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# SynLock-Pico-Module

## Serial Interface Protocol Specification

### 1 Scope

The SynLock-Pico-Module and its communication partner (host), e.g. a microcontroller or a PC (connected via voltage level shifter) are linked together by a so called serial three-wire-connection (TXD, RXD and GND). The data exchange via this connection is asynchronous, bi-directional and under normal circumstances half duplex. This specification describes the used protocol which allows the host to control all features of the SynLock-Pico-Module. This specification deals additionally to the pure data transmission with the synchronisation mechanism between the two communication partners.

### 2 Serial Interface

#### 2.1 Serial Interface Parameter

For the data transmission between host and SynLock-Pico-Module the standardised serial asynchronous interface with following parameters is used:

- Baud rate: 19200 Baud
- Number of data bits: 8 data bits
- Parity: no parity bit
- Number of stop bits: 1 stop-bit

The serial interface uses TTL voltage levels (0V and 5V) at physical layer for the transmission of characters.

#### 2.2 Break Character

Additionally to the transmission of data bytes the SynLock-Pico-Module sends for synchronisation purposes periodically so called break characters to the host. A break character consists according to the standard of a start bit (low), eight data bits (all low) and a inverted stop bit (low). This means the corresponding signal line is for the time of ten bits forced to low. This special condition can be detected by the host und interpreted as break character.

### 3 Synchronisation and Timing

Because of requesting very high und precise timing conditions by the wireless communication between SynLock-Pico-Module and transponder, which allows only very small tolerances up to micro seconds, it is crucial, that this communication is not interrupted or interfered by the data transmission between host and SynLock-Pico-Module. To permit a synchronisation with the SynLock-Pico-Module it transmits periodically break characters to the host. The host has to start its data transmission inside a time period of 20ms after complete receiving of the break character, this means it has to transmit at least the command to the SynLock-Pico-Module. For the transmission of each following character a time of maximal 2ms is permitted. Between two following break characters the transmission of only one command including the corresponding data if necessary. The SynLock-Pico-Module stops its communication with the transponder during this time period, so the complex timing of this communication can not disturbed by communication via the serial interface. After receiving and analysing the complete command including data if necessary the SynLock-Pico-Module executes the function assigned to the command and sends its status and if the command requires additional data back to the host. If an error occurs while executing the received command, only the status without any additional data will be sent back to the host. After processing a command and sending back its results to the host the SynLock-Pico-Module

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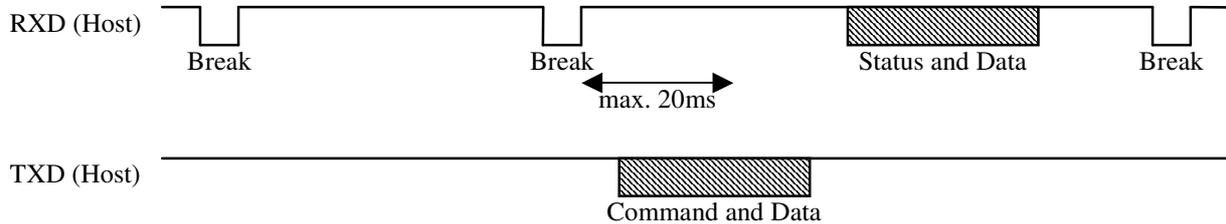
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transmits a new break character to give the opportunity to the host to transmit the next command to the SynLock-Pico-Module.

The transmission of a commando including the necessary synchronisation is shown in the following illustration.



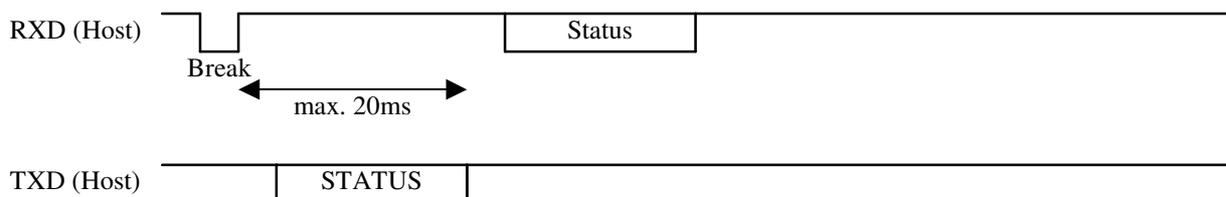
## 4 Commands

This chapter describes the formats of the different commands with their corresponding data if necessary for that special command. The SynLock-Pico-Module is capable to execute the following commands:

- Read Status: STATUS (0x40)
- Read Data (page): READ\_PAGE (0x00)
- Read Data (block): READ\_BLOCK (0x10)
- Write Data (page): WRITE\_PAGE (0x20)
- Write Data (block): WRITE\_BLOCK (0x30)
- Write Crypto Parameter: CRYPTO (0xf0)
- Read Software Version: VERSION (0xf8)

### 4.1 Read Status

This command allows the host to request the actual status of the SynLock-Pico-Module. After sending the command STATUS (0x40) the host gets a data byte from the SynLock-Pico-Module which contains the actual status in a coded format.



Coding:

Bits 7..4:	reserved	
Bits 3..0:	error code:	
	0x00	no error
	0x02	illegal command
	0x04	illegal address
	0x06	antenna defective or detuned
	0x08	no transponder in range
	0x0a	transponder has changed
	0x0c	transponder communication faulty

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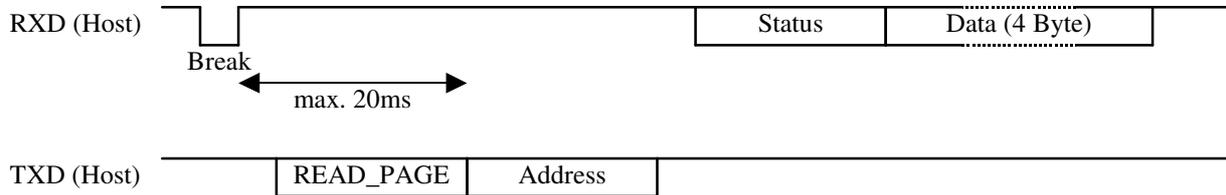
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## 4.2 Read Data (Page)

Using this command the host can read a data transponder page, four byte, from the transponder. To do this it transmits the command READ\_PAGE (0x00) and the address of the page to the SynLock-Pico-Module. This responds on its part with the status and the requested four Byte.

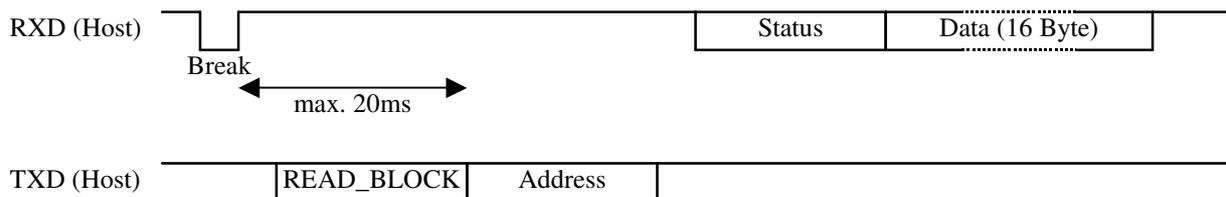


### Attention:

The two least significant bits of the address must be zero meaning the address must be dividable by four without a remainder.

## 4.3 Read Data (Block)

Similar to the command which initiates reading a transponder page the command READ\_BLOCK (0x10) reads also data from the transponder, but this command reads the data of a transponder block, sixteen byte. The SynLock-Pico-Module sends after receiving the command and the address the status and the sixteen read bytes of the according transponder block to the host.

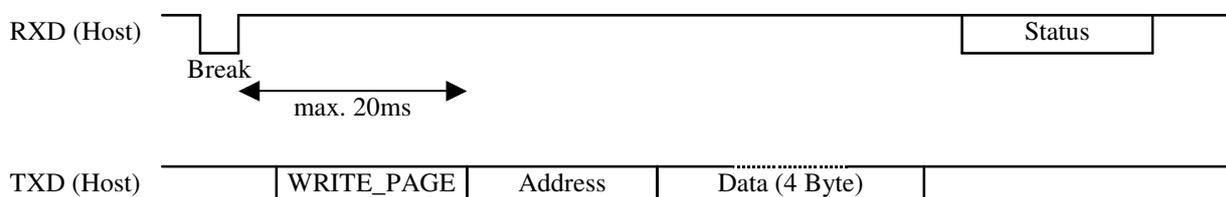


### Attention:

The four least significant bits of the address must be zero meaning the address must be dividable by sixteen without a remainder.

## 4.4 Write Data (Page)

The function of this command is to write the data of a transponder page, four byte. The host sends the command WRITE\_PAGE (0x20), the address and the four data byte to the SynLock-Pico-Module, which responds the status.



### Attention:

The two least significant bits of the address must be zero meaning the address must be dividable by four without a remainder.

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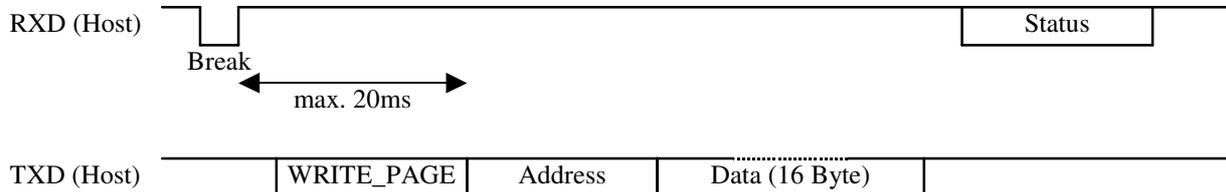
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## 4.5 Write Data (Block)

To write data to a transponder block in analogy to the command for writing a transponder page additionally the command WRITE\_BLOCK (0x30) exists. In exactly the same way the host transmits command, address and the sixteen data bytes to the SynLock-Pico-Module which responds the status as well.

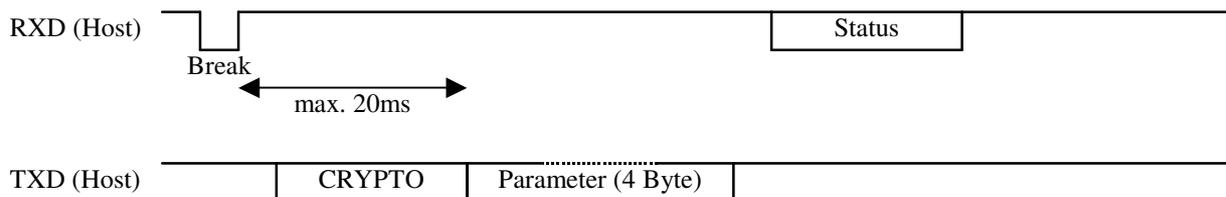


### Attention:

The four least significant bits of the address must be zero meaning the address must be dividable by sixteen without a remainder.

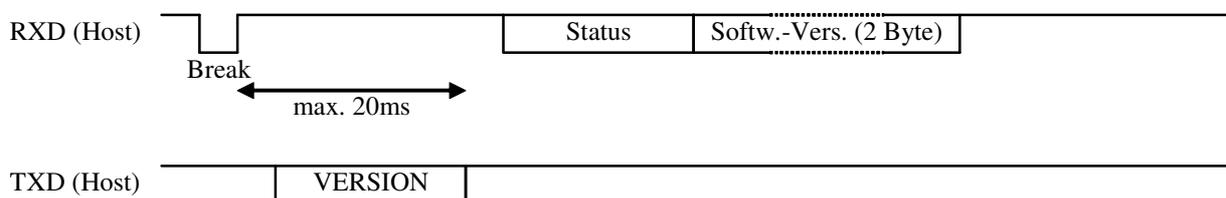
## 4.6 Write Crypto Parameter

To change the crypto parameter, called crypto seed, residing in the SynLock-Pico-Module the command CRYPTO (0xf0) is used. In addition to the command the four byte of the new crypto parameter are transmitted by the host to the SynLock-Pico-Module. The SynLock-Pico-Module delivers similar to the other commands the status.



## 4.7 Read Software Version

This command allows the host to read the software version of the SynLock-Pico-Module. After sending the command VERSION (0xf8) the SynLock-Pico-Module responds two bytes which contain the software version. The first byte represents the major version number, the second one the minor version number.



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