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(54) TELETEXT GRAPHIC CODES

(71) We, INDEPENDENT TELEVISION COMPANIES ASSOCIATION, a Trade Association registered in the United Kingdom, of Knighton House, 52/66 Mortimer Street, London W1N 8AN, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–

The invention relates to a television system hereinafter referred to as a teletext system, for the transmission of information, in the form of digitally coded signals, simultaneously with a television programme transmission and to a television receiver for use in such a system.

Two systems of this type are the ORACLE (Registered Trade Mark) and the CEEFAX (Registered Trade Mark) systems, in which the digitally coded information carrying signals are transmitted on otherwise unused television lines during the field blanking interval. Each line carries information for a complete row of forty 8-bit (including a parity bit) characters. There are twenty four rows to a 'page' including a top or header row which carries information for control or display purposes.

A wide range of characters, alphanumeric and graphic, are available for display and control characters are also available to provide colouring and flashing of selected characters. A list of teletext codes appears in a paper entitled "Specification of Standards for Broadcast Teletext Signals" published jointly by British Broadcasting Corporation, Independent Broadcasting Authority and British Radio Equipment Manufacturers' Association, in January 1976.

Control characters are displayed as 'space' characters; that is, they occupy a space in the displayed page and, in the graphics mode, this has the unfortunate effect of producing a blank space between two characters of different colours and in the same row.

According to one aspect of this invention, therefore, teletext system comprises a transmitting terminal having a source of video signals including a picture signal, means operable to add to the video signal, without interfering with the picture signal, digitally coded information carrying signals, including graphics display characters and graphics control characters, and a receiving terminal for displaying a picture corresponding to a picture signal and including means for extracting from the video signal and for storing the information carrying signals, and a decoder operable to convert the stored signals into a repetitive vision signal for selective display of the information by the receiver and to insert a graphics display character in the blank picture space which would otherwise be caused by the occurrence of a graphics control character.

According to another aspect of this invention we propose a television receiving terminal for use in a teletext system wherein digitally coded information carrying signals including graphics display characters and graphics control characters, are added to the video signal including a picture signal without interfering with the picture signal, the receiving terminal being adapted for displaying a picture corresponding to the picture signal and comprising means for extracting from the video signal and for storing the information carrying signals, and a decoder operable to convert the stored signals into a repetitive vision signal for selective display of the information by the receiver and to insert a graphics display character in the blank picture space which would otherwise be caused by the occurrence of a graphics control character.

Preferably, the decoder is arranged to repeat the graphics display character occurring immediately before the graphics control character. To repeat the previous graphic display character or generate any other predetermined graphic display character, upon the occurrence of a graphics control character, to occupy the blank picture space which would otherwise occur, produces a marked improvement, the effect being to simplify the appearance and hence the interpretation of graphic displays such as weather

maps.

In a preferred embodiment the decoder comprises a buffer store for storiing each graphics display character during the period in which the next character occurs and a detector for detecting the occurrence of a graphics control character and enabling the buffer store to insert the stored display character into the blank picture space, in response to detection of a graphics control character.

An embodiment of this invention will now be described by way of example with reference to the accompanying drawings of which:

Figures 1 and 2 are displays of a flag produced respectively by a conventional teletext system and a teletext system according to the present invention and

Figure 3 is a circuit diagram of a part of the decoder in a television receiving terminal according to this invention.

As explained above, each control character occupies a picture space so that in conventional teletext systems a blank space is produced between two graphics display characters of different colours. An example is shown in Figure 1 which is a display of a flag.

In order to change from a blue (shown shaded) to a white character, the control character "Graphics White" must be inserted in the message text. Similarly, the control word "Grahpics Blue" must be used to revert to a blue character, thereby producing the intervening blank space. Upon the occurrence of a control character, we propose, in accordance with the present invention, to repeat the previous graphic display character or to generate any other predetermined graphic display character to occupy the space which would otherwise occur. The improvement produced will be appreciated by comparing Figure 1 with Figure 2 which shows the same flag, but with the spaces produced by the control characters "Graphics White" and "Graphics Blue" respectively filled by blue and white graphics display characters.

At a transmitting terminal of the teletext system, digitally coded information carrying signals including display and control characters, for both the graphics and alphanumeric mode, are added to the video signal without interfering with the picture signal. Each receiving terminal used in the teletext system extracts from the video signal and stores, information carrying signals which are then converted by a decoder into a repetitive vision signal for selective display of the information.

In accordance with the present invention, the decoder is also operable to generate a graphics display character to occupy the picture space caused by the control character. Figure 3 shows one example of circuit capable of performing this function, in which data from the main receiver storage unit (normally a random access memory) is fed, along lines D_1-D_7, to tri-state buffers 1 to 7 and to two D-type latches 39 and 40 connected in series. A seven input NAND gate 19 and inverter 13 control the tristate buffers 1 to 7 and the latches 39 and 40 such that only either the buffers 1 to 7 or the latches are enabled at any one time. Both the buffers 1 to 7 and the seven outputs of the latch 40 are connected to the main display output 50.

All latch functions are cleared at the end of each line by the line sync. signal which is a digital representation of the analogue line synchromatic pulse (4.7 microseconds).

At the beginning of each line of data, therefore, the latches 39 and 40 are clear and are stepped by a clock pulse occurring at the leading edge of each character. Clocking of latch 39 is delayed relative to latch 40 for a period corresponding to the character width so that the two latches 39 and 40 and the delay 52 act as a buffer store, the output of latch 40 when enabled by gate 19, being the character occurring immediately before that stored in latch 39.

When operating in the graphics mode, that is when previous characters have been graphics display characters, devices 34, 35 and 38 enable gate 19 which opens at the occurrence of a graphics control character. The output of gate 19 then inhibits the tri-state buffers 1 to 7 and enables latch 40 via inverter 13, to feed the previous graphics display character to the main display output 50.

Colour control characters are decoded by gate 18 and inverter 12 which then clocks latch 42 and, via a delay of a single character width, latch 41 so that, when a graphics control character is detected by gate 19 the colour information at output of latch 42 corresponding to the previous graphics display character is substituted for this information at input to latch 41 by an array at latches 25 to 33.

To activate the circuit described above with reference to Figure 3, a special additional control character known as "Hold Graphics" is inserted at the beginning of each line of data in which a graphics control character follows a graphics display character, normal operation being reset by another additional control character known as "release graphics".

WHAT WE CLAIM IS:

1. A teletext system comprising a trensmitting terminal having a source of video signals including a picture signal, means operable to add to the video signal, without interfering with the picture signal, digitally coded information carrying signals

maps.

In a preferred embodiment the decoder comprises a buffer store for storiing each graphics display character during the period in which the next character occurs and a detector for detecting the occurrence of a graphics control character and enabling the buffer store to insert the stored display character into the blank picture space, in response to detection of a graphics control character.

An embodiment of this invention will now be described by way of example with reference to the accompanying drawings of which:

Figures 1 and 2 are displays of a flag produced respectively by a conventional teletext system and a teletext system according to the present invention and

Figure 3 is a circuit diagram of a part of the decoder in a television receiving terminal according to this invention.

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At a transmitting terminal of the teletext system, digitally coded information carrying signals including display and control characters, for both the graphics and alphanumeric mode, are added to the video signal without interfering with the picture signal. Each receiving terminal used in the teletext system extracts from the video signal and stores, information carrying signals which are then converted by a decoder into a repetitive vision signal for selective display of the information.

In accordance with the present invention, the decoder is also operable to generate a graphics display character to occupy the picture space caused by the control character. Figure 3 shows one example of circuit capable of performing this function, in which data from the main receiver storage unit (normally a random access memory) is fed, along lines D_1-D_7, to tri-state buffers 1 to 7 and to two D-type latches 39 and 40 connected in series. A seven input NAND gate 19 and inverter 13 control the tristate buffers 1 to 7 and the latches 39 and 40 such that only either the buffers 1 to 7 or the latches are enabled at any one time. Both the buffers 1 to 7 and the seven outputs of the latch 40 are connected to the main display output 50.

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At the beginning of each line of data, therefore, the latches 39 and 40 are clear and are stepped by a clock pulse occurring at the leading edge of each character. Clocking of latch 39 is delayed relative to latch 40 for a period corresponding to the character width so that the two latches 39 and 40 and the delay 52 act as a buffer store, the output of latch 40 when enabled by gate 19, being the character occurring immediately before that stored in latch 39.

When operating in the graphics mode, that is when previous characters have been graphics display characters, devices 34, 35 and 38 enable gate 19 which opens at the occurrence of a graphics control character. The output of gate 19 then inhibits the tri-state buffers 1 to 7 and enables latch 40 via inverter 13, to feed the previous graphics display character to the main display output 50.

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WHAT WE CLAIM IS:

1. A teletext system comprising a trensmitting terminal having a source of video signals including a picture signa' means operable to add to the video signal, without interfering with the picture signal, digitally coded information carrying signals

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including graphics display characters and graphics control characters, and a receiving terminal for displaying a picture corresponding to the picture signal and including means for extracting from the video signal and for storing the information carrying signals, and a decoder operable to convert the stored signals into a repetitive vision signal for selective display of the information by the receiver and to insert a graphics display character in the blank picture space which would otherwise be caused by the occurrence of a graphics control character.

2. A teletext system according to Claim 1 wherein the decoder is arranged to repeat the graphics display character occurring immediately before the graphics control character.

3. A teletext system according to Claim 2 wherein the decoder comprises a buffer store for storing each graphics display character during the period in which the next character occurs and a detector for detecting the occurrence of a graphics control character and enabling the buffer store to insert the stored display character into the blank picture space, in response to detection of a graphics control character.

4. A television receiving terminal for use in a teletext system wherein digitally coded information carrying signals including graphics display characters and graphics control characters, are added to the video signal including a picture signal, without interfering with the picture signal, the receiving terminal being adapted for displaying a picture corresponding to the picture signal and comprising means for extracting from the video signal and for storing the information carrying signals, and a decoder operable to convert the stored signals into a repetitive vision signal for selective display of the information by the receiver and to insert a graphics display character in the blank picture space which would otherwise be caused by the occurrence of a graphics control character.

5. A receiving terminal according to Claim 4 wherein the decoder is arranged to repeat the graphics display character occurring immediately before the graphics control character.

6. A receiving terminal according to Claim 5, wherein the decoder comprises a buffer store for storing each graphics display character during the period in which the next charcter occurs and a detector for detecting the occurrence of a graphics control character and enabling the buffer store to insert the stored display character into the blank picture space in response to detection of a graphics control character.

7. A teletext system constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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