

# SAA5040

## Teletext Acquisition and Control Circuit

### Product Specification

### Linear Products

### DESCRIPTION

The SAA5040A, SAA5040B, SAA5040C, SAA5041, SAA5042 and SAA5043 form the SAA5040 series of MOS N-channel integrated circuits. They perform the control, data acquisition and data routing functions of the teletext system. The circuits differ in the on-screen display that is provided and in the decoding of the remote-control commands. The functions of the circuits are detailed in Tables 1, 2 and 3; throughout the remainder of the data, the SAA5040 is referred to when the complete series of circuits is being described.

The SAA5040 is a 28-lead device which receives serial teletext data and clock signals from the remote-control systems incorporating the SAA5012 or SAB3022, SAB3023 decoder circuits. The SAA5040 selects the required page information and feeds it in parallel form to the teletext page memory.

The SAA5040 works in conjunction with the SAA5020 timing chain and the SAA5050 series of character generators.

The circuit consists of two main sections.

#### a. Data acquisition section

The basic input to this section is the serial teletext data stream DATA from the SAA5030 video processor circuit. This data stream is clocked at a 6.9375MHz clock rate (F7) from the SAA5030. The incoming data stream is processed and sorted so that the page of data selected by the user is written as 7-bit parallel words into the system memory. Hamming and parity checks are performed on the incoming data to reduce errors. Provision is also made to process the control bits in the page header.

#### b. Control section

The basic input to this section is the 7-bit serial data (DATA) from the remote control decoder circuit such as the SAA5012 or SAB3012. This is clocked by the DLIM signal.

The remote-control commands are decoded and the control functions are stored.

Full details of the remote-control commands used in the various SAA5040 series options are given in Tables 1, 2 and 3. The control section also writes data into the page memory independently of the data acquisition section. This gives an on-screen display of certain user-selected functions such as page number and program name.

The 3-State data and address outputs to the system memory are set to high impedance state if certain remote-control commands are received (e.g., view-data mode). This is to allow another circuit to access the memory using the same address and data lines. The address lines are also high impedance while the acquisition and control circuit is not writing into the memory.

Further information on the control of the complete teletext system is available.

The circuit is designed in accordance with the September 1976 Broadcast Teletext specification published by BBC/IBA/BREMA.

A typical circuit diagram of a teletext decoder is shown in Figure 5.

### FEATURES

- Converts serial data into parallel
- Performs error detection and correction
- Generates memory control signals
- Interfaces to the remote-control system

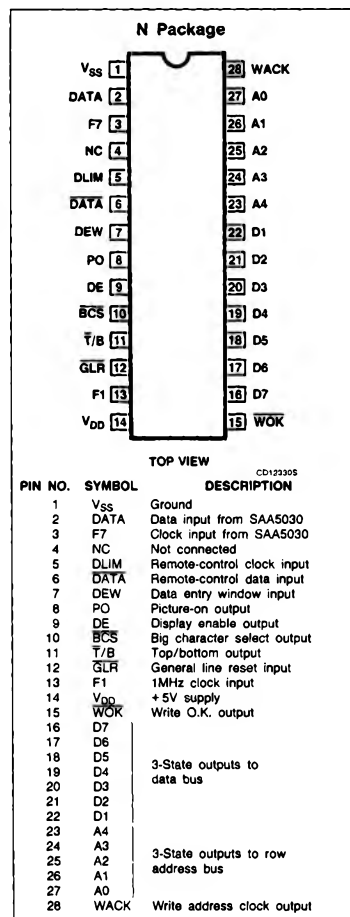
### APPLICATIONS

- Teletext
- Data acquisition

### ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
28-Pin Plastic DIP	-20°C to +70°C	SAA5040BN

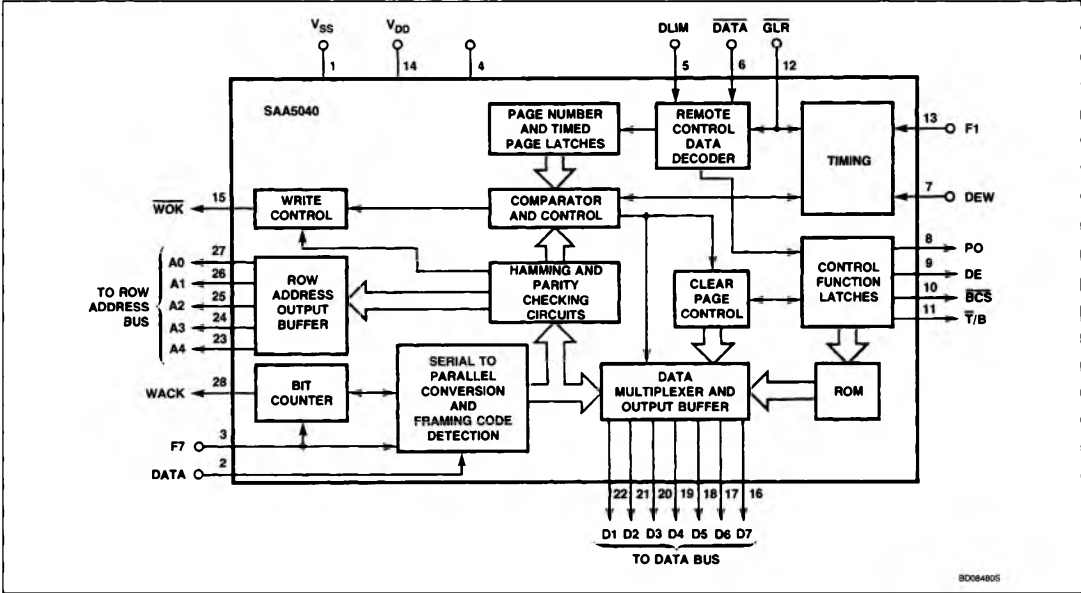
### PIN CONFIGURATION



Teletext Acquisition and Control Circuit

SAA5040

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V <sub>DD</sub>	Supply voltage (Pin 14)	-0.3 to 7.5	V
V <sub>I</sub>	Input voltage (all inputs)	-0.3 to 7.5	V
V <sub>O8</sub>	Output voltage (Pin 8)	-0.3 to 13.2	V
V <sub>O</sub>	Output voltage (all other outputs)	-0.3 to 7.5	V
T <sub>STG</sub>	Storage temperature range	-65 to +125	°C
T <sub>A</sub>	Operating ambient temperature range	-20 to +70	°C

## Teletext Acquisition and Control Circuit

SAA5040

**DC AND AC ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  and  $V_{DD} = 5\text{V}$ , unless otherwise stated.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
$V_{DD}$	Supply voltage (Pin 14)	4.5		5.5	V
$I_{DD}$	Supply current		80	120	mA
<b>F7 DATA (Pin 2), F7 CLOCK (Pin 3)</b>					
$V_{IH}$	Input voltage; High	3.5		5.5	V
$V_{IL}$	Input voltage; Low <sup>1</sup>			0.5	V
$t_R$	Rise time			30	ns
$t_F$	Fall time			30	ns
$R_i$	Input resistance (measured at 4V)	2		18	M $\Omega$
$C_i$	Input capacitance			7	pF
<b>F1 (Pin 13)</b>					
$V_{IH}$	Input voltage; High	2.4		$V_{DD}$	V
$V_{IL}$	Input voltage; Low	0		0.6	V
$t_R$	Rise time			50	ns
$t_F$	Fall time			30	ns
$C_i$	Input capacitance			7	pF
$I_{IR}$	Input leakage current ( $V_i = 0$ to 5.5V)			10	$\mu\text{A}$
<b>DLIM (Pin 5), DATA (Pin 6), DEW (Pin 7), GLR (Pin 12)</b>					
$V_{IH}$	Input voltage; High	2.0		$V_{DD}$	V
$V_{IL}$	Input voltage; Low	0		0.8	V
$C_i$	Input capacitance			7	pF
$I_{IR}$	Input leakage current ( $V_i = 0$ to 5.5V)			10	$\mu\text{A}$
<b>DE (Pin 9), BCS (Pin 10), T/B (Pin 11) (with internal pull-up to <math>V_{DD}</math>)</b>					
$V_{OL}$	Output voltage; Low ( $I_{OL} = 400\mu\text{A}$ )	0		0.5	V
$V_{OH}$	Output voltage; High $-I_{OH} = 50\mu\text{A}$ for Pin 9 $-I_{OH} = 30\mu\text{A}$ for Pin 10 $-I_{OH} = 20\mu\text{A}$ for Pin 11	2.4		$V_{DD}$	V
		2.4		$V_{DD}$	V
		2.4		$V_{DD}$	V
$t_R$	Output voltage rise time			10	$\mu\text{s}$
$t_F$	Output voltage fall time			1	$\mu\text{s}$
$C_O$	Output capacitance			7	pF
$-I_O$	Output current with output in High state ( $V_O = 0.5\text{V}$ )	50		500	$\mu\text{A}$
<b>PO (Pin 8) (with internal pull-up to <math>V_{DD}</math>)</b>					
$V_{OL}$	Output voltage; Low ( $I_{OL} = 140\mu\text{A}$ )	0		0.5	V
$V_{OH}$	Output voltage; High ( $-I_{OH} = 50\mu\text{A}$ )	2.4		$V_{DD}$	V
$t_R, t_F$	Output rise and fall time ( $C_L = 40\text{pF}$ ) <sup>3</sup>			10	$\mu\text{s}$
$C_O$	Output capacitance			7	pF
$-I_O$	Output current with output in High state ( $V_O = 0.5\text{V}$ )	50		500	$\mu\text{A}$

## Teletext Acquisition and Control Circuit

SAA5040

**DC AND AC ELECTRICAL CHARACTERISTICS** (Continued)  $T_A = 25^\circ\text{C}$  and  $V_{DD} = 5\text{V}$ , unless otherwise stated.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
D1 to D7 (Pins 16 to 22) (3-State)					
V <sub>OL</sub>	Output voltage; Low (I <sub>OL</sub> = 100μA)	0		0.5	V
V <sub>OH</sub>	Output voltage; High (I <sub>OH</sub> = -100μA)	2.4		V <sub>DD</sub>	V
t <sub>R</sub> , t <sub>F</sub>	Output rise and fall time (C <sub>L</sub> = 40pF) <sup>3</sup>			100	ns
± I <sub>OROFF</sub>	Output leakage current in 'OFF' state (V <sub>O</sub> = 0 to 5.5V)			10	μA
C <sub>O</sub>	Output capacitance			7	pF
WOK (Pin 15) (3-State with internal pull-up to V <sub>DD</sub> )					
V <sub>OL</sub>	Output voltage; Low (I <sub>OL</sub> = 400μA)	0		0.5	V
V <sub>OH</sub>	Output voltage; High (-I <sub>OH</sub> = 200μA)	2.4		V <sub>DD</sub>	V
t <sub>R</sub> , t <sub>F</sub>	Output voltage rise time Output voltage fall time } (C <sub>L</sub> = 80pF) <sup>3</sup>			50 100	ns ns
± I <sub>OROFF</sub>	Output current with 3-State 'OFF' (V <sub>O</sub> = 0.5V)	80		500	μA
C <sub>O</sub>	Output capacitance			7	pF
WACK (Pin 28) (3-State)					
V <sub>OL</sub>	Output voltage; Low (I <sub>OL</sub> = 1.6mA)	0		0.5	V
V <sub>OH</sub>	Output voltage; High (-I <sub>OH</sub> = -100μA)	2.4		V <sub>DD</sub>	V
t <sub>R</sub> , t <sub>F</sub>	Output voltage rise time Output voltage fall time } (C <sub>L</sub> = 40pF) <sup>3</sup>			50 300	ns ns
± I <sub>OROFF</sub>	Output leakage current in 'OFF' state (V <sub>O</sub> = 0 to 5.5V)			10	μA
C <sub>O</sub>	Output capacitance			7	pF
A0 to A2 (Pins 25 to 27) (3-State)					
V <sub>OL</sub>	Output voltage; Low (I <sub>OL</sub> = 200μA)	0		0.5	V
V <sub>OH</sub>	Output voltage; High (-I <sub>OH</sub> = 200μA)	2.4		V <sub>DD</sub>	V
t <sub>R</sub> , t <sub>F</sub>	Output rise and fall time (C <sub>L</sub> = 90pF) <sup>3</sup>			300	ns
± I <sub>OROFF</sub>	Output leakage current in 'OFF' state (V <sub>O</sub> = 0 to 5.5V)			10	μA
C <sub>O</sub>	Output capacitance			7	pF
A3 and A4 (Pins 23 and 24) (3-State)					
V <sub>OL</sub>	Output voltage; Low (I <sub>OL</sub> = 1.6mA)	0		0.5	V
V <sub>OH</sub>	Output voltage; High (-I <sub>OH</sub> = 200μA)	2.4		V <sub>DD</sub>	V
t <sub>R</sub> , t <sub>F</sub>	Output rise and fall time (C <sub>L</sub> = 40pF) <sup>3</sup>			300	ns
+ I <sub>OROFF</sub>	Output leakage current in 'OFF' state (V <sub>O</sub> = 0 to 5.5V)			10	μA
C <sub>O</sub>	Output capacitance			7	pF
TIMING CHARACTERISTICS					
Teletext data and clock (F7 DATA + F7 CLOCK) <sup>2</sup> (Figure 1)					
TF <sub>7</sub>	F7 Clock cycle time	144			ns
	F7 Clock duty cycle (High-to-Low)	30		70	%
t <sub>SU</sub>	F7 Clock to data setup time		60		ns
t <sub>HOLD</sub>	F7 Clock to data hold time		40		ns

## Teletext Acquisition and Control Circuit

SAA5040

**DC AND AC ELECTRICAL CHARACTERISTICS** (Continued)  $T_A = 25^\circ\text{C}$  and  $V_{DD} = 5\text{V}$ , unless otherwise stated.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
Control DATA and clock (DATA + DLIM) <sup>3</sup>					
t <sub>CH</sub>	DLIM Clock High time <sup>4</sup>	6.5	8		μs
t <sub>CL</sub>	DLIM Clock Low time	3.5	8	60	μs
t <sub>SU</sub>	DLIM to DATA setup time	0	14		μs
t <sub>HOLD</sub>	DLIM to DATA hold time	8	14		μs
Writing teletext data into memory during DEW (Figure 3)					
t <sub>WACK</sub>	WACK cycle time	1150			ns
t <sub>AWW</sub>	WACK rising edge to WOK falling edge	250		450	ns
t <sub>WRW</sub>	WACK rising edge to WOK rising edge	150		310	ns
t <sub>WPD</sub>	WOK pulse width	300			ns
t <sub>DW</sub>	Data output setup time	330			ns
t <sub>DH</sub>	Data output hold time	0			ns
t <sub>RAW</sub>	Row address setup time before first WOK	190			ns
t <sub>RWR</sub>	Row address valid time after last WOK	0			ns

**TIMING CHARACTERISTICS**

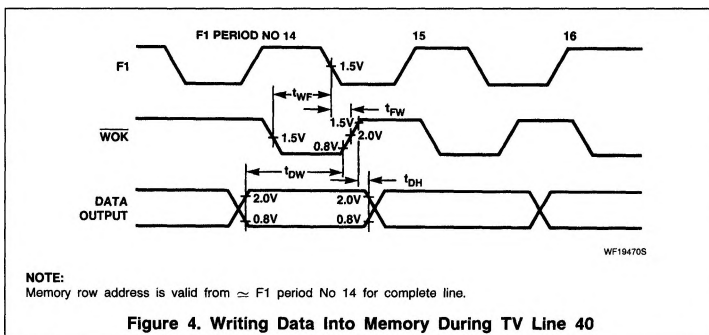
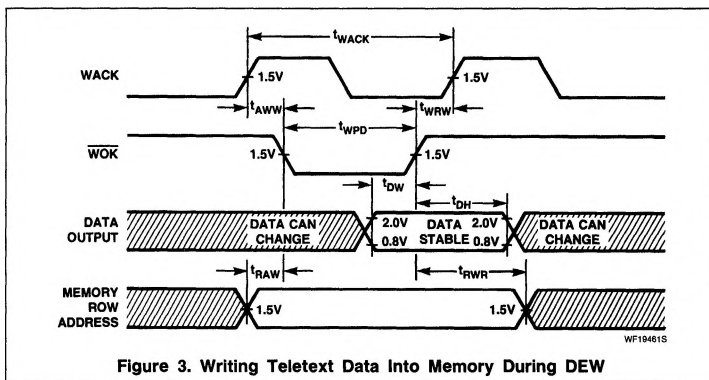
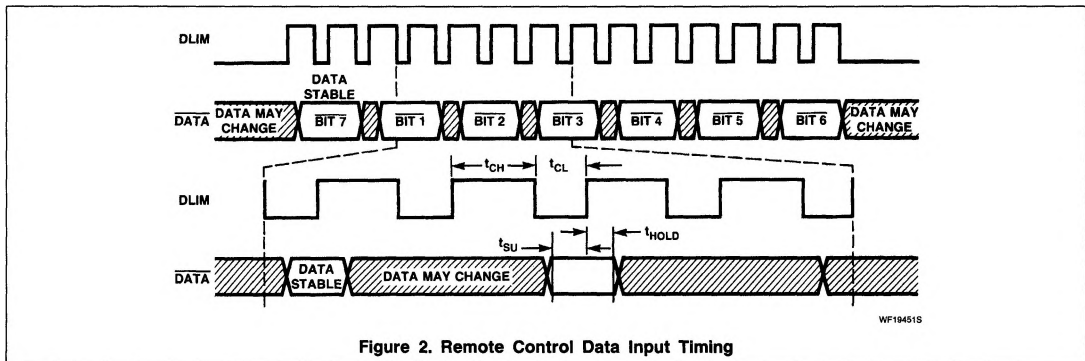
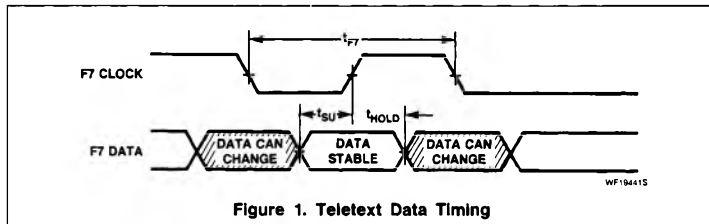
SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
Writing header information into memory during TV line 40 (Figure 4)					
	This arrangement is a combined phasing of the SAA5040 and the SAA5020 and is therefore referred to F1 input. The first $\overline{WOK}$ is related to F1 No 14½ from the SAA5020				
TF <sub>1</sub>	F1 clock cycle time	1000			ns
t <sub>WF</sub>	Time from F1 to $\overline{WOK}$ falling edge	300		500	ns
t <sub>FW</sub>	Time from F1 to $\overline{WOK}$ rising edge	0		120	ns
t <sub>DW</sub>	Data output setup time	330			ns
t <sub>DH</sub>	Data output hold time	0			ns

**NOTES:**

1. These inputs may be AC-coupled. Minimum rating is  $-0.3\text{V}$ , but the input may be taken more negative if AC-coupled.
2. Transition times measured between 0.5 and 3.5V levels. Delay times are measured from 1.5V level.
3. Transition times measured between 0.8 and 2.0V levels. Delay times are measured from 1.5V level.
4. There is no maximum DLIM cycle time, provided the DLIM duty cycle is such that  $t_{CL\text{MAX}}$  requirement is not exceeded.

## Teletext Acquisition and Control Circuit

SAA5040



# Teletext Acquisition and Control Circuit

# SAA5040

## APPLICATION DATA

The function is quoted against the corresponding pin number.

**1 V<sub>SS</sub> Ground** — 0V.

**2 DATA Data Input from SAA5030** — This input is a serial data stream of broadcast teletext data from the SAA5030 video processor, the data being at a rate of 6.9375MHz.

This input from the SAA5030 is AC-coupled with internal DC restoration of the signal levels.

**3 F7 Clock Input from SAA5030** — This input is a 6.9375MHz clock from the SAA5030 video processor which is used to clock the teletext data acquisition circuitry. The positive edge of this clock is nominally at the center of each teletext data bit.

This input from the SAA5030 is AC-coupled with internal DC restoration of the signal levels.

**5 DLIM Remote-Control Clock Input** — This input from the remote-control receiver-decoder is used to clock remote-control data into the SAA5040. The positive-going edge of every second clock pulse is nominally in the center of each remote control data bit.

**6 DATA Remote Control Data** — This input is a 7-bit serial data stream from the remote-control receiver-decoder.

This data contains the teletext and viewdata remote-control user functions. The nominal data rate is 32μs/bit. The remote-control commands used in the SAA5040 series are shown in Tables 1, 2, and 3.

**7 DEW Data Entry Window** — This input from the SAA5020 Timing Chain defines the period during which received teletext data may be accepted by the SAA5040. This signal is also used to enable the five memory address outputs (Pins 23 to 27) and the 7-bit parallel data outputs (Pins 16 to 22).

**8 PO Picture On** — This output to the SAA5012, SAA5030 and SAA5050 circuits is a static level used for the selection of TV picture video 'on' or 'off'. The output is High for TV picture 'ON', Low for TV picture 'OFF'. The output has an internal pull-up to V<sub>DD</sub>.

**9 DE Display Enable** — This output to the SAA5050 teletext character generator is used to enable the teletext display.

The output is High for display enabled, Low for display disabled.

The output is also forced to the Low state during the DEW and TV line 40 periods and when a teletext page is cleared.

The output has an internal pull-up to V<sub>DD</sub>.

**10 BCS Big Character Select** — This output to the SAA5020 timing chain and to the SAA5050 character generator is used to select double height character format under user control. The output is High for normal height characters, Low for double height characters. It is also forced to the High state on page clear. The output has an internal pull-up to V<sub>DD</sub>.

**11 T/B Top/Bottom** — This output to the SAA5020 timing chain is used to select whether top or bottom half page is being viewed. The output is High for bottom half page and Low for top half page. It is also forced to the Low state on page clear. The output has an internal pull-up to V<sub>DD</sub>.

**12 GLR General Line Reset** — This input from the SAA5020 timing chain is used as a reset signal for internal control and display counter.

**13 F1** — This input is a 1MHz clock signal from the SAA5020 timing chain used to clock internal remote-control processing and encoding circuits.

**14 V<sub>DD</sub> +5V Supply** — This is the power supply input to the circuit.

**15 WOK Write O.K.** — This 3-State output signal to the system memory is used to

control the writing of valid data into the system memory. The signal is Low to write, and is in the high impedance state when viewdata is selected. The 3-State buffer is enabled at the same time as the data outputs (see below). An internal pull-up device prevents the output from floating into the Low state when the 3-State buffer is OFF.

**16, 17, 18, 19, 20, 21, 22 D7 to D1, Data Outputs** — These 3-State outputs are the 7-bit parallel data outputs to the system memory. The outputs are enabled at the following times:

- During the data entry window (DEW) to write teletext data into the memory. The data rate is 867kB per second and is derived from the teletext data clock.
- During TV line 40 for encoded status information about user commands (e.g., program number), to be written into the memory. This period is known as EDIL (encoded data insertion line). The data rate is 1MB per second and is derived from the 1MHz display clock F1.
- When the page is cleared. In this case, the data output is forced to the space code (0100000) during the display period for one field. This data is held at the space code from either TV line 40 (if page clear is caused by user command), or the received teletext data line causing the clear function, until the start of the data entry window (DEW) of the next field.

**23, 24, 25, 26, 27 A4 to A0 Memory Addresses** — These 3-State outputs are the 5-bit row address to the page memory. This address specifies in which of 24 rows the teletext data is to be written. The outputs are enabled during the data entry period (DEW).

**28 WACK Write Address Clock** — This 3-State output is used to clock the memory address counter during the data entry period (DEW). The output is enabled only during this period. The positive-going edge of WACK is used to clock the address counter.

## Teletext Acquisition and Control Circuit

## SAA5040

Table 1. Remote-Control Commands Used in the SAA5040A/SAA5040B/SAA5040C/SAA5043<sup>8</sup>

CODE					TELEVISION MODE ( $b_7 = b_6 = 0$ ) <sup>7</sup>		TELETEXT MODE ( $b_7 = 1, b_6 = 0$ ) <sup>7</sup>	
$b_5$	$b_4$	$b_3$	$b_2$	$b_1$				
0	0	0	0	0	RESET <sup>1</sup>		STATUS      Program/header display <sup>6</sup> HOLD        Stops reception of teletext <sup>9</sup>	
0	0	0	0	1				
0	0	0	1	0				
0	0	0	1	1				
0	0	1	0	0				
0	0	1	0	1				
0	0	1	1	0				
0	0	1	1	1	TIME           Gives time display.		DISPLAY CANCEL <sup>3</sup>	
0	1	0	0	0			TAPE           Resets to small characters  TIMED PAGE OFF TIMED PAGE ON	
0	1	0	0	1				
0	1	0	1	0				
0	1	0	1	1				
0	1	1	0	0				
0	1	1	0	1				
0	1	1	1	0				
0	1	1	1	1				
1	0	0	0	0	PROGRAMS <sup>2</sup>		NUMBERS <sup>4, 6</sup>	
1	0	0	0	1				
1	0	0	1	0				
1	0	0	1	1				
1	0	1	0	0				
1	0	1	0	1				
1	0	1	1	0				
1	0	1	1	1				
1	1	0	0	0			SMALL CHARACTERS LARGE CHARACTERS TOP HALF PAGE LARGE CHARACTERS BOTTOM HALF PAGE  SUPERIMPOSE <sup>6</sup> TELETEXT/ON <sup>5</sup>	
1	1	0	0	1				
1	1	0	1	0				
1	1	0	1	1				
1	1	1	0	0				
1	1	1	0	1				
1	1	1	1	0				
1	1	1	1	1				

## NOTES:

- Reset clears the page memory, sets page number to 100 and time code to 00.00 and resets timed page and display cancel modes.
- Program names are displayed for 5s in a box at the top left of the screen in large characters. Program commands clear the page memory except in timed page mode.

The following boxed information is displayed:

REMOTE-CONTROL COMMAND	SAA5040A	SAA5040B	SAA5040C	SAA5043
$b_5$ $b_4$ $b_3$ $b_2$ $b_1$				
1 0 0 0 0	BBC1	Gives no status box	BBC1	Ch 1
1 0 0 0 1	BBC2		ITV	Ch 2
1 0 0 1 0	ITV		BBC2	Ch 3
1 0 0 1 1	4		BBC1	Ch 4
1 0 1 0 0	5		ITV	Ch 5
1 0 1 0 1	6		VTR	Ch 6
1 0 1 1 0	7		BBC1	Ch 7
1 0 1 1 1	VCR		ITV	Ch 8
1 1 0 0 0	9		BBC2	Ch 9
1 1 0 0 1	10		BBC1	Ch 0
1 1 0 1 0	11		ITV	Ch 10
1 1 0 1 1	12		VTR	Ch 11

- Display cancel removes the text and restores the television picture. The device then reacts to any update indicator on the selected page. An updated newflash or subtitle is displayed immediately. When an updated normal page arrives, the page number only is displayed in a box at the top left of the screen. The full page of text can then be displayed when required, using the teletext/on command.
- Three number commands in sequence request a new page, and four number commands select a new time code in timed page mode. When a new page has been requested, the page header turns green and the page numbers roll until the new page is captured.
- The teletext/on command resets display cancel, hold, and superimpose modes.
- Status, timed page on, timed page off, numbers, superimpose, and teletext/on commands all reset to top half page and produce a box around the header for 5s. This allows the header to be seen if the television picture is on (e.g. newflash or display cancel modes).
- In viewdata mode ( $b_7 = b_6 = 1$ ) the device is disabled and teletext cannot be received. All 3-State outputs are high impedance.



## Teletext Acquisition and Control Circuit

SAA5040

8. Table 1 shows code required for functions specified. The device requires the inverse of these codes i.e.,  $\bar{b}_7$  to  $\bar{b}_1$ . The code is transmitted serially in the following order:  $\bar{b}_7$ ,  $\bar{b}_1$ ,  $\bar{b}_2$ ,  $\bar{b}_3$ ,  $\bar{b}_4$ ,  $\bar{b}_5$ ,  $\bar{b}_6$ .

9. When hold mode is selected, 'HOLD' is displayed in green at the top right of the screen.

10. A 'P' is displayed before the page number at the top left of the screen (e.g., P123).

Table 2. Remote-Control Commands Used in the SAA5041<sup>9</sup>

CODE $b_5$ $b_4$ $b_3$ $b_2$ $b_1$	TELEVISION MODE ( $b_7 = b_6 = 0$ ) <sup>8</sup>	TELETEXT MODE ( $b_7 = 1$ , $b_6 = 0$ ) <sup>8</sup>
0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 1 1 0 0 1 0 0 0 0 1 0 1 0 0 1 1 0 0 0 1 1 1	TIME Gives time display	STATUS Gives header and time display. <sup>6</sup> TIMED PAGE On/off toggle function.
0 1 0 0 0 0 1 0 0 1 0 1 0 1 0 0 1 0 1 1 0 1 1 0 0 0 1 1 0 1 0 1 1 1 0 0 1 1 1 1		TELETEXT RESET <sup>1</sup>
1 0 0 0 0 1 0 0 0 1 1 0 0 1 0 1 0 0 1 1 1 0 1 0 0 1 0 1 0 1 1 0 1 1 0 1 0 1 1 1	PROGRAMS <sup>10</sup>	NUMBERS <sup>2, 7</sup>
1 1 0 0 0 1 1 0 0 1 1 1 0 1 0 1 1 0 1 1 1 1 1 0 0 1 1 1 0 1 1 1 1 1 0 1 1 1 1 1		0 1 2 3 4 5 6 7 8 9 SMALL CHARACTERS LARGE CHARACTERS Top/bottom toggle function HOLD Stops reception of teletext—toggle function <sup>3</sup> DISPLAY CANCEL <sup>4</sup> SUPERIMPOSE NORMAL DISPLAY <sup>5</sup>

## NOTES:

- The teletext reset command clears the page memory, selects Page 100, goes to small characters, and resets hold, timed page, and display cancel modes.
- Three number commands in sequence request a new page, and four number commands select a new time code in timed page mode. When a new page has been requested, the page header turns green and the page numbers roll until the new page is captured.
- When hold mode is selected, 'HALT' is displayed in green at the top right of the screen.
- Display cancel removes the text and restores the television picture. The SAA5041 then reacts to any update indicator on the selected page. An updated newflash or subtitle is displayed immediately. When an updated normal page arrives, the page number only is displayed in a box at the top left of the screen. The full page of text can then be displayed when required, using the normal display command.
- The normal display command resets display cancel, hold, and superimpose modes.
- Status, timed page, numbers, hold, superimpose, and normal display commands all reset to top half page and produce a box around the header for five seconds. This allows the header to be seen even if the television picture is on (e.g., newflash or display cancel modes).
- An 'S' is displayed before the page number at the top left of the screen (e.g., S123).
- In view data mode ( $b_7 = b_6 = 1$ ) the SAA5041 is disabled and teletext cannot be received. All 3-State outputs are high impedance.
- Table 2 shows code required for functions specified. The SAA5041 requires the inverse of these codes, i.e.,  $\bar{b}_7$  to  $\bar{b}_1$ . The code is transmitted serially in the following order:  $\bar{b}_7$ ,  $\bar{b}_1$ ,  $\bar{b}_2$ ,  $\bar{b}_3$ ,  $\bar{b}_4$ ,  $\bar{b}_5$ ,  $\bar{b}_6$ .
- Clear memory occurs except in timed page mode.

## Teletext Acquisition and Control Circuit

SAA5040

Table 3. Remote-Control Commands Used in the SAA5042<sup>9</sup>

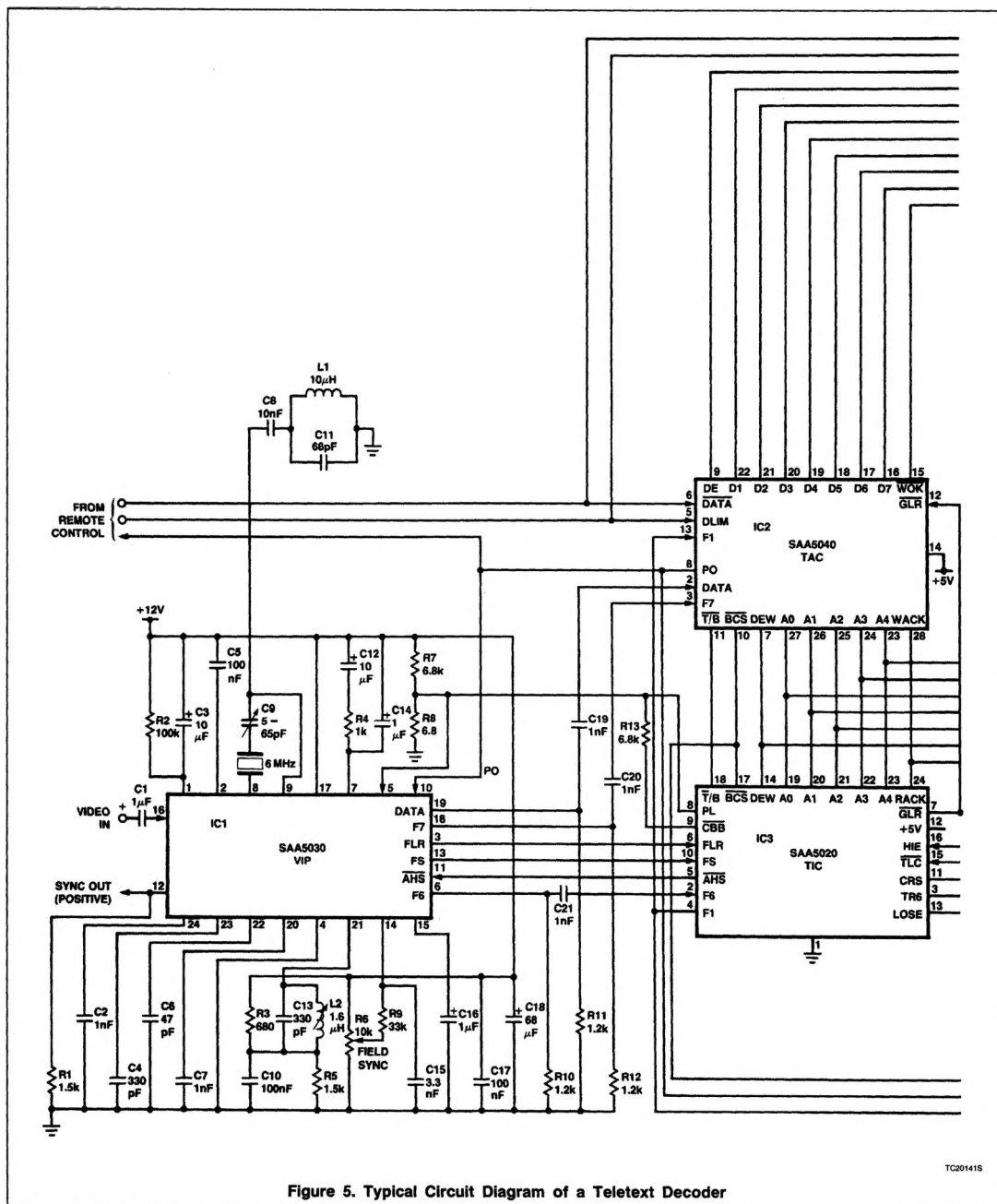
CODE					TELEVISION MODE ( $b_7 = b_6 = 0$ ) <sup>8</sup>	TELETEXT MODE ( $b_7 = 1, b_6 = 0$ ) <sup>8</sup>
$b_5$	$b_4$	$b_3$	$b_2$	$b_1$		
0	0	0	0	0	RESET <sup>1</sup>	STATUS Gives header and time display <sup>6</sup> HOLD Stops reception of teletext-toggle function <sup>3</sup>
0	0	0	0	1		
0	0	0	1	0		
0	0	0	1	1		
0	0	1	0	0		
0	0	1	0	1		
0	0	1	1	0		
0	0	1	1	1		
0	1	0	0	0	TIME Gives time display	SMALL CHARACTERS  LARGE CHARACTERS TOP HALF PAGE LARGE CHARACTERS BOTTOM HALF PAGE DISPLAY CANCEL/RECALL <sup>4</sup> DISPLAY RECALL
0	1	0	0	1		
0	1	0	1	0		
0	1	0	1	1		
0	1	1	0	0		
0	1	1	0	1		
0	1	1	1	0		
0	1	1	1	1		
1	0	0	0	0	PROGRAMS <sup>10</sup>	NUMBERS <sup>2, 7</sup>
1	0	0	0	1		
1	0	0	1	0		
1	0	0	1	1		
1	0	1	0	0		
1	0	1	0	1		
1	0	1	1	0		
1	0	1	1	1		
1	1	0	0	0		8 9  TIMED PAGE On/Off toggle function CLEAR MEMORY LONG TERM STORE/SMALL CHARACTERS  SUPERIMPOSE TELETEXT/ON <sup>5</sup>
1	1	0	0	1		
1	1	0	1	0		
1	1	0	1	1		
1	1	1	0	0		
1	1	1	0	1		
1	1	1	1	0		
1	1	1	1	1		

## NOTES:

- Reset clears the page memory, sets page number to 100 and time code to 00.00, and resets timed page and display cancel modes.
- Three number commands in sequence request a new page, and four number commands select a new time code in timed page mode. When a new page has been requested, the page header turns green and the page numbers roll until the new page is captured.
- When hold mode is selected, 'STOP' is displayed in green at the top right of the screen.
- Display cancel/recall removes the text and restores the television picture. The SAA5042 then reacts to any update indicator on the selected page. An updated newflash or subtitle is displayed immediately. When an updated normal page arrives, the page number only is displayed in a box at the top left of the screen. The same command will then cause a normal page to be displayed, but will cancel a newflash or subtitle page. Alternatively, text can then be recalled by using the teletext/on command.
- The teletext/on command resets display cancel, hold, and superimpose modes.
- Status, timed page, numbers, superimpose, and teletext/on commands all reset to top half page and produce a box around the header for five seconds. This allows the header to be seen even if the television picture is on (e.g., newflash or display cancel modes).
- A 'P' is displayed before the page number at the top left of the screen (e.g., S123).
- In view data mode ( $b_7 = b_6 = 1$ ) the SAA5042 is disabled and teletext cannot be received. All 3-State outputs are high impedance.
- Table 3 shows code required for functions specified. The SAA5042 requires the inverse of these codes, i.e.,  $b_7$  to  $b_1$ . The code is transmitted serially in the following order:  $\bar{b}_7, \bar{b}_1, \bar{b}_2, \bar{b}_3, \bar{b}_4, \bar{b}_5, \bar{b}_6$ .
- Clear memory occurs except in timed page mode.

## Teletext Acquisition and Control Circuit

SAA5040



TC20141S

Teletext Acquisition and Control Circuit

SAA5040

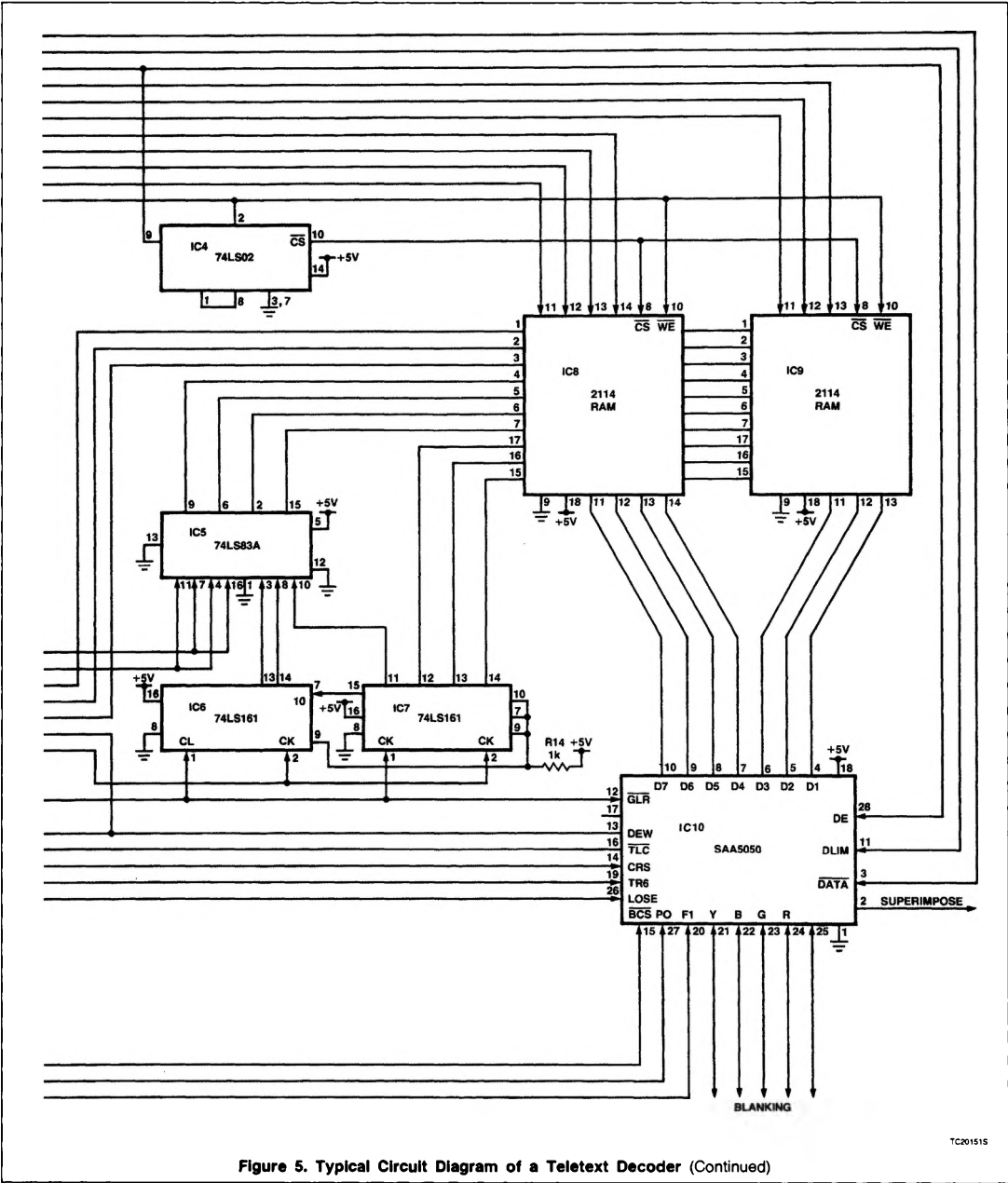


Figure 5. Typical Circuit Diagram of a Teletext Decoder (Continued)

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