SWISS TIMING

Transmission Protocol

SATURN/VEGA

MULTI SPORT SCOREBOARD

0100.073.02

Version 2.0

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TABLE OF CONTENTS

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1 TRANSMISSION CHARACTERISTICS

1.1 Norms

Transmission **:** Serial asynchronous unidirectional
Type **:** ASCII, 1 start bit, 8 data bits, no parity, 1 stop bit
Speed **:** 9600 Bauds
Electrical standard **:** RS422

2 TRANSMISSION PROTOCOL

2.1 Kind of messages

The protocol is composed by a basic message followed by some different options messages:

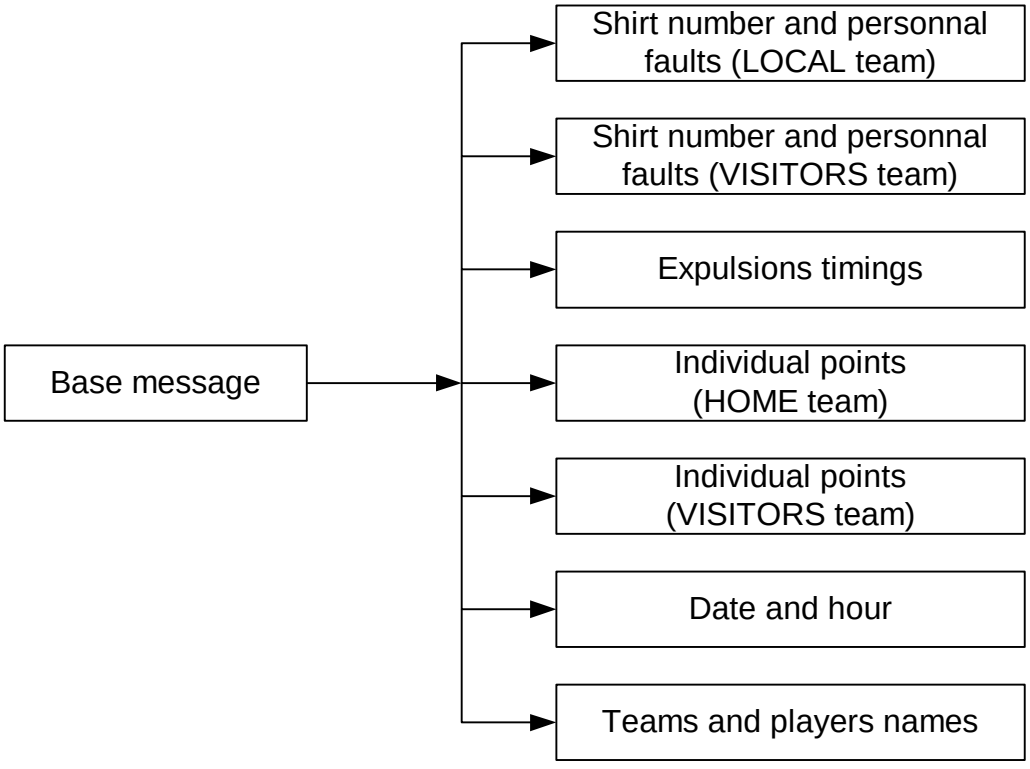


Fig 2.1 – Protocol structure

The basic message and the option message are sent each 100 ms like the following cycle:

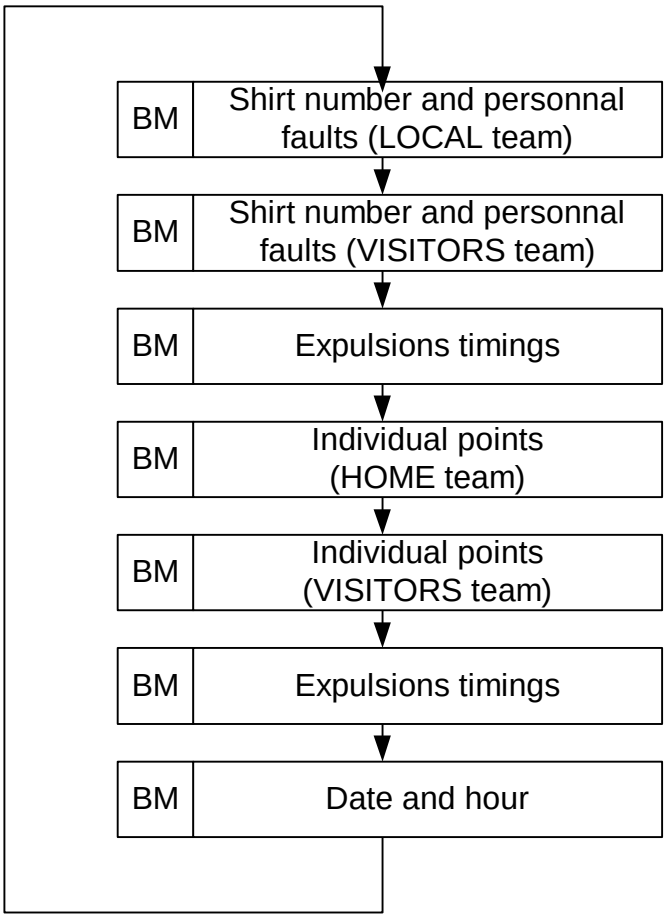


Fig 2.2 – Sending messages sequence

Like this, the scoreboard is refreshed many times at second.

2.2 Names message

The "Team and player names" message is sent when entering in a game. It can also be manually sent from the "*Name*" function of the "*Console Set*" menu.

3 MESSAGES DEFINITION

3.1 Messages structure

Each message is defined by:

- a character for beginning (<STX>),
- one or two character(s) for the identification of the message type and the information ("D", "F1", …),
- several characters for the information,
- a character for end (<ETX>),
- a character for the checksum (<CRC>).

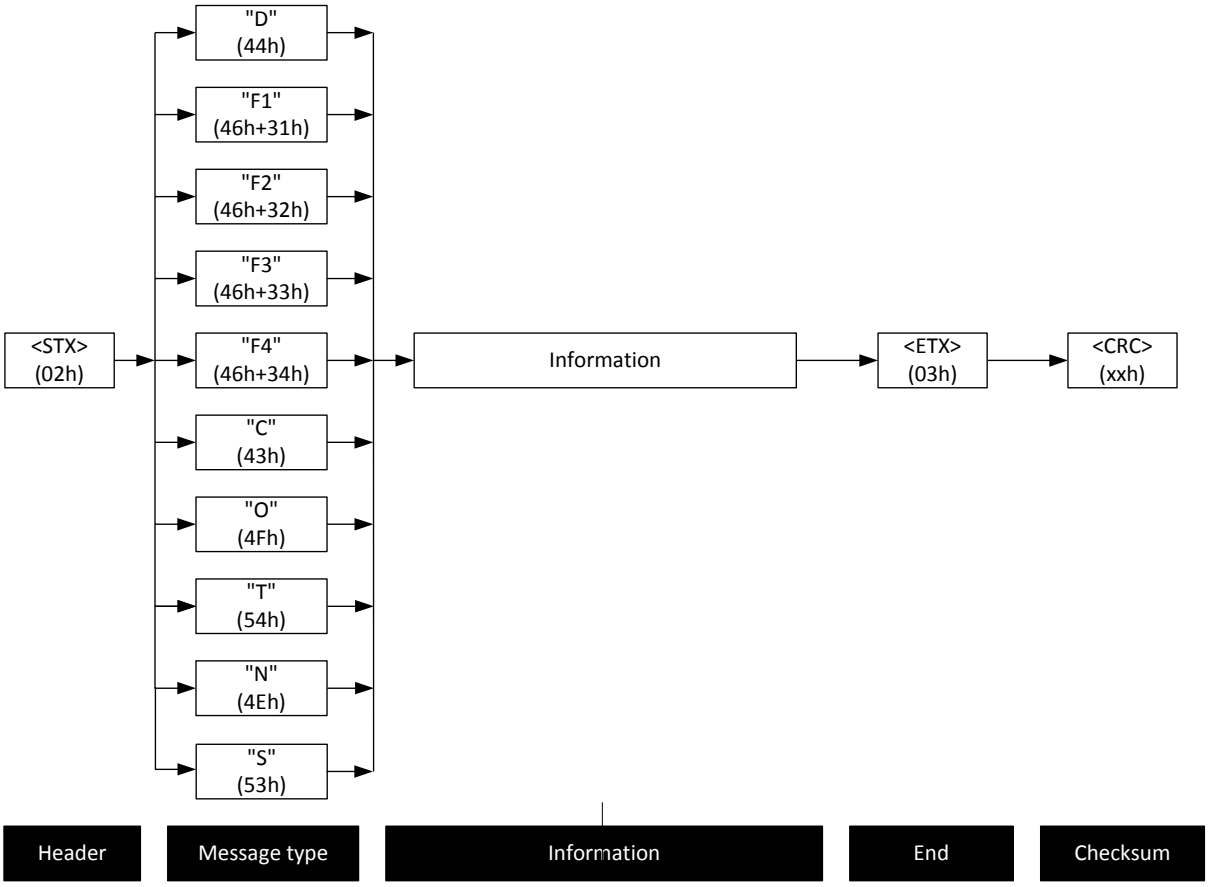
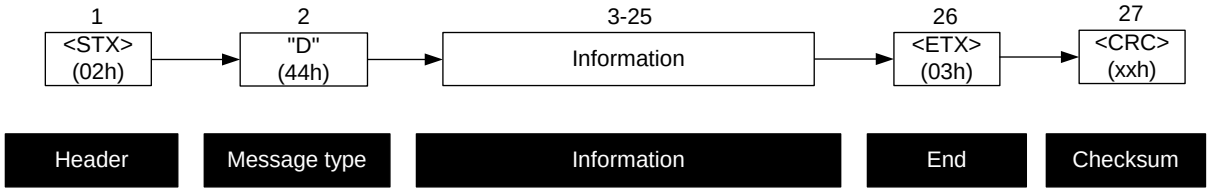


Fig 2.3 – Different messages structure

<CRC> is the XOR of all the characters from <STX> to <ETX> (included).

3.2 Base message

Length: 27 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
3	MM:SS	5	Clock minutes & seconds (or SS.D¬: clock seconds and 1/10s during the last minute of a countdown)
8	PH	3	HOME Team score
11	PV	3	VISITORS Team score
14	FH	1	HOME Team faults
15	FV	1	VISITORS Team faults
16	TOH	1	HOME Team Time out counter
17	TOV	1	VISITORS Team Time out counter
18	PER	1	Period (1, 2, 3, 4, 5, 6, … or E for extra time if the “Possession” setting is enabled). Space if day time is displayed. See also PNU from “Date and hour” message.
19	SER	1	Services or possession (0 all off, 1 HOME on, 2 VISITORS on, 3 all on)
20	S/S	1	Start/Stop (0 stop, 1 start, 2 stop with shot clock point ON, 3 start with shot clock point ON)
21	SIR	1	Horn (0 all off, 1 main on, 2 shot clock on, 3 all on)
22	TOU	2	Time out activated
24	PPD	2	Ball possession time activated

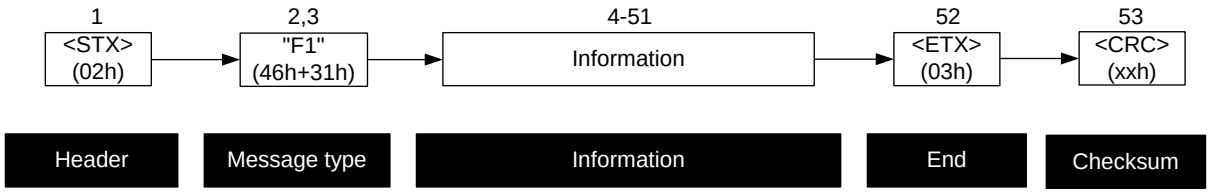
Example:

<STX>D19:54<SP><SP>1<SP><SP>022011210<SP><SP><SP><SP><ETX><CRC>

This example shows that the HOME team leads by 1 to 0. Each team has committed a fault and the VISITORS team has had a time. The both teams confront themselves in the first period and the service belong the HOST team Time is running and horn, time out and ball possession time are inactive.

3.3 Shirt number and personal faults for HOME players message

Length: 53 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
4	DM1	1	Ten of shirt for player no. 1 (if the 7th bit is set to 1, it shows that the player is on the playground)
5	UM1	1	Unit of shirt for player no. 1
6	P1	1	Faults number for player no. 1
7	DM2	1	Ten of shirt for player no. 2 (if the 7th bit is set to 1, it shows that the player is on the playground)
8	UM2	1	Unit of shirt for player no. 2
9	P2	1	Faults number for player no. 2
10	DM3	1	Ten of shirt for player no. 3 (if the 7th bit is set to 1, it shows that the player is on the playground)
11	UM3	1	Unit of shirt for player no. 3
12	P3	1	Faults number for player no. 3
13	DM4	1	Ten of shirt for player no. 4 (if the 7th bit is set to 1, it shows that the player is on the playground)
14	UM4	1	Unit of shirt for player no. 4
15	P4	1	Faults number for player no. 4
…			
49	DM16	1	Ten of shirt for player no. 16 (if the 7th bit is set to 1, it shows that the player is on the playground)
50	UM16	1	Unit of shirt for player no. 16
51	P16	1	Faults number for player no. 16

Example:

<SP> = space

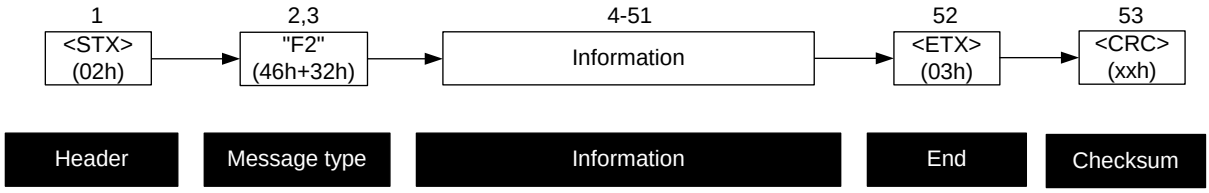
<STX>F1`4<SP>`51`6<SP>`71<SP>8<SP><SP>9110<SP>q1<SP>12<SP>13<SP>14<SP>15
<SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><ETX><CRC>

This example shows that players 4, 5, 6, 7 and 11 of the LOCAL team are on the playground. In this case, the ten is symbolized by a ` or q for player carrying a bigger shirt number than 9, which means that the 7th bit of ten is set to 1. Also note that the players 5 and 7 committed each a fault.

If player 4 isn't on playground:	<SP>4	(00100000 00110100)
If player 4 is on playground:	`4	(01100000 00110100)
If player 11 isn't on playground:	11	(00110001 00110001)
If player 11 is on playground:	q1	(01110001 00110001)

3.4 Shirt number and personal faults for VISITORS players message

Length: 53 bytes

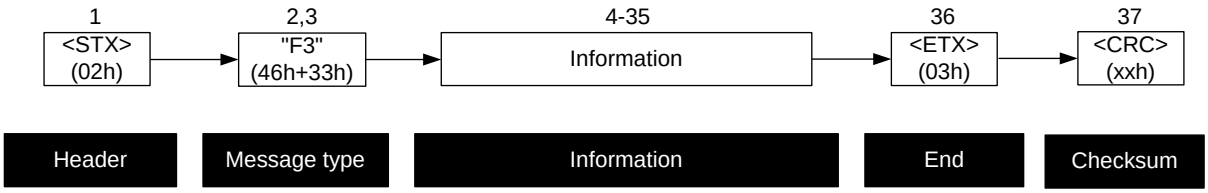


Information			
Position	**Code**	**Byte(s)**	**Description**
4	DM1	1	Ten of shirt for player no. 1 (if the 7th bit is set to 1, it shows that the player is on the playground)
5	UM1	1	Unit of shirt for player no. 1
6	P1	1	Faults number for player no. 1
7	DM2	1	Ten of shirt for player no. 2 (if the 7th bit is set to 1, it shows that the player is on the playground)
8	UM2	1	Unit of shirt for player no. 2
9	P2	1	Faults number for player no. 2
10	DM3	1	Ten of shirt for player no. 3 (if the 7th bit is set to 1, it shows that the player is on the playground)
11	UM3	1	Unit of shirt for player no. 3
12	P3	1	Faults number for player no. 3
13	DM4	1	Ten of shirt for player no. 4 (if the 7th bit is set to 1, it shows that the player is on the playground)
14	UM4	1	Unit of shirt for player no. 4
15	P4	1	Faults number for player no. 4
…			
49	DM16	1	Ten of shirt for player no. 16 (if the 7th bit is set to 1, it shows that the player is on the playground)
50	UM16	1	Unit of shirt for player no. 16
51	P16	1	Faults number for player no. 16

Example: See previous example

3.5 Points of each LOCAL player message

Length: 37 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
4	DP1	1	Ten of the points for the player no. 1
5	UP1	1	Unit of the points for the player no. 1
6	DP2	1	Ten of the points for the player no. 2
7	UP2	1	Unit of the points for the player no. 2
8	DP3	1	Ten of the points for the player no. 3
9	UP3	1	Unit of the points for the player no. 3
…			
34	DP16	1	Ten of the points for the player no. 16
35	UP16	1	Unit of the points for the player no. 16

Example:

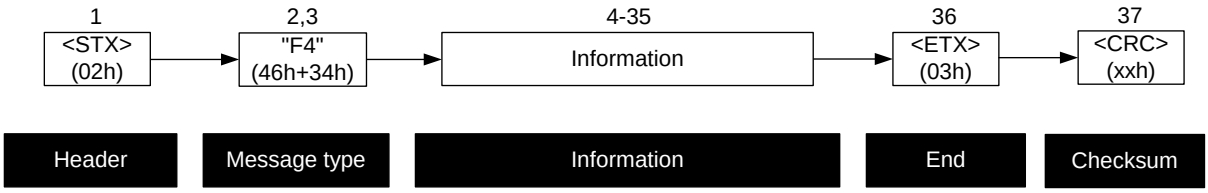
<STX>F3<SP><SP><SP>3<SP><SP><SP>2<SP><SP>20<SP><SP><SP><SP><SP><SP>

<SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><SP><ETX><CRC>

Here, the number of player's shirt does not appear. So for example, we are playing basketball, the player number 1 will wear the shirt number 4. In this example, the player number 2 (shirt 5) has 3 points, the player number 4 (shirt 7) has 2 points and the player number 6 (shirt 9) has 20 points.

3.6 Points of each VISITOR player message

Length: 37 bytes

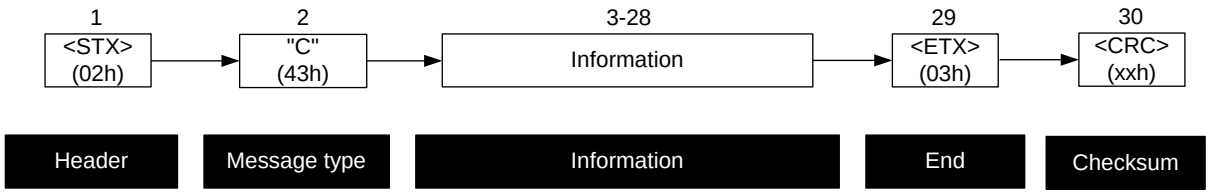


Information			
Position	**Code**	**Byte(s)**	**Description**
4	DP1	1	Ten of the points for the player no. 1
5	UP1	1	Unit of the points for the player no. 1
6	DP2	1	Ten of the points for the player no. 2
7	UP2	1	Unit of the points for the player no. 2
8	DP3	1	Ten of the points for the player no. 3
9	UP3	1	Unit of the points for the player no. 3
…			
34	DP16	1	Ten of the points for the player no. 16
35	UP16	1	Unit of the points for the player no. 16

Example: See previous example

3.7 Expulsions timings setting message (standard version)

Length: 30 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
3	DM1	1	Ten of the minutes for the timer no. 1
4	UM1	1	Unit of the minutes for the timer no. 1
5	DS1	1	Ten of the seconds for the timer no. 1
6	US1	1	Unit of the seconds for the timer no. 1
…			
23	DM6	1	Ten of the minutes for the timer no. 6
24	UM6	1	Unit of the minutes for the timer no. 6
25	DS6	1	Ten of the seconds for the timer no. 6
26	US6	1	Unit of the seconds for the timer no. 6
27	A	1	Penalty of 10 min for the LOCAL team (1 first, 2 second, 3 both)
28	B	1	Penalty of 10 min for the VISITORS team (1 first, 2 second, 3 both)

Example:

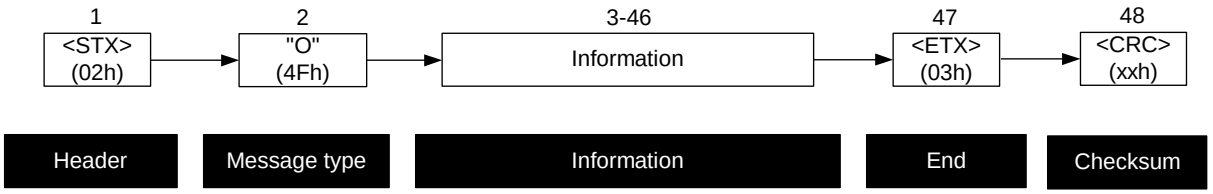
<STX>C<SP>037<SP>125<SP>400<SP>349<SP>352<SP>40010<ETX><CRC>

In this example we have 6 timings for penalties, 3 for each team. Respectively, the timings 1 to 3 are for the LOCAL team and the timings 4 to 6 for the VISITORS team. According the rules of Ice Hockey, when a team has already engaged two penalties, the third remains in waiting until the first is ended. The local team has a timing to 37 seconds, 1minute 25 seconds, 4 minutes and a 10 minutes (red dot) engaged. The VISITORS team has a timing to 3 minutes 49 seconds, 3 minutes 52 seconds and 4 minutes.

3.8 Expulsions timings setting message (Olympic version)

This message replaces the "C" message (see 3.7) for the Olympic version. A parameter in the "*Advance*" menu (from the "*Console Set*" main menu) allows to choose the configuration.

Length: 48 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
3	GD1	1	Ten of the player number for the timer no. 1
4	GU1	1	Unit of the player number for the timer no. 1
5	DM1	1	Ten of the minutes for the timer no. 1
6	UM1	1	Unit of the minutes for the timer no. 1
7	:	1	Separator character (3Ah)
8	DS1	1	Ten of the seconds for the timer no. 1
9	US1	1	Unit of the seconds for the timer no. 1
…			
38	GD6	1	Ten of the player number for the timer no. 6
39	GU6	1	Unit of the player number for the timer no. 6
40	DM6	1	Ten of the minutes for the timer no. 6
41	UM6	1	Unit of the minutes for the timer no. 6
42	:	1	Separator character (3Ah)
43	DS6	1	Ten of the seconds for the timer no. 6
44	US6	1	Unit of the seconds for the timer no. 6
45	A	1	Penalty of 10 min for the LOCAL team (1 first, 2 second, 3 both)
46	B	1	Penalty of 10 min for the VISITORS team (1 first, 2 second, 3 both)

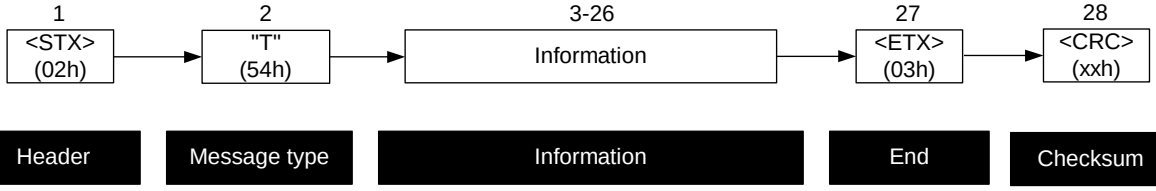
Example:

STX>O28<SP>0:37<SP>9<SP>1:2511<SP>4:00
12<SP>3:49<SP>5<SP>3:5288<SP>4:0010<ETX><CRC>

In this example we have 6 timings for penalties, 3 for each team. Respectively, the timings 1 to 3 are for the LOCAL team and the timings 4 to 6 for the VISITORS team. According the rules of Ice Hockey, when a team has already engaged two penalties, the third remains in waiting until the first is ended. The local team has a timing to 37 seconds (bib number 28), 1minute 25 seconds (bib number 9), 4 minutes (bib number 11) and a 10 minutes (red dot) engaged. The VISITORS team has a timing to 3 minutes 49 seconds (bib number 12), 3 minutes 52 seconds (bib number 5) and 4 minutes (bib number 88).

3.9 Date and hour

Length: 28 bytes



Information			
Position	**Code**	**Byte(s)**	**Description**
3	DD	1	Ten of the day date
4	DU	1	Unit of the day date
5	/	1	Separator character (2Fh)
6	MOD	1	Ten of the month date
7	MOU	1	Unit of the month date
8	/	1	Separator character (2Fh)
9	YD	1	Ten of the year date
10	YU	1	Unit of the year date
11	HD	1	Ten of the hour (time of day)
12	HU	1	Unit of the hour (time of day)
13	:	1	Separator character (3Ah)
14	MD	1	Ten of the minutes (time of day)
15	MU	1	Unit of the minutes (time of day)
16	.	1	Separator character (2Eh)
17	SD	1	Ten of the seconds (time of day)
18	SU	1	Unit of the seconds (time of day)
19	CFG	1	Console configuration, Byte from 0x80 to 0x9F with bit set if the corresponding setting is Enabled in the Advance console setting: bit 0 for “Tennis Orion”, bit 1 for “Olympics”, bit 2 for “Hockey outdoor”, bit 3 for “Possession” and bit 4 for “604”
20	SPORT	1	Sport selected: 0 for Basket and Netball, 1 for Volley, 2 for Football, 3 for Handball, 4 for Hockey, 5 for Water polo, 6 for Tennis and 7 for Custom
21	PNU	1	**Saturn controller (only valid from software version 5.12):** • Period number (always from 0 to 9, never “E” for extra period). • Set to 0 during game intermission (not for Volley). • Decrease from 3 to 1 during the hour before an ice hockey game. **Quantum Entry Terminal:** • Unspecified
22	LUM	1	Scoreboard luminosity (only managed by Saturn V2 scoreboards) [from software version 5.37]: ¬ (space) or 0: Luminosity selected inside the scoreboard by switch. 1: Lowest scoreboard luminosity 2:Medium low scoreboard luminosity 3: Medium high scoreboard luminosity 4: Highest scoreboard luminosity
23	SSI	1	Start/Stop Indication [from software version 5.37]: ¬ (space): No Hockey or no Whistle detection. 1: Manual Start (hockey whistle detection only). 2: Manual Stop (hockey whistle detection only). 3: Automatic Stop (hockey whistle detection only).
24	LAN	1	Bit 0 & 1: Language character set to display on alphanumeric scoreboard: Bit 1 / Bit 0 / Char. 32-127 / Char. 128-255 0 / 0 / Char 32-127 of Font 1 (Latin/standard) / Char 128-255 of Font 2 (Cyrillic) 0 / 1 / Char 128-255 of Font 3 (not yet defined) 1 / 0 / Char 128-255 of Font 4 (not yet defined) 1 / 1 / Not used Bit 2, 3, 4, 6, 7: 0 (reserved for future use) Bit 5: 1 (to ensure back compatibility)
25	XX7	1	Reserved for future use (space character as default)
26	XX8	1	Reserved for future use (space character as default)

Example:

<STX>T24/02/0409:57.35,050<SP>!<SP><SP><ETX><CRC>

PER & PNU values (sample for hockey):

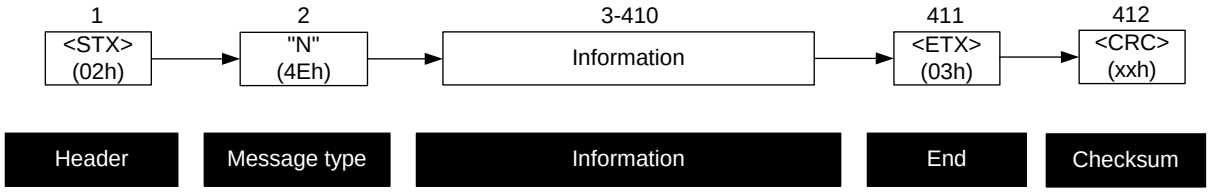
Description	PER	PNU
Day time	¬	Not defined
Pre warm-up	0	3
Warm-up	0	2
Pre game	0	1
1st period	1	1
1st intermission	1	0
2nd period	2	2

Description	PER	PNU
2nd intermission	2	0
3rd period	3	3
3rd intermission	3	0
Overtime period	4	4
4th intermission	4	0
Game winning shot	5	5

4 SPECIAL MESSAGES

4.1 Teams names and players names

This message is sent when you enter in a game. It can also be sent when entering in "*Console set*" "*Name*" by using the "*Send name*" key.



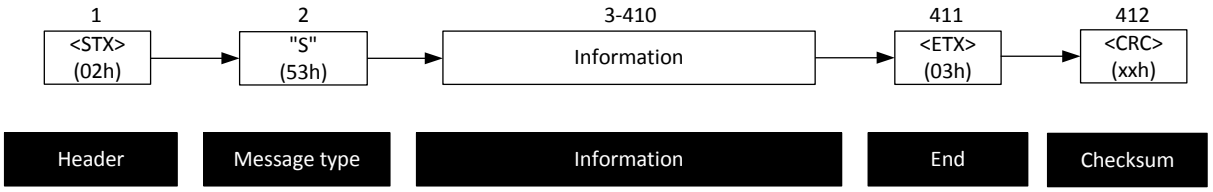
Information			
Position	**Code**	**Byte(s)**	**Description**
3	TNH	12	Name of the LOCAL team (*)
15	TNV	12	Name of the VISITOR team (*)
27	GH1	12	Name of the player 1 of the LOCAL team
39	GH2	12	Name of the player 2 of the LOCAL team
…			
207	GH16	12	Name of the player 16 of the LOCAL team
219	GV1	12	Name of the player 1 of the VISITOR team
231	GV2	12	Name of the player 2 of the VISITOR team
…			
387	GV15	12	Name of the player 15 of the VISITOR team
399	GV16	12	Name of the player 16 of the VISITOR team

(*): 12 characters must be sent but some scoreboards have fewer characters displayed.

Note: this message is very long; if only the teams' names have to be sent, the information GH1 to GH16 and GV1 to GV16 can be omitted.

4.2 Frame selection

ONLY VALID FOR Quantum Based Entry Terminal.
The SATURN console does not send this message.



Information			
Position	**Code**	**Byte(s)**	**Description**
3	FRA	1..n	Name of the frame to select. Application dependent.

Note: this message is not repeated in the loop.

5 Version history

Version	Date	Chapter	Modifications since last version
1.7	02.04.12	3.9	Replace XX4 by LUM & XX5 by SSI in “T” message.
1.8	13.07.12	3.9	Replace XX6 by LAN in “T” message.
1.9	04.05.15	4.2	Frame selection for Quantum Entry Terminal (and IRIS scb) [LUTPIE]
2.0	05.11.15	3.9	Add some specification for Quantum Entry Terminal controller

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