

Fencing Piste Apparatus Protocol

RS422-FPA

Compilation of propositions made by the Fencing Piste Apparatus Community

Protocol Version 3.04a

Version 1.0	1995
Version 1.1	2003
Version 2.0	1/1/2010
Version 2.2	22/10/2014 (New information Highlighted) Status Msg 2, Status Msg 4
Version 3.01	18/07/2015 (New information Highlighted) (Precision Time Msg 2), (Status, Msg 4), Running time in 1/10 th in the last 10 secondes of a fight
Version 3.01a	23/09/2015 Small Correction of in the information table for Msg 3
Version 3.02	20/07/2017 Length of Period field variable to accommodate Poule Match Numbers (Msg 3)
Version 3.03	11/02/2019 Add Unwillingness to Fight (U2F) messages #8
Version 3.03a	14/02/2019 Add 2 nd P-Black Card Definition for Team (Msg #8)
Version 3.04	07/05/2019 Add Message for Bout Control (Msg #9)\$
Version 3.04a	21/05/2019 Fix typo in Section 3.9 and 3.11

1. Index of Contents

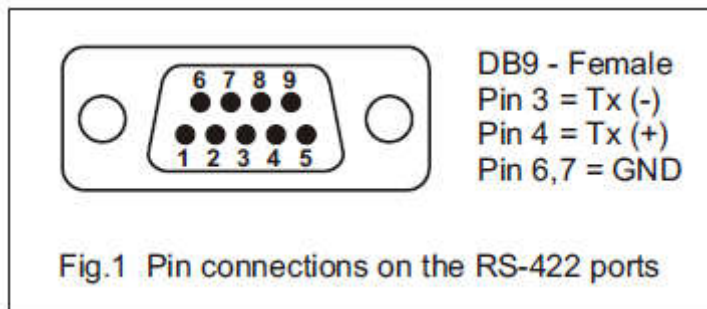
1.	Index of Contents	- 1 -
2.	Physical Layer	- 2 -
2.1	Transmission Standard	- 2 -
2.2	Electrical Standard	- 2 -
2.3	Electrical Characteristics	- 2 -
2.4	Electrical Isolation:	- 2 -
3.	Message Protocol	- 3 -
3.1	Message 1: <i>Red, Green & Whites Lights</i>	- 3 -
3.2	Message 2: <i>Match Time Info & Status</i>	- 3 -
3.3	Message 3: <i>Competitors Data</i>	- 4 -
3.4	Message 4: <i>Status Info from Fencing Piste Apparatus</i>	- 5 -
3.5	Message 5: (Optional) <i>Left Competitor Information</i>	- 5 -
3.6	Message 6: (Optional) <i>Right Competitor Information</i>	- 6 -
3.7	Message 7: (Optional) <i>Competition Information</i>	- 6 -
3.8	Message 8: <i>Unwillingness to Fight (U2F)</i>	- 7 -
3.9	Message 9: <i>Match Event from Remote Control Action</i>	- 8 -
	Procedure:	- 9 -
3.10	Error Detection implemented at the reception side.....	- 9 -
3.11	Messages Availability	- 9 -
3.12	Messages Transmission.....	- 9 -

2. Physical Layer

2.1 Transmission Standard

Norm: RS422
Baud Rate: 38400 bps
Data Bits: 8
Parity: None
Stop bit: 1

2.2 Electrical Standard



Pin	Signal
3	RS422 Tx-
4	RS422 Tx+
6	GND
7	GND

2.3 Electrical Characteristics

The bus driver IC must conform to the RS422 standard. An RS485 driver can therefore also be used. The driver circuit must have fault protection to ensure that the system cannot be damaged by a wiring fault. For example, the 12 volt line of one device could be connected to an RS422 transmit line on the other device

2.4 Electrical Isolation:

In the interest of safety, it is recommended that the scoring apparatus has galvanic isolation on its RS422 port. Otherwise a galvanic isolation is compulsory on all RS422 receiving device. In any case, galvanic isolation is strongly recommended on every receiving device.

3. Message Protocol

3.1 Message 1: Red, Green & Whites Lights

[SOH] [DC4] R<x>G<x>W<x>w<x> [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC4]	1 byte	14 Hex	Start of Commands ID
R<x>	2 bytes	52 Hex + Variable	Red Light : x = 0 => Light OFF x = 1 => Light ON
G<x>	2 bytes	47 Hex + Variable	Green Light : x = 0 => Light OFF x = 1 => Light ON
W<x>	2 bytes	57 Hex + Variable	White Light Right : x = 0 => Light OFF x = 1 => Light ON
w<x>	2 bytes	77 Hex + Variable	White Light Left : x = 0 => Light OFF x = 1 => Light ON
[EOT]	1 byte	04 Hex	End of transmission
Total Length	11 bytes		

Note: Message with lights is with the highest priority. First Message to be output in the sequence

3.2 Message 2: Match Time Info & Status

[SOH] [DC3] Z [STX] <MM:SS.DC> [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
Z	1 byte	Variable	R for Running Time N for Net Time (Time Stopped) J for Injury Time B Break Time
[STX]	1 byte	02 Hex	Start of information
MM:SS.DC	8 bytes	Variable	Time Info: Exemple: -3:00 (Running Time: 1 seconde duration) -2:59 (Running Time: 1 seconde duration) -2:58 -2.55.99 (Net time) -0:12 -0:11 -0:10 (Running Time: 1/10 th duration) -0:09.9 (Running Time: 1/10 th duration) -0:09.8 -0:09.7 -0:07.21 -0:07.2 -0:07.1 -0:00.0 (End of Time)
[EOT]	1 byte	04 Hex	End of transmission
Total Length	13 bytes		

Note: The Status of the time is given by the Z label character. The status does not affect the time

3.3 Message 3: Competitors Data

[SOH] [DC3] D [STX] XX:YY [STX] ABb [STX] CDd [STX] P [STX] R [STX] vW [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
D	1 byte	44 Hex	Id. of Data Message
[STX]	1 byte	02 Hex	Start of information
XX	2 bytes	Variable	Score Info for Right Competitor -0, -1, -2 ... 45
:	1 byte	3A Hex	Separator
YY	2 bytes	Variable	Score Info for Left Competitor -0, -1, -2 ... 45
[STX]	1 byte	02 Hex	Start of information
A	2 byte	Variable	Yellow Card for Right Competitor -0, -1 etc....
B	2 byte	Variable	Red Card for Right Competitor -0, -1, -2, etc
b	1 byte	Variable	Black Card for Right Competitor 0, 1
[STX]	1 byte	02 Hex	Start of information
C	2 byte	Variable	Yellow Card for Left Competitor
D	2 byte	Variable	Red Card for Left Competitor
d	1 byte	Variable	Black Card for Left Competitor 0, 1
[STX]	1 byte	02 Hex	Start of information
P	1 byte	Variable	Priority: 0 = No Priority, 1 = Priority Right, 2 = Priority Left
[STX]	1 byte	02 Hex	Start of information
R	Variable	Variable	Period or Round: 1,3 or 1,9, or X for Extra Period. In Pouples, this field reflects the match number.
[STX]	1 byte	02 Hex	Start of information
vW	2 bytes	Variable	V: Number of Video request remaining for Right Competitor (0,1,2,3) W: Number of Video request remaining for Left Competitor (0,1,2,3)
[EOT]	1 byte	04 Hex	End of transmission
Total Length	29 bytes		

Note: Information which is not available should be replaced by the default value.

(Ex: extra Period. If not available on the Remote or on the Device, the current period/round should be sent

(Ex. Number of Video Request remaining. If Info Not Available, a space (0x20) value should be sent)

3.4 Message 4: Status Info from Fencing Piste Apparatus

[SOH] [DC3] I [STX] M [STX] W [STX] S [STX] N [STX] VW [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
I	1 byte	49 Hex	Id. of Info Message
[STX]	1 byte	02 Hex	Start of information
M	1 bytes	Variable	Match Status, 0: Undefined status 1: Start Match 2: End Match 3: Standby Other Values to be added later
[STX]	1 byte	02 Hex	Start of information
W	1 bytes	Variable	Weapon Information: 0: undefined 1: Epée, 2: Sabre, 3: Foil, Other Values to be added later (Slave Mode for example)
[STX]	1 byte	02 Hex	Start of information
S	1 byte	Variable	0: Not Used 1: Service Call Required on this piste, Other Values to be added later (Type of Incident for Example)
[STX]	1 byte	02 Hex	Start of information
N	1 byte	Variable	0: Undefined 1: Doctor required on this piste 2: Piste/Apparatus Technician required on the piste 3: Video Technician required on the piste Other Values to be added later
[EOT]	1 byte	04 Hex	End of transmission
Total Length	12 bytes		

Note: Information which is not available should be replaced by the default value.

(Ex: Doctor Information. If not available on the remote or on the Device, a 0 Value should be sent)

3.5 Message 5: (Optional) Left Competitor Information

[SOH] [DC3] NL [STX] Bib [STX] Name_Left [STX] LNat [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
NL	2 byte	4E Hex, 4C Hex	Id. of Info Message Name Left
[STX]	1 byte	02 Hex	Start of information
Bib	Variable	Variable Max Length 8	Unique Bib Number assigned to this competitor assigned by the general Management system
[STX]	1 byte	02 Hex	Start of information
Name_Left	Variable	Variable Max Length 20	Name for the Left Competitor. The Name information should be formatted according to the formatting rules in effects for SCB display In case, there are no formatting available, the name could be composed of Surname and First name with a comma (2C Hex) separating the Surname and the First name.
[STX]	1 byte	02 Hex	Start of information
LNat	3 byte	Variable	NOC codes (IOC list) for the Left Nation
[EOT]	1 byte	04 Hex	End of transmission
Total Length	39 bytes		

Note:

- The Name information message could only be sent at the reception of the names from the General Management System
- In Team Event, the names will be sent at every end of each round
- If a data field (Bib, Name, Nat) is not available, the pertinent field will be empty (there will be two consecutives STX)

3.6 Message 6: (Optional) Right Competitor Information

[SOH] [DC3]NR [STX]Bib [STX]Name_Right [STX]RNat [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
NR	2 byte	4E Hex, 52 Hex	Id. of Info Message Name Right
[STX]	1 byte	02 Hex	Start of information
Bib	Variable	Variable Max Length 8	Unique Bib Number assigned to this competitor assigned by the general Management system
[STX]	1 byte	02 Hex	Start of information
Name_Right	Variable	Variable Max Length 20	Name for the Right Competitor. The Name information should be formatted according to the formatting rules in effects for SCB display In case, there are no formatting available, the name could be composed of Surname and First name with a comma (2C Hex) separating the Surname and the First name
[STX]	1 byte	02 Hex	Start of information
RNat	3 byte	Variable	NOC codes (IOC list) for the Right Nation
[EOT]	1 byte	04 Hex	End of transmission
Total Length	39 bytes		

Note:

- The Name information message could only be sent at the reception of the names from the General Management System
- In Team Event, the names will be sent at every end of each round
- If a data field (Bib, Name, Nat) is not available, the pertinent field will be empty (there will be two consecutives STX)

3.7 Message 7: (Optional) Competition Information

[SOH] [DC3]MC [STX]Comp [STX]Phase [STX]Poule [STX]Match [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
MC	2 byte	4D Hex, 43 Hex	Id. of Main Computer info message
[STX]	1 byte	02 Hex	Start of information
Comp	Variable	Variable Max Length 8	Competition identifier Ex: efj-eq,
[STX]	1 byte	02 Hex	Start of information
Phase	Variable	Variable Max length 2	First round of poules is 1 when it exists; second round of poules is 2 when it exists; tableau is "last round of poules number" plus 1 Ex: 1
[STX]	1 byte	02 Hex	Start of information
Poule	Variable	Variable Max length 8	Number of the poule or identifier of the tableau Example 3, A32
[STX]	1 byte	02 Hex	Start of information
Match	Variable	Variable Max length 3	Number of the match inside the poule or the tableau Ex: 12
[EOT]	1 byte	04 Hex	End of transmission
Total Length	30 bytes		

Note:

- The information on this message corresponds to the data exchange with the Cyrano protocol between the General Management System and the Piste Apparatus.
- If a data field (Comp, Phase, Poule or Match) is not available, the pertinent field will be empty (there will be two consecutive STX).

3.8 Message 8: Unwillingness to Fight (U2F)

[SOH] [DC3] UF [STX] m:ss [STX] PCard_Right [STX] PCard_Left [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
UF	2 byte	55 Hex, 46 Hex	Id. of Unwillingness to Fight message
[STX]	1 byte	02 Hex	Start of information
M:SS	4 bytes	Variable	Unwillingness to Fight Timer: Counting up from 0:00. Format M:SS Ex: 0:00 0:15 0:50 1:00 Field Empty if not used
[STX]	1 byte	02 Hex	Start of information
PCard_Right	1 byte	Variable	Right Competitor P-Cards status 0 : No P-Cards 1 : P-Yellow Card 2: P-Red1 Card 3: P-Red2 Card 4: P-Black Card 5: P-Black Card #2 (Team's Substitute)
[STX]	1 byte	02 Hex	Start of information
PCard_Left	1 byte	Variable	Left Competitor P-Cards status 0 : No P-Cards 1 : P-Yellow Card 2: P-Red1 Card 3: P-Red2 Card 4: P-Black Card 5: P-Black Card #2 (Team's Substitute)
[EOT]	1 byte	04 Hex	End of transmission
Total Max Length	14 bytes		

3.9 Message 9: Match Event from Remote Control Action

[SOH] [DC3] FC [STX] Value [EOT]

Label	Length	Content	Explanation
[SOH]	1 byte	01 Hex	Start of transmission
[DC3]	1 byte	13 Hex	Start of identification
FC	2 byte	46 Hex, 43 Hex	Id of Match Control Message
[STX]	1 byte	02 Hex	Start of information
Value	Variable	Variable	Bout Control Info NEXT BEGIN VALIDATE PREVIOUS More to be defined if required
[EOT]	1 byte	04 Hex	End of transmission
Total Max Length	14 bytes		

Procedure:

3.10 Error Detection implemented at the reception side

Error type	Description
Missing Start/End Char	The message is invalid in case of missing Start or End Char Identifier in a specified timeline
Length Error	The length of the message is Incorrect
Unknown Identifier	The identifier of the message is not known
Data Error	The data section length is incorrect
Data Validation	The data does not match the expected value range

3.11 Messages Availability

- **Messages 1 through 3 are sent repeatedly.**
This ensures the data to be constantly refreshed on the receiver side in case of hot connection.
- **Message 4 is sent only when change of status information occurs.** (This msg contains only status info)

Option 1:

- **Message 5 and 6 are sent only when change of Competitor information occurs from the Management System.**
- **Message 7 is sent only when change of Competition information occurs from the Management System.**
- **Message 8 is sent only when change occurs.** (Change of UF Timer, change of p-Cards)
- **Message 9 is sent only when change occurs.** (Command of Bout Info Control)

Option 2:

- **Message 5 and 6, when available, are sent at a frequency rate of 1 every 10 times of the frequency rate of message 1 through 3 (Once every 12s), or as soon as a change occurs.**
- **Message 7, when available, is sent at a frequency rate of 1 every 10 times of the rate of the message 1 through 3 (Once every 12s), or as soon as a change occurs.**
- **Message 8, when available, is sent at a frequency rate of 1 every 10 times of the rate of the message 1 through 3 (Once every 12s), or as soon as a change occurs.**

3.12 Messages Transmission

Highest Priority:

- A datum has changed. All messages impacted by the change of that datum are sent as soon as possible with the following priority: message 1 (Highest priority), message 2, message 3, message 4, message 5, message 6, message 7, message 8 (Lowest priority).

Normal Priority:

- After a 1.2s period with no change of data in the messages 1/2/3, those messages will be resend.
(Time laps to avoid resending data while a running time is outputted)

Lowest Priority:

- *In case of Scheduling Option 2:*
After a 12s period with no change of data in the messages 5/6/7/8, those messages will be resend if available.