringe formed character display data based on said converted character display data.

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11. A picture synthetic display method characterized in that one or more kinds of character display pattern is producibly processed, a fringe formed character display pattern is producibly processed based on the fringe forming and interpolatable processing of the character display pattern, a reversal processing for replacing the display color and the background color of the character display pattern or the fringe formed character display pattern is carried out, and the character display pattern, the fringe formed character display pattern, the reversed character display pattern, or the fringe formed reversed character display pattern is selectively output processed based on the reversal processing, and a synthetic picture output data (DOM) is caused to be output based on the character display data (Di) and the external picture input data (DIN).

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12. A picture synthetic display apparatus characterized in that said apparatus comprises:

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picture display control means having picture display means (2) for outputting one or more kinds of character display data based on an external control signal, first fringe forming means (111) for outputting a fringe formed character display data based on the character display data, first selection means (131) for selectively outputting the character display data or a fringe formed character display data, first reversal means (121) for outputting a reversed character display data or a fringe formed reversed character display data based on the character display data or the fringe formed character display data, and control means (15) for controlling input and output of the picture display means (2), the first fringe forming means (111), the first selection means (131), and the first reversal means (121); and

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picture synthesizing means (5) for outputting a synthetic picture output data based on the character display data and the external picture input data.

Fig. 1

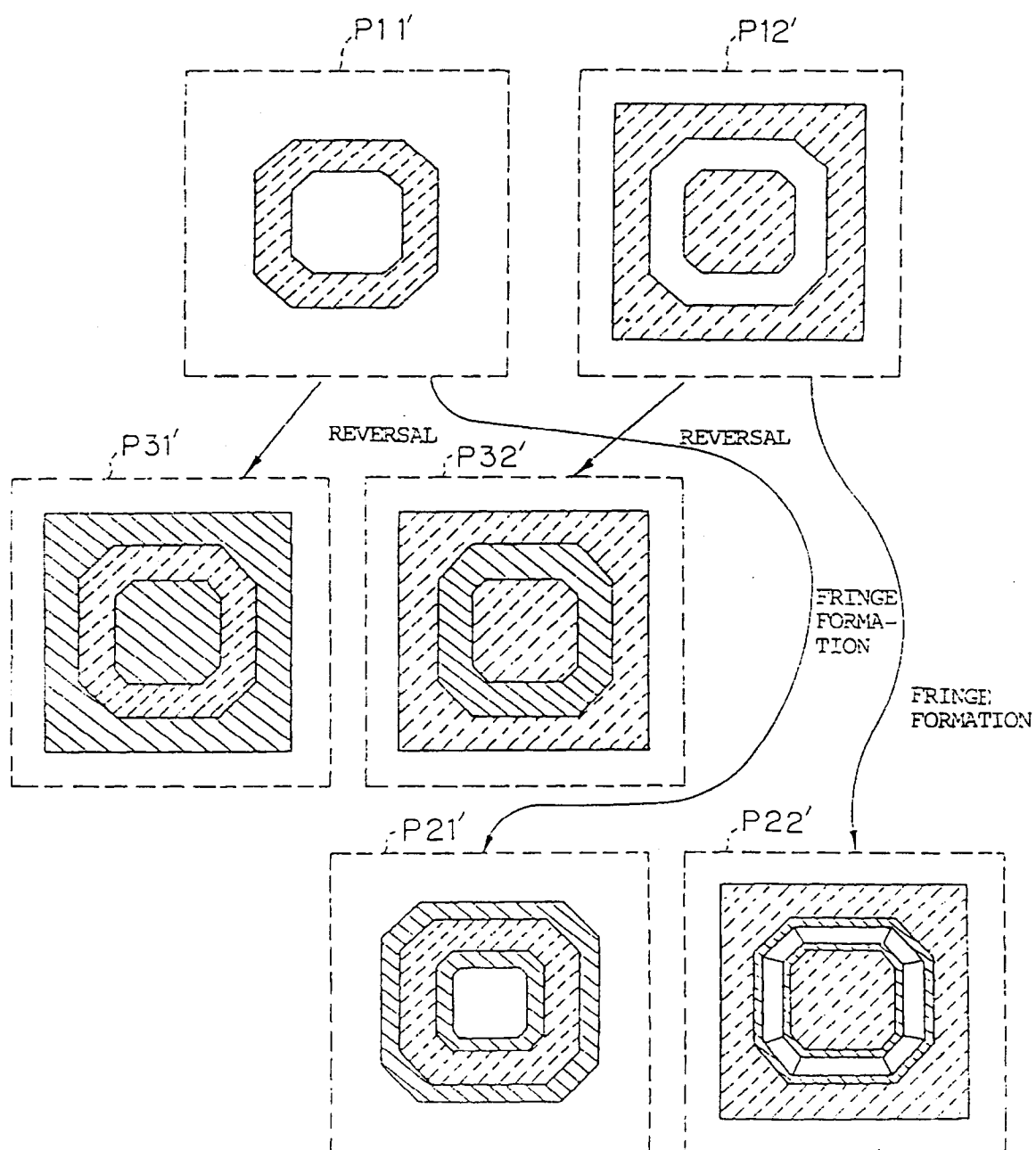


Fig. 2

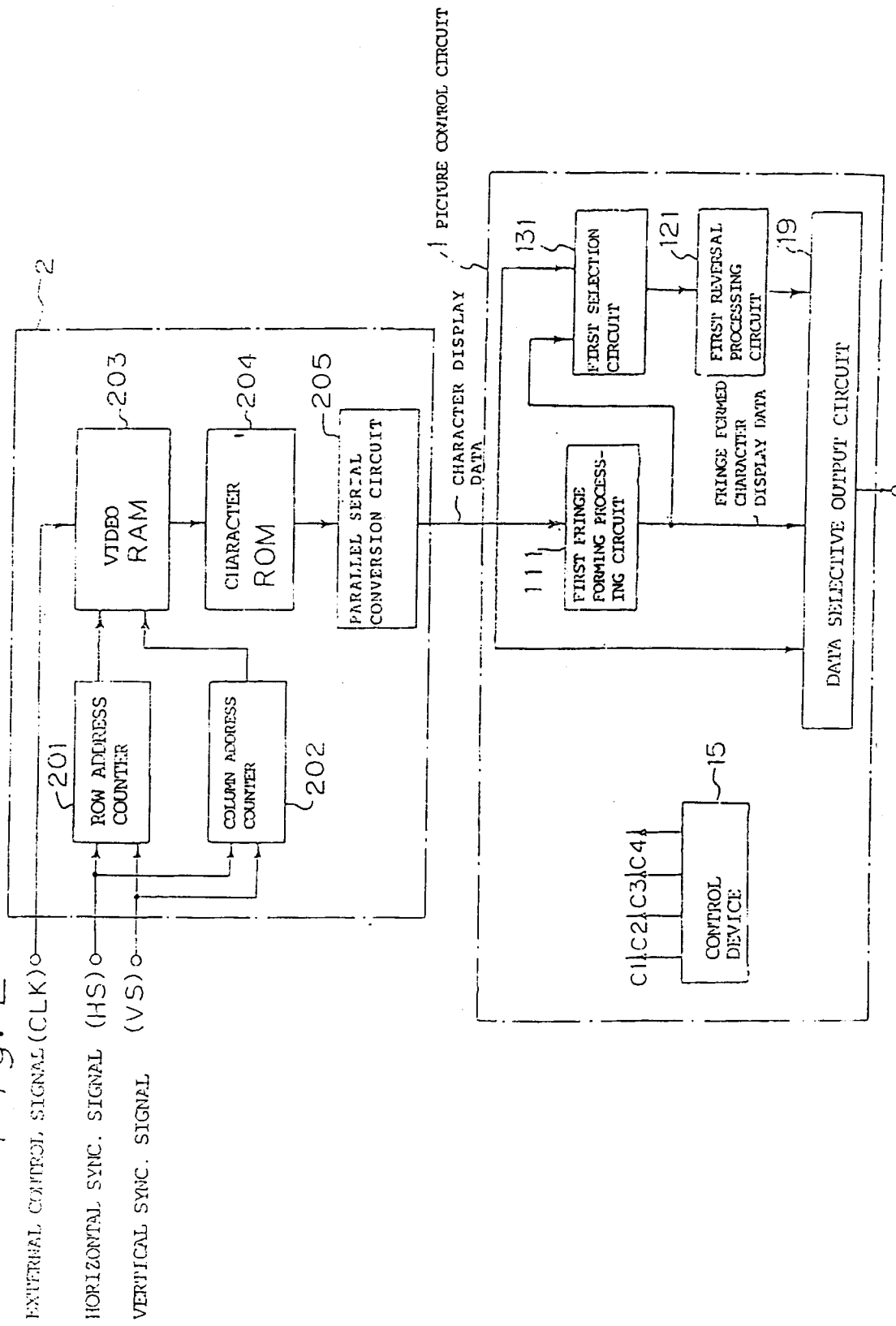


Fig. 3

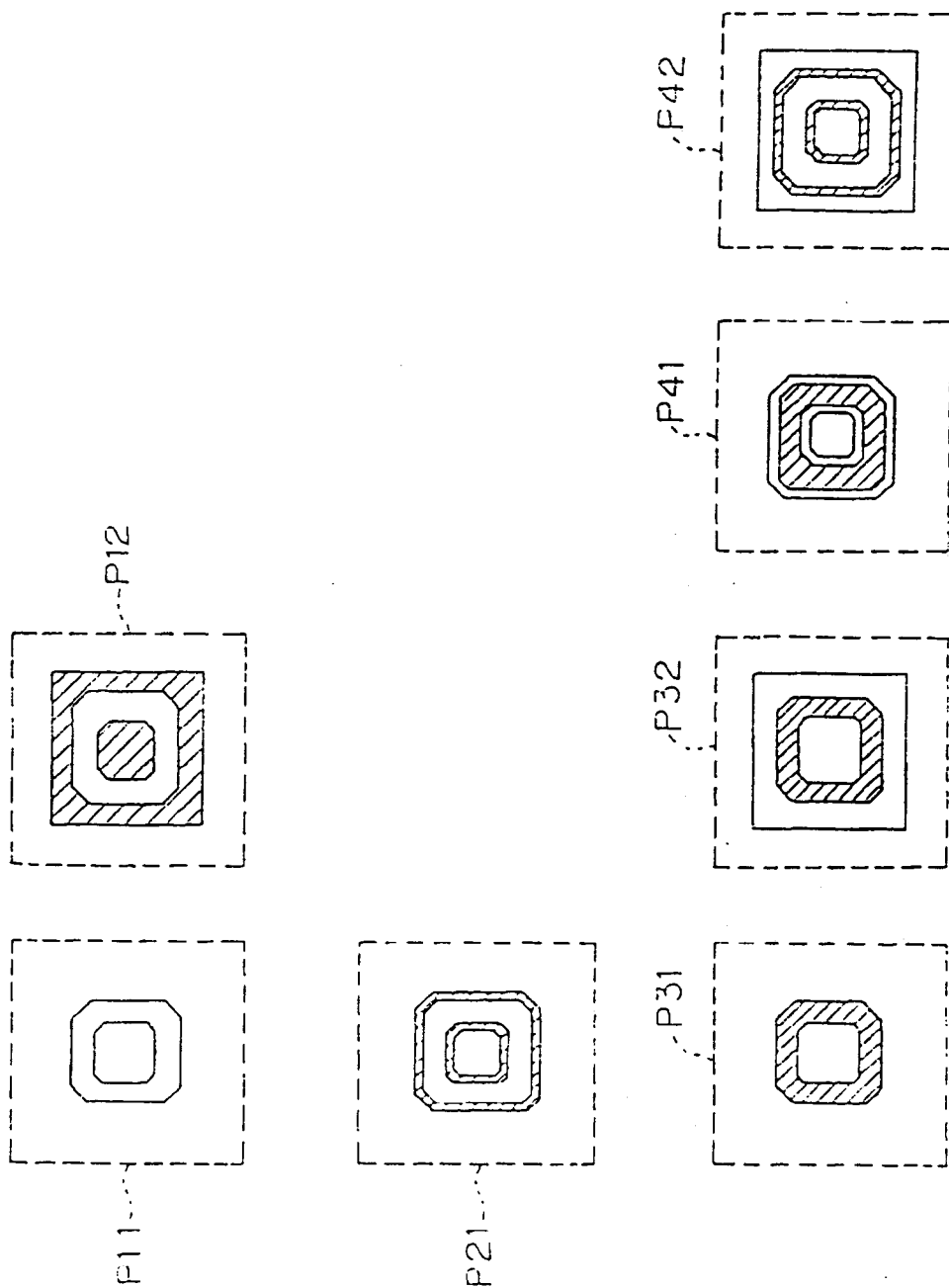


Fig. 4

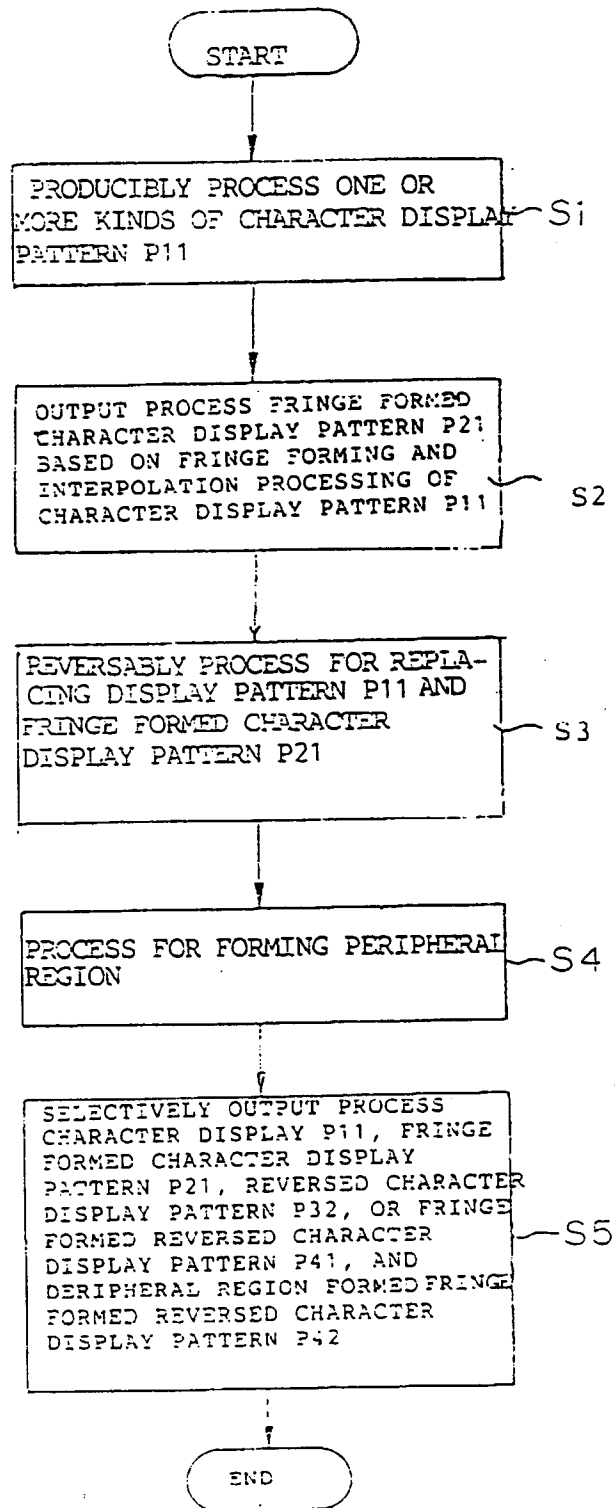


Fig. 5

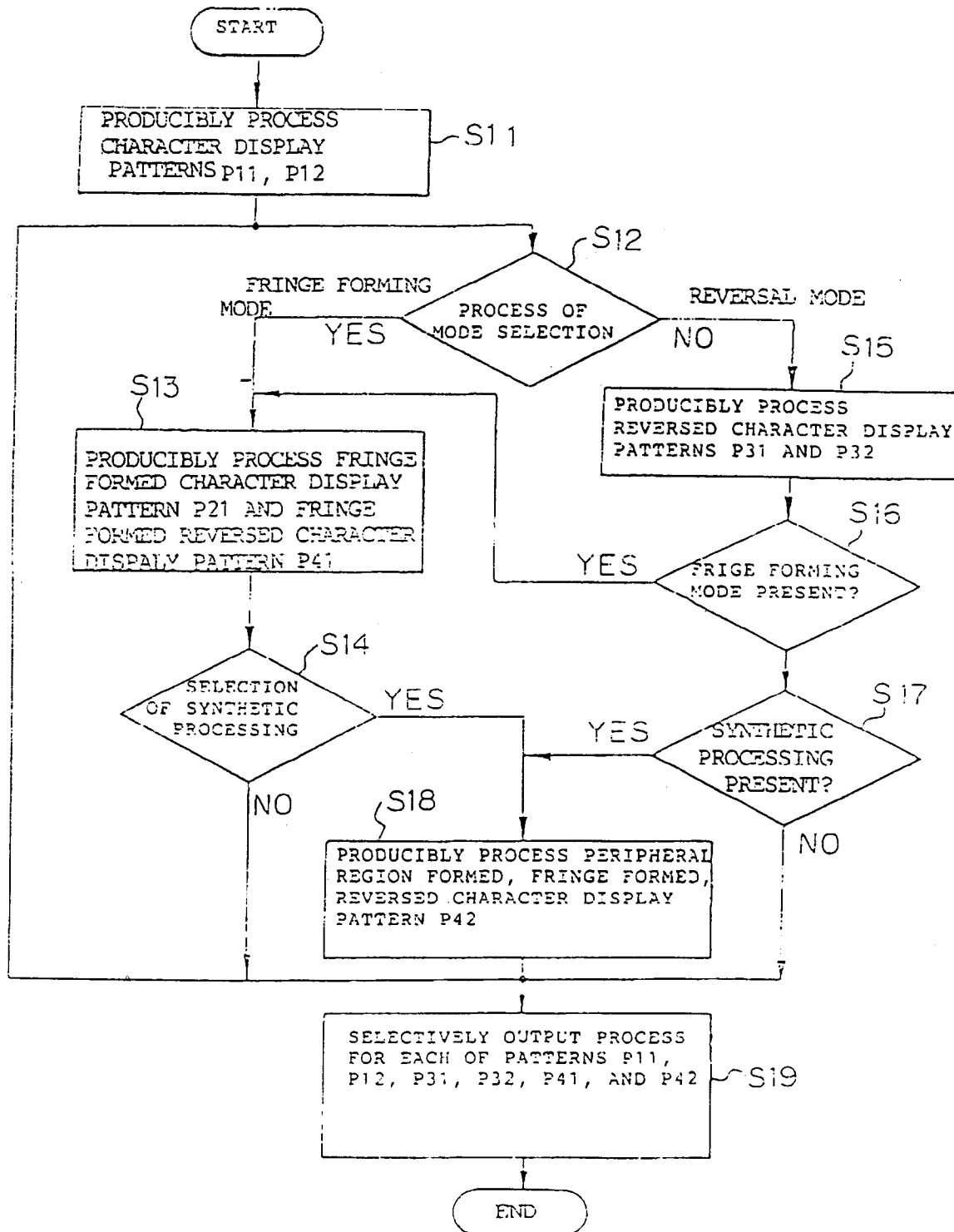


Fig. 6

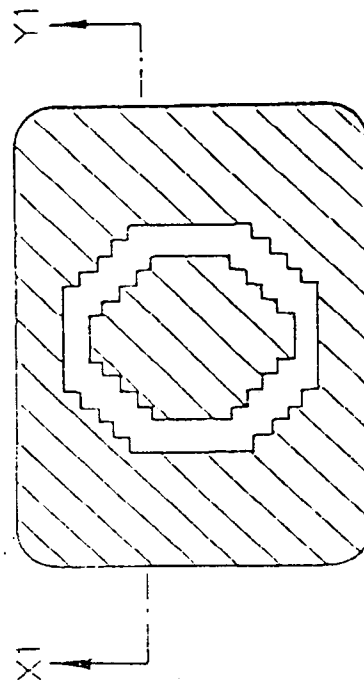
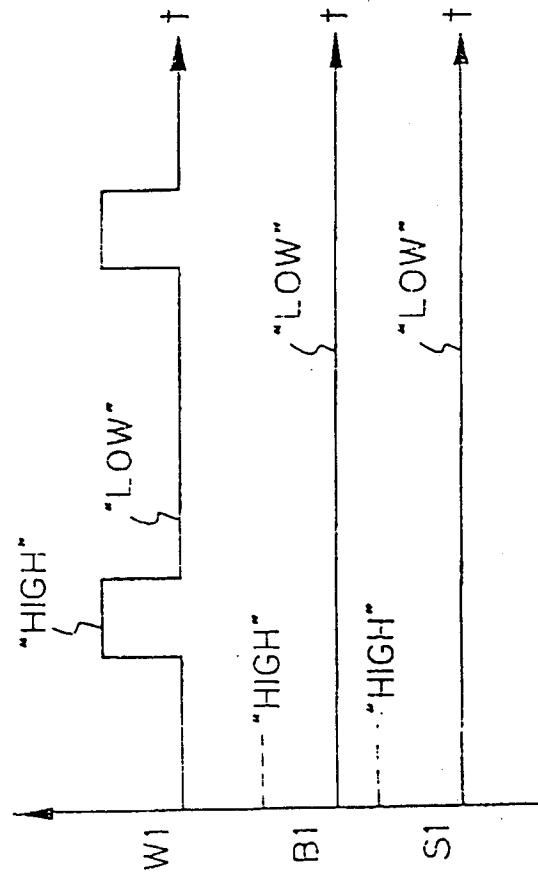


Fig. 7

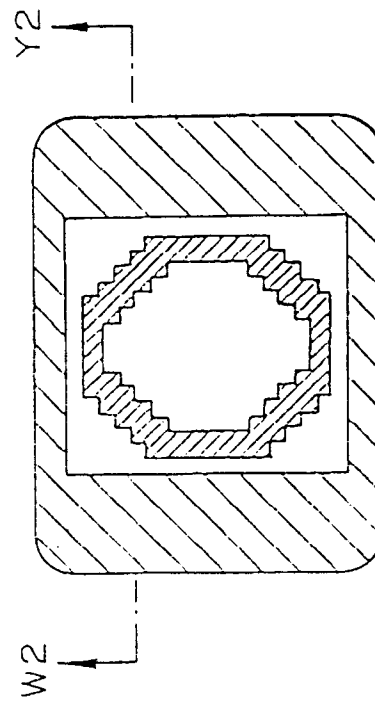
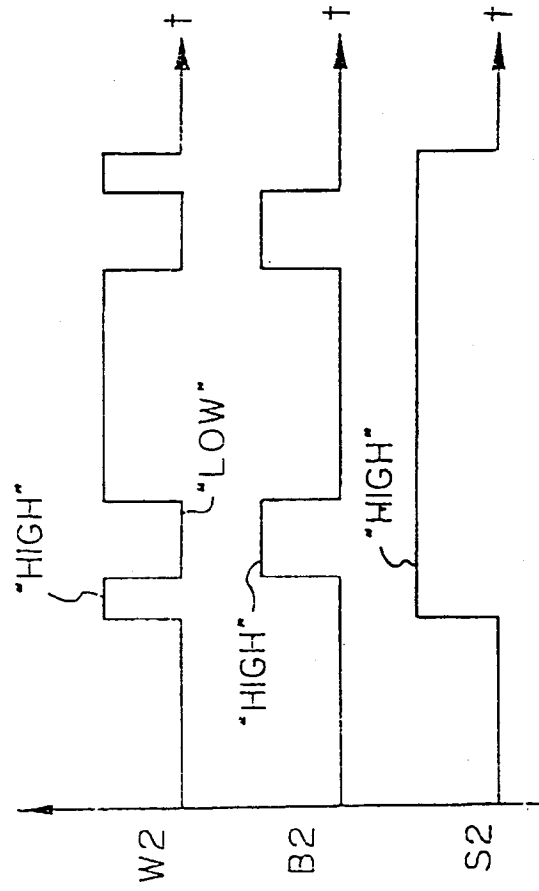


Fig. 8

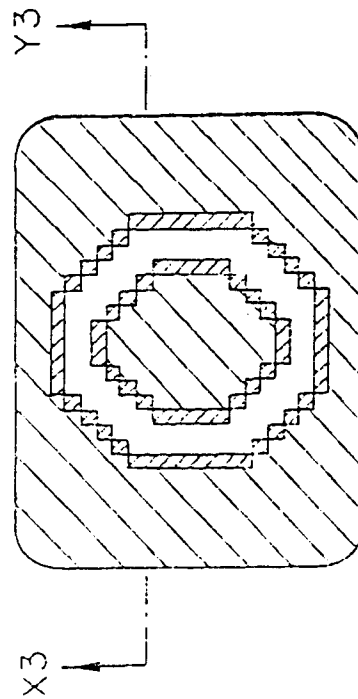
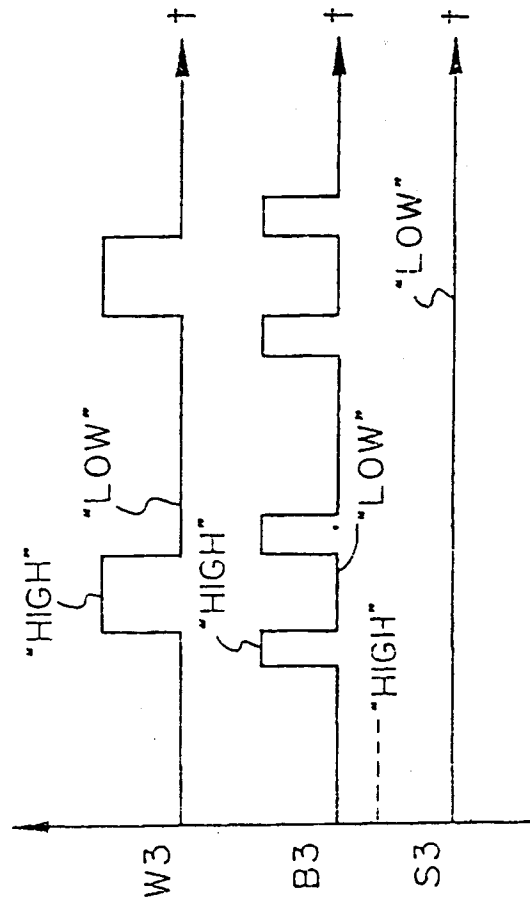


Fig. 9

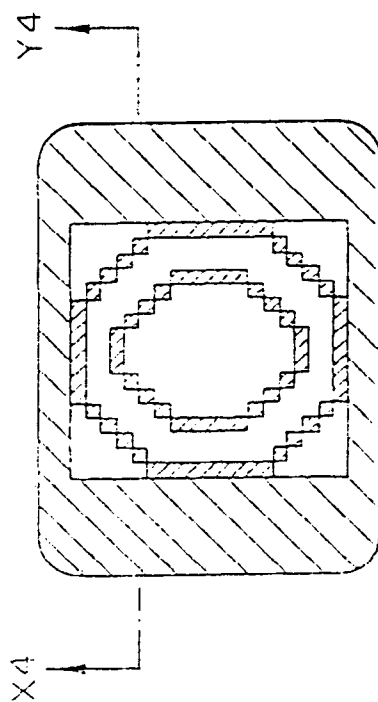
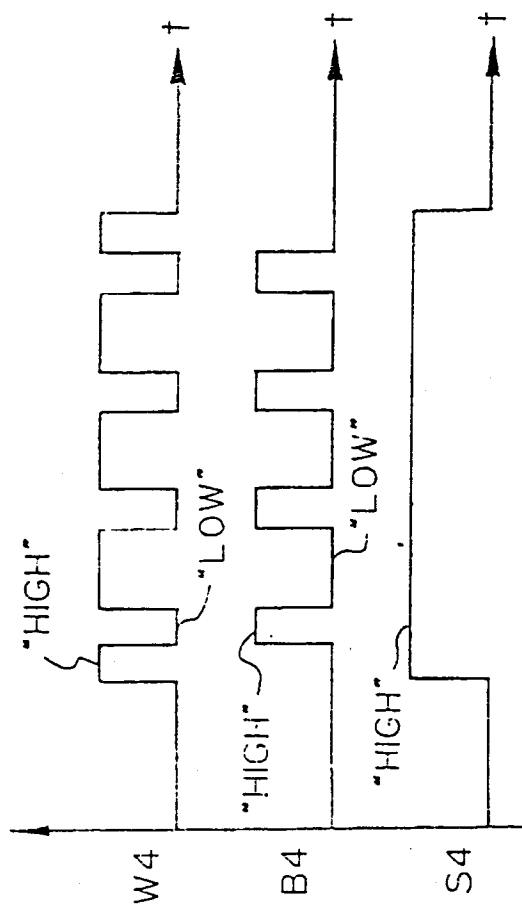


Fig. 10

→ ROW																								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
↓	COLUMNS																							
1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
2	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
3	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
4	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
5	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
6	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
7	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
8	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
9	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
10	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G

Fig. 11

CHARACTER DISPLAY

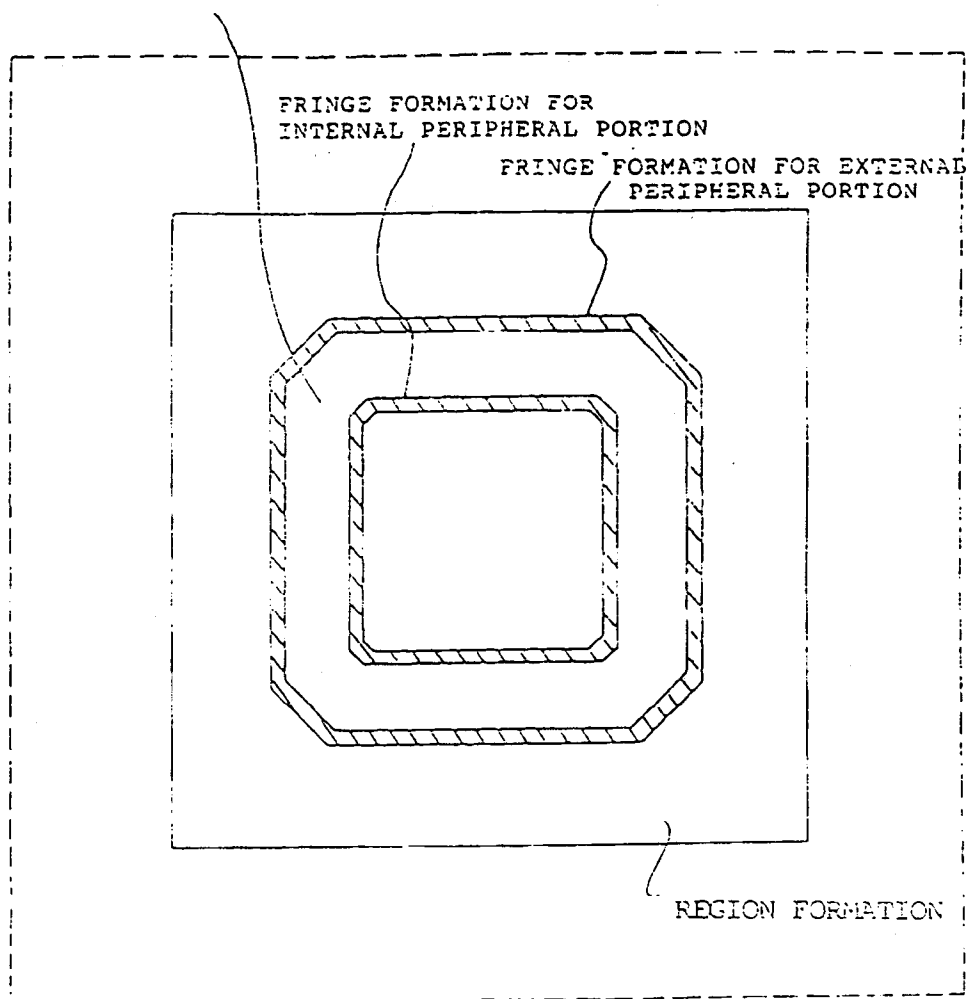


Fig. 12

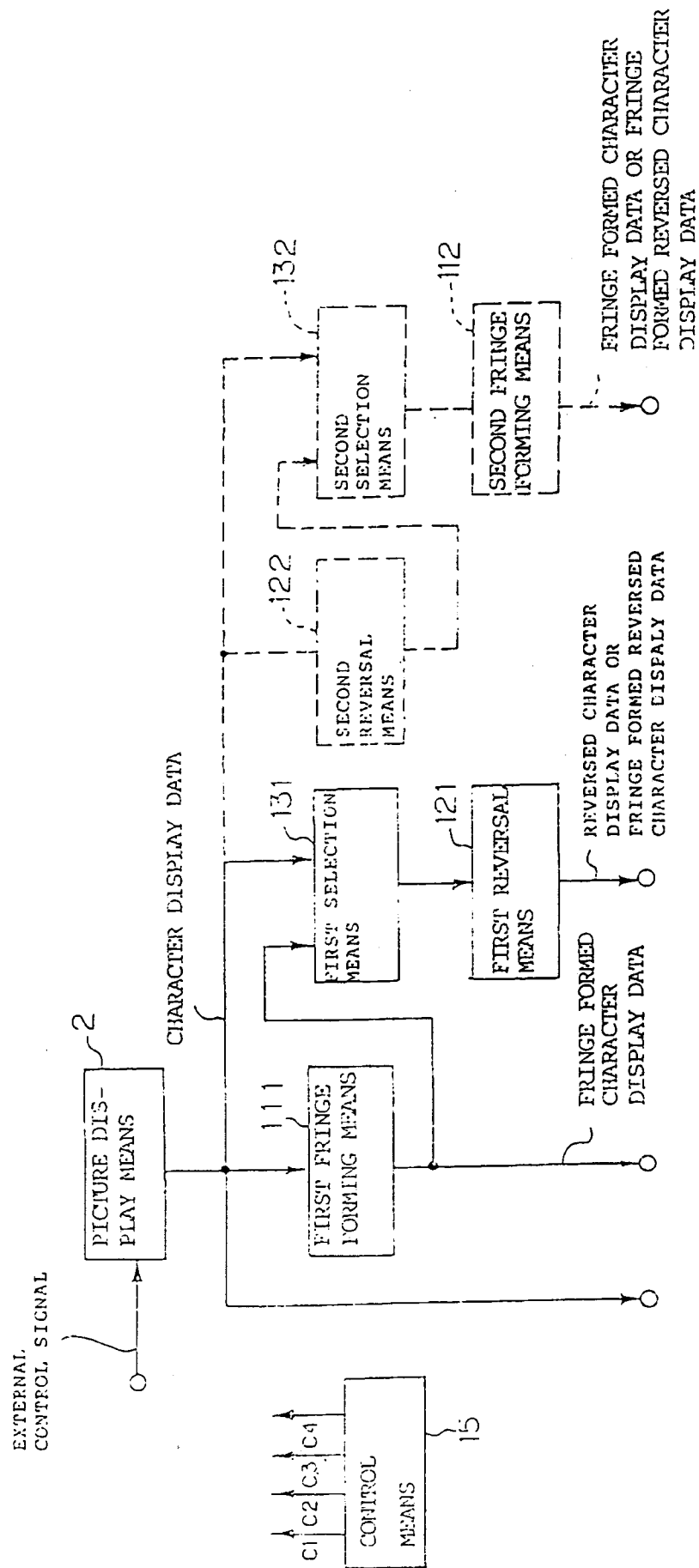


Fig. 13

EXTERNAL CONTROL SIGNAL

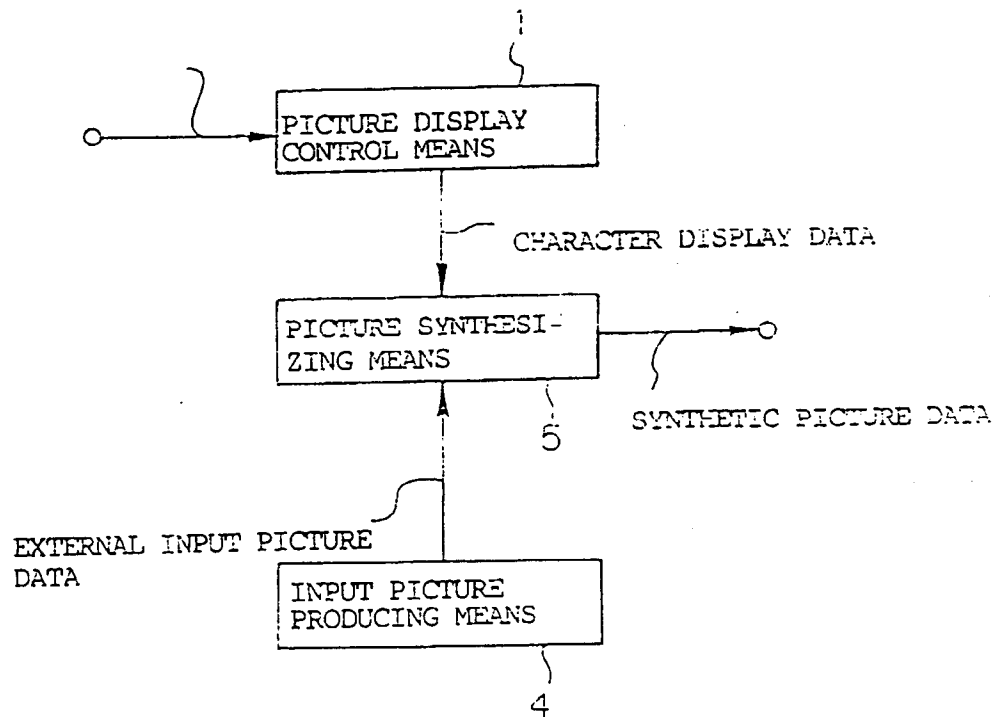


Fig. 14A

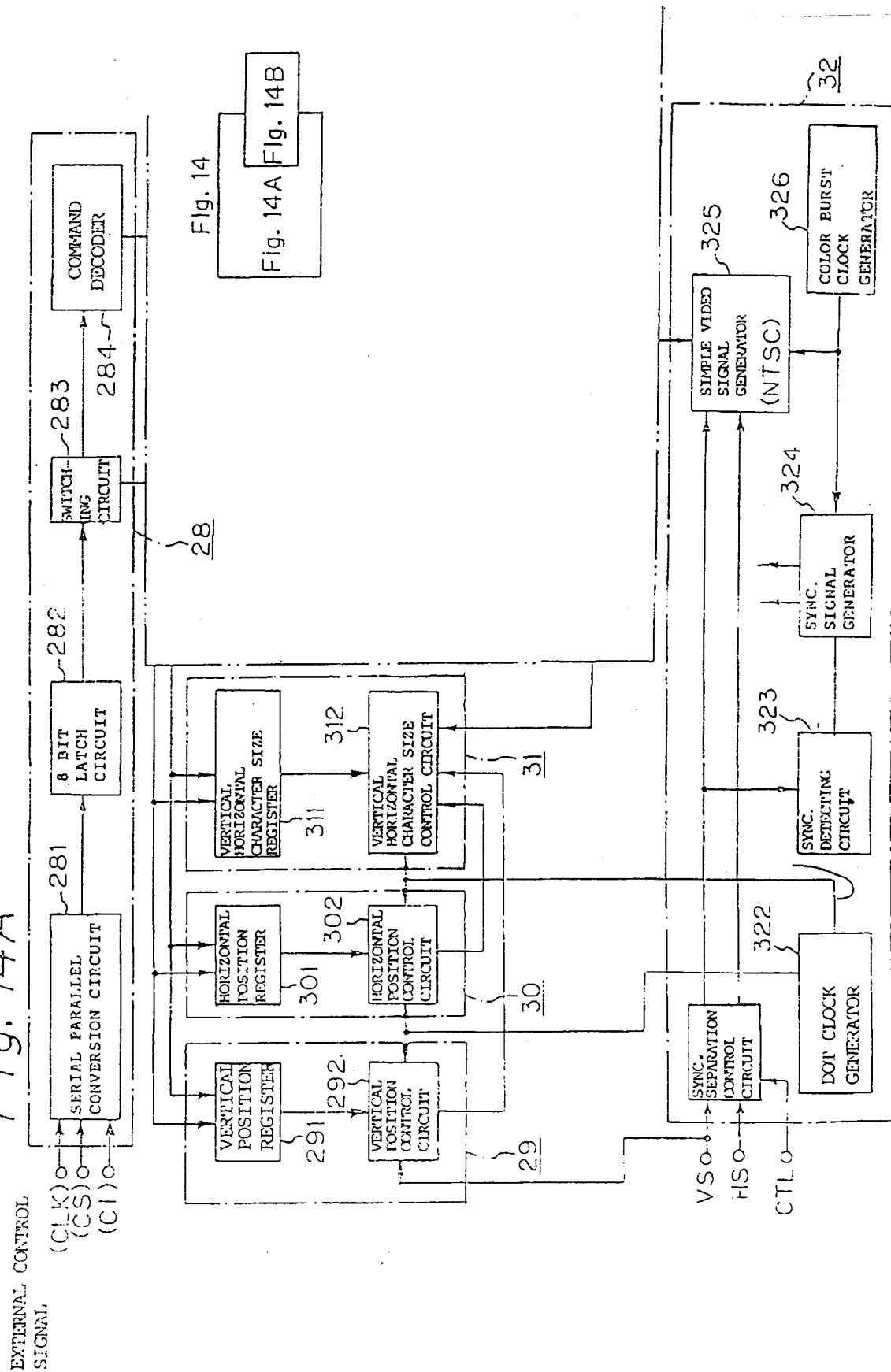
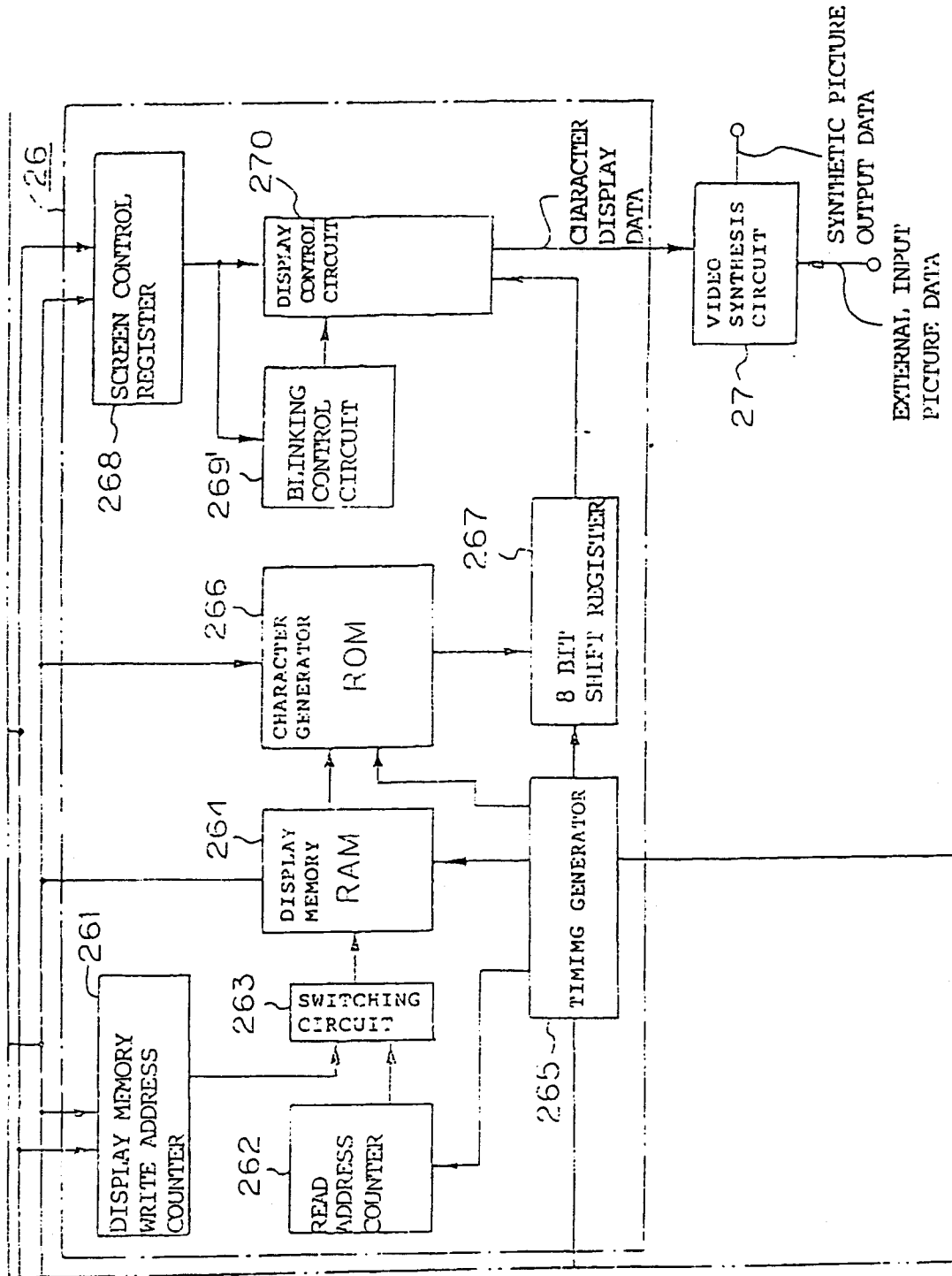
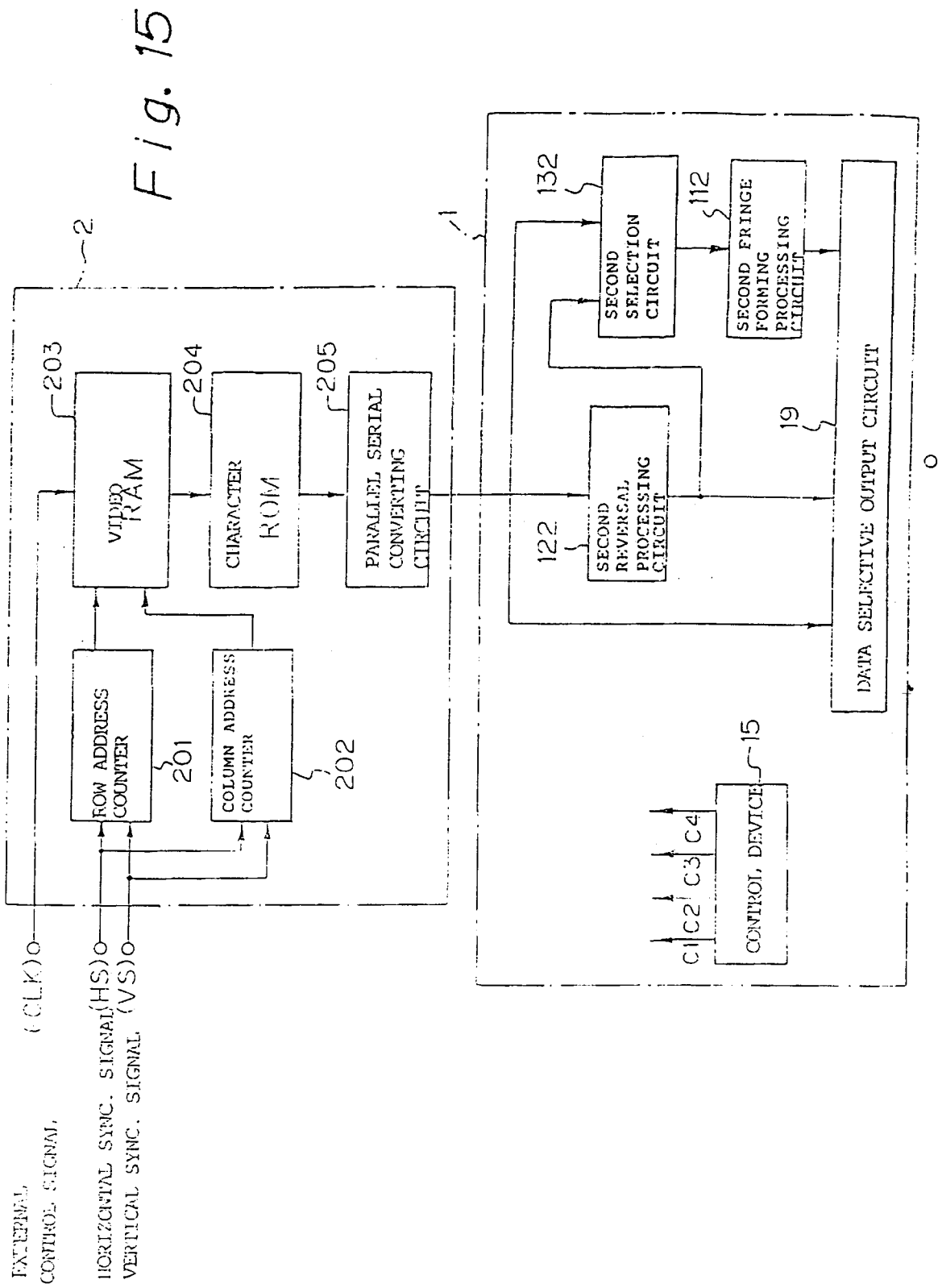


Fig. 14B





INTERNATIONAL SEARCH REPORT

International Application No PCT/JP91/01301

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		
Int. Cl ⁵ G09G5/28		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	G09G5/22-5/32, H04N5/278	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
Jitsuyo Shinan Koho 1926 - 1991 Kokai Jitsuyo Shinan Koho 1971 - 1991		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	JP, U, 53-94033 (Nippon Hoso Kyokai), August 1, 1978 (01. 08. 78), (Family: none)	1-6, 7-9, 10, 11, 12
Y	JP, A, 57-186871 (Ampex Corp.), November 17, 1982 (17. 11. 82), & US, A, 4,392,156 & GB, A, 2,099,258 & DE, A, 3,216,652	1-6, 7-9, 10, 11, 12
Y	JP, A, 60-123888 (Fujitsu Ltd.), July 2, 1985 (02. 07. 85), (Family: none)	1-6, 7-9, 10, 11, 12
¹⁰ Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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	
November 28, 1991 (28. 11. 91)	December 17, 1991 (17. 12. 91)	
International Searching Authority	Signature of Authorized Officer	
Japanese Patent Office		