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Ciciora

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[54] **NTSC RECEIVER USEABLE WITH TELETEXT/VIEWDATA INFORMATION**

[75] Inventor: **Walter S. Ciciora**, Park Ridge, Ill.

[73] Assignee: **Zenith Radio Corporation**, Glenview, Ill.

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[51] **Int. Cl.**[3] **H04N 7/08;** H04N 3/22

[52] **U.S. Cl.** **358/147;** 358/180; 358/142; 358/85; 315/395

[58] **Field of Search** ..... 358/147.85, 140, 180, 358/142, 146; 315/395; 340/731, 750, 723, 748; 179/2 TV

[56] **References Cited**

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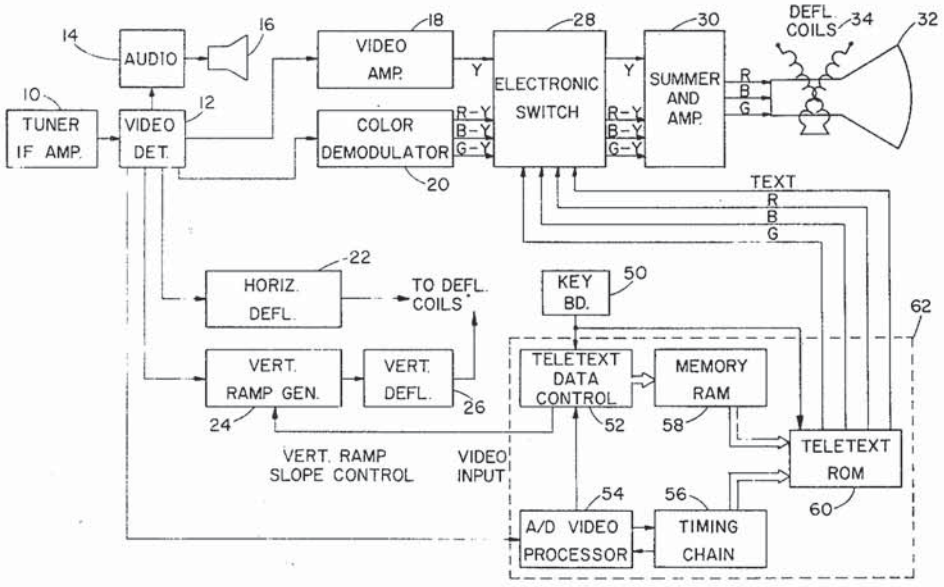
Primary Examiner—John C. Martin

Attorney, Agent, or Firm—Thomas E. Hill

[57] **ABSTRACT**

A Teletext equipped NTSC television receiver system includes means for compressing the raster in the vertical direction in response to 625-line formatted Teletext signals to display normally overscanned horizontal lines on the television viewing screen. Thus 625-line formatted Teletext material may be used directly with NTSC receivers.

13 Claims, 2 Drawing Figures



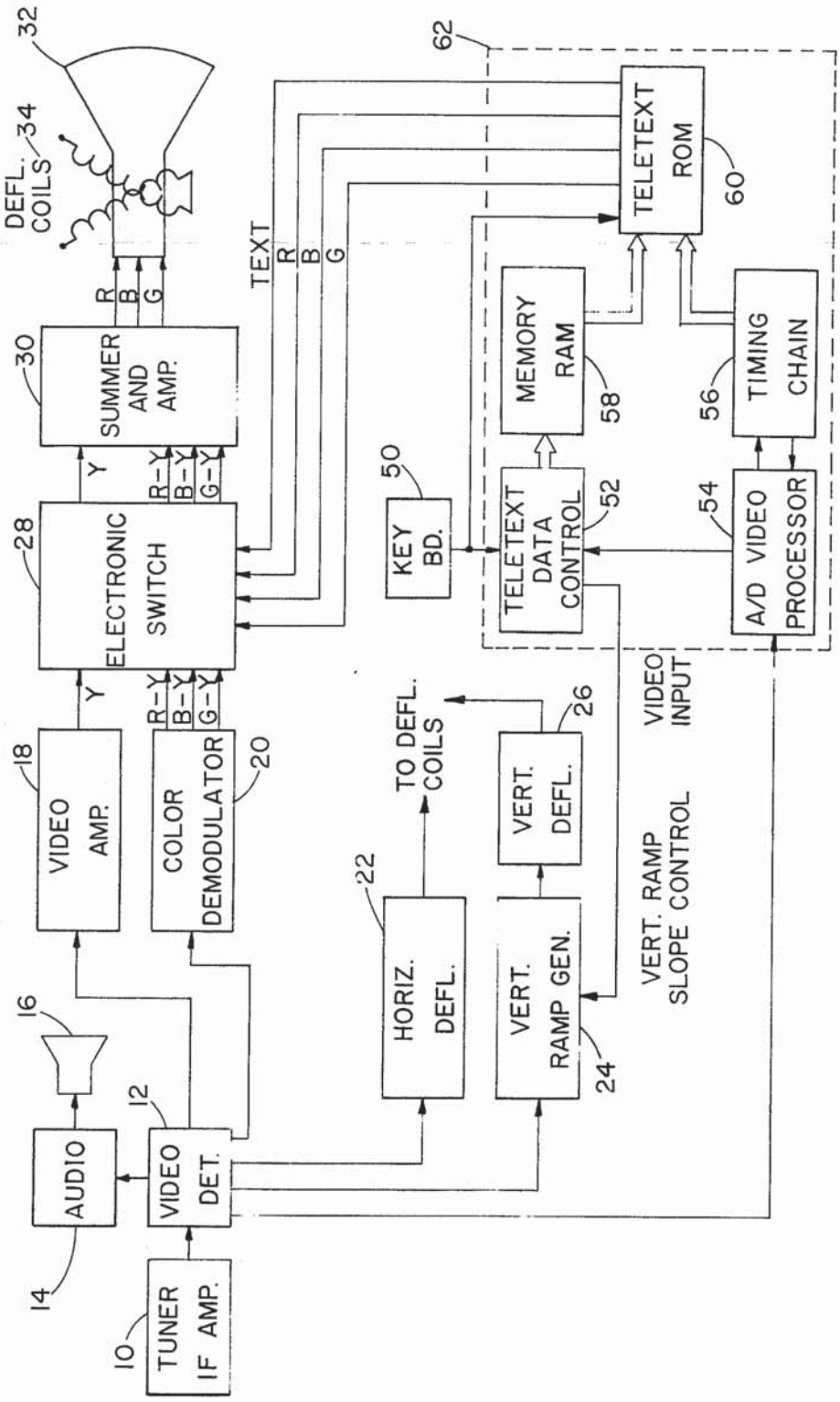


FIG. 1

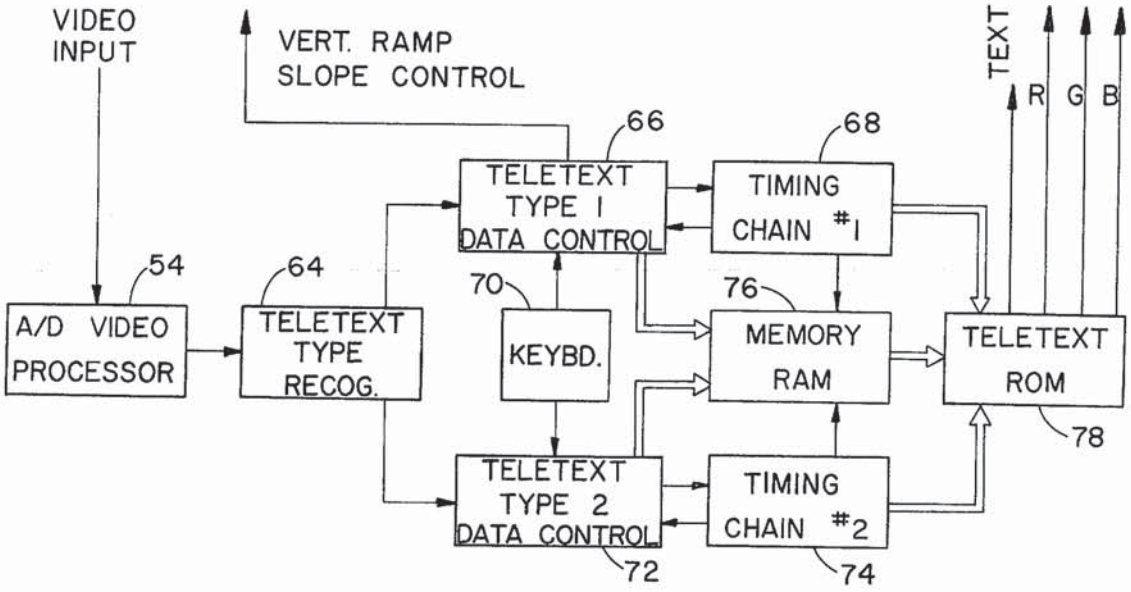


FIG. 2

NTSC RECEIVER USEABLE WITH TELETEXT/VIEWDATA INFORMATION

BACKGROUND OF THE INVENTION

This invention relates generally to Teletext Communication Systems and specifically to means for utilizing Teletext information formatted for 625 line displays in Teletext-equipped NTSC television receivers.

DESCRIPTION OF THE PRIOR ART

Teletext denominates a new and rapidly growing television communication technique which uses the vertical blanking interval of a television broadcast signal for transmission of text and graphical information. Systems are already operational in England for transmitting pages of formatted text material, in digital form on lines 17, 18, 330 and 331 of their 625 line system. Receivers equipped with appropriate decoders and memories are capable of decoding instructions for any page of the transmitted text information and displaying it on their viewing screens.

The transmitted signal includes character or symbol identification in coded form, but not the information for actually generating the character or symbol display. The character generation means are in the receiver and include a read only memory (ROM) and means for "reading" the memory for character generation in response to a character identification input. For example if the decoded signal calls for character "A", the ROM locations are appropriately addressed to produce the required information to form an "A" at the desired location on the television screen. Thus the receiver includes a random access memory (RAM) for storing the decoded digital line signals and a ROM for actual generation of the character or symbol information. The ROM may be microprocessor controlled for addressing the memory in accordance with the input character identification or conventional logic means may control the addressing.

Despite some limitations, such as the access time for information retrieval, the potential of Teletext Communication is enormous. In the British "ORACLE" system for example, the Teletext information consists of bursts of digital signals on the aforementioned lines. Each line-of-data signal contains 360 bits arranged in 45 Bytes of eight bits each. The first five Bytes are used for synchronizing, control and address purposes while the remaining 40 are used to denote characters. Each character is allocated 8 bits and a page consists of 24 rows of 40 characters.

With two data lines per field four pages of text may be transmitted each second. The pages are grouped into magazines of up to 100 pages each. (Up to eight such magazines may be provided.) A control code and address code are used to select and display desired information with every data line containing a coded magazine number and row address.

A special 4 digit time code enables up to 3,200 different texts for each "page" to be transmitted and selected through a time-division-multiplex approach. The time code is not necessarily related to clock time but is used to greatly expand the magazine pages. For example a page may be selected by its magazine number and page number or by the above numbers and a time code.

Since the information is transmitted serially, it may take a little while for a particular page to be transmitted and the viewer may experience some delay between his request and presentation of the information. To minimize delay popular features may be transmitted frequently. On the other hand, pages of limited interest may be transmitted infrequently. Since the receiver has the facility for storing the desired control and data signals it is feasible to store infrequently transmitted, but desired material at a time when the receiver is not being used (i.e. during the early morning hours) which would then be ready for presentation without delay at a later time.

There are various Teletext-like services in operation in England, Europe, and the United States which supply specialized information to subscribers with properly equipped television receivers. The specialized information includes stock market quotations, instructural programs, newscasts, weather information, directories for various activities, sports results, etc.

In practice a viewer with a Teletext equipped receiver would request, via a keyboard or other suitable selection mechanism, display of a magazine index listing of Teletext information available by page and time code, if used. He would then select the page or pages of material he wished to view on his receiver.

As mentioned the digital data includes synchronizing, control and address information for determining paging and format of the information when displayed on the screen. The receiver includes means selecting and storing the desired digital information, a read only memory for storing the necessary character information: means addressing the read only memory under control of the stored digital information and means controlling the address means for proper synchronization and framing the character information being read out of the character memory. The Teletext information is supplied to the receiver video section for proper display on the viewing screen.

The term Teletext is generally considered to refer to over-the-air transmission of text information during the vertical interval. An obvious alternative method for transmission of such information is to use conventional telephone lines. When this is done it is generally referred to as Viewdata. It will be appreciated that, as far as the present invention is concerned, it matters not whether Teletext or Viewdata information is being received. Regardless of whether information transmission occurs via conventional telephone lines as in Viewdata or during the vertical interval via television video signal as in Teletext, the present invention, since it involves only the display of such information, has equal applicability.

In the British 625 line system a Teletext page format is 40 characters per line with the height of each row of characters being 10 lines and a page consisting of 20–24 rows. A 625 line system (312/313 lines per frame) of course contains more "usable lines" than a 525 line NTSC system. In both systems the unusable lines are accounted for by a combination of overscanning and processing time required for the video display. Teletext information which is coded for the British television system has a format requiring 240 usable lines, which is greater than the number of normally visible lines in an NTSC system.

The United States presently has no standard for Teletext material. There is a great deal of interest in enabling any U.S. Teletext system to use material formatted for the British standards with minimum modification. How-

ever, none of the systems presently in use in the United States are capable of using such material.

The major difficulty is, that to retain the definition of the British system, 10 horizontal lines for the characters and the number of rows in the page would result in the upper and lower portions of the text material being off the screen because in the NTSC system there is a maximum of 240/241 usable lines, with some of these being lost due to overscanning which is a necessity for mass produced television receivers. To reformat the British Teletext material for use in an NTSC system of, for example, only 20 rows of 10-line characters would thus require human intervention. If the human element were not needed, it would only be necessary to add British data decoders to derive the proper control signals and would only impose a minor capital expenditure on broadcasters.

One suggested solution is to adopt a United States page format requiring only 9 horizontal lines per character. This would permit use of British Teletext material without reformating. However a substantial loss of character definition would result and consequently it is not an acceptable solution.

One system envisioned by the invention would essentially adopt the page format of the British system, namely 24 rows of 10-line characters, (with 40 characters per scan line) and compress the television raster to display all usable lines on the viewing screen. Thus each frame in a field would have 240/ 241 lines displayed on the receiver screen. Another system envisioned by the invention would utilize raster-compression only for British formatted Teletext material and would process and display locally produced Teletext material in accordance with whatever standard is ultimately adopted in the United States. This latter system would involve having a separate ROM for British formatted characters, decoding logic to determine when British Teletext material was being received and switch means for automatically selecting the appropriate apparatus in accordance with the output of the decoding logic.

OBJECTS OF THE INVENTION

An object of this invention is to provide a novel and improved television receiver.

A further object of this invention is to provide a novel Teletext equipped television receiver.

SUMMARY OF THE INVENTION

In accordance with the invention a Teletext equipped NTSC television receiver having a normal video display capability of 200 usable horizontal lines per field includes signal synthesis means for converting digital signals received during the vertical retrace interval having a format of approximately 240 horizontal scan lines per field and means for altering the picture tube raster to enable said signal synthesis means to make a video display of said digital signals less without alteration of the signal synthesis means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a Teletext equipped NTSC television receiver in accordance with one aspect of the invention.

FIG. **2** is a block diagram of a Teletext equipped NTSC television receiver in accordance with another aspect of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a television tuner and IF amplifier **10** is coupled to a video detector **12** which supplies an audio circuit **14**, a video amplifier **18**, a color demodulator **20**, a horizontal deflection circuit **22** and a vertical ramp generator **24**. Audio circuit **14** includes conventional detection and amplification circuitry and is coupled to a speaker **16** for reproducing the audio accompaniment of the broadcast television signal. A pair of conventional deflection coils **34** are mounted on the picture tube and are supplied by horizontal deflection circuit **22** and vertical deflection circuit **26**. The input of the vertical deflection circuit **26** is supplied from vertical ramp generator **24**.

Unlike conventional television receivers, the outputs of color demodulator **20** and the output of video amplifier **18** are supplied to an electronic switch **28**. Also, the output of video detector **12** supplies an A/D (analog to digital) video processor **54**. The luminance signal Y and color difference signals R-Y, B-Y and G-Y outputs of electronic switch **28** are combined into R, B, and G signals and supplied to a summer and amplifier **30** which feeds appropriate elements in an electron gun structure (not shown) in a picture tube **32**. With the exception of the electronic switch, the summer and amplifier and the video output to A/D video processor **54**, the color television receiver thus described will be seen to be conventional.

A/D video processor **54** accepts the serial digital Teletext information in the vertical retrace interval of the broadcast television signal and supplies it to a Teletext data control **52** which accesses a memory RAM **58**. Memory RAM **58**, in turn, accesses a Teletext ROM **60**. A/D video processor **54** is intercoupled with a timing chain circuit **56** which also accesses Teletext ROM **60**. Teletext data control **52** and Teletext ROM **60** are also accessed by a keyboard **50** by means of which the viewer may select desired pages of Teletext information and system operating modes. In general these modes are Television, Teletext, and Mixed—the latter comprising Teletext information superimposed upon normal television video.

The outputs of ROM **60** include a blanking signal, a so-called text signal and RGB signals, all of which are supplied to electronic switch **28**. The RGB signals from the Teletext ROM are of fixed value and the number of colors reproducible is accordingly limited. The text signal is a form of blanking signal and when the receiver is operating in the Teletext mode, blanks out all video except where characters are to appear.

As thus far described the Teletext equipment included in dashed-line box **62** is conventional and the circuit arrangement for utilizing the Teletext equipment in the television receiver is also well-known in the Teletext art. For example see Mullard Technical information Note **54** (Mullard Ltd., Mullard House, Torrington Place, London WC1E7HD) in which the Teletext equipment is described in great detail. The difference in the present circuit is in the lead connecting Teletext data control **52** to vertical ramp generator **24**, over which is supplied a vertical ramp slope control signal. When the television receiver is operated in the Teletext mode, the slope of the vertical ramp is changed to affect the vertical deflection circuits in a compressive manner, that is, substantially all of the horizontal lines of each

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