SIEMENS

ICs for Consumer Electronics

TVTEXT
Firmware and Command Interface Description Version 0.01

SDA 5250/5254/5255 (8 Pages) Firmware Version V3.3x

Target Specification   1996-12-01

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SDA 5250/5254/5255 Revision History: Current Version: 1996-12-01		
Previous Version:		
Page (in previous Version)	Page (in current Version)	Subjects (major changes since last revision)
		For changed features in the firmware versions see the file read.me on the demo disk
	32	Odd/even output in DISPLAY_MODE2
	32	New input parameter for Update Mode in DISPLAY_MODE2
	27	The X28/29 feature is not supported any more.
	29	New input parameter "Dont_write_row0" in DISPLAY_MODE1.
	29	Changed P26 behavior without P26_overwrite bit.
	32	New input parameter "top_pgm_mode" in DISPLAY_MODE2.
	35	Constant Definition for the Update Mode Characters.
	48	Change to Compiler 5.02 and linker 3.52.
	48	Banking of the TVTEXT Firmware
	52	Firmware in memory model small and large
	36	WSS implemented
	32	Small Pagetrace
	52	Changed xdata linker start address
	50	Vertical user subroutine "user_function"
	48	Linker 3.52 part of the firmware
	37	Output of subtitle C6 page
	32	Reset_acq start with OSD in DISPLAY_MODE2
	32	p26_clear_c8 in DISPLAY_MODE2.
	29	New optional user request with USER_REQUEST_LIST
	56	First cyrillic version
	35	Hungarian language possible
	29	New HOLD mode possibility in DISPLAY_MODE1
	34	Changed MIX mode behavior in DISPLAY_MODE3
	9	Possibility to change the Page requests
	56	Two twist languages for cyrillic
	56	Changed linker and object filenames for the cyrillic firmware
	34	Row 24 control and switch with Display_mode3.2
	58	First Greek release
	60	OSD Overview
	60	Text Reception Quality
	61	Patents

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1   General Information

TVTEXT software is a SIEMENS software package which provides the programmer of the SDA 5250 (TVTEXT) with an easy access to and control of teletext. The following introductory chapters give an overview about the development environment and how to use this manual. This manual gives an information about the modules, commands and the input and output parameters of the TVTEXT teletext software.

The SDA 5250 are a standard controller family with integrated hardware for teletext reception and display. Most of the teletext features are realized by software operations which are described in this specification. The interface is very simple so that the development time for integrating the text firmware in the complete TV software goes to zero.

After giving the RESET command, the setup parameters are read and evaluated.

The complete page management is done on chip. TOP and FLOF detection and the following memory allocation is done automatically, as well as the acquisition of packet 8/30/1, 8/30/2, VPS or WSS. The initial teletext page is set to 'page 100' unless modified by the user software or by a valid packet 8/30.

The user has different possibilities to enter a page request. One way is entering a page number for a new display page with the 'DIGIT' commands. It is also possible to enter a page request with the colour keys RED, GREEN, YELLOW, CYAN or the INDEX key. These keys have different meanings depending on the current request mode. In all cases only the new display page has to be entered and all following page requests are done automatically by the firmware depending on the current mode.

Some additional status information is also available (e.g. TOP, FLOF, Page found, …) for generating individual messages like 'Page xxx not broadcasted' by the external controller.

For page acquisition a maximum of 8 pages is available. If OSD functions should be used, **chapter 7** is reserved for OSD text. After reset the SDA 5250 is in the 'SIMPLE mode', that means the initial page (page 100) is requested and the following 7 pages. The processor will start with the PICTURE mode. Optionally it can be decided, whether VPS or TEXT reception in line 16 should have higher priority during the first few frames of data acquisition after reset.

SDA 5250 automatically changes to the page trace mode if enabled as soon as the page-trace repetition-counter reaches 64 and 8 different pages will be stored in the page trace. The page-trace repetition-counter is incremented after the same page is received twice. If the bit 2 in the DISPLAY_MODE1 input parameter is set to '0', the complete page trace function is disabled and the pages are requested in binary order (binary means increment or decrement the page number by 1).

The user has the possibility to block upto 4 of the 8 available pages (with the LIST_PAGE command) for so called favorite or LIST pages. These pages are favorite page numbers of the user, programmed for each program individually, and stored for example in the

NVM of the TV. These pages can not be removed by the automatic TOP or FLOF requests. In the LIST mode a special menu in row 24 can be generated for easy page selection by use of the colour keys.

In TOP mode the BTT and a given number of AITs are immediately requested. Then the memory is filled with next block page, group page and so on (see below). A standard TOP title is also written to row 24 of the display memory. TOP mode is only switched on, if more than 7 pages are marked in the BTT.

In FLOF mode the four link pages and the index page of the display chapter given by X/27/0 are requested. No page request will be given twice. Packets X/27/0 are compressed and stored in a special memory section.

The reception of packets 8/30/0 and 8/30/1 is always enabled.

Special input parameter register control the commands, the acquisition and the display functions.

Pages are requested in the order of their priority until the memory space is exhausted.

The priority of the pages is fixed in the following table.

2 Page Request Priority Table

After the firmware has detected the request system (Simple, Trace, TOP...)
it is necessary to request the TTX pages in the background with a special systematic as shown in this Page Request Priority Table with different page request groups (List pages, Request_List pages...):

Priority	Simple or Trace Request	Top Request	Flof Request
highest	Display page	Display page	Display page
	LIST pages	LIST pages	LIST pages
	User pages from USER_REQUEST_LIST (if enabled)	Basic TOP Table	User pages from USER_REQUEST_LIST (if enabled)
	Pages from REQUEST_LIST	Additional information table pages	FLOF links 1 … 4
		User pages from USER_REQUEST_LIST (if enabled)	FLOF index link
lowest		Pages from REQUEST_LIST	Pages from REQUEST_LIST

The pages of the USER_REQUEST_LIST must be enabled with the User_Request_List bit. For additional information see input parameter DISPLAY_MODE1.7.

The pages from the REQUEST_LIST are defined in the code array REQUEST_LIST in the module ADR_IOP.C51. It is an array of 3 columns and 6 rows. The working priority is in every row from left to right. If after the last request of next groups or 10's, there are any free pages, the memory is filled with page plus.

REQUEST_LIST [6][3] (code array)

Request System	Request Command	REQUEST_ LIST (col0)	REQUEST_ LIST (col1)	REQUEST_ LIST (col2)
Top, Simple, Trace	green key, page plus	number of previous pages	number of next blocks or 100's	number of next groups or 10's
Top, Simple, Trace	red, key, reset_acq, digits, page minus	number of previous pages	number of next blocks or 100's	number of next groups or 10's
Top, Simple, Trace	yellow key	number of previous pages	number of next blocks or 100's	number of next groups or 10's
Top, Simple, Trace	blue, index key	number of previous pages	number of next blocks or 100's	number of next groups or 10's
Flof	for all request commands	number of previous pages	number of next 100's	number of next 10's
List	for all request commands	number of previous pages	number of next 100's	number of next 10's

Example:

For the commands blue and index shall be requested:

1 page minus and as much as possible block pages

Array for request setup ! possible values for the number of pages: 0-7 !

unsigned char code REQUEST_LIST[6][3] =

/*P-, blocks, groups */

{0x01, 0x01, 0x01, /* green key, page plus   1 page minus, 1 block, 1 group, page plus */

 0x01, 0x01, 0x01, /* red key, reset_acq, digits, page minus: 1 page minus, 1 block, 1 group, page plus */

 0x01, 0x01, 0x01, /* yellow key   1 page minus, 1 block, 1 group, page plus */

 0x01, 0x07, 0x00, /* blue, index key   1 page minus, 7 blocks, 0 group, page plus */

 0x01, 0x00, 0x00, /* FLOF mode   1 page minus, all next pages*/

 0x01, 0x00, 0x00}; /* LIST mode   1 page minus, all next pages*/

3   Command Directory

This chapter contains a list of commands from the TVTEXT Command Interface TCI. The documentation for each command contains a statement about the command's purpose, a description of its input parameters with used parameter registers, and a description of its return values with used parameter registers. The documentation for some functions contains additional, important comments that a designer needs in order to use the command. How these commands are called is described in **chapter 18**.

4   TCI Command Table

The following table shows the command name/command number assignment:

Command Name	Command Number
RESET_ACQ	00
OSD_ROW24	01
PICTURE_MODE	02
TV_TEXT_MODE	03
MIX_MODE	04
UPDATE_MODE	05
TOGGLE_LIST_MODE	06
INDEX	07
SUBPAGE_MODE	08
SIZE	09
HOLD	10
REVEAL	11
CLOCK	12
LIST_PAGE	13
RED	14
GREEN	15
YELLOW	16
CYAN	17
PAGE_PLUS	18
PAGE_MINUS	19
SIZE_OFF	20
DIGIT0	23
DIGIT1	24
DIGIT2	25
DIGIT3	26
DIGIT4	27
DIGIT5	28
DIGIT6	29
DIGIT7	30
DIGIT8	31
DIGIT9	32
OSD	33

5 Command Description

5.1 Modified Display Registers

After the reset_acq() command the following display registers are modified by the firmware and the commands:

DTIM, DTCR, DMODE1, DMODE2, DCRP, LANGC, SCCON

5.2 RESET_ACQ (No. 00)

This command resets the complete acquisition and should be given after each change of the program. After initializing the TVTEXT-page RAM and returning to the picture mode, the setup parameters are read and evaluated.

Reset_acq() enables also two acqusition interrupts. The first interrupt starts with the recognition of the vertical signal. In this short interrupt the function userfunc is executed. The second interrupt starts with the recognition of the line24 of every field.
In this interrupt the teletext data of the VBI buffer are processed, checked and stored.

Input parameters: SETUP PARAMETERS (see **chapter 7**)
Return values: all return parameters
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	Always possible	Never locked
Related I/O parameter	None	None

5.3 OSD_ROW24 (No. 01)

Osd_row24 is a toggle command which switches on or off the on screen display in row 24. The corresponding status bit is in ACQUISITION_MODE.7 (disable row24). If osd_row24 is switched on, the current content of the display chapter in row24 is stored in the background. The user has now the possibility, to write his own menu line in row 24 of the display chapter. If a TTX page is stored in this state, packet 24 will be stored in the background. Leaving this command (by giving it again) will restore the row 24 content (e.g. TOP title, FLOF, LIST, …)

Input parameters: None
Return values: ACQUISITION_MODE.7 ('1' = osd_row24 is ON, '0' is OFF)
Comments: None .

EXECUTION TABLE	Possible State	Locked at State
	Always possible	Never locked
Related I/O parameter	None	None

5.4   PICTURE_MODE (No. 02)

Switches from any TEXT mode to TV mode. The switch is done by setting the whole screen to transparent. All acquisition tasks are done in background.

Input parameters: None
Return values: RETURN_3
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	Always possible	OSD
Related I/O parameter	None	RETURN_3.4

5.5   TV_TEXT_MODE (No. 03)

Switches from TV mode to TEXT mode. The switch is done by resetting all transparent background and foreground bits. Further any special text modes (i.e. double height, hold, reveal) are cleared.

Input parameters: None
Return values: RETURN_3.3
Comments: None .

EXECUTION TABLE	Possible State	Locked at State
	Always possible	OSD
Related I/O parameter	None	RETURN_3.4

5.6   MIX_MODE (No. 04)

This command toggles between TEXT background colour and transparent background colour. The switch is done by setting the appropriate transparent bits in the special function registers. Boxed characters can be displayed boxed or with transparent background with DISPLAY_MODE3.0.

Input parameters: DISPLAY_MODE3.0
Return values: RETURN_3.2
Comments: None.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.7 UPDATE_MODE (No. 05)

After giving this command the display is switched to transparent.

– If the page is running in (the header is active) the page number will be seen in the left top of the screen without flash.
– If the page is still being searched the characters from the update_code (see **chapter 6.7**) are displayed with flash until the page header is found.
– If the page is already found, the text sign will be displayed without flash, until the next page header is found. Then the page number is displayed.

In update mode the input of any page-related key as digit, red, green, …, to start a new page request is possible.

Input parameters: None
Return values: RETURN_3.0
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.8 TOGGLE_LIST_MODE (No. 06)

This command switches on the LIST mode and offers a single line menu similar to the FLOF menu. This line contains the stored LIST page numbers which can be selected by the appropriate colour buttons. If there are less than 4 LIST pages stored, a '???.????' will appear in the related prompt box. If the list page is a subpage (subcode unequal 0000_H or $3F7F_H$) the subpage number will also appear. If the list page is stored as a page with subpage 'don't care' mode, instead of the subpage number '----' will appear (e.g. 207.----).

Input parameters: None
Return values: TEXT_MODE.3
Comments: For format of the status line see **chapter 12.**

EXECUTION TABLE	Possible State	Locked at State
	Always possible	Never locked
Related I/O parameter	None	None

5.9   INDEX (No. 07)

– In FLOF mode there will be a change to the INDEX page of the FLOF broadcaster.
  If there is no INDEX page linked there will be a return to page 100 if no P8/30 init page
  is available.
– In TOP or SIMPLE mode the index page request will return to page 100 if no P8/30
  init page is available.
– If packet 8/30 is available there will be a return to the initial page of this packet.
– If the init-page bit in DISPLAY_MODE1 is set, a page request of the user defined init
  page will be done (see also I/O parameter description).
  This mode has the highest priority.

Input parameters: DISPLAY_MODE1.3
Return values: None
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.10   SUBPAGE_MODE (No. 08)

If this command is given the subpage mode is activated. That means that any subpage
of the current basic display chapter can be requested. In that mode 4 digits must be
given to specify a subpage. The subpage mode is terminated if this command is given
again, or if any other page select method is used.

With the red and green keys the next and the previous subcode can be selected.

If any basicpage is requested in subpage 'don't care' mode and in subpage 'do care'
mode with a special subcode (i.e. by use of a LIST page), this subpage is stored in the
chapter with the 'do care' mode. When subpage mode command is given, the subpage
start value is '0001'.

Input parameters: None
Return values: RETURN_3.6
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.11 SIZE (No. 09)

This command switches between the three possible display sizes in the following order:

Normal size:	Row 0 … 24 are shown in normal height.
Double size upper half:	Row 0 … 11 are shown in double height, row 24 in normal height.
Double size lower half:	Row 12 … 23 are shown in double height, row 24 in normal height.

Input parameters: None
Return values: SFR DMODE1.(bit 3 and 4)
Comments: Giving any page number related command (digit, colour key, index, p + …) TVTEXT will always return to normal size. .

EXECUTION TABLE	Possible State	Locked at State
	Always possible	Never locked
Related I/O parameter	None	None

5.12 HOLD (No. 10)

This command stops the reception of the actual display chapter. This feature can be used to watch 'running through' subpages. The time information is not effected by this command. If these memory locations should not be overwritten, the user has to set the 'TIME_OFF' bit. This command has a toggle function. A new page request by any digit command will clear the hold function.

Input parameters: See description of DISPLAY_MODE1.5 for different hold modes
Return values: RETURN_2.7
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3 (bit 3)	RETURN_3 (bit 4)

5.13   REVEAL (No. 11)

All hidden characters are revealed. Giving this command again, hides these characters again. If a new subpage runs in during subpage 'don't care' mode, hidden characters are concealed after each new subpage reception. This command has a toggle function.

Input parameters: None
Return values: SFR DMODE1.5
Comments: None

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3 (bit 3)	RETURN_3 (bit 4)

5.14   CLOCK (No. 12)

In picture mode this command shows the actual time from the last 8 characters of each header in serial TTX transmission mode. In parallel TTX transmission mode the clock is shown of the actual displayed magazine. The clock is shown in double height. The foreground and background colour can be selected in the setup parameters. If the command is given again, or TEXT mode is chosen the clock is switched off. The position of the clock can be influenced by changing the horizontal and vertical delay registers DHD and DVD.

Input parameters: DISPLAY_MODE0
Return values: RETURN_3.5
Comments   None

EXECUTION TABLE	Possible State	Locked at State
	TV_PIC	OSD
Related I/O parameter	RETURN_3.1	RETURN_3.4

5.15 LIST_PAGE (NO. 13)

This command adds or removes a LIST page (a favorite page) to the page memory. If the list page to be added is already requested, only the status of this page is changed to a list page.

LIST pages can only be removed by the LIST command or after reset_acq. If the memory is full the page with the lowest priority is automatically removed and a page request will be started.

Input parameters: Page request record:

LIST_RECORD[0]

0	0	0	0	0	M2	M1	M0

LIST_RECORD[1]

PT3	PT2	PT1	PT0	PU3	PU2	PU1	PU0

LIST_RECORD[2]

0	MT2	MT1	MT0	MU3	MU2	MU1	MU0

LIST_RECORD[3]

0	0	HT1	HT2	HU3	HU2	HU1	HU0

All above listed request bits have the same meaning as defined in the Enhanced Teletext Specification.

LIST_MODE

0	0	ADD/ REM	SDC	0	0	LC_1	LC_0

LC_1 … 0   LIST_colour:
            0: The LIST page is attached to the red colour button
            1: The LIST page is attached to the green colour button
            2: The LIST page is attached to the yellow colour button
            3: The LIST page is attached to the cyan colour button

SDC   Subpage 'don't care' mode:
            1: The LIST page is a running-through subpage
            0: The LIST page is a subpage

ADD/REM   ADD or REMOVE a LIST page:
                     1: The LIST page is added to the page memory
                     0: The LIST page is removed from the page memory

Return values: None.
Comments: The command LIST_MODE offers a menu line which shows the
                     stored list pages. A stored list page must be removed before a new
                     list page can be given again with the same colour number.

5.16   RED (No. 14)

Depending on the current mode the display chapter is changed to the page number indicated by the red button.

– In TOP mode, this is the previous available page marked in the BTT.
– In FLOF mode it is the first link page of packet x/27 of the current display page.
– In LIST mode it is the LIST#1 Page.
– In SIMPLE mode it is the previous available page in decimal order.
– In PAGETRACE mode it is the previous available page from the page trace.
– IN SUBPAGE mode it is the subpage with next lower subpage number.
   If the subpage is '0000', the next decremented subpage will be '3979'.

After changing the display chapter the new page requests are automatically done

Input parameters: None
Return values: None
Comments: Any other page selecting method quits this one. If a new page
                        request is done, the actual page number will be written in row 0 col
                        0-6 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.17   GREEN (No. 15)

Depending on the current mode the display chapter is changed to the page number indicated by the green button.

– In TOP mode this is the next available page marked in the BTT.
– In FLOF mode it is the second link page of packet x/27 of the current display page.
– In LIST mode it is the LIST#2 Page.
– In SIMPLE mode it is the next available page in decimal order.
– In PAGETRACE mode it is the next available page from the page trace.
– In SUBPAGE mode it is the subpage with next higher subpage number.

After changing the display chapter the new page requests are automatically done.

Input parameters: None
Return values: None
Comments: Any other page selecting method quits this one. If a new page
                        request is done, the actual page number will be written in row 0
                        col 0-6 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.18   YELLOW (No. 16)

Depending on the current mode the display chapter is changed to the page number indicated by the yellow button.

– In TOP mode this is the next available group page marked in the BTT.
– In FLOF mode it is the third link page of packet x/27 of the current display page.
– In LIST mode it is the LIST#3 Page.
– In SIMPLE or PAGETRACE mode it is the 10th page.
– In SUBPAGE mode this button is not defined.

After changing the display chapter the new page requests are automatically done.

Input parameters: None
Return values: None
Comments: Any other page selecting method quits this one. If a new page
                        request is done, the actual page number will be written in row 0
                        col 0-6 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD, SUBPAGE_MODE
Related I/O parameter	RETURN_3.3	RETURN_3 (bit 6,4)

5.19   CYAN (No. 17)

Depending on the current mode the display chapter is changed to the page number indicated by the cyan button.

– In TOP mode this is the next available block page marked in the BTT.
– In FLOF mode it is the forth link page of packet x/27 of the current display page.
– In LIST mode it is the LIST#4 page.
– In SIMPLE or PAGETRACE mode it is the 100th page.
– In SUBPAGE mode this button is not defined.

After changing the display chapter the new page requests are automatically done.

Input parameters: None
Return values: None
Comments: Any other page selecting method quits this one.

If a new page request is done, the actual page number will be written in row 0 col 0-6 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD, SUBPAGE_MODE
Related I/O parameter	RETURN_3.3	RETURN_3 (bit 6,4)

5.20   PAGE_PLUS (No. 18)

After giving this command, TVTEXT will request the next decimal page or, in pagetrace mode the next page trace page.

Input parameters: None
Return values: None
Comments: If a new page request is done, the actual page number will be
                          written in row 0 col 0-6 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD, SUBPAGE_MODE
Related I/O parameter	RETURN_3.3	RETURN_3 (bit 6,4)

5.21 PAGE_MINUS (No. 19)

After giving this command, TVTEXT will request the previous decimal page or, in pagetrace mode the previous page trace page.

Input parameters: None
Return values: None
Comments: If a new page request is done, the actual page number will be written in row 0 of the display chapter.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD, SUBPAGE_MODE
Related I/O parameter	RETURN_3.3	RETURN_3 (bit 6,4)

5.22 SIZE_OFF (No. 20)

This command will switch the display to normal height in any case.

Input parameters: None
Return values: SFR DMODE1.(bit 3,4)
Comments: None.

EXECUTION TABLE	Possible State	Locked at State
	Always possible	None
Related I/O parameter	None	None

5.23 DIGIT0 (No. 23)

The digit '0' is added to the page number and written to the actual column position of row 0 of the display memory. This command is used for numeric selection of a page. 3 digits (4 in subpage mode) must be given one after each other, to select a new page. After entering the third digit for the page number (the forth in subpage mode) the display chapter will change and the page request of the complete page number will be executed. Depending on the current mode (TOP, FLOF, SIMPLE or LIST) all other page requests are automatically made in the background.

Input parameters: None
Return values: None
Comments: Any other page selection method quits this one. Incomplete page numbers in the first 8 columns of the header are replaced by '-. The first digit of the page number must be > 0 and ≤ 8.
In subpage mode the 4 digits may not be higher than '3979'. For format of the first 8 characters in row 0 of the display memory see **chapter 9**.

EXECUTION TABLE	Possible State	Locked at State
	TEXT	OSD
Related I/O parameter	RETURN_3.3	RETURN_3.4

5.24 DIGIT1 (No. 24)

This command has the same meaning as 'D_0' with the difference that the digit '1' is added to the page number.

5.25 DIGIT2 (No. 25)

This command has the same meaning as 'D_0' with the difference that the digit '2' is added to the page number.

5.26 DIGIT3 (No. 26)

This command has the same meaning as 'D_0' with the difference that the digit '3' is added to the page number.

5.27 DIGIT4 (No. 27)

This command has the same meaning as 'D_0' with the difference that the digit '4' is added to the page number.

5.28   DIGIT5 (No. 28)

This command has the same meaning as 'D_0' with the difference that the digit '5' is added to the page number.

5.29   DIGIT6 (No. 29)

This command has the same meaning as 'D_0' with the difference that the digit '6' is added to the page number.

5.30   DIGIT7 (No. 30)

This command has the same meaning as 'D_0' with the difference that the digit '7' is added to the page number.

5.31   DIGIT8 (No. 31)

This command has the same meaning as 'D_0' with the difference that the digit '8' is added to the page number.

5.32   DIGIT9 (No. 32)

This command has the same meaning as 'D_0' with the difference that the digit '9' is added to the page number.

Please note:

If row 0 is not visible in the display chapter, (e.g. a newsflash page is received), the first page request command like digit(), index() red(), green()... will only box row0.
The second page request command will start the command.

5.33   OSD (No. 33)

This command switches the display chapter to **chapter 7** and activates the OSD mode. All acquisition tasks are further done in background. This command is only possible, if DISPLAY_MODE1 bit 0 was set before reset_acq. The display special function registers and the language control register are saved by giving this command.They are restored after giving the command again (toggle function) and the ACQ switches to the original display chapter.

In OSD mode the transparent and language control registers must be set by the user. When the OSD command is entered, the following display SFR's are stored to the array DISPLAY_SAVE[10] (xdata) or they are restored from this array if the OSD mode is left:

DISPLAY_SAVE[0] = DTCR;
DISPLAY_SAVE[1] = LANGC;
DISPLAY_SAVE[2] = DTIM;
DISPLAY_SAVE[3] = DVD;
DISPLAY_SAVE[4] = DHD;
DISPLAY_SAVE[5] = DMODE1;
DISPLAY_SAVE[6] = DMODE2;
DISPLAY_SAVE[7] = DCCP;
DISPLAY_SAVE[8]_SAVE = DCRP;
DISPLAY_SAVE[9]_SAVE = SCCON;

If the OSD chapter 7 is enabled, the "clear_page_bits" in row25 of chapter 7 are under complete user control. If these bits are not used, they must be set to 0. There is no automatic default value.

Input parameters: SETUP PARAMETERS (OSD_CHAP_7)
Return values: RETURN_3.4
Comments: Don't forget to set OSD_CHAP_7 in the setup parameters before giving this command.

EXECUTION TABLE	Possible State	Locked at State
	Enabled OSD	Disabled OSD
Related I/O parameter	DISPLAY_MODE1 (bit 0 = '1')	DISPLAY_MODE1 (bit 0 = '0')

6   Setup Parameters

The following table gives an overview of all possible setup parameters. Bits marked with an (*) are evaluated only in the command reset_acq() and may not be changed after this command. If these bits are changed, the reset_acq() command must be given. Other bits can be changed everytime.

6.1   ACQUISITION_MODE

7   0

Dis_24	0	Ena_Reset_Acq	Nu_Ait_1 *	Nu_Ait_0 *	Ena_Flof *	Ena_Top *	Vps_Prir *

Vps_Prir	1:	After the reset of the acq the reception of VPS has higher priority than the reception of teletext (in line 16). If after 10 fields no VPS data is received, TVTEXT will automatic switch to text reception in line 16.
	0:	The reception of teletext in line 16 has higher priority than VPS.
Ena_Top	1:	The automatic reception of TOP pages (including block pages, group pages and so on) is enabled.
	0:	The automatic acquisition of TOP pages is disabled.
Ena_Flof	1:	The automatic reception of linked FLOF pages is enabled.
	0:	The automatic acquisition of FLOF pages is disabled.
Nu_Ait_1 … **Nu_Ait_0**		Define the maximum number of AITs which are automatically requested by the ACQ.
Ena_Reset_Acq	1:	This bit enables the automatic reset option of TVTEXT if the 'TEXT-INTER-Bit' is set (see return parameter RETURN_2.3).
	0:	The automatic reset option is disabled.
Dis_24		This bit is a return parameter and toggled with the OSD_ROW24 command (see also command No. 1).
	1:	The reception of data in row 24 is disabled as well as the creating of top titles and list menus. The status line can be used for user menus.
	0:	Row 24 of the current display chapter must not be overwritten by the user.

6.2   DISPLAY_MODE0

7							0
Bg_ Clock_2	Bg_ Clock_1	Bg_ Clock_2	Fg_ Clock_2	Fg_ Clock_1	Fg_ Clock_0	Head_Off	Clock_Off

Clock_Off   1:   Row0/col32 … col39 of the display page are never
                    overwritten and the time is not updated.,
              0:     These positions are overwritten by the acquisition with the
                    time information of all incoming headers.

Head_Off   1:   During the rolling header mode row0/col8 … col31 are not
                    overwritten.
              0:     During the rolling header mode these positions are
                    overwritten by the acquisition with all incoming headers in
                    serial mode. In parallel mode only the headers of the selected
                    magazine number are overwritten.

Fg_Clock_2 … 0   Define the foreground colour of the clock in command
                    'CLOCK' (serial colour control byte).

Bg_Clock_2 … 0   Define the background colour of the clock in command
                    'CLOCK' (serial colour control byte).

6.3 DISPLAY_MODE1

7							0
User_ Request_List	Dont_Write_ Row0	Hold_State	Hamm_ Nocorr	Init_Page	Ena_Trace *	Ats *	Osd_ Chap_7 *

Osd_Chap_7   1: **Chapter 7** can be used for OSD functions and is not overwritten by the acquisition.

                      0: **Chapter 7** is used for page acquisition.

Ats   1: This is a reduced acquisition mode for using the up to 7 display chapters for another purpose e.g. the automatic tuning system. If this bit is set, the user has to set the xdata variable LAST_ACQ_CHAP to the desired value before calling reset_acq. E.g. LAST_ACQ_CHAP = 2 means, that the programmer can use the display chapter 3 … 7 for his own purpose. The reception of packet 8/30 and vps is still available, but the TOP and the FLOF modes are disabled.

                      0: Normal acquisition mode.

Ena_Trace   1: The page trace is enabled.

                      0: The page trace is disabled. The programmer can use the 256 byte array beginning at the Xdata label PAGE_TRACE for his own purpose.

Init_Page   0: Page 100 will be requested after reset_acq. If a valid packet 8/30 was received and no user page request was done, an automatic page request with the init page of packet 8/30 will be started. A call of the command index will request the flof index, if not available the packet 8/30 index, and, if not available page 100.

                      1: The function of mode 0 is disabled.
The user has the possibility to define his own init page.
The index command will request the user defined page. If this bit is set to '1', the following variables (Xdata) have to be set before reset_acq or index command is called:
Xdata label is NEW_PAGE (array of 4 elements)
NEW_PAGE(+0): the init page mag number
NEW_PAGE(+1): the init page page number
NEW_PAGE(+2): the init page subpage-minutes number
NEW_PAGE(+3): the init page subpage-hours number
If an init page with subpage 'do care' is desired, please set the bit 7 of NEW_PAGE(+ 2) to '1'.

Hamm_Nocorr   0:   A one bit error of the magazine- and packet address will be corrected.
                   1:    A one bit error of the magazine- and packet address will not be corrected.

Hold_State   If the HOLD() command was executed this bit has following effect:
                   0:    The page request doesn't stop at once and the header is rolling.The page request for the display page stops after the requested page has been received and row 0 - 23 (except the clock) are not overwritten.
                   1:    The page request for the display page stops at once. In any case row 0 - 23 (except the clock) are not overwritten.
                         If the Hold mode is active/inactive RETURN_2 bit 7 is set or cleared.
                         Any new page request e.g. with the colour keys, the index command, entering or leaving the subpage_mode or list_mode, a pagerequest by digits.... will clear the HOLD mode. A TV_TEXT() or a PICTURE() command will not clear the HOLD mode. An active HOLD mode can also be cleared by giving the HOLD() command again.

Dont_Write_Row0 0:   The positions in row 0 column 0 … 6 of the current display chapter are overwritten by the firmware.
                   1:    The positions in row 0 column 0 … 6 of the current display chapter are not overwritten by the firmware and controlled by the user. This bit is cleared by the reset_acq command.

User_Request_List   Enables or disables the User_request_List pages for the Page Request Priority Table.

0: No user pages will be requested

1: The maximum of 7 user pages will be requested from the xdata array USER_REQUEST_LIST[14].
The page request of the display page can be started either with the digit() commands, the colour/index keys or with the following setup:
NEW_PAGE is an array in xdata of four elements.
DISPLAY_MODE1 = DISPLAY_MODE1|0x80;
                              //switch to user request table
NEW_PAGE[0] =1:   //write the magazine number
NEW_PAGE[1] = 00;   //write the page number
NEW_PAGE[2] = 0;   //write the subpage number
                              //(subpage is don't care if bit 7 is 0)
NEW_PAGE[3] = 0;   //write the subpage hours number
new_page_request();//call the page request:
If the bit user_request is set the pages in the **page_request_priority table** will be taken from the xdata array USER_REQUEST_LIST[14] at every new page request.
The format of the xdata array USER_REQUEST_LIST[14]:
USER_REQUEST_LIST[0] = 1. Magazine
USER_REQUEST_LIST[1] = 1. Pagenumber
USER_REQUEST_LIST[2] = 2. Magazine
USER_REQUEST_LIST[3] = 2. Pagenumber

 .

 .

USER_REQUEST_LIST[12] = 7. Magazine
USER_REQUEST_LIST[13] = 7. Pagenumber
A 0xff in any magazine number of the User_Request_List indicates the end condition for the user request.
The remaining possible pages are requested accordingly to the page request priority table.

6.4   DISPLAY_MODE2

7							0
P26_Clear_ C8	Start_Reset_ Osd *	Ptrace_ Small *	Top_Pgm_ Mode	Act_Update With_C8	Displ_News_ In_Update	Eo_P30	Eo_Vs

EO_VS
1: Enabled ODD/EVEN output pin VS.
0: Disabled ODD/EVEN output pin VS.

EO_P30
1: Enabled ODD/EVEN output pin P30.
0: Disabled ODD/EVEN output pin P30.

Displ_News_In_Update
0: The boxed characters of the newsflash page are not shown if the page is received.
1: The boxed characters of the newsflash page are shown if the page is received. Switching off/on the update mode hides the boxed characters until the page is received again.

Act_Update_With_C8
0: After first reception the update mode is controlled (page received or not) by every incoming header of this page.
1: After first reception the update mode is controlled (page received or not) by every incoming header with C8 bit of this page.

Top_Pgm_Mode
0: In TOP mode the red() command will request the normal page minus.
1: In TOP mode the red() command will request the page minus in priority group steps:
If the current page is a normal page the previous normal page will be requested.
If the current page is a group page the previous group page will be requested.
If the current page is a block page the previous block page will be requested.

Ptrace_Small   To obtain an additional 156 bytes XDATA memory space,
                           the user has the possibility to choose either the small or
                           the large page trace model. In the large pagetrace model
                           all incoming pages, also the hexadecimal numbers, were
                           included. The necessary XDATA for this feature is 256
                           bytes.
                           In the small pagetrace model only the decimal
                           pagenumbers (x00-x99) were included. The necessary
                           XDATA for this feature is only 100 bytes.
                           The TVTEXT acquisition demo is delivered in the large
                           page trace model. To switch to the small one, the source
                           code delivered module ADR_IOP.C51 must be compiled
                           with the following compiler switch option:
                           C51 ADR_IOP.C51 define (ptrace_small)
                           With RESET_ACQ() the function USER_DEFINITIONS()
                           in the same module is called and depending on how the
                           module ADR_IOP.OBJ was compiled, the corresponding
                           status bit in DISPLAY_MODE2 (bit 5) is set or cleared.
                           **This bit is handled automatically and it is not allowed
                           to set or clear this bit by the user program after the
                           reset_acq**

Start_Reset_Osd   0: The reset_acq() command will start with picture mode.
                         1: The reset_acq() command will start with OSD **chapter 7**.
                           This is only possible if the OSD chapter is enabled in
                           DISPLAY_MODE1.0. If TVTEXT was started with OSD
                           chapter 7, this mode can only be left by the OSD()
                           command, which returns TVTEXT to picture mode. The
                           variables of DISPLAY_SAVE[10] (see OSD() command)
                           are not used in this special case.

P26_Clear_C8   1: Packet 26 related characters in the page memory are
                           cleared also, if the subcode of the in coming header is the
                           same and the C8 update bit is set to 1 (C8 = 1).
                         0: No effect with C8 = 1.

6.5   DISPLAY_MODE3

7							0
0	0	0	0	0	Row24_ Control	0	Mix_State

Mix_State: 0: All background colors are set to transparent when the command mix_mode() is given.

1: Only non boxed background colors are set to transparent when the command mix_mode() is given.
The status row 0 col 0-6 are displayed boxed. The status row 24 is displayed boxed in the text modes LIST, TOP, PAGETRACE, and SIMPLE.
This input parameter must be initialized before reset_acq() command.

Row24_Control   0: Recommended standard function.
The declaration of the constants (e.g. red -, green +, yellow cyan) for row 24 in TOP, Simple, Subpagemode, Flof P+,- and boxed row24 is copied from the arrays of subpline, boxline, flofline and topline1 in the module

1: ADR_IOP.C51.
The declaration of the constants (e.g. red -, green +, yellow cyan) for row 24 in TOP, Simple, Subpagemode, Flof P+,- and boxed row24 is copied from the arrays of user_subpline, user_boxline, user_flofline and user_topline1 in the module ADR_IOP.C51
These array-lables must be changed and defined to the following lengths if they are used:
user_subpline[1]; // must be set to [28] if used
user_boxline[1]; // must be set to [10] if used
user_flofline[1]; // must be set to [32] if used
user_topline1[1]; // must be set to [16] if used

6.6 The Language User Set Table: USER_LANGC[8]

Depending on the received C12 … 14 bits TVTEXT will switch to that language, which is written to USER_LANGC (xdata array[8]).

C14, 13, 12 7   0

0 0 0	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
0 0 1	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
0 1 0	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
0 1 1	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
1 0 0	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
1 0 1	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
1 1 0	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0
1 1 1	0	LANGC.6	LANGC.5	LANGC.4	LANGC.3	LANGC.2	LANGC.1	LANGC.0

Possible language values for the TVTEXT standard version:

0x0d = French
0x2b = Scandinavian
0x39 = Turkish
0x00 = German
0x0e = Spanish
0x0c = Italian
0x0a = English
0x5a = Rumanian
0x5c = Tchechoslovacian
0x5d = Polish
0x5e = Serbian
0x5b = Hungarian

6.7 Constant Definitions for the Update Mode Characters

The only osd characters which are used by the firmware are in the update mode and depend on the osd character-set of the chip. The following 6 bytes must be defined in the user program as public code characters:

update_code[6] = {$01B_H$, 08_H, 60_H, 61_H, 20_H, $1B_H$}; (example of C51)

If the osd text sign is on other character positions, the 2 bytes 60_H and 61_H must be replaced. In banked programs please locate these 6 bytes in the common area.

7 Return Parameters

The following tables give an overview of all possible return parameters.

7.1 VPS_DATA

7   0

VPS_5_7	VPS_5_6	VPS_5_5	VPS_5_4	VPS_5_3	VPS_5_2	VPS_5_1	VPS_5_0
VPS_11_7	VPS_11_6	VPS_11_5	VPS_11_4	VPS_11_3	VPS_11_2	VPS_11_1	VPS_11_0
VPS_12_7	VPS_12_6	VPS_12_5	VPS_12_4	VPS_12_3	VPS_12_2	VPS_12_1	VPS_12_0
VPS_13_7	VPS_13_6	VPS_13_5	VPS_13_4	VPS_13_3	VPS_13_2	VPS_13_1	VPS_13_0
VPS_14_7	VPS_14_6	VPS_14_5	VPS_14_4	VPS_14_3	VPS_14_2	VPS_14_1	VPS_14_0

See description of VPS, WSS.

7.2 WSS_DATA

WSS_DATA[2] (xdata) byte 0							
7	6	5	4	3	2	1	0
Group 2				Group 1			

WSS_DATA[2] (xdata) byte 1							
0	0	not used	not used	not used	10	9	8
		Group 4			Group 3		

VPS, WSS The VPS or WSS data bytes are error checked and written to a buffer in the Xdata RAM. Their actual values can be read every time.
The received data are biphase decoded and only updated if all 5 (VPS) or 2 (WSS) relevant bytes are received without any errors. The VPS- or WSS-received flags in RETURN_1 and RETURN_2 indicate, that after a program change the data in the buffer (VPS/WSS) is updated and valid again.

7.3   Subtitle C6 Page

There is an easy way to find a subtitle page with C6 = 1.
The output parameters are C6_MAG and C6_PAGE in the xdata RAM.
After the reset_acq() command the variable C6_MAG is set to 0xff;
Every, including none requested headers are analyzed, whether the C6 subtitle bit is set or not.
If yes, the variables C6_MAG and C6_PAGE are overwritten
by the pagenumber of this incoming header.
These variables are not overwritten until C6_MAG is set to 0xff again or a reset_acq() command is executed.

C6_Mag: (xdata)

					C6_ Mag.2	C6_ Mag.1	C6_ Mag.0

C6_Page: (xdata)

C6_ Page.7	C6_ Page.6	C6_ Page.5	C6_ Page.4	C6_ Page.3	C6_ Page.2	C6_ Page.1	C6_ Page.0

7.4   TEXT_MODE

7   0

X	X	PAGE_ TRACE_ MODE	X	LIST_ MODE	FLOF_ MODE	TOP_ MODE	SIMPLE_MO DE

SIMLPE_MODE   TVTEXT is in SIMPLE mode.

TOP_MODE   TVTEXT is in TOP mode.

FLOF_MODE   TVTEXT is in FLOF mode.

LIST_MODE   TVTEXT is in LIST mode.

PAGE_TRACE_MODE   TVTEXT is in PAGE TRACE mode.
                        The page trace repetition counter has reached 64.

7.5 RETURN_1

7							0
REC_8_30_2	REC_8_30_1	REC_TXT	REC_VPS	REC_TXT_16	NEWS_IND	TOP_IND	FLOF_IND

FLOF_IND	TVTEXT has stored a transmitted packet X/27/0.
TOP_IND	TVTEXT has recognized a transmitted basic TOP table.
NEWS_IND	The current display page is a newsflash/subtitle page.
REC_TXT_16	TVTEXT has recognized a transmitted teletextline in TV line 16.
REC_VPS	TVTEXT has stored valid VPS-data in TV line 16.
REC_TXT	TVTEXT has recognized any valid teletext header in any TV line.
REC_8_30_1	TVTEXT has recognized a packet 8_30_1.
REC_8_30_2	TVTEXT has recognized a packet 8_30_2.

7.6 RETURN_2

7							0
HOLD	REC_WSS	X	X	TEXT_INTER	PAGE_NOT_IN_CYCLE	PAGE_FOUND	SDC

SDC	The current display page is in subpage 'don't care' mode.
PAGE_FOUND	The current display page is received.
PAGE_NOT_IN_CYCLE	This bit indicates whether the current display page is in the page trace or not.
TEXT_INTER	TVTEXT has recognized an interruption of text transmission of more than four frames.
REC_WSS	TVTEXT has stored a valid WSS signal in TV line 23.
HOLD	The current display chapter is in hold mode. After a new page request the hold mode is automatically cleared.

7.7 RETURN_3

7							0
X	SUBPAGE_ MODE	CLOCK_ MODE	OSD_ MODE	TEXT_ MODE	MIX_ MODE	PICTURE_ MODE	UPDATE_ MODE

UPDATE_MODE   TVTEXT is in UPDATE mode.

PICTURE_MODE   TVTEXT is in Picture mode.

MIX_MODE   TVTEXT is in MIX mode.

TEXT_MODE   TVTEXT is in TEXT mode.

OSD_MODE   TVTEXT is in OSD mode.

CLOCK_MODE   The CLOCK command is active.

SUBPAGE_MODE   The SUBPAGE mode is active.

8   Stored Format of 1-Byte Hamming Protected Data

The 1-byte hamming check of data bytes transmitted in TOP tables is done on-line before storing the data into a one byte location. The data bits are compressed to the four LSBs. If there is a non correctable hamming error, the code 'ERR' bit is set:

7							0
0	0	ERR	0	D3_j	D2_j	D1_j	D0_j

9 Stored Format of a Page

Row	Column	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R0	C0	BOX-control (update mode) or space							
R0	C1	BOX-control (update mode) or space							
R0	C2	Magazine number (ASCII)							
R0	C3	Page tens (ASCII)							
R0	C4	Page units (ASCII)							
R0	C5	0	0	1	0	0	0	0	0
R0	C6	0	0	1	0	0	0	0	0
R0	C7	Foreground green or space							

Row	Column	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R0	C8 … C39	D7 0	D6 0	D5 0	D4 0	D3 D3	D2 D2	D1 D1	D0 D0

Row	Column	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R1 … R24	C0 … C39	D7 0	D6 0	D5 ERR	D4 0	D3 D3	D2 D2	D1 D1	D0 D0

Row	Column	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R25	C0 … C3	Erase row bits.							
R25	Col4	0	0	0	0	0	M2	M1	M0
R25	Col5	PT3	PT2	PT1	PT0	PU3	PU2	PU1	PU0
R25	Col6	C4	MT2	MT1	MT0	MU3	MU2	MU1	MU0
R25	Col7	C6	C5	HT1	HT0	HU3	HU2	HU1	HU0
R25	Col8	C14	C13	C12	C11	C10	C9	C8	C7
R25	Col9	0	HEN	SDC	CH_1	CH_0	PBR	PBLF	FIRST
R25	Col10 … 23	Reserved for internal use.							

Remarks:

– Column 2 … 4 in row 0 are used for the page number given by the infrared control.
– Column 0 … 1 are used for the box control characters (for update mode).
– Column 5 … 6 are set to 20_H.
– Column 7 is set to foreground green as long as the page is not received (rolling header).
– All bytes in column 8 … 39 of row 0 and all bytes in row 1 are either parity or hamming checked (corresponding to the Enhanced Teletext Specification).

M(i), PT(i), PU(i), MT(i), MU(i), HT(i), HU(i)		The bits in row 25/column 4 … 5 contain the absolute magazine number and the page number. Col 5..8 contain the page subcode and the control bits of the received page of this chapter if PBLF = '0'.
HEN	1:	Automatic hold of page acquisition after next end of page. The last eight positions of the header of the display page (clock) are always updated. To switch them off use the bit CLOCK_OFF.
	0:	Automatic hold is disabled.
SDC	1:	This page is in subpage 'don't care' mode.
	0:	This page is in subpage 'do care' mode.
PBLF	1:	Page being looked for.
	0:	Header of the page is found.
PBR	1:	Page being received.
	0:	Page not being received.
FIRST	1:	The page is received for the first time.

CHECK Modes

The check bits indicate the checks to be done by acquisition.

Table 1

CH_1	CH_0	Mode
0	0	Normal page check: Header bytes 6 … 13 are 1-byte hamming checked. All other bytes of the page are parity checked.
0	1	No parity check for normal page: Header bytes 6 … 13 are 1-byte hamming checked. All other bytes of the page are stored unchecked.
1	0	1-byte hamming check (TOP page): Header bytes 6 … 13 are 1-byte hamming checked. Header bytes 14 … 45 are parity checked. All bytes in packet 1 … 22 are 1-byte hamming checked.
1	1	Mixed 1-byte hamming check: Header bytes 6 … 13 are 1-byte hamming checked. Header bytes 14 … 45 are parity checked. Bytes 0 … 7 and 20 … 27 in packet 1 … 22 are 1-byte hamming checked. Bytes 8 … 19 and 28 … 39 in packet 1 … 22 are parity checked.

10 Stored Format of Packet 8/30 (x000) Format 1

PACK_8_30_1

i	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	PAG_ER	0	0	0	0	M2	M1	M0
1	PT3	PT2	PT1	PT0	PU3	PU2	PU1	PU0
2	0	MT2	MT1	MT0	MU3	MU2	MU1	MU0
3	0	0	HT1	HT0	HU3	HU2	HU1	HU0
4	Network identification (see byte 13 WST)							
5	Network identification (see byte 14 WST)							
6	Time offset code (see byte 15 WST)							
7	Modified julian date 1. byte (see byte 16 WST)							
8	Modified julian date 2. byte (see byte 17 WST)							
9	Modified julian date 3. byte (see byte 18 WST)							
10	Universal time coordinated 1. byte (see byte 19 WST)							
11	Universal time coordinated 2. byte (see byte 20 WST)							
12	Universal time coordinated 3. byte (see byte 21 WST)							
13	Short program label 1. byte (see byte 22 WST)							
14	Short program label 2. byte (see byte 23 WST)							
15	Short program label 3. byte (see byte 24 WST)							
16	Short program label 4. byte (see byte 25 WST)							
17 … 36	20 bytes parity coded for 'Status Display'							

Remarks

M(i), PT(i), PU(i), MT(i), MU(i), HT(i), HU(i) The bits in column 0 … 3 contain the absolute magazine number, the page number and the page subcode of the initial teletext page.

PAG_ER 1: The initial teletext page number is not completely received.

0: The initial teletext page number was received without any errors.

11   Stored Format of Packet 8/30 (x100) Format 2

PACK_8_30_2

i	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	PAG_ER	0	0	0	0	M2	M1	M0
1	PT3	PT2	PT1	PT0	PU3	PU2	PU1	PU0
2	0	MT2	MT1	MT0	MU3	MU2	MU1	MU0
3	0	0	HT1	HT0	HU3	HU2	HU1	HU0
4	Reserved				Byte 13 of format 2			
5					Byte 14 of format 2			
6					Byte 15 of format 2			
7					Byte 16 of format 2			
8					Byte 17 of format 2			
9					Byte 18 of format 2			
10					Byte 19 of format 2			
11					Byte 20 of format 2			
12					Byte 21 of format 2			
13					Byte 22 of format 2			
14					Byte 23 of format 2			
15					Byte 24 of format 2			
16					Byte 25 of format 2			
17 … 36	20 bytes parity coded for 'Status Display' (see WST)							

Remarks

M(i), PT(i), PU(i), MT(i), MU(i), HT(i), HU(i)	The bits in column 0 … 3 contain the absolute magazine number, the page number and the page subcode of the initial teletext page.
PAG_ER	1: The initial teletext page number is not completely received. 0: The initial teletext page number was received without any errors.

12   Format of the Row24 Titles

12.1   Format of PAGETRACE and SIMPLE Title

For normal text mode, the firmware will create a simple title in row 24 of the current display chapter.

C0 … C12	C13 … C24	C25	C26	C27	C28 … C39
Red page minus, green page plus	Next 10th page	06$_H$	1D$_H$	00$_H$	Next 100th page

12.2   Format of TOP Title

As soon as the TOP mode is recognized, the firmware will create a TOP title in row 24 of the current display chapter. The TOP title will be updated every time after any of the AITs is received. Pages which are not included in the AIT will be represented by their decimal page number.

C0 … C12	C13 … C24	C25	C26	C27	C28 … C39
Red page minus, green page plus	Next group	06$_H$	1D$_H$	00$_H$	Next block

12.3   Format of LIST Menu

If the LIST mode is switched on, a status line is generated in the display memory. Each field of this line will get a different foreground colour (red, green, yellow, cyan) and black as a background colour. If the field contains a subpage number, the page number and the subpage number will be separated by a '.'. If the subpage is set to 'don't care', the four subpage digits are set to '- - - -'.

C0	C1	C2 … C9	C10 … C11	C12 … C19	C20 … C21	C22 … C29	C30 … C31	C32 … C39
1B$_H$	01$_H$	LIST PAGE #0	20$_H$, 02$_H$	LIST PAGE #1	20$_H$, 03$_H$	LIST PAGE #2	20$_H$, 06$_H$	LIST PAGE #3

12.4   Format of Subpage Menu

In subpage mode in row 24 a menu is offered which shows the user which subpage is selected. This menu has a white background and a blue foreground colour. The following shows an example of this menu.

C0 … C12	C13 … C23	C24 … C31	C32 … C39
Red page minus, green page plus	20$_H$	page . subpage number	20$_H$

12.5   Format of Row24 Title in Newsflash Mode

If the actual display page is in newsflash mode row 24 is displayed boxed in TOP, SUBPAGE and SIMPLE mode if the rolling header is active or any page request digit is typed in the 1st time..

C0	C1	C2 … C3	C4 … C12	C13 … C39
01_H	$1D_H$	$0B_H$	Red page minus, green page plus	Rest of the row24 title

13   Development Environment

13.1   Hardware

The Software development tool should be a PC 80386 or higher with MS-DOS. For testing the software, an in-circuit emulator (e.g. KONTRON) provides an optimum of efficiency.

13.2   Software

The following tools were needed to develop the software:

- INTEL ASM51 assembler or Keil A51 assembler
- KEIL C51 compiler
- KEIL L51 linker.
- KEIL BL51 bank linker.

SIEMENS

14 Linker and Module Description of the Acquisition Demo

The following chapter gives an information about the necessary files needed to link teletext to a TV-system controller software. All necessary module file names are stored in the 'lk.dat' file and explained in the next chapter.

Note: To link the acquisition files with any TV controller program, the modules must be compiled or assembled with Intel Asm51, Keil A51 assembler or Keil C51 compiler.

The following linker version is valid for the TVTEXT firmware:

• Keil linker V3.52.

From firmware V2.0 on all modules are compiled with the Keil compiler V5.02, older versions with the compiler V4.06. It is not possible to mix modules compiled with V4.06 and V5.02. If the TV-controller software is developed only with the Intel assembler, the necessary linker V3.52 is delivered together with the TVTEXT firmware. If the TV-controller software is developed with a C51 compiler which is older than V5.02, an update must be ordered at the Keil company.

14.1 Banking of the TVTEXT Firmware

Banking of the firmware is possible. For banking the new C51 Keil compiler V5.02 and the bank linker BL51 X3.53 is necessary.

With the 'OC51.exe' tool from Keil this 'bank linked module' must be converted to the bank hex files. The complete firmware and the code constants of TVTEXT shall be in the same bank.

See also the example linker file 'BLK.DAT' on the demo disk.

If the TVTEXT firmware is linked with port pin banking, the complete firmware modules must be located in the COMMON area.

14.2   The Linker File (lk.dat)

Please add the following files and linker commands to your TV-system controller-software-linker-file:

(*)acq_main.obj, &

(*)acq_chec.obj, &

(*)acq_list.obj, &

(*)acq_top.obj, &

(*)acq_flof.obj, &

(*)acq_comm.obj, &

(*)acq_hand.obj, &

(*)adr_vbi.obj, &

(*)adr_dis.obj, &

(*)adr_p273.obj, &

(*)adr_iop.obj, &

   userfunc.obj, &

   dat_stor.obj, &

   hammfunc.obj, &

   wss_v20.obj, &

   xdata($0F6EB_H$,?xd?adr_dis($0C000_H$), &

   ?xd?adr_vbi($0F400_H$), &

   ramsize(256)

TVTEXT acquisition demo contains the following (for the TV program not necessary) additional files:

(*)acqdemo.obj, &

(*)chardemo.obj, &

(*)ifrdemo.obj, &

   startup.obj, &

   init.obj, &

(*)irir60.obj

Files marked with a (*) are written in C51 language, the remaining are written in assembler 51. The ?xd? linker commands are described in section XRAM mapping.
Mix of firmware modules with firmware modules of older versions is not allowed.

14.3   Description of the Files

acq_main.obj

It is the interrupt service routine for the vertical interrupt at CVBS signal line 24. The interrupt address is $002B_H$.

This subroutine decodes the fly-back buffer and handles the complete acquisition.

acq_chec.obj

This subroutine must be called by main loop in the TV controller program with either call acq_chec (in asm) or acq_chec() (in C51). Here the acq_status e.g. switch to TOP, FLOF, or PAGETRACE is cyclically controlled and switched if possible.

acq_list.obj

All subroutines for the LIST mode.

acq_top.obj

All subroutines for the TOP mode.

acq_flof.obj

All subroutines for the FLOF mode.

acq_comm.obj

In this file all the possible TVTEXT commands e.g. red, green, mix_mode, size, …, are implemented.

acq_hand.obj

Contains all subroutines for the acquisition-, and chapter handling.

adr_vbi.obj

Contains the declaration for the fly_back buffer XRAM.

adr_dis.obj

It contains the declaration for the display buffer XRAM.

adr_iop.obj

It contains the declarations for the INPUT and OUTPUT parameters according to the specification

userfunc.obj

This subroutine is called at every vertical sync interrupt AVIRST = '1'. It is executed after the ACC, Registers and DPTR's are pushed by interrupt.

A timer can be started/stopped here to detect the vertical frequency (50/60 Hz).

The max. execution time (with call and ret) for this subroutine is 1 ms which are 3000 cpu cycles at a crystal frequency of 18 MHz. Please see also the source file 'userfunc.a51'.

adr_p273.obj

It contains the declarations for the OUTPUT parameters packet 27, 8/30 and packet 29.

dat_stor.obj

The file contains all subroutines for a 'fast store' of hamming, parity, biphase or no checked bytes to the display buffers.

hammfunc.obj

In this file the subroutines for the 3- and the 1-byte hamming check are stored.

wss_v20.obj

It contains the check and the store of the WSS information.

Description of the Additional Files for the Acq Demo

(These files are also available as C51 sourcecode on the demo disc).

acqdemo.obj

It is the main loop for the acquisition.

chardemo.obj

The file contains the demo picture after power ON and the demo rows for OSD in text.

init.obj and startup.obj

The reset initialization programmed by C51 conventions (see KEIL C51 manual).

ifrdemo.obj

There are examples implemented, how all TVTEXT commands can be called and handled. A small demo program shows the usage of on-screen display as a block in a ttx page and osd in row 24. Further examples are given for adding and removing the list pages. In this module is also the subroutine 'Adjust_horizontal' implemented:

To correct the horizontal position, caused by an external LC circuitry tolerance, there is a function, written in C51 source in the file IFRDEMO.C51 on the demo disc. For further information please read the header of the function 'Adjust_horizontal' of this file.

irir60.obj

The infrared interrupt program at pin EX1 with a special IFR compare timer. With this module you can decode a lr60 word in < 600 µs. For more detailed description see **chapter 25**.

Note: The TVTEXT firmware sets no interrupt priority register. Please set the infrared interrupt to any higher priority than the TTX interrupt.

15 XRAM Mapping

The XDATA RAM has 10 kbytes and must be linked with the above mentioned ?xd? link-file and has the following start addresses:

?xd?adr_dis (display buffer) start address: $0C000_H$, length: 8192 bytes
?xd?adr_vbi (fly_back buffer) start address: $0F400_H$

and the XDATA RAM of the acq_main program:

?xd?acq_main (variables acq_main) start address: $0F6EB_H$

Note: If you define your own xdata variables do not set them at an address lower than $0F6EB_H$. For the free XRAM size and location see the linker information.
Please note, that all INPUT and OUTPUT parameters described in the target firmware specification are located in the XDATA RAM.

16 DATA and IDATA Mapping

Please note that a part of the 256 bytes data and idata RAM in the TVTEXT is used for the acquisition. For the free RAM size see the linker information of the M51 file.

17 Memory Model of the TVTEXT Firmware

The functions of the TVTEXT firmware are all compiled with the compiler 'small' directive (void FUNCTION(void) small;). There are two versions possible with the 'small' and the 'large' directive in the global #pragma statement. Depending on the delivered firmware the user has the possibility to choose either the small or the large memory model for his own software.

18   External Command Calls

To execute a TCI (TVTEXT Command Interface) command you have the choice of calling it directly or indirectly with the command number:

e.g. for the red key

Direct Call

in 8051 assembler language:

- lcall red

in 8051C language:

- red()

Indirect Call with the Command Number

in 8051 assembler language:

- mov r7,#14d
- call _execute_acq_command

in 8051 C language:

execute_acq_command(14).

As an example for these command calls please see also the source code file ifrdemo.c51 on the firmware demo disk.

19   How to Start

This chapter gives you an overview, how to start TVTEXT acquisition after an 'error free linking' as described in **chapter 14**.

19.1   Initialization

Note: After the hardware reset (power ON) a clear of the complete internal and external RAM (Data and Xdata) is necessary (see also description of the Keil start-up module).
The clock divider control bit in the special function register AFR must not be set, if the TVTEXT firmware is used.

After program reset all input parameters have to be initialized before calling reset_acq. Furthermore the languages for the C12 … 14 bits have to be set. Depending on the hardware the H-V mode or the SSC mode must be selected and the interrupt priority for infrared must be a higher level than the acquisition interrupt.
As an example for this initialization please see also the start-up sequence of the source code file acqdemo.c51 on the firmware demo disk.

19.2   Reset_acq

After program start of TVTEXT (reset) or after every channel change you have to initialize the TVTEXT acquisition by giving this command.

Reset_acq will also enable the acq-interrupt (IE.5) (see also **chapter 5.2**).

Note: It is not allowed to start any TVTEXT command before the input parameters are set and before the reset_acq command is executed.

The TVTEXT will start in SIMPLE_MODE. All other modes (subpage, list, clock, osd's, top, flof, update, …) are left by reset_acq.

19.3   Acq_chec

In the TV-controller-program endless-loop the command acq_chec must be added. Acq_chec controls the complete acquisition that means:

– Automatic reset_acq if enabled and no teletext receive for more than 4 half-fields.
– Switch to FLOF request if enabled and write FLOF titles if enabled.
– Switch to TOP request if TOP enabled and detected and write TOP titles
  with or without ADDI's if enabled.
– Switch to page-trace request if the pagetrace is full.
– Update of the RETURN and TEXTMODE parameters.

20   Segment Name Conventions for Assembler Programs

To ensure the overlay process of the variables of the L51 linker, the segment names must be defined in C51 Keil compiler conventions in the external assembler programs.

Examples:

?PR?FUNCTION?MODULE SEGMENT CODE   for program code in function
?DT?FUNCTION?MODULE SEGMENT DATA   for local variables in function
?BI?FUNCTION?MODULE SEGMENT BIT   for local bit variables in function

Note: To ensure, that the linker can generate a complete program flow analysis, the main program must have the segment name ?pr?main.
Please see also C51 Keil compiler manual.

21   Data Pointer Select (DPSEL) Handling

The TVTEXT firmware uses several data pointers (DPTR selected with DPSEL). The acquisition interrupt stores and restores these data pointers. But the TVTEXT commands need DPTR0 as start value for a correct function. If the external TV-controller software uses another data pointer than DPTR0, it is necessary to set DPSEL to '0' before any acquisition command is called or before acq_check is executed.

When the acquisition command or acq_check is finished the return value of DPSEL is '0'.

22   Appendix

22.1   Cyrillic Firmware Version

Most modules of the cyrillic version are the same as modules of the TVTEXT 8 page version. The cyrillic specific differences are generated by the compilerswitch "cyrillic". The features for the standard TVTEXT firmware version are also valid for the cyrillic version.

The linker filenames for cyrillic (file cylk.daton demo disk):

acdm_cy8.obj, acmn_cy8.obj, acq_chec.obj, acq_list.obj, acq_top.obj, &
acq_flof.obj, accm_cy8.obj, achd_cy8.obj, chdm_cy8.obj, ifrdemo.obj, &
adr_vbi.obj, adr_dis.obj, adr_p273.obj, adio_cy8.obj, startup.obj,&
init.obj, userfunc.obj, dast_cy8.obj, hammfunc.obj, wss.obj, irir60.obj&
TO *"LINKER_OUTPUT_NAME"* &
xdata(0f6ebh,?xd?adr_dis(0c000h), ?xd?adr_vbi(0f400h)) ramsize(256)

The bank linker filenames for cyrillic (file bcylk.dat on demo disk):

COMMON{startup.obj, init.obj, acdm_cy8.obj},
BANK0 {chdm_cy8.obj},
BANK1{acmn_cy8.obj, acq_chec.obj, acq_list.obj, acq_top.obj, acq_flof.obj,
      accm_cy8.obj, achd_cy8.obj, adr_vbi.obj, adr_dis.obj, adr_p273.obj,
      adio_cy8.obj, userfunc.obj, dast_cy8.obj, hammfunc.obj, wss.obj},
BANK2{ifrdemo.obj,irir60.obj}
TO ACQBANK
BANK0 (?CO?CHARDEMO(1000H))
        xdata(0f6ebh,?xd?adr_dis(0c000h), ?xd?adr_vbi(0f400h)) RAMSIZE(256)
BANKAREA (1000H,0FFFFH) IBANKING DEBUGPUBLICS DEBUGSYMBOLS
DEBUGLINES

The initialization is nearly the same as for the standard version with the following exeptions:

1. These primary languages are supported and must be initialized in the array USER_LANGC[8] with the following numbers:

    0 = letish   *
    1 = Estonian   *
    2 = Russian   *
    3 = Ukrainian   *
    4-7 = English   *
    5a = Rumanian
    5c = Czechian
    5d = Polish
    5e = Serbian
    5b = Hungarian

    At languages which are marked with a "*" the twist mode is allowed to a language, which is also marked with a "*".

2. The following input parameters (xdata) must be initialized for the twist mode:

TWIST_LANGUAGE0:   Must be initialized with that language value, to which shall be twisted in a latin based page.

TWIST_LANGUAGE1:   Must be initialized with that language value, to which shall be twisted in a cyrillic based page.

The following languagenumbers are allowed for the twist mode:

    0 = Letish   *
    1 = Estonian   *
    2 = Russian   *
    3 = Ukrainian   *
    4-7 = English   *

Please see also acqdemo.c51 source file on the demo disk. Please refer to those parts which belong to the compilerswitch "cyrillic".

Number of acquisition pages for the cyrillic version:

In the cyrillic version only a 6 page acquisition from chapter 0 - 5 is possible.
The **chapter 7** remains the chapter for OSD purpose.
In **chapter 6** the incoming P26 are stored as bit flags and it cannot be used as a page acquisition chapter.
In the ATS mode (input parameter DISPLAY_MODE1 bit 1) the last LAST_ACQ_CHAP parameter can have only values from 0 to 5.
Disabling the OSD mode with the input parameter bit 0 of DISPLAY_MODE1 has no effect.

22.2 Greek Firmware Version

Most modules of the greek version are the same as modules of the TVTEXT 8 page version. The greek specific differences are generated by the compilerswitch "greek". The features for the standard TVTEXT firmware version are also valid for the greek version.

The changed linker filenames for Greek (file grlk.daton demo disk):

acdm_gr8.obj, acmn_gr8.obj, acq_chec.obj, acq_list.obj, acq_top.obj,   &
acq_flof.obj, accm_gr8.obj, achd_gr8.obj, chdm_gr8.obj, ifrdemo.obj,   &
adr_vbi.obj, adr_dis.obj, adr_p273.obj, adio_gr8.obj, startup.obj,   &
init.obj, userfunc.obj, dast_gr8.obj, hammfunc.obj, wss_v20.obj, irir60.obj&
TO *"LINKER_OUTPUT_NAME"* &
xdata(0f6ebh, ?xd?adr_dis(0c000h), ?xd?adr_vbi(0f400h)) ramsize(256)

The bank linker filenames for Greek (file bgrlk.dat on demo disk):

COMMON{startup.obj, init.obj, acdm_gr8.obj},
BANK0 {chdm_gr8.obj},
BANK1{acmn_gr8.obj, acq_chec.obj, acq_list.obj, acq_top.obj, acq_flof.obj,
    accm_gr8.obj, achd_gr8.obj, adr_vbi.obj, adr_dis.obj, adr_p273.obj,
    adio_gr8.obj, userfunc.obj, dast_gr8.obj, hammfunc.obj, wss_v20.obj},
BANK2{ifrdemo.obj, irir60.obj}
TO ACQBANK
BANK0 (?CO?CHARDEMO(1000H))
        xdata(0f6ebh, ?xd?adr_dis(0c000h), ?xd?adr_vbi(0f400h)) RAMSIZE(256)
BANKAREA (1000H, 0FFFFH) IBANKING DEBUGPUBLICS DEBUGSYMBOLS DEBUGLINES

The initialization is nearly the same as for the standard version with the following exeptions:

1. These primary languages are supported and must be initialized in the
   array USER_LANGC[8] with the following numbers:
   00 = German
   0a = English
   42 = Turkish   *
   43 = Greek   *
   2b = Scandinavian
   0c = Italian
   0d = French
   0e = Spain

At languages which are marked with a "*" the twist mode is allowed to a language, which is also marked with a "*".

Please see also acqdemo.c51 source file on the demo disk.

Please refer to these parts which belong to the compilerswitch "greek".

22.3   SIGNAL QUALITY COUNTER

Three counters at the xdata label ACQ_OUPUT[4] count the following values:

Meaning of the ACQ_OUTPUT parameters:

ACQ_OUTPUT(+ 0): NU_HE_7 … NU_HE_0 number of detected headers

ACQ_OUTPUT(+ 1): SQC_0.7 … SQC_0.0 correctable hamming errors

ACQ_OUTPUT(+ 2): SQC_1.7 … SQC_1.0 non correctable hamming errors

ACQ_OUTPUT(+ 3): Not used

ACQ_OUTPUT[0, …, 2] is set to '0' with the reset_acq command.

The signal quality can be found out (after reset_acq) by the relation of the found headers and the number of hamming errors.

Please note that each of these counters is stopped, when it has reached the value '255'.

23　　　Application Notes

23.1　　Overview about the On Screen Display Possibilities for the 8 Page Version

At the positions of row 0 col 0-6, row 0 col 32-39 and row 24 col 0-39 OSD can be realized in the active display chapter without disturbing the text reception.

– **OSD in row 0 col 32-39:** by setting the clock_off bit in DISPLAY_MODE0.0.
  When this bit is cleared the next incoming header overwrites the row 0 col32-39.
– **OSD in row 24 col 0-39:** call of the command osd_row24(). These positions are now not overwritten by the firmware and can be used for OSD. If this mode is left (call osd_row24() again), row 24 is actualized by the firmware.
– **OSD row 0 col 0-6:** set the bit Dont_write_row0 in DISPLAY_MODE1.6. These positions are now not overwritten by the firmware and can be used for OSD.
  If this mode is left (clear the bit Dont_write_row0 in DISPLAY_MODE1.6), row 0 col 0-6 must be restored by the programer or updated by any new_page_request command like index(), red, digit...
– **OSD row 0 to row24:** call of the command osd().The complete display **chapter 7** can be used for OSD. OSD and text together can be realized by a copy loop from the active display chapter to the OSD **chapter 7** (must be enabled).
  Please note: If the current text page and osd rows are displayed together, the text row before the osd row or the last osd row could contain a control character for double height from the broadcaster. In this case these rows should be erased.

Software examples for all above mentioned OSD displays are a part of each firmware version in the files IFRDEMO.C51 on the demo disk.

23.2　　Text Reception Quality

Several TV set manufacturers use their own test pages during production to check the text reception performance of the TV sets.

One of the standard test pages is a so called clock_cracker page, which consists of an alternating pattern of data bytes which leads to a minimum number of edges in the data stream.

This is the worst condition, which can occur under real text reception conditions. Every device should decode this page correctly.

If a non-standard test page (similar to the clock cracker page) is to be used, only a few parity fails are allowed. This is required for a correct frequency control. If a data line consists of a longer sequence of "00000000" bytes (parity error!), the required frequency adjustment is not longer possible and decoding errors may occur (depending of the actual PLL stability of a certain device and of the signal stability).

The behavior regarding this non-standard test pages has no correlation to the reception quality of real teletext signals.

24   Patents

Dear Software User,

you may appreciate the integrated circuit SDA 525x (TV-TEXT) as an advanced teletext processor for comprehensive teletext information treatment. In order to benefit from its hardware features we prepared a number of firmware options for you disposal.

For this reason, we would like to draw your attention to relevant intellectual property rights that might be in conflict with the firmware routines. Especially, please consider the following patents/patent applications:

1. TOP-Teletext - European Patent EP 0 264 565 / German Patent DE 36 34 757 from Thomson Multimedia:

The patents refer to the use of the TOP-basic-table from the transmitting station when the "next page"-key is operated. We have been informed that Thomson already started licensing activities.

2. Page trace - German Patent DE 36 22 308 from Thomson Multimedia:

The patent refers to the "page trace"-firmware option that collects the page numbers of all receivable pages. Through "page trace" the TOP-basic-table may be replaced.

3. Remote control - European Patent EP 0 145 677 from EDICO:

The patent refers to a tv-set comprising a remote control including a "+/-"-key for scrolling through teletext pages.

4. Favorite pages - European Patent EP 0 438 185 from EDICO:

The patent refers to the memory organization for storing page numbers for favorite teletext pages.

5. Meshing - European Patent Application EP 0 553 910 from Philips:

The patent application refers to superimposing text on a television picture through a display window with transparent background colour.

When using one of the above mentioned firmware routines in a TV set please make sure that you are not in conflict with the patents/patent applications and obtain a license from the patent holder if necessary.

Please bear in mind that there may be additional protective rights in further countries originating from the above patents/patent applications. You may understand that we cannot guarantee for the above mentioned list being complete.

Generally, we do not undertake any liability for claims from intellectual property rights which may be held by third parties other than Siemens being related to the implementation of firmware routines made available through Siemens.
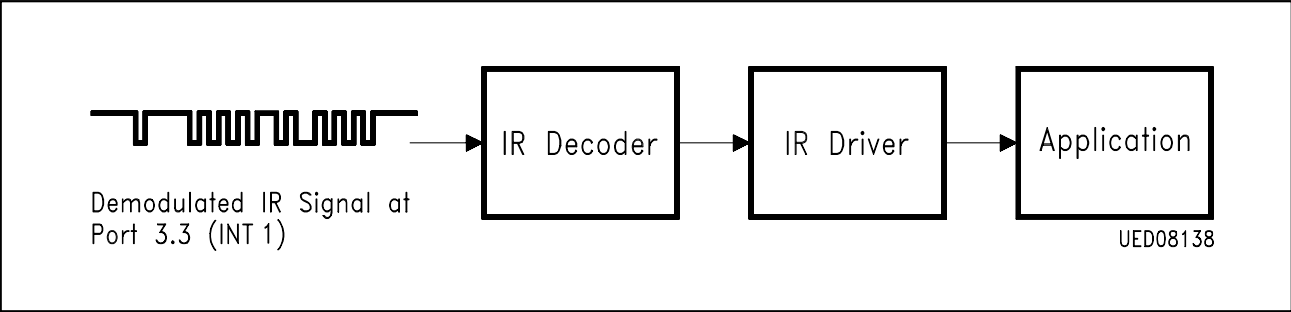
25   Infrared Decoder for SIEMENS IR60 Code

Figure 1
Description of the IR Decoder

Every edge of the IR signal at port 3.3 is starting the interrupt service routine (ISR) with the function name 'IrIsr()'. Simultaneously the value of the IR timer is captured into the Capture Register CAPL and CAPH and the IR timer is autoreloaded with '0' by hardware. The ISR saves the Capture Registers into two variables 'TL' and 'TH' and checks if these captured timer values are within specified time intervals. In case of a valid timer value the signal will be decoded, the information will be stored and the ISR will be left. In case of no valid value the information variables will be reinitialised so that the next edge will understood as the first bit of the next command.
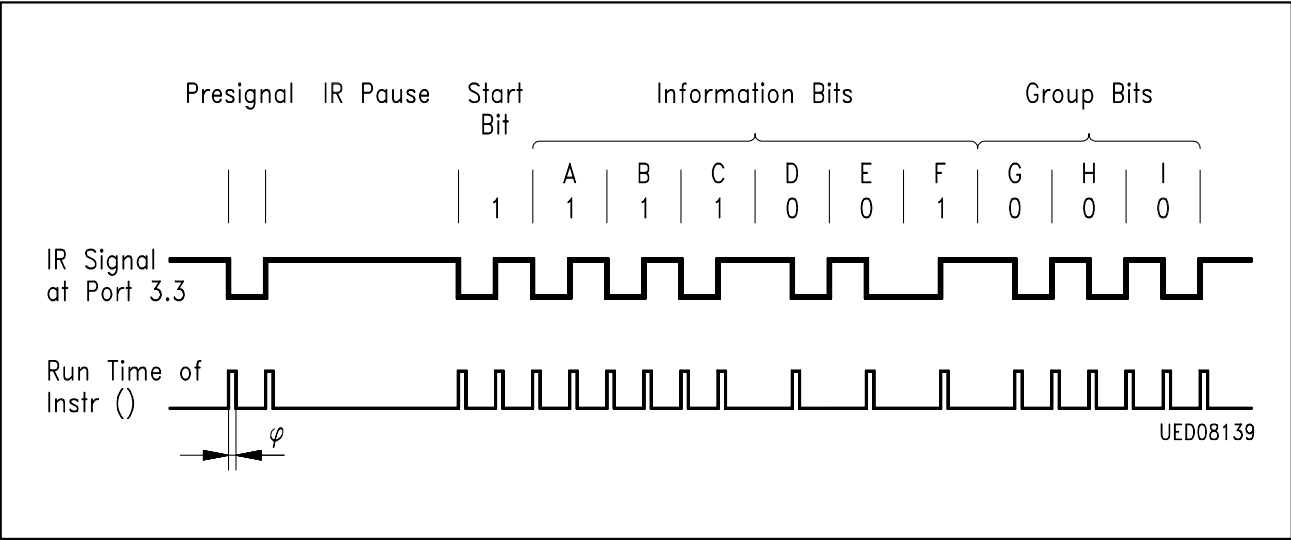

Figure 2
Timing Diagram of IR Decoder

Test Conditions

Controller type	SIEMENS SDA 5250-E
Crystal frequency of Controller	18 MHz
IR Receiver type	SIEMENS SFH 506.33
IR Transmitter type	SIEMENS SDA 2218
Crystal frequency of IR transmitter	500 kHz $\pm$ 10 %

IrIsr() Output Parameter (global variables) given to IR Driver

Name of Parameter	Data Type	Explanation
IrReady	Bit	Will be set to '1', if a new command has been received, must be cleared by IR driver software after getting the new command.
IrCommand	Unsigned char (bit 0 … 5)	Bits 0 … 5 are holding actual complete received IR command if IrReady is set to '1', bit 0 contains the A-bit and bit 5 the F-bit of the SIEMENS IR60 Code.
IrGroup	Unsigned char (bit 0 … 2)	Bits 0 … 3 are holding actual complete IR group if IrReady is set to '1', bit 0 contains the G-bit and bit 2 the I-bit of the SIEMENS IR60 Code.

	7							0
IrCommand	X	X	F-bit	E-bit	D-bit	C-bit	B-bit	A-bit

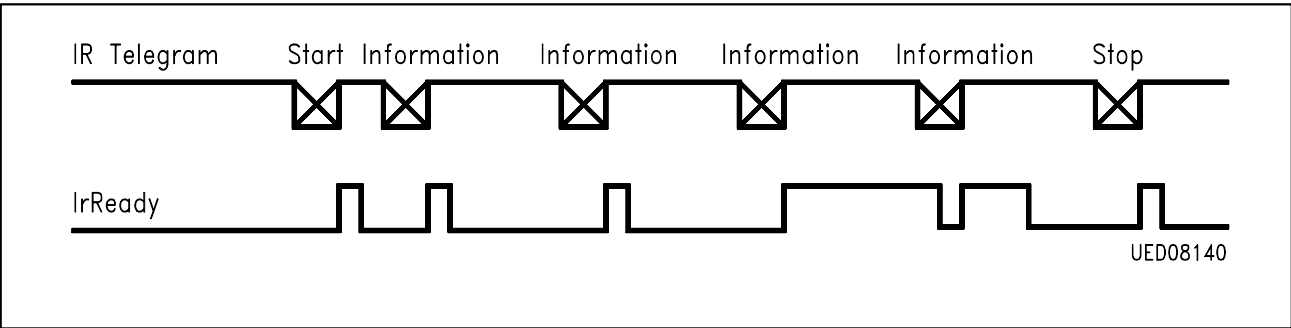|								
IrGroup	X	X	X	X	X	I-bit	H-bit	G-bit

UED08140

Figure 3
Timing Diagram of IrReady Bit

The IrReady bit will be set by the IR decoder if a complete command has been received and must be cleared by the IR driver software after getting the group and command information from the variables 'IrCommand' and 'IrGroup'. The command information must be got before a new complete command has been received. Otherwise the last received command information will be lost.

Files of the IR Decoder

To run IrIsr() following files are necessary:

File Name	Content
IRIR60.OBJ, IRIR60.C51	Function IrIsrInit() Function IrIsr()
IRIR60.H	Extern declaration of – global variables needed by IrIsr() – function IrIsrInit()

Implementation of IR Decoder modules into TV Application

- Include IRIR60.H in every module where output parameters of the IR decoder will be used (e.g. in IR driver)
- Include IRIR60.H in that module where initialization of IR decoder should occur
- Initialization of IR Decoder must be done by calling the function 'IrIsrInit()', ensure that bit EA (enable all interrupts) will be set to '1'
- The IR driver must be programmed
- To adjust 'IrIsr' for different IR transmitter crystal frequencies the IR timing constants in file IRIR60.C51 must be modified.

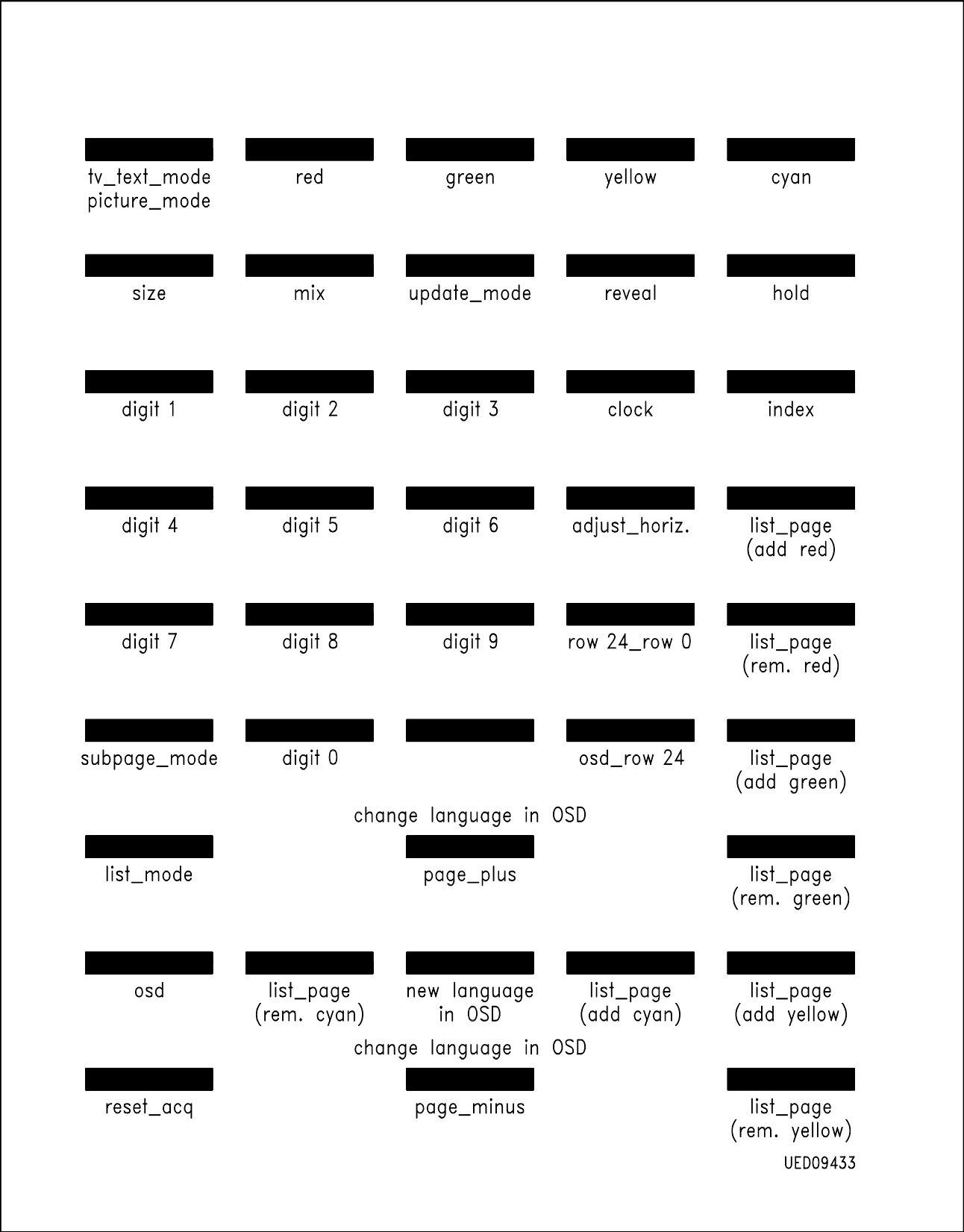## 25.1   Infrared Keys for TVTEXT Commands in the Acquisition Demo

tv_text_mode picture_mode	red	green	yellow	cyan
size	mix	update_mode	reveal	hold
digit 1	digit 2	digit 3	clock	index
digit 4	digit 5	digit 6	adjust_horiz.	list_page (add red)
digit 7	digit 8	digit 9	row 24_row 0	list_page (rem. red)
subpage_mode	digit 0		osd_row 24	list_page (add green)

change language in OSD

list_mode	page_plus	list_page (rem. green)

osd	list_page (rem. cyan)	new language in OSD	list_page (add cyan)	list_page (add yellow)

change language in OSD

reset_acq	page_minus	list_page (rem. yellow)

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Figure 4