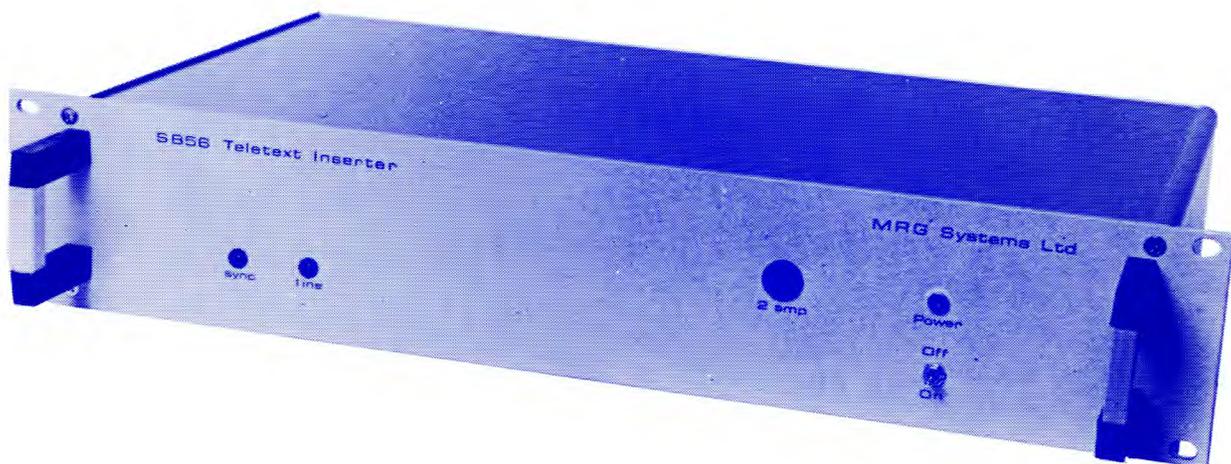


SB56 TELETEXT INSERTER



TECHNICAL USER MANUAL

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1. INTRODUCTION

- 1.1 This manual is intended to provide a comprehensive technical guide for users of the SB56 TELETEXT INSERTER.

It is important that the instructions and recommended procedures for installation are executed correctly, otherwise the warranty provided with the SB56 may be invalidated.

- 1.2 The SB56 TELETEXT INSERTER both stores and broadcasts pages. Creation and modification of pages can be achieved by using the commands detailed in Section 3.

Alternatively, a page make-up editor 'TED' can be purchased to perform this task. This package is currently available to run on the (Acorn) BBC Model B micro-computer (fitted with at least one disc drive). It has been developed by MRG Systems Ltd and is fully compatible with the SB56. Full details are available from the company upon request.

- 1.3 Please check that the SB56 is complete with the following accessories:

- a) Mains Lead
- b) Tuning Adjustment Tool
- c) Spare Fuse
- d) RS232C Cable (If Ordered)

- 1.4 Section 2 details the steps necessary to power-up the SB56, connect it to a host computer (or VDU) and tune it for use with teletext receivers. Section 3 describes all of the SB56 commands for page updating and control of the system display. The appendices contain more information concerning connection and switch details, and a list of the Teletext codes. A brief command summary is included and also an example BASIC program for generating commands.

- 1.5 To obtain the best performance from the information display system provided by the SB56, it is helpful to understand some of the methods used in the SB56 to broadcast pages. This section provides an overview.

To ensure fast page capture times with conventional field-blanking decoders (eg the Mullard system), pages are always transmitted in pairs in interleaved magazines; magazine 1 first followed by magazine 2. Each page pair requires 3 television fields for transmission - a total time of 60 milliseconds.

The Teletext specification defines a page by a single digit magazine number followed by a two-digit page number, eg 123 is magazine 1 page 23. The SB56 supports two magazines each of 52 pages starting at 00. The last page is therefore 251.

Enabled pages are transmitted in numerical order in interleaved magazines, ie 101,201,102,202 and so on. Since a page pair is always transmitted, should the user disable one of the pair, it will still be transmitted, but with the Teletext C10 control bit set which causes the decoder to suppress the display of that page. For example, if 101 is enabled and 201 disabled, they are both transmitted, but 201 will not be displayed by the decoder.

If both pages in a pair are disabled, neither is transmitted thus improving the response time for the remaining pages. A faster response will therefore be obtained by using pages 101 to 110 and 201 to 210 rather than pages 101 to 120.

The user has full control over pages 100 to 150 and 200 to 250. 151 and 251 should be regarded as special purpose. The status of these pages cannot be changed (they are always enabled) and they may not be 'Broadcast' to, although they may be updated, cleared and read as for the other pages. It is recommended that 151 is used either as an index page or for special announcements.

Page 251 has two special functions. Normally it contains a test display showing all features of the Teletext display format, but it can also be used for displaying Cycling Pages (see 3.3.4). In this mode, the test display is removed, and selected pages are displayed in sequence on 251, the display time for each page being set in the 'F' register (see 3.3.12). Any number of pages may be selected for cycling (except 151 and 251) whether or not they are being transmitted. Pages are cycled in the same order that they would be for transmission (ie in ascending page order in interleaved magazines).

2 INSTALLATION -----

2.1 PRELIMINARY STEPS

- 2.1.1 Mains Power: Ensure that the SB56 is switched off. The power switch is situated on the front panel on the right-hand side. Connect the SB56 to a 220-240 volt mains supply with the lead provided.
- 2.1.2 UHF Output: Connect a 75 ohm coaxial cable from the 'UHF Out' socket on the rear panel to the TV distribution system. Note that for testing, the SB56 may be connected directly to a Teletext TV receiver.
- 2.1.3 RS232C Port: Connect the 'Line' connector to your computer (or VDU). See Appendix 2 for connection details.
- 2.1.4 Set-Up Switch: The SB56 is supplied set to 9600 baud, 8 data bits, 1 stop, no parity. Should this need to be changed, refer to Appendix 2.
- 2.1.5 Power-Up: Switch on the SB56 and check that the red indicator above the power switch illuminates. If it does not, check that all cables are correctly connected. If so, switch off and check the front panel fuse. If it has failed replace it with a 2 amp type.
- 2.1.6 Status Indicators: Ensure that the two green indicators on the front panel marked 'Sync' and 'Line' are illuminated.
- 'Sync' shows that frame interrupt pulses are being generated and that the micro-processor is operational.
- 'Line' shows that the RS232C RxD line is correctly connected. If not alight, check the cable connections. The most likely reason is pins 2 & 3 being reversed (See Appendix 2).
- 2.1.7 Summary: At this stage the SB56 is operational. If the equipment does not power-up correctly, repeat the procedure from the beginning checking all connections carefully. If the failure persists, contact the equipment supplier.

2.2 TUNING

2.2.1 Introduction:

Having completed the preliminary steps, the SB56 is ready to be tuned. It can be tuned to any channel between 22 and 40 and is supplied tuned approximately to channel 38.

It is recommended that for initial checks, a receiver is tuned to the same channel as the SB56. If this is not practical, refer to 2.2.3.

2.2.2 Tuning a Teletext Receiver:

- a) The SB56 video signal is a ragged vertical white bar on a black background. Tune the receiver until this signal can be seen.

If the background is noisy (showing white flecks), the UHF signal may be too weak, and the distribution system (and connections) should be checked. If the background contains broad slowly moving horizontal bars the signal is too strong for the receiver. In this case reduce the gain of the distribution system or fit an in-line attenuator.

- b) Select 'Text' mode on the receiver and request page 251. This will display the test page. Should any errors in the display be apparent, readjust the receiver tuning slightly.
- c) Select page 100. The screen should display the header line with the remainder of the screen blank. This is correct as, after power-up, page 100 contains only spaces.

At power-up, the SB56 broadcasts pages 100 to 104, 200 to 204, 151 and 251 only. Any of these pages can thus be selected but the remaining pages cannot be accessed until they are enabled for display (see 3.3.4).

- d) Because of the non-interlaced signal generated by the SB56, some Teletext TV receivers with scan/search tuning may not immediately lock on the SB56 signal. In this case the manual over-ride facility should be used in accordance with the set manufacturer's instructions. Note that this only applies to initial setting-up of the channel selection buttons on the receiver.

2.2.3 Tuning the SB56:

- a) Access to the tuning adjustment is made by removing the top cover. Remove the screw marked 'Access' on the rear panel. Carefully slide the top cover rearwards and remove it. The tuning control is at the front of the printed circuit board and is marked 'Tuning'. Adjustments must be made with the tool provided - clockwise to reduce the channel number, anticlockwise to increase it.
- b) The position of the vertical bar transmitted as a tuning signal may be moved to the left or right of the screen by adjusting RV1 (front left-hand corner of the PCB) anti-clockwise or clockwise. If a blank screen is required, adjust RV1 until the bar just disappears from the right-hand side of the screen.

Note that where a number of SB56 Inserters are being used on different channels in the same system, it is convenient to adjust the position of the tuning bar to easily distinguish between channels.

- c) After adjustments have been completed, refit the cover and replace the securing screw.
- d) Take care when tuning the SB56 to ensure that the signal does not cause interference with adjacent TV channels.

3 COMMANDS

3.1 OVERVIEW

A simple structure is used in which a one or two character command, followed by relevant parameters, is sent to the SB56. All commands use printing Ascii characters and are terminated by Carriage Return (Ascii 13).

The SB56 executes the command received and returns a single character acknowledgement message followed by either a Carriage Return or Carriage Return Line Feed depending upon the Communication Option selected as explained in Section 3.3.1.

The acknowledgement messages are:

- '0' = Good command
- '1' = Bad command or Magazine out of range
- '2' = Page out of range
- '3' = Line out of range
- '4' = Character out of range

After execution of a command, the SB56 input buffer is reset to prevent loss of synchronism with the input.

Note that if a text string entered is too long for the line, the string will be truncated to the end of line and accepted but a '1' message will be returned.

A normally valid page or line not permitted for a particular command will return an error message (eg attempting to change the status of page 251).

When the SB56 has completed its initialization after switch-on, a '0' is returned to indicate that it is ready to receive commands. The '0' may be preceded by a random character.

3.2 SYNTAX NOTATION

3.2.1 The command syntax has been developed to allow the host computer to be programmed in virtually any language without the need for special driver routines.

The following notation convention is used in the command definitions which follow:

m = Magazine number (1 or 2)
pp = Page number (00 to 51)
ll = Line number (00 to 23 - 00 is the header)
ff = Field number (00 to 39)
CR = The Carriage Return character (Ascii 13)
LF = The Line Feed character (Ascii 10)
, = Separator (may be any non-control character)

Where a command contains optional parameters, they are shown surrounded by brackets. These are for clarity only and must not be sent as part of the command string.

3.2.2 Appendix 3 contains the Teletext control and display codes which are not included in the command explanations.

3.3 COMMAND DEFINITIONS AND SYNTAX:

3.3.1 SET COMMUNICATION OPTION

Function: In addition to the line options selectable by the set-up switch, three communication options may be selected:

- a) Teletext or Viewdata mode
- b) CR or CRLF terminator
- c) Echo on or off

An 8-bit option register is maintained for this purpose, accessed by the 'V' command.

Option	Bit	Set	Clear (Default)
Mode	7	Viewdata Mode	Teletext Mode
Reserved	6	-	-
Reserved	5	-	-
Reserved	4	-	-
Reserved	3	-	-
Reserved	2	-	-
Terminator	1	CRLF	CR only
Echo	0	Echo on	Echo off

The register is cleared after initialization.

Purpose: MODE. The mode option determines the way in which attribute characters, eg colour, flashing, etc, are sent and received.

In Teletext mode, a control character is used, eg to set Text Red, a Control A should be sent. In Viewdata mode, an escape sequence is used instead so that to set Text Red, an escape character (Ascii 27) should be sent followed by an 'A'.

Note that in Teletext mode, the Double Height code (Ascii 13) is the same as the terminator, so in this mode a Control P should be sent instead (and will be returned by the 'Read' commands). In Viewdata mode, double height is set using Escape M. The default mode is Teletext.

3.3.2 INITIALIZE

Function: Resets pages 100 to 151, 200 to 250 to spaces, page 251 to the test display and samples the set-up switch to establish baud rate, word length and parity options. The F register is set to 20 (hex) and the V register to 0.

Purpose: To restart the system without switching off and on again (which has the same effect).

Syntax: ICR

Example: ICR will re-initialize the SB56.

COMMAND TERMINATOR. All commands sent to the SB56 must be terminated with a CR. Subsequent LF or Null characters will be ignored.

If the CR option is selected, acknowledgement messages returned by the SB56 will be terminated by CR, and if the CRLF option is selected, by CRLF. The default is CR.

ECHO. This option is made available to assist when using a VDU to communicate with the SB56. Normally, commands sent to the SB56 are not echoed to the host. Setting the Echo On option allows characters to be echoed to the host (or VDU) as they are being transmitted. Note that some confusion may occur as control characters will not usually display on a VDU. The default mode is Echo Off.

Syntax: The 8-bit option register is updated by the 'V' command:

VvvCR

where vv is the hexadecimal value to be set into the 'V' register.

Example: V82CR sets Viewdata mode, CRLF terminator & Echo off.

V03CR sets Teletext mode, CRLF terminator & Echo on.

Note: Send V83CR if you wish to use a VDU.

3.3.3 WARM RESTART

Function: Resamples the set-up switch to determine baud rate, word length and parity, and clears the 'V' register.

All pages and their associated status registers remain unchanged.

Purpose: To enable a communication option to be changed without affecting any stored pages, eg when changing from VDU to computer input.

Syntax: WCR

Example: WCR will sample the set-up switch & clear the 'V' register.

3.3.4 SET PAGE STATUS

Function: To update a particular page status register.

A 16-bit register is maintained for each page which is used to:

- a) Control whether or not a page is transmitted.
- b) Control whether or not a page is cycled to page 251.
- c) Set the Teletext page control bits C5 to C14 (as described in the BREMA specification).

The register bits are allocated as follows:

Bit 15	-	Enable page for transmission
Bit 14	-	C4 Erase bit
Bit 13	-	Add to cycling page list
Bit 12	-	Reserved
Bit 11	-	Reserved
Bit 10	-	Reserved
Bit 9	-	Not allocated
Bit 8	-	Not allocated
Bit 7	-	Not allocated
Bit 6	-	C11 Magazine serial
Bit 5	-	C10 Inhibit Display
Bit 4	-	C9 Interrupted Sequence
Bit 3	-	C8 Update
Bit 2	-	C7 Suppress Header
Bit 1	-	C6 Subtitle
Bit 0	-	C5 Newsflash

Note that because of the fast page transmission rate achieved with the SB56 coupled with the absence of a TV picture, the only bits of practical use are 15, 13, 5 and 2.

Purpose: a) Enable Page for transmission.

In principle, only enabled pages are transmitted so that the response time is minimized. In practise, pages are transmitted in interleaved-magazine pairs. If a page is enabled, then both it and the corresponding page on the other magazine are transmitted, but if the latter page is not enabled, then the C10 bit (bit 5) is set so that it will not be displayed by the decoder. (see 1.4)

Thus where decoders are used which respond the C10 control bit (eg Mullard), the user can simply enable and disable pages as required, control of bit 5 being transparent to the user.

Note that after switch-on or the I command, pages 100 to 104, 200 to 204, 151 and 251 are enabled.

b) Add Page to Cycling List.

Setting bit 13 adds the page to the cycling list. As soon as one or more pages are added to the list the test display is removed from page 251 and each cycling page is displayed in turn for a time determined by the F register (see section 3.3.12).

If all pages are removed from the cycling list, the test display is restored to page 251.

It is not necessary for a page to be enabled for transmission for it to be added to the cycling list. Also, once a page has been added to the list it will remain there regardless of whether it is subsequently enabled for or disabled from transmission.

c) Suppress Header.

Setting this bit will cause the page to be displayed without its header. This is a facility in the receiver decoder, not the SB56.

Syntax: Smp,nnnCR

where nnn is a hexadecimal number representing the required value of the status register for that page.

Example: S125,8000CR enables page 125 for display
S142,A000CR enables page 142 for display and adds it to the cycling list
S235,2000CR disables page 235 from display but adds it to the cycling list
S150,8004CR enables page 150 for display with a suppressed header.

Note: a) Any number of bits may be set or cleared with a single 'S' command.
b) The status of pages 151 and 251 cannot be changed.

3.3.5 SET DATE

Function: To set the date in the header line of all pages.

A free format date field is reserved in the header line of each page from columns 19 to 32 inclusive, between the title and the time.

Purpose: To enable extra information to be provided in the page header. The date is not maintained by the SB56, and therefore should be updated every day.

Syntax: D(up to 14 characters)CR

Example: D Fri 17 Apr CR

D 17/04/84CR

- Note:
- a) If more than 14 characters are entered, the first 14 will be accepted and entered into the date field, but an acknowledgement message '1' will be returned.
 - b) The date field is initialized to all spaces.
 - c) To maintain legibility, the first character entered should be a space or a colour code.
 - d) If the time is required in a different colour to the date, the appropriate colour code must be included at the end of the date field.
 - e) The Teletext specification reserves column 32 as part of the time display, but the SB56 allows it to be set within the date field for additional flexibility (see Update Field command).
 - f) The command 'DCR' will clear the date field.

3.3.6 SET TIME

Function: The SB56 maintains a 24 clock with time incremented once a second. The command enables the clock to be set to a new time. Entry of seconds is optional.

Purpose: The time derived from the internal clock is displayed at the right hand end of every header line in a fixed format (columns 33 to 39).

Syntax: T`hh,mm(,ss)`CR

where hh are hours, mm are minutes and ss are seconds.

Example: T03,15CR sets the time to 0315:00

T19,23,45CR sets the time to 1923:45

Note:

- a) After initialization the time is set to 0000:00
- b) The user must ensure that entries are valid.
- c) The command 'T`hh`CR' will update hours only, but will return a '1' acknowledgement.

3.3.7 CLEAR PAGE

Function: To set all characters in the specified page, apart from the header line, to space.

Purpose: Where the contents of a page are to be replaced this command can be used to ensure that the previous contents have been erased.

Syntax: CPmppCR

Example: CP100CR clears page 100

CP247CR clears page 247

Note: Page 251 may be cleared, but note that the command will reset to spaces the currently-displayed contents of page 251. Therefore, if the cycling page facility is in use, the current page will be overwritten by the next page on the cycling list. Also, if subsequently all pages are removed from the cycling list, the test display will be restored.

3.3.8 CLEAR LINE

Function: Set all characters in the specified line to space.

Purpose: When the contents of a line are to be changed, this command can be used to ensure that the previous contents are erased.

Syntax: CLmpp,l1CR

where l1 is the line number to be cleared.

Example: CL105,01CR sets line 01 on page 105 to all spaces

CL217,23CR clears line 23 on page 217.

Note: a) Line 00 of any page may not be cleared

b) Lines 01 to 23 of pages 151 and 251 may be cleared
(but see note in 3.3.7).

3.3.9 UPDATE LINE

Function: Writes the text string passed as a parameter to the start of the line specified. The previous contents are overwritten, and if less than a full line is entered, subsequent characters up to the end of the line will be set to spaces.

Purpose: To enter a new line of text for display.

Syntax: ULmpp,ll(up to 40 characters)CR

Example: UL115,02MRG Systems LtdCR

will insert 'MRG Systems Ltd' at the start of line 02 on page 115. The rest of the line will be blank.

- Note:**
- a) Line 00 of any page cannot be updated with this command.
 - b) Page 251 may be updated but subsequent selection and deselection of cycling pages will cause the test display to be reloaded.
 - c) Text strings longer than 40 characters will be accepted but truncated to 40 characters. An acknowledgement message '1' will be returned.
 - d) Pages may be updated whether or not they are enabled for display.
 - e) The command 'ULmpp,ll,CR' will clear the line.

3.3.10 UPDATE FIELD

Function: Writes the text string passed as a parameter to the line specified starting at the specified field (ie column number). It overwrites the fields necessary to insert the text, but leaves fields to the left and right (if any) unchanged.

Purpose: To allow simple updating of part of a line.

Syntax: UFmpp,ll,ff(up to 40 characters)CR

where ff is the field or column where the first character is to be replaced.

Example: UF107,15,23HelloCR

will place 'Hello' on page 107, line 15, starting at column 23. Fields 00 to 22 and 28 to 39 will remain unchanged.

Note: a) Fields 08 to 32 in line 00 may be updated for special effects. The other fields must not be updated. If a header line is updated, subsequent status commands (to any page) may remove the update.

eg. UF100,00,08 Index PageCR will replace 'MRGFAX P100' with ' Index Page'.

b) Column 32 in the header is part of the time display so that if a character is inserted in this position the character will flash in all headers on that magazine, regardless of the page selected. This effect can be used to advantage, eg as an indication of an important update.

c) Text strings that exceed the space available to the right of the specified field start position will truncated to the end of line and accepted, but a '1' acknowledgement will be returned.

d) This command affects pages whether or not they are enabled for display.

3.3.11 BROADCAST LINE

Function: Writes the text string passed as a parameter to the line specified on every page in the range 100 to 150, and 200 to 250.

Purpose: To write an identical message to every page using only one command. It is useful where 'standard' (eg 'Main Index - p100') or urgent (eg 'Newsflash on p120') messages need to be sent.

This command operates in a similar way to 'Update Line' and fills fields to the right of the text string (if any) with spaces.

Syntax: BL11(up to 40 characters)CR

Example: BL23Teletext is WonderfulCR will place the message 'Teletext is Wonderful' at the bottom of every page starting at the left hand side.

- Note:**
- a) Line 00 cannot be broadcast to.
 - b) Pages 151 and 251 cannot be broadcast to.
 - c) Text strings longer than 40 characters will be truncated and accepted, but an acknowledgement message '1' will be returned.
 - d) This command affects pages whether or not they are enabled for display.
 - e) Lines which have been broadcast to may be subsequently updated on individual pages if required.

3.3.12 BROADCAST FIELD

Function: Writes the text string passed as a parameter to the field specified on every page in the range 100 to 150, and 200 to 250.

Purpose: To write an identical message to every page using only one command. It is useful where 'standard' (eg 'Main Index - p100') or urgent (eg 'Newsflash on p120') messages need to be sent.

This command operates in a similar way to 'Update Field' and leaves fields to the left and right (if any) of the inserted text string unchanged.

Syntax: BF11 ff(up to 40 characters)CR

Example: BF23 10Teletext is WonderfulCR will place the message 'Teletext is Wonderful' at the bottom of every page starting at column ten.

- Note:**
- a) Fields 00 - 07 in line 00 may not be broadcast to.
 - b) Pages 151 and 251 cannot be broadcast to.
 - c) Text strings longer than 40 characters will be truncated and accepted, but an acknowledgement message '1' will be returned.
 - d) This command affects pages whether or not they are enabled for display, except that fields in line 00 on disabled pages will not be broadcast to.
 - e) Lines which have been broadcast to may be subsequently updated on individual pages if required.

3.3.13 SET CYCLING TIME

Function: Updates the time value in the 'F' register.

Purpose: The SB56 has a facility in which a selection of pages may be displayed in turn on page 251. Pages may be added to the cycling list by updating their status register (see 3.3.4).

The value set in the 'F' register determines the cycling time, that is the length of time each page is displayed on each cycle of the list.

The Cycling Time is defined as a multiple of the minimum time - approximately 75 milliseconds, and is expressed as a hexadecimal number.

Syntax: FttCR

where tt is a hexadecimal multiplier of the minimum cycle time (approx 75mS).

Example: F10CR sets the cycle time to $16 \times 75 \text{ mS} = 1.2 \text{ secs}$

FFFCR sets the cycle time to $255 \times 75 \text{ mS} = 19 \text{ secs}$

- Note:
- a) By disabling nearly all pages from conventional display and using say 10 cycling pages with a short cycling time, a semi-animated effect can be obtained.
 - b) The maximum cycle time is useful in 'silent' salesman' applications where key pages can be displayed in a carousel fashion at acceptable reading rate.
 - c) If the cycling time is set to a value less than the time taken to display all the enabled pages, the cycling pages will be updated more rapidly than the decoder access time. As a result, some cycling pages will then not be displayed at all or on an erratic basis.

3.3.14 READ LINE

Function: Reads the contents of the specified line from the SB56 to the serial line.

Purpose: Where the host does not maintain a complete copy of the pages in the SB56, this command enables some or all of the pages to be read back.

It is useful where a back-up of the current page is required prior to shut-down.

Syntax: RLmpp,11CR

Example: RL103,23CR will return the bottom line of page 103.

Note: a) A good 'Read' command will return the text string with the '0' acknowledgement concatenated.

If the page and/or line is out of range, only the error acknowledgement will be returned.

- b) The terminator will be CR in CR mode, CRLF in CRLF mode (see 3.3.1).
- c) Attribute codes, eg Text Red are returned either as control characters if Teletext mode is set, or as escape sequences if Viewdata mode is set (see 3.3.1).
- d) Page 251 may be read, but if the cycling list is in operation, lines from the currently displayed page will be returned and the result may be unpredictable.
- e) Line 00 may be read, but the first 8 characters are Hamming-encoded and are unlikely to be returned as printing characters.

3.3.15 READ FIELD

Function: Returns the contents of the line specified starting at the specified field.

Purpose: For extracting a portion of a line.

Syntax: RFmpp,11,ffCR

Example: RF134,23,30CR will return the right-most ten characters on page 134, line 23, sfrom field 30.

RF100,00,33CR will return the current time.

Note: See notes for 'Read Line' command, section 3.3.13.

3.3.16 READ STATUS

Function: Returns the status of specified page.

Purpose: This command enables the current status of pages to be obtained and is useful where there have been changes made to page status since the last download.

Syntax: RSmpCR

Example: RS100CR might return A0000CR showing that page 100 was enabled for both conventional and cycling display.

Note: a) A good 'Read' command will return the status as a Hex number with the '0' acknowledgement concatenated.

If the page is out of range, only the error acknowledgement will be returned.

b) The terminator will be CR in CR mode, CRLF in CRLF mode.

3.3.17 READ CYCLING TIME

Function: Returns the current value of the 'F' register.

Purpose: To find the current value of Cycling Time.

Syntax: RCCR

Example: RCCR might return 130CR showing that the current value of the 'F' register was 13 (Hex).

Note:

- a) A good 'Read' command will return the value as a Hex number with the '0' acknowledgement concatenated.
- b) The terminator will be CR in CR mode, CRLF in CRLF mode.

APPENDIX ONE

SB56 TECHNICAL SPECIFICATION

SB56 TECHNICAL SPECIFICATION

- Dimensions: 3.5" x 17.5" x 10" excluding mounting ears.
(2U rack-mounting cabinet)
- Power: 220-240 volts, 50 Hz, approx 30 watts.
- Output: UHF tuneable by an internal preset between channels 22 and 40, providing 4mV into 75 ohms. A vertical white bar is provided as a video signal, with adjustable horizontal position. A non-interlaced signal is transmitted without a colour burst, and the (6MHz intercarrier) sound channel is unmodulated.
- Pages: A maximum of 104 pages may be transmitted in two magazines of 52 pages. A 24-hour clock is maintained and the header line may have the BREMA Specification control bits set if required.
- Two magazines are supported (pages being accessed by a single digit magazine number followed by a two-digit page number) and pages are transmitted in numerical order in interleaved magazines. A full page is always transmitted, and all pages are set to spaces at switch-on.
- A cycling page facility is provided with which selected pages may be automatically displayed in sequence on 251 with a variable cycling time.
- If no pages are being cycled, a test display is provided on 251.
- Communication: An RS232C line is provided with an internal switch for setting baud rate (15 are available from 50 to 19.2k), word length (7 or 8 bit), and parity option (odd, even, or none).

APPENDIX TWO

RS232C

CONNECTOR ARRANGEMENTS

AND

SWITCH SETTINGS

RS232C CONNECTIONS & SWITCH SETTINGS

Connector: A 25-way Female 'D' connector is provided with snap-locking arrangements:

Pin 1 - Protective Ground
 Pin 2 - Receive Data
 Pin 3 - Transmit Data
 Pin 7 - Signal Ground

Switch: The PCB-mounted switch, accessible by removing the SB56 top cover, is sampled at power-up or following either the 'I' or 'W' commands, and is set to determine the line options required.

The switch is labelled 1 to 8 and the table below indicates how it should be set:

1 - On (pointer towards edge of PCB)
 0 - Off (pointer towards centre of PCB)
 - - Not applicable

1 2 3 4 5 6 7 8

Baud rate:	0 1 1 1 - - - -	50	baud
	1 0 1 1 - - - -	75	baud
	0 0 1 1 - - - -	110	baud
	1 1 0 1 - - - -	134.5	baud
	0 1 0 1 - - - -	150	baud
	1 0 0 1 - - - -	300	baud
	0 0 0 1 - - - -	600	baud
	1 1 1 0 - - - -	1200	baud
	0 1 1 0 - - - -	1800	baud
	1 0 1 0 - - - -	2400	baud
	0 0 1 0 - - - -	3600	baud
	1 1 0 0 - - - -	4800	baud
	0 1 0 0 - - - -	7200	baud
	1 0 0 0 - - - -	* 9600	baud
	0 0 0 0 - - - -	19.2	kbaud
Word Length:	- - - - 1 - - -	* 8 bit word	(1 stop bit)
	- - - - 0 - - -	7 bit word	(1 stop bit)
Parity:	- - - - - 1 - -	* Parity disabled	
	- - - - - 0 1 1	Odd parity	
	- - - - - 0 0 1	Even parity	
	- - - - - 0 1 0	Mark parity bit transmitted	
	- - - - - 0 0 0	Space parity bit transmitted	

Note: The '**' indicates the settings when the equipment is supplied.

APPENDIX THREE



TELETEXT DISPLAY CODES

b ₇ b ₆ b ₅ b ₄ b ₃ b ₂ b ₁ Col Row					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1				
Bits	b ₄	b ₃	b ₂	b ₁	0	1	2	2a	3	3a	4	5	6	6a	7	7a
0 0 0 0 0	0	0	0	0	NUL ^①	DLE ^①			0		⓪	P	—		p	
0 0 0 0 1	0	0	0	1	Alpha ⁿ Red	Graphics Red	!		1		A	Q	a		q	
0 0 0 1 0	0	0	1	0	Alpha ⁿ Green	Graphics Green	"		2		B	R	b		r	
0 0 0 1 1	0	0	1	1	Alpha ⁿ Yellow	Graphics Yellow	£		3		C	S	c		s	
0 0 1 0 0	0	1	0	0	Alpha ⁿ Blue	Graphics Blue	\$		4		D	T	d		t	
0 0 1 0 1	0	1	0	1	Alpha ⁿ Magenta	Graphics Magenta	%		5		E	U	e		u	
0 0 1 1 0	0	1	1	0	Alpha ⁿ Cyan	Graphics Cyan	&		6		F	V	f		v	
0 0 1 1 1	0	1	1	1	Alpha ⁿ White ^②	Graphics White	'		7		G	W	g		w	
1 0 0 0 0	1	0	0	0	Flash	Conceal Display	(8		H	X	h		x	
1 0 0 0 1	1	0	0	1	Steady ^②	Contiguous Graphics ^②)		9		I	Y	i		y	
1 0 0 1 0	1	0	1	0	End Box ^②	Separated Graphics	*		:		J	Z	j		z	
1 0 0 1 1	1	0	1	1	Star1 Box	ESC ^①	+		;		K	←	k		¼	
1 1 0 0 0	1	1	0	0	Normal Height ^②	Black Background ^②	,		<		L	½	l			
1 1 0 0 1	1	1	0	1	Double Height	New Background	-		=		M	→	m		¾	
1 1 1 0 0	1	1	1	0	SO ^①	Hold Graphics	.		>		N	↑	n		÷	
1 1 1 0 1	1	1	1	1	SI ^①	Release Graphics ^②	/		?		O	#	o			

① These control characters are reserved for compatibility with other data codes

② These control characters are presumed before each row begins

Codes may be referred to by their column and row.
e.g. 2, 5 refers to %

Character rectangle

Black represents display colour

White represents background

APPENDIX FOUR

BUILDING COMMANDS IN BASIC

BUILDING COMMANDS IN BASIC

The SB56 requires leading zeroes to be entered for single digit page, line and field numbers. Most BASIC dialects (but not the BBC version) insert a leading space for a sign field and none generate the leading zero. The following example shows how the command may be correctly built in the case of the 'Update Line' command:

```
100 REM - Build an Update Line command given magazine number
110 REM - in M, page number in P, line number in L, and text
120 REM - string to be sent in A$.
130 REM - T & T$ are temporary variables & C$ is the complete
140 REM - command.
150 REM - First do the magazine number:
160 T=M : GOSUB 1000 : C$='UL'+T$
170 REM - Then the page number:
180 T=P : GOSUB 1000 : C$=C$+T$
190 REM - And the line number:
200 T=L : GOSUB 1000 : C$=C$+T$
210 REM - Now add the text string:
220 C$=C$+A$
230 REM - This is where you would send the string....
240 REM - And then return to the calling program.

1000 REM - Routine to build a string representation of a number
1010 REM - assuming that STR$ generates a leading space:
1020 T$=STR$(T)
1030 T$=RIGHT$(T$,LEN(T$)-1)
1040 IF LEN(T$)=1 THEN T$="0"+T$
1050 RETURN
```

APPENDIX FIVE



SB56 COMMAND SUMMARY

SB56 COMMAND SUMMARY

SYNTAX	FUNCTION	REF SECTION
BFll ff(up to 40 chars)CR	Broadcast Field	3.3.12
BLll(up to 40 chars)	Broadcast Line	3.3.11
CLmpp,llCR	Clear Line	3.3.8
CPmppCR	Clear Page	3.3.7
D(up to 14 chars)CR	Set Date	3.3.5
FttCR	Set Cycling Time	3.3.13
ICR	Initialize	3.3.2
RCCR	Read Cycling Time	3.3.17
RFmpp,ll,ffCR	Read Field	3.3.15
RSmppCR	Read Page Status	3.3.16
RLmpp,llCR	Read Line	3.3.14
Smpp,nnnnCR	Set Page Status	3.3.4
Thh,mm(,ss)CR	Set Time	3.3.6
UFmpp,ll,ff(text)CR	Update Field	3.3.10
ULmpp,ll(text)CR	Update Line	3.3.9
VvvCR	Set Comms Options	3.3.1
WCR	Warm Restart	3.3.3

Note: See section 3.2 for explanation of the syntax notation.