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Hardware configuration
Explanation of the serial protocol

(g:\datalite\manuals\dx_host_manual\host-manual_V22.doc)

Contents

1 Hardware configuration 3
1.1 Dipswitch S1 3
1.2 Dipswitch S2 4

2 Protocol 4

3 Explanation of the protocol 5
3.1 Addressing 5
3.2 Blinkspeed 5
3.3 Readtime 5
3.4 Schedular 6
3.5 Brightness 6
3.6 Scroll effect 6
3.7 Fading effect 7
3.8 Moving speed 7
3.9 Text width 7
3.10 Text activity 7
3.11 Synchronisation 7
3.12 Carriage return 8
3.13 Display mode 8
3.14 Realtime clock 8

4 Special control characters 9

6 Example for one panel with two controllers 10

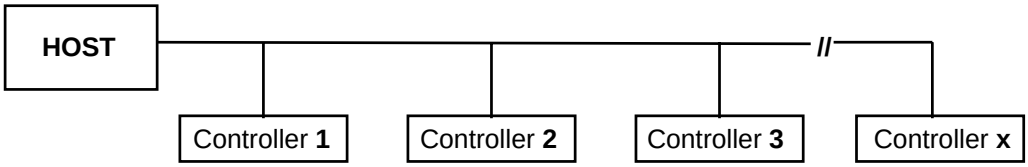
7 Topview (picture) controller-board type: DX-3200_6 12
- layout sub-D connector
- layout RJ-11 connector

8 Table of dipswitch-settings 13

1 Hardware configuration

One or more controllers are connected through a RS-232 connection with a PC.
Another name for this PC is 'host'.

Typical configuration with more than one controller:



The controllers are separately addressable by giving them a unique address, which can be set by a dipswitch on the controller board. Addresses 0 through 31 are available. The baudrate can also be changed with the same dipswitch.

On each controller there are two dipswitches: S1 and S2. These dipswitches determine most functions of the controller.

1.1 Dipswitch S1

With the D25-connector on the bottom of the printed circuit board,
dipswitch S1 is the right-handed one.

"ON"= 1, "OFF"= 0

1	2	3	4	5	6	7	8	test function (text T)
0	0	0	0	.	.	.	.	normal operation (default)
1	0	0	0	.	.	.	.	test halted
			to					
0	1	1	1	.	.	.	.	test halted
1	1	1	1	.	.	.	.	test active

1	2	3	4	5	6	7	8	invert function (text INV)
.	.	.	.	.	.	0	.	not active (default)
.	.	.	.	.	.	1	.	active

1	2	3	4	5	6	7	8	dim function (text LDR)
.	.	.	.	.	.	.	0	not active (default)
.	.	.	.	.	.	.	1	active (default)

In case of the 'information panel'-EPROM, header 1 through 8 are available for respectively line 1 through 8. Each controller can access 8 lines of each 48 characters long.

In case of the 'moving message'-EPROM, header 1 is applicable. The controller can now access up to 192 columns (32 characters in view).

1.2 Dipswitch S2

With the D25-connector on the bottom of the printed circuit board, dipswitch S1 is the left-handed one.

"ON"= 1, "OFF"= 0

1	2	3	4	5	6	7	8	controller address (text ADR1, ADR2, ADR3, ADR4, ADR5)
0	0	0	0	0	.	.	.	0 (default)
1	0	0	0	0	.	.	.	1
0	1	0	0	0	.	.	.	2
		to						
1	1	1	1	1	.	.	.	31

1	2	3	4	5	6	7	8	baudrate (text BAUD1, BAUD2)
.	.	.	.	.	1	0	.	1200
.	.	.	.	.	1	1	.	2400
.	.	.	.	.	0	0	.	4800 baud (default)
.	.	.	.	.	0	1	.	9600

2 Protocol of the DX-3200 controller

ASCII control characters will be represented by 'Basic like' characters. E.g. carriage return will be denoted as chr$(13). ASCII spaces are represented by the '_' symbol. Spaces have no meaning and are used only for typographical purposes.

chr$(1)	= 01 (hex)	= Start Of Heading (SOH)
chr$(13)	= 0D (hex)	= Carriage Return (CR)
chr$(14)	= 0E (hex)	= Bold text (SO) – only usable for information panels
chr$(22)	= 16 (hex)	= Synchronistion (SYN)
chr$(27)	= 1B (hex)	= Escape (ESC)
chr$(28)	= 1C (hex)	= Field Separator (FS)
chr$(29)	= 1D (hex)	= Blink (GS)
chr$(value + 32)	= 20 (hex)	= Value plus offset (= space)

Command strings sent from the host computer have the following (general) format:

(addressing)	→	address string for one controller
(page 1; line 1 text) (page 1: line 8 text)	→	first page; line 1 through 8
(page attributes)	→	attributes for this page only (e.g. blinktime, readtime and schedular)
(information panel attributes)	→	additional for information panel ! (e.g. scroll- and fading effect)
(moving message attributes)	→	additional for moving message ! (e.g. moving speed and textwidth)
(page 2; line 1 text) (page 2: line 8 text)	→	second page; line 1 through 8
(page attributes)	→	attributes for this page only (e.g. blinktime, readtime and schedular)
(information panel attributes)	→	additional for information panel ! (e.g. scroll- and fading effect)

(moving message attributes) → additional for moving message !
(e.g. moving speed and textwidth)

(synchronisation) → synchronisation character
(carriage return) → termination character

The controller, page, information panel and moving message attributes are ESC commands. These commands are explaned below.

3 Explanation of the protocol

3.1 Addressing

Attribute : controller
Function : access one controller
Syntax : chr$(1) + chr$(value + 32) + chr$(28)
Values : Addresses 0 through 31 are available.

Example : chr$(1) + → start of heading
chr$(0 + 32) + → controller address, first controller
chr$(28) + → field separator

3.2 Blinkspeed

Attribute : page
Function : blinkspeed of selected text
Syntax : chr$(27) + 'B' +
chr$(value + 32) + chr$(28)
Value : 1 ... 4

Example : chr$(27) + 'B' + → ESC + B
chr$(34) + → blinkspeed= 2 * 0,5 s= 1,0 s.
chr$(28) → field separator

3.3 Readtime

Attribute : page.
Function : readtime for this page.
Syntax : chr$(27) + 'A' +
chr$(value + 32) + chr$(value + 32) + chr$(value + 32) + chr$(value + 32) + chr$(28)
Value : 1 ... 50

Example : chr$(27) + 'A' + → ESC + A
chr$(32) + → 0 * 4096 = 0
chr$(32) + → 0 * 256 = 0
chr$(43) + → 11 * 16 = 176
chr$(43) + → 11 * 1 = 11 +
chr$(28) → field separator

The readtime for this page= 187 * 26,7 ms. 5 seconds.

3.4 Schedular

Attribute : page.
Function : schedular for this page.
Syntax : chr$(27) + 'P' +
chr$(year + 32) + chr$(month + 32) + chr$(32) + chr$(day + 32) +
chr$(hour + 32) + chr$(minutes+ 32) + chr$(seconds+ 32) + chr$(28).
Values : year → 0 ... 95; offset from 1980 !
Month → 1 ... 12
weekday → unused
day → 1 ... 31
hours → 0 ... 23
minutes → 0 ... 59
seconds → 0 ... 59

Example : chr$(27) + 'P' + → ESC + P
chr$(47) + → year= 15 + 1980= 1995
chr$(33) + → month= january
chr$(32) + → weekday (unused)
chr$(57) + → day= 25
chr$(46) + → houres= 14
chr$(72) + → minutes= 40
chr$(60) + → seconds= 28
chr$(28) → field separator

Pages following this page will get the following string:
chr$(27) + 'P' + '*= + chr$(32) + chr$(32) + chr$(32) + chr$(32) + chr$(32) + chr$(32) +chr$(28)

3.5 Brightness (additional for information panel EPROM)

Attribute : page
Function : brightness for this page
Syntax : chr$(27) + 'Q' + chr$(value + 32) + chr$(28)
Value : 1 ... 17

Example : chr$(27) + 'Q' + → ESC + Q
chr$(49) + → maximum brightness
chr$(28) → field separator

3.6 Scroll-effect (additional for information panel EPROM)

Attribute : page
Function : scroll effect for this page
Syntax : chr$(27) + 'R' + chr$(value + 32) + chr$(28)
Value : 0 → no scroll effect
1 → scroll effect

Example : chr$(27) + 'R' + → ESC + R
chr$(33) + → scroll effect
chr$(28) → field separator

3.7 Fading-effect (additional for information panel EPROM)

Attribute : page
Function : fading effect for this page
Syntax : chr$(27) + 'S' + chr$(value + 32) + chr$(28)
Value : 0 → no fading effect
1 → fading effect

Example : chr$(27) + 'S' + → ESC + S
chr$(33) + → fading effect
chr$(28) → field separator

3.8 Moving speed (additional for moving message EPROM)

Attribute : page
Function : moving speed for this page
Syntax : chr$(27) + 'F'+ chr$(value + 32) + chr$(28)
Value : 1 ... 20

Example : chr$(27) + 'F' + → ESC + F
chr$(45) + → moving speed= 13 * 26,7 ms= 347 ms
chr$(28) → field separator

3.9 Textwidth (additional for moving message EPROM)

Attribute : page
Function : textwidth for this page
Syntax : chr$(27) + 'K' + chr$(value + 32) + chr$(28)
Value : 0 → normal text
1 → bold text

Example : chr$(27) + 'K' + → ESC + K
chr$(33) + → bold text
chr$(28) → field separator

3.10 Text activity (additional for moving message EPROM)

Attribute : page
Function : text activity for this page
Syntax : chr$(27) + 'S' + chr$(value + 32) + chr$(28)
Value : 0 → moving text
1 → steady text

Example : chr$(27) + 'S' + → ESC + S
chr$(33) + → steady text
chr$(28) → field separator

3.11 Synchronisation

chr$(22) → synchronisation
This character is only neccesary in case of panels with multiple controllers

3.12 Carriage return

chr$(13) → carriage return

3.13 Display mode

Attribute : controller. This is not part off a textstring! This string is supposed to be sent separately.
Syntax : chr$(1) + (address + 32) + chr$(28) + chr$(27) + 'D' +
chr$(value + 32) + chr$(28) + chr$(13)
Values : 0, 1, 2, 3 or 4

Example : chr$(1) + chr$(32) + chr$(28) + → address string, first controller
chr$(27) + 'D' + → ESC + D
chr$(32) → display 'off'. Switch off display. Entered text will not become visible until display is switched on again.
chr$(33) → display 'on'. Switch on display. Entered text will become visible, even if it was entered while the display was off.
chr$(34) → test 'off' . Switch off test.
chr$(35) → test halt. Switch halt test. The current page is kept visible.
chr$(36) → test 'on'. Switch on test. The controller will now roulate test pages. All data will be lost.
chr$(42) → If connected, a output will toggle (sync. output - special E-prom).
chr$(28) + chr$(13)

3.14 Realtime clock

Attribute : controller. This is not part off a textstring! This string is supposed to be sent separately.
Function : access and adjust the realtime clock on the controller.
Syntax : chr$(1) + (address + 32) + chr$(28) +
chr$(27) + 'T' +
chr$(year + 32) + chr$(month + 32) + chr$(32) + chr$(day + 32) +
chr$(hour + 32) + chr$(minutes+ 32) + chr$(seconds + 32) + chr$(28) + chr$(13).
Values : year → 0 ... 95; offset from 1980 !
Month → 1 ... 12
Weekday → unused
Day → 1 ... 31
Hours → 0 ... 23
Minute → 0 ... 59
Seconds → 0 ... 59

Example : chr$(27) + 'T' + → ESC + T
chr$(47) + → year= 15 + 1980= 1995
chr$(33) + → month= january
chr$(32) + → weekday (unused)
chr$(57) + → day= 25
chr$(46) + → houres= 14
chr$(72) + → minutes= 40
chr$(60) + → seconds= 28
chr$(28) + → field separator
chr$(13) + → carriage return

4 Special control characters

control character	will expand to:	
%Y	year	e.g. 95
%m	month	e.g. 9
%D	day	e.g. 1
%H	houres	e.g. 14
%m	minutes	e.g. 53
%S	seconds	e.g. 23
%R	readtime; hour-glass	e.g. A
%day	days till 1-1-2000	e.g. 783
%dayleft	time till 1-1-2000	e.g. 23:04:19
%seconds	seconds till 1-1-2000	e.g. 67701861
%TMP (optional)	temperature	e.g. 23°C
%W	winddirection	e.g. NO
%VELO	windspeed	e.g. 12 m/s

Leading zeroes will be suppressed, except for minutes and seconds.

5 Overview of the commands

Syntax		**Description**
chr$(1) + chr$(value + 32) + chr$(28) +	→	controller attribute, addressing, value: 0 ... 31
'0' + 'AAAAA' + chr$(28) +	→	text: AAAAA; line 1
'1' + 'BBBBBB' + chr$(28) +	→	text: BBBBBB; line 2
" " "		
'7' + 'HHHHH' + chr$(28) +	→	text: HHHHH; line 8
chr$(27) + 'B' + chr$(value + 32) + chr$(28) +	→	page attribute, blinkspeed, value: 0 ... 4
chr$(27) + 'A' + 4 * chr$(value + 32) + chr$(28) +	→	page attribute, readtime, value: 0 ... 15
chr$(27) + 'P' + 7 * chr$(value + 32) + chr$(28) +	→	page attribute, schedular, value: 0 ... 23

moving message

chr$(27) + 'F' + chr$(value) + chr$(28) +	→	moving speed, value: 0 ... 20
chr$(27) + 'K' + chr$(value) + chr$(28) +	→	bold text, value: 0 or 1
chr$(27) + 'S' + chr$(value) + chr$(28) +	→	steady text, value: 0 or 1

information panel

chr$(27) + 'Q' + chr$(value) + chr$(28) +	→	brightness, value: 1 ... 17
chr$(27) + 'R' + chr$(value) + chr$(28) +	→	scroll effect, → value: 0 or 1
chr$(27) + 'S' + chr$(value) + chr$(28) +	→	fading effect, value: 0 or 1,
chr$(22)	→	synchronisation
chr$(13)	→	carriage return
chr$(1) + chr$(value + 32) + chr$(28) +	→	controller attribute, addressing, value: 0 ... 31
chr$(27) + 'D' + chr$(value + 32) + chr$(28) +	→	controller attribute, display mode, value: 0 ... 4
chr$(13)	→	carriage return
chr$(1) + chr$(value + 32) + chr$(28) +	→	controller attribute, addressing, value: 0 ... 31
chr$(27) + 'T' + 7 * chr$(value + 32) + chr$(28) +	→	controller attribute, realtime clock, value: 0 ... 23
chr$(13)	→	carriage return

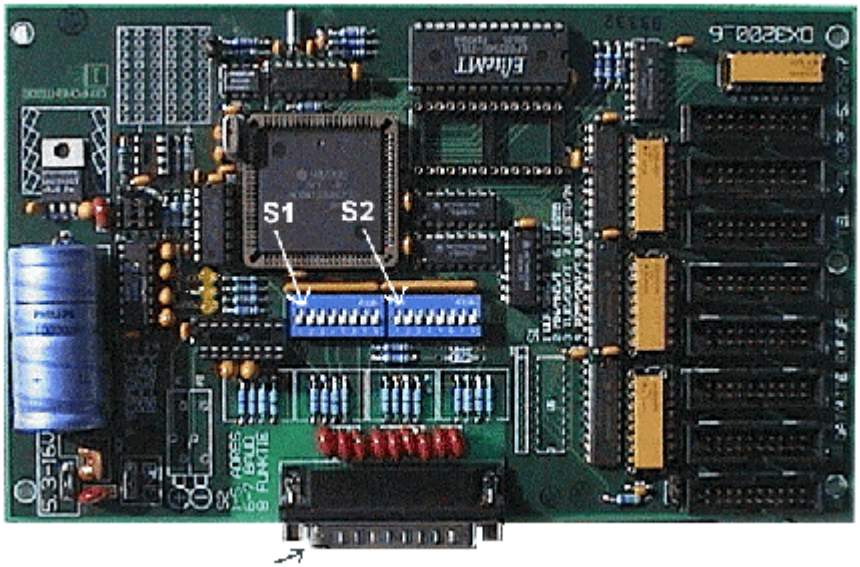
6 Example for one panel with two controllers

chr$(1) + chr$(32) + chr$(28);	→	first controller
‘0'+=hello this is line 1=+chr$(28);		
‘1'+=hello this is line 2=+chr$(28);		
‘2'+=hello this is line 3=+chr$(28);		
‘3'+=hello this is line 4=+chr$(28);		
‘4'+=hello this is line 5=+chr$(28);		
‘5'+=hello this is line 6=+chr$(28);		
‘6'+=hello this is line 7=+chr$(28);		
‘7'+=hello this is line 8=+chr$(28);		
chr$(27) + chr$(65) + chr$(32) +chr$(32)		
+chr$(43) + chr$(43) +chr$(28);	→	readtime 5 seconds
chr$(22);	→	synchronisation
chr$(1) + chr$(33) + chr$(28);	→	second controller
‘0'+=hello this is line 1=+chr$(28);		
‘1'+=hello this is line 2=+chr$(28);		
‘2'+=hello this is line 3=+chr$(28);		
‘3'+=hello this is line 4=+chr$(28);		
‘4'+=hello this is line 5=+chr$(28);		
‘5'+=hello this is line 6=+chr$(28);		
‘6'+=hello this is line 7=+chr$(28);		
‘7'+=hello this is line 8=+chr$(28);		
chr$(27) + chr$(65) + chr$(32) +chr$(32)		
+chr$(43) + chr$(43) +chr$(28);	→	readtime 5 seconds
chr$(22);	→	synchronisation
chr$(13);	→	carriage return

In hex values this would be:

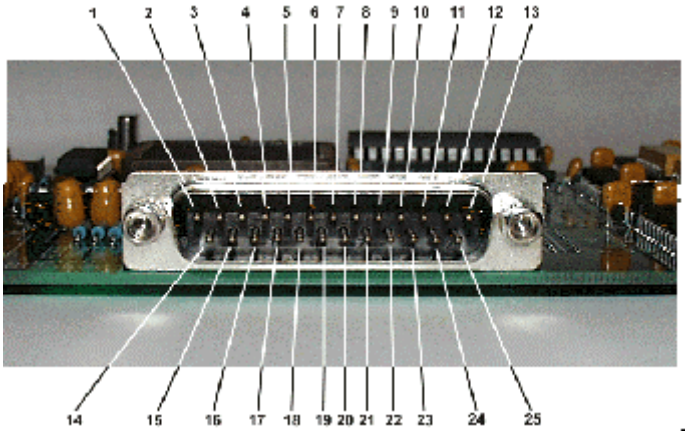
```
01 20 1C
30 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 31 1C
31 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 32 1C
32 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 33 1C
33 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 34 1C
34 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 35 1C
35 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 36 1C
36 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 37 1C
37 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 38 1C
1B 41 20 20 2B 2B 1C
16

01 20 1C
30 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 31 1C
31 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 32 1C
32 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 33 1C
33 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 34 1C
34 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 35 1C
35 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 36 1C
36 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 37 1C
37 68 65 6C 6C 6F 20 74 68 69 73 20 69 73 20 6C 69 6E 65 20 38 1C
1B 41 20 20 2B 2B 1C
16

13
```

7 Topview (picture) controller-board type: DX-3200_6

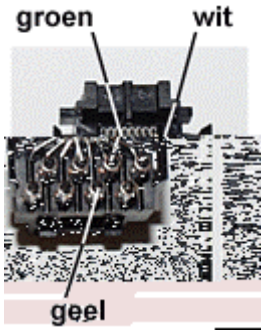


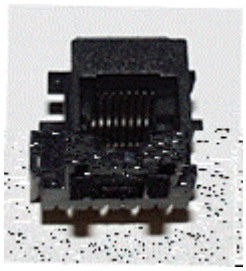
Picture: DX-3200_6_02.gif

1 - GND (white)
2 - RS-232 Tx
3 - RS-232 Rx (Yellow)
4 - Rs-232 lus (green)
5 - GND (Temp.)
6 -Temp. Sens.
7 - GND (Temp.)
8 - DCF-77 (Data)
9 - N.C.
10 - GND
11 - SW 1
12 - SW 2
13 - SW 3
14 - SW 4
15 - SW 5
16 - SW 6
17 - SW 7
18 - SW 8 / LDR
19 - GND (LDR)
20 - VCC (Temp.)
21 - VCC (DCF-77)
22 - synch in
23 - synch out
24 - RS-485 TX/RX (+) / ADC CH0 (green)
25 - RS-485 TX-RX (-) / ADC CH1 (Yellow)



Achterzijde paneel
RJ-11 connector





8. Table of dipswitch-settings

Dipswitch S1 (left/ links)

1	2	3	4	5	6	7	8		Panel-Eprom
.	.	.	.	.	.	.	0		dimming "ON"
.	.	.	.	.	.	.	1		dimming "OFF"
.	.	.	.	.	0	0	.		1,8 mm dotm.
.	.	.	.	.	0	1	.		> 1,8 mm dotm.
1	1	1	1	.	.	.	.	.	test

Dipswitch S2 (right/ rechts)

1	2	3	4	5	6	7	8		Panel-Eprom
.	.	.	.	.	.	.	0		infopaneel
.	.	.	.	.	.	.	1		lichtkrant
.	.	.	.	.	1	0	.		1200 baud
.	.	.	.	.	1	1	.		2400 baud
.	.	.	.	.	0	0	.		4800 baud
.	.	.	.	.	0	1	.		9600 baud
0	0	0	0	0	.	.	.		adres 0
1	1	1	1	1	.	.	.		adres 31