protocol serial controlled LCD-Display (HD44780 controller)

interface parameter:
115200 baud, 8 data bits, 1 stopbit, no parity (8n1)

constants:

DC_LCD_INIT	= 0x1f
DC_LCD_READ	= 0xab
DC_LCD_WRITE	= 0x56
DC_LCD_RAW_READ	= 0xf6
DC_LCD_RAW_WRITE	= 0x16
DC_LCD_PWM	= 0x6a
STX	= 0x02
ETX	= 0x03

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command frame:

STX	command	number of bytes, without command, number and crc	[byte 0]	[byte 1]	[...]	[byte n] (max. 31)	crc16 low	crc16 high	ETX

The timeslot for transmitting a command frame is 100ms and starts after the command (2nd byte of frame) is transmitted. If the last byte is not received within this time, the command is discarded and the device waits for the next frame.
The crc16 is calculated with the polynom $X^{16}+X^{15}+X^2+1$ over all bytes except STX and ETX. Every command will be answered with a frame of the same format and the requested data bytes (may be 0). Frames with incorrect format or wrong crc will not be answered.

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command frame DC_LCD_CLEAR:

STX	DC_LCD_INIT	0x00	crc16 low	crc16 high	ETX

clears the complete display and moves the cursor home

answer frame DC_LCD_CLEAR:

STX	DC_LCD_INIT	0x00	crc16 low	crc16 high	ETX

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command frame DC_LCD_READ:

STX	DC_LCD_READ	0x02	0xAA	0xNN	crc16 low	crc16 high	ETX

read 0xNN bytes starting at address 0xAA
For accessing the display (DD-RAM) the address must be ored with 0x80, for access to the CG-RAM use 0x40 + address. Refer to the HD44780 datasheet for a desciption of memory configuration.
The maximum number of bytes that can be read at a time is 32 (0xNN = 0x20).

answer frame DC_LCD_READ:

STX	DC_LCD_READ	0xNN	byte 0	byte 1	...	byte NN	crc16 low	crc16 high	ETX

command frame DC_LCD_WRITE:

STX	DC_LCD_WRITE	0xNN	0xAA	byte 0	byte 1	...	byte NN-1	crc16 low	crc16 high	ETX

write 0xNN-1 bytes starting at address 0xAA
For accessing the display (DD-RAM) the address must be ored with 0x80, for access to the CG-RAM use 0x40 + address. Refer to the HD44780 datasheet for a desciption of memory configuration.
The maximum number of bytes that can be written at a time is 32 (0xNN = 0x21).

answer frame DC_LCD_WRITE:

STX	DC_LCD_WRITE	0x00	crc16 low	crc16 high	ETX

command frame DC_LCD_RAW_READ:

STX	DC_LCD_RAW_READ	0x00	crc16 low	crc16 high	ETX

reads BUSY-flag and address of controller
The read function is executed with HD44780 signal RS=0. The readed byte is passed in the answer frame.

answer frame DC_LCD_RAW_READ:

STX	DC_LCD_RAW_READ	0x01	data read	crc16 low	crc16 high	ETX

command frame DC_LCD_RAW_WRITE:

STX	DC_LCD_RAW_WRITE	0x01	data write	crc16 low	crc16 high	ETX

write any byte to the HD44780 controller
The write function is executed with HD44780 signal RS=0. Any HD44780 command can be executed.

answer frame DC_LCD_RAW_WRITE:

STX	DC_LCD_RAW_WRITE	0x00	crc16 low	crc16 high	ETX

command frame DC_LCD_PWM:

STX	DC_LCD_PWM	0x01	pwm value	crc16 low	crc16 high	ETX

write an 8 bit value to the backlight pwm controller 0 means backlight is off, 0xff is full on, any value between is dimmed backlight
The pwm output is PIN9/PD5/OC0B at the ATTINY2313. The dimming is smooth with one step up or down every 10 ms.

answer frame DC_LCD_PWM:

STX	DC_LCD_PWM	0x00	crc16 low	crc16 high	ETX