

The invention relates to a method in accordance with the first part of claim 1. A method of this type is known from GB-A-2 187 614.

In the conventional teletext system presently used in Europe (with the exception of France), one merely makes use of the so-called "Level 1" of the teletext standard WST (world system teletext) which is only provided with a limited basic character set for text and graphical representations. Special characters, fine structures or colour shadings cannot be reproduced with this "Level 1" system. For the avoidance of these shortcomings, the WST Standard provides for, especially in its development stages "Level 2" and "Level 3", the transmission of supplementary items of data in so-called pseudo rows (also known as "ghost rows") which have addressable row numbers that are not used by "Level 1" but which are nevertheless kept free in the transmission format. When required, a plurality of rows having the same row number have to be used for the transmission of the necessary quantity of supplementary items of data as is illustrated with the help of Fig. 1 for the row number # 26 (c.f. also the periodical "Rundfunktechnische Mitteilungen", 27, for the year (1983), Volume 3, pages 116 - 134).

For special supplementary items of data, namely for freely definable characters (DRCS characters = dynamically redefinable character sets), pseudo pages, which are inserted in the teletext cycle using hexadecimal numbering and which have an expanded format (rows 0 - 24) vis a vis the basic page format (rows 0 - 23) and exclusively contain items of information regarding the bit structure of the DRCS characters, are used in accordance with the WST Standard or the GB-A-2 187 614. The manner of representation ("mode") of the DRCS characters being used at any particular time is indicated in a pseudo row (row 28). The position of the character locations in the basic page, which are intended to be supplemented by means of the DRCS characters, as well as the addresses of the relevant DRCS characters in the pseudo page, are indicated in the pseudo row 26 of the basic page in question. Furthermore, the page number of the associated pseudo page is indicated in the pseudo row 27.

As a result of the distribution of the information for the structure, manner of representation and the addressing of the supplementary items of data over pseudo rows and pseudo pages, the known method is not only limited to DRCS characters but also proves to be complicated and correspondingly subject to interference.

Independently of whether just pseudo rows alone, or pseudo rows and pseudo pages together, are transmitted, there is the problem that the teletext receiver does not receive any item of information regarding the number of pseudo rows which are currently being transmitted in respect of a teletext page (basic items of data). Consequently, the decoder does not "know" whether, which and, if necessary, how many, pseudo rows have been transmitted for a teletext page. Consequently, a correct evaluation can only then take place if the wanted teletext page and all of the associated pseudo rows have been received in full. Furthermore, an additional storage space e.g. 4 kByte, constantly has to be kept available in the decoder for each teletext page that is to be stored, which space cannot otherwise be used when there is a missing transmission of pseudo rows.

In contrast to this, the object of the invention is to make possible, in a method of the type mentioned hereinabove, an efficient transmission or more rapid processing of the supplementary items of data and to simultaneously ensure full compatibility with existing teletext receivers operating in accordance with "Level 1".

In accordance with the invention, this object is achieved by the features specified in claim 1.

In a development of the invention in accordance with claim 2, the supplementary items of data for a plurality or for all of the teletext pages are transmitted in at least one supplementary page. The number of supplementary pages can thereby be reduced in advantageous manner.

Further advantageous embodiments and developments of the method in accordance with the invention are apparent from the claims 3 to 11.

The invention will be explained in more detail hereinafter with the help of the embodiments illustrated in the drawing. Therein

Fig. 1 shows a schematic illustration of the known teletext WST Standard;

Fig. 2 a schematic illustration of the method in accordance with the invention in accordance with a first embodiment,

Fig. 3 a schematic illustration of the method in accordance with the invention in accordance with a second embodiment and

Fig. 4 a block circuit diagram of an embodiment of a circuit arrangement for carrying out the method in accordance with the invention.

As distinct from the teletext WSR Standard (Fig. 1), so-called supplementary pages, which are preferably structured in the format of the teletext pages, are transmitted in addition to the conventional teletext pages ("basic pages").

With the method in accordance with the invention, in accordance with a first embodiment (Fig. 2), so-called supplementary pages, which are preferably structured in the format of the teletext pages, are transmitted in addition to the conventional teletext pages ("basic pages").

With the method in accordance with the invention, in accordance with a second embodiment (Fig. 3), supplementary items of data for a plurality or for all of the teletext pages are transmitted in at least one supplementary page.

As Fig. 2 and Fig. 3 depict, the supplementary page(s) associated with a certain teletext page contain the items of data ("supplementary items of data") which are missing for a higher WSR Level (e.g. Level 2/3).

As an example, in the second embodiment in accordance with the invention, the "Level 1" - page 100 having the subcode 0000 and the supplementary pages 10A 0001 and 10A 0002 is indicated in Fig. 3. The first hexadecimally numbered supplementary page 10A 0001 contains a specially characterised section, in which, supplementary items of data are contained which are applicable not only for the appertaining "Level 1" - page 100 0000 but also for other "Level 1" pages - for the page 104 0001 for example. Thus here, in this example, the supplementary items of data for 104 0001 are composed of the specially characterised section of page 10A 0001, which is not specially transmitted (again), and the appertaining supplementary page 10E 0100.

The same applies analogously for basic pages having page numbers from 200. For example, the supplementary page 10E is associated with the basic page 104, the supplementary page 1E0 with the basic page 109 and the supplementary page 1E9 with the basic page 199.

An essential feature of the invention consists in that supplementary items of data for subordinated pages are transmitted under the page numbers of higher numbered pages. In a known teletext transmission method ("TOP" System), an item of

information regarding each basic page in the cycle and their association with other pages is transmitted in a special teletext page ("Basic TOP Table") in the form of a classification into pages, groups, blocks. This classification is used at present in order to distinguish subordinate and higher numbered pages from each other. Thereby, a precisely defined location (according to columns and rows) is provided on the special page (BT table) for each basic page.

The following Table I indicates which hexadecimal supplementary page numbers are associated with the individual basic pages between 100 and 199 for example.

Table I

100	101	102	103	104	105	106	107	108	109	10A	10B	10C	10D	10E	10F
"				"	"				"	"					"
110															11F
120															
...															
180									189	18A				18E	18F
190				194	195				199	19A				19E	19F
"				"	"				"	"					"
1A0									1A9	1AA					1AF
1B0									1B9						
1C0									1C9						
1D0									1D9						
1E0									1E9	1EA					1EF
1F0									1F9	1FA					1FF

The PT table, whose coding is illustrated in Table II, is transmitted as a further special page ("Pseudo Table" or "PT") in accordance with the same column and row association as in the BT table. For each basic page (at whose location there is a specific PT code), the PT table contains indications regarding

the number of the supplementary pages and an additional item of information as to whether further supplementary items of data are present in the higher numbered pages.

Table II

Number of Supplementary pages	Further supplementary items of data in the higher numbered pages	Code PT
0	-	0
1	-	1
2	-	2
3	-	3
4	-	4
5	-	5
6	-	6
7	-	7
0	yes	8
1	yes	9
2	yes	A
3	yes	B
4	yes	C
5	yes	D
6	yes	E
7	yes	F

The following Table III depicts the rules for calculating how the subcode for the supplementary pages can be determined from the subcode of the basic page and the number of the supplementary pages (Table II) when there is a multiplicity of pages (= basic page plus subordinate page(s)). For example, two supplementary pages of the basic page 0001 have the subcodes 0101 and 0102. The subcode of the basic page represents an "extended page number" so that the subordinate pages of the multiple page No 120 have the page numbers 120 0001, 120 0002 The parts 0001, 0002 of the numbers represent the subcodes.

Table III

Basic page subcode	Number of supplementary pages	Supplementary page Subcode	Remarks
0000	1	0000	Basic page with one supp
0000	XX	0001 0002 00XX	Basic page with XX supp
0001	1	0100	First sub page with 1 supp
00YY	X	YY01 YY02 YYXX	YY sub with XX supp

A cycle ("Higher Level Cycle") in accordance with the method in accordance with the invention is illustrated in the following Table IV with the help of an example.

Table IV

		Code PT	Supplementary items of data from the following supp page (Supp)
100	Block A	2	2 Supp v 100
110	Group A1	1	1 Supp v 110
111	Page A1-1	8	1 Supp v 110
112	Page A1-2	9	1 Supp v 110 + 1 Supp v 112
120	Group A2		
121	Page A2-1		
200	Block B	8	2 Supp v 100
210	Group B1	9	2 Supp v 100 + 1 Supp v 210
211	Page B1-1	9	2 Supp v 100 + 1 Supp v 210 + 1 Supp v 211
212	Page B1-2	3	3 Supp v 212
220	Group B2		
221	Page B2-1		

In the cycle illustrated, a plurality of pages are combined into a group and a plurality of groups are combined into a block. For page 110 for example, a code 1 from Table II signals that only one supplementary page of the page 110 and no further supplementary pages from the higher numbered page 100 are present. By contrast, the page 111 having the PCT code 8 signals that there are no supplementary pages present but, that specially characterised sections in the supplementary page of page 110 have to be taken into account.

At the receiving end (Fig. 4), basic items of data and supplementary items of data are separated in like manner from the video signal in a splitting stage 10 and combined into individual teletext pages. Each teletext page is supplied via the output lead 11 to a gate circuit 30 which supplies the teletext page supplied to it via a read line 31 to a page buffer store 40 in the event that a control circuit 50, which will be explained in detail further on, supplies an enable signal on an output lead 51 to the gate circuit 30. Furthermore, the control circuit 50 causes an addressing of the page buffer store 40 for the read-in process via a further output lead 52. The read-out process of the page buffer store 40 likewise occurs via a third output lead 53 under the control of the control circuit 50.

The page numbers of the teletext pages occurring on the lead are supplied to the control circuit 50 via a lead 21 from a page number output coupling circuit 20. To this end, the output coupling circuit 20 detects the number of each of the teletext pages supplied over the lead 11 via a branching lead 12. Furthermore, the control circuit 50 is connected to the input means 70 that is operated by the user. The wanted page number is supplied via a lead 71 to the control circuit 50. If there occurs a special page having the page numbers of the basic pages (so-called "Basic TOP Table") or another special page (PT Table in accordance with Table II) including the information as to whether specially characterised sections having supplementary items of data for subordinated pages are contained and/or with the number of the supplementary pages for each associated basic page which occurs in the cycle of the teletext pages or in a section of the cycle, then these special pages are, or the relevant special page is, automatically supplied to the page buffer store 40. The items of data of these buffer stored special pages are transmitted via the data read line 54 to the control circuit 50 which determines the page numbers and the appertaining number of supplementary items of data for each page number and inserts them into a page number store 60 which is connected via a bidirectional bus 61 to the control circuit 50.

It is now assumed for the device at the receiving end for carrying out the method in accordance with the first embodiment that the user has selected the page # 100 by actuation of the keyboard 70 for example. The control circuit 50 determines the number and the page numbers of the associated supplementary pages for this selected page. If for example, the basic page # 100 is supplemented by two supplementary pages (Fig. 2), then these two supplementary pages bear the page number # 10A having the subordinated pages # 0001 and 0002. Due to an unambiguous, predefined relationship between the basic pages # 100 to 899 and the appertaining supplementary pages 10A to 1E9 (which, in the example under consideration, are in hexadecimal notation), the page numbers of the supplementary pages can be easily calculated or determined with the help of special tables. As soon as one of these pages occurs in the cycle, something that is communicated to the control circuit 50 by the output coupling circuit 20, an enable signal for the gate circuit 30 appears on the output lead 51 whereupon the basic page # 100 for example, is placed in the storage location # 1 via the lead 31, the supplementary page 10A 0001 is placed in the storage location # 2 and the supplementary page 10A 0002 is placed in the storage location # 3 of the page buffer store 40. The addressing of the storage locations occurs, as already explained, under the control of the control circuit 50 via the output lead 52. After all three of the pages under consideration have been read-in, the control circuit 50 generates a read-out command for the storage location # 1 via the output lead 53, whereupon the basic page # 100 is read out from the page buffer store 40 over the lead 41 to a decoder for basic items of data 80. The decoder for basic items of data 80 decodes the page # 100 in suitable manner and passes the thus resulting items of data via the lead 91 to a processor 90. Moreover, two read-out commands for the storage locations # 2 and # 3 are given by the control circuit 50 over the output lead 53 and the supplementary pages 10A 0001 and 10A 0002 are successively read out over the lead 42 to a decoder for supplementary items of data 81. The decoder for supplementary items of data 81 decodes the items of data of the supplementary pages in suitable manner and passes on the resulting items of data via the lead 92 to the processor 90 which presents the decoded items of data from all three pages together as a video signal having the components R, G, B and S on the screen of a television receiver for example.

The device at the receiving end is now to be so modified that it has means for carrying out the method in accordance with the second embodiment. For the sake of simplicity, the same expressions and references as used previously will be used hereinafter. It is now assumed that the user has selected the

page # 111 by actuation of the keyboard 70 for example. The control circuit 50 determines the number and the page numbers of the associated supplementary pages for this selected page. If for example, the basic page # 111 is supplemented by supplementary items of data from the higher numbered page 110 (Table II), then the supplementary page bears the page number # 11A. As soon as one of these pages occurs in the cycle, something that is communicated to the control circuit 50 by the output coupling circuit 20, an enable signal for the gate circuit 30 appears on the output lead 51 whereupon the basic page # 111 for example, is placed in the storage location # 1 via the lead 31 and the supplementary page 11A is placed in the storage location # 2 of the page buffer store 40. The addressing of the storage locations occurs, as already explained, under the control of the control circuit 50 via the output lead 52. After the two pages under consideration have been read-in, the control circuit 50 generates a read-out command for the storage location # 1 via the output lead 53, whereupon the basic page # 111 is read out from the page buffer store 40 over the lead 41 to the decoder for basic items of data 80. The decoder for basic items of data 80 decodes the page # 111 in suitable manner and passes the thus resulting items of data via the lead 91 to the processor 90. Moreover, a read-out command for the storage location # 2 is given by the control circuit 50 over the output lead 53 and the supplementary page 11A is read out over the lead 42 to the decoder for supplementary items of data 81. The decoder for supplementary items of data 81 decodes the items of data in the specially characterised section of the supplementary page in suitable manner and passes on the resulting items of data via the lead 92 to the processor 90 which presents the decoded items of data from all three pages together as a video signal having the components R, G, B and S on the screen of a television receiver for example.

In one particular embodiment, the decoder for basic items of data 80 consists of a teletext Level 1 decoder and the decoder for the supplementary items of data transmitted in an interactive video set-up code consists of an interactive video decoder (BTX).

In accordance with the first embodiment furthermore, following the occurrence of the user's wish for page # 100, the control circuit 50 may automatically carry out an occupation of the remaining storage location # 4 of the page buffer store 40 with a further page. As the next following page number, the page # 105 for example is encountered in the page number store 60. Moreover, the control circuit 50 determines for example that there are no more supplementary pages for the basic page # 105.

As a result, the page # 105 may, after its appearance in the teletext cycle, be buffer stored in the storage location # 4 in the manner already described.

With the help of the method in accordance with the invention according to the first embodiment, the available buffer store 40 can be adaptively, and thus optimally, used since only so many storage locations have to be reserved as are actually required for the presentation of any particular page.

A further advantage of this method consists in that missing rows in the supplementary pages can be detected in a simple manner and rows subject to interference can be supplied to a suitable, not illustrated, error correcting circuit. The control circuit 50 "knows" from the page number store 60 whether, and if so, how many, supplementary pages are present in the cycle. Since, in the case of no interference, all of the rows in a supplementary page are normally filled, or, a special end of data character can be provided in the last row when a supplementary page is not completely filled, the seek and load process for the page buffer store 40 can be appropriately influenced when the supplementary pages are not complete or are missing, namely, in a manner such that a page is gradually completely and correctly buffer stored with all of the supplementary pages.

Furthermore, in accordance with the second embodiment, following the described occurrence of the user's wish for the page # 111, the control circuit 50 can automatically carry out an occupation of the remaining two storage locations # 3 and # 4 of the page buffer store 40 with further pages. As the next following page number, the page # 112 for example is encountered in the page number store 60. Moreover, the control circuit 50 determines for example (Table IV) that the basic page # 112 is supplemented by the supplementary page # 11C and the specially characterised section of the page 11A already loaded into the storage location # 2. As a result, the pages # 112 and 110 may, after their appearance in the teletext system, be buffer stored in the storage locations # 3 and # 4 in the manner already described and, upon being called for, be illustrated on the screen together with the general items of data from store # 2.

With the help of the method in accordance with the invention according to the second embodiment, the available buffer store 40 can be optimally utilised since the supplementary items of data in the specially characterised sections apply for a plurality of basic pages and do not have to be newly loaded on each occasion.

An advantage of this method consists in that the additional data capacity which is necessary for Level 3 can be minimised. The supplementary items of data can be defined not just for one page but also for higher numbered pages (groups), a block or for the whole cycle. Thus for example, a new colour table for the whole cycle, sports logos for the block "Sport" and similar headings for "News" groups can be arranged.

Claims

1. Method of transmitting preferably periodically repeated items of teletext data in a television signal, in which the items of teletext data are separated from the television signal at the receiving end in accordance with a standard - e.g. in accordance with the so-called Level 1 of the WST teletext standard (world system teletext), the respective items of data appertaining to a teletext page are collected and the thus assembled teletext pages are buffer stored, wherein, at the transmitting end, supplementary items of data for a respective teletext page in the form of one or more associated supplementary pages having page numbers in the hexadecimal system are transmitted in addition to the basic items of teletext data of teletext pages (basic pages) built-up in accordance with the standard, which supplementary items of data are buffer stored separately from the basic items of data of a wanted teletext page at the receiving end and are processed in such a way that at those character locations where there are no supplementary items of data, the characters associated with the basic items of data are displayed and that at those character locations where there are supplementary items of data, the characters associated with the basic items of data are displayed in combination with the characters associated with the supplementary items of data, characterised in that, the supplementary pages are structured in the format of teletext pages in accordance with the standard and that the page numbers of the supplementary pages, which are coded in the hexadecimal system, are associated in accordance with a predefined plan with selectable - preferably by means of a numeric keypad - page numbers of the associated teletext basic pages which are organised in the decimal system.

2. Method in accordance with Claim 1, characterised in that, the supplementary items of data for a plurality or for all of the teletext pages are transmitted in at least one supplementary page.

3. Method in accordance with Claim 1 or 2, characterised in that, the supplementary items of data are transmitted in the interactive video set-up code.

4. Method in accordance with Claim 3, characterised in that, separate decoding means are provided for the basic items of data and the supplementary items of data at the receiving end.

5. Method in accordance with any of the Claims 1 to 4, characterised in that, a special item of information is



transmitted regarding the number of supplementary pages per associated, conventional teletext page.

6. Method in accordance with any of the Claims 1 to 5, characterised in that, a special item of information is transmitted as regards whether, and if so, how many, supplementary pages including supplementary items of data for a plurality of teletext pages are contained in the teletext cycle, as well as whether, and if so, how many, supplementary pages including only supplementary items of data that are specific to a page of each teletext page that is to be supplemented are contained in the teletext cycle.

7. Method in accordance with any of the Claims 1 to 6, characterised in that, a further special item of information regarding the number of utilised rows is transmitted in at least one supplementary page.

8. Method in accordance with any of the Claims 1 to 7, characterised in that, the special item of information is transmitted in the format of a supplementary page.

9. Method in accordance with any of the Claims 1 to 8, characterised in that, at least the supplementary items of data relevant for a plurality of teletext pages are transmitted with an error protection that is increased with respect to the basic items of data.

10. Method in accordance with any of the Claims 1 to 9, characterised in that, the supplementary items of data are transmitted with an error protection that is increased with respect to the basic items of data.

11. Method in accordance with any of the Claims 1 to 10, characterised in that, the supplementary items of data at least partly represent error protection items of data for the associated basic items of data which are used at the receiving end for correcting and, if necessary, for the substitution of the associated basic items of data that have been subjected to interference.

