



## Design Specification

**Project:** BOGBALLE CALIBRATOR UNIQ

**Project No.:** 175-0004

## Serial Protocol Specification

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## Change Log

Date	Initials	Version	Short description
19.03.2003	JA	0.1	Document created.
01.04.2003	JA	1.0	First release of document
07.05.2003	JA	1.1	Paragraph 3.5 is changed: The response to {RSC} (status) is changed to: {WPopsathfmC}



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## **1 Introduction**

This document is prepared as a Design Specification for those who want to interface external equipment to the BOGBALLE CALIBRATOR UNIQ through the serial port / RS232.

This document is written by Jens Ancker and refers to the Functional Specification for CALIBRATOR UNIQ.



## 2 Connection UNIQ to external equipment

The CALIBRATOR UNIQ can be connected to external equipment through the RS232 port located on the left hand side of the UNIQ. The picture below shows the location of the serial port.



The connector on the UNIQ is implemented as a standard RS232 connector with the same layout as a PC – DB9 male.

Pin #	Description (on UNIQ side)
1	Do not connect
2	Data in
3	Data out
4	Do not connect
5	Signal Ground
6	Do not connect
7	Do not connect
8	Do not connect
9	Do not connect

If UNIQ is going to be connected to a standard PC port the cable must be as below:

DB9 – female	DB9 - female
Pin 2	Pin 3
Pin 3	Pin 2
Pin 5	Pin 5

A standard NULL-MODEM cable can be used.



## 2.1 Serial port setting

The CALIBRATOR UNIQ uses the below port settings on the RS232 port:

Bits pr. Second: 9600  
Number of data bits: 8  
Parity: None  
Stop bits: 1  
Flow control: None



### **3 Protocol description**

When CALIBRATOR UNIQ is connected to external equipment the UNIQ will always appear as a slave and the external computer will always be master. This means that UNIQ only sends data on the serial port if requested.

In the following paragraphs the implementation of the protocol will be described in details.

#### **3.1 Checksum**

In the protocol a checksum calculation is included. The example below explains how the checksum calculation works:

**{SB287C}** // C is the checksum and is given by an XOR of the 5 first byte

The start-/end characters and the checksum itself are **not** included in the checksum calculation.

$S \text{ XOR } B \text{ XOR } 2 \text{ XOR } 8 \text{ XOR } 7 = h53 \text{ XOR } h42 \text{ XOR } h32 \text{ XOR } h38 \text{ XOR } h37 = h2C$

In the above example the checksum is **h2C**.

If the checksum character is h00, h7B (}) or h7D (}) the checksum character is forced to h55 (U).

#### **3.2 Telegram to UNIQ**

A telegram to UNIQ must be sent without space between two characters. If the time between two characters is more than 2 seconds the telegram will be lost due to timeout.

#### **3.3 Telegram from UNIQ**

A accept of a telegram from UNIQ doesn't mean that the requested action will take place, but only that the telegram was accepted.



### 3.4 Change of values/mode in UNIQ

Change of values/mode in UNIQ			
Action	Computer sends	UNIQ answers	Comment
Application rate with application rate returned	{SDxxxC}	{ADxxxC}	xxx kg/ha
Application rate with application rate returned	{SDxxxxC}	{ADxxxxC}	xxxx kg/ha
Spread width	{SBxxxC}	{ABxxxC}	xx,x m
Distance	{SLxxxxxC}	{ALxxxxxC}	xxxxx m
HA[y]	{SHyxxxxC}	{AHyxxxxC}	y: 1-5 is area no. 1-5. y >= 6 is mapped to total counter
Hopper contents	{SlxxxxxC}	{AlxxxxxC}	xxxxx Kg
Time	{SCddmmyyhmmC}	{ACddmmyyhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
Active Area	{SAxC}	{AAxC}	x: 1-5 x >= 6 will be mapped to total counter
Open	{SOC}	{AOC}	NOT SUPPORTED
Plot	{SPC}	{APC}	Toggle the Plot function. <b>Affects calculation only, no active control of trend actuator.</b>
Zero set Tara	{STC}	{ATC}	Resets counter. If FAI enabled the force restart.
Start	{SGC}	{AGC}	
Stop	{SSC}	{ASC}	



### 3.5 Reading out values/status from UNIQ

Reading out values/status from UNIQ			
Action	Computer sends	UNIQ answers	Comment
Set value, application rate	{RDC}	{WDxxxC}	xxx Kg/ha Length(xxx) >= 3
Present value, application rate	{RAC}	{WAxxxC}	xxx Kg Length(xxx) >= 3
Spread width	{RBC}	{WBxxxC}	xx,x m Length(xxx) >= 3
Distance	{RLC}	{WLxxxxxC}	xxxxx m Length(xxxxx) >= 5
HA[y]	{RhyC}	{WHyxxxxC}	xx,xx ha y >= 6 will be mapped to total counter. Length(xxxx) >= 4
Hopper contents	{RIC}	{WlxxxxxC}	xxxxx Kg
Tara	{RTC}	{WTxxxxxC}	xxxxx Kg Length(xxxxx) >= 5
Speed	{RVC}	{WVxxxC}	xx,x km/h
Time	{RCC}	{WCddmmyyhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
PTO	{RPC}	{WPxxxC}	xxx rpm Length(xxx) >= 3
Status	{RSC}	{WPopsatlhfmC}	o: Open 0=always p: 0=Normal/Trend to border 1=Trend from border s 0=Stop 1=Start a: 1-5 area no. 6=Total counter t: 0=E 1=EX (EX normal)(M3 normal) 2=EX2(EX+40%)(M3+40%)(M3-40%) 3=EW 4=EXW (EXW normal) M3W(normal) 5=EX2W(EXW+40%)(M3W+40%)(M3W-40%) 6=D 7=DZ l: Language 0=always h: 0=Fixed speed 1=Impulse sensor 2=Radars 3=Tractor board f:0=Tank sensor not available 1=Tank sensor available m: mode 0=always