

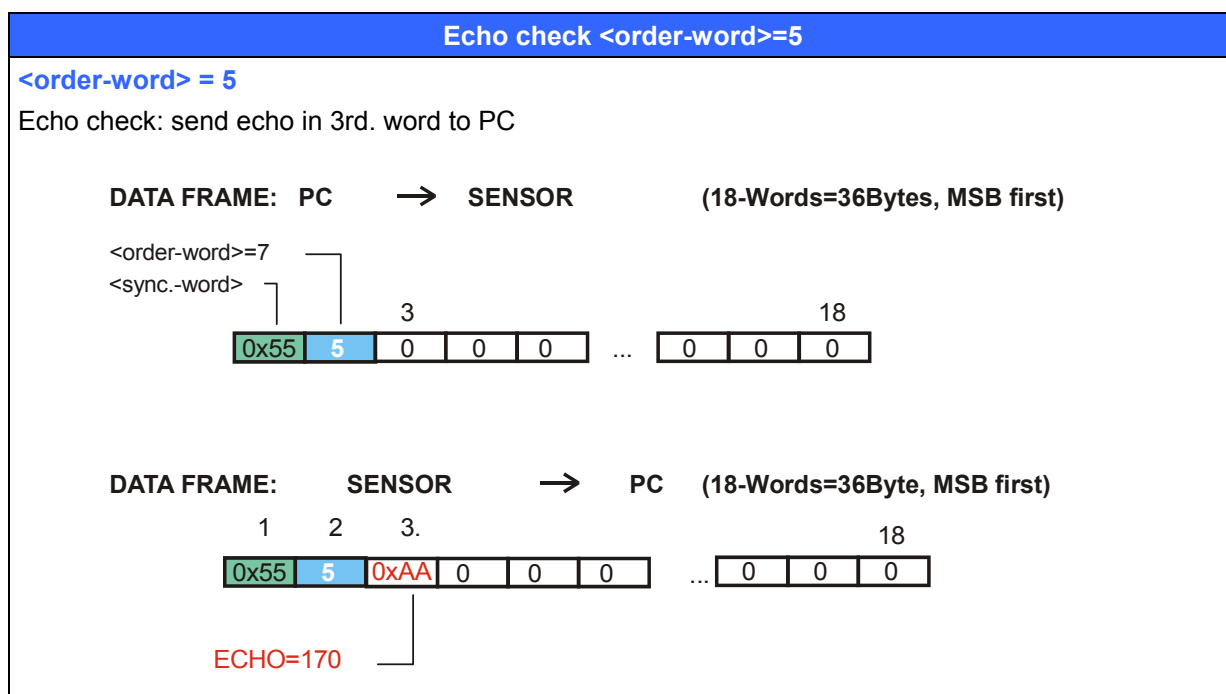
TECHNICAL INFORMATION:

PRODUCT:	L-LAS-TB CCD-Line-Laser-Sensor-Series	Date:	20.12.2006
	<i>Software - state: V2.20</i>		(wk)
TOPIC:	RS232-Interface-Protocol for L-LAS-TB CCD-Sensors PC-Software-Version <i>L-LAS-TB-Scope V2.20</i>		
RS232 Interface-Protocol PC ↔ L-LAS-TB sensor			
<ul style="list-style-type: none">- Standard RS232 serial interface, no hardware handshake- 3-wire connection: GND, TX0, RX0- Speed: 19200 baud, 8 data-bits, no parity-bit, 1 stop-bit, binary-mode <p>The control device (PC or PLC) have to send a frame of <i>18-words</i> (<i>1 word = 2 byte = 16 bit</i>) to the <i>L-LAS-TB</i> hardware. All words must be transmitted in binary format. The most significant byte must be transmitted first (MSB-first).</p> <p><u>METHOD:</u> The microcontroller of the L-LAS-TB sensor is permanently reading (polling) the input-buffer of the RS-232 module. If the incoming word = <i>0x0055</i> (<i>0x55 hexadecimal = 85 decimal</i>), this is interpreted as the synchronisation-event <sync-word>. After this, the 2.nd word with the order number <order-word> is read in by the microcontroller. The order word <order-word>, is followed by 16 further words <parameter-word>. After reading the complete data-frame (18-words = 36 bytes), the <i>L-LAS-TB</i> sensor hardware executes the order which is coded at the 2.nd word <order-word>.</p>			

Format of the parameter-frame:		
Word No.	Meaning	Comment
1	<sync-word> = 0x0055	hex-code 0x55, binary=0000 0000 0101 0101, dec.=85
2	<order-word>	Order word (c.f. table below)
3	parameter POWER	Laser Intensity (0 ... 1000)
4	parameter RS232MODE	RS232-mode STAT=0 / CONT=1 (continous data output)
5	parameter VIDEOTHD	Threshold for edge detection of video signal (0 ... 1023)
6	parameter ANAMODE	Mode of Analog-output: (0=DIRECT, 1=DIRECT no AVG, 2=MAX-intern-triggerd, 3=MIN-intern-triggerd, 4=MAX-extern-triggered, 5=MIN-extern-triggerd)
7	parameter POLARITY	Polarity setting for OUT0, OUT1, (0=DIRECT, 1=INVERSE)
8	parameter E-MODE	Eval-mode (0=L-EDGE, 1=R-EDGE, 2=WIDTH, 3=CENTER)
9	parameter E-BEGIN	Evaluation start-pixel (1 .. E_END-1)
10	parameter E-END	Evaluation end-pixel (E_BEG+1 .. MAXPIXEL)
11	parameter TEACH-VALUE	Teach-value TEACH (1 ... 1024)
12	parameter TOLERANCE	Tolerance-value TOL: (0 ... 512)
13	parameter OP-MODE	Operation-Mode (LOW=0 / HIGH=1) gain or readout-mode
14	parameter HARDW-MODE	Enable/disable TOL-potentiometer and Button at Housing (DISABLE-ALL=0, ENABLE-ALL=1,ENABLE-BTN=2, ENABLE POTI=3)
15	parameter SLOPE	Slope parameter for calibration $Y = \text{slope} * x + \text{intersect}$ Float-value is multiplied with 128
16	parameter INTERSECT	Intersection parameter $Y = \text{slope} * x + \text{intersect}$ Intersection has offset of 30000
17	parameter AVERAGE	Average setting: 1,2,4,8,16,32,64,128,256,512 or 1024
18	Parameter DELTATOL	Tolerance for differential mode 1 ... 1024

Meaning of the 2 nd word of the data-frame: <order-word>		
Value	Meaning / Action	
0	Nop	no operation
1	Send parameter from PC into RAM of L-LAS	volatile: 18 words PC ⇒ L-LAS-RAM
2	Get L-LAS-RAM-parameter	18 words, L-LAS-RAM ⇒ PC
3	Send parameter from PC into EEPROM of L-LAS	18 words, PC ⇒ L-LAS-EEPROM
4	Get EEPROM parameters of L-LAS	18 words, L-LAS-EEPROM ⇒ PC
5	Echo check: Get echo of L-LAS, line ok = 0xAA	18 words, 3 rd . word=0x00AA (Echo=170)
6	Activate Teach at L-LAS, store in RAM	18 words PC ⇒ L-LAS-RAM
7	Get software version info from L-LAS	36 words, L-LAS ⇒ PC (version-string)
8	Get measured values out of L-LAS-RAM	18 words, L-LAS-RAM ⇒ PC
9	Get data-buffer-block out of L-LAS-RAM,	64 words, L-LAS-RAM ⇒ PC
11	Reset maxima/minima-values (analog-output-mode)	18 words PC ⇒ L-LAS-RAM

EXAMPLES:

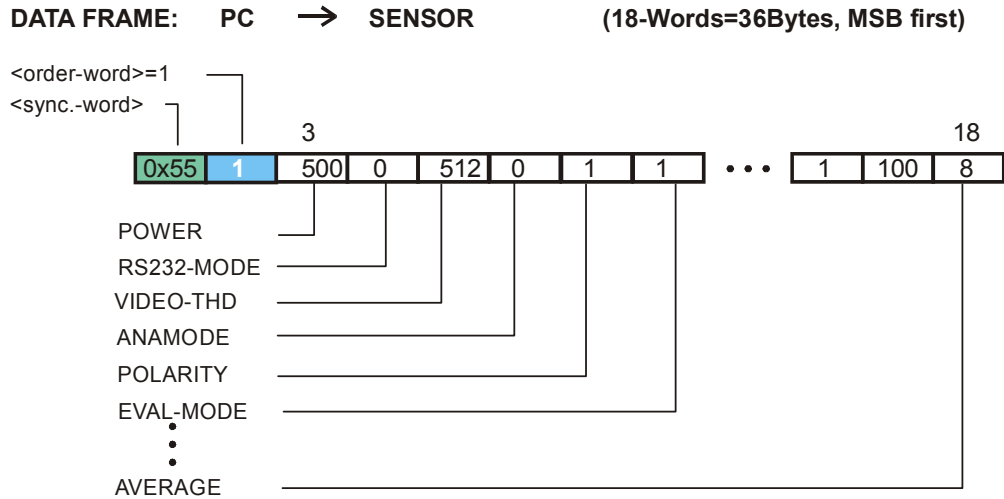


SEND parameter to L-LAS-RAM <order-word>=1

<order-word> = 1

Send actual parameters and store the frame into L-LAS-RAM

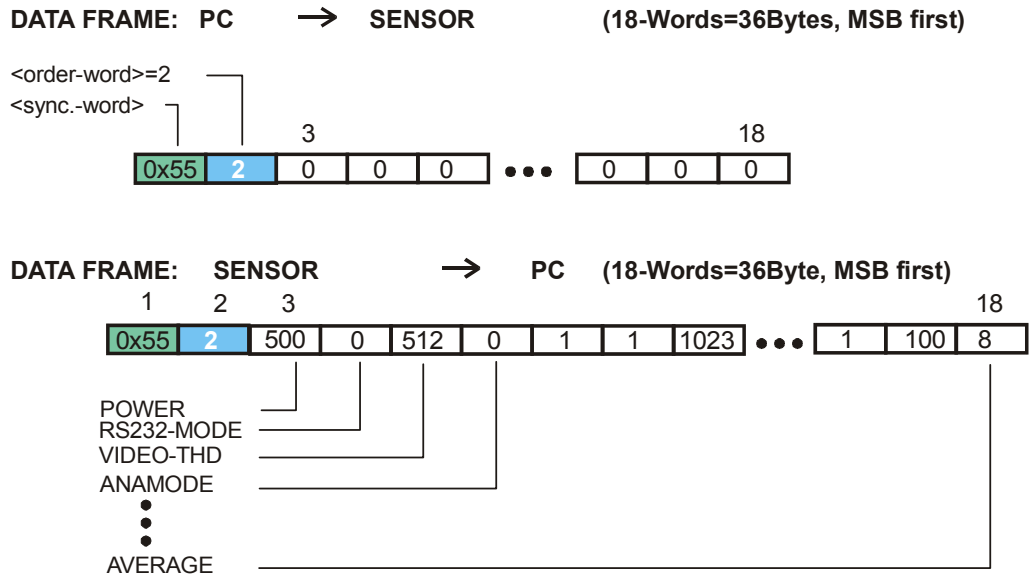
No data frame is send back to the PC with the order = 1 !!!



GET L-LAS-RAM parameter <order-word>=2

<order-word> = 2

GET L-LAS RAM parameter

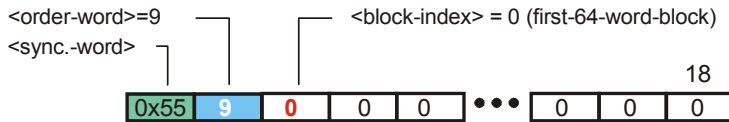


GET L-LAS-sensor DATA-BUFFER <order-word>=9

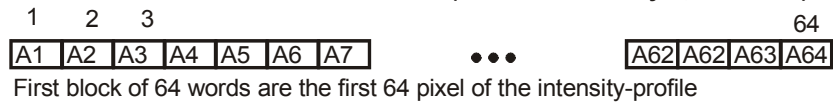
<order-word> = 9

Due to limited RAM memory at the L-LAS-sensor, the data buffers have to be sent to the PC in blocks of 64-words one after the other. The data buffer contents the 256-pixel of the intensity-profile which is measured at the CCD-receiver.

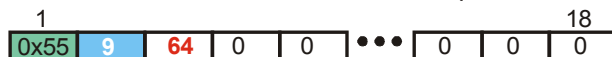
Step1: DATA FRAME: PC → L-LAS-sensor (18-Words=36Bytes, MSB first)



DATA FRAME: L-LAS-sensor → PC (64-Words = 128Byte, MSB first)



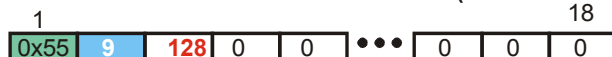
Step2: DATA FRAME: PC → L-LAS-sensor (18-Words=36Bytes, MSB first)



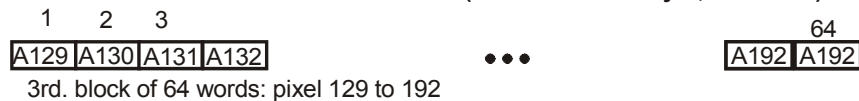
DATA FRAME: L-LAS-sensor → PC (64-Words = 128Byte, MSB first)



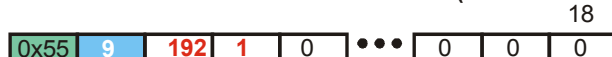
Step3: DATA FRAME: PC → L-LAS-sensor (18-Words=36Bytes, MSB first)



DATA FRAME: L-LAS-sensor → PC (64-Words = 128Byte, MSB first)



Step4: DATA FRAME: PC → L-LAS-sensor (18-Words=36Bytes, MSB first)



DATA FRAME: L-LAS-sensor → PC (64-Words = 128Byte, MSB first)

