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“TOP” System for Teletext

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Forward to the 2nd Edition

The 1st Edition of the Technical Guideline „TOP“ System for Teletext, dated 21.4.1988, has been expanded in accordance with the wishes of several European broadcasting organizations and providers of teletext services in cooperation with the receiver industry.

The following items have been introduced into the TOP specification:

- the specification of a Multipage Extension Table for the unambiguous identification of up to $8191_{\text{dec}}$ sub-pages: this corresponds to the maximum sub-code value $3F7F$.

- the specification of the link commands, with which the page-selection sequence, otherwise predetermined by the page number, can be varied in the receiver.

- the specification of the “combined” Basic Top Tables in the parallel mode. The initialization phase of the receiver can thereby be reduced, above all when several magazines are provided by one teletext source.

The extensions are organized so that they are (downwards) compatible with the specified functions in the 1st Edition of the TOP-Specification. That is to say that the TOP teletext decoder already on the market can still be used as hitherto when the extended possibilities are utilized at the transmitting end, whereas future TOP decoders incorporating the new possibilities can offer more extensive functions.

December 1991
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Introduction

The TOP (Table of Pages) system specified in the following document is a service provided by the broadcasting organizations for the teletext user. With a suitably designed teletext decoder it provides a user-friendly method of selecting pages from the teletext transmission cycle. The selection of the teletext pages is effected by means of special function keys on the remote-control unit for the teletext decoder. In addition, the TOP helps to achieve rapid orientation in the teletext programme on offer and to provide an effective guide to the user.

The basic idea of the TOP consists of a table to be transmitted like a normal teletext page, in which all the pages of the teletext programme being transmitted are marked. This table, called the Basic TOP Table, and other types of TOP Table, are defined in the present specification.

Guidelines for the operation of the TOP system are given in Annexe 1.

Various recommendations, especially for the TOP receiver, are given in Annexe 2.

A description of the TOP system is to be found in Annexe 3. It includes a description of how the selection of teletext pages is effected with TOP and how the realization of the TOP system may be achieved at the sending and receiving ends.

The various abbreviations employed may be found in Annexe 4.

Annexe 5 contains a list of references.
1. General

The tables associated with the TOP system are called the "Basic TOP Table", the "Multipage Table", the "Multipage Extension Table" and the "Additional Information Table".

Figure 1 gives an overall view of these tables.

In the Basic TOP Table are listed all available teletext pages with decimal page numbers together with the special markings established by the editorial staff for block, group, television programme-preview block and sub-title pages. These occupy Rows 1 to 20.

In addition, Rows 21 and 22 contain a Page-Linking Table, in which the page numbers of the remaining TOP Tables are given. The so-called Basic TOP Table List for the identification of the magazines containing teletext is located in Row 23.

Two types of Multipage Table are specified. One of the Multipage Tables (MP), which is constructed in a space-saving way in accordance with the co-ordinate system of the Basic TOP Table, allows for the unambiguous identification of up to 9 sub-pages for each multiple page. The other, the Multipage Extension Table, which allows for the display of the maximum possible number of sub-pages for each multiple page (up to 8191, max), is made up in the form of a list.

In the Additional Information Table are transmitted the texts for the guidance of the user (titles for blocks, groups and for the directly selectable pages) and the codes for the directly selected pages, as well as the linking information.

With the exception of the titles in the Additional Information Table, all other information contained in the TOP Tables is given enhanced data error protection during transmission by means of a (8/4) Hamming coding [1]. The source code and the Hamming-coded channel code assigned in each case are set out in Figure 2. The characters of the titles are, however, safeguarded during transmission by a so-called parity bit [1] (odd parity).
2. Basic TOP Table with Basic TOP Table List and with Page-Linking Table

2.1 Basic TOP Table (BT) with Basic TOP Table List (BTL)

2.1.1 Information content of the Basic TOP Table with Basic TOP Table List

Basic TOP Table
In the Basic TOP Table, all the pages currently transmitted are labelled with decimal numbers and special identifications are assigned for normal, group, block, television programme-preview block and sub-title pages, each one with or without additional information as to whether it is a single or a multiple page.
In addition to this, the page header of the Basic TOP Table contains an up-dating feature whereby the changes in the teletext programme and also in the TOP Tables are recognized.

Basic TOP Table List
The Basic TOP Table List indicates which magazines contain teletext and in which Basic TOP Table(s) the Basic-TOP-Information is transmitted. The information contained in the Basic TOP Table List describes the normal case (static list). Disturbances or other special cases are not shown.

2.1.2 Structure of the Basic TOP Table with the Basic TOP Table List

Basic TOP Table
All the permissible decimal page numbers* (100 to 899) are represented in the table. The representation takes the form in which each page number is assigned a definite position in the table by means of a coordinate system (row address, column address).

The format of the table matches the format of the teletext pages. For the Basic TOP Table, 20 rows of a teletext page, each with 40 columns, are used.

The relationship between the page number and the co-ordinates of the position in the table is expressed by the formula:

\[ N = 100 + S + 40 \cdot (R-1) \]

where

- \( N \) = decimal page number (100...899)
- \( R \) = Row address (1...20)
- \( S \) = Column address (0...39)

The structure of the table is illustrated in Figure 3. To make it more easily understood, the individual page numbers are shown in each of their assigned positions in the table.

Basic TOP Table List
The Basic TOP Table List is set out in Row 23, Columns 32 to 39 of the Basic TOP Table. One column in the Basic TOP Table List is definitely assigned to each teletext magazine (see Figure 4A).

* Page number: In the following text, the term "page number" is used, for linguistic simplicity, to denote the complete sequence of numbers that is necessary to select a teletext page, including the the magazine number and, where applicable, the page sub-code. In cases where there are differences, attention will be specially drawn to them.
2.1.3 Coding of the Basic TOP Table with the Basic Top Table List

Basic TOP Table
The coding is carried out in accordance with the code table shown in Figure 4. The channel code is made up from the source code by use of the (8/4) Hamming code [1].

Basic TOP Table List
The coding is carried out in accordance with the code table shown in Figure 4A. The channel code is made up from the source code by use of the (8/4) Hamming code [1].

2.1.4 Rules for the generation and transmission of the Basic TOP Table and the Basic TOP Table List

The Basic TOP Table is generated at the transmitting end as laid down in Paras. 2.1.2 and 2.1.3.

Insertion and deletion of pages
The insertion of a page in the transmission cycle or the deletion of a page from the cycle, as well as possible changes to the programme structure, give rise to a change or an up-dating of the Basic TOP Table or of one of the other TOP Tables listed in the Page-Linking Table. (The up-dating of the content of a page already within the cycle ought not to lead to a change in the TOP Tables.)

When a teletext page is inserted into the cycle, the teletext computer must first insert this page and then up-date the TOP Tables. Should several pages be inserted into the cycle at the same time (e.g. when initializing the teletext computer or by a collective command given at a certain time of day), it can be useful that the teletext computer first completely inserts all the pages waiting to be dealt with and then up-dates the TOP Tables together.

When removing a page from the cycle, the computer must work in the reverse order; first to up-date the TOP Tables and then remove the pages. This ensures that a decoder does not wait in vain for the arrival of a page listed in the TOP Tables when it has already been deleted from the cycle.

Up-dating character/sub-code
A change or up-dating of the Basic TOP Table or of one of the other TOP Tables listed in the Page-Linking-Table is indicated by a change in the numerical value in the sub-code section [2] (Bits b4, b5, b6) in the page header of the Basic TOP Table. (The behaviour of the control bit C8 = text renewal in the page headers of the TOP Tables is therefore meaningless.)

Bits b0 to b3 are used to identify normal or multiple pages.

The six highest value bits in the sub-code are permanently set to logic “1” as a definite criterion for a Basic TOP Table.
The page sub-code of the BT can therefore assume values between 3F00 and 3F71.

Composition of the page sub-codes in the Basic TOP Table:

```
3F x x
```

- \(0_{\text{hex}}\): BT transmitted as normal page
- \(1_{\text{hex}}\): BT transmitted as multiple page

<table>
<thead>
<tr>
<th>Fixed value for identification of the Basis TOP Table</th>
<th>Up-dating character = 0...7</th>
<th>Bit: b4...b6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit: b8...b13</td>
<td></td>
<td>Bit: b0...b3</td>
</tr>
</tbody>
</table>

**Serial magazine transmission (Serial mode):**

One Basic TOP Table is transmitted for the entire teletext programme. All pages with decimal page numbers (100 to 899) are labelled in accordance with their currently valid status in the Basic TOP Table.

Rows 1 to 21 or 22 are transmitted completely.

The Basic TOP Table is transmitted under page number 1F0 3Fxx.

Transmission of the Basic TOP Table List can be optional.

**Parallel magazine transmission (Parallel mode)**

For each individual (transmission) magazine, a separate Basic TOP Table can be transmitted in the same magazine or, if a teletext source supplies several magazines, the information for several magazines can also be combined into one Basic TOP Table.

Rules for magazine(-related) Basic TOP Tables
In each Basic TOP Table, the pages associated with their respective magazines are (at least) marked in accordance with their currently valid status.

On transmission, the rows in the Basic TOP Table that are not relevant to the respective (transmission) magazine can be omitted.

The Basic TOP Table is transmitted under the page number YF0 3Fxx. \(Y\) represents the respective magazine number.

Example: Transmission of the Basic TOP Table for Magazine 3 on Page 3F0 3Fxx with Rows 6, 7 and 8

<table>
<thead>
<tr>
<th>Magazine 3</th>
<th>Page 300 ... Page 399</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marking corresponding to the Basic TOP Table (Figure 3)</td>
<td>Row 6 ... Row 8 Column 0 ... Column 19</td>
</tr>
</tbody>
</table>
Each Basic TOP Table contains a Basic TOP Table List with details for the particular magazine as well as the other magazines.

Rules for combined Basic TOP Tables:

- If a teletext source supplies several magazines in the parallel mode, it is possible to combine the magazine(-related) Basic TOP Information for several magazines into one Basic TOP Table.

- On transmission, the remaining magazine(-related) Basic TOP Tables (whose content has been taken into account in the combination) can be omitted.

- If several magazines are combined into one Basic TOP Table, this is to be transmitted in the magazine with the lowest page number.
  (See also Figure 4B).

- A combination of individual magazines is indicated in the Basic TOP Table List.

- If (in an exceptional situation) no data should be produced for a magazine, the code “0” must be inserted in this magazine’s field (see also Figure 4B).

2.1.5 Rules for the interpretation of the Basic TOP Table at the receiving end

The Basic TOP Table is to be called up with the complete page number including the sub-code, in which both the lowest value positions of the sub-code are set to “Don’t care”, e.g. 1F0 3Fxx with serial-magazine transmission.

The Basic TOP Table, or at least the page header, is to be read in again at a suitable interval, in order to include the changes to and up-dating of the TOP Tables (see also Para. 2.1.4, Up-dating character in the page sub-code in the page header of the Basic TOP Table). A renewed read-in of the Basic TOP Table is similarly necessary when reception of the Basic TOP Table is incomplete or disturbed.

In addition, with parallel-magazine transmission, the following applies: it is only necessary for the magazine identified in the Basic TOP Table, that is to say the relevant rows and columns of the respective Basic TOP Table, to be interpreted.

When a three-figure number is keyed-in for a page that is marked in the Basic TOP Table with “page not in cycle”, an immediate appropriate indication should be given to the user (e.g. “Page not available”). The selection and the indication of such a page should, however, not be prevented. (This is advantageous, for example, if, at the beginning of a programme with sub-titles, the receiver has not yet carried out the up-dating of the Basic TOP Table).

2.2 Page-Linking Table (PL)

2.2.1 Information content of the Page-Linking Table

The Page-Linking Table contains a list of page numbers on which the rest of the TOP system tables are transmitted. Apart from the page numbers, the list contains details of the respective table identifications (e.g. Multipage Table or Additional Information Table).
2.2.2 Structure of the Page-linking Table

The format of the table is matched to the format of the teletext pages. For the Page-Linking Table, use is made of two rows, each of 40 columns, of a teletext page. In each row, up to 5 page numbers and the respective table identifications can be represented. Altogether, it is possible for $2 \times 5 = 10$ further TOP tables to be addressed in Rows 21 and 22 of a teletext page. The structure of the Page-Linking Table is shown in Figure 1 and Figure 5.

2.2.3 Coding of the Page-Linking Table

The coding of the page numbers and the table identifications is carried out in accordance with Figure 5.

The channel code is made up from the source code by use of the (8/4) Hamming code [1].

2.2.4 Rules for the generation and transmission of the Page-Linking Table

The Page-Linking Table is generated at the transmitting end as laid down in Paras. 2.2.2 and 2.2.3.

It is transmitted on a teletext page together with the Basic TOP Table. The transmission of the Page-Linking Table is thus effected in Rows 21 and 22.

For other limitations, see Para. 2.1.4, the generation and transmission of the Basic-TOP Table.

If no more than four table page numbers are needed, the transmission of Row 22 can be omitted. In that case, care should be taken that the fifth field of Row 21 must contain the "End-symbol" and that all preceding unused fields must contain the "Don't care" symbol.

Or, alternatively:

If less than 10 table page numbers are needed in the table, the substitute symbol "Don't care" is entered in each first byte for the unused fields.

(When use is made of the "Don't care" symbol or the "End-symbol", the remaining 7 bytes that follow in the same field should, if possible, be set to "0".

2.2.5 Rules for the interpretation of the Page-Linking Table at the receiving end

The bytes in the same field following a "Don't care" symbol or an "End-symbol" have no significance for the receiver. Where it occurs, a row following an "End-symbol" has no significance for the receiver.

The Page-Linking Table has to be read in again each time after the identification of a change in the up-dating character in the page header of the Basic TOP Table.

A renewed read-in of the Basic TOP Table is similarly necessary in the case of incomplete or disturbed reception.
3. **Multipage Tables**

Two types of Multipage Table are foreseen:

- One, the Multipage Table (MP), which is constructed in accordance with the coordinate system of the Basic TOP Table and allows for the unambiguous identification of up to 9 sub-pages for each multiple page.

- The other, the Multipage Extension Table (MP-EX), which allows for the marking of up to 8191*sub-pages for each multiple page. (This corresponds to the maximum sub-code value 3F7Fw.) The Multipage Extension Table is made up in the form of a list.

3.1 **Multipage Table (MP)**

3.1.1 **Information content of the Multipage Table**

In the Multipage Table, all currently transmitted multiple pages are marked and special identifications assigned for the number of the sub-pages in each case.

3.1.2 **Structure of the Multipage Table**

The Multipage Table is constructed in accordance with the Basic TOP Table (see Para. 2.1.2, the structure of the Basic TOP Table).

3.1.3 **Coding of the Multipage Table**

The coding is carried out in accordance with the code table shown in Figure 6.

The channel code is made up from the source code by use of the (8/4) Hamming code [1].

3.1.4 **Rules for the generation and transmission of the Multipage Table**

The Multipage Table is generated at the transmitting end as laid down in Paras. 3.1.2 and 3.1.3.

**Serial magazine transmission (Serial mode):**

Only one Multipage Table can be transmitted for the whole teletext programme.

If a Multipage Table is to be transmitted in the teletext programme, the page number (including the sub-code) and this table's identification must be entered in the Page-Linking Table.

All multiple pages with decimal page numbers (100 to 899) are marked in accordance with the number of the currently associated sub-pages in the Multiple Table. Rows 1 to 20 are transmitted completely.

**Parallel magazine transmission (Parallel mode)**

For each individual (transmission) magazine, an independent Multipage Table can be transmitted in the same or in another magazine.
Note: In the parallel mode, one Multipage Table can also contain multipage marks for several (transmission) magazines (see also Figure 8, TOP in parallel mode).

If an assigned Multipage Table is transmitted for a (transmission) magazine, the page number (including the sub-code) and this table's identification must be entered in the Page-Linking Table transmitted in the respective (transmission) magazine.

All multiple pages with decimal page numbers in the assigned (transmission) magazine(s) are marked in accordance with the number of the currently associated sub-pages in the Multiple Table.

On transmission, the rows in the Multipage Table that are not relevant to the assigned magazine(s) can be omitted.

3.1.5 Rules for the interpretation of the Multipage Table at the receiving end

- The Multipage Table is to be called up with the complete page number (including sub-code) contained in the associated Page-Linking Table.

- If a multipage identification for a particular page is detected by the receiver in the Multipage Table, it is only valid if, at the same time, the page is identified as a multiple page in the Basic TOP Table.

- The Multipage Table is to be read in again each time after the recognition of a change in the up-dating characteristic in the page header of the Basic TOP Table.

- A renewed read-in is similarly necessary when reception is incomplete or disturbed.

- In addition, with parallel-magazine transmission, the following applies: it is only necessary to interpret the rows and columns of the Multipage Table relevant to the assigned (transmission) magazine(s).

3.2 Multipage Extension Table (MP-EX)

3.2.1 Information content of the Multipage Extension Table

The Multipage Extension Table contains a list of multiple page numbers and the details of the respective number of the sub-pages (in the sub-code byte +3 to +6, see Figure 6A).

3.2.2 Structure of the Multipage Extension Table

The format of the table matches the format of the teletext pages. For a Multipage Extension Table, use is made of 22 rows of a teletext page, each with 40 columns. Five fields are arranged in each row. One multiple page number can be entered in each field together with the number of its sub-pages. Altogether, it is possible for $22 \times 5 = 110$ multiple pages to be entered in Rows 21 and 22 of a Multipage Extension Table. The structure of the Page-Linking Table is shown in Figure 6A.

3.2.3 Coding of the Multipage Extension Table

The coding is carried out in accordance with the code table given in Figure 6A. The channel code is made up from the source code by use of the (8/4) Hamming code [1].

Figure 6B gives some examples of the representation of the number of sub-pages in the Multipage Extension Table.
3.2.4 Rules for the generation and transmission of the Multipage Extension Table

The transmission of the Multipage Extension Table is left to the discretion of each broadcasting organization.

Other rules:
- If less than 22 rows are needed for the listing of the multiple pages, the transmission of the remaining unused rows may be omitted. In addition, the "End-symbol" is placed in the 5th field of the last row used or - if this field is already occupied - in the 5th field of the following row and the "Don't care" symbol entered in all preceding unused fields.

or alternatively:

If less than 110 multiple pages (22 rows of 5 fields) are entered in the table, the substitute symbol "Don't care" is put into the unused fields.

(When the "Don't care" and "End" symbols are used, the rest of the following bytes in the same field should, if possible, be set to "0").

- It is inadmissible to duplicate the same page numbers.

- The use of the last byte of each field has not yet been defined. It therefore remains as reserve capacity available for future developments.

- The use of the 3rd bit in each field, which is not needed for the representation of the number of the sub-pages, has not yet been defined. Consequently they remain as reserve capacity available for future developments.

Serial magazine transmission (Serial mode):

The list of the multiple page numbers is transmitted in a Multipage Extension Table or, if one table is not sufficient, in several tables.

The page number(s) (including the sub-codes), under which the Multipage Extension Table(s) is (are) transmitted, must be entered in the Page-Linking Table as well as the table identifications.

Parallel magazine transmission (Parallel mode)

For each individual (transmission) magazine, one or, if necessary, several separate Multiple-Table(s) can be transmitted in the same or another magazine.

Note:

In the parallel mode, the Multipage Table(s) can also contain information for several (transmission) magazines (similarly to the use of an Additional Information Table for two (transmission) magazines as depicted in Figure 8, TOP in parallel mode).

If multipage information is transmitted for one (transmission) magazine on one (or if necessary, more) Multipage Extension Table(s), the page number(s) (including the sub-code) and this table's (these tables') identification must be entered in the Page-Linking Table transmitted in the corresponding (transmission) magazine.
3.2.5 Rules for the interpretation of the Multipage Extension Table at the receiving end

- The Multipage Extension Table(s) is (are) to be called up with the complete page number(s) (including the sub-code) contained in the associated Page-Linking Table.

- If a multipage identification for a particular page is detected by the receiver in the Multipage Table, it is only valid if, at the same time, the page is identified as a multiple page in the Basic TOP Table.

- The Multipage Extension Table is to be read in again each time after the recognition of a change in the up-dating characteristic in the page header of the Basic TOP Table.

- A renewed read-in is similarly necessary when reception is incomplete or disturbed.

- The bytes in the same field following a "Don't care" symbol or an "End-symbol" have no significance for the receiver. Where the situation arises, the rows following an "End-symbol" have no significance for the receiver.

4. Additional Information Table

4.1 Information content of the Additional Information Table

The Additional Information Table contains additional details for particular teletext pages, such as the title of a page, possibly a so-called direct selection code and linking information.

4.2 Structure of the Additional Information Table

The format of the table matches the format of the teletext pages. 22 rows, each with 40 columns, are used for an Additional Information Table. Additional information for two teletext pages can be represented in each row. Altogether, it is possible to accommodate additional information for $22 \times 2 = 44$ pages in Rows 1 to 22 of one teletext page.

The structure of the Additional Information Table is depicted in Figure 1 and Figures 7 and 7A.

4.3 Coding of the Additional Information Table

The coding of the additional information contained in the Additional Information Table is done in accordance with Figures 7 and 7A. For Bytes 0...7 and 20...27, the channel code is made up from the source code by use of the $(8/4)$ Hamming code [1].

For Bytes 8...19 and 28...39, the channel code results from adding a parity bit (odd parity) to the (7 bit) source code.
4.4 Rules for the generation and transmission of the Additional Information Table

The Additional Information Table is generated at the transmitting end as laid down in Paras. 4.2 and 4.3.

In addition, the following rules apply:

- If less than 22 rows are used, the transmission of the remaining unused rows may be omitted. In addition, the "End-symbol" is placed in the 2nd field of the last row used. If this field is already occupied, the "Don't care" symbol must be placed in the 1st field of the following row and the "End-symbol" in the 2nd field of that row.

or alternatively:

If less than 44 additional-information items are entered in the table, the substitute symbol "Don't care" is put into the unused fields.

(When the "Don't care" and "End" symbols are used, the rest of the following 7 Hamming-coded bytes in the same field should, if possible, be set to "0").

- the standard character set for the display of a title is defined by the three control bits C12 to C14 in the page header of the corresponding Additional Information Table (in which the title is listed) [2].

Titles with different character sets are transmitted in different Additional Information Tables, in which the different control bits C12 to C14 corresponding to the respective character sets are situated.

(In addition, it should subsequently be possible to assign to any of the titles, instead of the standard character set, a special character set (not defined by C12 to C14 in the Teletext Specification). In addition, an "Extension-Information" is foreseen within the Additional Information Table, which should however be specified only when needed; see also Figures 7 and 7A.)

- As titles are entered in the title field from the left-hand side, any remaining positions in the field that are not needed are filled with "Blank" symbols (Hexcode: 20). If at all possible, the "Slash" symbol should not be used in titles.

- No more than two different pages can be given the same direct selection code.

- It is inadmissible to duplicate the same page numbers.

Serial magazine transmission (Serial mode):

The additional information for all pages of the entire teletext programme is transmitted in one Additional Information Table or, if one table is insufficient, in several tables. The page number(s) (including the sub-codes), under which the Additional Information Table(s) is (are) transmitted, and this table's (these tables') identification(s) must be entered in the Page-Linking Table.
Parallel magazine transmission (Parallel mode)

For each individual (transmission) magazine, independent additional information items in one or, if necessary, more Additional Information Table(s) can be transmitted in the same or in another magazine.

Note: In the parallel mode, the Additional Information Table(s) can also contain information for several (transmission) magazines (see also Figure 8, TOP in parallel mode). If additional information is transmitted for one (transmission) magazine on one (or if necessary, more) Additional Information Table(s), the page number(s) (including the sub-code) and this table's (these tables') identification(s) must be entered in the assigned Page-Linking Table.

4.5 Rules for the interpretation of the Additional Information Table at the receiving end

- The Additional Information Table(s) is (are) to be called up with the complete page number(s) (including the sub-code) contained in the associated Page-Linking Table.

- Determination of currently valid pages with additional information:
  
  If the receiver detects a particular page in the Additional Information Table, the information for the page in question is only valid if, at the same time, the page is marked in the Basic TOP Table as a page with additional information.

- Determination of currently valid pages with direct selection code:
  
  If the receiver detects several currently valid pages with the same direct selection code, the page with the lowest page number is to be assigned to the direct selection code.

- Determination of the title for user information:
  
  The block title forms a textual whole together with the titles of the associated groups and the titles of the pages with direct selection codes, which should also be coherently displayed by the receiver for user information.
  
  A renewed read-in is necessary if the received Additional Information Table is defective. Until correct reception is possible, the respective page numbers can be displayed for the user instead of the user-guidance text (prompt rows, index pages).

- The Additional Information Table is to be read in again each time after the recognition of a change in the up-dating characteristic in the page header of the Basic TOP Table.

- A renewed read-in is similarly necessary when reception is incomplete or disturbed.

- The bytes in the same field following a "Don't care" symbol or an "End-symbol" have no significance for the receiver. Where the situation arises, the rows following an "End-symbol" have no significance for the receiver.
4.6 Link information

When the pages are selected at the receiving end, the linking information makes it possible to arrange the selected row sequence in accordance with the requirements of the editorial staff. By this means the otherwise predetermined row sequence corresponding to the page numbers can be varied.
The link information consists of a "Link-Command" - (1st byte) and the "Link-Data" field (3rd byte). The link commands "JUMP", "CALL-PAGE(S)", "CALL-BLOCK(S) or GROUP(S)" and "RETURN".
Figure 7A shows the structure and the coding of the link information.

4.6.1 "JUMP"

Function:

- The link-command JUMP indicates that, instead of the page that includes this order (= jump-page), another page should be displayed and the programme sequence continued from there.

- The page number of this page, to which the jump has been made (= follow-page), is contained in the link-data field.

- The following JUMP combinations are permitted:

  a JUMP command to a block page:
  bypasses one or more blocks

  a JUMP command to a group page:
  bypasses one or more groups of a block

  a JUMP command to a normal page:
  bypasses one or more normal pages in the same group

Rules for the use of JUMP commands at the transmitting end:

- Only the permitted combinations described above may be used for jump-pages and follow-pages.

- The page number entered in the link-data field must be available in the Basic TOP Table (and also transmitted with it).

- No unintentional continuous loops may be created when the JUMP command is used.

- The follow-page of a JUMP command, or of a JUMP command contained in a sub-routine, may not lie outside the sub-routine (see also 4.6.2 and 4.6.3).

Rules for the interpretation of the JUMP command at the receiving end:

- The prompt row (or the index of the TOP blocks and groups generated by the decoder) is to be composed taking account, as appropriate, of existing JUMP commands. That is to say, any blocks, groups or pages bypassed with the JUMP command may not be shown in the prompt row or in the TOP block and group index.

- the selection of pages that are bypassed with the JUMP command is possible by keying-in the page number.
4.6.2 "CALL-PAGE(S)"

Function:

- The CALL-PAGE command indicates that another part of the programme (= sub-routine) should be inserted immediately after the page that contains this command (= call-page).

- The pages contained in the sub-routine are to be inserted as normal pages immediately after the call-page (without consideration of their actual TOP hierarchy).

- The page number of the first page of the sub-routine (= sub-routine start-page) is given in the link-data field, as well as a sub-routine label "x" in the link-command field.

- The sub-routine begins with the page number given in the CALL-PAGE command.

The sub-routine ends after a page that contains the link-command "RETURN-LABEL x". The label x must also match the label of the selected CALL-PAGE command. In addition, the "RETURN-ALL-LABEL" command terminates a sub-routine irrespective of the selected label.

- Any page can call up a sub-routine with the CALL-PAGE command: e.g. (among others) a block page (see Figure 9A, Column 3), a group page (see Figure 9B, Column 3) or a normal page (see Figure 9C, Column 3).

- Within a sub-routine only one further sub-routine can be called up (2-level nesting).

Rules for the use of the CALL-PAGE command at the transmitting end:

- The page number entered in the link-data field must be available in the Basic TOP Table (and also transmitted with it).

- No unintentional continuous loops may be created when the CALL-PAGE command is used.

- Account must be taken of the restriction to two-level nesting.

- The follow-page of a JUMP command, or of a JUMP command contained in a sub-routine, may not lie outside the sub-routine (see also 4.6.2 and 4.6.3).

Rules for the interpretation of the CALL-PAGE command at the receiving end:

- The selection of the inserted pages is effected by means of the "Next Page" button.

- A JUMP command within a sub-routine must be executed.

- If no associated RETURN command is found for a CALL-PAGE command, the command in question should not be executed.
4.6.3 "CALL-BLOCK(S) or GROUP(S)"

Function:

- The CALL-BLOCK(S) or GROUP(S) command indicates that another part of the programme (= sub-routine) should be inserted at the particular place in the programme.

- The pages contained in the sub-routine are inserted into the programme after the call-page in accordance with their TOP hierarchy (see following table).

- The page number of the first page of the sub-routine (= sub-routine start-page) is given in the link-data field, as well as a sub-routine label "x" in the link-command field.

- The sub-routine begins with the page number given in the CALL-PAGE command.

- The sub-routine ends after the last page of an inserted block or an inserted group that contains the link-command "RETURN-LABEL x". The label x must also match the label of the selected CALL-BLOCK(S) or GROUP(S) command. In addition, the "RETURN-ALL-LABEL" command terminates a sub-routine irrespective of the selected label.

- Selected pages can be block or group pages. Block or group pages are permitted to be sub-routine start-pages, irrespective of their TOP hierarchy. The following table shows the permitted combinations and describes the working of the command. A graphic representation is given in Figures 9A, 9B and 9C.

- Within a sub-routine only one further sub-routine can be called up (two-level nesting).
The following combinations are possible:

<table>
<thead>
<tr>
<th>The selected page is a ...</th>
<th>Sub-routine start-page is a...</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block page</td>
<td>Block page</td>
<td>Insertion of one or more blocks after the selected page's own block up to and including the block labelled with &quot;RETURN&quot; (see Figure 9A, Column 1)</td>
</tr>
<tr>
<td>Block page</td>
<td>Group page</td>
<td>Insertion of one or more groups of any block in front of the next group on the selected page (or, if there is no group, before the next block) up to and including the group labelled with &quot;RETURN&quot; (see Figure 9A, Column 2)</td>
</tr>
<tr>
<td>Group page</td>
<td>Group page</td>
<td>Insertion of one or more groups of a block after the selected page's own group up to and including the group labelled with &quot;RETURN&quot; (see Figure 9B, Column 2)</td>
</tr>
</tbody>
</table>
Rules for the use of the "CALL-BLOCK(S) or GROUP(S)" command at the transmitting end:

- The page number entered in the link-data field must be available in the Basic TOP Table (and also transmitted with it).

- Only the permitted combinations for selected page and sub-routine start-page may be used (see table on previous page).

- No unintentional continuous loops may be created when the CALL-BLOCK(S) or GROUP(S) command is used.

- Account must be taken of the restriction to two-level nesting.

- The follow-page of a JUMP command, or of a JUMP command contained in a sub-routine, may not lie outside the sub-routine (see also 4.6.2 and 4.6.3).

Rules for the interpretation of the CALL-BLOCK(S) or GROUP(S) command at the receiving end:

- The selection of the inserted pages is effected in accordance with their TOP hierarchy by means of the "Next Page", "Next Group" and "Next Block" buttons.

- The prompt row (or the index of the TOP blocks or groups generated by the decoder) is to be composed taking account of "CALL-BLOCK(S) or GROUP(S)" commands. That is to say that any blocks or groups inserted with the "CALL-BLOCK(S) or GROUP(S)" command must be shown in the prompt row or in the TOP block and group index.

- Within a sub-routine only one further sub-routine can be called up (two-level nesting).

- A JUMP command within a sub-routine must be executed.

- If no associated RETURN command is found for a CALL-BLOCK(S) or GROUP(S) command, or other inadmissible combinations arise (see Figures 9A, 9B and 9C), the command in question should not be executed.
5. **List of Illustrations**

Figure 1  The TOP System

Figure 2  Code Table: (8/4) Hamming code

Figure 3  Structure of the Basic TOP table (with Basic TOP Table List and Page-Linking Table)

Figure 4  Code Table: Basic TOP Table

Figure 4A  Structure and coding of the Basic TOP Table List

Figure 4B  Example for a Basic Top Table List in parallel mode

Figure 5  Structure and coding of the Page-Linking Table

Figure 6  Code table: Multipage Table

Figure 6A  Structure and coding of the Multipage Extension Table

Figure 6B  Example for the display of the number of sub-pages in the Multipage Extension Table

Figure 7  Structure and coding of the Additional Information Table

Figure 7A  Additional Information Table
Extension indication and Link information

Figure 8  TOP in parallel mode

Figures 9A, 9B & 9C  Summary of the Link commands
### Basic TOP Table (BT)

- Marking of all currently transmitted pages with special identifications for: normal, group, block, subtitle or programme-preview block pages with or without additional information.

### Multipage Table (MP)
- Multipage Extension Table (MP-EX)
  - Marking resp. list of currently transmitted multipages with special identifications for the number of sub-pages.

### Additional Information Table (AI)
- List with page numbers and associated additional information (e.g. titles for pages, direct-selection codes, link informations).

---

**Fig. 1** The TOP System
### Coding

<table>
<thead>
<tr>
<th>Source code</th>
<th>Channel code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hexadecimal notation</strong></td>
<td><strong>Decimal notation</strong></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
</tr>
<tr>
<td>C</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>13</td>
</tr>
<tr>
<td>E</td>
<td>14</td>
</tr>
<tr>
<td>F</td>
<td>15</td>
</tr>
</tbody>
</table>

**Protection bits**

$b_7 = b_8 \oplus b_6 \oplus b_4$

$b_5 = b_6 \oplus b_4 \oplus b_2$

$b_3 = b_4 \oplus b_2 \oplus b_8$

$b_1 = b_2 \oplus b_8 \oplus b_6$

$\oplus = $ Exklusiv-Or

$b_1$ is transmitted first

### Decoding

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Interpretation</th>
<th>Information is</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>no error</td>
<td>taken over</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>b8 faulty</td>
<td>corrected</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>b7 faulty</td>
<td>taken over</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>b6 faulty</td>
<td>corrected</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>b5 faulty</td>
<td>taken over</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>b4 faulty</td>
<td>corrected</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>b3 faulty</td>
<td>taken over</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>b2 faulty</td>
<td>corrected</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>b1 faulty</td>
<td>taken over</td>
</tr>
<tr>
<td>A, B, C = 0</td>
<td></td>
<td></td>
<td></td>
<td>several errors</td>
<td>rejected</td>
</tr>
</tbody>
</table>

### Fig. 2 Code Table: (8,4) Hamming code
Fig. 3  Structure of the Basic TOP Table
(with Basic TOP Table List and Page-Linking Table)
<table>
<thead>
<tr>
<th>Page identification</th>
<th>as multipage</th>
<th>with additional information</th>
<th>Source code (hexadecimal notation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page not included</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Subtitle page</td>
<td></td>
<td>x</td>
<td>1</td>
</tr>
<tr>
<td>Programme- preview block page</td>
<td>x</td>
<td>x</td>
<td>2</td>
</tr>
<tr>
<td>Block page</td>
<td>x</td>
<td>x</td>
<td>3</td>
</tr>
<tr>
<td>Group page</td>
<td></td>
<td>x</td>
<td>4</td>
</tr>
<tr>
<td>Normal page</td>
<td></td>
<td>x</td>
<td>5</td>
</tr>
<tr>
<td>4 further codes *)</td>
<td></td>
<td>x</td>
<td>6</td>
</tr>
<tr>
<td>for future extension</td>
<td></td>
<td>x</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B</td>
</tr>
</tbody>
</table>

*) no effect in the receiver

**Fig. 4 Code Table: Basic TOP Table**
**Fig. 4A**  Structure and coding of the Basic TOP Table List

Basic TOP Table

<table>
<thead>
<tr>
<th>Byte 32</th>
<th>...</th>
<th>Byte 39</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Row 23

Columns contain information for magazine ...

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
</table>

Codetable for magazine 1 ... 8

<table>
<thead>
<tr>
<th>Function</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Associated TOP Table in magazine ...</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Magazine without TOP</td>
<td>C</td>
</tr>
<tr>
<td>Magazine not transmitted</td>
<td>D</td>
</tr>
<tr>
<td>No data</td>
<td>0</td>
</tr>
<tr>
<td>5 further codes for future extension</td>
<td></td>
</tr>
</tbody>
</table>


Figure 4 B

Example for a Basic TOP Table List with parallel magazine transmission and combined Basic TOP Table

Example:

One programme supplier sends Magazines 1, 2 and 3 in parallel mode. In order to speed up the TOP initialization at the receiving end, he brings the Basic-TOP-Information for Magazines 1, 2 and 3 together in the Basic TOP Table 1F0 3Fxx.

A second programme supplier provides Magazines 4 and 5.
No data are produced for Magazine 8.

Both the Basic TOP Table List in the Basic TOP Table 1F0 3Fxx from the first supplier and the Basic TOP Table List in the Basic TOP Table 4F0 3Fxx from the second supplier have the following appearance:

<table>
<thead>
<tr>
<th>Column 32</th>
<th>Column 39</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1 1 4 4 D D 0</td>
<td></td>
</tr>
</tbody>
</table>

Row 23

After the Basic TOP Table 1F0 3Fxx has been received, the receiver recognizes that the information for Magazines 2 and 3 is also contained in this Basic TOP Table and that, in addition, the information for Magazines 4 and 5 is transmitted in the Basic TOP Table 4F0 3Fxx.

For Magazine 8, a check is carried out to determine whether this magazine is occupied and whether a separate Basic TOP Table is being transmitted.
Fig. 5  Structure and coding of the Page Linking Table
<table>
<thead>
<tr>
<th>Multipage identification</th>
<th>Source code (hexadecimal notation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 multipages</td>
<td>2</td>
</tr>
<tr>
<td>3 multipages</td>
<td>3</td>
</tr>
<tr>
<td>4 multipages</td>
<td>4</td>
</tr>
<tr>
<td>5 multipages</td>
<td>5</td>
</tr>
<tr>
<td>6 multipages</td>
<td>6</td>
</tr>
<tr>
<td>7 multipages</td>
<td>7</td>
</tr>
<tr>
<td>8 multipages</td>
<td>8</td>
</tr>
<tr>
<td>9 multipages</td>
<td>9</td>
</tr>
<tr>
<td>≥10 multipages</td>
<td>A</td>
</tr>
</tbody>
</table>

7 further codes *)
for future extensions

*) no effect in the receiver

Fig. 6 Code table: "Multipage Table"
Fig. 6A  Structure and coding of the Multipage Extension Table

- no effect in the receiver
- according to teletext specification
- permissible only in byte 32
<table>
<thead>
<tr>
<th>Multipage Extension Table</th>
<th>byte + 3</th>
<th>byte + 4</th>
<th>byte + 5</th>
<th>byte + 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
</tr>
<tr>
<td>15 dez = XX00 0000 X000 1111 bin</td>
<td>16 dez = XX00 0000 X001 0000 bin</td>
<td>127 dez = XX00 0000 X111 1111 bin</td>
<td>128 dez = XX00 0000 X000 0000 bin</td>
<td>2047 dez = XX00 0000 X111 1111 bin</td>
</tr>
<tr>
<td>2048 dez = XX01 0000 X000 0000 bin</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
</tr>
<tr>
<td>F</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
<td>0, 4, 8, C, 0</td>
</tr>
<tr>
<td>3, 7, B, F</td>
<td>7, F</td>
<td>7, F</td>
<td>7, F</td>
<td>7, F</td>
</tr>
</tbody>
</table>

Fig. 6B Example for the display of the number of sub-pages in the Multipage Extension Table.
Fig. 7
Structure and coding of the Additional Information Table

Field Descriptor
Magazine No. 1-8

Page No. tens
Page No. units

4 bytes Linking Information

Direct selection

12 bytes for title

Byte+0
Byte+1
Byte+2
Byte+3...Byte+6
Byte+7
Byte+8
Byte+19

Code table (Part 1)
Byte: 0,20

1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8

Magazine number

Code table (Part 2)
Byte: 0,20

Extension

Code table for Byte+1, Byte+2 and Byte+3 correspond to the Code tables for Magazine and Page number

16 bytes for future extensions

Byte+0
Byte+1
Byte+2
Byte+3
Byte+4
Byte+19

Code table (Part 3)
Byte: 0,20

5 further codes *)
for future extensions

0
9
A
B
C

Don't care

End-symbol *)

F

*) No effect in the receiver

†) According to teletext specification

††) Permissible only in Byte 20

Character set defined by C12, C13, C14

* indicates extra characters

FIG. 7A
Fig. 7A
Additional Information Table,
Extension indication and Link information

Field Descriptor
Page No.
4 bytes
Page No.
Linking
4 bytes
information
0 - 6
Direct
Byte+0
Byte+1
Byte+2
Byte+7
Byte+8
Byte+9
selection

Magazine No.
Page No.
Page No.
units

11 bits for future extensions

11 bits for future extensions

no Link Information
for future extensions

RETURN
3
all Labels
Label 0
Label 1
Label 2
Label 3

JUMP
1

CALL
Label 0
Label 1
Label 2
Label 3

PAGE(S)
8

CALL
or
GROUP(S)

Label 0
Label 1
Label 2
Label 3

C
D
E
F

1 or more
extension fields
in this Al

Fig.7
D
19 bytes
Fig. 8  TOP in parallel mode
Fig. 9A Summary of the Link commands, Part 1

"CALL-BLOCK(S)"

B1  CALL B3,
    Label x

B2

B3  RETURN
    Label x

B4

---

"CALL-GROUP(S)"

B1  CALL G32,
    Label x

G11

G12

G32

G33  RETURN
    Label x

B4

---

"CALL-PAGE(S)"

B1  CALL N311,
    Label x

G11

N111

G12

G31

N311

N312  RETURN
    Label x

B4

---

Fig. 9A, Column 1  Fig. 9A, Column 2  Fig. 9A, Column 3
Fig. 9B Summary of the Link commands, Part 2

"CALL–GROUP(S)"

"CALL–PAGE(S)"

G11  CALL G32, Label x

<

G12

G32  RETURN Label x

N321

N322

N323  RETURN Label x

G33

G33

Fig. 9B, Column 2  Fig. 9B, Column 3
Fig. 9C Summary of the Link commands, Part 3

"CALL-PAGE(S)"

\[
\begin{align*}
\text{N111} & \quad \text{CALL N311, Label x} \\
\text{N112} & \\
\text{N311} & \\
\text{N312} & \quad \text{RETURN Label x} \\
\end{align*}
\]

Fig. 9C, Column 3
ARD/ZDF/ZVEI Guideline
"TOP" System for Teletext

Annexes to the System Specification

A1 Guidelines for the TOP system
A2 Recommendations
A3 Description of the TOP system
A4 Abbreviations and definitions of terms employed
A5 References
Annexe 1

Guidelines for the TOP System

1. Requirements for the teletext transmitting installation

Apart from the rules already laid down in the specification for the generation of the TOP Tables at the source, and their transmission, the following requirements are to be met by the teletext transmitting installation.

- All teletext computers and teletext sub-title computers belonging to the ARD Members and the ZDF must generate the TOP Tables corresponding to the transmitted teletext programme. Any teletext combiners in the transmission chain must accept the incoming TOP Tables in accordance with their function and insert them in the output transmission cycle. It is thereby ensured that at each point in the signal chain the TOP Tables correspond to the teletext programme.

Whereas the teletext computers transmit the TOP Tables embedded in the programme transmission cycle, the sub-title computers must transmit the TOP Tables at regular intervals of about 10 seconds, as in this case there is no real transmission cycle.

- all the TOP Tables contained in the teletext programme are transmitted at least once during a cycle.

- when there is interference, or outside the period of the normal teletext programme (e.g. during a data-bridge cycle), it is possible to dispense with the transmission of the TOP Tables.

- An appraisal of current television programmes shows that two Additional Information Tables (i.e. 88 block or group titles) are sufficient for the display of a normal teletext programme. When required, extension to three Additional Information Tables is possible. No more Additional Information Tables will be transmitted before 1995.

- Two methods of identification of transmitted multiple pages can be chosen.

(a) The “Multipage Table” (MP) is transmitted exclusively.

(b) Both the “Multipage Table” (MP) and one or more “Multipage Extension Table(s)” (MP-EX) are transmitted. By this means, it is possible to list in the MP-EX(s) either only those multiple pages with more than 9 sub-pages or, alternatively, all the multiple pages.
2. **Requirements for the TOP domestic receivers**

Apart from the rules already laid down in the specification for the effect of the TOP Tables at the receiving end, the following requirements are to be met by a TOP domestic receiver.

- The maximum waiting time for the arrival of the "Basic TOP Table" at the receiving end should be adjusted to about one minute ("Time-Out" time for the beginning of the TOP initialization after the domestic television receiver is switched on or after switching to another programme). Should the receiver not detect a TOP Table, conventional page selection must be possible as the fall-back mode.

- Care must therefore be taken that TOP decoders will also continue to work if, in the future, currently unallocated codes are used or TOP Tables, not at present defined, are transmitted.

- New decoder designs should be able to make use of the MP format as well as the MP-EX format in order to be able to determine completely the number of multiple pages by the methods given in Para.1.
Annexe 2

Recommendations

1. **Recommendation on page numbering for the transmission of the Multipage Table and the Additional Information Table(s)**

   The page number, on which the Basic TOP Table is transmitted, is laid down in the TOP Specification as 1FO 3FxX.

   The page numbers of the normal TOP Tables may be freely chosen according to the specification of the individual broadcasting organization. In order that these page numbers may be identified at the receiving end, they are entered into the Page-Linking Table at the sending end. After receiving the Basic TOP Table (which also includes the Page-Linking Table), the receiver determines the page numbers of the normal TOP Tables from the Page-Linking Table. These will be called up afterwards. After the arrival of these pages the TOP initialization is completed. Because of the two-step calling-up process, the time required for the TOP initialization can amount, in the extreme case, to two teletext transmission cycles.

   The broadcasting organizations are recommended to transmit the Multipage Table and the Additional Information Table(s) for preference on the particular page numbers given below:

   - Multipage Table : 1F1 0000
   - Additional Information Table 1 : 1F2 0000
   - Additional Information Table 2 : 1F3 0000

   The equipment manufacturers are recommended to implement the numbers given above as standard values in the software. By this means, it becomes possible to call up the other TOP Tables at almost the same time as the Basic TOP Table and thereby halve the initialization time. (This situation arises, for instance, for decoders with four input circuits). After receiving the Basic TOP Table, the receiver must make use of the Page-Linking Table and compare the values contained within it with the standard values. When the values correspond, the TOP initialization is completed. If values other than the standard values are entered in the Page-Linking Table, these different pages must be called up in a second stage.

2. **Recommendations for the behaviour of TOP teletext receivers after switching on or switching to another TV programme**

   In the TOP initialization phase, the TOP teletext decoders should behave as far as possible like the teletext decoders used until now. That is to say that, after switching on or switching over, a first teletext page*, specific to the receiver, should be selected and the selection sequence indicated (e.g. by the display of the numbers running through in the page header). At the same time the TOP Tables (see Annexe 2, Recommendation 1) should be called up in the background. In this phase, input from the teletext remote control (e.g. the numerical selection of other teletext pages) should also be possible.

*) After switching on or switching over, the automatic selection of the following lines is conceivable, depending upon the equipment design:
   - Page 100
   - a number that can be pre-programmed by the viewer (as with conventional decoders with pre-programming)
   - the last page number seen before switching to another programme (Example: ARD 303, switch to the ZDF, automatic selection of Page 303).
After completion of the TOP initialization, the decoder should switch automatically into the TOP mode and indicate this on the screen, e.g. by displaying the TOP "prompt" row.

If, at the moment of switching on or switching over, TOP operation is not available (Page 1F03Fx does not appear in the transmission cycle within one minute), the receiver remains in the no-TOP mode. Additionally, in the no-TOP mode the receiver should, within a suitable time period (or by appropriate permanent hardware provisions), call up the Basic TOP Table in the background in order to recognize the reception of the TOP service and then to switch automatically into the TOP mode.

If a receiver operating in the TOP mode detects that the Basic TOP Table is no longer being transmitted, it should automatically switch into the no-TOP mode.

3. **Recommendations for the behaviour of TOP teletext receivers with faulty reception of the TOP Tables**

Difficult local reception conditions or unsuitable cable installations can give rise to faulty reception of the teletext signal and also of the TOP Tables. Faulty or incomplete transmission of the TOP Tables can also be due to a fault at the transmitting end.

In these cases, some reduction in the convenience of using the receiver with a TOP teletext service is generally unavoidable**).

As a result of the hierarchically organized structure of the TOP system in several TOP Tables, it is possible, through optimal structuring of the decoder software, that total loss of TOP operational convenience will occur in only a few cases: e.g. with a severely disturbed or scarcely receivable Basic TOP Table. But even in these cases it is possible to select teletext pages by conventional methods (e.g. by keying-in the three-figure page number).

Alternatively, it is possible to have an operation similar to TOP, whereby the arriving pages are automatically divided by the receiver into blocks or groups, thereby facilitating page selection by means of the four coloured buttons.

On the other hand, TOP operation is still possible with faulty reception of the Multipage Table or the Additional Information Table, although with restricted functions. Page selection is carried out with the four coloured buttons or by means of the TOP selection menu. In this mode, the individual page numbers are displayed instead of the TOP titles. The use of direct selection and TOP assistance for multipage selection is not possible.

**) However, it is guaranteed that the operation of the receiver with regard to its other functions (e.g. programme-selection, adjustment of vision and sound) is still possible.
Annexe 3

Description of the TOP-System

1. Introduction
With conventional teletext decoders it is necessary to select a page by keying in a three-figure number. Minor input errors can occur in this way and, moreover, it is not possible for the viewer to ascertain in advance whether the page that he wants is available within the programme at that time. For this reason, the TOP (Table of Pages) System has been developed by the ARD and ZDF, in order to make available to the user a simpler, more reliable and, compared mainly to conventional decoders, faster selection of teletext pages - even if the page number is not known.*

2. Basic idea
The basic idea of the new system is that the individual teletext pages are arranged in subject groups like file cards (see Figure A1). In this way, for example, all news pages are grouped together in a separate "box-file" (or block). Other blocks are, possibly, one for sport, one for television programmes, for service and so on. Correspondingly - as is customary with file cards - there are further sub-divisions: each block contains several groups; so the News block, for example, can be made up of groups for Politics, Economics and Culture.

2.1 User-guided selection of pages
In accordance with this arrangement, the blocks and groups that have been assembled can be selected by the user, one after another, with four specially identified buttons on the remote control for the decoder:

the 1st button (+) selects the next page in the "box-file" or in the programme,
the 2nd button (group button, coloured yellow for example) selects the first page of the next group,
the 3rd button (block button, coloured blue for example) selects the next block and
the 4th button (-) reverts to the previously seen page.

In the "prompt" row (25th row) at the lower (or upper) edge of the television screen, two fields identified by colours corresponding to the keys are used to guide the user. These prompt rows are generated by the decoder and show the viewer the title of the immediately available block, the title of the next group in this block and the title of the next block. This is illustrated by Figure A2. The user is "browsing" within the News "box-file" (block) and has just selected a page from the Politics group. He can select further political news items by means of the 1st (+) button. Alternatively, economic news is obtained with the 2nd (red) button. By pressing the 3rd (blue) button, the News "box-file" is left and the first page in the next Sports "box-file" selected.

The advantages of guiding the user like this by means of a prompt row can also be used for programming a video recorder. By pressing a special button on the remote-control unit, the programme-preview pages may be directly selected (see Figure A3).

*Page number: In the following text, the term "page number" is used, for linguistic simplicity, to denote the complete sequence of numbers that is necessary to select a teletext page, including the magazine number and, where applicable, the page sub-code. In cases where there are differences, attention will be specially drawn to them.
Within this group of pages, it is possible, by pressing the group button, to go from day to day as if turning the pages of a programme journal. The programme-preview information for other programmes is arranged in other blocks and may be obtained by means of the block button.

2.2 Direct page selection
Direct page selection is also possible instead of the step-by-step selection from one "box-file" to the next and from one group to the next.

Naturally it is possible - as with conventional decoders - to select the page by keying-in the three figures of the page number, provided that the desired page number is known; in addition, with the TOP system, it is also possible to effect a direct page selection by means of an index page compiled in the decoder. In such an index are listed all the blocks contained in the teletext programme together with their groups (see Figure A4). The user has only to mark the desired group on the index and the decoder then directly selects the desired pages.

As well as this direct page selection from the whole transmission cycle, it is possible with the TOP System to select directly particular pages which the editorial staff know will be frequently requested. These pages will be specially marked by the teletext editor and brought together by the decoder in a special index (see Figure A5). As with the direct selection already described, the user has only to call up a "Highlights" index page like this and mark the corresponding title. By this means, the editorial staff have the possibility of emphasizing their particularly important and frequently requested pages in comparison to the rest of the pages, thereby ensuring a particularly simple and convenient selection of these pages.

3. Requirements at the transmitting end

The TOP system requires only a little extra work from the teletext editorial staff. The establishment of the blocks and their groups, the allocation of the page numbers and the inputting of titles can be done with the aid of a "configuration menu" (see e.g. Figure A6). Then it is only necessary for the editorial staff to call up this menu when blocks or groups are to be changed or when they are newly incorporated. In normal operation, the TOP tables can be generated by the computer completely automatically. Thus, there is no additional work required of the editorial staff when, for example, new pages are incorporated in the transmission cycle or old pages are removed.

4. Realization of the TOP System

The tables required by the TOP, the "Basic TOP Table", the "Multipage Table", and the "Additional Information Table" will be independently managed and transmitted by the teletext computer (see Figure A7). All the available teletext pages will be listed in the "Basic TOP Table" together with the special markings for the blocks, groups, TV-programme-preview block and sub-title pages established by the editorial staff. Each page has to be assigned a particular position in this TOP Table in accordance with a system of co-ordinates. Thus, for example, the position for Page 100 is to be found in column 0 of teletext row 1.

By use of this table, which is transmitted as a normal page in the transmission cycle, it is possible, for example, for a decoder in a video recorder automatically to select the programme-preview pages.
In addition, rows 21 and 22 of the "Basic TOP Table" contain a "Page-Linking Table", in which the page numbers of the rest of the TOP Tables are given.

The "Multipage Tables" contain details of all the multiple pages and the number of their sub-pages. By interpretation of these tables, the decoder is set up to provide the appropriate space in the memory for sub-pages and thereby to store completely a set of multiple-pages. In the "Additional Information Table" are transmitted the codes for the direct page selection and the texts for guiding the user (Titles for the blocks, the groups and for the directly selectable pages).

A teletext programme with about 200 pages (plus multiple pages) requires the transmission in serial mode of about four TOP Tables: one "Basic TOP Table", one "Multipage Table" or one "Multipage Extension Table" and one or two "Additional Information Tables". This corresponds to an increase of about 2% in the necessary transmission capacity.

The transmission of the TOP Tables as normal pages in the cycle does not require any extension of the current teletext specification.

Also, when the TOP system is introduced, there is no change in the ability of the decoders already in the viewers' possession to operate exactly as before. TOP is implemented by the appropriate extension of the control functions in the multipage decoders which are now available from nearly all equipment manufacturers, whereby, as a rule, no change is needed in the hardware. However, it would be desirable in subsequent new developments to realize, by hardware changes, some of the functions carried out up to now by the software.

The individual TOP Tables still have some reserve codes which can be utilized for future developments.

If required, the TOP system can be extended to page selection outside the decimal system.

5. **Additional improvements for the user**

At the receiving end, intelligent receiver designs are possible, which, by making use of the simultaneously transmitted TOP Tables, give the user, apart from the user-guidance for page selection, additional information in the "prompt row" such as "Page not in cycle", "Please wait", "Multiple pages with 4 sub-pages". These announcements are immediately emitted by the decoder, without needing to wait for the arrival of the requested pages.

With TOP it is also possible to reduce considerably the waiting time for requested pages by appropriate design of the decoder memory. Depending upon the size of the memory, it is possible to receive and store the pages associated with the block and group that are likely to be called up next, while the user is still reading the most recently selected page.

Over and above that, it is possible to have so-called "learning" decoders, which, from the sequence of the commands given by the user, predict which page numbers will be selected next.
By means of the graduated distribution of information, it will be possible to produce receiving equipment with different features for various levels of convenience.

For simple units, the utilization of the Basic TOP Table will suffice. For more convenient units based on decoders with limited page stores (e.g. 8), it may be possible to do without the utilization of the "Multipage Table" and thus the storage of all the pages of a set of multiple-pages.

If, in the future, decoders with larger page stores (e.g. for 64 or 256 pages) become available, which provide intermediate storage for a part of the received teletext programme, the use of the TOP system will become even more convenient.

TOP helps to ensure that, for one thing, the memory is fully utilized and, for another, a user-friendly guide is guaranteed through the multitude of teletext pages, even if they are in different programmes.

6. Figures

Figure A1 Basic principle of TOP
Figure A2 TOP user guide
Figure A3 TOP user guide
Selection of TV programme-preview pages
Figure A4 Additional possibilities of TOP
   1. Direct selection of pages from the whole teletext programme
Figure A5 Additional possibilities of TOP
   2. Direct selection of pages that are specially marked by the editors
Figure A6 Configuration of the TOP data at the transmitting end
Figure A7 The TOP system
Fig. A1  Basic principle of TOP
Fig. A2    TOP user guide
Fig. A3  TOP user guide
1. Direct page selection by means of an index page compiled in the decoder.

**Fig. A4** Additional possibilities of TOP
Composition of the most-requested pages

- Sport/News
- Radio/TIP
- Service/Lotto
- Topicalities/snow level
- Service/alpine roads
- ARD/films
- ARD/Regional

ARD / Films

Title of the appropriate block / title of the page with the direct-selection code

Remote control

2. Direct page selection that are specially marked by the editors

Fig. A5  Additional possibilities of TOP
Fig. A6  Configuration of the TOP data at the transmitting side
Fig. A7   The TOP System
Annexe 4

**Abbreviations and definitions of terms employed**

The following abbreviations are employed

AI     = Additional Information Table
BT     = Basic TOP Table
FT     = Teletext
MP     = Multipage Table
MP-EX  = Multipage Extension Table
PL     = Page-Linking Table
Annexe 5

References

[1] Fernsehtext-Spezifikation
ARD/ZDF/ZVEI/DBP
Ausgabe Juni 1986

See
Para. 2.2.3 Hammingcode-geschützte Bytes
Para. 8.22 Hamming-Code

(ARD/ZDF/ZVEI/DBP
Teletext Specification
June 1986)

(Hamming-code protected bytes)

(Hamming code)

[2] Fernsehtext-Spezifikation
ARD/ZDF/ZVEI/DBP
Ausgabe Juni 1986

See
Para. 8.26 Kopfzeile
Para. 8.43 Seiten-Subcode
Para. 4.4 Sprachenzeichensatz

(ARD/ZDF/ZVEI/DBP
Teletext Specification
June 1986)

(Page header data-line)

(Page sub-code)

(Character set)