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	Interface description Specification Plena Protocol	
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Specification Plena Protocol

Subject: FPA5000 ← → Plena Voice Alarm System

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1 Synopsis

Plena is a Voice Alarm and Public Address system manufactured by BOSCH. It can be connected to an external device like e.g. a Bosch Fire panel like the FPA5000 or the FPA1200, a custom security panel or remote control room via a (supervised) serial interface.

With an external serial interface convertor also supervisory control and data acquisition over a large distance is possible. (e.g. with use of Bosch Audio over IP Interface)

This document describes the protocol of the Plena Voice Alarm System serial interface.

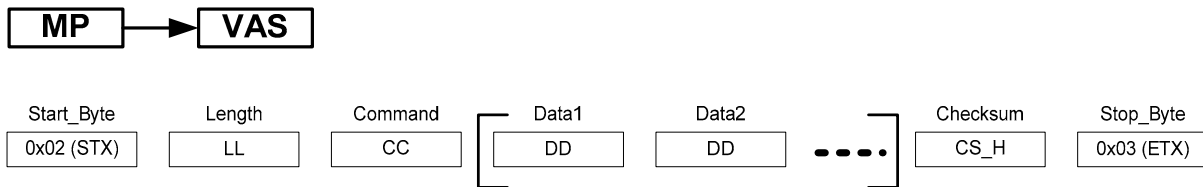
The external device in this document is described as MP. (Magic Panel)

2 Data Frame Format

The interface between the Magic Panel and Plena Voice Alarm System is a master slave configuration. The Magic Panel sends a command or a request to the Plena System and the Plena answers on it. (only if an answer to a command is defined).

The following section shows the assembly of the command and the answer frame. Each block represents one byte.

2.1 Commands from Magic Panel to Plena



Start_Byte: Start byte is always 0x02 (STX)

Length: Number of bytes following after the command byte till the Checksum Byte. If no data is used after the command byte, length is 0x00.

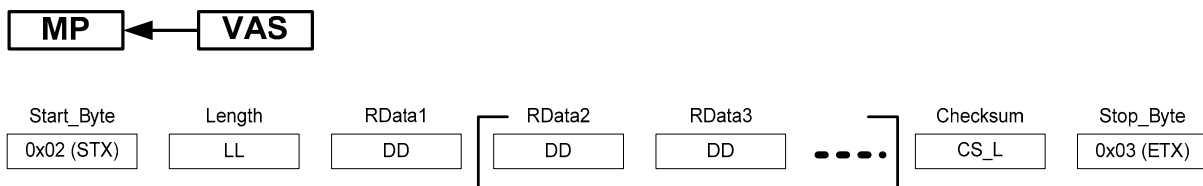
Command: Command Byte. [0x00; 0xff]

Data: Optional Data Bytes

Checksum: 8 Bit CRC build of command and data bytes.

Stop_Byte: Stop byte is always 0x03 (ETX)

2.2 Answers from Plena to Magic Panel



Start_Byte: Start byte is always 0x02 (STX)

Length: Number of bytes following after the RData1 byte till the Checksum Byte. If no data is used after the RData1 byte, length is 0x00.

RData: Response byte(s) at least one.

Checksum: 8 Bit CRC build of data bytes. (polynomial: $x^8 + x^5 + x^4 + 1$)

Stop_Byte: Stop byte is always 0x03 (ETX)

The calculation of the checksum can be found at 4.5, CRC Check.

3 Behavior of the interface

3.1 Power on

Because of the different boot up times of both systems, Magic Panel and Plena should boot up independently.

When the Magic Panel has finished its boot up, it starts with polling the Plena System.

The Plena announces, if it has finished its boot up phase.

When the Magic Panel gets the answer that Plena is ready, it may set the supervision time and supervision functionality.

When supervision is activated at the Plena System, the Plena expects at least one valid command request in the specified supervision window. If the request command is missing and supervision is activated the Plena System goes into fault state. As default the supervision is not activated at the Plena system and will be activated by the Magic Panel after the boot up of both systems.

“Any valid and accepted command sent from the Magic panel to the Plena System shall reset the supervision watchdog in the Plena system.”

3.2 Transmission and receiving errors

If the Plena System receives a command frame with an invalid length byte or receives a frame with a wrong checksum it rejects the frame and goes into trouble state. There will be no answer on rejected commands.

If the Plena System receives an unknown command or bad parameters for a known command it rejects this command and submits an error message to Magic Panel.

If Magic Panel receives an answer frame with an invalid length byte or receives a answer frame with a wrong checksum it rejects the answer and announce a trouble message on the display.

3.2.1 Communication timing

The RS-232 interface communication port settings:
9600 baud, 8 databits, no parity, 1 stopbits

4

Communication details

Command	Datagrams	Response
	Request Commands	
0x01	Standard Request	X
0x02		
0x03	Request Router States	X
0x04	Request Zone A States	X
0x05	Request Zone B States	X
0x06	Request LED States	X
0x07	Request SW Triggers States	X
0x08	Request HW EMG Trigger States	X
0x09	Request HW Business Trigger States	X
0x0A		
0x0B		
0x0C		
0x0D		
0x0E		
0x0F		
	Set Commands	
0x10	Set Supervision Time	X
0x11	Set Supervision On / Off	X
0x12	Set Soft Trigger On / Off	X
0x13	Set HW EMG Trigger On / Off	X
0x14	Set HW Business Trigger On/Off	X
0x15	Set Event Log	X
0x16	Set Control Key	X
0x17		
0x18		
0x19		
0x1A		
0x1B		
0x1C		
0x1D		
0x1E		
0x1F		
	Reset Commands	
0x20	Reset Emergency State	X
0x21	Reset Trouble State	X
0x22		
0x23		
0x24		

5 Request Commands

5.1.1 Standard Request (Standard Polling)



Command							
0x01							



RData 1	Rdata 2						
0x01	RD2						

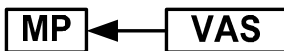
If the answer is missing at all, the Magic Panel will announce a trouble message for a disturbed connection to the Plena System.

- RD2 Bit 0: Trouble State (1 if Plena is in trouble state)
- RD2 Bit 1: Emergency State (1 if emergency is active)
- RD2 Bit 2: Plena Failure (1 if there is an internal Plena fault)
- RD2 Bit 3: Plena internal supervision (1 if disabled)
- RD2 Bit 4: reserved
- RD2 Bit 5: reserved
- RD2 Bit 6: reserved
- RD2 Bit 7: Ready State (1 if Plena has finished boot up phase)

5.1.2 Request Router States



Command							
0x03							



RData 1	RData 2	RData 3	RData 4	RData 5	RData 6	RData 7	RData 8	RData 9	RData 10	RData 11
0x03	RD2	RD3	RD4	RD5	RD6	RD7	RD8	RD9	RD10	RD11

Returns FailDataByte of each Router x ($x = i - 2$).

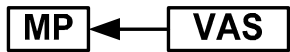
($i = 2 \dots 11$)

- RD_i Bit 0: Battery Failure
- RD_i Bit 1: Mains Failure
- RD_i Bit 2: Booster1 Failure
- RD_i Bit 3: Booster2 Failure
- RD_i Bit 4: Short Ground Failure
- RD_i Bit 5: Input Failure (SIO or EMG Input)
- RD_i Bit 6: Network Failure
- RD_i Bit 7: MCU Failure

5.1.3 Request ZoneA States



Command							
0x04							



RData 1	RData 2	RData 3	RData 4	RData 5	RData 6	RData 7	RData 8	RData 9	RData 10	RData 11
0x04	RD2	RD3	RD4	RD5	RD6	RD7	RD8	RD9	RD10	RD11

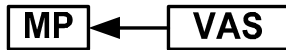
Returns FailData of ZoneA at Router x (x = i - 2) (i = 2 ..11)

- RD_i Bit 0: ZoneA 1 at Router x (1 if the Impedance Check Fails)
- RD_i Bit 1: ZoneA 2 at Router x
- RD_i Bit 2: ZoneA 3 at Router x
- RD_i Bit 3: ZoneA 4 at Router x
- RD_i Bit 4: ZoneA 5 at Router x
- RD_i Bit 5: ZoneA 6 at Router x
- RD_i Bit 6: reserved
- RD_i Bit 7: reserved

5.1.4 Request ZoneB States



Command							
0x05							



RData 1	RData 2	Rdata 3	RData 4	RData 5	RData 6	RData 7	RData 8	RData 9	RData 10	RData 11
0x05	RD2	RD3	RD4	RD5	RD6	RD7	RD8	RD9	RD10	RD11

Returns FailData of ZoneB at Router x ($x = i - 2$)

($i = 2 \dots 11$)

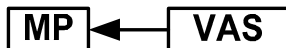
RD_i Bit 0: ZoneB 1 at Router x (1 if the Impedance Check Fails)
 RD_i Bit 1: ZoneB 2 at Router x
 RD_i Bit 2: ZoneB 3 at Router x
 RD_i Bit 3: ZoneB 4 at Router x
 RD_i Bit 4: ZoneB 5 at Router x
 RD_i Bit 5: ZoneB 6 at Router x
 RD_i Bit 6: reserved
 RD_i Bit 7: reserved

5.1.5 Request LED States



Command	Data 1						
0x06	D1						

Returns LED State (1 if activated) of MainController (if D1 = 0) or Router x (D1=1 .. 9)



RData 1	RData 2	RData 3	RData 4	RData 5	RData 6	RData 7	Rdata 8
0x06	RD2	RD3	RD4	RD5	RD6	RD7	RD8

RD2 Bit 0: Processor reset
 RD2 Bit 1: Network
 RD2 Bit 2: Call/EMG
 RD2 Bit 3: Music/Spare
 RD2 Bit 4: Ground Short
 RD2 Bit 5: Input
 RD2 Bit 6: Mains
 RD2 Bit 7: Battery

RD3 Bit 0: Message
 RD3 Bit 1: EMG mic_Fault
 RD3 Bit 2: RCP
 RD3 Bit 3: Router
 RD3 Bit 4: reserved

RD3 Bit 5: reserved
 RD3 Bit 6: CD/Tuner
 RD3 Bit 7: Aux

 RD4 Bit 0: Alert Message
 RD4 Bit 1: Alarm Message
 RD4 Bit 2: EMG mic
 RD4 Bit 3: EMG
 RD4 Bit 4: reserved
 RD4 Bit 5: Supervision disabled LED (0=off / 1 = on)
 RD4 Bit 6: reserved
 RD4 Bit 7: reserved

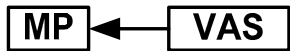
 RD5: ZoneA LEDs (Bit 0-5, Bit 6-7 reserved)
 RD6: ZoneB LEDs (Bit 0-5, Bit 6-7 reserved)
 RD7: BGM LEDs (Bit 0-5, Bit 6-7 reserved)
 RD8: Call LEDs (Bit 0-5, Bit 6-7 reserved)

5.1.6 Request Soft Triggers States

The triggers suppressed by lower priority than the active one(s) are not submitted with this request.



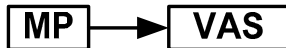
Command							
0x07							



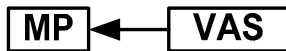
RData 1	RData 2	RData 3	...	...	...	...	RData 16
0x07	RD2	RD3	...	...	...	...	RD16

RD2: Soft trigger 1~8 matches bit 0 - 7
 RD3: Soft trigger 9~16 matches bit 0 - 7
 ...
 ...
 ...
 RD16 Soft trigger 113~120 matches bit 0-7

5.1.7 Request HW EMG Trigger



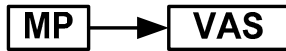
Command							
0x08							



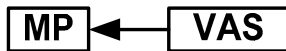
RData 1	RData 2	RData 3	RData 4	RData 5	RData 6	RData 7	RData 8	RData 9	RData 10	RData 11
0x08	RD1	RD2	RD3	RD4	RD5	RD6	RD7	RD8	RD9	RD10

- RD1: the EMG trigger action of Main Controller (trigger 1 to 6 match Bit 0 5)
 RD2: the EMG trigger action of Router 1 (trigger 1 to 6 match Bit 0 5)
 RD3: the EMG trigger action of Router 2 (trigger 1 to 6 match Bit 0 5)
 RD4: the EMG trigger action of Router 3 (trigger 1 to 6 match Bit 0 5)
 RD5: the EMG trigger action of Router 4 (trigger 1 to 6 match Bit 0 5)
 RD6: the EMG trigger action of Router 5 (trigger 1 to 6 match Bit 0 5)
 RD7: the EMG trigger action of Router 6 (trigger 1 to 6 match Bit 0 5)
 RD8: the EMG trigger action of Router 7 (trigger 1 to 6 match Bit 0 5)
 RD9: the EMG trigger action of Router 8 (trigger 1 to 6 match Bit 0 5)
 RD10: the EMG trigger action of Router 9 (trigger 1 to 6 match Bit 0 5)

5.1.8 Request HW Business Trigger



Command							
0x09							

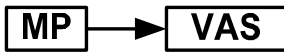


RData 1	RData 2	RData 3	RData 4	RData 5	RData 6	RData 7	RData 8	RData 9	RData 10	RData 11
0x09	RD1	RD2	RD3	RD4	RD5	RD6	RD7	RD8	RD9	RD10

- RD1: the business trigger action of Main Controller (trigger 1 to 6 match Bit 0 5)
 RD2: the business trigger action of Router 1 (trigger 1 to 6 match Bit 0 5)
 RD3: the business trigger action of Router 2 (trigger 1 to 6 match Bit 0 5)
 RD4: the business trigger action of Router 3 (trigger 1 to 6 match Bit 0 5)
 RD5: the business trigger action of Router 4 (trigger 1 to 6 match Bit 0 5)
 RD6: the business trigger action of Router 5 (trigger 1 to 6 match Bit 0 5)
 RD7: the business trigger action of Router 6 (trigger 1 to 6 match Bit 0 5)
 RD8: the business trigger action of Router 7 (trigger 1 to 6 match Bit 0 5)
 RD9: the business trigger action of Router 8 (trigger 1 to 6 match Bit 0 5)
 RD10: the business trigger action of Router 9 (trigger 1 to 6 match Bit 0 5)

6 Set Commands

6.1.1 Set Supervision Time



Command	Data 1						
0x10	D1						

D1: Supervision time in seconds. Within this time the Magic Panel has to send at least one request command to the Plena System. If the supervision is set, the Plena System goes in trouble state if no valid command request was send within the supervision window.



RData 1	RData 2						
0x10	RD2						

RD2: The Plena answers by sending back the supervision time.

6.1.2 Set Supervision On / Off



Command	Data 1						
0x11	D1						

D1: Set supervision functionality on or off (1 for on / 0 for off). When supervision is activated at the Plena System the Plena expects at least one valid command request in the specified supervision window. If the request command is missing and supervision is activated the Plena System goes into fault state.
 As default the supervision is not activated at the Plena System and will be activated by the Magic Panel after the boot up of both systems.
 "Any valid and accepted command sent from the Magic panel to the Plena System shall reset the supervision watchdog in the Plena system."



RData 1	RData 2						
0x11	RD 2						

RD2: The Plena answers by sending back the supervision state (1 if supervision is activated / 0 if supervision is deactivated).

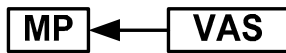
6.1.3 Set Soft Trigger On / Off



Command	Data 1	Data 2					
0x12	D1	D2					

D1: Number of the trigger input. (1 ..120)

D2: Set state (1 for activated / 0 for deactivated)



RData 1	RData 2	RData 3					
0x12	RD2	RD3					

RD2: Number of the trigger input.

RD3: Actual state of the trigger input (1 for activated / 0 for deactivated)

In case of future application the possibility to set Hardware related triggers must be available. Looking forward where industrial bus systems become more common, it should be possible to send contact states via the an external bus instead of using the contacts on the backside of the system. The choice using the physical contacts or either the bus contacts is a choice of the installer.

6.1.4 Set HW EMG Trigger On / Off



Command	Data 1	Data 2					
0x13	D1	D2					

D1: Number of the trigger input. (1 ..60)

D2: Set state (1 for activated / 0 for deactivated)



RData 1	RData 2	RData 3					
0x13	RD2	RD3					

RD2: Number of the trigger input. (1 ..60)

RD3: Actual state of the trigger input (1 for activated / 0 for deactivated)

6.1.5 Set HW Business Trigger On / Off



Command	Data 1	Data 2					
0x14	D1	D2					

D1: Number of the trigger input. (1... 60)

D2: Set state (1 for activated / 0 for deactivated)

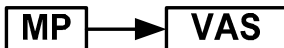


RData 1	RData 2	RData 3					
0x14	RD2	RD3					

RD2: Number of the trigger input. (1... 60)

RD3: Actual state of the trigger input (1 for activated / 0 for deactivated)

6.1.6 Set Event Log



Command	Data 1						
0x15	D1						

D1 = 0; Event Log Off

D1 = 1; Event Log On



Command	Data 1						
0x15	D1						

D1 = Sending back the Event log Switch D1

Set Control Key



Command	Data 1						
0x16	D1						

D1 = 1: EMG Button
 D1 = 2: EMG ACK
 D1 = 3: EMG Reset
 D1 = 4: FAULT ACK
 D1 = 5: FAULT Reset
 D1 = 6: ALARM Message
 D1 = 7: ALERT Message
 D1 = 8: ALL Call
 D1 = 9: BGM Selection (CD/Tuner or Aux)

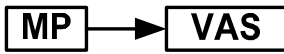


Command	Data 1						
0x16	D1						

D1 = Sending back the control Key number D1

7 Reset Commands

7.1.1 Reset Emergency State



Command							
0x20							



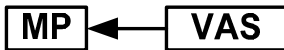
RData 1	RData 2						
0x20	RD2						

RD2: Actual emergency state of the Plena System (1 for emergency state / 0 for normal state).

7.1.2 Reset Trouble State



Command							
0x21							



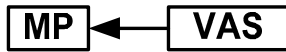
RData 1	RData 2						
0x21	RD2						

RD2: Actual trouble state of the Plena System (1 for trouble state / 0 for normal state).

8 Error Messages



Magic Panel submits a command unknown for the Plena System.



RData 1	RData 2	RData 3					
0xff	RD2	RD3					

RD1: negative acknowledgement
RD2: unknown command if RD3 = 0x00
RD3: bad parameter for command in RD2

9 CRC Check

On client side it is used a reflected lookup table for the 8 bit CRC check. The polynomial used to create this table is $x^8 + x^5 + x^4 + 1$. (0x19). This is also used in the Dallas One Wire (DOW) protocol and it's used in the Scaleable Node Address Protocol (SNAP). The start value for the CRC-checksum is 0xff.

The CRC can be calculated as follows:

1. Set the CRC to 0xff.
2. Find the logical exclusive or between the lsb of the CRC and the lsb of the data.
3. If this value is 0:
 - a. Right shift CRC.
4. If the value is 1:
 - a. Find the new CRC value by taking the logical exclusive or of the CRC and the CRC polynomial 0x19.
 - b. Right shift CRC.
 - c. Set the msb of the CRC to 1.
5. Right shift the data
6. Repeat the sequence 2-5 8 times for a whole byte.
7. Take the next byte
8. Repeat the sequence 2-7 until all bytes are done.

10 Reference

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