handBoard 7

Professional Led Display Scoreboard Software

USER MANUAL

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LANGUAGE SUPPORT

handBoard supports all languages. You can use special characters from any language such as Arabic, Chinese, Hebrew, and other Asian alphabets in the application.

Contents

1. Introduction 7
   1.1 What handBoard 7 Does 7
   1.2 Display Modes 8
   1.3 How to Read This Guide 8
   1.4 Website and Support 9
2. Installation and First Start 10
   2.1 System Requirements 10
   2.2 Installing 10
   2.3 First Start 10
   2.4 Folders and Files 12
   2.5 Upgrading to a New Version 13
   2.6 Uninstalling 13
   2.7 Quick Start: The First Match 13
3. Licensing 15
   3.1 PC (CPU) and USB Licences 15
   3.2 DEMO Mode 15
   3.3 Entering a PC Licence 15
   3.4 Creating a USB Licence 17
   3.5 Licence Status 18
4. Main Window and Menus 19
   4.1 Title Bar and Window Sizes 19
   4.2 Menu Tabs 21
   4.3 Board Windows 22
   4.4 Closing the Program 22
5. Operator Panel 24
   5.1 The Game Tab at a Glance 24
   5.2 Score 28
   5.3 Match Clock 28
   5.4 Periods 30
   5.5 Team Timeouts 31
   5.6 2-Minute Suspensions 33
   5.7 7-Metre Shootout 35
   5.8 Team Names, Text Lines and Logos 36
   5.9 Sounds and Horn 36
   5.10 A Typical Match 37
   5.11 Remote and Keyboard Equivalents 38

6. Match Rules and the Period & Penalty Settings 39
6.1 Opening the Window 39
6.2 The Three Presets: Handball, U19 and U16 39
6.3 Every Field Explained 40
6.4 Cumulative Time 41
6.5 Saving and Applying 42
6.6 Hidden Settings in start.xml 42
6.7 What the Program Checks and What It Leaves to the Operator 43
7. Display Modes and Board Output 44
7.1 Board Position and Size 45
7.2 Standard (St) 46
7.3 Sponsored (Sp) 46
7.4 Advertisement (Ad) 51
7.5 Chroma Key (CK) 58
7.6 Board Formats 65
7.7 Typical Set-Ups 65
8. Designs and the Design Editor 67
8.1 The Factory Masters 67
8.2 Design Gallery 67
8.3 Where the Designs Are Stored 68
8.4 Saving Your Own Design 69
8.5 The Design Editor 69
8.6 Background Video and Middle Image 72
9. Info Screens 73
9.1 The Info Tab 73
9.2 How the Info Screens Work 76
9.3 Banner 77
9.4 Announce 80
9.5 Goal 83
9.6 2-Minute Suspension 85
9.7 Yellow Card 88
9.8 Red Card 89
9.9 Blue Card 91
9.10 Substitution 91
9.11 Multiple Substitution 94
9.12 Team Lists and Player Pictures 96
9.13 Referees 97
9.14 Sponsors 99

9.15 Team Database 101
9.16 CK Lower Thirds 102
9.17 Returning to the Scoreboard 111
10. Statistics and Tables 113
10.1 Timeline 113
10.2 Stats 116
10.3 Standings 117
10.4 Results and Fixtures 120
11. Teams, Players, Photos and Logos 123
11.1 Team Names 123
11.2 Team Colours 123
11.3 Logos 123
11.4 Player Lists 124
11.5 Where the Player Lists Are Used 126
11.6 Photos and Photo Folders 126
11.7 Team Database 126
11.8 The Penalty Player Lists on the Game Tab 127
12. Media Player, Playlists, Camera, Screen Capture and NDI 128
12.1 Media Player and Playlists 128
12.2 Cameras 131
12.3 Screen Capture 132
12.4 NDI 132
13. Remote Control 133
13.1 Network and Firewall 133
13.2 Switching the Remote On 133
13.3 PIN 135
13.4 Logging On 135
13.5 The Remote Panel 136
13.6 The MATCH Button 141
13.7 The Timeout Question 141
13.8 Phone and Tablet 142
13.9 What the Remote Cannot Do 142
14. HTTP API 143
14.1 Request Format 143
14.2 Replies 143
14.3 Reading the State 144
14.4 Command Groups 145
14.5 Compatibility with Other Board7 Programs 145

15. Keyboard Shortcuts ... 146
15.1 Keyboard Hook Manager ... 146
15.2 Good to Know ... 147
16. Languages and Titles ... 148
16.1 Choosing the Language ... 148
16.2 Editing Translations ... 149
16.3 Titles ... 149
16.4 Factory Texts ... 150
17. Settings Reference ... 151
17.1 The Settings Tab ... 151
17.2 License ... 151
17.3 Screen Properties ... 152
17.4 Board Design Buttons ... 154
17.5 Remote Control ... 154
17.6 Language ... 154
17.7 Youtube Tutorials ... 155
17.8 Where Other Settings Are ... 155
18. Troubleshooting and FAQ ... 156
18.1 The Board Is Black or Empty (WebView2) ... 156
18.2 The Board Is on the Wrong Monitor or Has the Wrong Size ... 156
18.3 Display Scaling ... 156
18.4 Fonts ... 156
18.5 Network, Firewall and Port 1907 ... 156
18.6 NDI ... 157
18.7 The Match Clock Does Not Start ... 157
18.8 The Suspension Timers Stop ... 157
18.9 FAQ ... 158
Appendix A: Handball Rules Reference ... 159
A.1 Playing Time (Rule 2:1 and Following) ... 159
A.2 Overtime and 7-Metre Throws (Rule 2:2) ... 159
A.3 Team Timeout (Rule 2:10) ... 160
A.4 2-Minute Suspension and Disqualification (Rules 16:3-16:8) ... 161
A.5 7-Metre Throws During the Match (Rule 14) ... 162
A.6 What the Program Does Not Follow ... 162
Appendix B: HTTP API Command Reference ... 163
B.1 Request and Replies ... 163
B.2 Commands ... 163
B.3 The GET Reply ... 167

B.4 Differences from API_Commands.txt 168
Appendix C: Glossary 169
Appendix D: Match-Day Checklist 171

1. Introduction

1.1 What handBoard 7 Does

handBoard 7 is scoreboard and match-graphics software for handball. You run the match from the main window on the operator PC. The program draws the scoreboard in a separate board window that you place on a second display, a projector or an LED wall, or send over the network as an NDI video stream.



Figure 1. The Standard board of the sample match: SC Magdeburg – Aalborg, second half, 26 – 24, cumulative clock 48:35, three 2-minute suspensions running.

During a match handBoard 7 shows and keeps:

- the score of both teams, changed with the up and down arrows beside each score;
- the match clock. It counts up from 00:00 in each half, or cumulatively (the second half runs from 30:00 to 60:00) when Cumulative Time is switched on;
- the periods: First Half, Second Half, two overtime periods (Extra Time - 1 and 2) and the 7-metre shootout (P), with the factory presets Handball (2 × 30 minutes), U19 (2 × 30) and U16 (2 × 25), overtime 2 × 5 minutes;
- 2-minute suspensions with the shirt number and a countdown for each player. The suspension timers run only while the match clock runs;
- team timeouts with their own countdown (60 seconds as delivered). The program counts the timeouts of each team and warns when a timeout breaks the IHF limits: no timeout in overtime or in the 7-metre throws, at most 3 per match, at most 2 per half of regular time, only 1 in the last 5 minutes of regular time. You can start the timeout anyway;
- the 7-metre shootout with the result of each throw;
- the team names on one or two lines, the team logos, a centre logo and two text lines (for example the arena and the date and time);
- handball info screens: Banner, Announce, Goal, 2 Min, Yellow Card, Red Card, Substitution, team lists with pictures, Referees and Sponsors, and the statistics tables Timeline, Stats, Standings, Results and Fixtures;
- sponsor images, scrolling texts, video playlists, camera pictures and screen captures.

You can also run handBoard 7 from a phone or a tablet (remote control, chapter 13), from other programs through the HTTP API (chapter 14) and with keyboard shortcuts (chapter 15).

1.2 Display Modes

The board has four display modes. You switch between them with the St, Sp, Ad and CK buttons on the Game tab (chapter 7).

- Standard (St): the full-screen scoreboard with team names, logos, score, match clock, period, suspensions and the two text lines.
- Sponsored (Sp): the Standard scoreboard with a sponsor band at the bottom or the top, showing sponsor images or a scrolling text.
- Advertisement (Ad): the scoreboard together with a large area for a video playlist, a camera or a screen capture, and banners.
- Chroma Key (CK): a compact scorebug and lower-third info graphics on a key colour, to be keyed over a live TV picture in a vision mixer.



Figure 2. The Standard (left) and Sponsored (right) display modes.



Figure 3. The Advertisement (left) and Chroma Key (right) display modes.

Each display mode has its own design. You can change the design in the design editor and save your own designs (chapter 8).

1.3 How to Read This Guide

Chapters 2 to 4 cover the installation, the licence and the main window. Chapters 5 and 6 are the core of the work during a match: the operator panel and the period, timeout and suspension settings. Chapters 7 to 12 describe the display modes, designs, info screens, statistics, teams and players, and the media. Chapters 13 to 15 cover the remote control, the HTTP API and the keyboard shortcuts. The guide ends with languages, the settings reference, troubleshooting and the appendices: the handball rules and what handBoard 7 checks (A), the HTTP API commands (B), a glossary (C) and a match-day checklist (D).

- A pair block shows the board output on the left and the panel that produced it on the right.
- A picture with numbered badges is followed by a table with the same numbers.

- Names of buttons and labels are written as the English interface shows them. In another interface language the captions differ; the places are the same.
- Steps are numbered. Do them in this order.

> **Note:** The pictures show the program with its sample match (SC Magdeburg – Aalborg) and sample data. Scores and clocks were set for the pictures. The program ran with a licence; without a licence the boards show the word DEMO (chapter 3). The licence key, the Computer ID and the network address are hidden in the pictures.

1.4 Website and Support

- Website: www.footballscoreboardsoftware.com (also shown in the title bar and on the License page of the settings)
- Support: arslan.ziya@gmail.com (also shown on the License page of the settings, with the program version)
- Video tutorials: Settings > Youtube Tutorials opens them in the web browser.

2. Installation and First Start

2.1 System Requirements

Item	Requirement
Windows	64-bit Windows 10 or Windows 11. The program is a 64-bit program. On a 32-bit Windows the setup stops and offers handBoard 6 instead.
.NET Framework	4.7.2 or later. Without it the setup stops and offers the Microsoft download page.
Microsoft Edge WebView2 Runtime	Required: every board is drawn with it. Without it the setup stops and offers the Microsoft download page.
Rights	Administrator rights for the setup. The desktop shortcut starts the program as administrator.
Board output	A second monitor, a projector, an LED wall controller or an NDI receiver for the board window
Network	Only for the remote control and the HTTP API (port 1907) and for NDI
Display scaling	100 % on the monitor that shows the board is recommended (section 18.3)

> **Note:** Current Windows 10 and Windows 11 PCs normally have the .NET Framework 4.7.2 and the WebView2 Runtime. If the setup stops with "... is required but not installed. Click OK to download it.", click OK, install the component from the Microsoft page and run the setup again.

2.2 Installing

1. Close handBoard 7 if it runs.
2. Run the setup (handBoard7Setup.exe). If you did not start it as administrator, the setup asks "Administrator privileges are required to install this application. Would you like to restart the setup as administrator?". Click Yes.
3. Follow the wizard. The program is installed in C:\handBoard7. The folder cannot be changed.

During the installation the setup also:

- installs the fonts of the boards (common\font) in Windows ("Installing fonts...");
- adds four Windows firewall rules for port 1907, named "handBoard 1907 TCP IN", "handBoard 1907 UDP IN", "handBoard 1907 TCP OUT" and "handBoard 1907 UDP OUT" ("Configuring firewall rule..."). A rule that exists already is not added again;
- creates two desktop shortcuts: handBoard7 (the program, set to run as administrator) and handBoard7 Help (this guide, handBoard7Help.pdf).

In Apps & Features the program is listed as handBoard7, version 7.6.7.19.

2.3 First Start

Start handBoard 7 with the desktop shortcut. A small status card shows the progress while the program loads: "handBoard Started...", "Controls Initialized...", "Renderer Initialized..." and "Entering Main Loop...". Before the card changes, the program reads the Computer ID and looks for a USB licence stick; on a slow PC this can take some seconds.

Then the main window opens at the bottom right of the screen with the Game tab, and the board window opens at the top left.

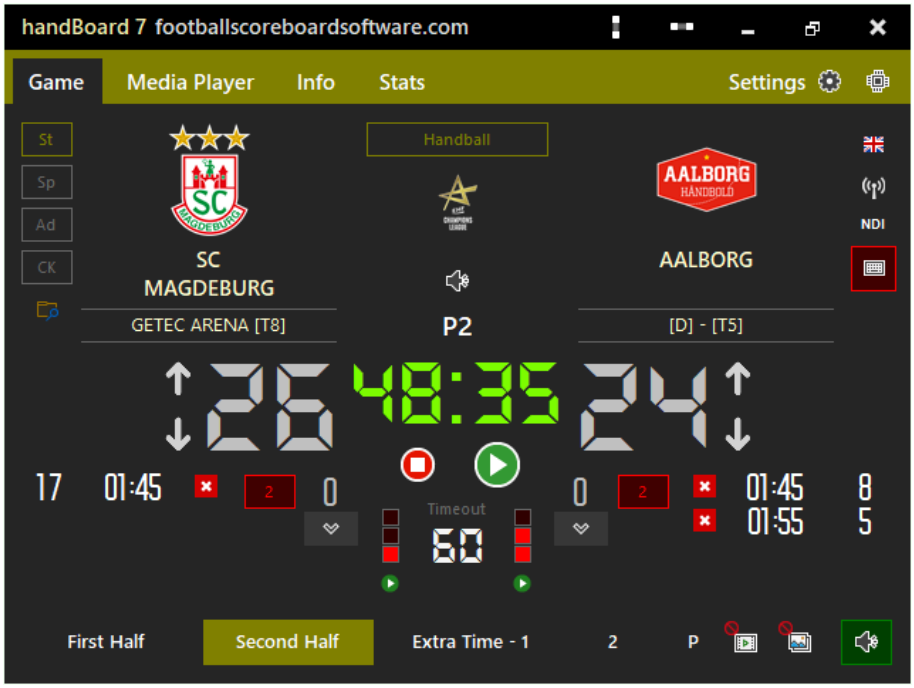


Figure 4. The main window with the Game tab (shown here during a match; at the first start the score is 0 – 0 and the clock 00:00).

A new installation starts with these settings:

Setting	First Start Value
Board window	Left 0, Top 0, 960 × 540 pixels
Display mode	Standard (St)
Language	The language of the Windows regional format; English if it is not one of the 46 languages
Sample match	SC Magdeburg – Aalborg with their logos and the EHF Champions League logo; text lines "GETEC ARENA [T8]" and "[D] - [T5]" (arena, date and time); score 0 – 0
Periods	Handball: halves 2 × 30 minutes, overtime 2 × 5 minutes; Cumulative Time off
Team timeouts	On, 60 seconds
Suspensions	2 minutes (120 seconds)
Background video	media\videos\BlackRoyal.mp4, opacity 6
Sponsor band (Sp)	At the bottom
Chroma key colour	Green
Remote control	Off, PIN 123456
Keyboard shortcuts	Off. The keys are already assigned: Esc starts and stops the clock, F9 and F12 give a goal to the home and the guest team.
Sounds	On
NDI sender name	Hb7_NDI

Setting	First Start Value
Licence	DEMO until a licence is entered (chapter 3)

> **Note:** Run only one copy of handBoard 7. The program does not stop a second copy; two copies would write the same settings file, and only one of them can use the remote control port 1907 (section 18.5).

2.4 Folders and Files

Everything lives in C:\handBoard7:

Folder or File	Contents
handBoard7.exe and the .dll files	The program
start.xml	The settings: board position and size, display mode, designs in use, periods, timeouts and suspensions, team names and logos, keyboard keys, remote control, language (created at the first start)
config.xml, configSp.xml, configAd.xml, configCK.xml	Banner and Announce texts and the settings of the Sponsored, Advertisement and Chroma Key modes
hand7License.xml	The PC licence (written when you save a key, chapter 3)
common\data	Players, teams, referees, sponsors, playlists, statistics tables
common\font	The fonts of the boards
common\images	Pictures, team logos and flags (flags)
common\remote	The remote control pages and API_Commands.txt
common\sounds	The sounds the program plays, for example when the clock starts or stops and when a timeout ends
common\vizrt\storage	The factory designs and your saved designs
common\vizrt\current	The designs in use
common\xml	Language file (lang.xml), factory copy (langFactory.xml), titles (title.xml), licence terms
media\videos, media\images	Background videos, background, player and sponsor pictures
media\downloads	Pictures and tables downloaded by the program
handBoard7.exe.WebView2	The browser profile of the boards. The program empties it at every start.
API_Commands.txt	The HTTP API reference (Appendix B)
handBoard7Help.pdf	This guide
open_firewall_1907.bat, install_fonts.ps1	Helpers to repeat the firewall and font steps of the setup (sections 18.4 and 18.5)

> **Note:** handBoard 7 finds its files relative to the folder it was started in. Start it with the desktop shortcut or with handBoard7.exe in C:\handBoard7. If you make your own shortcut, set its Start in folder to C:\handBoard7.

2.5 Upgrading to a New Version

Install the new version over the old one with its setup. The setup replaces the program and copies the delivered files again:

Kept	Replaced by the Delivered Files
start.xml (your settings, team names, logos, keys, periods)	The program and its libraries
hand7License.xml (the PC licence)	config.xml, configSp.xml, configAd.xml, configCK.xml
Files you added yourself (your own pictures, videos, saved designs and playlists with new names)	Every delivered file in common and media with the same name: players, teams, playlists, sponsors and tables in common\data, lang.xml, title.xml, the designs in common\vizrt, the remote pages

> **Note:** The setup does not merge your files with the new ones: a delivered file overwrites your file of the same name, for example your players, your translations in lang.xml or a changed factory design. Before you install a new version, copy C:\handBoard7 to a safe place, and copy back the files you want to keep after the installation.

2.6 Uninstalling

Use Apps & Features > handBoard7 > Uninstall. The uninstaller removes the files the setup installed. Files created later, for example start.xml, hand7License.xml and your own pictures and designs, stay in C:\handBoard7. The fonts and the firewall rules stay in Windows.

> **Note:** Before you uninstall, copy C:\handBoard7 to a safe place if you want to keep your settings, players, designs and licence file.

2.7 Quick Start: The First Match

1. Start handBoard 7. The Game tab shows the sample match.
2. Put the board where the audience sees it: Settings > Screen Properties, set L, T, W and H to the position and size of the second monitor or LED output (chapters 7 and 17).
3. Check the match format: Settings > Screen Properties > Periods & Penalty Settings, choose Handball, U19 or U16, and check the period lengths, the timeout and the suspension time (chapter 6).
4. Type the team names (one or two lines) and the two text lines, and choose the logos (chapters 5 and 11).
5. Check that First Half is selected and start the clock with the Play button (or Esc when the keyboard shortcuts are on).
6. Give each goal with the up arrow beside the score of the team. Start suspensions and team timeouts from the Game tab (chapter 5).
7. At half time click Second Half; after the match prepare the next one (chapter 5).

For a TV production use the Chroma Key display mode (chapter 7); to work from a phone switch the remote control on (chapter 13).

3. Licensing

3.1 PC (CPU) and USB Licences

handBoard 7 runs with a licence key. There are two kinds:

	PC Licence (CPU)	USB Licence
Bound to	This PC, through its Computer ID (12 characters, beginning with H, M, P or F)	One USB stick, through its USB ID (12 characters, beginning with U)
Key file	C:\handBoard7\hand7License.xml	hand7License.xml in the root folder of the stick
Use	Only on this PC	On any PC where the stick is plugged in
Checked	At every program start	At every program start, before the PC licence

The licence is read when the program starts. After you enter a key, or plug in the USB stick, restart the program.

The key also sets the largest board size (Max Resolution, section 17.2) and an expiry date. Some licences enable the GPU screen capture of the Advertisement and Chroma Key modes (GPU badge on the License page) and the extra media player (eMP badge).

3.2 DEMO Mode

Without a valid licence the program runs in DEMO mode. You can try every part of the program, with these limits:

- On the Standard, Sponsored, Advertisement and Chroma Key boards the match clock reads DEMO for one second in every ten.
- After 5 minutes of play in a period the match clock shows DEMO instead of the time, on the Game tab and on the board.
- The info-screen board, the media-player board and the media area of the Advertisement board show a DEMO label.
- The score of the home team cannot be changed with its arrows (on the Game tab, with the F9 key or from the remote control page), and the home team logo cannot be changed or removed. The program shows "License Required ! This action is not allowed in the DEMO version." The guest team works normally.
- Download From Internet (Stats tab, chapter 10) works twice per session; the next download shows the same message.

The licence icon at the right of the menu bar shows the state: a padlock without a licence, a USB stick symbol with a USB licence, a CPU symbol with a PC licence. Rest the mouse on it for the tooltip: "No License", "USB License Found" or "CPU License Found".

3.3 Entering a PC Licence

Open Settings > License.

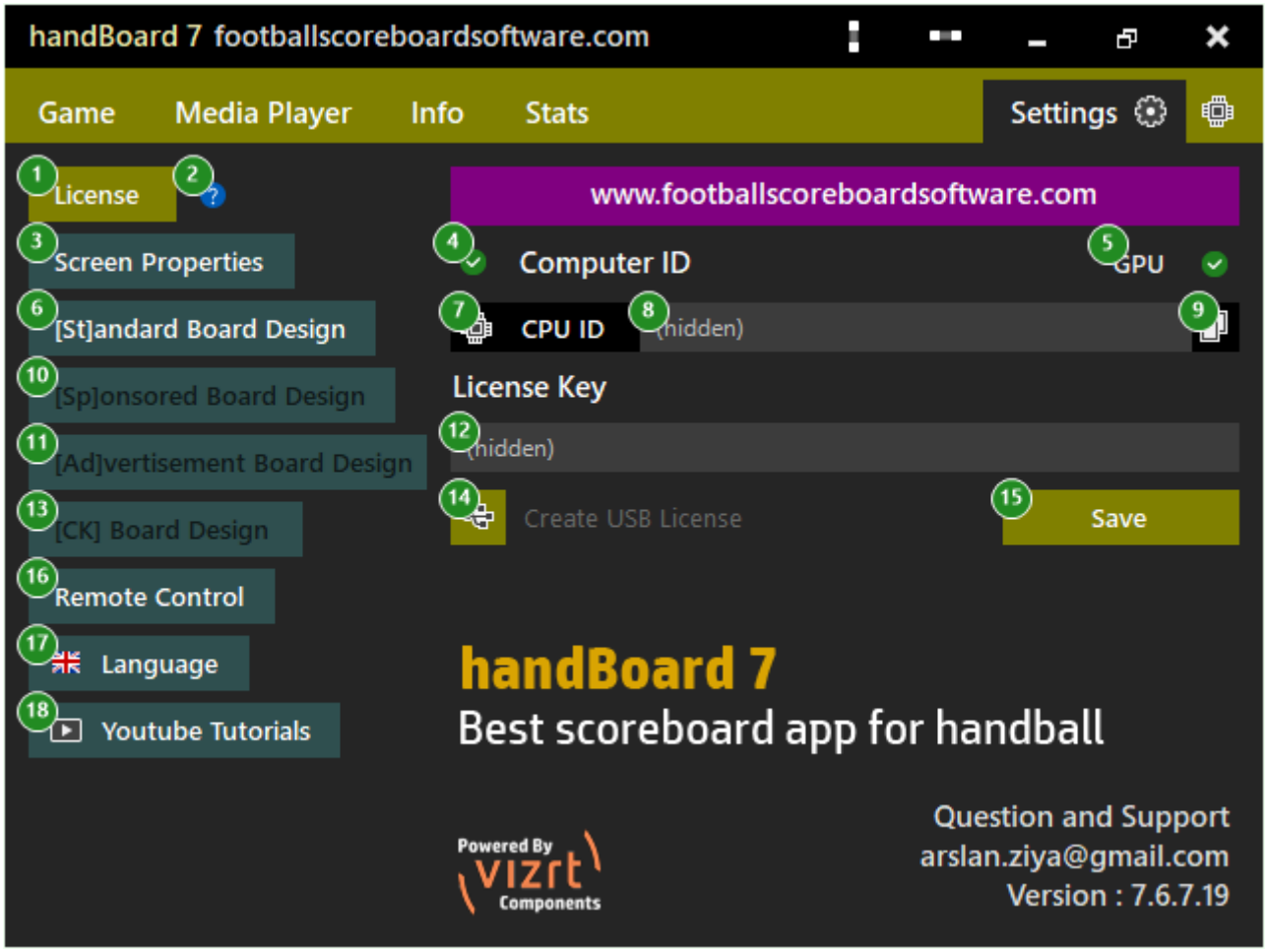
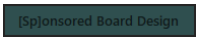
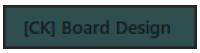
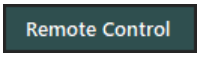
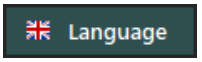
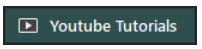


Figure 5. The License page. The Computer ID and the key are hidden in this picture.

No.	Control	Name	What It Does
1	License	**License**	Opens the License page: Computer ID, licence key, Save and Create USB License (chapter 3).
2	?	**License Info (?)**	Opens the License Info box: Validation, Max Resolution, Expire Date, Model, GPU Enabled, Extra Player, Record & Replay and the result of the date check.
3	Screen Properties	**Screen Properties**	Opens the Screen Properties table: board position and size, Max Resolution, Periods & Penalty Settings, background video opacity, separator and image play duration.
4	✓	**CPU License Terms (? / Tick)**	Opens the licence terms of the PC licence. It shows a question mark while the key in the box does not fit this PC and a green tick when it does.
5	GPU ✓	**GPU**	Badge: shown when the licence enables the GPU screen capture of the Advertisement and Chroma Key modes. No action.
6	[St]andard Board Design	**[St]andard Board Design**	Opens the design editor of the Standard board (chapter 8). Enabled only in the St display mode.
7	CPU ID	**CPU ID**	Label of the Computer ID of this PC (the ID for a PC licence). No action.
8	(hidden)	**Computer ID**	The Computer ID of this PC (12 characters, read only). Send it to the vendor to order a PC licence.

No.	Control	Name	What It Does
9		**Copy**	Copies the Computer ID to the clipboard.
10		**[Sp]onsored Board Design**	Opens the design editor of the Sponsored board (chapter 8). Enabled only in the Sp display mode.
11		**[Ad]vertisement Board Design**	Opens the design editor of the Advertisement board (chapter 8). Enabled only in the Ad display mode.
12		**License Key**	The PC licence key. Lime = the key fits this PC, light grey = it does not fit, pink = it fits but the date check failed.
13		**[CK] Board Design**	Opens the design editor of the Chroma Key board (chapter 8). Enabled only in the CK display mode.
14		**Create USB License**	Opens the USB License Creator: choose a USB stick, copy its USB ID and save a USB licence key on the stick.
15		**Save**	Checks the key and writes it to hand7License.xml: "License Key Valid. Please Restart Application." or "License Key Not Valid!".
16		**Remote Control**	Opens the Remote Control page: server on or off, address and QR code, PIN (chapter 13).
17		**Language**	Opens the Language page: program language, translations and titles (chapter 16).
18		**Youtube Tutorials**	Opens the handBoard 7 video tutorials on YouTube in the web browser.

1. Click the copy button at the right of the Computer ID. The ID is copied to the clipboard.
2. Send the Computer ID to the vendor (arslan.ziya@gmail.com) and order the licence.
3. Paste the key you receive into License Key. The box turns lime when the key fits this PC; it turns light grey when it does not, and pink when the key fits but the date check fails (section 3.5).
4. Click Save. The program shows "License Key Valid. Please Restart Application." and writes the key to C:\handBoard7\hand7License.xml.
5. Restart handBoard 7.

If the key does not fit, Save shows "License Key Not Valid!" and puts the saved key back into the box.

- The icon left of Computer ID opens the licence terms of the PC licence. It is a question mark while the key in the box does not fit this PC and a green tick when it does.
- The ? button next to License opens License Info (section 3.5).
- The purple band at the top opens www.footballscoreboardsoftware.com in the web browser.
- The bottom of the page shows the support address and the program version (Version : 7.6.7.19).

> **Note:** Do not type into the License Key box of a licensed PC. A key that does not fit makes the running session unlicensed at once: the match clock shows DEMO until a valid key is back in the box or the program restarts.

3.4 Creating a USB Licence

1. Plug a USB stick into the PC.

2. Open Settings > License and click the USB button next to Create USB License. The USB License Creator opens.
3. Choose the stick in Select USB Device. A stick that already holds a key shows "- License Key Found".
4. Copy the USB ID with the copy button and send it to the vendor.
5. Paste the key you receive into License Key and click Save. The key file hand7License.xml is written to the root folder of the stick and the program shows "License Key Valid. Please Restart Application."
6. Restart handBoard 7 with the stick plugged in.

Esc or the close button leaves the USB License Creator. Its question-mark icon opens the licence terms of the USB licence. When a valid USB licence is found at start, the License page shows "USB License Detected" with the USB ID and the key.

> **Note:** When a valid USB licence is found, the program does not read the PC licence. Pull out the stick and restart to use the PC licence.

3.5 Licence Status

The ? button next to License opens the License Info box:

Line	Meaning
Validation	Yes with a valid PC or USB licence, No in DEMO
Max Resolution	The largest board width and height allowed by the key (38400 in DEMO)
Expire Date	The end of the licence
Model	The licence model number
GPU Enabled, Extra Player, Record & Replay	Options of the licence model
Last line	The result of the date check: "All license checks passed.", "[2099]. Skipping check." for a licence without an end date, or the reason for a failure (expiry date passed, or "System clock appears to have been set back")

When the licence is not accepted:

What You See	Reason and Fix
"License Key Not Valid!"	The key belongs to another PC or stick. A PC key stops working after a hardware change of the main board or the processor; send the new Computer ID to support.
It worked before and now shows DEMO	The licence expired, or the PC clock is earlier than the last start of the program. No message is shown: open the License Info box. Correct the Windows date and time, then restart.
The License Key box turns pink	The key fits, but the date check failed (expired, or clock set back).
USB licence not found	The stick must be plugged in before the program starts.

4. Main Window and Menus

4.1 Title Bar and Window Sizes

The main window is the operator's window. It opens at 640 × 480 pixels at the bottom right of the screen and cannot be made smaller. It has three parts: the title bar, the menu bar with the tabs, and the page of the selected tab.

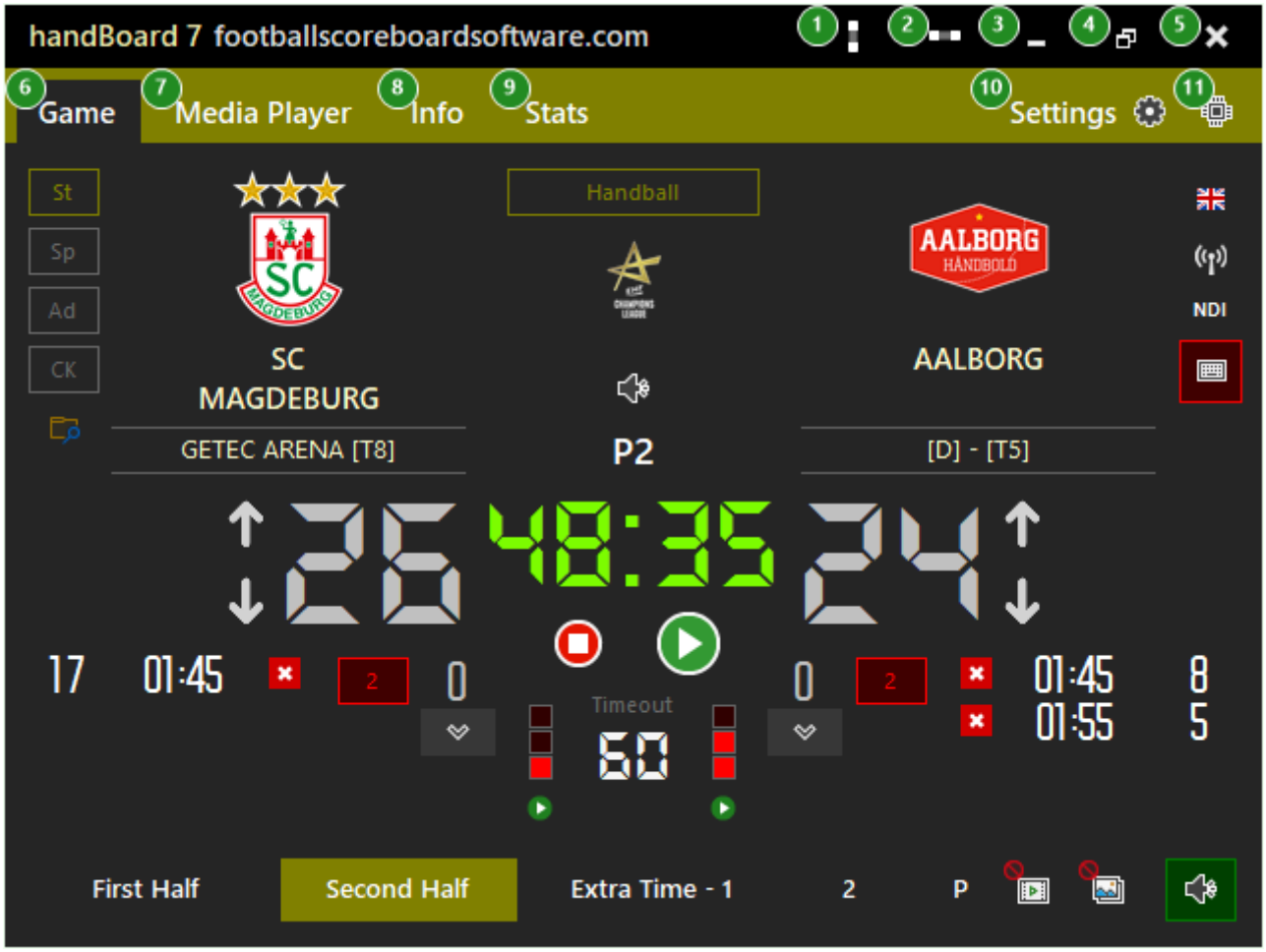
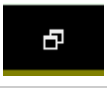
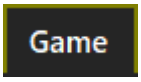
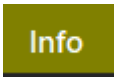
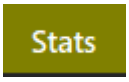
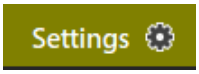


Figure 6. The main window: title bar and menu bar (the page below is the Game tab, chapter 5).

No.	Control	Name	What It Does
1		**Column**	Makes the main window a full-height column, 640 pixels wide, at the right edge of the screen. Click again for 640 × 480 at the bottom right.
2		**Strip**	Makes the main window a full-width strip, 480 pixels high, along the bottom of the screen. Click again for 640 × 480 at the bottom right.
3		**Minimise**	Minimises the main window. The board windows stay on.
4		**Maximise**	Fills the screen with the main window; click again to go back. The page keeps its size and is centred.

No.	Control	Name	What It Does
5		**Close (X)**	Closes handBoard 7 after the question "The Application Will Be Closed! Are You Sure?". The team names and text lines are saved; the score and the clock are not kept.
6		**Game**	Opens the Game tab: the operator panel with score, clock, periods, suspensions, timeouts, 7-metre shootout and display modes (chapter 5).
7		**Media Player**	Opens the Media Player tab: six playlists of videos and pictures and a URL list (chapter 12).
8		**Info**	Opens the Info tab: Banner, Announce, Goal, team lists, Referees, 2 Min, cards, substitutions, Sponsors and Team Database (chapter 9).
9		**Stats**	Opens the Stats tab: Timeline, Stats, Standings, Results and Fixtures (chapter 10).
10		**Settings**	Opens the Settings tab: licence, Screen Properties, designs, remote control, language and video tutorials (chapter 17). While a video plays on the media-player board it shows the time left in the clip.
11		**Licence icon**	Shows the licence state: padlock = no licence (DEMO), USB stick = USB licence, CPU = PC licence. Rest the mouse on it for "No License", "USB License Found" or "CPU License Found" (chapter 3).

The title bar shows handBoard 7 and the product website. Drag the title bar to move the window. Its buttons, from left to right:

Button	What It Does
Column	Makes the window a full-height column of 640 pixels at the right edge of the screen. Click again for 640 × 480 at the bottom right.
Strip	Makes the window a full-width strip of 480 pixels along the bottom of the screen. Click again for 640 × 480 at the bottom right.
Minimise	Minimises the main window. The boards stay on.
Maximise	Fills the screen. Click again to go back.
Close (X)	Closes the program after a question (section 4.4).

- Drag any edge or corner to resize the window. The window snaps to the screen edges and to other windows.
- The column and the strip are useful when the main window shares the screen with other programs, for example a vision-mixer software.

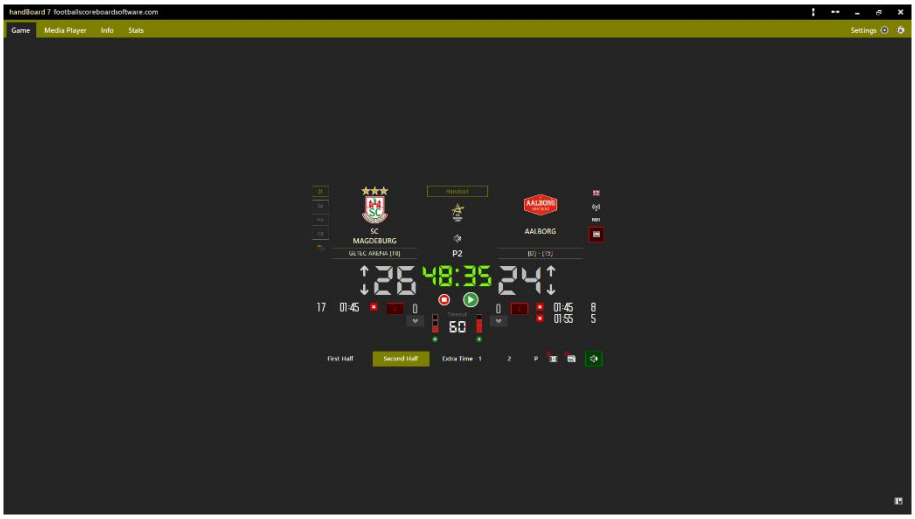


Figure 7. The maximised main window. The page always stays the same size and is centred.

4.2 Menu Tabs

Tab	Opens	Chapter
Game	The operator panel: score, clock, periods, suspensions, timeouts, 7-metre shootout, display modes	5
Media Player	Six playlists of videos and pictures, and a URL list	12
Info	Info screens: Banner, Announce, Goal, team lists, Referees, 2 Min, cards, substitutions, Sponsors, Team Database	9, 11
Stats	Timeline, Stats, Standings, Results and Fixtures	10
Settings	Licence, board position and size, designs, remote control, language	17
Licence icon (right)	Shows the licence state; rest the mouse on it for the text	3

- In the Sponsored, Advertisement and Chroma Key display modes one more tab appears after Stats: Sp, Ad or CK. It opens the page of that mode (chapter 7). In the Standard mode the tab is hidden.
- While a video plays on the media-player board, the Settings tab shows the time left in the clip, for example ▶ 0:42.

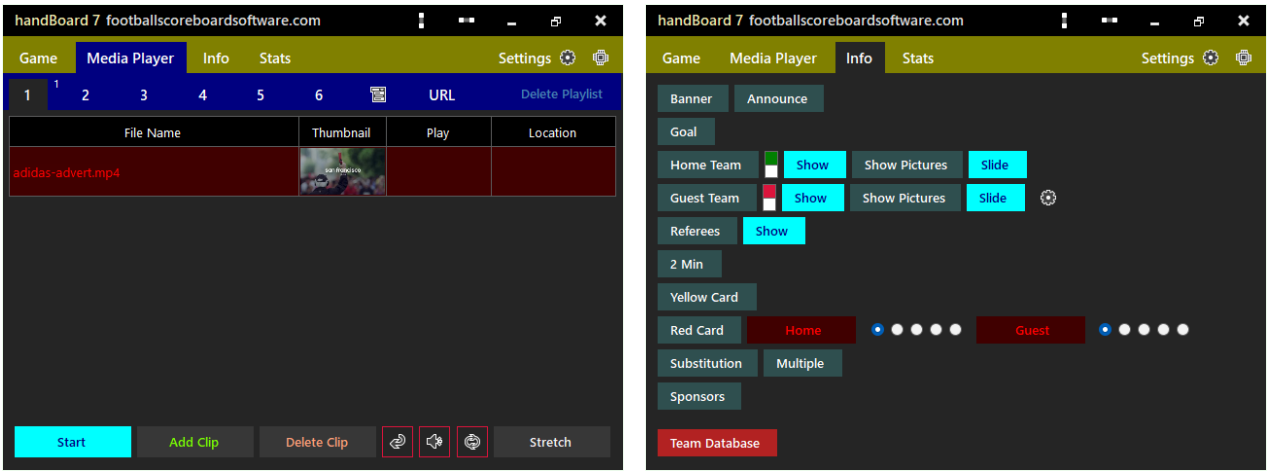


Figure 8. The Media Player tab (left) and the Info tab (right).

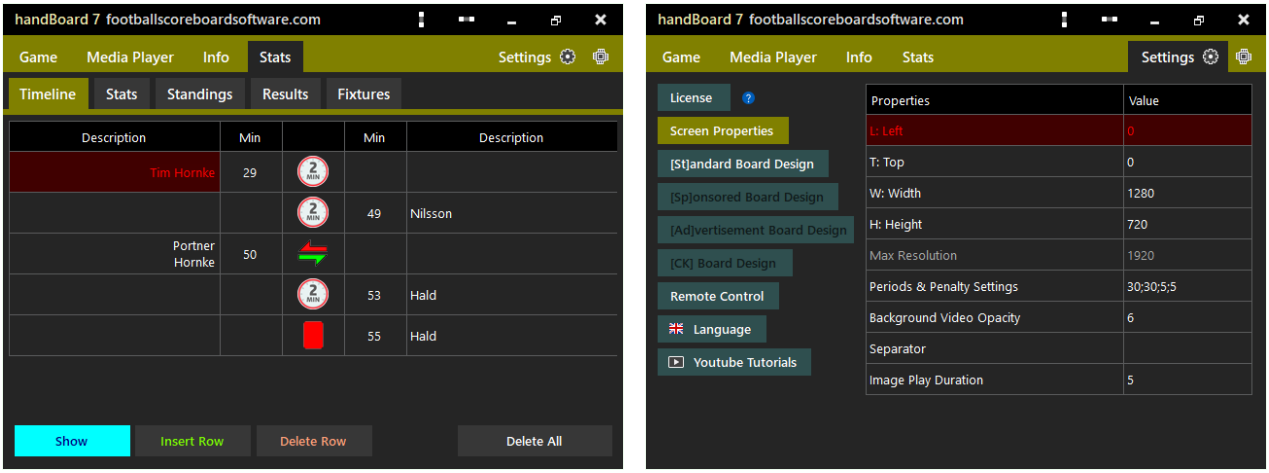


Figure 9. The Stats tab (left) and the Settings tab with Screen Properties (right).

4.3 Board Windows

The boards are separate windows without a frame: one for the Standard and Sponsored board, one for Advertisement, one for Chroma Key, one for the info screens and one for the media player. Only the board of the current display mode is shown.

All board windows share one position and size, set in Settings > Screen Properties: L: Left, T: Top, W: Width and H: Height, in pixels of the Windows desktop (chapters 7 and 17). To show the board on a second monitor or LED controller output, set Left to the x position of that output in the Windows display layout, for example 1920 for a monitor to the right of a full-HD main screen.

> **Note:** The boards cannot be placed at negative positions: a Left or Top below 0 is used as 0. Arrange the board monitor to the right of or below the main screen in the Windows display settings (section 18.2).

4.4 Closing the Program

1. Click the Close button (X) in the title bar.
2. The program asks "The Application Will Be Closed! Are You Sure?". Click Yes.

The program saves the team names and the two text lines, stops the boards and the media, releases the fonts it loaded and closes.

> **Note:** The score, the match clock, the period, the timeouts and the running suspensions are not kept. After a restart the Game tab starts at 0 – 0. Do not close the program during a match.

Questions and messages of the program cover the page with a coloured title band (red for warnings) and Yes / No or OK buttons. Esc answers No (or OK).

5. Operator Panel

The operator panel is the Game tab of the main window. Everything you need during a handball match is on this one page: the score, the match clock, the periods, the team timeouts, the 2-minute suspensions, the 7-metre throws, the team names and the display mode. The page fits a 640 × 480 window, so it also works on a small screen beside the board.

5.1 The Game Tab at a Glance

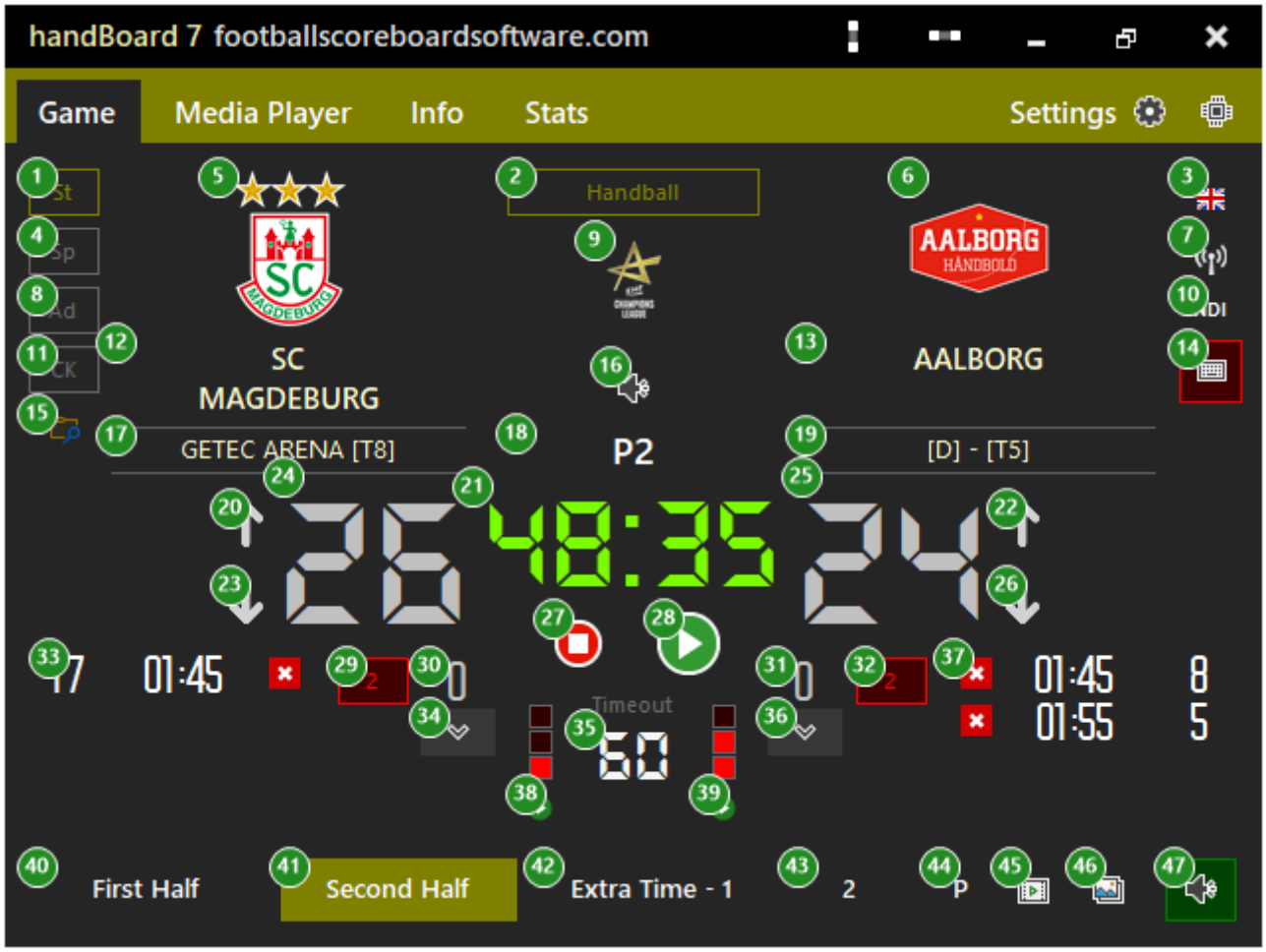
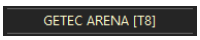
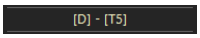
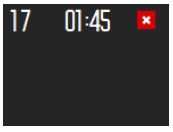
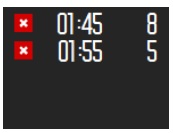
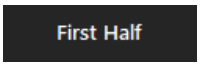
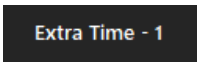


Figure 10. The Game tab during the second half of the sample match: SC Magdeburg – Aalborg, 26 – 24, clock 48:35 (Cumulative Time on), timeouts used 1 / 2, suspensions running for home no. 17 and guest no. 8 and no. 5.

No.	Control	Name	What It Does
1	St	**St**	Switches the board to the Standard display mode (chapter 7). The active mode has olive text.
2	Handball	**Mode (Handball / U19 / U16)**	Shows the rule preset and opens the Period & Penalty Settings window: half and overtime lengths, suspension buttons, cumulative time and timeout length (chapter 6).
3		**Language Settings (Flag)**	Opens the Language page of the settings (chapter 16).
4	Sp	**Sp**	Switches the board to the Sponsored display mode: the scoreboard with a sponsor band (chapter 7).

No.	Control	Name	What It Does
5		**Home Logo**	Click to choose the logo of the home team (an image file). Rest the mouse on it and click the small X to remove it.
6		**Guest Logo**	Click to choose the logo of the guest team. Rest the mouse on it and click the small X to remove it.
7		**Remote Control (Antenna)**	Opens the Remote Control page of the settings (chapter 13).
8		**Ad**	Switches the board to the Advertisement display mode: score, banners and a media area (chapter 7).
9		**Board Logo**	Click to choose the centre logo of the board, for example the competition logo. Rest the mouse on it and click the small X to remove it.
10		**NDI**	Starts or stops sending the board into the network as the NDI source Hb7_NDI (chapter 12). The button flashes red while it sends.
11		**CK**	Switches the board to the Chroma Key display mode: a scorebug on the key colour (chapter 7).
12		**Home Team Name**	The name of the home team on the board, on one or two lines. Click and type; Enter starts the second line. The box turns black when it has more than two lines.
13		**Guest Team Name**	The name of the guest team on the board, on one or two lines. Click and type; Enter starts the second line.
14		**Keyboard Shortcuts (Keyboard)**	Opens the Keyboard Hook Manager (chapter 15). Green while the global keyboard shortcuts are on, red while they are off.
15		**Select Design (Folder)**	Opens the design gallery beside the button to choose another board design (chapter 8).
16		**Horn**	Plays the horn (sound 02.wav) at once. Shown only while the sound is switched on.
17		**Text Line 1**	The first free text line of the board, for example the venue. [D] and [T] placeholders show the date and the time of day (section 5.8).
18		**Period Text**	The short period text (P1, P2, E1, E2, E3, E4). The period buttons set it, and it can be typed over. The board shows it only when Cumulative Time is off.
19		**Text Line 2**	The second free text line of the board. It can hold the same date and time placeholders as text line 1.
20		**Home +1**	Adds one goal to the home team.
21		**Match Clock**	The match time in mm:ss, counting up. While the clock is stopped, click it and type a time; Play then continues from that time. Green while the clock runs or is paused, white after a reset or a period change.

No.	Control	Name	What It Does
22		**Guest +1**	Adds one goal to the guest team.
23		**Home −1**	Takes one goal away from the home team (a correction; never below 0).
24		**Home Score**	The goals of the home team. Click it and type a number to set the score directly.
25		**Guest Score**	The goals of the guest team. Click it and type a number to set the score directly.
26		**Guest −1**	Takes one goal away from the guest team (a correction; never below 0).
27		**Stop / Reset**	Clock running: pauses it. Clock stopped: sets the clock back to the start of the period and deletes all suspensions of both teams.
28		**Play / Pause**	Starts the match clock, or pauses it while it runs. The suspensions run and pause with it. Greyed out during a team timeout.
29		**Suspension Button (Home)**	"Start Penalty": adds a suspension row for the shirt number in the box beside it, with the duration of the Period & Penalty Settings (120 s, caption 2).
30		**Shirt Number (Home)**	The shirt number for the next home suspension. Type it, or pick it with the player list button below.
31		**Shirt Number (Guest)**	The shirt number for the next guest suspension. Type it, or pick it with the player list button below.
32		**Suspension Button (Guest)**	"Start Penalty": adds a suspension row for the guest team, for the shirt number in the box beside it.
33		**Home Suspensions**	One row per running suspension of the home team: shirt number, remaining time and an X that cancels the row. Double-click the number or the time to correct it while the clock is stopped.
34		**Select Player (Home)**	Opens the list of the shirt numbers of the home players (chapter 11) and puts the chosen number into the shirt number box.
35		**Timeout Countdown**	The length of the next team timeout in seconds (60 by default); it counts down in red while a timeout runs. Type another value before the start if needed. Hidden while the match clock runs.
36		**Select Player (Guest)**	Opens the list of the shirt numbers of the guest players and puts the chosen number into the shirt number box.
37		**Guest Suspensions**	One row per running suspension of the guest team: shirt number, remaining time and an X that cancels the row. Double-click the number or the time to correct it while the clock is stopped.

No.	Control	Name	What It Does
38		**Home Timeout Start / Stop**	Starts a team timeout of the home team (one pip more), after a warning when it breaks an IHF rule; click again to end it early. Hidden while the match clock runs.
39		**Guest Timeout Start / Stop**	Starts a team timeout of the guest team (one pip more), after a warning when it breaks an IHF rule; click again to end it early. Hidden while the match clock runs.
40		**First Half**	Selects the first half: the clock goes to 00:00 and the period text to P1. Does nothing while the clock or a timeout runs.
41		**Second Half**	Selects the second half: the clock goes to 30:00 (Cumulative Time on) or 00:00, the period text to P2.
42		**Extra Time - 1 / Extra Time - 2**	Selects the first half of an overtime (E1). Clicked again during an overtime, it switches between the first and the second overtime (Extra Time - 2, E3).
43		**2 (Overtime, Second Half)**	Selects the second half of the current overtime: E2 in the first overtime, E4 in the second.
44		**P (7-Metre Throws)**	Selects the 7-metre throws: the team names give way to the throw records and the centre shows the O / X buttons and Show (section 5.7).
45		**Background Video**	Chooses the video layer behind the board (media\videos). The small X on the icon removes it.
46		**Middle Image**	Chooses an image layer between the background video and the scoreboard. The small X on the icon removes it.
47		**Sound On / Off**	Switches the program sounds on (green) or off (red): clock start and stop, horn, end of a timeout, end of a suspension.

The three small squares above and below the word Timeout are the timeout pips of each team (section 5.5). They are not numbered in the picture: click them to correct the number of timeouts used. Rest the mouse on a logo to show the small X that removes it.

Board Output **Control Panel**

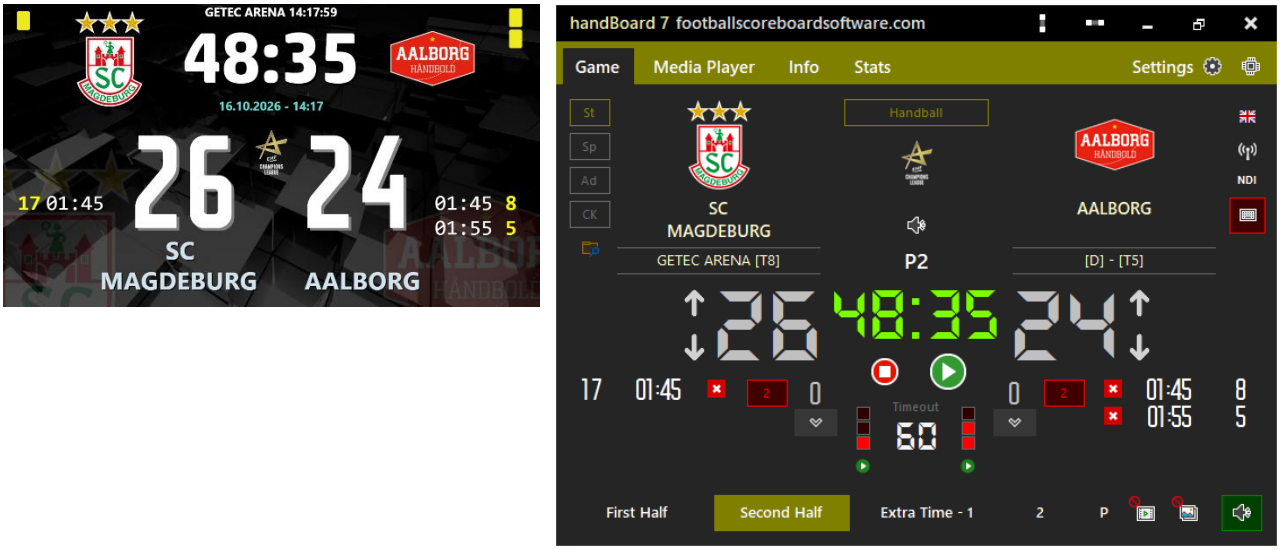


Figure 11. The Standard board and the Game tab that drives it. The board shows the clock, the score, the timeouts used (yellow bars beside the logos), the running suspensions with their shirt numbers, and the two text lines with the time of day and the date.

What the board shows, and where, depends on the design (chapter 8). The pictures of this chapter use the factory design of the Standard display mode.

> **Note:** In DEMO mode (chapter 3) the home score arrows and the home logo answer with "License Required! This action is not allowed in the DEMO version.", and the clock shows DEMO after 5 minutes of a period.

5.2 Score

Give a goal to a team in one of these ways:

- click the up arrow beside the score of that team;
- press the keyboard shortcut of the team, F9 for the home team and F12 for the guest team, when the global keyboard shortcuts are on (chapter 15);
- use the remote control or the HTTP API (section 5.11).

The down arrow takes one goal away, as a correction. The score never goes below 0.

To set a score directly, click in the score, type the number and click somewhere else. The board takes the new value at its next refresh.

- A goal does not end a running suspension of the other team. In handball a suspension always runs its full 2 minutes (section 5.6).
- A goal does not stop the match clock.
- The program does not keep a goal history and has no Undo. Correct a wrong goal with the down arrow.

5.3 Match Clock

The match clock counts up, in minutes and seconds (mm:ss). It stops by itself at the end of the period, for example at 30:00, and plays the horn.

Control	Clock Running	Clock Stopped
Play / Pause (right)	Pauses the clock.	Starts the clock, or continues from the time shown.
Stop (left)	Pauses the clock, like Pause.	Resets the clock to the start of the period and deletes all suspensions of both teams.

The digits are green while the clock runs or is paused, and white after a reset or a period change.

- The suspensions run only while the match clock runs, and pause with it (section 5.6).
- During a team timeout Play and Stop are greyed out: the clock cannot be started before the timeout ends (section 5.5).
- The keyboard shortcut Escape starts and pauses the clock when the global keyboard shortcuts are on (chapter 15).

> **Note:** Click Stop only when you really want to restart the period. A second click on Stop, with the clock stopped, deletes every running suspension. At the end of a half you do not need Stop: the clock stops by itself, and the next period button sets the clock for the next half while the suspensions are kept.

Setting the Time

1. Pause the clock.
2. Click in the clock and type the time as mm:ss, for example 48:35. The minutes may be above 59, for example 64:55.
3. Click Play. The clock continues from the time you typed.

The time you type must lie inside the period:

- With Cumulative Time on, a time outside the range of the period (for example 25:00 in the second half, which runs from 30:00 to 60:00) is replaced by the start of the period.
- With Cumulative Time off, a time after the end of the period is replaced by 00:00.
- A text that is not a time in mm:ss is replaced by the start of the period.

The remote control and the HTTP command set_chronometer can set the time as well: the clock is paused first, then set (section 5.11).

Cumulative Time

The setting Cumulative Time of the Period & Penalty Settings (chapter 6) decides how the clock counts:

Period	Cumulative Time On	Cumulative Time Off
First Half	00:00 – 30:00	00:00 – 30:00
Second Half	30:00 – 60:00	00:00 – 30:00
Extra Time - 1, first half (E1)	60:00 – 65:00	00:00 – 05:00
Extra Time - 1, second half (E2)	65:00 – 70:00	00:00 – 05:00
Extra Time - 2, first half (E3)	70:00 – 75:00	00:00 – 05:00
Extra Time - 2, second half (E4)	75:00 – 80:00	00:00 – 05:00

The table uses the senior lengths (2 × 30 minutes, overtime 2 × 5 minutes). With other lengths the ranges follow them, for example 25:00 – 50:00 for the second half of a U16 match.

With Cumulative Time off, the board shows the period text (P1, P2, E1 …) in the place of the timeout countdown, so that the spectators know which half is running. With Cumulative Time on, the clock itself shows the half and the period text is not shown on the board.

5.4 Periods

The period buttons are at the bottom of the panel. The selected period is olive.

Button	Period	Period Text	Clock Starts At (Cumulative On / Off)
First Half	1	P1	00:00 / 00:00
Second Half	2	P2	30:00 / 00:00
Extra Time - 1	3, first half of the overtime	E1 (E3 in the second overtime)	60:00 or 70:00 / 00:00
2	4, second half of the overtime	E2 (E4 in the second overtime)	65:00 or 75:00 / 00:00
P	5, 7-metre throws	–	– (section 5.7)

A period button works only while the match clock and a team timeout are stopped; otherwise the click does nothing. The button sets the clock to the start of the period and the period text. It does not change the score, the timeouts or the suspensions: a suspension that has not ended at half-time continues in the next half as soon as the clock runs.

> **Note:** A click on the period that is already selected also sets the clock back to the start of that period. Do not click Second Half again during the second half.

Overtime and the Second Overtime

A handball overtime has two halves of 5 minutes. If the score is still level, a second overtime of two halves of 5 minutes follows (Appendix A). The panel has one pair of buttons for both overtimes:

1. Click Extra Time - 1 for the first half of the first overtime (E1).
2. Click 2 for its second half (E2).
3. If a second overtime is needed, click Extra Time - 1 again. The button changes to Extra Time - 2 and the period text to E3.
4. Click 2 for the second half of the second overtime (E4).

- In an overtime, every click on the Extra Time button switches between the first and the second overtime (Extra Time - 1 / Extra Time - 2).
- A click on First Half or Second Half sets the panel back to the first overtime.
- The 7-metre throws (P) keep the overtime round: coming back from P to the overtime buttons continues with the same overtime.
- The lengths of the overtime halves are the fields Extra Time - 1 and Extra Time - 2 of the Period & Penalty Settings (5 and 5 minutes by default, chapter 6).

- The period texts of the second overtime come from start.xml (PERIOD/P5Text and P6Text). When they are empty, the program raises the last digit of the first-overtime texts by 2: E1 becomes E3, E2 becomes E4 (chapter 6).

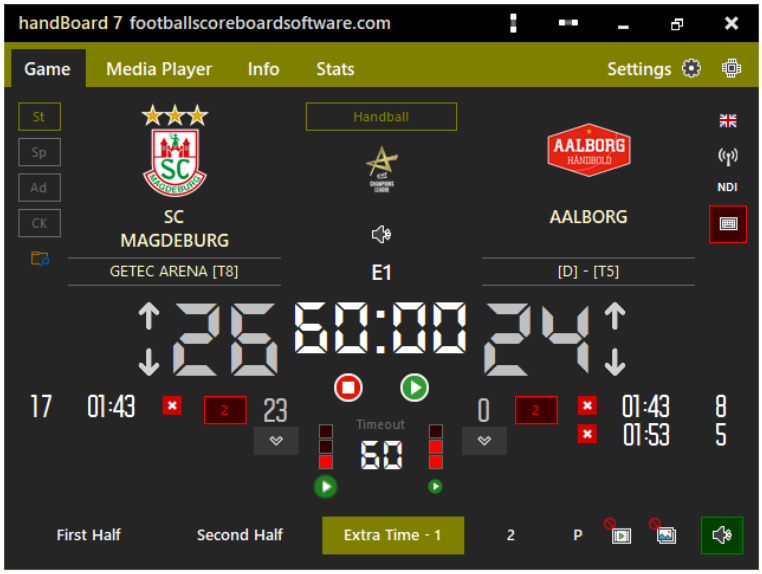


Figure 12. The first overtime: Extra Time - 1 is selected, the period text is E1 and the clock (Cumulative Time on) starts at 60:00.

Board Output **Control Panel**

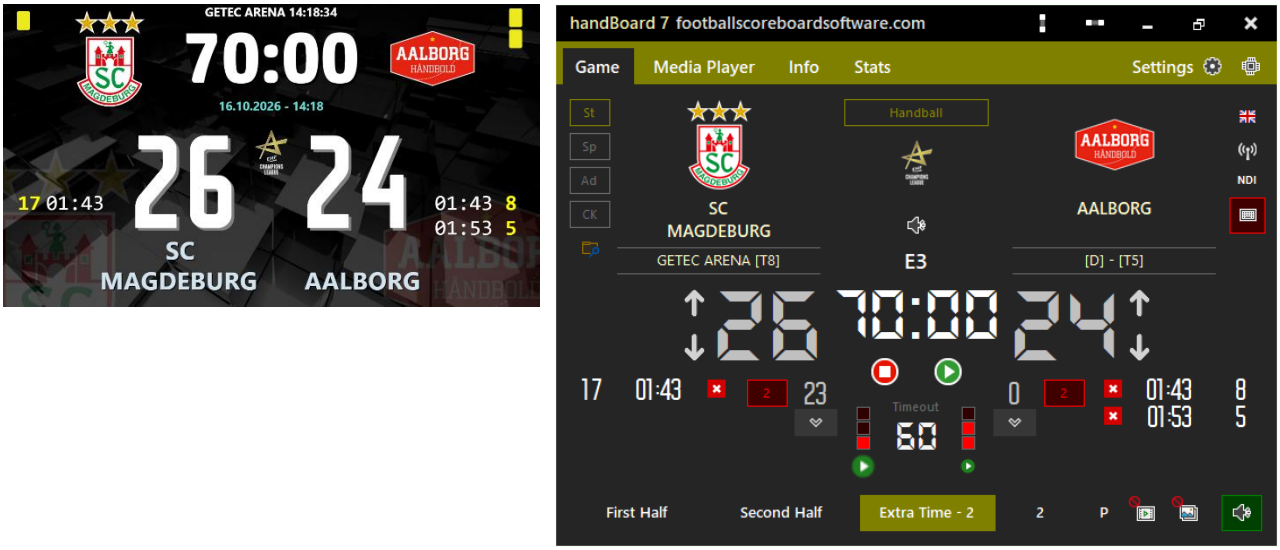


Figure 13. The second overtime: the button reads Extra Time - 2, the period text is E3 and the clock starts at 70:00. The suspensions of the overtime pictures continue from the second half.

5.5 Team Timeouts

Each team has three timeout pips beside the timeout countdown, filled from the bottom up. A red pip is a timeout used. The board shows the timeouts used of each team (yellow bars beside the logos in the factory design).

A team timeout can be started only while the match clock is stopped. While the clock runs, the countdown and the two start buttons are hidden (section 5.10).

To give a team a timeout:

1. Pause the match clock when the timekeeper stops the game.

2. Click the small play button under the timeout pips of the team.
3. If the timeout breaks one of the IHF rules below, the program asks first (see the warnings below). Click Yes to start it anyway, or No to cancel.
4. The timeout starts: the team gets one pip more, its newest pip flashes, the countdown counts down in red from 60, and the board shows the countdown. The start button of the team turns into a stop button; the start button of the other team is hidden.
5. At 0 the timeout ends with a sound, the countdown goes back to the timeout length, and Play and Stop are available again. Start the clock when the game restarts.

To end a timeout early, click the stop button of the team. The timeout stays counted.

Board Output **Control Panel**

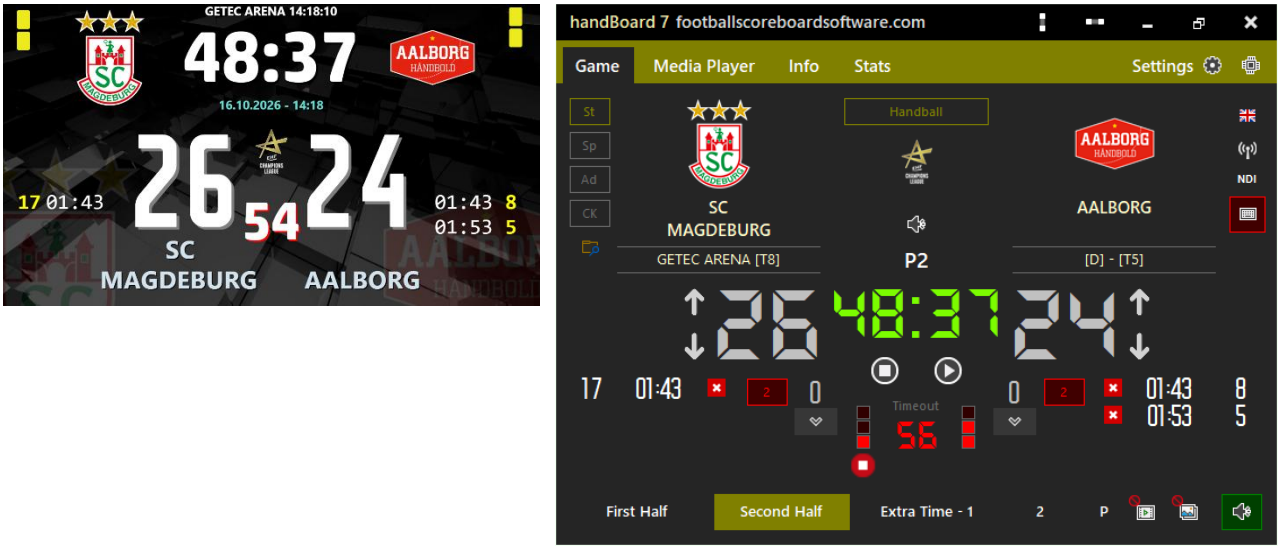


Figure 14. The second timeout of SC Magdeburg: the countdown runs on the panel (56) and on the board (54, between the scores); Play and Stop are greyed out.

- The length of a timeout is the Timeout field of the Period & Penalty Settings, 60 seconds by default (chapter 6). To give a timeout of another length once, type the seconds into the countdown before you start it.
- While a timeout runs, the match clock cannot be started and the period buttons do not react.
- The CK scorebug shows the timeout countdown only while a timeout runs.

IHF Warnings

When you start a timeout, the program checks the IHF rules for team timeouts in the form used by the IHF and most competitions: 3 team timeouts per match (note to rule 2:10 and Clarification No. 3, Appendix A.3). If the timeout breaks one of them, a red Warning window asks the question below. The program does not refuse the timeout: the timekeeper and the referees decide, and you answer Yes or No.

Message	When
No Team Timeout in Overtime or 7-Metre Throws.	An overtime period (Extra Time - 1 / 2 and 2) or the 7-metre throws (P) is selected.
A Team May Take Max. 3 Timeouts per Match.	The team has already used 3 timeouts.
Max. 2 Timeouts per Half of Regular Time.	The team has already started 2 timeouts in this half.

Message	When
Only 1 Timeout in the Last 5 Minutes of Regular Time.	It is the last 5 minutes of the second half by the clock (for example 55:00 or later with Cumulative Time on, 25:00 or later with it off), and the team has already started a timeout in those 5 minutes.

Each message ends with "Start Timeout Anyway?". Only the first rule that applies is shown, in the order of the table.

- The program has 3 pips per team. A timeout started anyway when all 3 pips are red runs normally, but the count stays at 3.
- The checks for each half and for the last 5 minutes know only the timeouts started with the play buttons. Timeouts set by clicking the pips count for the maximum of 3, but the program does not know when they were taken.
- The remote control page asks the same question in the browser before it starts a timeout (chapter 13). The HTTP command timeout_start starts the timeout without a question.

Correcting the Timeouts Used

Click the pips of the team:

- the lowest pip: switches between 0 and 1 timeout used;
- the middle pip: 2 timeouts used;
- the highest pip: 3 timeouts used.

The correction works at any time and does not start a timeout. The timeouts used are not reset by the program, also not between matches: set them back to 0 before a new match (section 5.10). Setting them to 0 also clears what the warnings know about the timeouts of that team.

> **Note:** The timeout pips, the start buttons and the countdown can be hidden in the Period & Penalty Settings (Timeout check box, chapter 6), for competitions without team timeouts.

5.6 2-Minute Suspensions

Each team has a list of its running suspensions below its score. A row shows the shirt number, the remaining time and a small X.

To add a suspension:

1. Type the shirt number into the number box beside the 2 button of the team. Or click the arrow button below the box and choose the number from the list of the team's players (chapter 11).
2. Click the 2 button ("Start Penalty").
3. A row with the number and 02:00 is added at the end of the list.

Board Output **Control Panel**

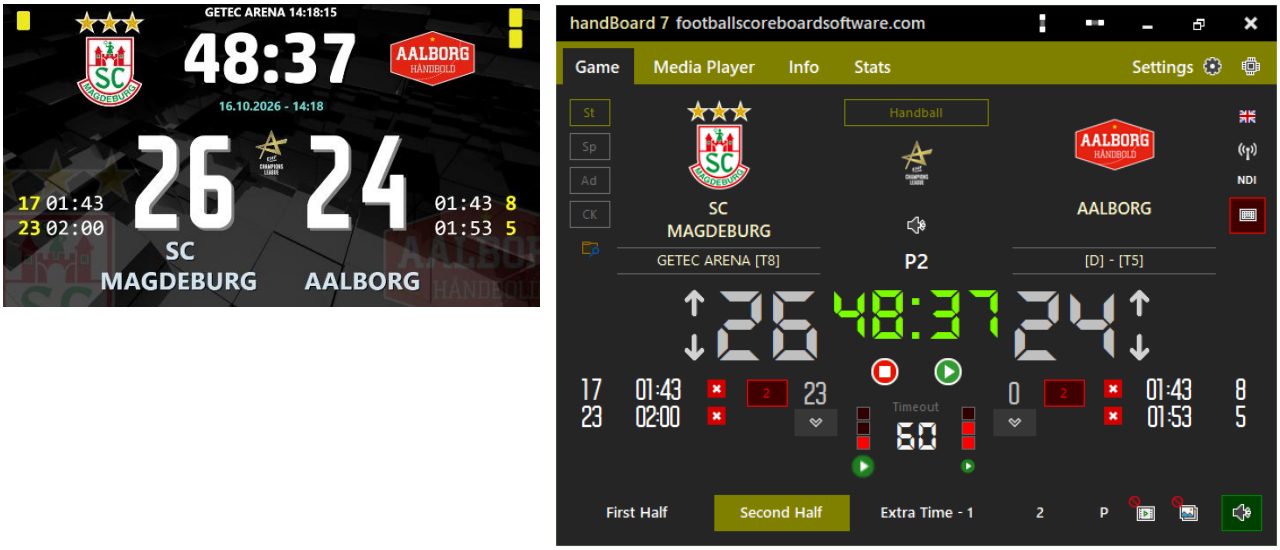


Figure 15. A suspension added for home no. 23 while the clock is paused: the new row waits at 02:00. Home no. 17 and guest no. 8 and no. 5 continue when the clock runs.

How the suspensions count:

- A suspension counts down only while the match clock runs. Added while the clock is stopped, it waits and starts with the clock, as the suspension time begins when the game is restarted.
- All suspensions of a team run at the same time, each with its own time. There is no maximum number of suspended players.
- When a row reaches 00:00, it disappears with a sound. The board removes it at the same time.
- A goal does not end a suspension.
- The suspensions are kept when you change the period: a suspension that has not ended at the end of the first half continues in the second half (or in the overtime).
- The list shows a few rows at once; with more rows it gets a scroll bar.

Corrections:

- Cancel a suspension: click the X of its row. This works at any time.
- Correct the number or the time: pause the clock, double-click the shirt number or the time of the row, type the new value and press Enter. The time must be mm:ss, for example 01:30; another text is not accepted.
- A second click on Stop, with the clock stopped, deletes all suspensions of both teams (section 5.3).

What the program does not do:

- It does not count the suspensions of a player. The third suspension of the same player is a disqualification; the referees decide it.
- A disqualification also reduces the team on the court for 2 minutes. Add a 2-minute suspension with the shirt number of the disqualified player for it.
- For a suspension of a team official, type the official's letter (for example A) instead of a number. The box accepts any short text.

> **Note:** The duration and the caption of the suspension button come from the Period & Penalty Settings (120 seconds, caption 2). Up to two more buttons with other durations can be added there; they are hidden while their duration is 0 (chapter 6). The setting End Penalty On Goal in start.xml (BOARD/EndPenaltyOnGoal) ends the first suspension of the other team with every goal while the clock runs. It is for other sports, is off (0) by default and must stay off for handball.

5.7 7-Metre Shootout

When a match must have a winner and the score is still level after the overtimes, the competition rules may decide by 7-metre throws (Appendix A). Click P to switch the panel to the 7-metre throws. Like the other period buttons, P works only while the clock and a timeout are stopped.

The panel changes:

- The team names give way to the throw records of the two teams.
- The clock, the period text and the timeout area give way to two buttons for each team, a green tick (scored) and a red X (missed), and the button Show.
- The score, the logos and the text lines stay.

To record the throws:

1. Click the tick of the team when a throw is scored, or its X when it is missed. The record of the team gets [O] (scored) or [X] (missed) at its end.
2. Click Show to put the throws on the board.
3. Repeat for every throw, alternating between the teams as they throw.

Board Output **Control Panel**

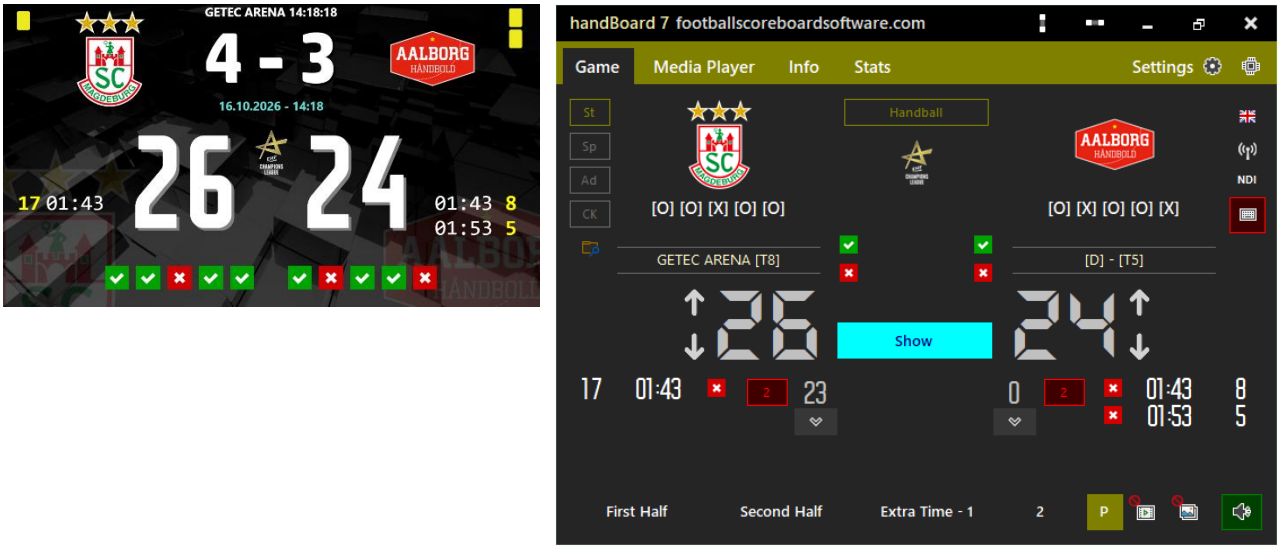


Figure 16. After five throws each: SC Magdeburg [O] [O] [X] [O] [O], Aalborg [O] [X] [O] [O] [X]. The board shows the throws as ticks and crosses and the shootout total 4 – 3 in the clock field; the score of the match stays 26 – 24.

- All throws are kept, also those after the first five (the sudden-death throws). The board shows the last 5 throws of each team.
- The board shows the shootout total, the scored throws of each team, in place of the clock, for example 4 - 3. Before the first throw the field is empty.
- On the CK output the result line shows the match score with the shootout total, for example "30 - 30 (4 - 3)", together with the last 5 throws of each team.
- The board shows the throws you record on the panel after you click Show. A throw sent from the remote control appears on the board at once. In the CK display mode, clicking P also shows the shootout output at once.
- To correct a throw, click in the record and edit it. Only the characters [ ] O X, commas and spaces are kept. To clear a record, delete its text; the remote control has its own Clear button.
- The program does not decide the winner and does not check the order of the throwers.
- Going back to a half or an overtime shows the team names again. The throw records are kept until you delete them.

5.8 Team Names, Text Lines and Logos

Team names. Click the name box and type the name. A name can have two lines: press Enter to start the second line, for example SC / MAGDEBURG. The box turns black when it has more than two lines, as a warning; remove the extra lines. The board shows the lines as typed.

Text lines. The two boxes under the team names are free text lines of the board, for example the venue, the competition or the round. Each is meant to be one line; the box turns black when it has more. A text line can hold placeholders for the date and the time of day, which the board replaces at every refresh:

Placeholder	Board Shows	Example
[D]	Today's date in the short date format of Windows	16.10.2026
[Dn]	The first n characters of the date	[D5] = 16.10
[T]	The time of day, hh:mm:ss (24-hour)	14:18:18
[Tn]	The first n characters of the time	[T5] = 14:18, [T8] = 14:18:18

The factory text lines of the sample match are "GETEC ARENA [T8]" and "[D] - [T5]": the board shows "GETEC ARENA 14:18:18" and "16.10.2026 - 14:18". The placeholders work in the two text lines only, not in the team names.

Logos. Click the home logo, the guest logo or the centre logo to choose an image file (BMP, GIF, JPEG or PNG). Rest the mouse on a logo and click the small X that appears to remove it. The centre logo is the board logo, for example the logo of the competition.

- The names and the text lines are saved when you close the program; the logos are saved when you choose them.
- The remote control and the HTTP API can set the names and the text lines too. There, an underscore (_) starts a new line (chapter 14).
- Teams, players and their logos can also come from the team database (chapter 11).

5.9 Sounds and Horn

The program plays a sound at these moments. The sound files are WAV files in the folder C:\handBoard7\common\sounds; replace a file with your own WAV file of the same name to change a sound (it is loaded at the next start).

File	Plays When
01.wav	The match clock starts.
02.wav	The period ends (the horn), and when you click the Horn button.
03.wav	A team timeout ends at 0.
04.wav	A suspension ends and its row disappears.
05.wav	The match clock is paused or reset.

- The Sound button at the bottom right switches all sounds on (green) and off (red). The setting is kept for the next start.
- The Horn button, the speaker above the period text, plays the horn at once. It is shown only while the sound is on.
- The sounds play on the default sound output of the PC. Connect the hall speakers there if the spectators must hear the horn.

5.10 A Typical Match

While the clock runs, the panel hides what cannot be used then:

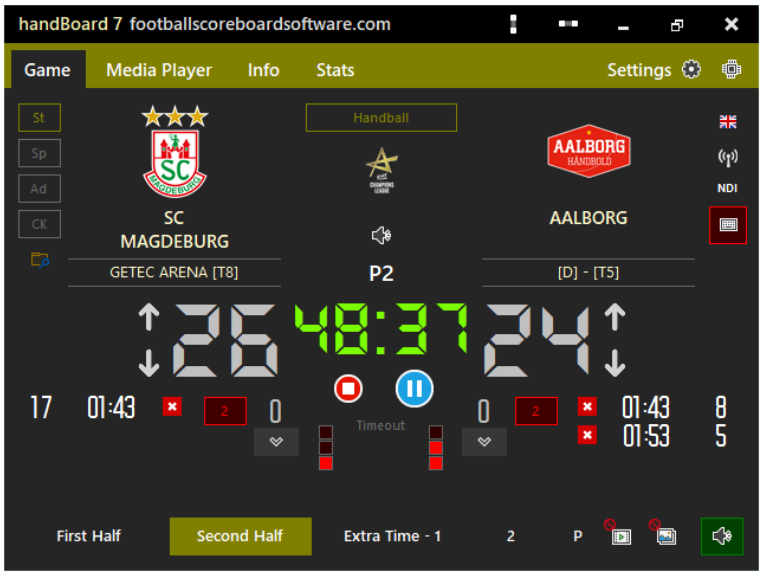


Figure 17. The second half with the clock running: Play has become Pause, the digits are green, and the timeout countdown and the two timeout start buttons are hidden.

- The timeout countdown and the two timeout start buttons are hidden; the timeout pips stay.
- The period buttons stay visible but do not react.
- Stop pauses the clock.

Before the match:

1. Check the rule preset on the Mode button (Handball, U19 or U16) and the Period & Penalty Settings: the lengths of the halves, Cumulative Time and the timeout length (chapter 6).
2. Enter the team names, the logos and the two text lines.
3. Set the score to 0 – 0 and the timeouts used to 0 (click the lowest pip until it is dark). Delete the suspensions of the previous match (Stop with the clock stopped) and, after a shootout, the 7-metre throws (click P and delete the two records).
4. Click First Half. The clock shows 00:00.
5. Choose the display mode (St for a big screen, CK for a TV production).

During the match:

6. Start and pause the clock with Play / Pause as the timekeeper starts and stops the time.
7. Give each goal with the up arrow of the team.
8. For a team timeout, pause the clock and click the play button under the pips of the team. Start the clock again when the game restarts.
9. For a suspension, type the shirt number, click 2. For a disqualification, add a 2-minute suspension as well.

10. At the end of the first half the clock stops by itself with the horn. Click Second Half.
11. If the competition needs a winner and the score is level at the end: Extra Time - 1, then 2; if needed Extra Time - 1 again for the second overtime, then 2; and finally P for the 7-metre throws.

5.11 Remote and Keyboard Equivalents

Most panel actions are also available on the remote control page (chapter 13), through the HTTP API (chapter 14, Appendix B) and with the global keyboard shortcuts (chapter 15).

Panel Action	Default Key	HTTP Command (cmd, value)
Clock play / pause	Escape	click, playpause (or set_chronometer, play / pause)
Clock stop / reset	–	click, stop (or set_chronometer, stop)
Set the clock	–	set_chronometer, 48:35
Home / guest +1	F9 / F12	set_home_score_up / set_guest_score_up
Home / guest −1	–	set_home_score_down / set_guest_score_down
Set the score	–	set_home_score / set_guest_score, the number
Period	–	click, period_1 … period_4 or penalty
Suspension	–	penalty_add, home or guest | number | seconds
Cancel a suspension	–	penalty_cancel, home or guest | row (0 = first)
Start or end a team timeout	–	timeout_start, home or guest
Correct the timeouts used	–	timeout_set, home or guest | up or down
7-metre throw	–	shootout, home or guest | O or X
Clear the 7-metre throws	–	shootout_clear, home or guest
Team names, text lines	–	set_home_team, set_guest_team, line_text_1, line_text_2
Display mode	–	click, st / sp / ad / ck

- The keyboard shortcuts work only after you switch them on in the Keyboard Hook Manager; the three keys can be changed there.
- The HTTP commands timeout_start and timeout_set are ignored while the match clock runs, like the timeout start buttons of the panel.
- The HTTP command timeout_start does not ask the IHF question; the remote control page asks it before it sends the command.

6. Match Rules and the Period & Penalty Settings

handBoard 7 keeps the rules that the scoreboard needs in one window, the Period & Penalty Settings: the lengths of the halves and of the overtime halves, the suspension buttons, the counting of the clock and the team timeout. This chapter explains the window, its three presets, every field, how the program stores and applies the values, and which handball rules the program checks.

6.1 Opening the Window

Open the Period & Penalty Settings in one of two ways:

- Game tab > the Mode button, which shows the preset, for example "Handball" (chapter 5.1).
- Settings > Screen Properties > row Periods & Penalty Settings: select the row and click the small clock button in its value cell (chapter 17). The value cell shows the four lengths, for example 30;30;5;5; you can also type them there.

Nothing changes until you click Save & Apply. The preset buttons only fill in the fields.

> **Note:** The window can be opened while the match clock runs. Change the lengths and Cumulative Time before the match or at half-time, with the clock stopped: a change during a running period gives a clock that no longer fits the period.

6.2 The Three Presets: Handball, U19 and U16

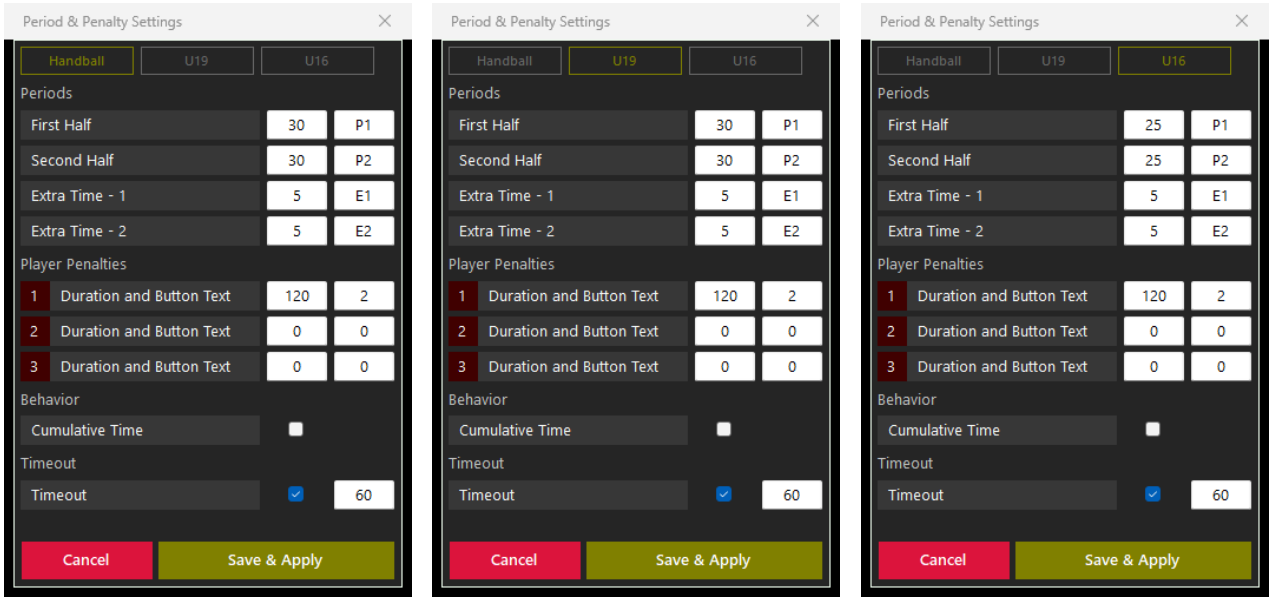


Figure 18. The Period & Penalty Settings with the presets Handball (left), U19 (middle) and U16 (right). Only the lengths of the halves differ.

Field	Handball	U19	U16
First Half / Second Half	30 / 30 min	30 / 30 min	25 / 25 min
Extra Time - 1 / Extra Time - 2	5 / 5 min	5 / 5 min	5 / 5 min

Field	Handball	U19	U16
Period texts	P1, P2, E1, E2	P1, P2, E1, E2	P1, P2, E1, E2
Suspension button 1	120 s, caption 2	120 s, caption 2	120 s, caption 2
Suspension buttons 2 and 3	0 (hidden)	0 (hidden)	0 (hidden)
Cumulative Time	Off	Off	Off
Timeout	On, 60 s	On, 60 s	On, 60 s

The lengths follow IHF rule 2:1: 2 × 30 minutes for teams with players of 16 years and above (Handball, U19), 2 × 25 minutes for youth teams of 12 to 16 years (U16). The overtime of IHF rule 2:2 has two halves of 5 minutes for every age group (Appendix A).

- A preset button fills all fields of the window with the values of the table. Values you typed before are replaced, so choose the preset first and then change single fields, for example switch Cumulative Time on.
- The selected preset is olive. Save & Apply stores it, and the Mode button of the Game tab shows it.
- The preset is only a set of values. The program has no other rule that depends on it: the timeout warnings, the suspensions and the periods work the same way in all three.
- For other formats, for example youth teams of 8 to 12 years (2 × 20 minutes), choose a preset and type the lengths.

6.3 Every Field Explained

Field	Values	Stored in start.xml	What It Does
Handball / U19 / U16	Preset	BOARD/Mode (0, 1, 2)	Fills the fields (section 6.2). The Mode button shows the saved preset.
First Half	Minutes	PERIOD/P1	The length of the first half. The clock stops by itself when it is reached.
Second Half	Minutes	PERIOD/P2	The length of the second half.
Extra Time - 1	Minutes	PERIOD/P3	The length of the first half of an overtime (button Extra Time - 1 / Extra Time - 2 on the panel).
Extra Time - 2	Minutes	PERIOD/P4	The length of the second half of an overtime (button 2 on the panel). Both overtimes use these two lengths.
Period text (right column of the Periods)	Short text	PERIOD/P1Text … P4Text	The period text of the panel and the board: P1, P2, E1, E2. The board shows it only when Cumulative Time is off.
Player Penalties 1: Duration and Button Text	Seconds and caption	BOARD/PenaltyConfig	The suspension button of each team: 120 seconds with the caption 2.
Player Penalties 2 and 3	Seconds and caption	BOARD/PenaltyConfig	Optional further suspension buttons. 0 seconds hides the button (the default).

Field	Values	Stored in start.xml	What It Does
Cumulative Time	On / off	BOARD/CumulativeTime (1 / 0)	On: the clock counts on over the halves (00:00-30:00, 30:00-60:00, 60:00-65:00 …). Off: every period starts at 00:00 (section 6.4).
Timeout (check box)	On / off	PERIOD/UseTimeout	On: the panel shows the timeout pips, start buttons and countdown. Off: that area of the panel is hidden.
Timeout (seconds)	Seconds	PERIOD/Timeout	The length of a team timeout, 60 seconds.

- The minute and second fields take whole numbers. A value that is not a whole number becomes 0 when you leave the field.
- The captions and the period texts are free text. Keep them short: the caption is the text of the small suspension button, and the period text appears in a small field of the board.
- The three suspension buttons are stored together in BOARD/PenaltyConfig as "seconds;caption;seconds;caption;seconds;caption;max", for example 120;2;0;0;0;0;4. The last value belongs to the row Max Penalty Player, which is hidden for handball and not used (section 6.6).

> **Note:** A suspension button with another duration can be useful for a competition with its own rules. For a disqualification the IHF rules need nothing else: the team is reduced for 2 minutes, which is a normal 2-minute suspension (chapter 5.6).

6.4 Cumulative Time

With Cumulative Time on, the clock shows the playing time of the whole match. With it off, every period starts at 00:00.

Period	On	Off
First Half	00:00 – 30:00	00:00 – 30:00
Second Half	30:00 – 60:00	00:00 – 30:00
First overtime, first half (E1)	60:00 – 65:00	00:00 – 05:00
First overtime, second half (E2)	65:00 – 70:00	00:00 – 05:00
Second overtime, first half (E3)	70:00 – 75:00	00:00 – 05:00
Second overtime, second half (E4)	75:00 – 80:00	00:00 – 05:00
7-metre throws (P)	–	–

The ranges follow the lengths of the fields: with the U16 preset the second half runs from 25:00 to 50:00, the first overtime from 50:00.

In both modes the clock counts up and stops by itself at the end of the period, with the horn. With Cumulative Time off, the board shows the period text (P1, P2, E1 …) in the field of the timeout countdown, so that the spectators know which half is running; with it on, the clock itself shows it and the period text is not shown. Use the mode that your competition or hall expects.

6.5 Saving and Applying

When you click Save & Apply, the program:

1. Reads the four lengths. If one of them is not a whole number, all four keep their previous values.
2. Reads the suspension buttons. If a duration is not a whole number or a caption is empty, the suspension buttons go back to the factory value (one button, 120 seconds, caption 2).
3. Saves the preset, the lengths, the period texts, the suspension buttons, Cumulative Time and the timeout to start.xml.
4. Closes the window and applies the values to the Game tab: the Mode button, the period buttons, the timeout length and the timeout area.

Cancel or the X of the window close it without saving and without a question.

When the new values take effect:

Value	Takes Effect
Lengths of the periods	At the next start of the clock. The clock range of the period in play is set when the clock starts.
Period texts	At the next click on a period button.
Cumulative Time	At the next click on a period button (the start time of the period) and the next start of the clock.
Timeout length	At once: the countdown on the panel shows the new length.
Timeout on / off	At once.
Suspension buttons	At once: the buttons of both teams show the new captions and give the new durations. Suspensions already running keep their time.

The values are kept for the next start of the program.

6.6 Hidden Settings in start.xml

Some settings that the scoreboard engine knows are not in the window. They are in the settings file start.xml in the program folder (C:\handBoard7\start.xml) and need no change for handball.

Key	Default	What It Does
PERIOD/P5Text, PERIOD/P6Text	Empty	The period texts of the second overtime. When they are empty, the program raises the last digit of the first-overtime texts by 2: E1 becomes E3, E2 becomes E4.
BOARD/EndPenaltyOnGoal	0	1 ends the first suspension of the other team with every goal while the clock runs, as in sports with a power play. A handball suspension is never ended by a goal: keep 0. The row End Penalty On Goal of Screen Properties is hidden.
BOARD/PlayersInPenaltyMax and the last value of PenaltyConfig	Any	A maximum number of suspended players for other sports. Not used: in handball all suspensions run at the same time and there is no

Key	Default	What It Does
		maximum. The row Max Penalty Player of the window is hidden.

> **Note:** Close handBoard 7 before you edit start.xml with a text editor, and keep a copy of the file. The program writes the file while it runs.

6.7 What the Program Checks and What It Leaves to the Operator

The scoreboard keeps the time, the score and the counters an operator puts on the board. It follows the IHF Rules of the Game where they concern the scoreboard (Appendix A).

The program does by itself:

- stops the clock at the end of every period, with the horn;
- starts the periods at the right time (00:00, 30:00, 60:00 … with Cumulative Time on);
- counts every 2-minute suspension down only while the match clock runs, all at the same time, without a maximum of suspended players, and removes it at 00:00 with a sound;
- keeps a suspension running into the next half or overtime;
- counts the team timeouts down and ends them with a sound;
- keeps every 7-metre throw of a shootout and works out the shootout total.

The program warns, and the operator decides:

- a team timeout in an overtime or during the 7-metre throws;
- a fourth team timeout of a team;
- a third team timeout of a team in one half;
- a second team timeout of a team in the last 5 minutes of the regular playing time.

The warning is a Yes / No question ("Start Timeout Anyway?", chapter 5.5). The program never refuses a timeout.

The program leaves to the operator:

- starting and stopping the clock when the timekeeper or the referees stop the time (time-out, injury, team timeout);
- the half-time break, the break before an overtime and the break between the overtime halves; the program has no break countdown;
- whether an overtime or 7-metre throws are needed, and the winner of the shootout;
- the number of suspensions of a player and the disqualification after the third one;
- the 2-minute reduction after a disqualification (add a 2-minute suspension);
- the order of the throwers and the players allowed in the 7-metre throws;
- the acoustic signals of the timekeeper during a timeout.

7. Display Modes and Board Output

handBoard 7 has four display modes. Each one has its own board window and its own scoreboard design (chapter 8):

Mode	Use	Board Window	Page
St, Standard	Full-screen scoreboard on a screen, projector or LED wall	Display	–
Sp, Sponsored	Standard scoreboard with a sponsor band at the bottom or the top	Display, split into scoreboard and band	Sp tab
Ad, Advertisement	Scoreboard column, up to two banners and a large area for a video playlist, a camera or a screen capture	Ad Display	Ad tab
CK, Chroma Key	Scorebug and lower thirds on a key colour for a vision mixer	CK Display	CK tab

Switch the mode with the St, Sp, Ad and CK buttons at the top left of the Game tab (tooltips Standard View, Sponsored View, Advertisement View, Chroma Key View). The active mode has olive text. You can also switch from the remote control (chapter 13) or with the HTTP command click and the value st, sp, ad or ck (chapter 14). The choice is saved and comes back at the next start.

In the Sp, Ad and CK modes an extra tab with the name of the mode (Sp, Ad or CK) appears in the menu bar next to Stats. It opens the page of that mode. The Standard mode has no page of its own: everything is on the Game tab.

When you switch the mode:

- the scoreboard design of the mode you leave is kept, and the design of the new mode comes back (chapter 8.3);
- the board window of the new mode is shown and the others are hidden;
- a video or picture playing full screen from the Media Player tab and an info screen on air are taken off;
- every source running on the Ad or CK board (video playlist, camera, screen capture) stops when you leave that mode. It does not start again by itself when you come back: start it again on the page of the mode.

7.1 Board Position and Size

All board windows use the position and size of Settings > Screen Properties:

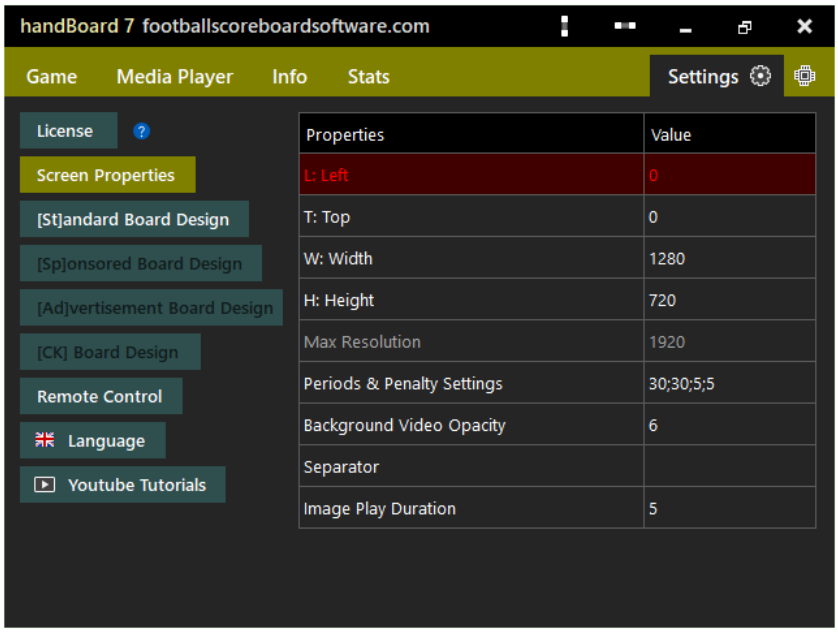


Figure 19. Settings > Screen Properties with the board position and size of the sample pictures (1280 × 720).

Row	Meaning	Default
L: Left	Board window x position in pixels on the Windows desktop	0
T: Top	Board window y position in pixels	0
W: Width	Board width in pixels. A larger value than Max Resolution is cut to Max Resolution.	960
H: Height	Board height in pixels. A larger value than Max Resolution is cut to Max Resolution.	540
Max Resolution	The largest width and height the licence allows (read only, chapter 3)	From the licence
Background Video Opacity	0-10: how strongly the background video shows behind the board (chapter 8.6). Another value goes back to 6.	6
Image Play Duration	Seconds a picture stays on screen in a playlist (1-120). Another value goes back to 5.	5

A change is saved when you leave the cell, and the boards move or change size at once. Chapter 17 describes the other rows of this page.

- The board window can be larger than the screen it is on, for example when an LED controller expects a larger picture than the display resolution.
- L and T are measured from the top left corner of the main Windows display. Negative values are not used: the board windows are placed at 0. Put the board display to the right of or below the main display in the Windows display settings.
- The board windows have no title bar and no frame. Do not cover them with other windows when you send the board over NDI (chapter 12.4).

7.2 Standard (St)

Board Output **Game Tab**

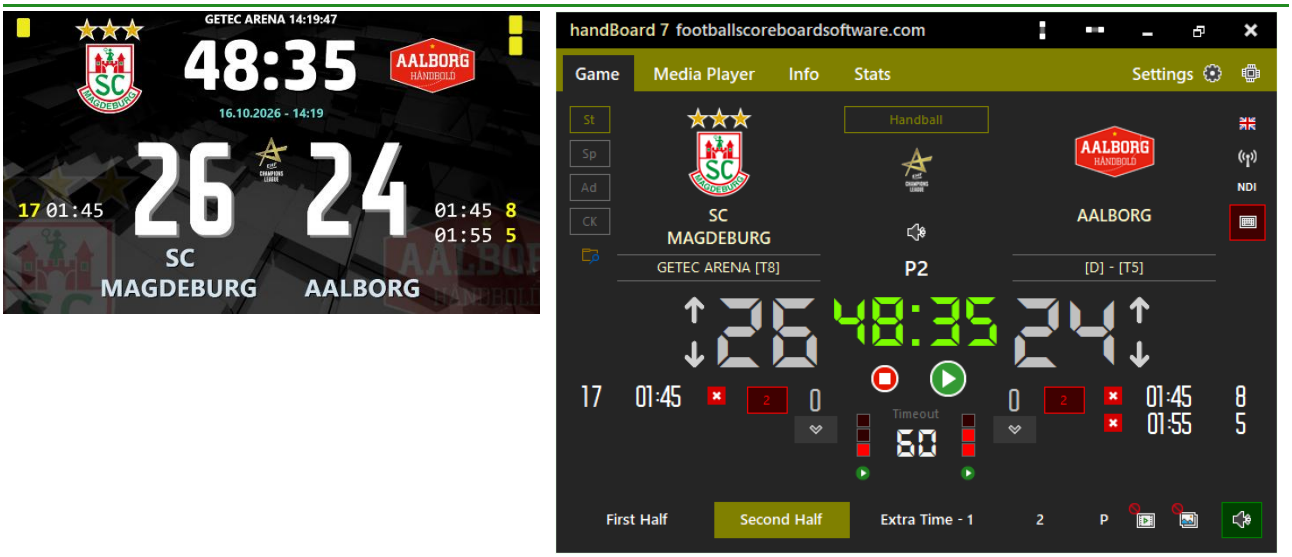


Figure 20. The Standard board of the sample match and the Game tab.

The Standard board shows the whole match: team logos and names, the score, the match clock, the period, the running 2-minute suspensions with shirt number and time, the used team timeouts, the centre logo and the two text lines (here the arena with the time of day, and the date). Chapter 5 explains each item. Its look comes from the design selected in the design gallery (chapter 8).

7.3 Sponsored (Sp)

The Sponsored board is the Standard board with a sponsor band at the bottom or the top. The band shows the sponsor logos sliding through, or a scrolling text. The scoreboard is drawn in the rest of the board window.



Figure 21. The Sponsored board with the sample sponsor logos in the band at the bottom.

Open the Sp tab in the menu bar. The page has three tabs: Sponsors, Scrolling Text and Settings. It opens on the tab of the content you applied last.

Sponsors

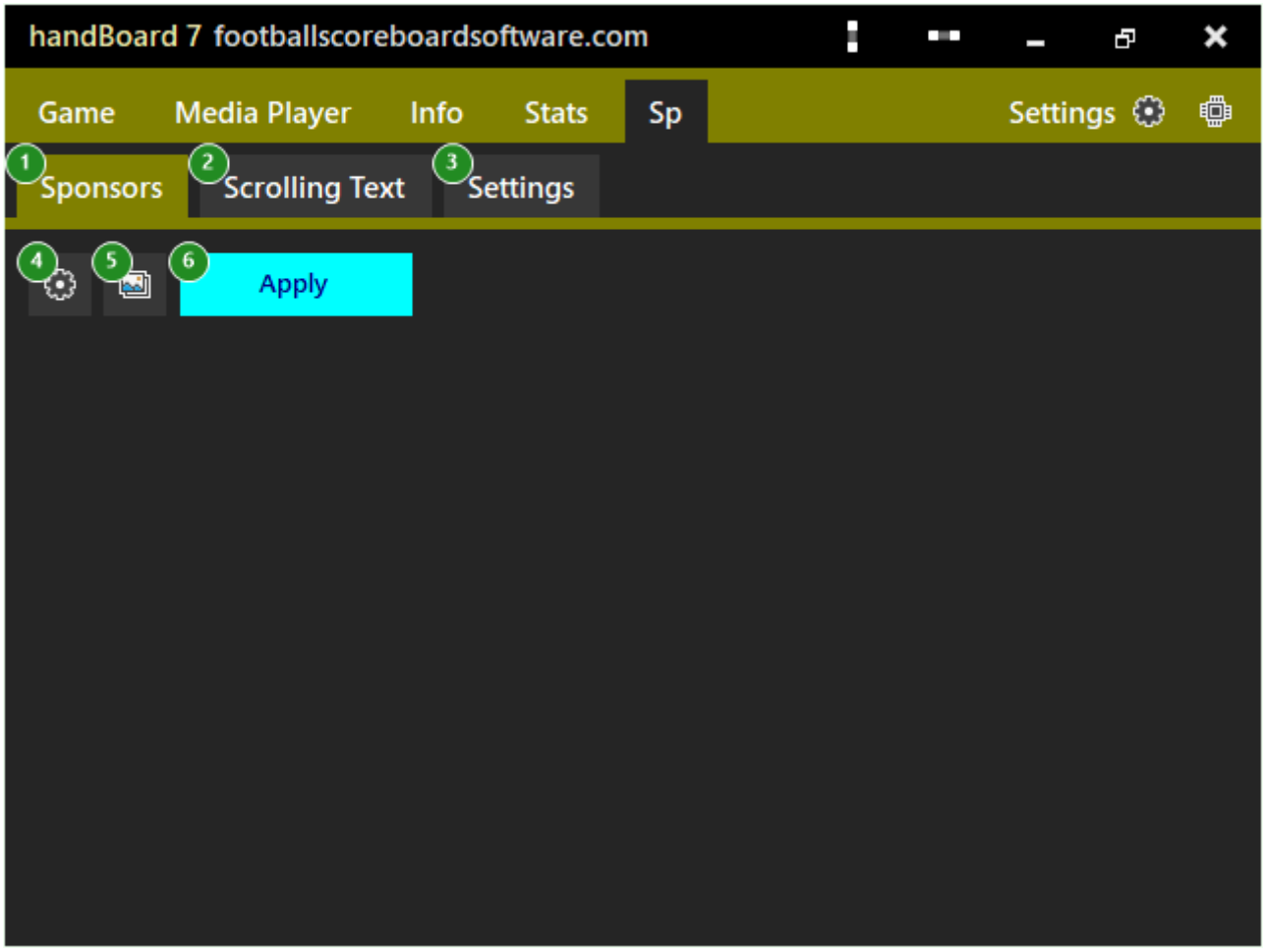


Figure 22. The Sp page: Sponsors.

No.	Control	Name	What It Does
1	Sponsors	**Sponsors**	Opens the Sponsors tab: puts the sponsor logos on the band.
2	Scrolling Text	**Scrolling Text**	Opens the Scrolling Text tab: the four text slots and the style of the scrolling band.
3	Settings	**Settings**	Opens the Settings tab: location and height of the sponsor band.
4		**Style (Gear)**	Opens or closes the style values of the logo slide: image-height, padding, top, speed and direction. The disk button in the box saves them.
5		**Sponsor List (Picture)**	Opens the sponsor list (Info > Sponsors), where you add, remove and sort the logos.
6	Apply	**Apply**	Puts all logos of the sponsor list on the band as an endless slide, with the style values of the gear box.

- Apply puts all logos of the sponsor list (Info > Sponsors, chapter 9) on the band, in list order, as an endless slide.

- The picture button opens the sponsor list, where you add, remove and sort the logos.
- The gear button opens the style values of the slide: image-height, padding, top, speed and direction (left or right). A number without a unit is a percentage of the band height, so image-height 100 fills the band. The disk button in the style box saves the values; Apply uses the values in the box.

Scrolling Text

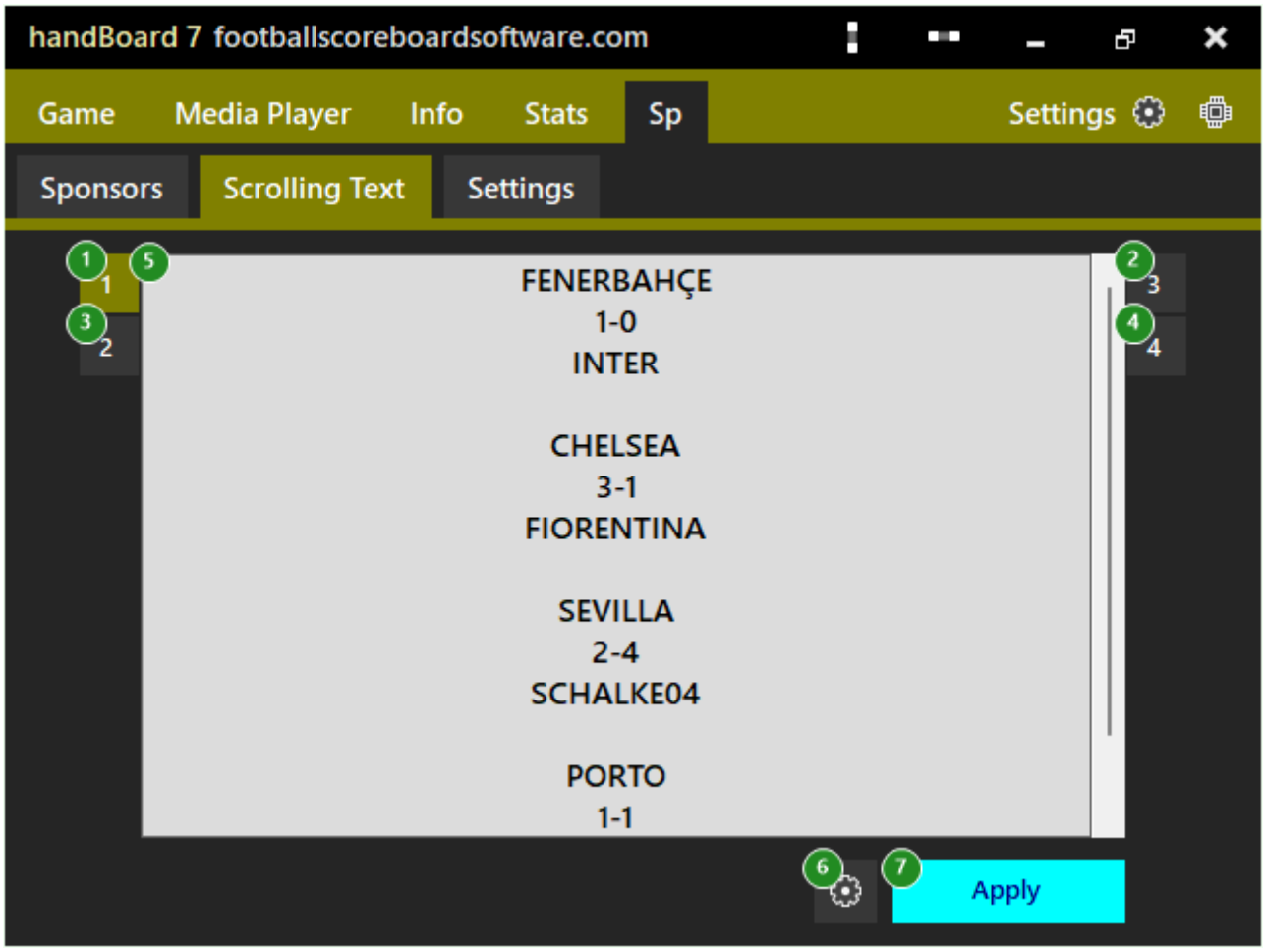
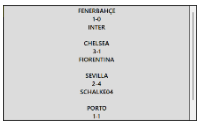


Figure 23. The Sp page: Scrolling Text with the sample text in slot 1.

No.	Control	Name	What It Does
1		**1**	Text slot 1: shows the text saved in this slot.
2		**3**	Text slot 3: shows the text saved in this slot.
3		**2**	Text slot 2: shows the text saved in this slot.
4		**4**	Text slot 4: shows the text saved in this slot.
5		**Text**	The text of the selected slot, one item per line. The items scroll one after the other; an empty line makes a gap.

No.	Control	Name	What It Does
6		**Style (Gear)**	Opens or closes the text style: font, size, weight, line height, shadow, padding, top, speed, direction and the three colours (background, odd items, even items). The disk button in the box saves them.
7		**Apply**	Saves the text in the selected slot and scrolls it in the band.

1. Choose one of the four text slots, 1 to 4. The slot shows the text saved in it.
2. Type the text, one item per line. The items scroll one after the other; an empty line makes a gap.
3. Click Apply. The text is saved in the slot and the band scrolls it.

The gear button opens the text style: font-family (with a font picker), font-size, font-weight, line-height, text-shadow, padding, top, speed and direction, and three colour boxes: the band background, the colour of the 1st, 3rd, 5th ... item and the colour of the 2nd, 4th, 6th ... item. A number without a unit is a percentage of the band height. The disk button saves the style; Apply uses the values in the box.

Factory style: Segoe UI, bold, font-size 70, dark navy background, items alternating cyan and white, speed 60, scrolling to the left.

Settings

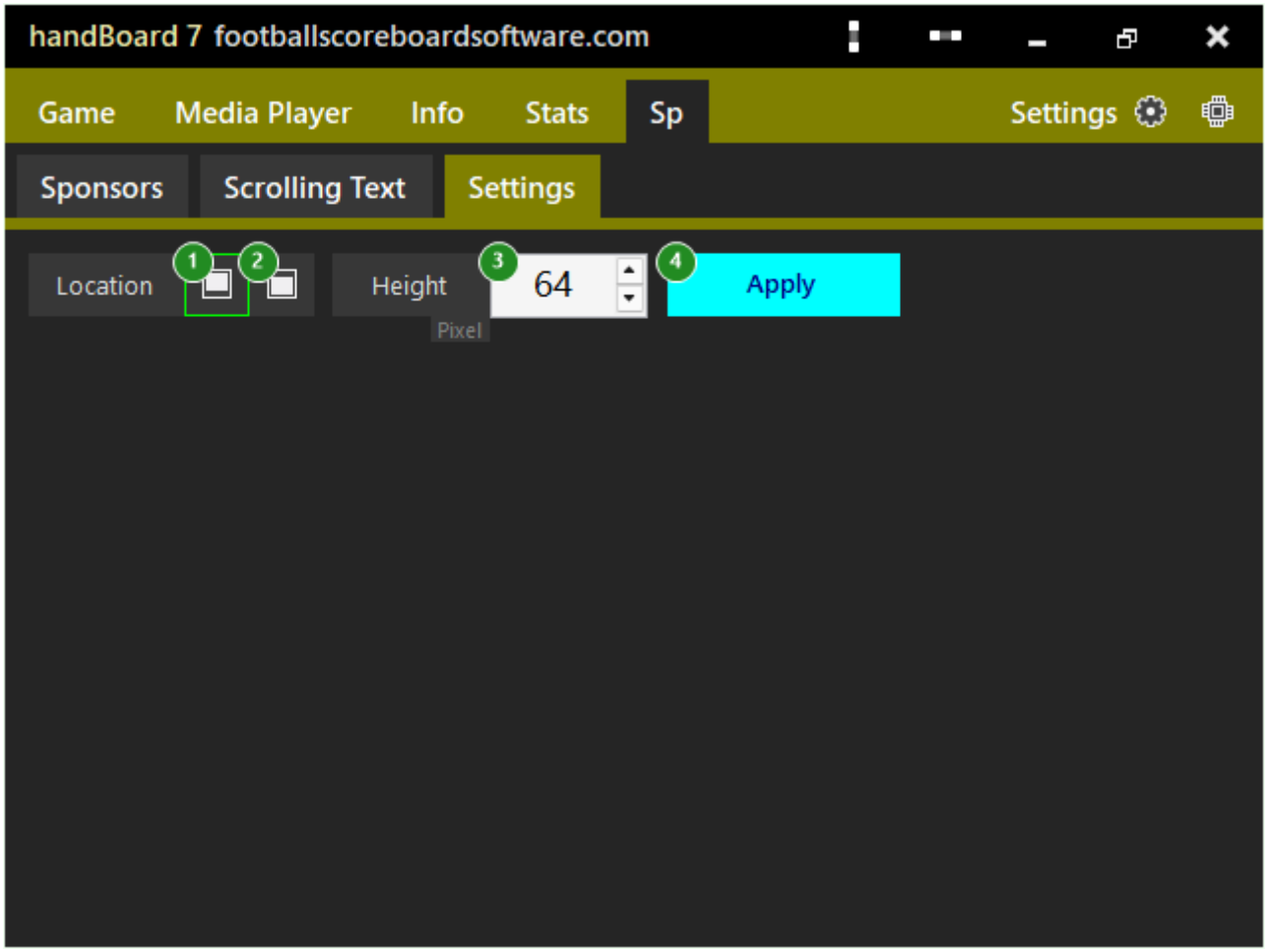


Figure 24. The Sp page: Settings with the location and height of the band.

No.	Control	Name	What It Does
1		**Bottom**	Puts the band at the bottom of the board (green frame = chosen). Click Apply to use it.
2		**Top**	Puts the band at the top of the board (green frame = chosen). Click Apply to use it.
3		**Height**	The height of the band in pixels (up to 1920, factory setting 64). Type it or use the arrows, then click Apply.
4		**Apply**	Saves the location and the height and changes the board at once.

- Location: the left button puts the band at the bottom, the right button at the top. The chosen one has a green frame.
- Height: the height of the band in pixels, up to 1920.
- Apply saves both values and changes the board at once.

Factory setting: Bottom, 64 pixels.

The band keeps the content you applied last (logos or text), also after a restart.

7.4 Advertisement (Ad)

The Advertisement board divides the board window into a scoreboard column, up to two banners and a large multimedia area for a video playlist, a camera or a screen capture.



Figure 25. The Advertisement board: the scoreboard column on the left, a video in the multimedia area and the sample text in banner 2 at the bottom.

The factory layout: the scoreboard column on the left (27 % of the board width), banner 2 at the bottom (15 % of the board height, beside the column), banner 1 off.

Open the Ad tab in the menu bar. The page has five tabs: Media Player, Camera, Screen Capture, Banner and Settings. It opens on the tab of the source you started last.

While a source runs on the Ad board, its tab on the page (Media Player, Camera or Screen Capture) and the Ad tab of the menu bar blink. Only one source shows at a time: starting one stops the other two.

Media Player

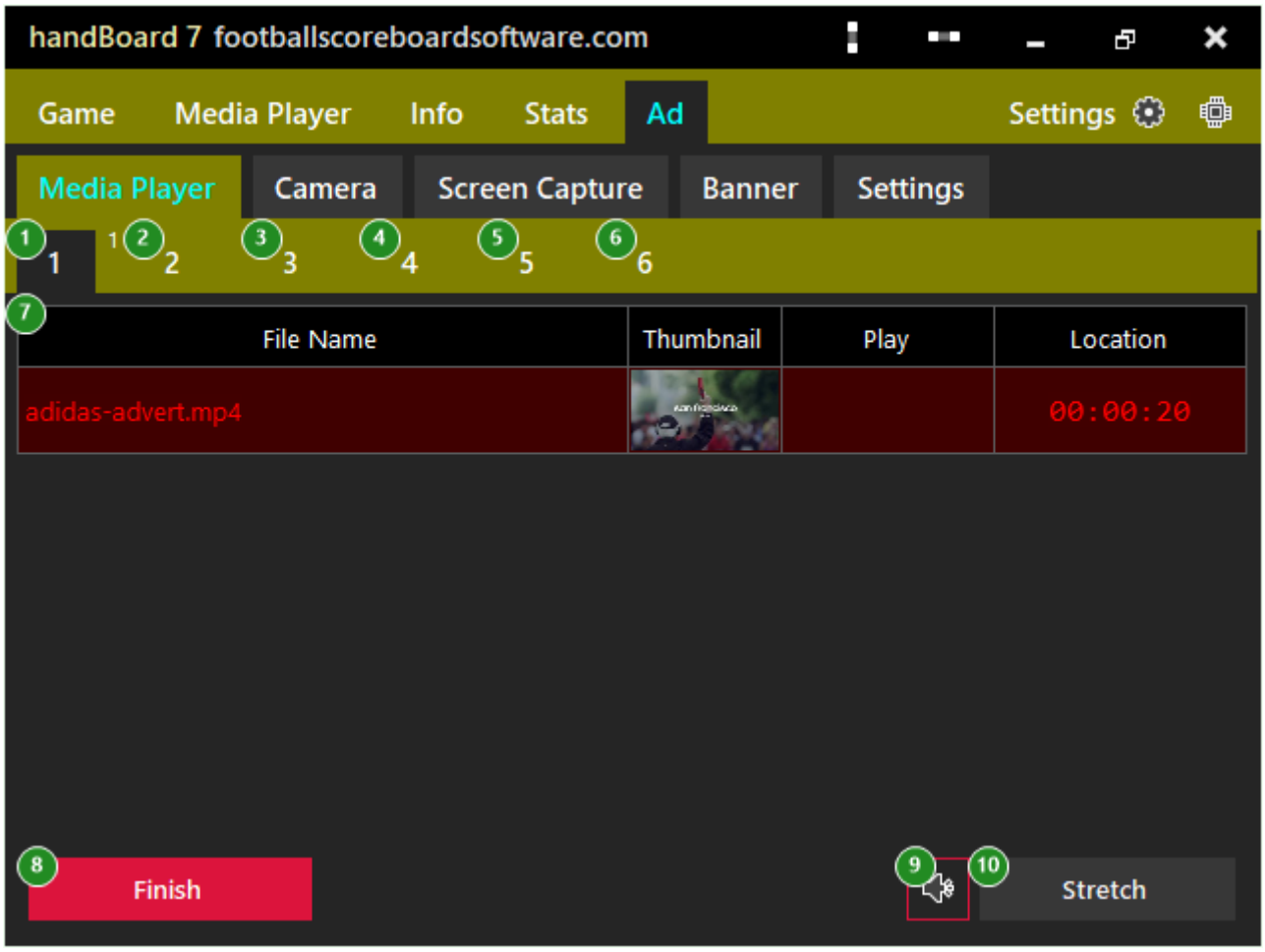
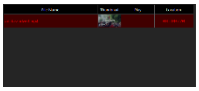
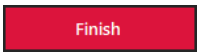


Figure 26. The Ad page: Media Player while playlist 1 plays in the multimedia area.

No.	Control	Name	What It Does
1	1	1	Opens playlist 1 of the Ad page. The small number above the button shows how many clips it holds. Not available while a clip plays.
2	2	2	Opens playlist 2 of the Ad page. Not available while a clip plays.
3	3	3	Opens playlist 3 of the Ad page. Not available while a clip plays.
4	4	4	Opens playlist 4 of the Ad page. Not available while a clip plays.
5	5	5	Opens playlist 5 of the Ad page. Not available while a clip plays.
6	6	6	Opens playlist 6 of the Ad page. Not available while a clip plays.

No.	Control	Name	What It Does
7		**Playlist**	The clips of the playlist: File Name, Thumbnail, Play and Location (time left of the playing clip). Click a row to select it; drag a row to change the order.
8		**Start / Finish**	Start plays the list from the selected clip in the multimedia area and repeats it; the button then reads Finish. Click Finish to stop.
9		**Sound**	Switches the sound of the clips on (green frame) or off (red frame).
10		**Display Mode (Stretch)**	Opens the list of display modes: how the picture fits the multimedia area (Center, CoverCenter, Original, SizeToFit, SizeToFitCenter, Stretch, ZoomCenter). The same setting as displayMode on the Settings tab.

The Ad Media Player has six playlists of its own for the multimedia area. They work like the playlists of the Media Player tab (chapter 12.1), with these differences:

- Start plays the list from the selected clip and keeps repeating it until you click Finish. There is no Return to Scoreboard button: the scoreboard column stays on the board all the time.
- The Play button in a row plays only that clip; click it again (Stop) to end it.
- While a clip plays, Add Clip, Delete Clip and Delete Playlist are hidden and the playlists cannot be switched.
- Stretch (or the mode shown on the button) sets how the picture fits the area. It is the same setting as displayMode on the Settings tab.

Camera

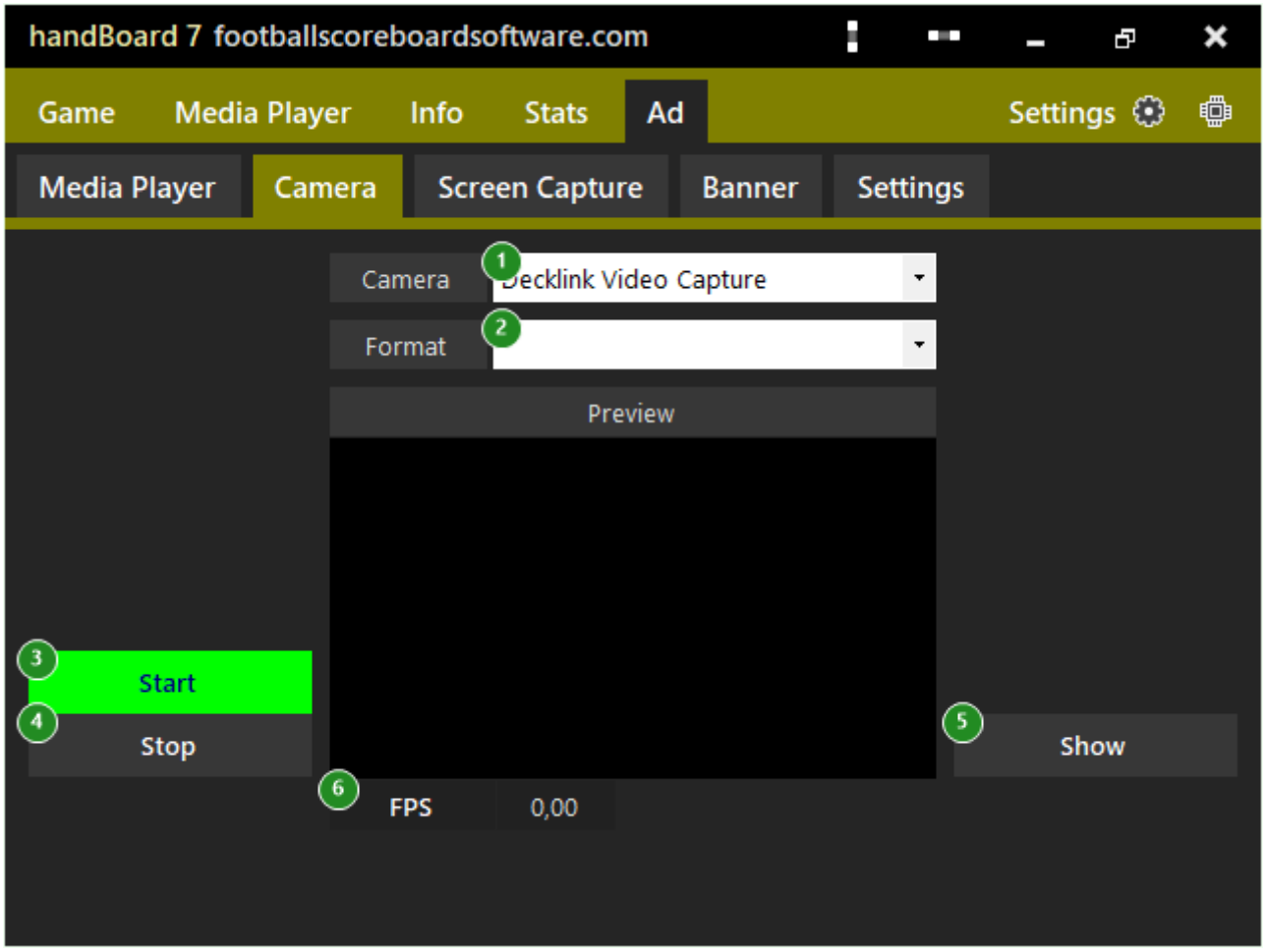


Figure 27. The Ad page: Camera.

No.	Control	Name	What It Does
1	Decklink Video Capture	**Camera**	The cameras and capture cards Windows offers. Choose one; the Format list then shows its formats.
2		**Format**	The picture formats of the chosen camera, for example 1920x1080 @ 30fps.
3	Start	**Start**	Opens the camera with the chosen format and shows its picture in the Preview.
4	Stop	**Stop**	Ends the camera picture (preview and board).
5	Show	**Show**	Puts the camera picture into the multimedia area of the Ad board. A playlist or a screen capture there stops.
6	FPS	**FPS**	Shows the frame rate the camera delivers.

1. Choose the camera (webcam or capture card) and its Format, for example 1920x1080 @ 30fps.
2. Click Start: the picture appears in the Preview.
3. Click Show: the picture goes into the multimedia area.
4. Stop ends it.

Chapter 12.2 has the details.

Screen Capture

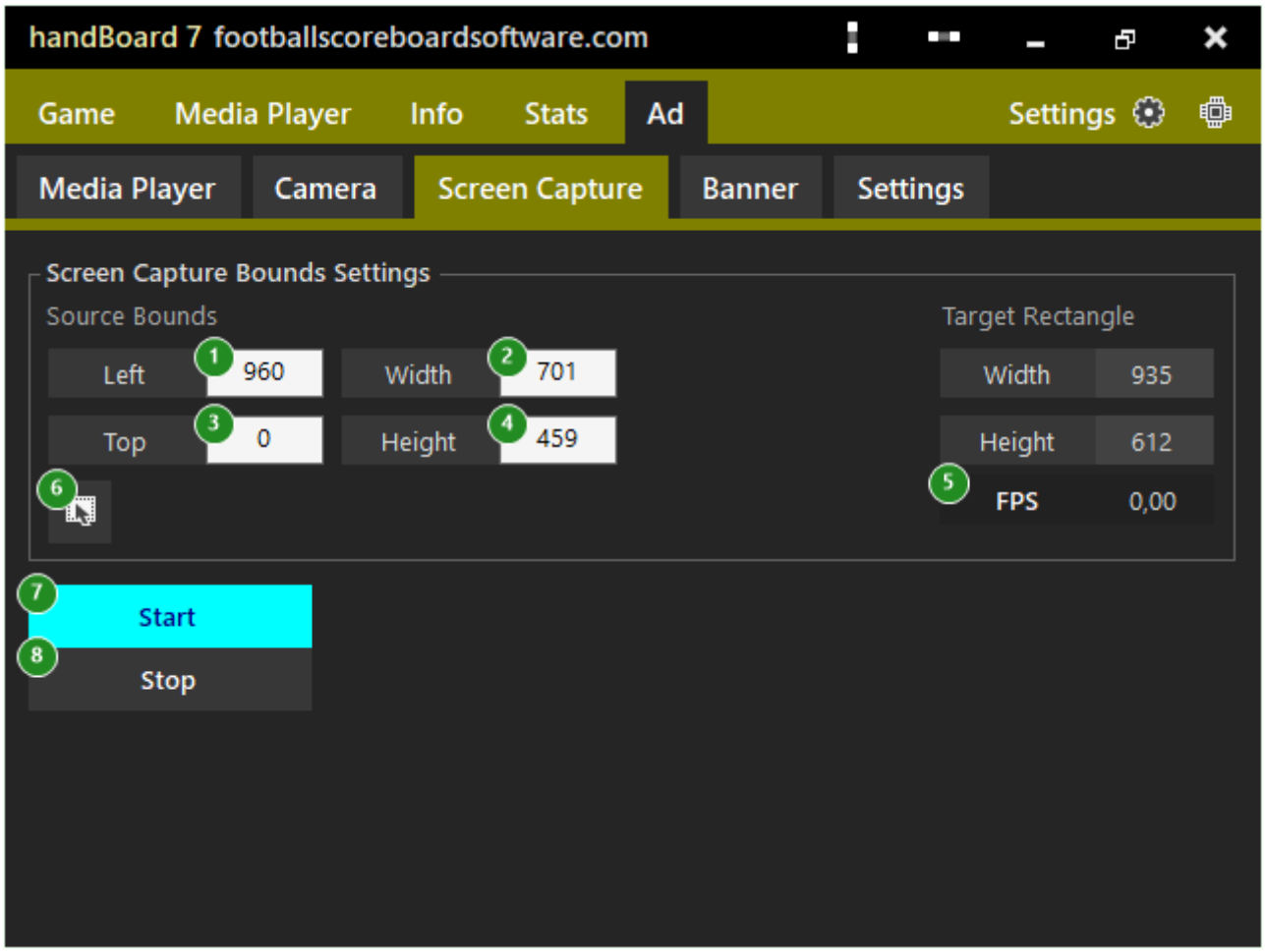


Figure 28. The Ad page: Screen Capture.

No.	Control	Name	What It Does
1	960	**Left**	Left edge of the captured area in pixels of the Windows desktop.
2	701	**Width**	Width of the captured area in pixels.
3	0	**Top**	Top edge of the captured area in pixels of the Windows desktop.
4	459	**Height**	Height of the captured area in pixels.
5	FPS	**FPS**	Shows the frame rate of the capture.
6		**Select Rectangle**	Lets you drag a frame on the screen; its position and size go into the four boxes.
7	Start	**Start**	Shows the area in the multimedia area of the Ad board and saves the bounds. A playlist or a camera there stops. Does nothing while a capture runs.
8	Stop	**Stop**	Ends the screen capture.

Shows a part of the PC screen in the multimedia area. Set the Source Bounds (Left, Top, Width, Height in pixels) or drag a frame with Select Rectangle, then click Start. Target Rectangle shows the size of the multimedia area (read only). Chapter 12.3 has the details.

Banner

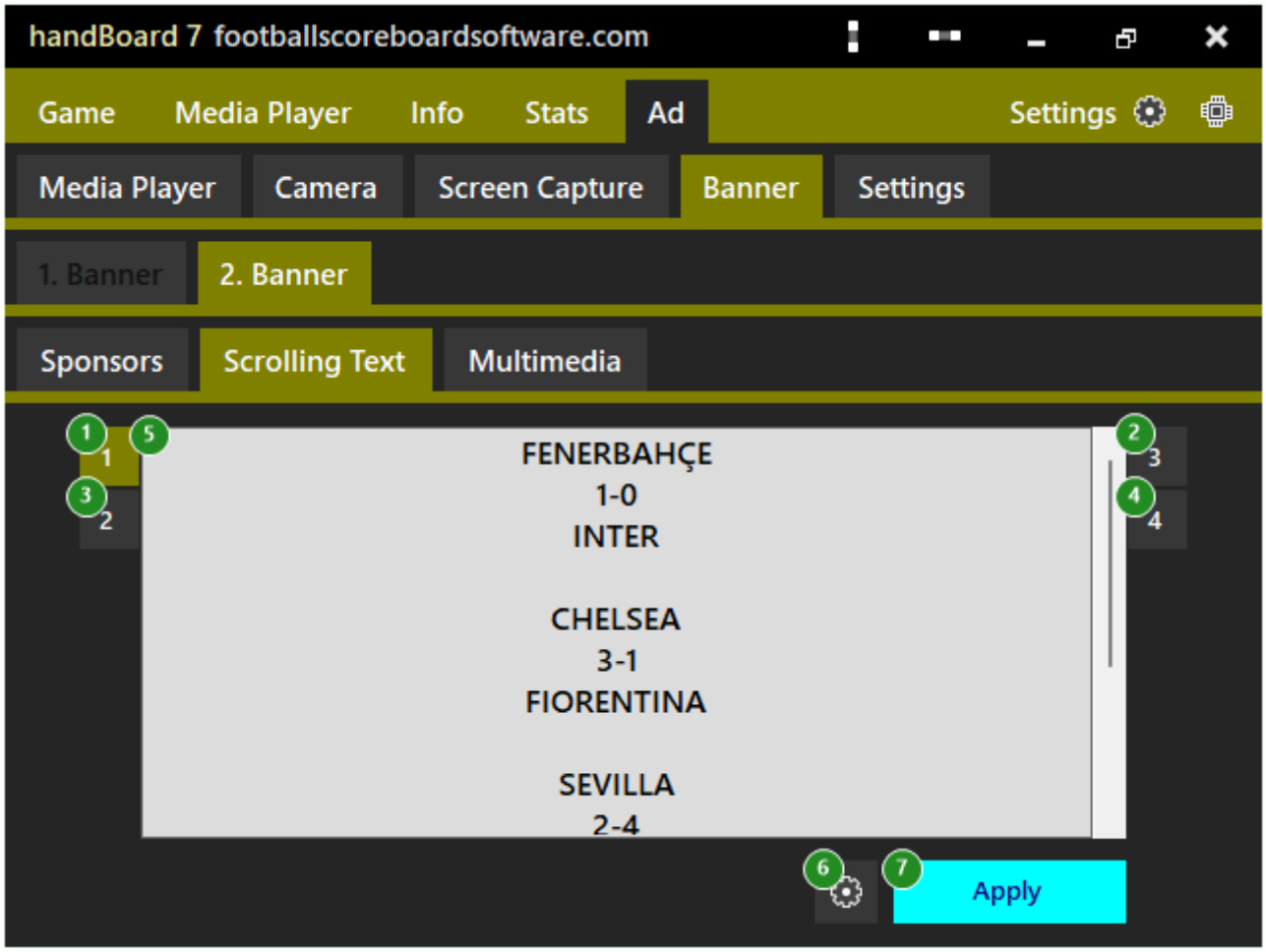
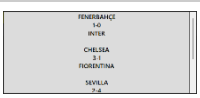


Figure 29. The Ad page: Banner, 2. Banner with the Scrolling Text of the sample text.

No.	Control	Name	What It Does
1		**1**	Text slot 1 of the banner.
2		**3**	Text slot 3 of the banner.
3		**2**	Text slot 2 of the banner.
4		**4**	Text slot 4 of the banner.
5		**Text**	The text of the selected slot, one item per line. The items scroll one after the other; an empty line makes a gap.

No.	Control	Name	What It Does
6		**Style (Gear)**	Opens or closes the text style of the banner: font, size, weight, line height, shadow, padding, top, speed, direction and the three colours.
7		**Apply**	Saves the text in the selected slot and scrolls it in the banner.

The tabs 1. Banner and 2. Banner hold the content of each banner. The tab of a banner that is switched off on the Settings tab is grey and cannot be clicked. Each banner has three content tabs:

Tab	What It Does
Sponsors	Apply puts the sponsor logos on the banner as an endless slide, as on the Sp page.
Scrolling Text	Four text slots and Apply, as on the Sp page. Each banner has its own texts and style.
Multimedia	Six playlists of videos and pictures that play inside the banner.

Settings

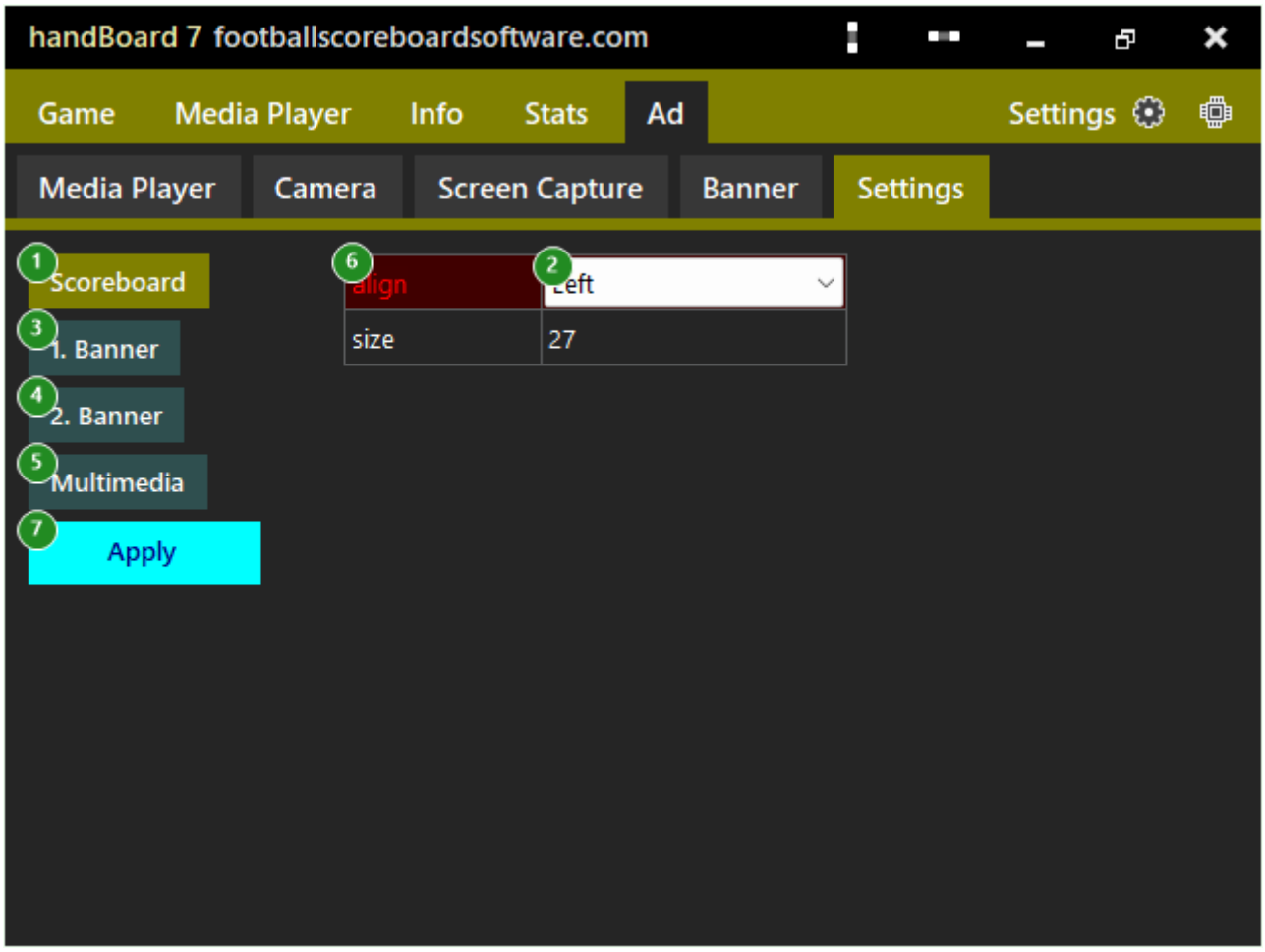
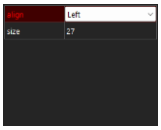


Figure 30. The Ad page: Settings with the values of the scoreboard column.

No.	Control	Name	What It Does
1	Scoreboard	**Scoreboard**	Shows the values of the scoreboard column (align, size) in the table.
2	Left	**align**	The drop-down list of the align value: Left, Right, Top or Bottom. Choose one, then click Apply.
3	1. Banner	**1. Banner**	Shows the values of banner 1 (align, size, dock, visible) in the table.
4	2. Banner	**2. Banner**	Shows the values of banner 2 (align, size, dock, visible) in the table.
5	Multimedia	**Multimedia**	Shows the displayMode of the multimedia area (how the picture fits) in the table.
6		**Layout Values**	Property and value of the selected part. Click a value to change it: align, dock, visible and displayMode give a drop-down list, size is typed in % of the board.
7	Apply	**Apply**	Saves the values of the selected part and changes the Ad board at once. A banner with size 0 or visible No is switched off and its content stops.

Choose a part on the left, change its values in the table, then click Apply. The board changes at once.

Part	Values
Scoreboard	align: Left, Right, Top or Bottom. size: the width of the column in % of the board width (the height for Top and Bottom).
1. Banner, 2. Banner	align: Top, Bottom, Left or Right. size: the height in % of the board height. dock: Yes = the banner runs across the whole board width, also over or under the scoreboard column; No = only beside the column. visible: Yes or No. A banner with size 0 or visible No is off and its content stops.
Multimedia	displayMode: how the picture fits the multimedia area: Center, CoverCenter, Original, SizeToFit, SizeToFitCenter, Stretch (default) or ZoomCenter.

> **Note:** A design saved in the Advertisement mode keeps this layout and brings it back when you apply it from the design gallery (chapter 8.4).

7.5 Chroma Key (CK)

The CK board shows a compact scorebug and lower-third graphics on a key colour. A vision mixer (or vMix, OBS ...) removes the key colour and lays the graphics over the camera picture.

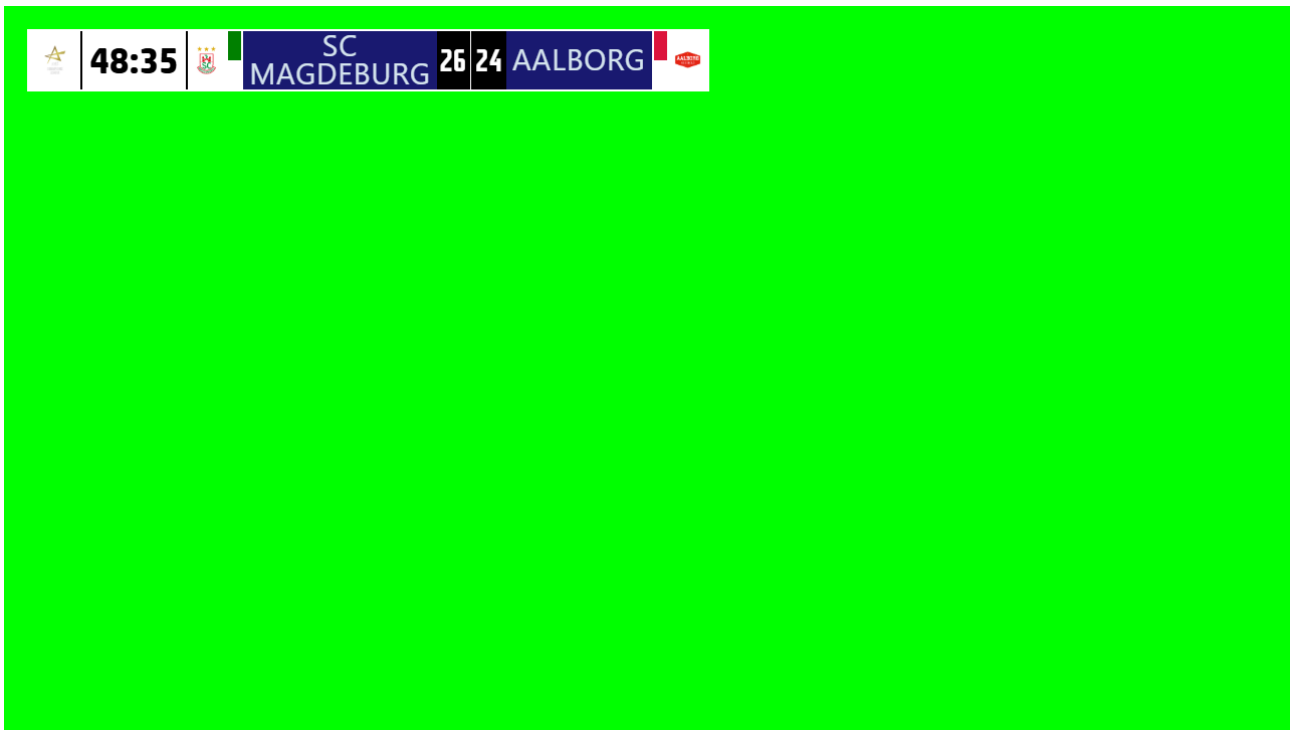


Figure 31. The CK board: the scorebug on the green key colour.

Open the CK tab in the menu bar. The page has five tabs: Info, Media Player, Camera, Screen Capture and Settings.

Info



Figure 32. The CK page: Info.

No.	Control	Name	What It Does
1	Info	**Info**	Opens the Info tab of the CK page: the scorebug and the lower thirds.
2	Media Player	**Media Player**	Opens the Media Player tab of the CK page: playlists behind the CK graphics. Blinks while a playlist plays.
3	Camera	**Camera**	Opens the Camera tab of the CK page: a camera picture behind the CK graphics. Blinks while the camera is shown.
4	Screen Capture	**Screen Capture**	Opens the Screen Capture tab of the CK page: a part of the PC screen behind the CK graphics. Blinks while the capture runs.
5	Settings	**Settings**	Opens the Settings tab of the CK page: the chroma key colour.
6	Scoreboard	**Scoreboard**	Shows the scorebug on the CK board.
7	Hide	**Hide**	Takes the scorebug off the CK board.
8	Goal	**Goal**	Opens the editor of the Goal lower third; Show there puts it on the CK board (chapter 9).

No.	Control	Name	What It Does
9	Hide	**Hide**	Takes the lower third that is on air off the CK board.
10	2 Min	**2 Min**	Opens the editor of the 2-minute suspension lower third; Show there puts it on the CK board (chapter 9).
11	Hide	**Hide**	Takes the lower third that is on air off the CK board.
12	Yellow Card	**Yellow Card**	Opens the editor of the Yellow Card lower third; Show there puts it on the CK board (chapter 9).
13	Hide	**Hide**	Takes the lower third that is on air off the CK board.
14	Red Card	**Red Card**	Opens the editor of the Red Card lower third; Show there puts it on the CK board (chapter 9).
15	Hide	**Hide**	Takes the lower third that is on air off the CK board.
16	Substitution	**Substitution**	Opens the editor of the Substitution lower third; Show there puts it on the CK board (chapter 9).
17	Hide	**Hide**	Takes the lower third that is on air off the CK board.
18	Timeline	**Timeline**	Opens the timeline of the match, from where it is shown as a lower third (chapter 10).
19	Hide	**Hide**	Takes the lower third that is on air off the CK board.

- Scoreboard shows the scorebug; its Hide button takes it off.
- Goal, 2 Min, Yellow Card, Red Card and Substitution open the editor of that lower third; Show there puts it on the CK board (chapter 9).
- Timeline opens the timeline of the match; from there you show it as a lower third (chapter 10).
- The Hide buttons next to the lower thirds take the lower third that is on air off the board. There is one lower third at a time, so each of these Hide buttons takes off whichever is showing.

Media Player, Camera and Screen Capture

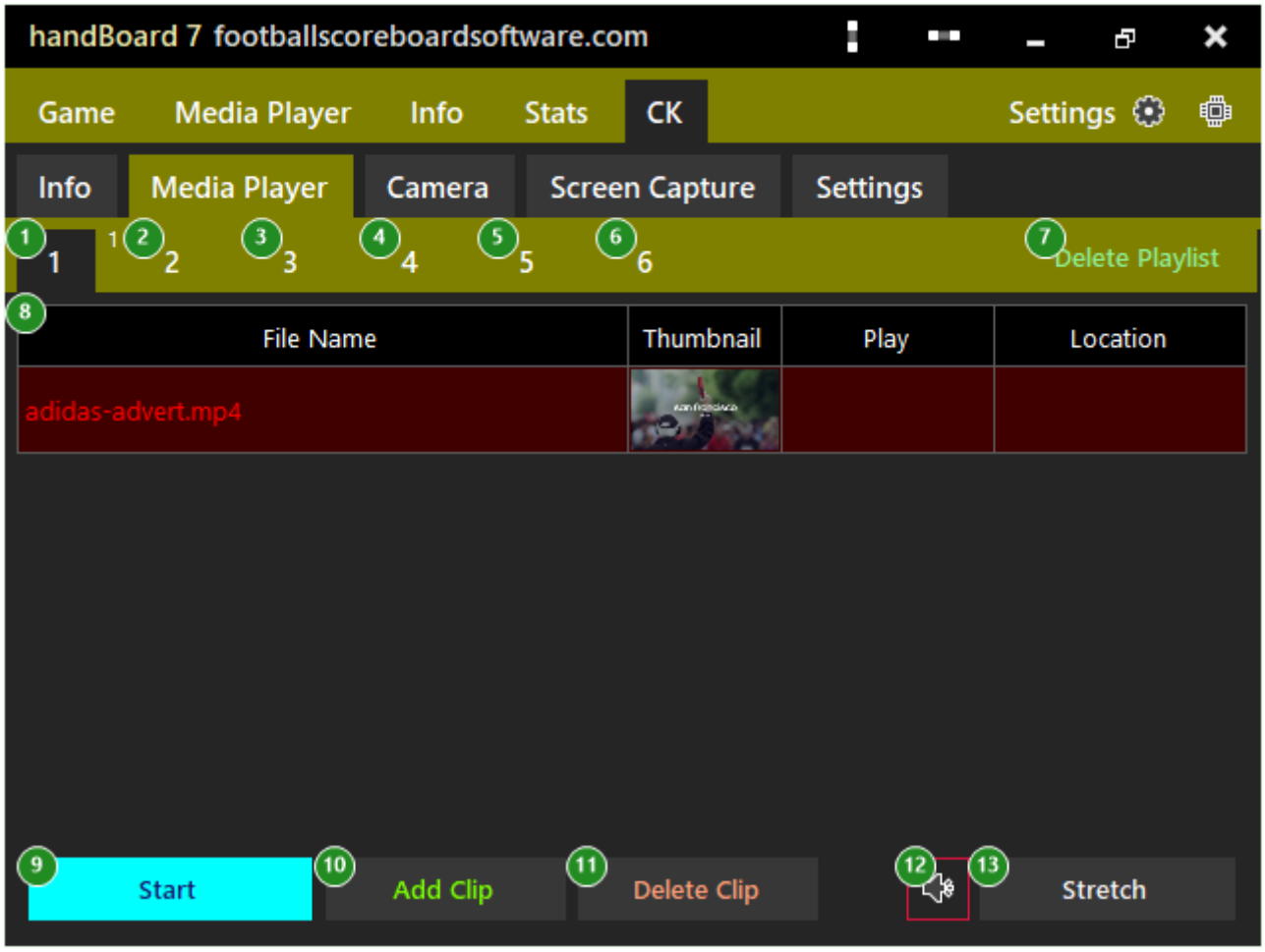
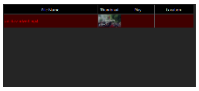
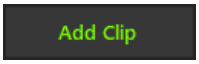


Figure 33. The CK page: Media Player.

No.	Control	Name	What It Does
1	1	1	Opens playlist 1 of the CK page. The small number above the button shows how many clips it holds. Not available while a clip plays.
2	2	2	Opens playlist 2 of the CK page. Not available while a clip plays.
3	3	3	Opens playlist 3 of the CK page. Not available while a clip plays.
4	4	4	Opens playlist 4 of the CK page. Not available while a clip plays.
5	5	5	Opens playlist 5 of the CK page. Not available while a clip plays.
6	6	6	Opens playlist 6 of the CK page. Not available while a clip plays.
7	Delete Playlist	**Delete Playlist**	Empties the current playlist at once, without a question. Hidden while a clip plays.

No.	Control	Name	What It Does
8		**Playlist**	The clips of the playlist: File Name, Thumbnail, Play and Location (time left of the playing clip). Click a row to select it; drag a row to change the order.
9		**Start / Finish**	Start plays the list from the selected clip behind the CK graphics and repeats it; the button then reads Finish. Click Finish to stop.
10		**Add Clip**	Adds video, audio or picture files to the playlist. Hidden while a clip plays.
11		**Delete Clip**	Removes the selected clip from the playlist. Hidden while a clip plays.
12		**Sound**	Switches the sound of the clips on (green frame) or off (red frame).
13		**Display Mode (Stretch)**	Opens the list of display modes: how the picture fits the CK board (Center, CoverCenter, Original, SizeToFit, SizeToFitCenter, Stretch, ZoomCenter).

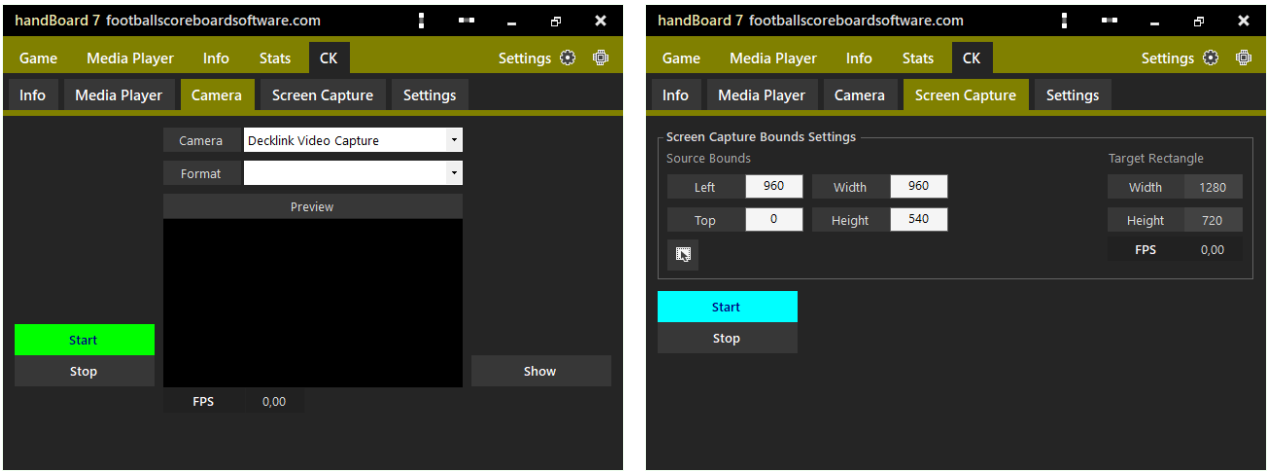


Figure 34. The CK page: Camera (left) and Screen Capture (right).

They work as on the Ad page (section 7.4 and chapter 12), with their own playlists and their own camera and capture settings. The picture fills the whole CK board behind the scorebug and the lower thirds, in place of the key colour. While a source runs, its tab and the CK tab of the menu bar blink.

Settings

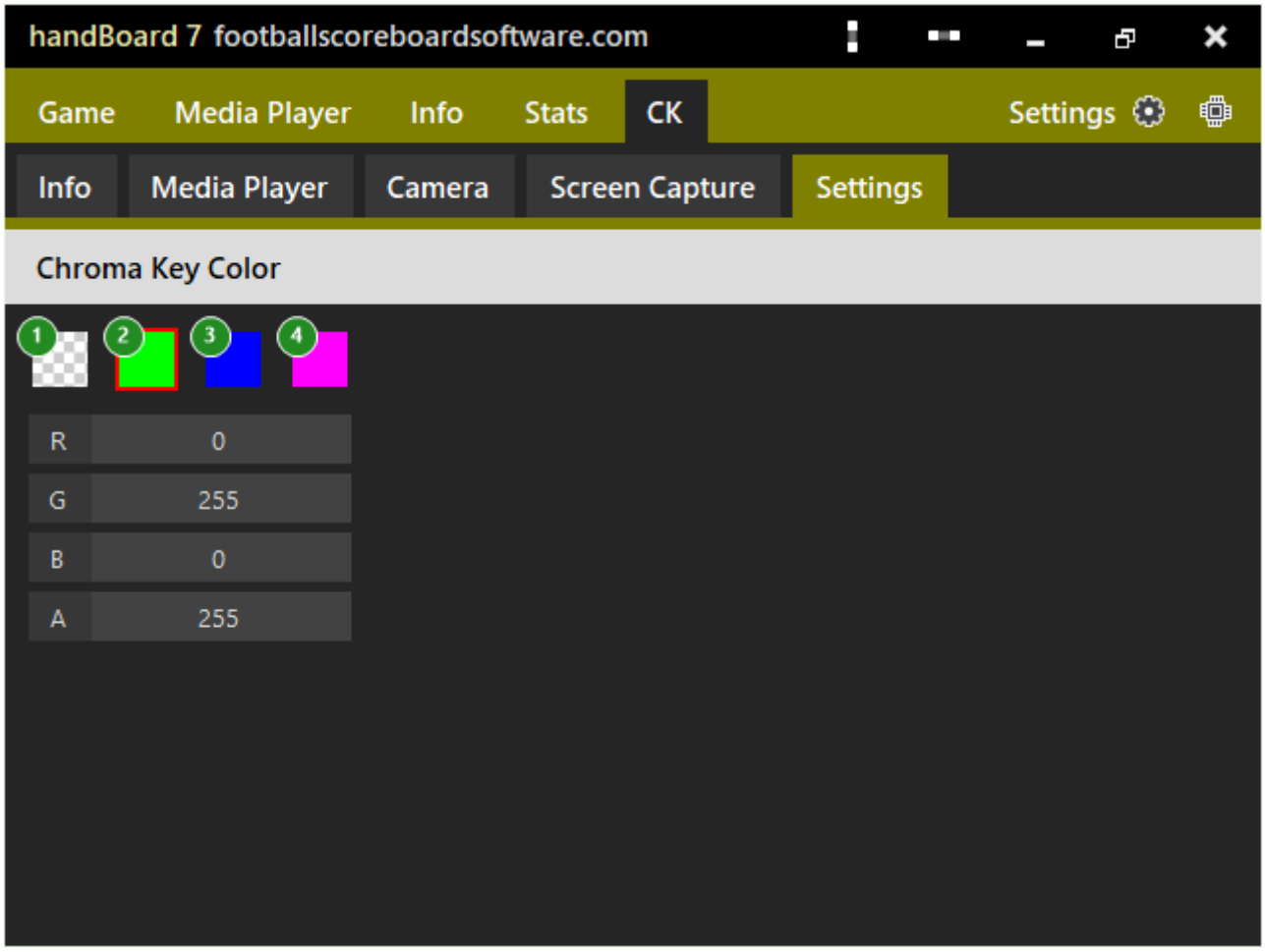


Figure 35. The CK page: Settings with the chroma key colour (green chosen).

No.	Control	Name	What It Does
1		**Transparent**	Makes the background of the CK board see-through on the Windows desktop (pure black in the graphics too). Not for NDI.
2		**Green**	Key colour green (R 0, G 255, B 0), the factory setting. Used at once; the chosen colour has a red frame.
3		**Blue**	Key colour blue (R 0, G 0, B 255). Used at once.
4		**Magenta**	Key colour magenta (R 255, G 0, B 255). Used at once.

Choose the Chroma Key Color: transparent, green (the factory setting), blue or magenta. The chosen colour has a red frame, its R, G, B and A values are shown below, and the board uses it at once.

Colour	R, G, B	Use
Green	0, 255, 0	The usual key colour.
Blue	0, 0, 255	When the graphics or the team colours contain much green.

Colour	R, G, B	Use
Magenta	255, 0, 255	When both green and blue appear in the graphics.
Transparent	–	The board window becomes see-through on the Windows desktop: only the graphics are visible, the desktop shows behind them. Pure black in the graphics also becomes see-through.

> **Note:** For NDI output and for a video output into a vision mixer, use green, blue or magenta: the NDI stream carries no transparency (chapter 12.4).

7.6 Board Formats

The factory designs place every object in percent of the board width (left, width ...) and of the board height (top, height, font size ...). So the board fills any window size you set in Screen Properties: 16:9, 4:3, 5:4 or a wide LED strip.

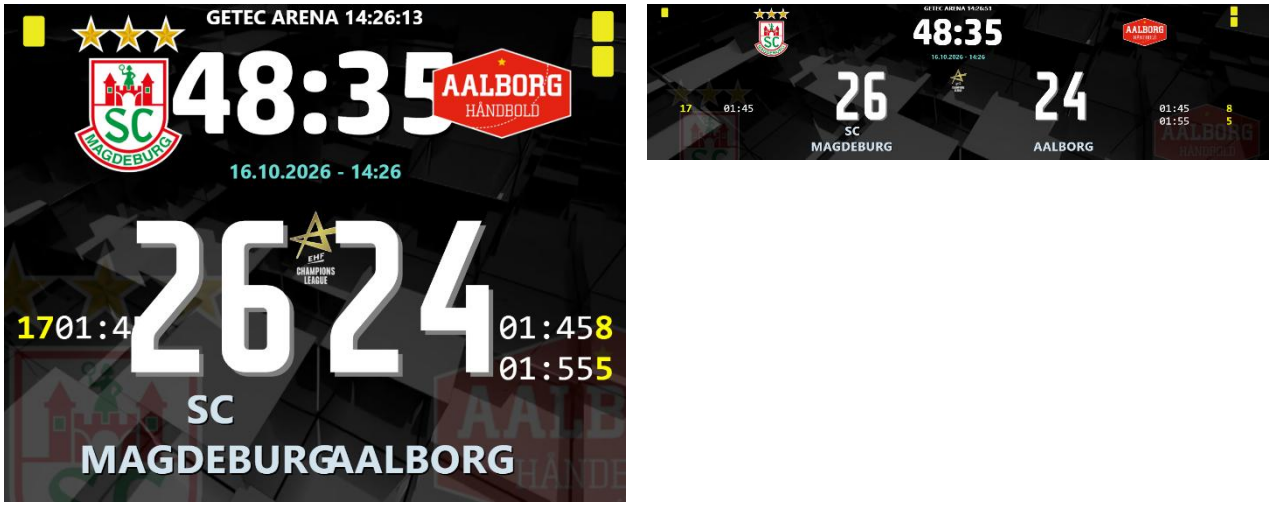


Figure 36. The Standard board at 1280 × 1024 (5:4) and on a 1920 × 480 LED strip.

The designs are made for 16:9. On a format far from 16:9, check the board and adjust the position and size of the objects in the design editor (chapter 8.5), then save the result as your own design for that screen.

7.7 Typical Set-Ups

LED wall or screen in the venue:

1. Connect the LED controller (or screen) as a second display of the PC and extend the Windows desktop to it.
2. In Settings > Screen Properties set L and T to the position of that display in the Windows layout, W and H to its resolution (or to the size the LED controller expects).
3. Use the Standard mode, the Sponsored mode for a sponsor band, or the Advertisement mode for video and live pictures during the breaks.

TV production with a vision mixer:

1. Choose the CK mode and a key colour on the CK page > Settings.
2. Send the CK board to the mixer: as a video output of the PC (second display into a converter), or over the network with the NDI button (chapter 12.4).
3. Key the colour out in the mixer; the scorebug and the lower thirds lie over the camera picture.
4. Show the lower thirds from the Info tab of the CK page.

Streaming with a software mixer (OBS, vMix):

1. Click NDI on the Game tab. The board appears in the software as the NDI source Hb7_NDI.
2. For an overlay use the CK mode and a chroma-key filter on the source in the software; for a full-screen graphic use the Standard mode.

In every set-up the operator can work in the main window, from a phone or tablet (chapter 13) or with the keyboard shortcuts (chapter 15).

8. Designs and the Design Editor

Every display mode draws its scoreboard from a design: the position, size, colour and font of each object on the board. The info screens (chapter 9) and the CK lower thirds have designs of their own. This chapter explains where the designs come from, how you choose one, and how you change it.

8.1 The Factory Masters

handBoard 7 ships factory designs, the masters. A master is a starting point: you can apply it, change the board in the design editor and save the result as your own design, but the program does not change the master itself.

Master (as listed in the gallery)	Display Modes
_Master - [St]andart Design [1] (default), [2], [3]	St and Sp
_Master - [Ad]vertise Design [1], [2], [3]	Ad
_Master - [CK]Chroma Key Design [1]	CK

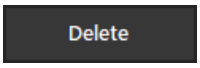
- The Sponsored mode uses the Standard designs: the gallery in the Sp mode lists the St designs.
- An Advertisement master also brings a layout of the Ad board (scoreboard column and banners, chapter 7.4).
- The Chroma Key master brings the scorebug and all CK lower thirds.

8.2 Design Gallery

1. On the Game tab, choose the display mode (St, Sp, Ad or CK, chapter 7).
2. Click Select Design, the small button under the CK button. The Open Design window opens next to it.
3. Click a design in the list. The preview on the right shows it with the live score of the match.
4. Click Apply.



Figure 37. The Open Design window with the Standard masters and the live preview.

No.	Control	Name	What It Does
1		**Close (X)**	Closes the window without a change. Esc or a click outside the window does the same.
2		**Design List**	The designs of the current display mode, sorted by name: the masters and your own designs. Click one to see it in the preview with the live score.
3		**Delete**	Deletes one of your own designs: the first click turns the button red, the second click deletes. Does nothing on a master.
4		**Rename (Pencil)**	Lets you type a new name for one of your own designs in the list; press Enter to keep it. Does nothing on a master.
5		**Apply**	Uses the selected design for the current display mode, redraws the board and closes the window.

The list is sorted by name and shows only the designs of the current display mode. Esc, the X or a click outside the window closes it without a change.

What Apply does:

Display Mode	Apply Brings
St, Sp	The scoreboard layout of the design. The info screens stay as they are.
Ad	The scoreboard layout, and the layout of the Ad board (scoreboard column, banner 1, banner 2) saved with the design.
CK	The CK master: the scorebug and the lower thirds.

8.3 Where the Designs Are Stored

The designs are files in two folders under C:\handBoard7\common\vizrt:

Folder	What It Holds
storage	The factory masters: the scoreboard designs (<GUID>.xml, for Ad also <GUID>_Segment.xml with the layout of the Ad board), the factory info-screen designs (storage\St), the CK master (storage\CK\<GUID>) and the list of the gallery, dataBoards.xml. Your own saved designs are added here too.
current	The working copies: the scoreboard the board shows now (Game.xml), the kept scoreboard of each display mode (current\Game\St, current\Game\Ad, current\Game\CK), each info screen, Banner, Announce and each CK lower third.

A design is an XML file: one entry for each object of the board, with its Location values (position and size) and its Style values (colour, font, border ...). Each time the board is drawn, the program turns the working copy into a stylesheet and a web page for the board window.

How the folders work together:

- Apply in the gallery copies a design from storage into the working copy in current.
- The design editor changes only the working copy, element by element.
- Save Design As copies the working scoreboard into storage as a new design of your own.
- Factory Settings in the design editor copies the factory version of one screen back into the working copy.

When you switch the display mode, the working scoreboard of the mode you leave is kept in current\Game\<mode>, and the one of the new mode comes back. Each display mode therefore keeps its own scoreboard. The St and Sp modes share one (current\Game\St).

> **Note:** The setup copies the whole common folder, and with it the folders storage and current. Before you install an update over a working installation, copy C:\handBoard7\common\vizrt to a safe place, so that your own designs and your changed working copies can be put back.

8.4 Saving Your Own Design

1. Open the design editor of the display mode (section 8.5) and change the scoreboard (Game).
2. Click Save Design As, the disk icon in the title bar of the editor.
3. Type a name ("Please Enter a Name") and confirm. The program reports "The data has been successfully saved."

Your design appears in the gallery of that display mode, next to the masters.

- Save Design As keeps the scoreboard (Game) only. The info screens, Banner and Announce are not part of it.
- In the Advertisement mode the design also keeps the layout of the Ad board (chapter 7.4). Apply brings that layout back.
- Make and save the designs for the Sponsored mode in the Standard mode: the Sp gallery lists the St designs.
- In the Chroma Key mode, saving is not supported: the program shows "Sorry, Design Saving Is Not Supported For CK Mode Yet!".
- Rename (the pencil button in the gallery) lets you type a new name for one of your own designs in the list; press Enter to keep it.
- Delete in the gallery removes one of your own designs: the first click turns the button red, the second click deletes the design without a further question.
- The masters cannot be renamed or deleted; the buttons do nothing on them.

8.5 The Design Editor

Open Settings and click the design button of the current display mode: [St]andard Board Design, [Sp]onsored Board Design, [Ad]vertisement Board Design or [CK] Board Design. Only the button of the active display mode can be clicked. The editor fills the work area; its title shows the board and the selected screen, for example "[St]andard Board Design - Game".

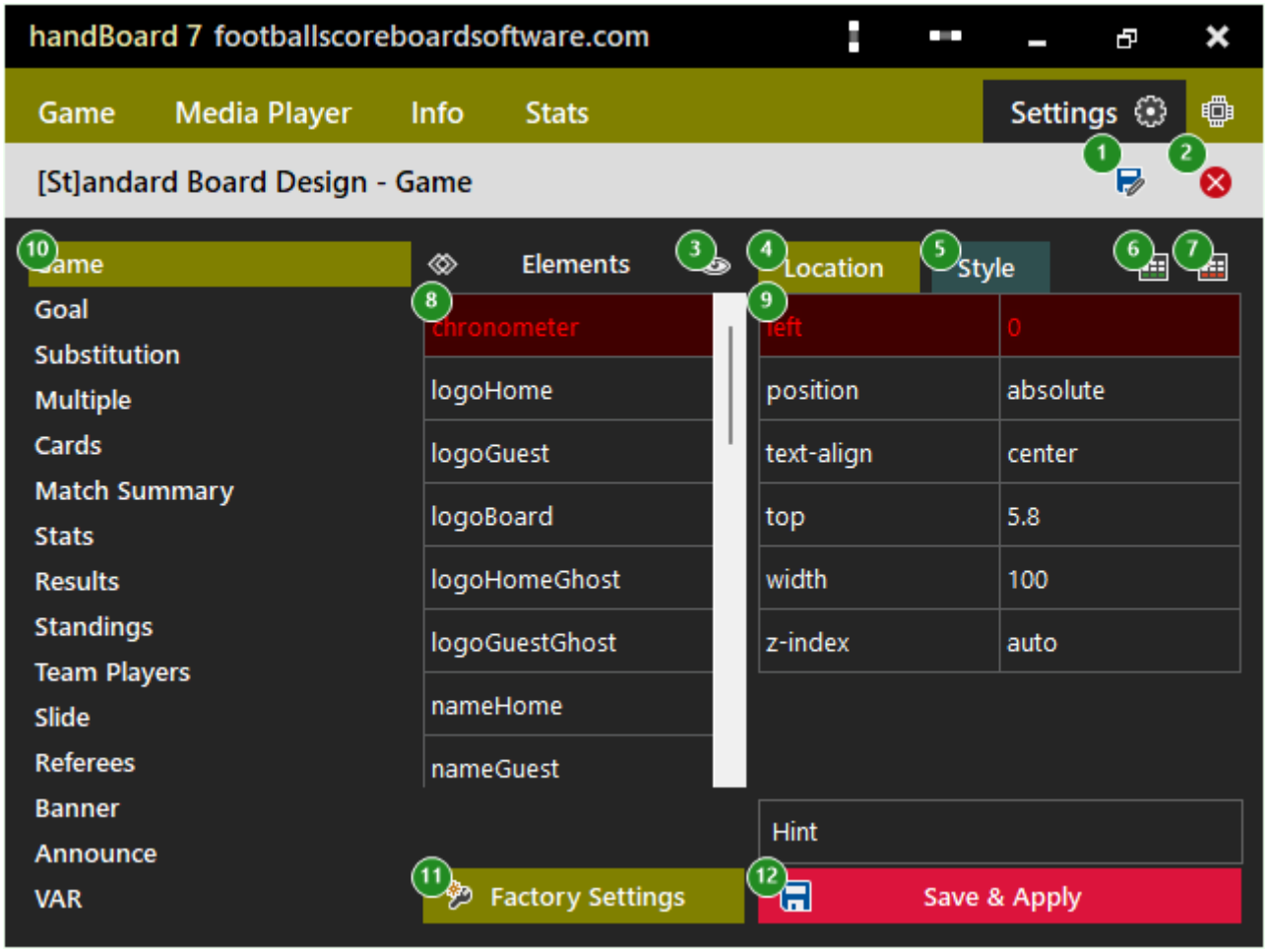
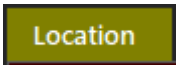
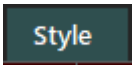
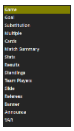
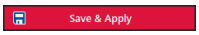


Figure 38. The design editor of the Standard board with the Game screen and the element chronometer (the match clock) selected.

No.	Control	Name	What It Does
1		**Save Design As (Disk)**	Saves the current scoreboard as your own design under a name you type; it then appears in the design gallery. Not supported in the CK mode.
2		**Close (X)**	Closes the design editor.
3		**Show or Hide (Eye)**	Switches the selected element between shown (display: block) and hidden (display: none). Click Save & Apply to use it.
4		**Location**	Shows the position and size values of the selected element (left, top, width, height ...).
5		**Style**	Shows the look values of the selected element (colour, font, border, shadow ...).
6		**Insert Row**	Adds an empty value row: choose or type the property, then type the value.
7		**Delete Row**	Removes the selected value row.
8		**Elements**	Every object of the selected screen; hidden objects are grey. Click one to load its values; the board frames it with a red dotted line.

No.	Control	Name	What It Does
9		**Values**	The property and value rows of the element. Click a property for the list of property names; click a value and type (or press F2). A colour value gets a colour picker button, font-family a font picker button.
10		**Screen List**	Game (the scoreboard), the info screens, Banner and Announce; in CK the scorebug and the lower thirds. Click one to edit it; the board shows that screen.
11		**Factory Settings**	After a question, brings back the factory version of the selected screen.
12		**Save & Apply**	Saves the values shown (Location or Style) of the selected element and redraws the board.

The screen list on the left:

Display Mode	Screens
St, Sp, Ad	Game (the scoreboard), Goal, Substitution, Multiple, Cards, Match Summary, Stats, Results, Standings, Team Players, Slide, Referees, Banner, Announce, VAR
CK	Game (the scorebug), Goal, Substitution, Cards, Match Summary, Penalty (the 2-minute suspension), VAR

How to change an element:

1. Click the screen in the list. The board shows that screen.
2. Click the element in the Elements list (hidden elements are grey). The board frames it with a red dotted line.
3. Click Location (position and size) or Style (look) and change the values in the table.
4. Click Save & Apply. The board is redrawn with the new values.

- Save & Apply saves the values of the table you see. Save the Location values before you switch to Style (and the other way round), and before you select another element: unsaved values are dropped.
- Click a property name for a list of property names, or type a new one. Hint lists typical values of the property for reference; type the value into the value cell (or press F2).
- A colour property gets a colour picker button in its value cell, font-family a font picker button.
- Insert Row adds an empty value row, Delete Row removes the selected row.
- The eye button switches the element between shown (display: block) and hidden (display: none); then click Save & Apply.
- A number without a unit is a percentage of the board: of the width for left, right, width and the left and right margins and paddings; of the height for top, bottom, height, font-size, line-height, margin, padding and gap. Values with px, em, %, vh or vw are kept as typed.
- The X at the top right closes the editor.

> **Note:** The editor works on the live board: selecting a screen puts it on the board output, and Save & Apply redraws it. Do not edit designs while you are on air. Click the Game tab to bring back the scoreboard.

Factory Settings

To undo your changes of one screen, select it in the design editor and click Factory Settings. The program shows the display mode and the screen and asks "Factory Settings Will Be Restored. Are You Sure?". After OK:

Screen	What Comes Back
An info screen, Banner or Announce	The factory design of that screen. Do this in the Standard mode: the St, Sp and Ad modes share the info screens, and in the Sp and Ad modes the program reports "File Not Found!".
A CK screen	That screen from the Chroma Key master.
Game (St, Sp, Ad)	A stored version of the scoreboard design.

> **Note:** To bring a scoreboard back to a master for sure, apply the master again in the design gallery (section 8.2). This does not touch your saved designs.

8.6 Background Video and Middle Image

The Standard, Sponsored and Advertisement boards have two layers behind the scoreboard: a background video and a middle-layer image above it. The CK board has neither; it shows the key colour or the picture of a running source (chapter 7.5).

The two buttons at the bottom right of the Game tab choose them:

Button	What It Does
Select Background Layer Video File (film icon)	Opens a file window (mp4, webm, ogg; the folder media\videos) and uses the video as the moving background. It plays in a loop, without sound.
Select Middle Layer Image File (picture icon)	Opens a file window (bmp, gif, jpeg, jpg, png) and lays the picture over the video, stretched to the whole board. A png with transparent parts lets the video show through.
Small red mark on each button	Removes the video or the image.

- Settings > Screen Properties > Background Video Opacity (0-10, default 6) sets how strongly the video shows.
- The board is redrawn at once. The choice is kept for all three display modes and after a restart.
- The factory background video is BlackRoyal.mp4 (media\videos); the factory installation has no middle image.

9. Info Screens

The info screens put an event or a list on the board instead of the scoreboard: a banner before the match, a goal, a 2-minute suspension, a card, a substitution, the team lists, the referees. In the St, Sp and Ad display modes a screen fills the board window; in the CK mode the CK page has its own lower thirds (section 9.16).

9.1 The Info Tab

Click Info in the menu bar. Every button on the left opens an editor in the work area; nothing changes on the board until you click Show in the editor.

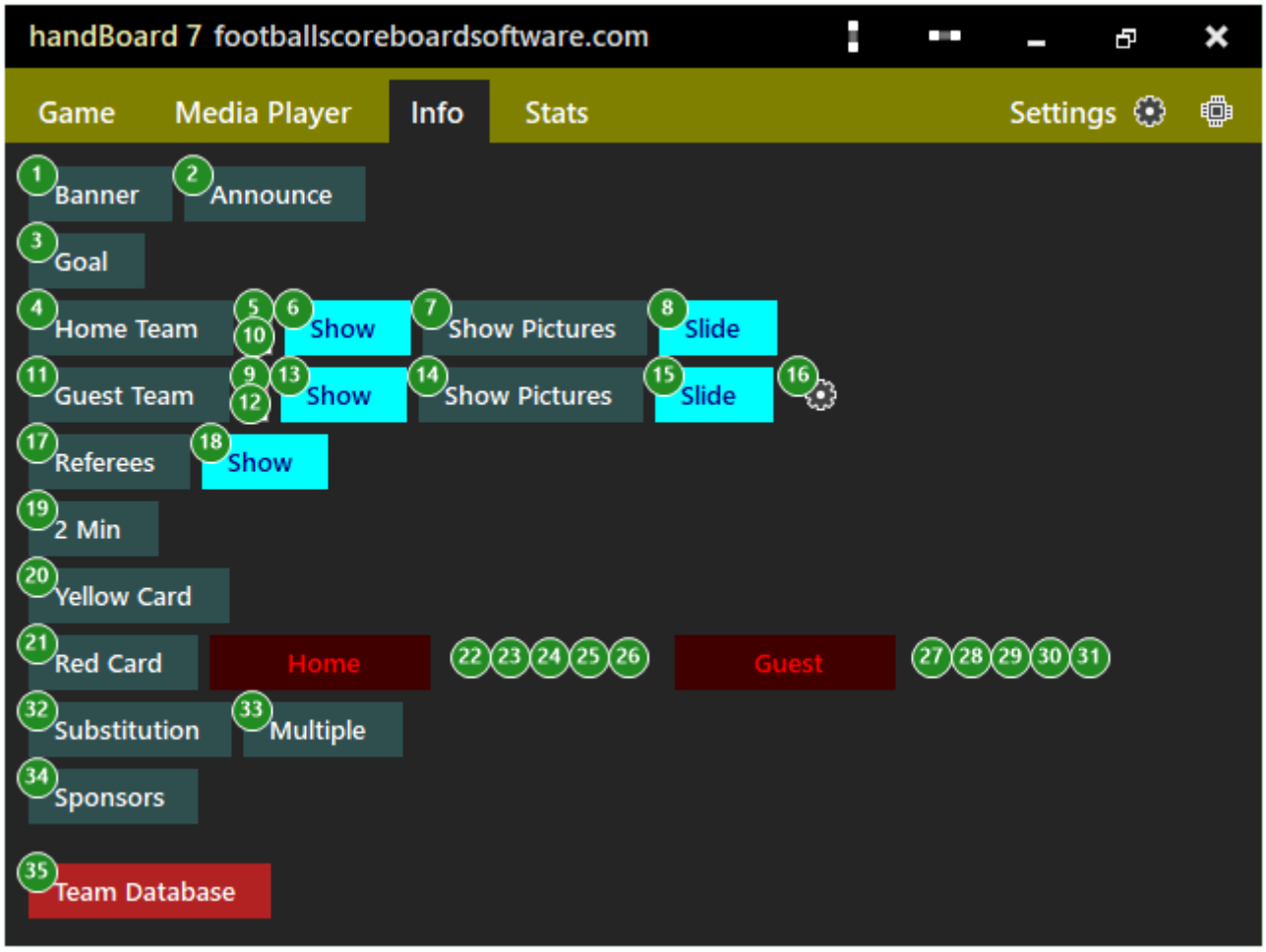
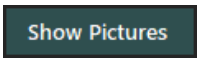
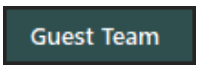
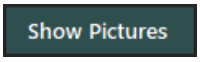
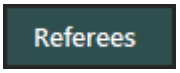
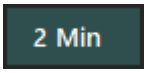
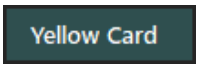
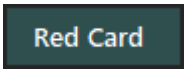
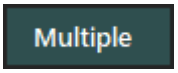


Figure 39. The Info tab.

No.	Control	Name	What It Does
1	Banner	**Banner**	Opens the Banner editor (section 9.3).
2	Announce	**Announce**	Opens the Announce editor (section 9.4).
3	Goal	**Goal**	Opens the Goal editor (section 9.5).
4	Home Team	**Home Team**	Opens the player list of the home team (chapter 11.4).

No.	Control	Name	What It Does
5		**Home colour 1**	The band colour of the home team (team list, colour bars of the designs). Click to choose a colour; saved at once.
6		**Show (home)**	Shows the team list of the home team on the board: team name, coach, Starting Seven and Substitutes.
7		**Show Pictures (home)**	Opens the player picture player with the Image for Banner files of the home team (section 9.12).
8		**Slide (home)**	Shows the slide show of the home team: one slide per player with number, name and Image for Events photo.
9		**Guest colour 1**	The band colour of the guest team. Click to choose a colour; saved at once.
10		**Home colour 2**	The text colour on the bands of the home team. Click to choose a colour; saved at once.
11		**Guest Team**	Opens the player list of the guest team (chapter 11.4).
12		**Guest colour 2**	The text colour on the bands of the guest team. Click to choose a colour; saved at once.
13		**Show (guest)**	Shows the team list of the guest team on the board.
14		**Show Pictures (guest)**	Opens the player picture player with the Image for Banner files of the guest team.
15		**Slide (guest)**	Shows the slide show of the guest team.
16		**Background (gear)**	Shows or hides the background choice of the team list, the slide show and the referee screen: scoreboard background video, black, or a selected video.
17		**Referees**	Opens the referee list (section 9.13).
18		**Show (referees)**	Shows the referee screen on the board.
19		**2 Min**	Opens the card editor with the type 2-Minute Suspension (section 9.6).
20		**Yellow Card**	Opens the card editor with the type Yellow Card (section 9.7).
21		**Red Card**	Opens the card editor with the type Red Card (section 9.8).
22		**Home red cards 0**	No red card symbol for the home team on the board.
23		**Home red cards 1**	One red card symbol for the home team on the boards whose design shows them.
24		**Home red cards 2**	Two red card symbols for the home team.
25		**Home red cards 3**	Three red card symbols for the home team.
26		**Home red cards 4**	Four red card symbols for the home team.

No.	Control	Name	What It Does
27		**Guest red cards 0**	No red card symbol for the guest team on the board.
28		**Guest red cards 1**	One red card symbol for the guest team on the boards whose design shows them.
29		**Guest red cards 2**	Two red card symbols for the guest team.
30		**Guest red cards 3**	Three red card symbols for the guest team.
31		**Guest red cards 4**	Four red card symbols for the guest team.
32		**Substitution**	Opens the Substitution editor (section 9.10).
33		**Multiple**	Opens the editor for several substitutions in one screen (section 9.11).
34		**Sponsors**	Opens the sponsor list (section 9.14).
35		**Team Database**	Opens the team database: saved player lists to load as home or guest list (section 9.15).

Row	Buttons	Section
1	Banner, Announce	9.3, 9.4
2	Goal	9.5
3, 4	Home Team, Guest Team with the team colours, Show, Show Pictures and Slide; the gear button	9.12
5	Referees, Show	9.13
6	2 Min	9.6
7	Yellow Card	9.7
8	Red Card with the red card points of both teams	9.8
9	Substitution, Multiple	9.10, 9.11
10	Sponsors	9.14
11	Team Database	9.15

- There is no Blue Card button: the blue card is a card type inside the card editor (section 9.9).
- The Home and Guest boxes in the Red Card row are captions of the red card points, not buttons.

9.2 How the Info Screens Work

1. Click the button of the screen on the Info tab. The editor opens in the work area; its title bar shows the name of the screen.
2. Choose the team, the player and the other values.
3. Click Show (or Show With Picture). The screen replaces the scoreboard on the board.
4. Click Game in the menu bar to bring the scoreboard back (section 9.17).

The editors of Goal, the cards and Substitution share these controls:

Control	What It Does
Sponsor row (top)	The first five pictures of the sponsor list (section 9.14). Click one to put it on the screen; the chosen sponsor is bright, the others are dimmed. The X next to the large sponsor picture removes the sponsor. All editors share one sponsor choice.
Home and Guest logos	Click the logo of the team. The chosen team is bright and its caption is aqua; the player lists follow the team.
Player	A list of the team's players as "number-name", sorted by number: the groups Starting 7, Substitutes and Other Players of the player list (chapter 11), not the coach. You can also type a number and a name, for example "17 Tim Hornke". An empty Player box flashes red and nothing is shown.
Minute	Filled with the current match minute when the editor opens: the running minute of the clock (48:35 is minute 49). You can overwrite it. In Goal and Substitution the stopwatch button next to it empties the box, or fills it again.
Show	Puts the screen on the board.
Show With Picture	The same with the player's photo (Image for Events of the player list, chapter 11.4).
Add to Match Timeline (lightning icon)	While its frame is green, every Show adds a row to the match timeline (Stats > Timeline, chapter 10.1). The same switch is used by all editors and the CK page.
Edit Title (pencil in the title bar)	Opens Settings > Language with the titles of the board screens (chapter 16).
Background	Use Scoreboard Background (the background video of the scoreboard), Use Black Background, or Use Selected Background with a folder button to choose a video or picture. The chosen button has a green frame; the box next to it shows the choice. Each editor keeps its own background.
X (title bar), Esc	Closes the editor. The screen stays on the board.

- The title line of a screen (Goal, Yellow Card, 2-Minute Suspension ...) comes from the titles of Settings > Language > Titles (chapter 16). A new installation has Turkish titles: an English operator sets Titles to English once. The pictures of this guide show the English titles.
- A screen is built when you click Show. It is not updated by itself: click Show again after a change.
- An info screen only shows the event. It never changes the score, a suspension or a timer of the Game tab, and the Game tab never shows an info screen by itself.
- The remote control and the HTTP API can show Goal, the cards and Substitution (info_goal, info_card, info_subst) and return to the scoreboard (match); chapter 13, chapter 14 and Appendix B.

> **Note:** The Add to Match Timeline switch is saved, but after a restart of the program it is off again. Check its frame before the match.

9.3 Banner

A full-screen banner with three lines, for example the venue, a hashtag and the throw-off time, with the two team logos and the sponsor.

Board Output **Control Panel**

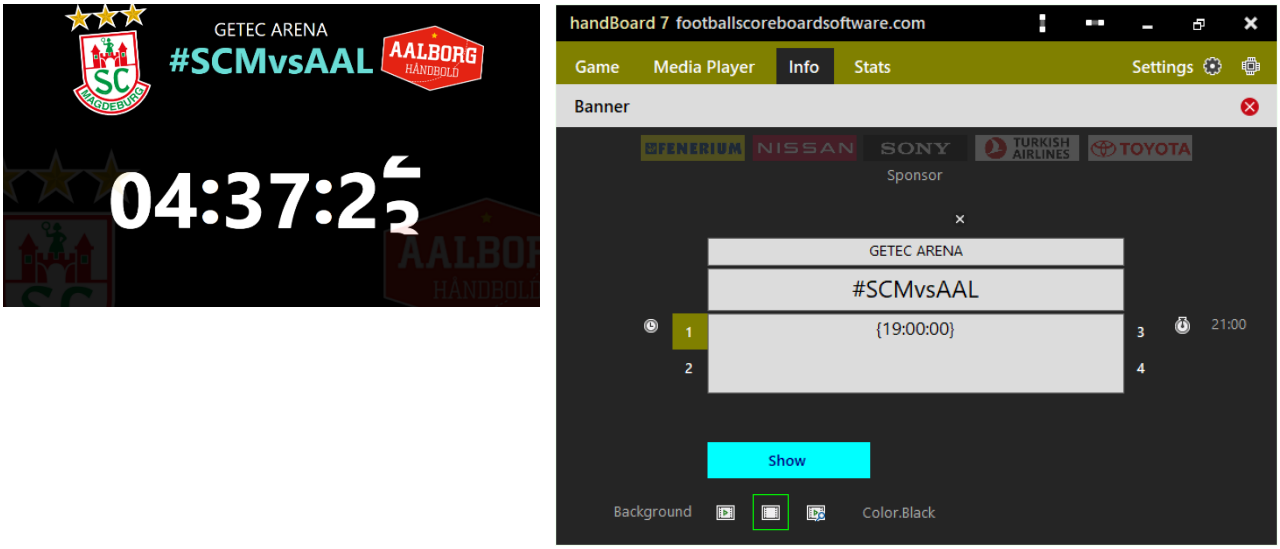


Figure 40. The banner on the board: the venue, the hashtag and the countdown to 19:00.

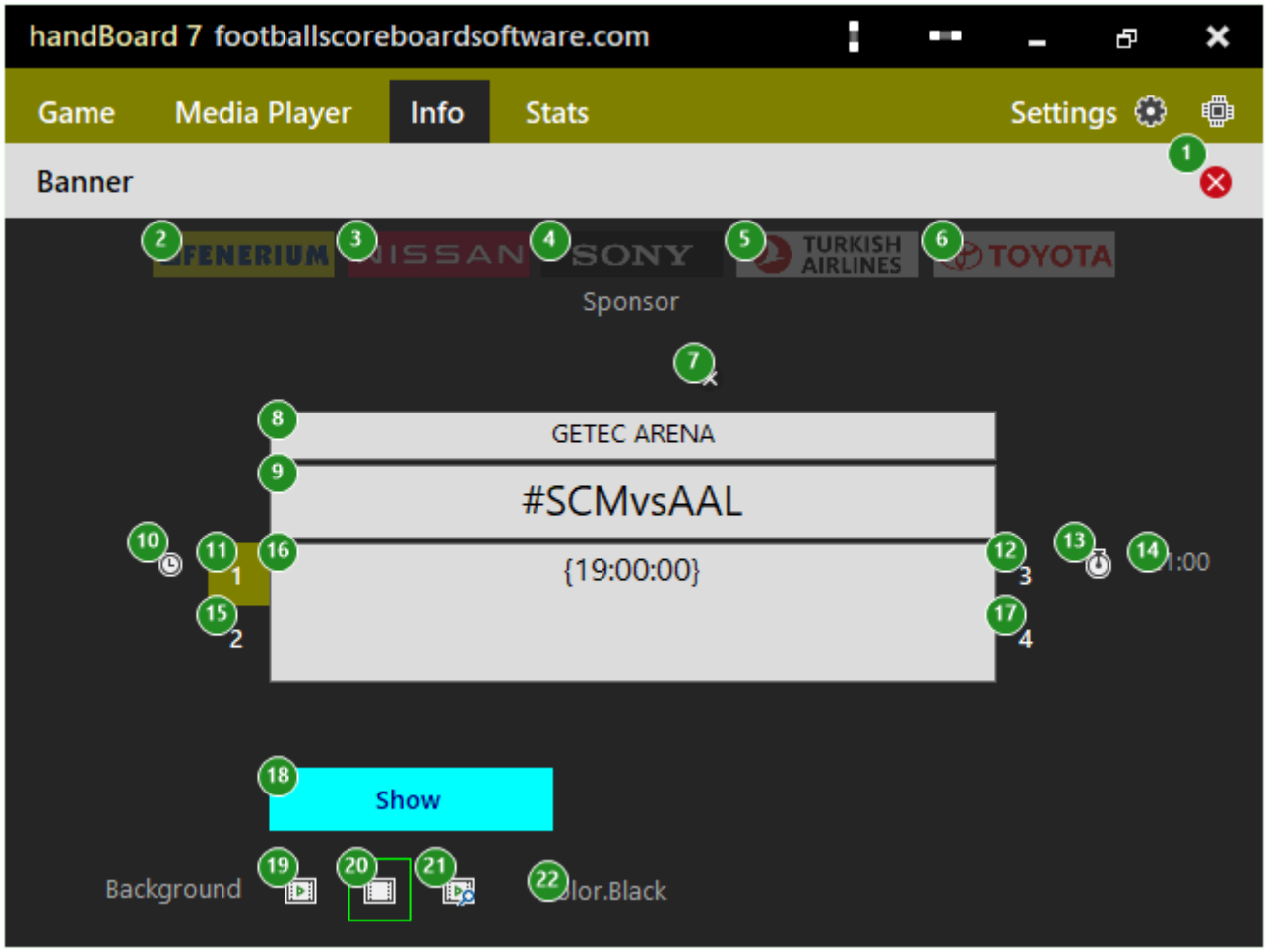


Figure 41. The Banner editor.

No.	Control	Name	What It Does
1		**Close**	Closes the editor. The banner stays on the board.
2		**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
3		**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
4		**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
5		**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.
6		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
7		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
8		**Top line**	The first line of the banner, for example the venue.
9		**Second line**	The second line, for example a hashtag.
10		**Show Clock**	Writes {00:00} into the main text: the board shows the time of day. Click again for {00:00:00} with seconds.

No.	Control	Name	What It Does
11		**1**	Shows main text version 1 for editing; Show saves and uses it.
12		**3**	Main text version 3.
13		**Show Remaining Time**	Writes the time of the time box, for example {21:00}, into the main text: the board counts down to that time of day. Click again for seconds.
14		**Time**	The target time of Show Remaining Time, hh:mm. Anything else becomes 23:59.
15		**2**	Main text version 2.
16		**Main text**	The main text of the selected version (1 to 4). A clock code such as {00:00} or {19:00} shows the time of day or a countdown.
17		**4**	Main text version 4.
18		**Show**	Saves the texts and puts the banner on the board.
19		**Use Scoreboard Background**	The banner runs over the background video of the scoreboard.
20		**Use Black Background**	The banner has a black background.
21		**Use Selected Background**	The banner runs over a video or picture of your choice; a folder button appears to choose the file.
22		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

Control	What It Does
Top box, second box	The first and the second line.
Main box with 1 to 4	The main text. It has four versions: click 1 to 4 to choose one. The text of the selected version is saved when you click Show; the two upper lines are the same for all four.
Show Clock (clock icon)	Writes {00:00} into the main box: the board shows the time of day. Click again for {00:00:00} with seconds.
Show Remaining Time (timer icon) and the time box	Writes the time of the box, for example {21:00}, into the main box: the board counts down to that time of day. Click again for the seconds ({21:00:00}). The time box takes hh:mm; anything else becomes 23:59.
Show	Saves the texts and puts the banner on the board.

- The clock buttons appear while you type in the main box. A small X next to the box you are in empties it.
- The clock and the countdown work when the main box holds only the code; any other text is shown as typed. They are not the match clock.

9.4 Announce

A full-screen announcement in large letters with one team logo, for example "MATCH DAY" or a safety message.

Board Output **Control Panel**

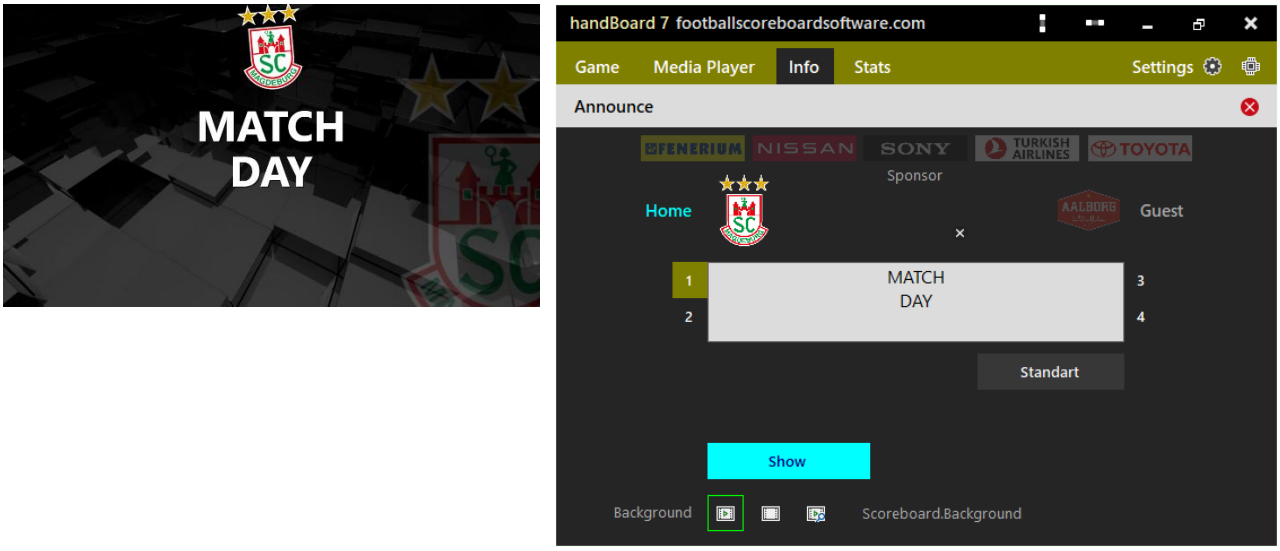


Figure 42. The announcement MATCH DAY with the home logo.

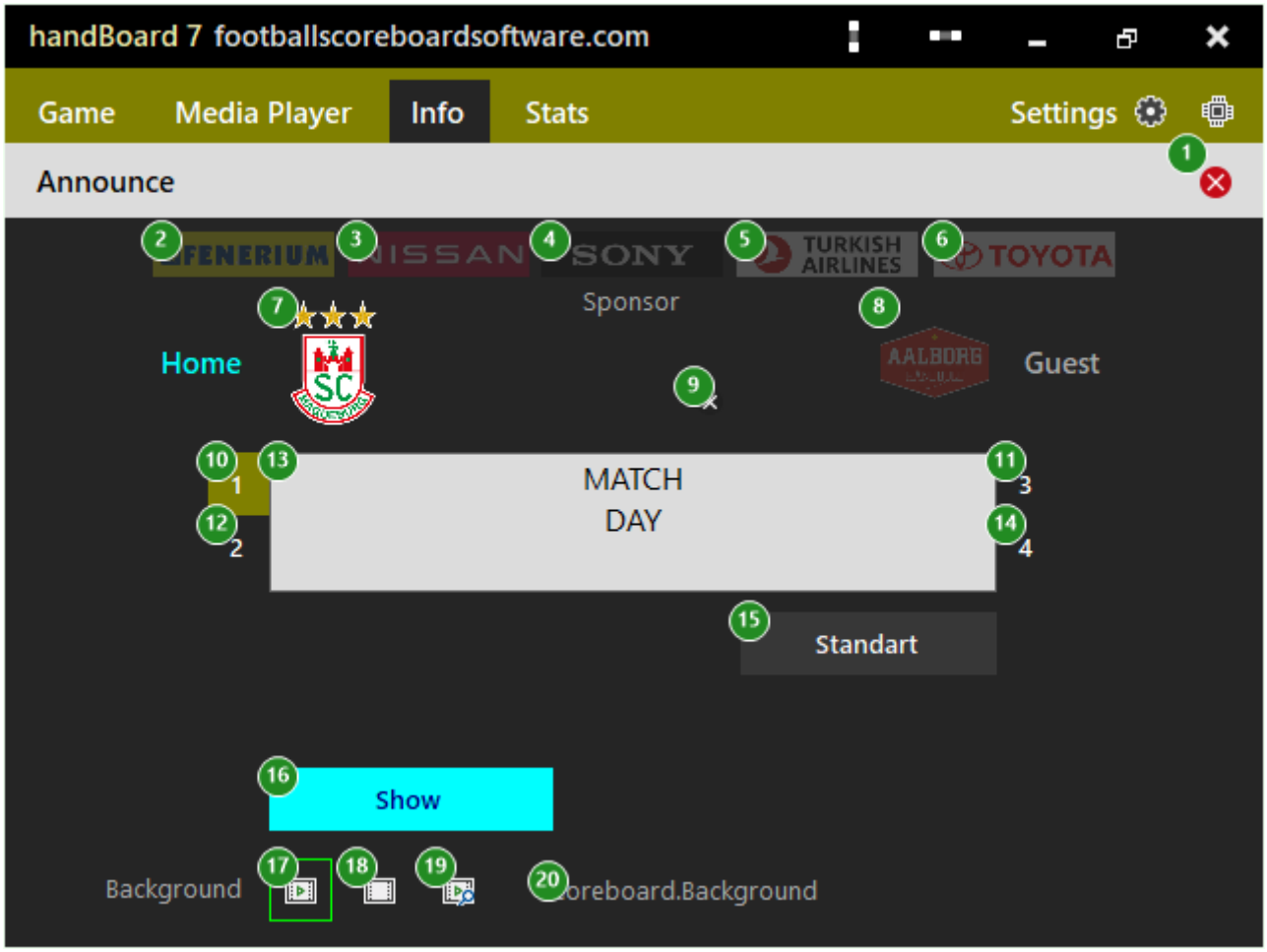
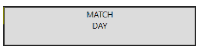
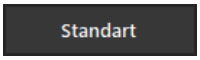
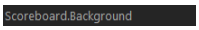


Figure 43. The Announce editor.

No.	Control	Name	What It Does
1		**Close**	Closes the editor. The announcement stays on the board.
2		**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
3		**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
4		**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
5		**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.
6		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
7		**Home logo**	Click to show the home logo on the announcement.
8		**Guest logo**	Click to show the guest logo on the announcement.

No.	Control	Name	What It Does
9		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
10		**1**	Shows text version 1 for editing; Show saves and uses it.
11		**3**	Text version 3.
12		**2**	Text version 2.
13		**Text**	The announcement of the selected version (1 to 4). Enter starts a new line.
14		**4**	Text version 4.
15		**Style**	The style of the text: Standart, Gradient, Shape, Stripe-H, Stripe-V, Stroke. Every style except Standart has a gear button with its font and colours.
16		**Show**	Saves the text and puts the announcement on the board.
17		**Use Scoreboard Background**	The announcement runs over the background video of the scoreboard.
18		**Use Black Background**	The announcement has a black background.
19		**Use Selected Background**	A video or picture of your choice; a folder button appears to choose the file.
20		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

Control	What It Does
Home and Guest logos	Click the logo to show on the announcement; the other one is dimmed.
Text box with 1 to 4	The announcement, in four versions. Press Enter for a new line.
Style list (Standart)	Standart (plain text), Gradient, Shape (moving colour shapes), Stripe-H and Stripe-V (moving stripes), Stroke (outlined text).
Gear button (all styles except Standart)	The style values: font-family (with a font picker), font-size, font-weight, bottom, text-shadow and text-stroke as far as the style uses them, and two or five colours. The disk button saves them.
Show	Saves the text and puts the announcement on the board.

9.5 Goal

The goal screen: the title, the team, the shirt number and the name of the scorer, the goal icon and, with Show With Picture, the player's photo. An animation can run over it.

Board Output | **Control Panel**

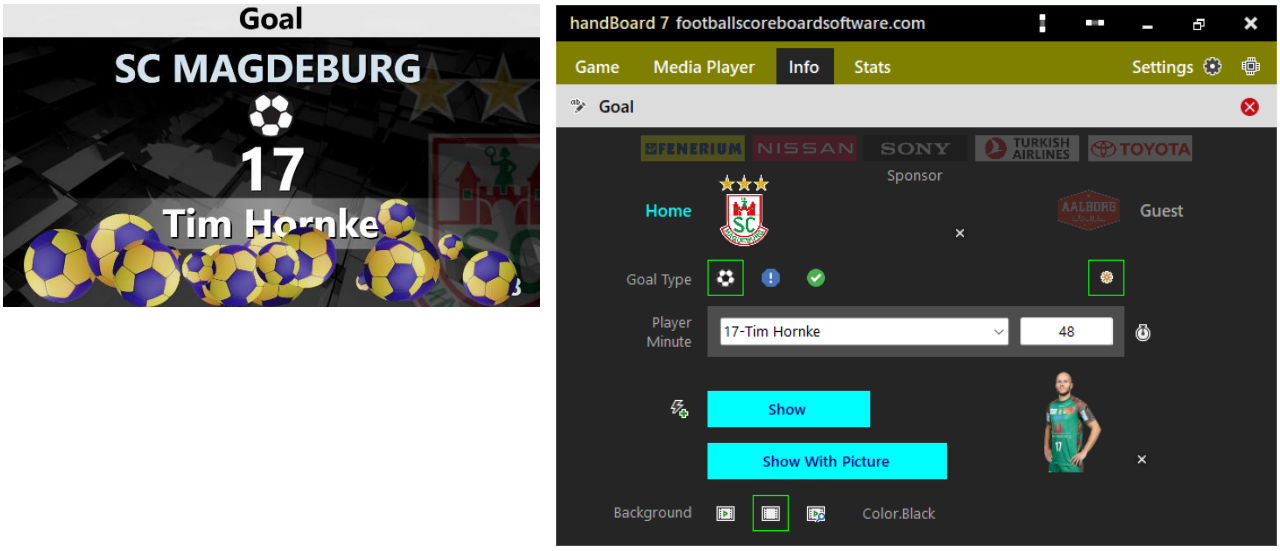


Figure 44. A goal of SC Magdeburg no. 17 with the ball animation.

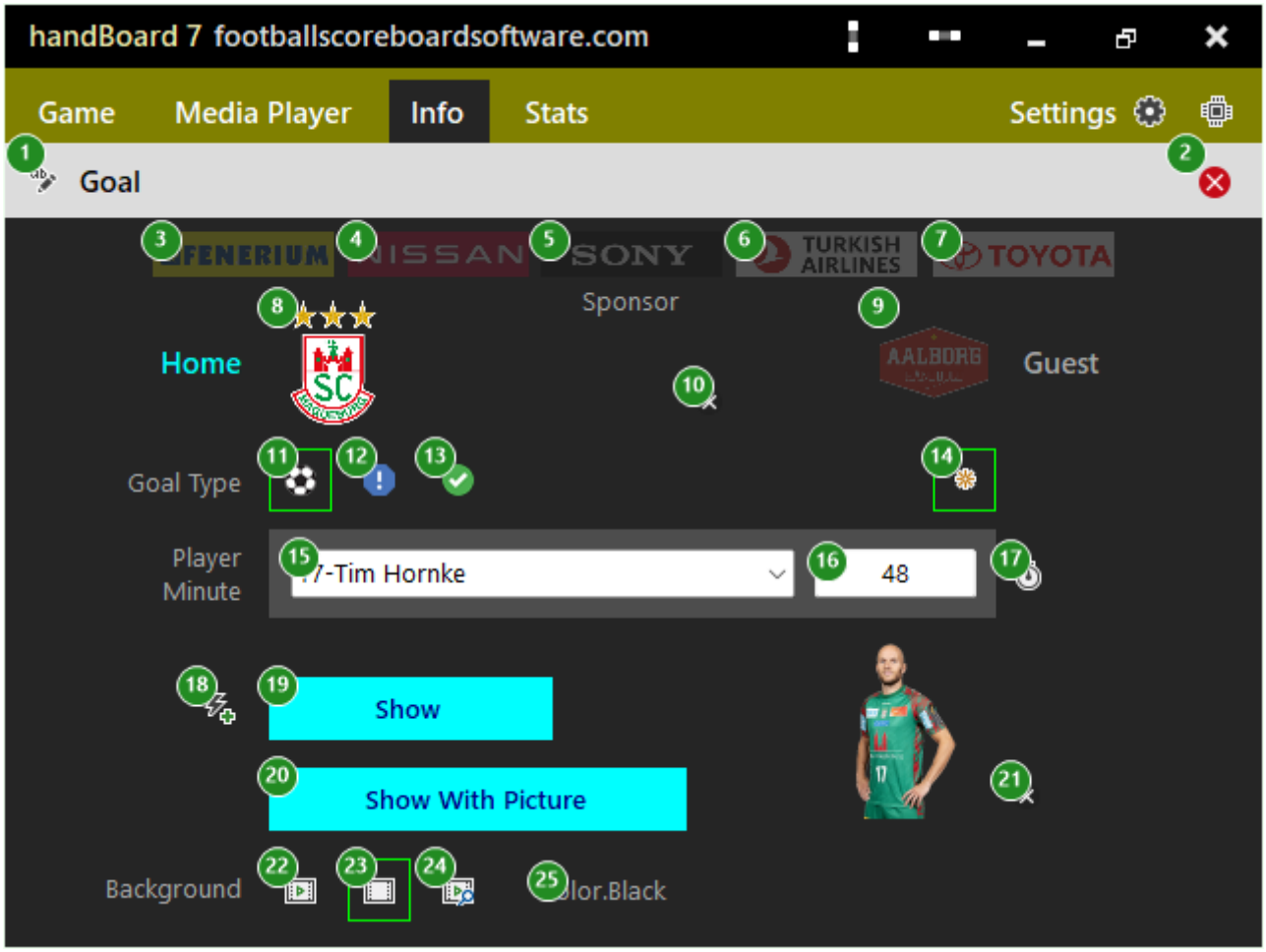
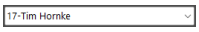


Figure 45. The Goal editor.

No.	Control	Name	What It Does
1		**Edit Title**	Opens Settings > Language with the titles of the board screens (Goal, Own Goal, 7-Metre Goal ...).
2		**Close**	Closes the editor. The screen stays on the board.
3		**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
4		**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
5		**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
6		**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.
7		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
8		**Home logo**	Click for a goal of the home team. The player list shows the home players.
9		**Guest logo**	Click for a goal of the guest team. The player list shows the guest players.
10		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
11		**Goal**	Goal type Goal: a goal of the chosen team.
12		**Own Goal**	Goal type Own Goal: the goal counts for the other team, whose name and logo the screen shows. Tooltip: Goal OG.
13		**7-Metre Goal**	Goal type 7-Metre Goal: a goal from a 7-metre throw. Tooltip: Penalty Goal.
14		**Animation**	Green frame: the goal animation runs with Show. Red frame: no animation. On for home goals, off for guest goals when the team is chosen.
15		**Player**	The scorer: choose number-name from the list or type a number and a name.
16		**Minute**	The minute of the goal, filled with the current match minute (Minute 49). Shown as typed.
17		**Minute (stopwatch)**	Empties the minute box, or fills it again with the current match minute.
18		**Add to Match Timeline**	Green frame: every Show adds the goal to the match timeline (chapter 10.1). Shared by all editors.

No.	Control	Name	What It Does
19		**Show**	Puts the goal screen on the board. Afterwards a Play Animation button appears next to it.
20		**Show With Picture**	Puts the goal screen with the player's photo on the board.
21		**Remove photo (X)**	Leaves the player photo out of Show With Picture.
22		**Use Scoreboard Background**	The screen runs over the background video of the scoreboard.
23		**Use Black Background**	The screen has a black background.
24		**Use Selected Background**	A video or picture of your choice; a folder button appears to choose the file.
25		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

Goal Type	Title	What Happens
Goal (ball)	Goal	A goal of the chosen team.
Own Goal (exclamation mark)	Own Goal	The goal counts for the other team: the screen shows the other team's name and logo, and the logo highlight changes to that team. Choose the player from the list of the team whose player threw the ball.
7-Metre Goal (tick)	7-Metre Goal	A goal from a 7-metre throw.

- The Minute box of this editor is written as "Minute 49". You may type any text; the board shows it as typed, where the design has a place for it.
- Animation (the button right of the goal types): green frame = the animation runs with Show, red frame = no animation. It is switched on for goals of the home team and off for the guest team; click it to change.
- After Show, a Play Animation button appears next to Show: it runs the animation again.
- With Add to Match Timeline the goal is entered for the team that scores it: an own goal for the other team.

> **Note:** Showing the goal does not count it. Count the goal with the score buttons of the Game tab (chapter 5.2).

9.6 2-Minute Suspension

The 2-minute suspension screen: the title 2-Minute Suspension, the team, the shirt number and the name of the player, and the 2 MIN icon.

The card editor serves the 2-minute suspension, the yellow, the red and the blue card. 2 Min on the Info tab opens it with the 2-minute type chosen; the Card Type buttons switch to another type. The box behind the player has the colour of the type: white, yellow, red or blue.

Board Output **Control Panel**

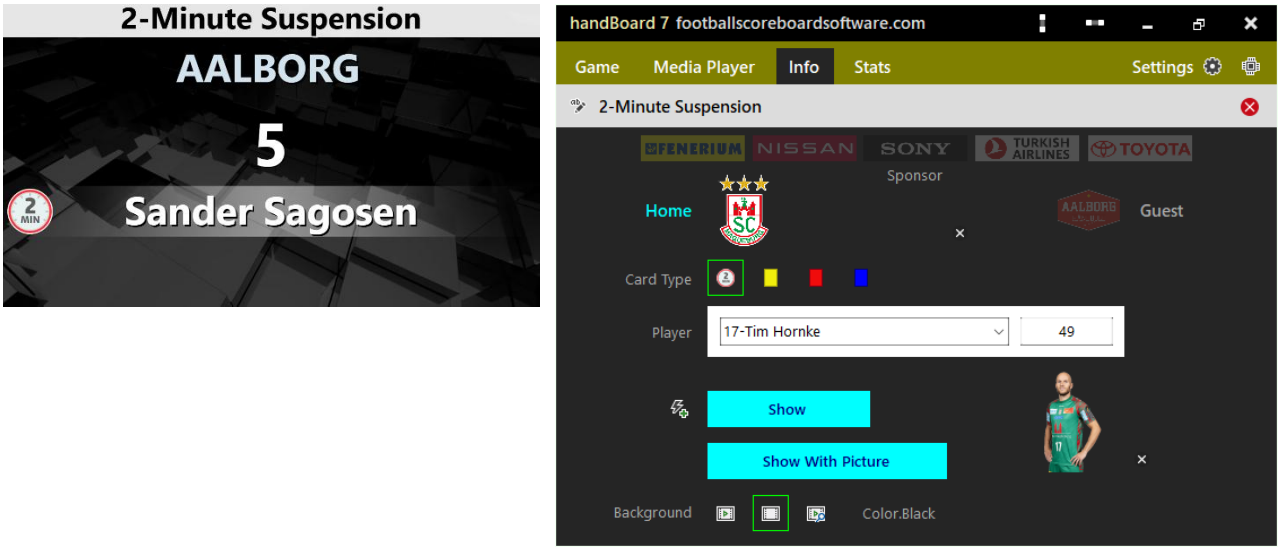


Figure 46. A 2-minute suspension of Aalborg no. 5.

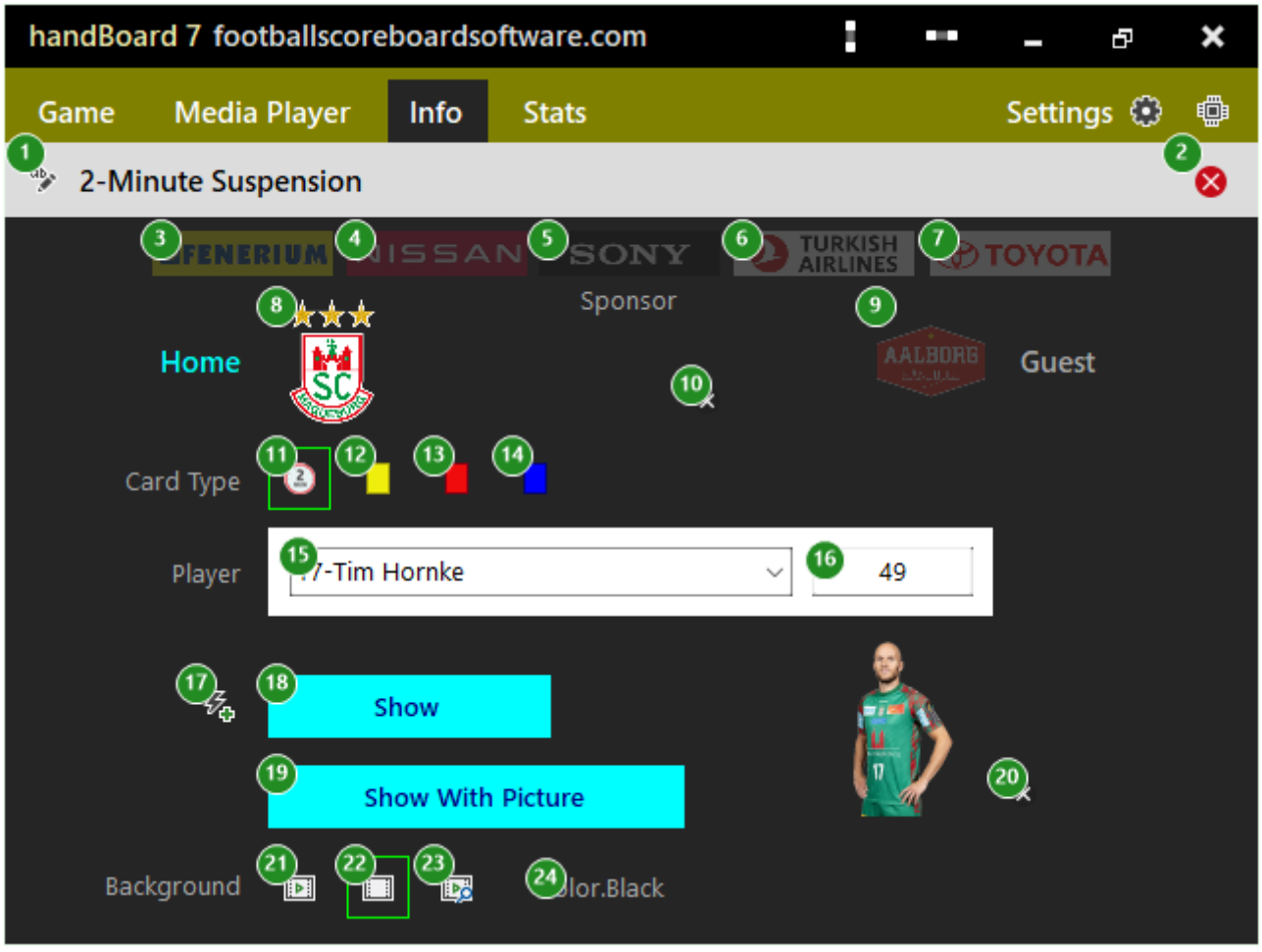


Figure 47. The card editor with the type 2-Minute Suspension.

No.	Control	Name	What It Does
1		**Edit Title**	Opens Settings > Language with the titles of the board screens (Yellow Card, 2-Minute Suspension ...).

No.	Control	Name	What It Does
2		**Close**	Closes the editor. The screen stays on the board.
3		**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
4		**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
5		**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
6		**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.
7		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
8		**Home logo**	Click for a player of the home team. The player list shows the home players.
9		**Guest logo**	Click for a player of the guest team. The player list shows the guest players.
10		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
11		**2-Minute Suspension**	Card type 2-Minute Suspension: the 2 MIN icon, white player box.
12		**Yellow Card**	Card type Yellow Card (warning).
13		**Red Card**	Card type Red Card (disqualification).
14		**Blue Card**	Card type Blue Card (disqualification with a written report).
15		**Player**	The player: choose number-name from the list or type a number and a name.
16		**Minute**	The minute, filled with the current match minute when the editor opens.
17		**Add to Match Timeline**	Green frame: every Show adds the card to the match timeline (chapter 10.1). Shared by all editors.
18		**Show**	Puts the screen on the board. It does not start a suspension.
19		**Show With Picture**	Puts the screen with the player's photo on the board.
20		**Remove photo (X)**	Leaves the player photo out of Show With Picture.

No.	Control	Name	What It Does
21		**Use Scoreboard Background**	The screen runs over the background video of the scoreboard.
22		**Use Black Background**	The screen has a black background.
23		**Use Selected Background**	A video or picture of your choice; a folder button appears to choose the file.
24		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

Card Type (left to right)	Title	Rule (IHF)
2 MIN	2-Minute Suspension	The player leaves the court for two minutes; the team plays short-handed. The third suspension of a player is a disqualification.
Yellow card	Yellow Card	The warning (section 9.7).
Red card	Red Card	The disqualification (section 9.8).
Blue card	Blue Card	A disqualification with a written report (section 9.9).

> **Note:** The screen does not start a suspension. Enter the suspension with the penalty boxes of the Game tab (chapter 5.6): they run the 2-minute timers on the board.

9.7 Yellow Card

The warning: a yellow card with the team, the shirt number and the name of the player. Yellow Card on the Info tab opens the card editor with the yellow type.

Board Output



Control Panel

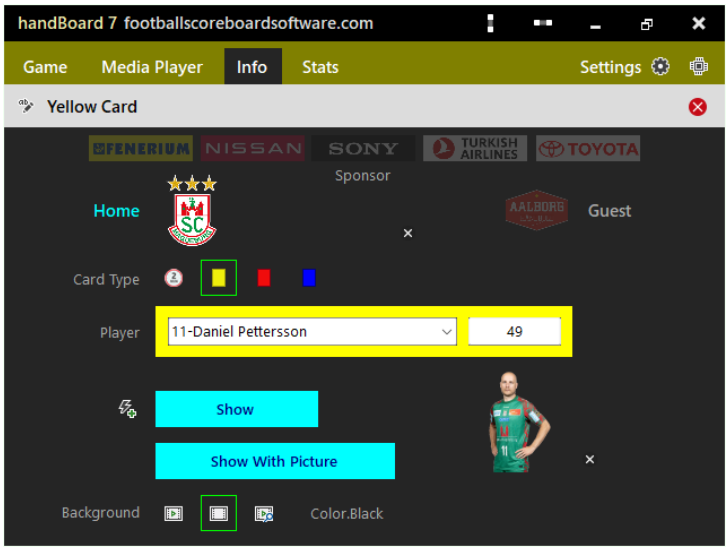


Figure 48. A yellow card for SC Magdeburg no. 25.

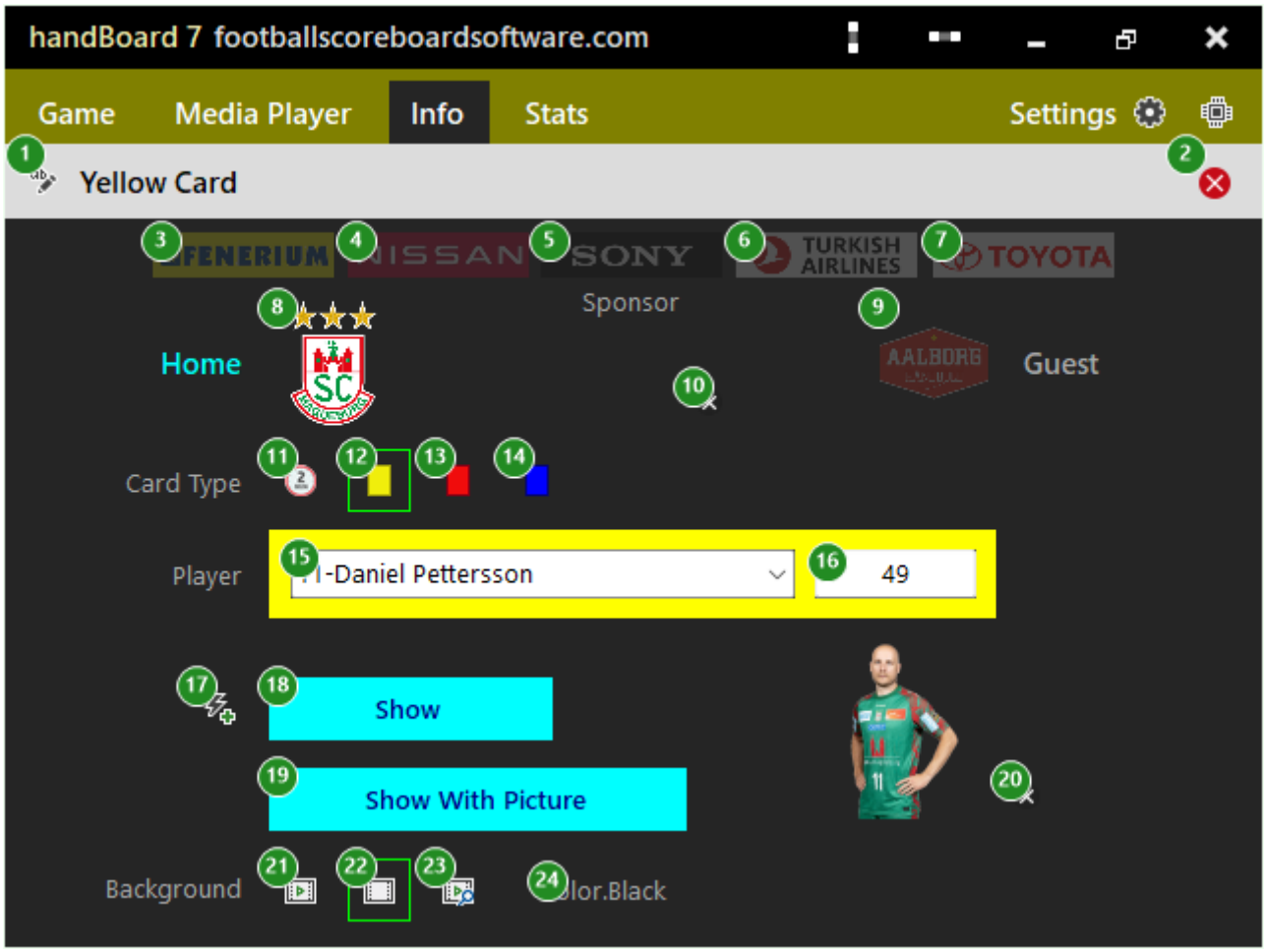


Figure 49. The card editor with the type Yellow Card. The controls are those of section 9.6.

- Under the IHF rules a player receives one warning, and a team at most three. The program does not count the cards.

9.8 Red Card

The disqualification: a red card with the team, the shirt number and the name of the player. Red Card on the Info tab opens the card editor with the red type.

Board Output **Control Panel**

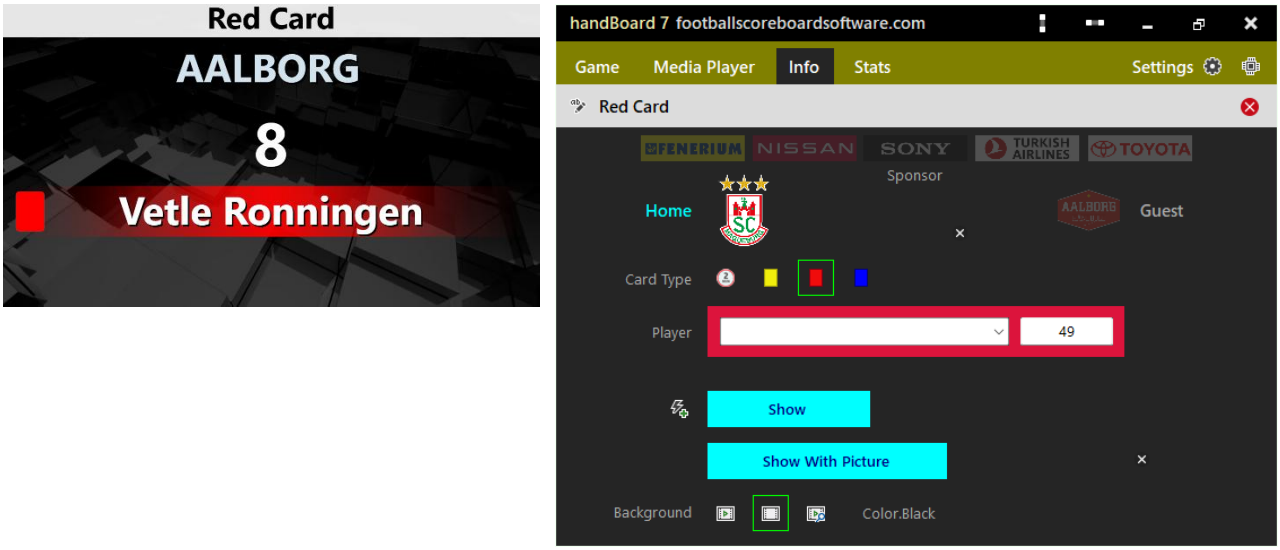


Figure 50. A red card for Aalborg no. 8.

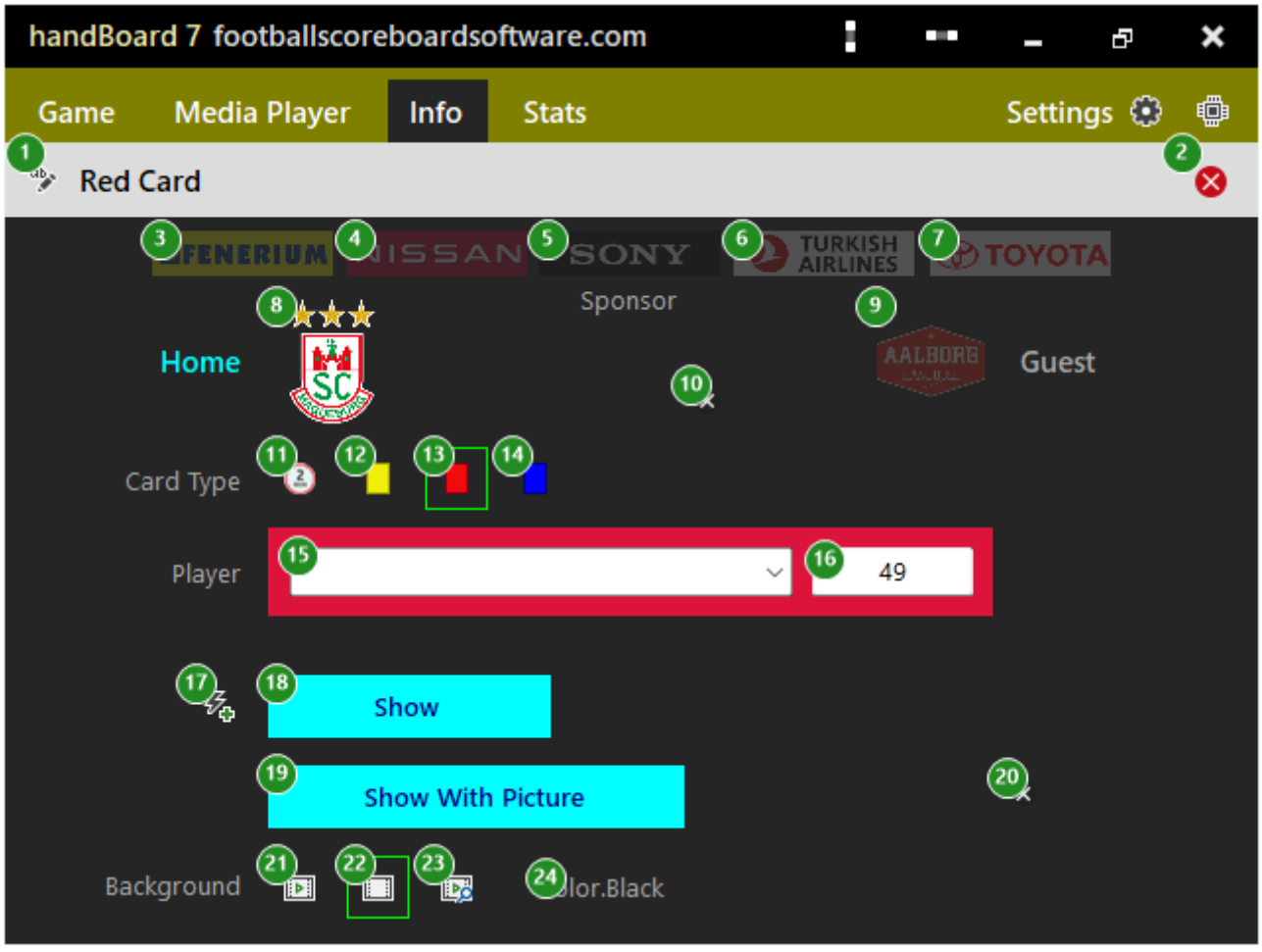


Figure 51. The card editor with the type Red Card. The controls are those of section 9.6.

- A disqualified player's team is reduced for two minutes, as for a 2-minute suspension. Enter that suspension on the Game tab (chapter 5.6); the Red Card screen does not.
- The third 2-minute suspension of the same player also leads to a disqualification.

Red card points: right of the Red Card button, one row per team (Home left, Guest right), five round buttons 0 to 4. They set the number of red card symbols of each team on the boards whose design shows them.

- Only these buttons set the symbols. The Red Card screen, the Game tab and the remote control never add or remove one.
- The setting is not saved: it starts at 0 with every start of the program, and a new match does not reset it.

9.9 Blue Card

The blue card follows a red card when the referees write a report (a disqualification with a written report, IHF rule 8:6 and 8:10). There is no Blue Card button on the Info tab:

1. Open Yellow Card or Red Card on the Info tab.
2. Click the blue Card Type button (the fourth). The title bar shows Blue Card, the box behind the player turns blue.
3. Choose the team and the player and click Show. The screen shows the title Blue Card and the blue card.

- With Add to Match Timeline, a blue card is entered with the blue card icon.
- The HTTP API calls this card type "yellowred" (info_card, Appendix B).

9.10 Substitution

A substitution: the team, the player coming in and the player going out, each with shirt number and name; with Show With Picture also their photos.

Board Output **Control Panel**

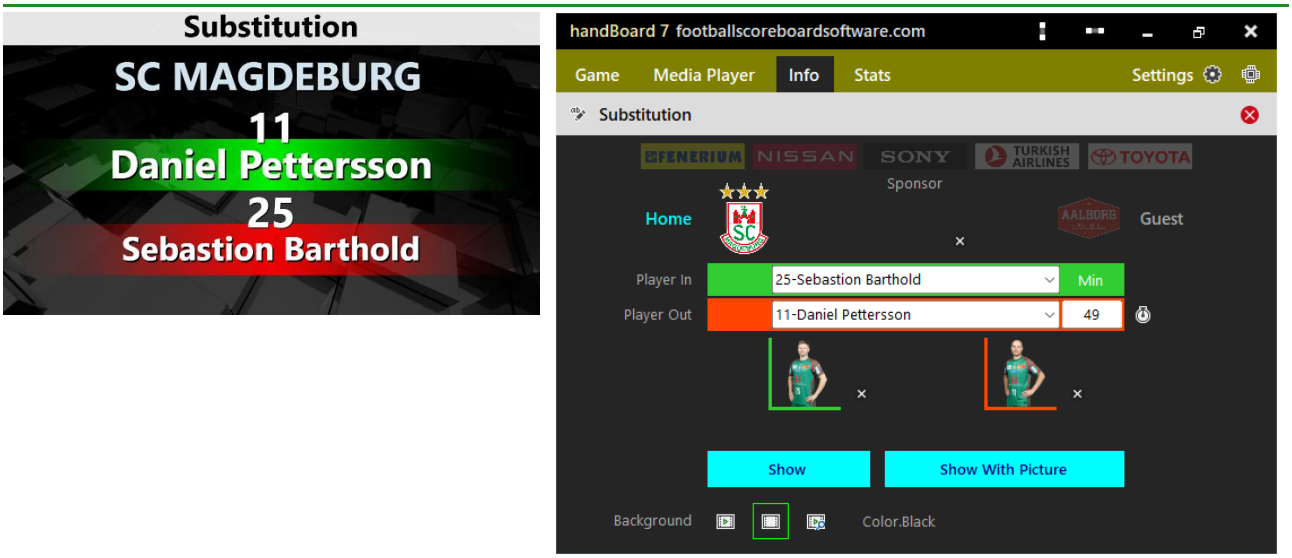


Figure 52. A substitution of SC Magdeburg.

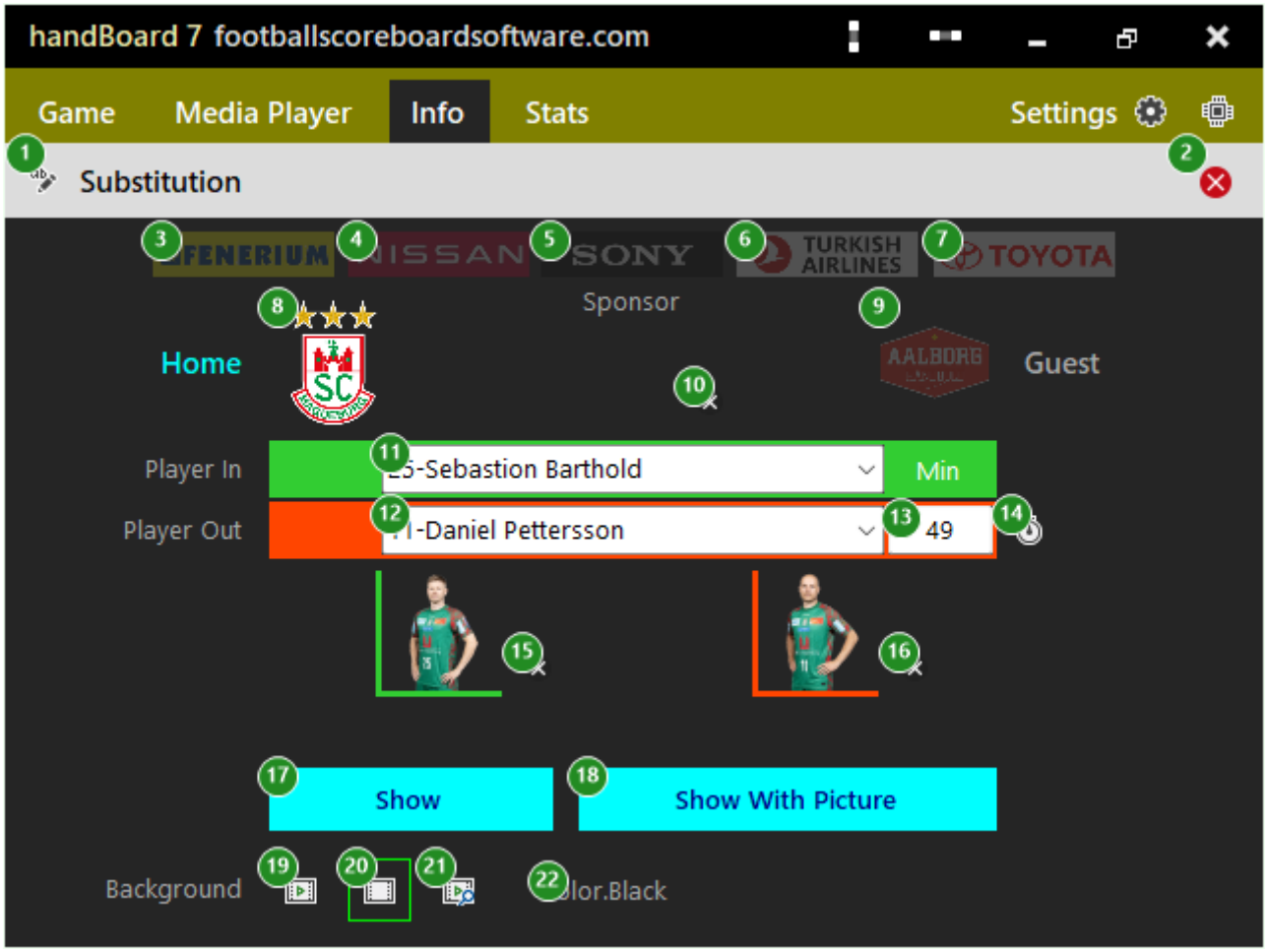


Figure 53. The Substitution editor.

No.	Control	Name	What It Does
1		**Edit Title**	Opens Settings > Language with the titles of the board screens (Substitution ...).
2		**Close**	Closes the editor. The screen stays on the board.
3		**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
4		**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
5		**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
6		**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.
7		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
8		**Home logo**	Click for a substitution of the home team.

No.	Control	Name	What It Does
9		**Guest logo**	Click for a substitution of the guest team.
10		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
11		**Player In**	The player coming on: choose number-name or type a number and a name.
12		**Player Out**	The player going off.
13		**Min**	The minute of the substitution, filled with the current match minute.
14		**Minute (stopwatch)**	Empties the minute box, or fills it again with the current match minute.
15		**Remove photo In (X)**	Leaves the photo of the player coming in out of Show With Picture.
16		**Remove photo Out (X)**	Leaves the photo of the player going out out of Show With Picture.
17		**Show**	Puts the substitution on the board.
18		**Show With Picture**	Puts the substitution with the photos of both players on the board.
19		**Use Scoreboard Background**	The screen runs over the background video of the scoreboard.
20		**Use Black Background**	The screen has a black background.
21		**Use Selected Background**	A video or picture of your choice; a folder button appears to choose the file.
22		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

Control	What It Does
Player In (green)	The player coming on.
Player Out (orange)	The player going off.
Min	The minute of the substitution, with the stopwatch button.
Photos	The Image for Events of both players, each with an X that leaves the photo out.

- Both players are needed: an empty box flashes red.
- On the board the player coming in has the green band, the player going out the red band.

- In handball substitutions are unlimited and are made on the run; the screen is a graphic only.

9.11 Multiple Substitution

Several substitutions of one team in one screen. Multiple on the Info tab opens it.

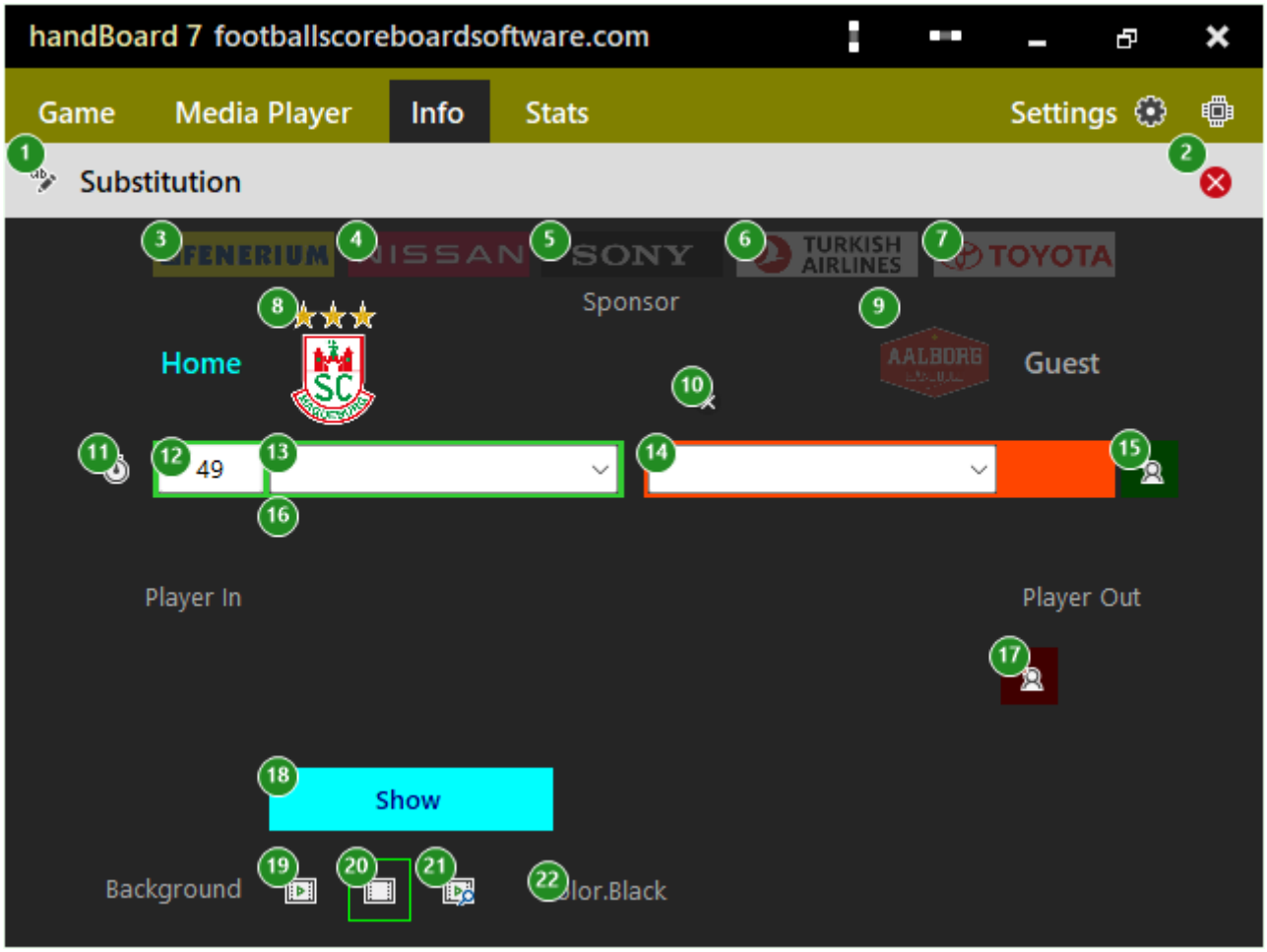


Figure 54. The Multiple editor.

No.	Control	Name	What It Does
1		**Edit Title**	Opens Settings > Language with the titles of the board screens (Substitution ...).
2		**Close**	Closes the editor. The screen stays on the board.
3	FENERIUM	**Sponsor 1**	The first picture of the sponsor list. Click to put it on the screen; the chosen sponsor is bright.
4	NISSAN	**Sponsor 2**	The second picture of the sponsor list. Click to choose it as sponsor.
5	SONY	**Sponsor 3**	The third picture of the sponsor list. Click to choose it as sponsor.
6	TURKISH AIRLINES	**Sponsor 4**	The fourth picture of the sponsor list. Click to choose it as sponsor.

No.	Control	Name	What It Does
7		**Sponsor 5**	The fifth picture of the sponsor list. Click to choose it as sponsor.
8		**Home logo**	Click for substitutions of the home team.
9		**Guest logo**	Click for substitutions of the guest team.
10		**Remove sponsor (X)**	Removes the sponsor from the screens. All editors share the sponsor choice.
11		**Minute (stopwatch)**	Empties the minute box, or fills it again with the current match minute.
12		**Minute**	The minute of the substitutions, filled with the current match minute.
13		**Player In**	The player coming on.
14		**Player Out**	The player going off.
15		**Add**	Adds the pair Player In / Player Out to the list; both players leave the two lists.
16		**Substitutions**	The pairs of this screen: player in and player out.
17		**Delete**	Removes the selected pair from the list.
18		**Show**	Puts all pairs of the list on the board in one screen.
19		**Use Scoreboard Background**	The screen runs over the background video of the scoreboard.
20		**Use Black Background**	The screen has a black background.
21		**Use Selected Background**	A video or picture of your choice; a folder button appears to choose the file.
22		**Background**	Shows the chosen background: Scoreboard.Background, Color.Black or the name of the selected file.

1. Click the team logo.
2. Choose Player In (left list) and Player Out (right list) and click Add (the green button). The pair goes into the list below, and both players leave the two lists.
3. Repeat for the other substitutions.
4. Click Show. The screen lists all pairs under the title Substitution.

- Delete (the red button) removes the selected pair; the player lists are filled again.

- The list is empty each time the editor opens. Show with an empty list makes the Player In box flash red.
- There is no Add to Match Timeline button in this editor, but the switch of the other editors applies: one row per pair.
- There is no Show With Picture.

9.12 Team Lists and Player Pictures

The Home Team and Guest Team rows of the Info tab:

Control	What It Does
Home Team, Guest Team	Open the player list of the team (chapter 11.4).
Colour boxes (two per team)	The team colours. The upper box is the band colour (the number boxes, the group titles and the coach band of the team list), the lower box the text colour on those bands. Click a box to choose a colour; it is saved at once.
Show	The team list on the board (below).
Show Pictures	Opens the player picture player (below).
Slide	A slide show of the team: a title slide per group, then one slide per player with shirt number, name and photo (Image for Events).
Gear button	The background of the team list, the slide show and the referee screen: Use Scoreboard Background, Use Black Background, or Use Selected Background with a button to choose a video file.

The team list shows the team name as title, the coach in a band below it, and two columns: Starting Seven (the group Starting 7 of the player list) and Substitutes. The group Other Players is not shown.

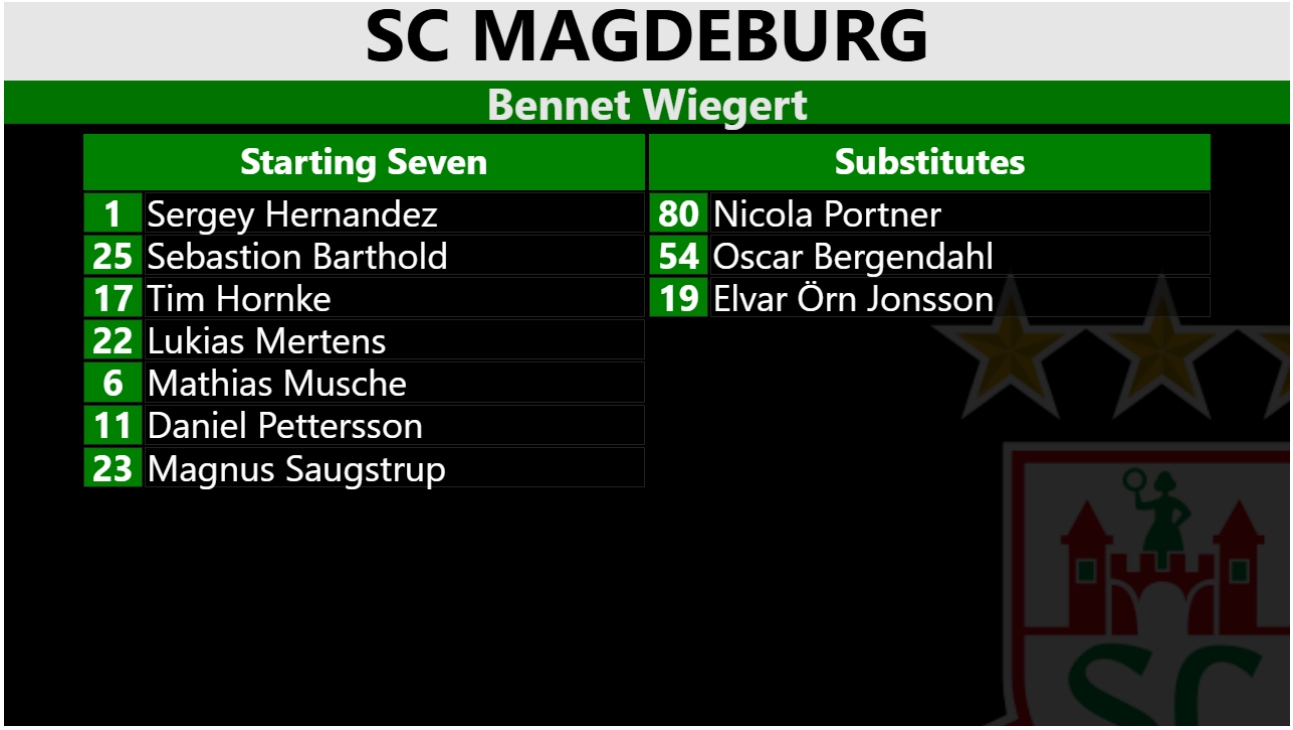


Figure 55. The team list of SC Magdeburg (Home Team > Show), in the team colours green and white.

Show Pictures opens the player picture player in the work area. It plays the files of the column Image for Banner of the player list: pictures or video clips.

Control	What It Does
Starting 7, Substitutes, Trainer	Load the group into the list.
The list	Number, Name, Thumbnail, Play and Position (the play position of a clip). A player without a file is selected in red and cannot be played; names of picture files are grey.
Play (in the selected row)	Plays the file of that player on the board; Stop ends it.
Start / Finish	Plays the list from the selected row to the end; Finish stops it.
Return to Scoreboard Screen When Playlist Ends	Green frame: after the last file the scoreboard comes back. Red frame: the list starts again.
Display mode button	How a picture or clip is fitted into the board.

> **Note:** The factory player lists have no Image for Banner files, so Show Pictures has nothing to play until you add pictures or clips to the players (chapter 11).

9.13 Referees

The referee list and the referee screen. Referees on the Info tab opens the list, Show next to it puts the screen on the board.

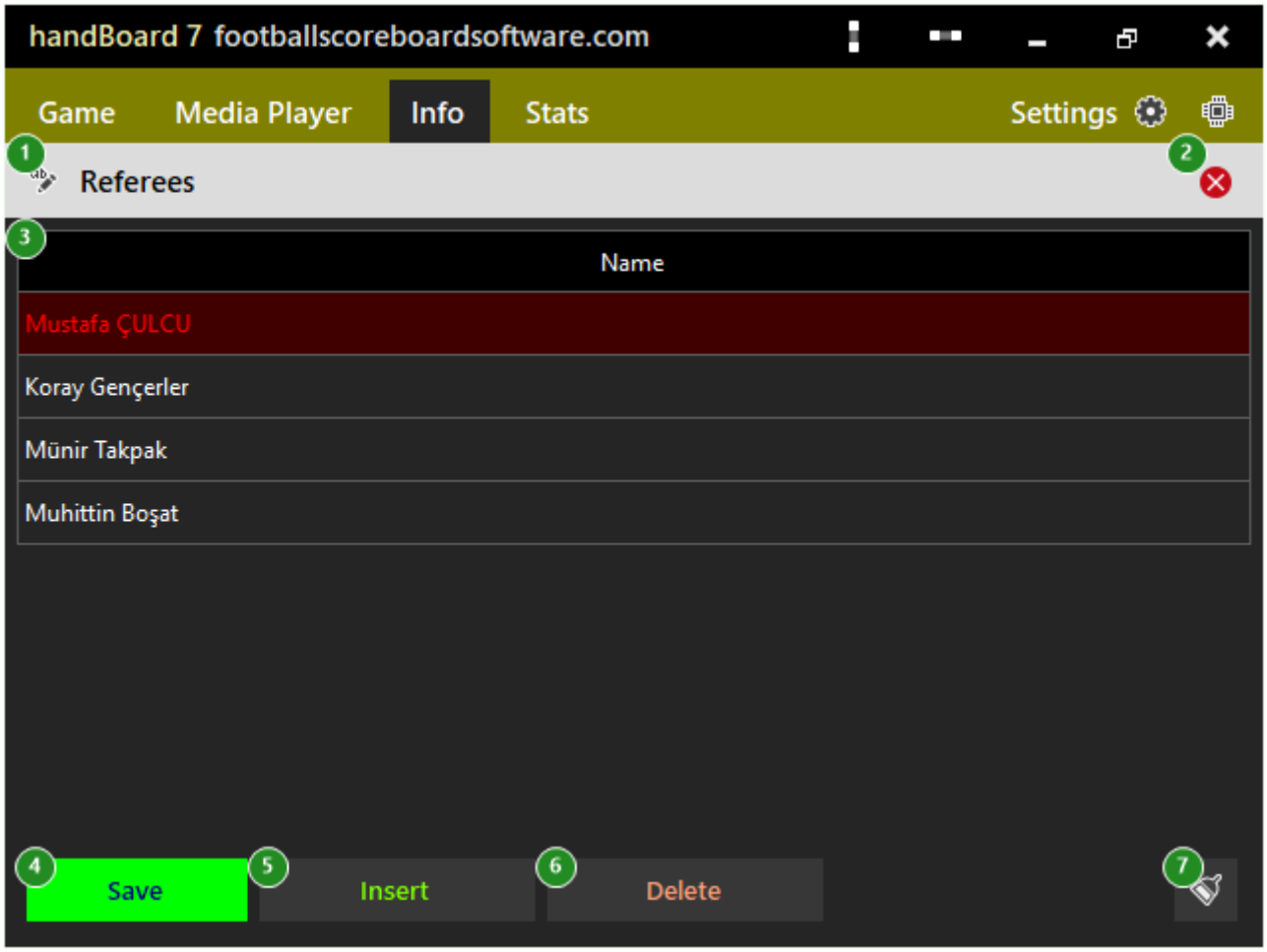
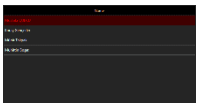
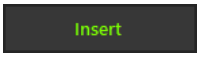
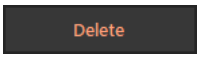


Figure 56. The referee list.

No.	Control	Name	What It Does
1		**Edit Title**	Opens Settings > Language with the titles of the board screens (Referees ...).
2		**Close**	Closes the list. Unsaved changes are lost.
3		**Name**	One official per row; the first name is shown large on the board. Drag a row to move it.
4		**Save**	Saves the list; lit while there are unsaved changes. Empty rows are dropped.
5		**Insert**	Adds an empty row at the end.
6		**Delete**	Removes the selected row (not the first row).
7		**Clear**	Empties the list; Save keeps the empty list.

Control	What It Does
Name (list)	One row per official. Drag a row to move it.
Insert	Adds an empty row at the end.
Delete	Removes the selected row. The first row cannot be deleted; overwrite it instead.
Save	Saves the list. It is lit while there are unsaved changes; empty rows are dropped.
Clear (brush)	Empties the list. Click Save to keep the empty list.

Board Output **Control Panel**

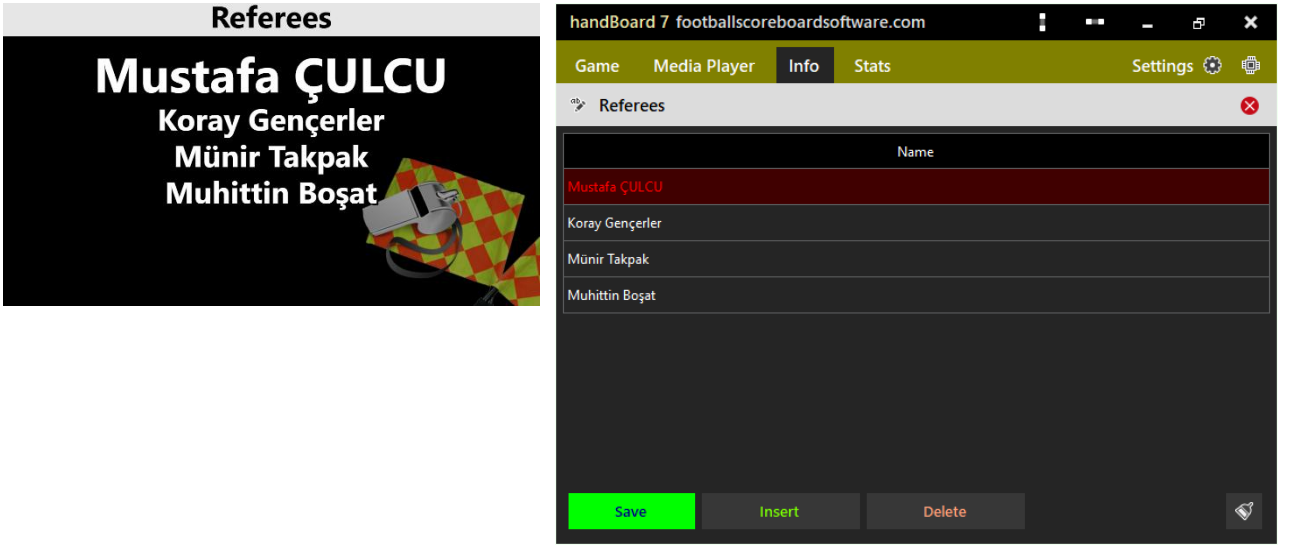


Figure 57. The referee screen (Referees > Show).

- The screen shows the title Referees, the first name in large letters and the other names below it. Put the referee pair first, then for example the timekeeper, the scorekeeper and the delegate.
- The background is the one of the gear button of the Info tab (section 9.12).

9.14 Sponsors

The sponsor list holds the pictures that the info screens show as sponsor. Sponsors on the Info tab opens it.

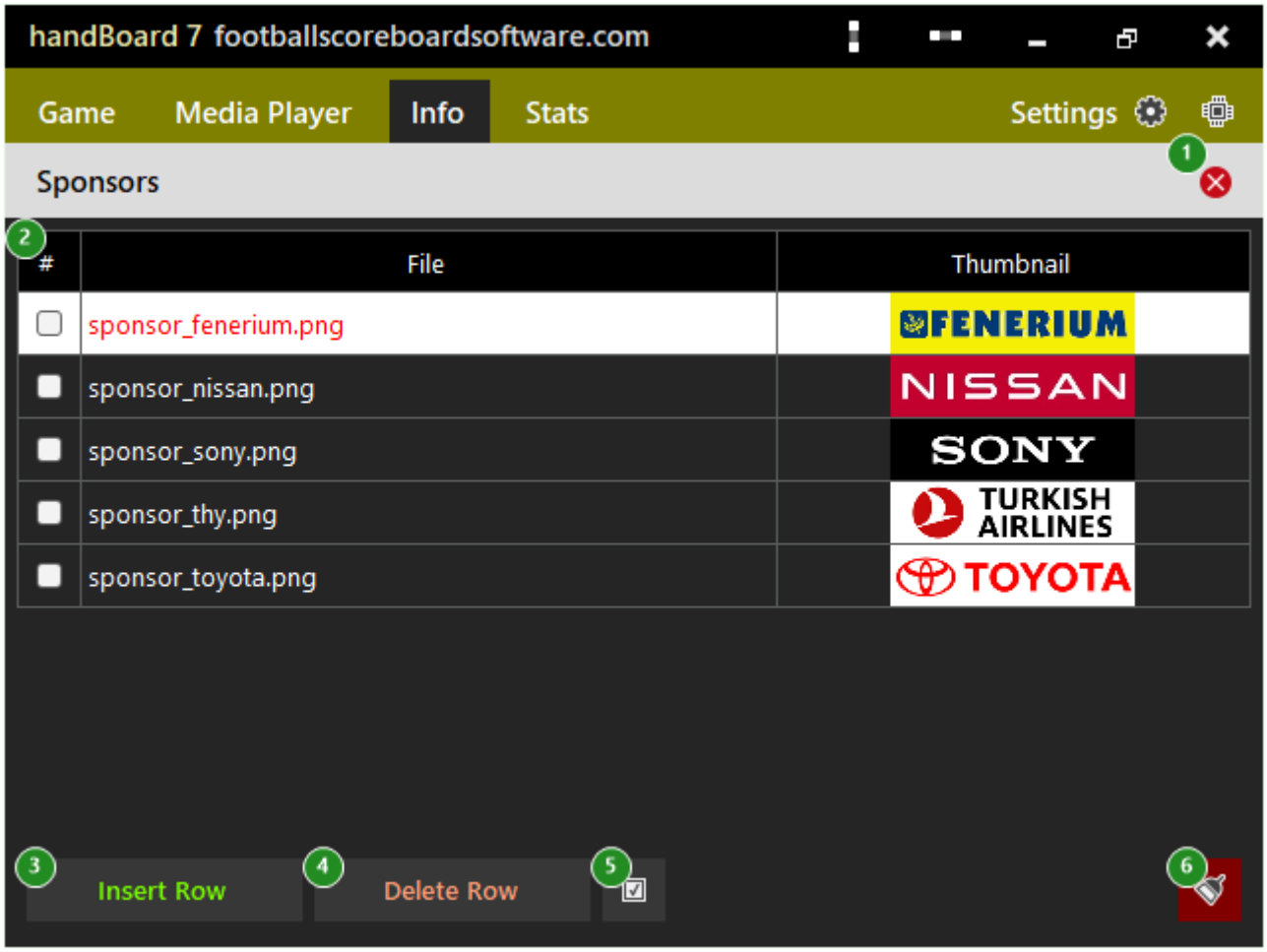
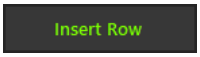
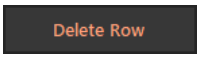


Figure 58. The sponsor list.

No.	Control	Name	What It Does
1		**Close**	Closes the sponsor list.
2		**Sponsor list**	Default mark, file name and thumbnail of each sponsor picture. The first five are the sponsor row of the editors. Drag a row to move it.
3		**Insert Row**	Adds one or more picture files.
4		**Delete Row**	Removes the selected row.
5		**Set Default**	Marks the selected row as default sponsor, moves it to the top and makes it the sponsor of the info screens. Again on the default row: removes the mark.
6		**Clear All**	Empties the sponsor list.

Control	What It Does
The list	# (the default mark), File and Thumbnail. Drag a row to move it. The first five rows are the sponsor row of the editors.

Control	What It Does
Insert Row	Adds one or more picture files.
Delete Row	Removes the selected row.
Set Default (tick)	Marks the selected row as the default sponsor, moves it to the top and makes it the sponsor of the info screens. Click it again on the default row to remove the mark.
Clear All (brush)	Empties the list.

- Every change is saved at once (common\data\sponsors.xml).
- The sponsor chosen in one editor (section 9.2) is the sponsor of all editors until you choose another or remove it.

9.15 Team Database

The team database keeps player lists for later matches. Save to Teams in the player list (chapter 11.4) adds the list under a name; Team Database on the Info tab shows them.

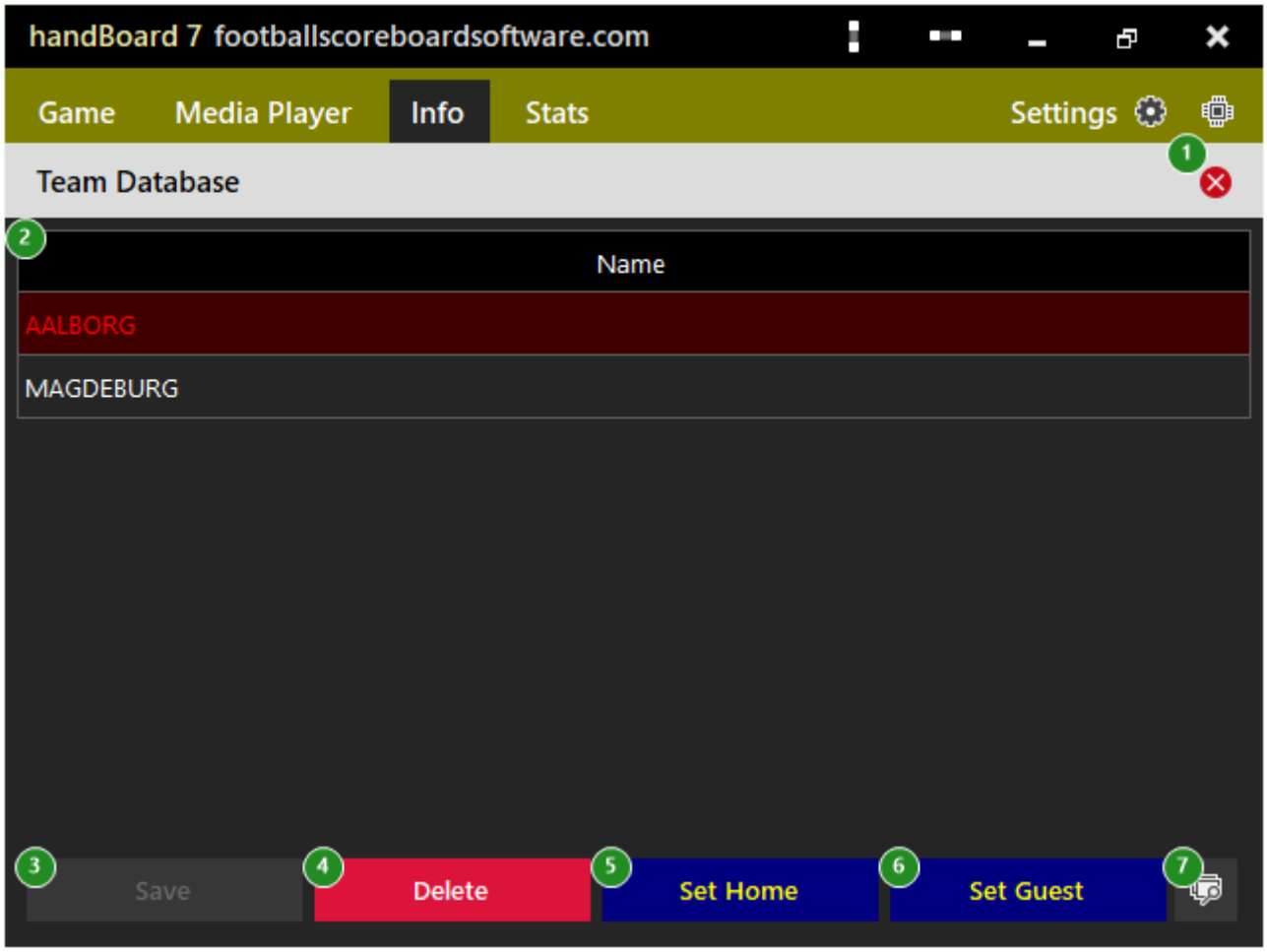
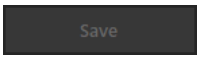
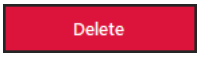


Figure 59. The team database with the two demo teams.

No.	Control	Name	What It Does
1		**Close**	Closes the team database.
2		**Name**	The saved teams. Select a name and type to rename it.
3		**Save**	Saves changed team names; grey until a name is changed.
4		**Delete**	Deletes the selected team after a confirmation.
5		**Set Home**	Loads the selected team into the home player list after a confirmation. Name and logo are not changed.
6		**Set Guest**	Loads the selected team into the guest player list after a confirmation.
7		**Show**	Opens the selected team in the player list editor; Save there changes the saved team.

Control	What It Does
Name (list)	The saved teams. To rename a team, select its name, type the new name (or press F2) and click Save.
Save	Saves the changed names. It is grey until a name is changed.
Delete	Deletes the selected team after a confirmation.
Set Home, Set Guest	Loads the selected team into the home or the guest player list after a confirmation. The team name and the logo on the Game tab are not changed.
Show (icon)	Opens the saved team in the player list editor. Save there changes the saved team, not the match list.

9.16 CK Lower Thirds

In the Chroma Key display mode the info screens are lower thirds under the scorebug, keyed by the vision mixer. They are opened from the Info tab of the CK page (CK in the menu bar, chapter 7.5): Goal, 2 Min, Yellow Card, Red Card, Substitution and Timeline, each with a Hide button. The CK editors have a pink title bar.

Difference to the Info Tab	
Hide	Each CK editor has Hide: the lower third goes off, the scorebug stays.
No sponsor, no background, no Show With Picture	The lower thirds show the logo, the team, the number, the name and the minute.
Titles	The CK titles come from the program language (Settings > Language), not from the titles of the board screens.

Difference to the Info Tab	
Minute	The minute box of the card editor is empty at the first opening: click the stopwatch to fill it.
Multiple, Referees, team lists	Not available as lower thirds.

Goal

Board Output **Control Panel**

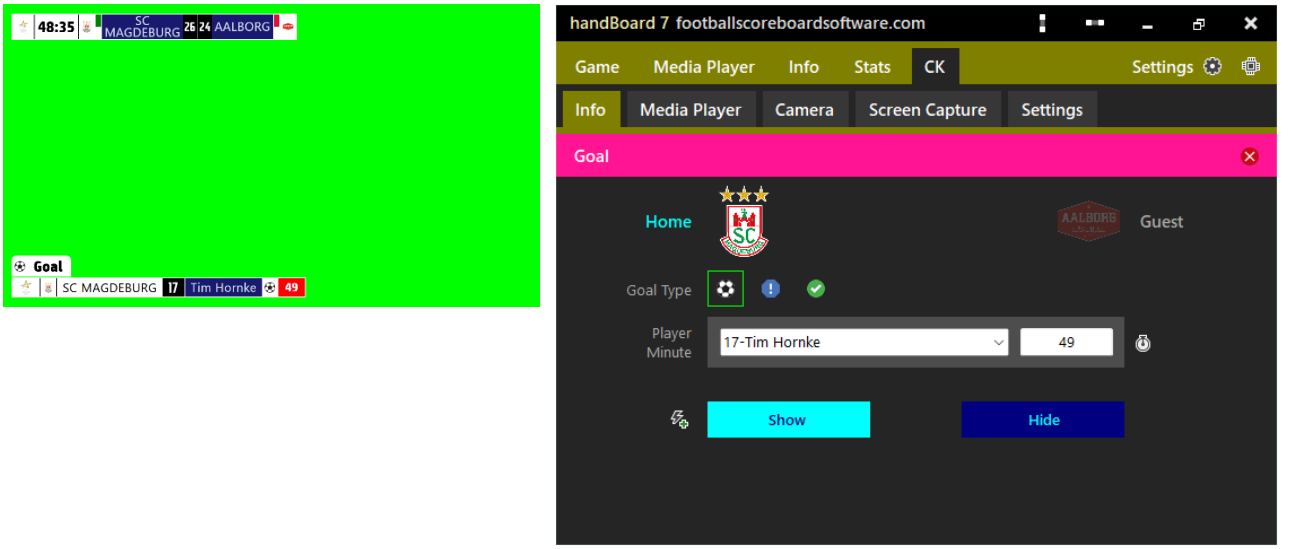


Figure 60. The goal lower third: Goal, SC MAGDEBURG, 17 Tim Hornke, minute 49.

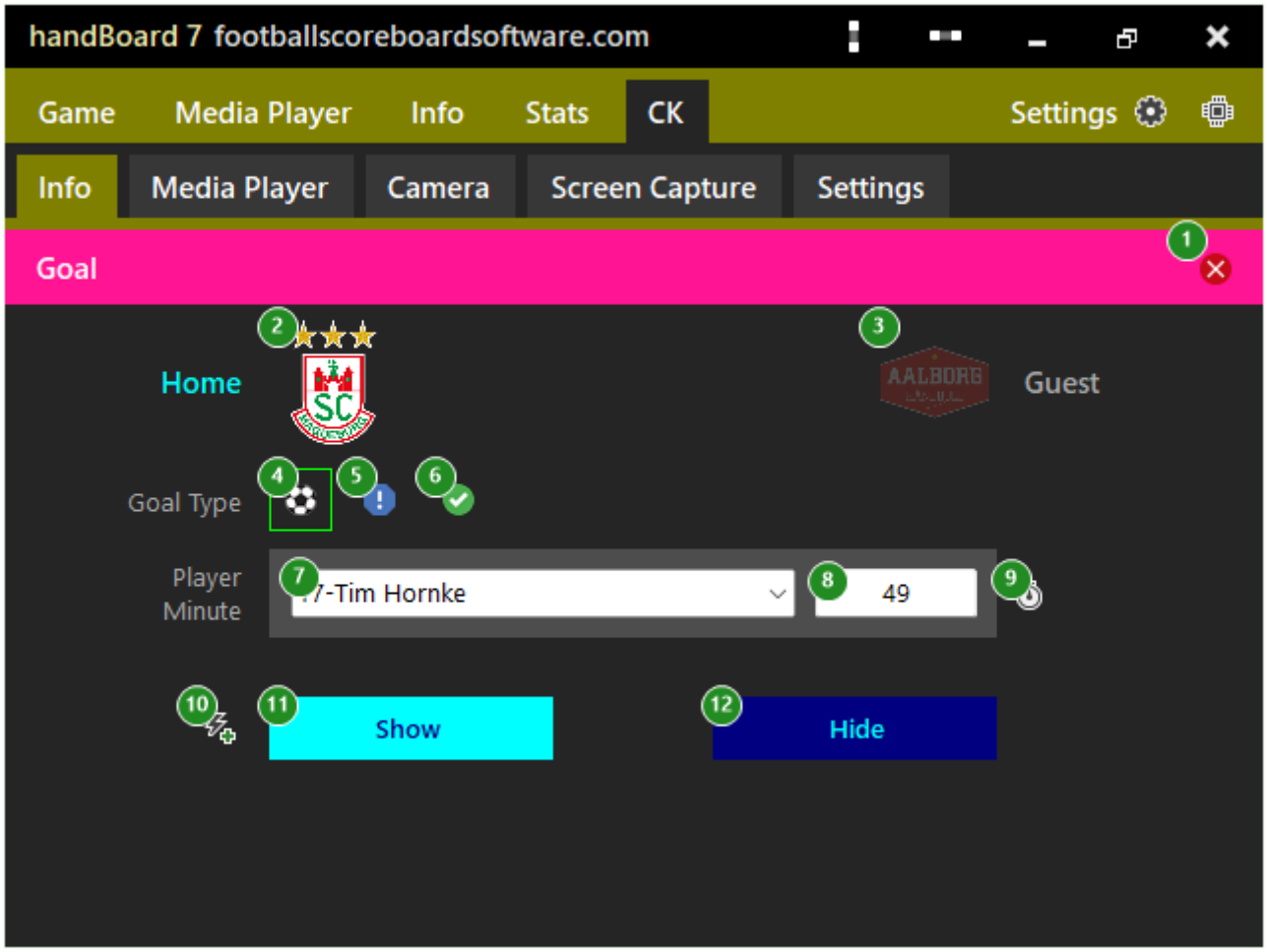
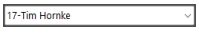


Figure 61. The CK Goal editor.

No.	Control	Name	What It Does
1		**Close**	Closes the editor. The lower third stays on air.
2		**Home logo**	Click for a goal of the home team.
3		**Guest logo**	Click for a goal of the guest team.
4		**Goal**	Goal type Goal.
5		**Own Goal**	Goal type Own Goal: the goal counts for the other team. Lower third title: Goal OG.
6		**7-Metre Goal**	Goal type 7-Metre Goal. Lower third title: Penalty Goal.
7		**Player**	The scorer: choose number-name or type a number and a name.
8		**Minute**	The minute, filled with the current match minute.

No.	Control	Name	What It Does
9		**Minute (stopwatch)**	Empties the minute box, or fills it again.
10		**Add to Match Timeline**	Green frame: every Show adds the goal to the match timeline. Shared by all editors.
11		**Show**	Puts the goal lower third on the CK board.
12		**Hide**	Takes the lower third off; the scorebug stays.

The goal types are those of section 9.5; there is no animation.

2-Minute Suspension, Yellow, Red and Blue Card

Board Output **Control Panel**

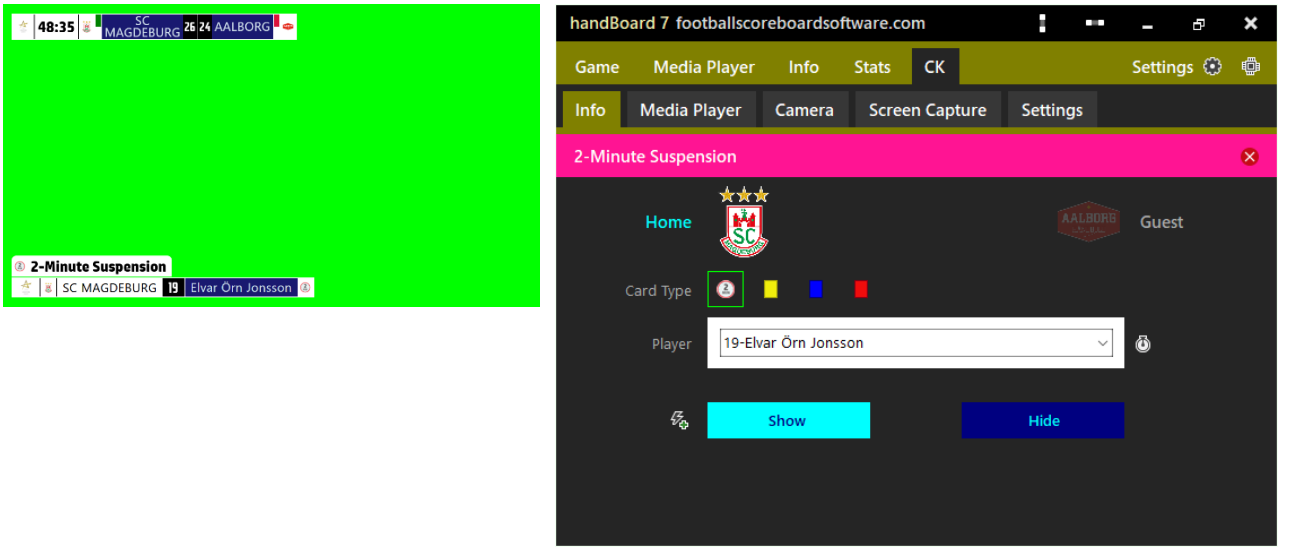


Figure 62. The 2-minute suspension lower third of SC Magdeburg no. 19.

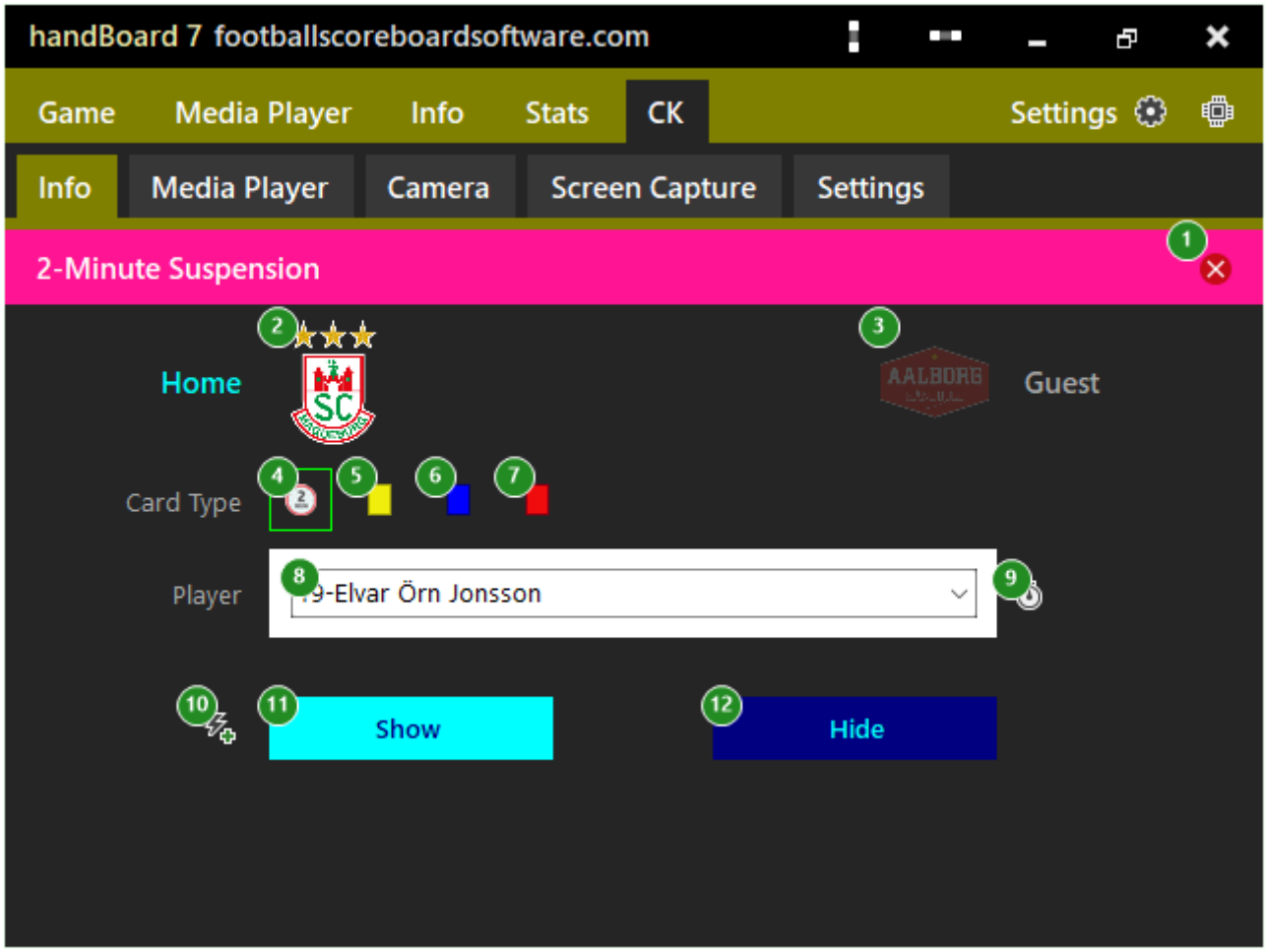


Figure 63. The CK card editor with the type 2-Minute Suspension. The card types are, left to right, 2-minute suspension, yellow, blue and red.

No.	Control	Name	What It Does
1		**Close**	Closes the editor. The lower third stays on air.
2		**Home logo**	Click for a player of the home team.
3		**Guest logo**	Click for a player of the guest team.
4		**2-Minute Suspension**	Card type 2-Minute Suspension.
5		**Yellow Card**	Card type Yellow Card.
6		**Blue Card**	Card type Blue Card.
7		**Red Card**	Card type Red Card.

No.	Control	Name	What It Does
8		**Player**	The player: choose number-name or type a number and a name.
9		**Minute (stopwatch)**	Fills the minute box with the current match minute, or empties it.
10		**Add to Match Timeline**	Green frame: every Show adds the card to the match timeline. Shared by all editors.
11		**Show**	Puts the card lower third on the CK board.
12		**Hide**	Takes the lower third off; the scorebug stays.

Board Output **Control Panel**

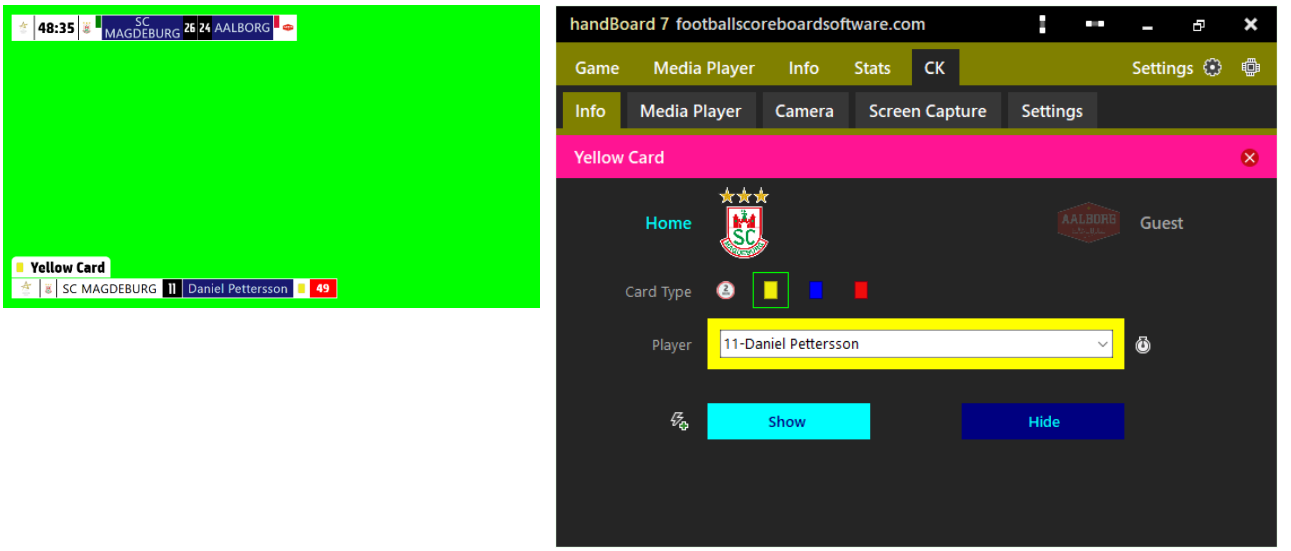


Figure 64. The yellow card lower third.

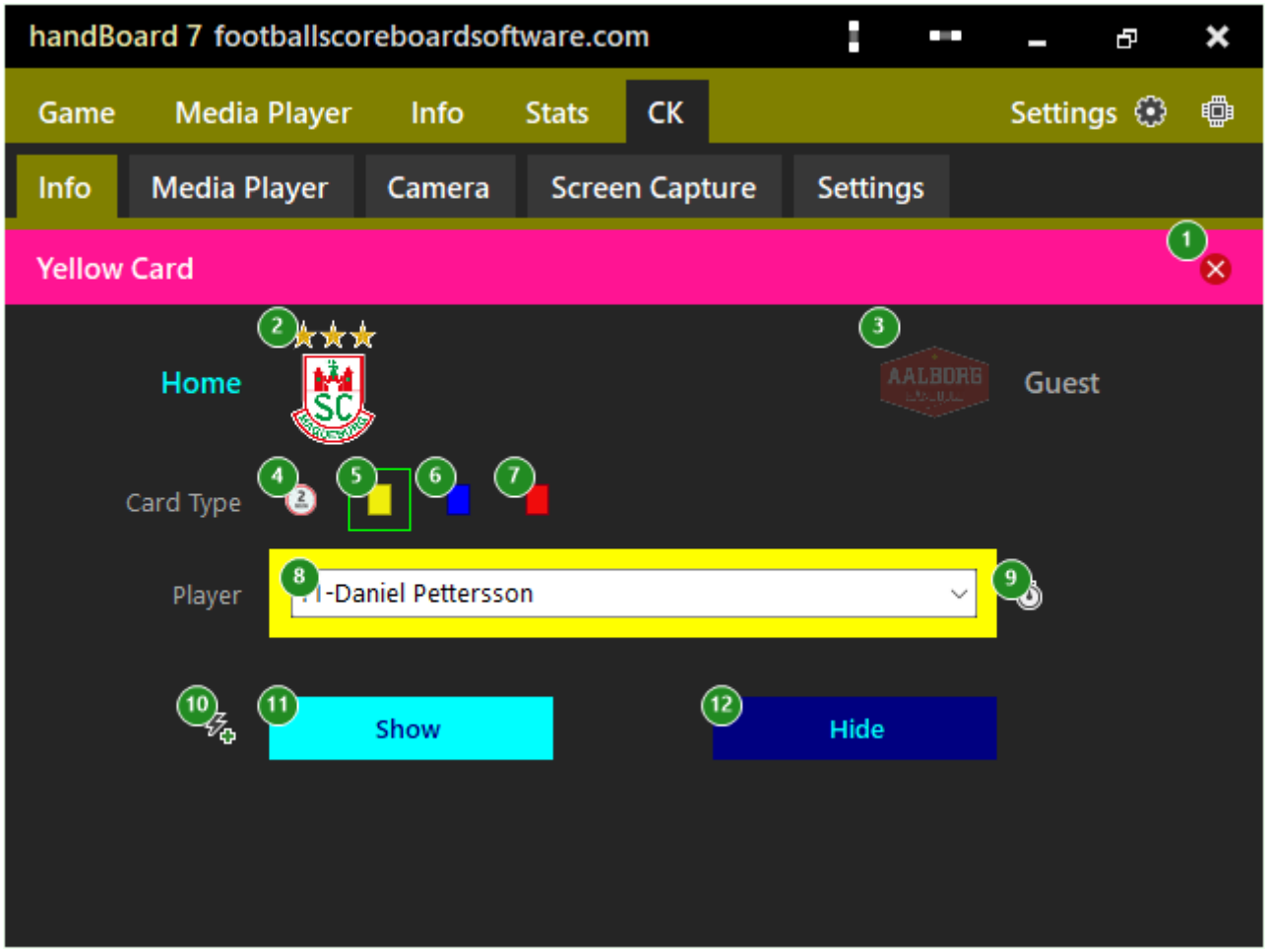


Figure 65. The CK card editor with the type Yellow Card.

- In the CK card editor the blue card is the third button and the red card the fourth; on the Info tab it is the other way round.

Substitution

Board Output **Control Panel**

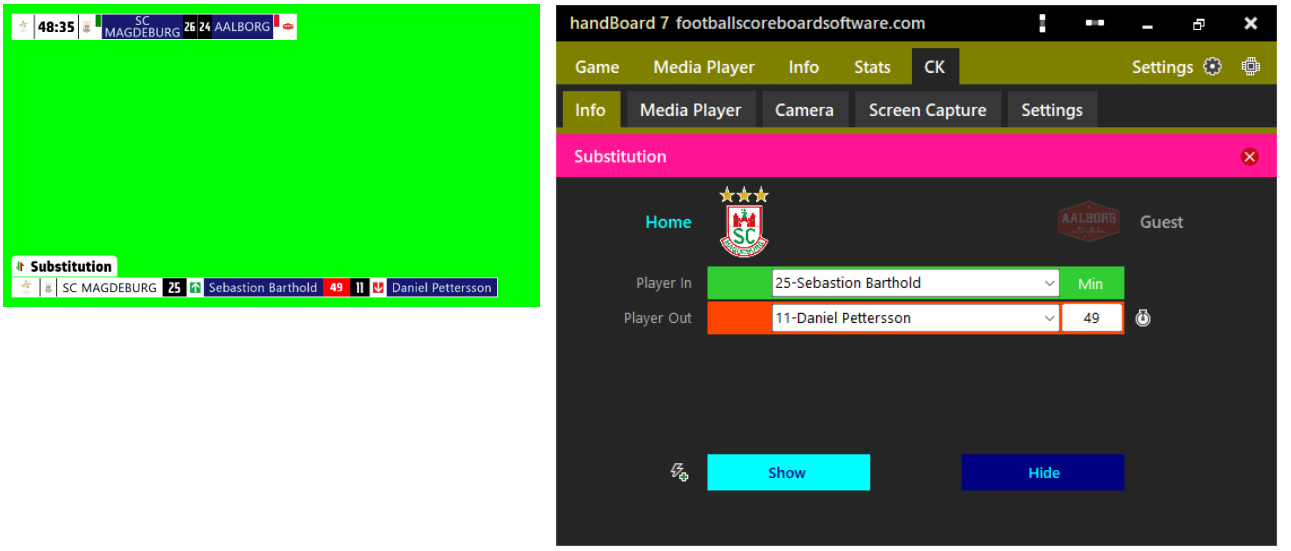


Figure 66. The substitution lower third: 25 in, 11 out, minute 49.

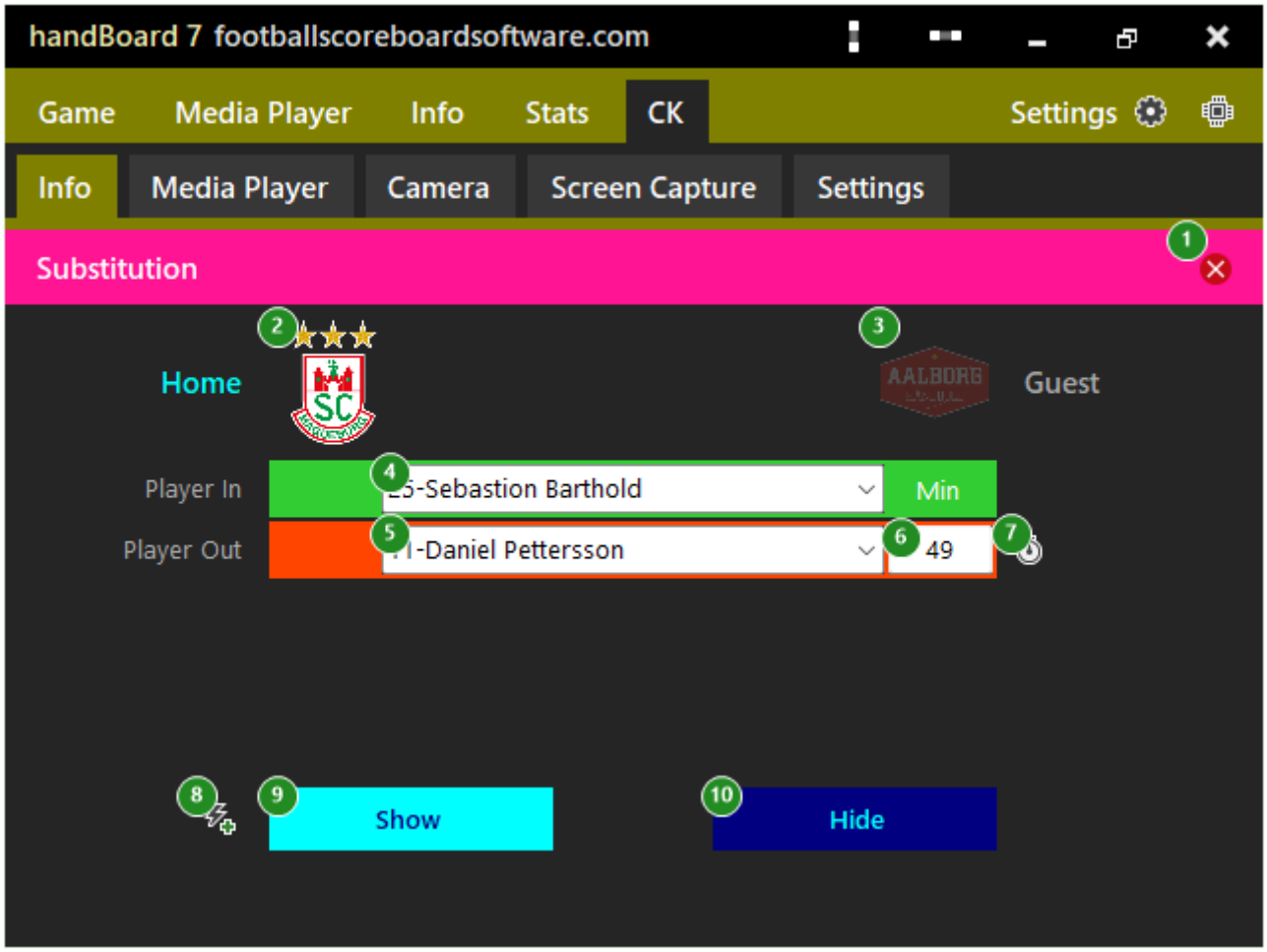


Figure 67. The CK Substitution editor.

No.	Control	Name	What It Does
1		**Close**	Closes the editor. The lower third stays on air.
2		**Home logo**	Click for a substitution of the home team.
3		**Guest logo**	Click for a substitution of the guest team.
4		**Player In**	The player coming on.
5		**Player Out**	The player going off.
6		**Min**	The minute, filled with the current match minute.
7		**Minute (stopwatch)**	Empties the minute box, or fills it again.
8		**Add to Match Timeline**	Green frame: every Show adds the substitution to the match timeline. Shared by all editors.
9		**Show**	Puts the substitution lower third on the CK board.

No.	Control	Name	What It Does
10	Hide	**Hide**	Takes the lower third off; the scorebug stays.

Timeline

Timeline opens the match timeline (chapter 10.1) with a Hide button. Show puts the events of the timeline as a lower third: the home events on the left, the guest events on the right, above a bar with the logos, names and score.

Board Output **Control Panel**

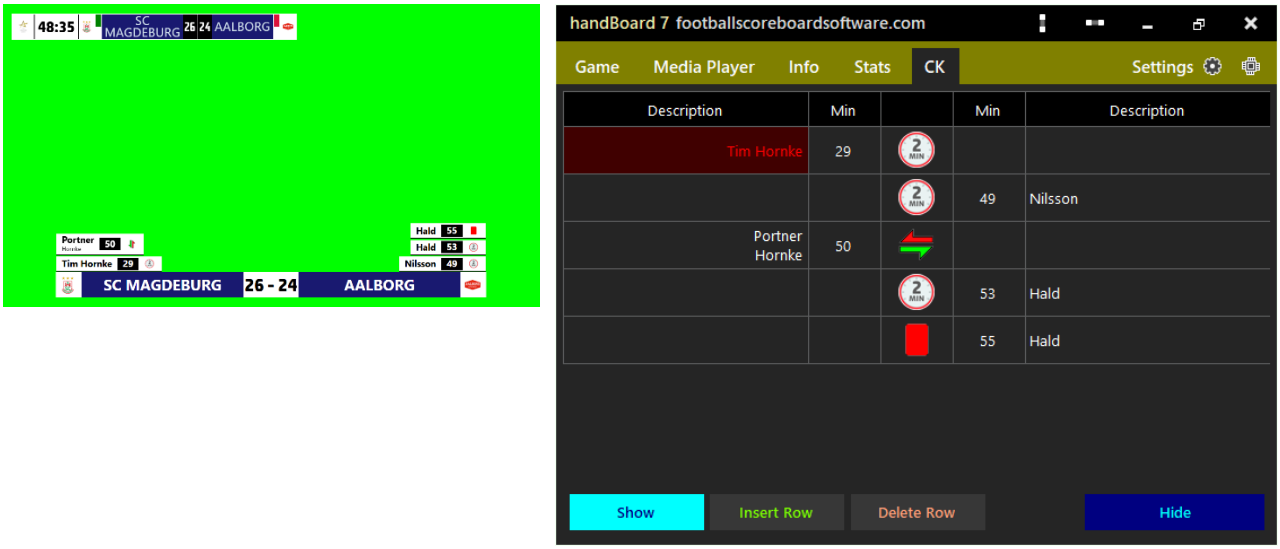


Figure 68. The timeline lower third.

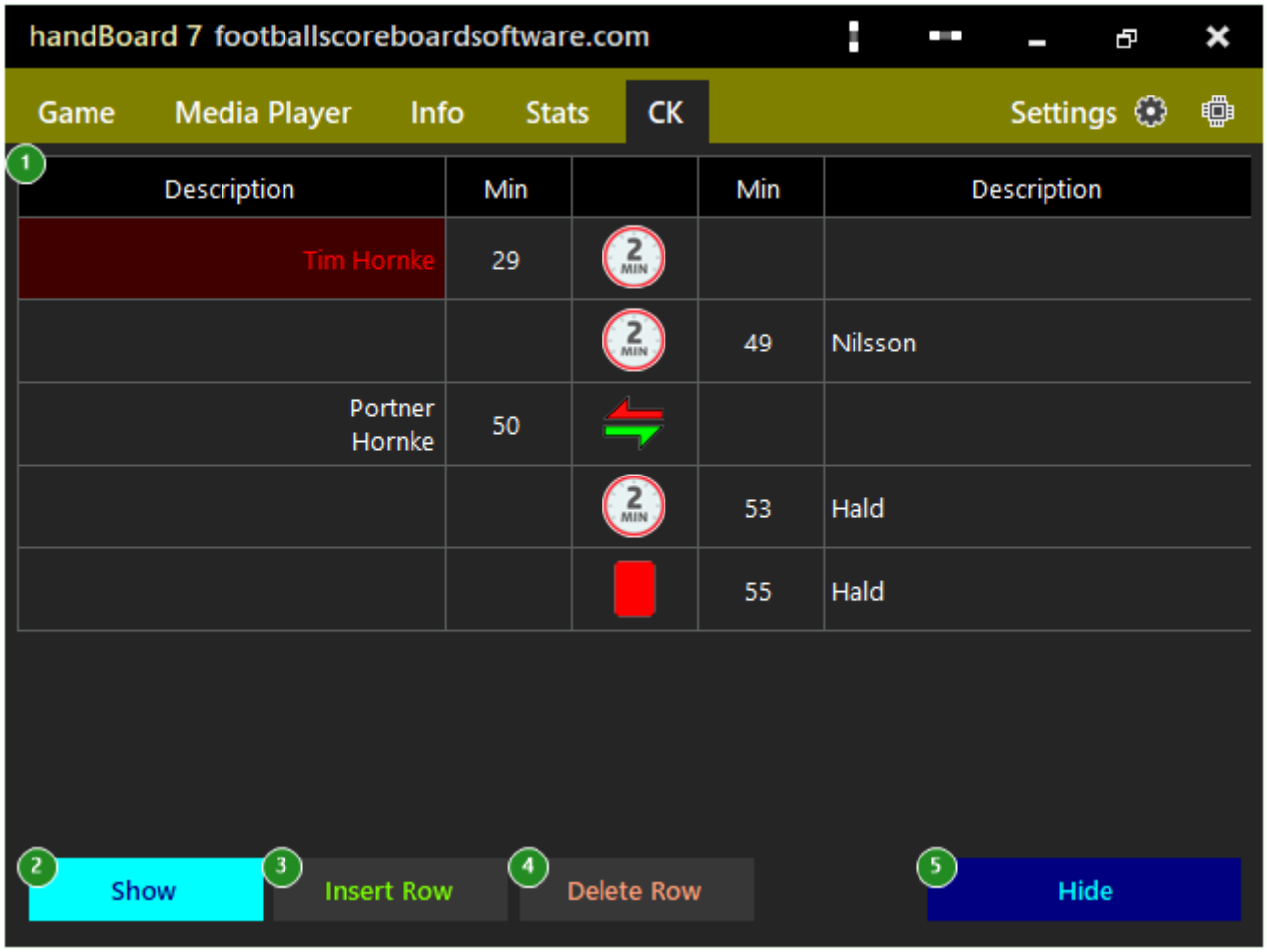
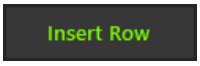
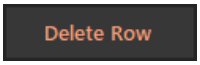


Figure 69. The timeline on the CK page.

No.	Control	Name	What It Does
1		**Timeline**	Home events left, guest events right of the icon column: description and minute. Click an icon cell, then its small button, to choose the icon. Saved at once.
2		**Show**	Puts the timeline lower third on the CK board: home events left, guest events right.
3		**Insert Row**	Adds an empty row above the selected row.
4		**Delete Row**	Removes the selected row.
5		**Hide**	Takes the timeline lower third off; the scorebug stays.

9.17 Returning to the Scoreboard

An info screen stays on the board until you bring the scoreboard back:

- Click Game in the menu bar. The scoreboard comes back and the Game tab opens.
- From the remote control or the HTTP API: the command match (chapter 13, Appendix B).
- The player picture player can return by itself at the end of its list (section 9.12).
- In CK: Hide in the editor or next to the screen button on the CK page.

- Closing an editor with X or Esc, or opening another tab, does not take the screen off.
- The match goes on while a screen is on air: the clock, the scores and the suspension timers keep running and are on the scoreboard when it comes back.

10. Statistics and Tables

The Stats tab holds the tables that you fill in by hand and show on the board: the match timeline, the match statistics, the league standings, the results and the fixtures. Click Stats in the menu bar; the second row has one tab per table.

Tab	What It Holds	Section
Timeline	The events of the match: goals, suspensions, cards, substitutions.	10.1
Stats	Match statistics: a home value, a label and a guest value per row.	10.2
Standings	The league table.	10.3
Results	The results of a round.	10.4
Fixtures	The coming matches.	10.4

- Each table has its own Show button. The table replaces the scoreboard on the board; Game in the menu bar brings the scoreboard back (chapter 9.17).
- A new match does not clear the tables.
- The download of league tables from the internet is not available in handBoard 7: its button is hidden.

10.1 Timeline

The match timeline: one row per event, the home events on the left and the guest events on the right of the icon column.

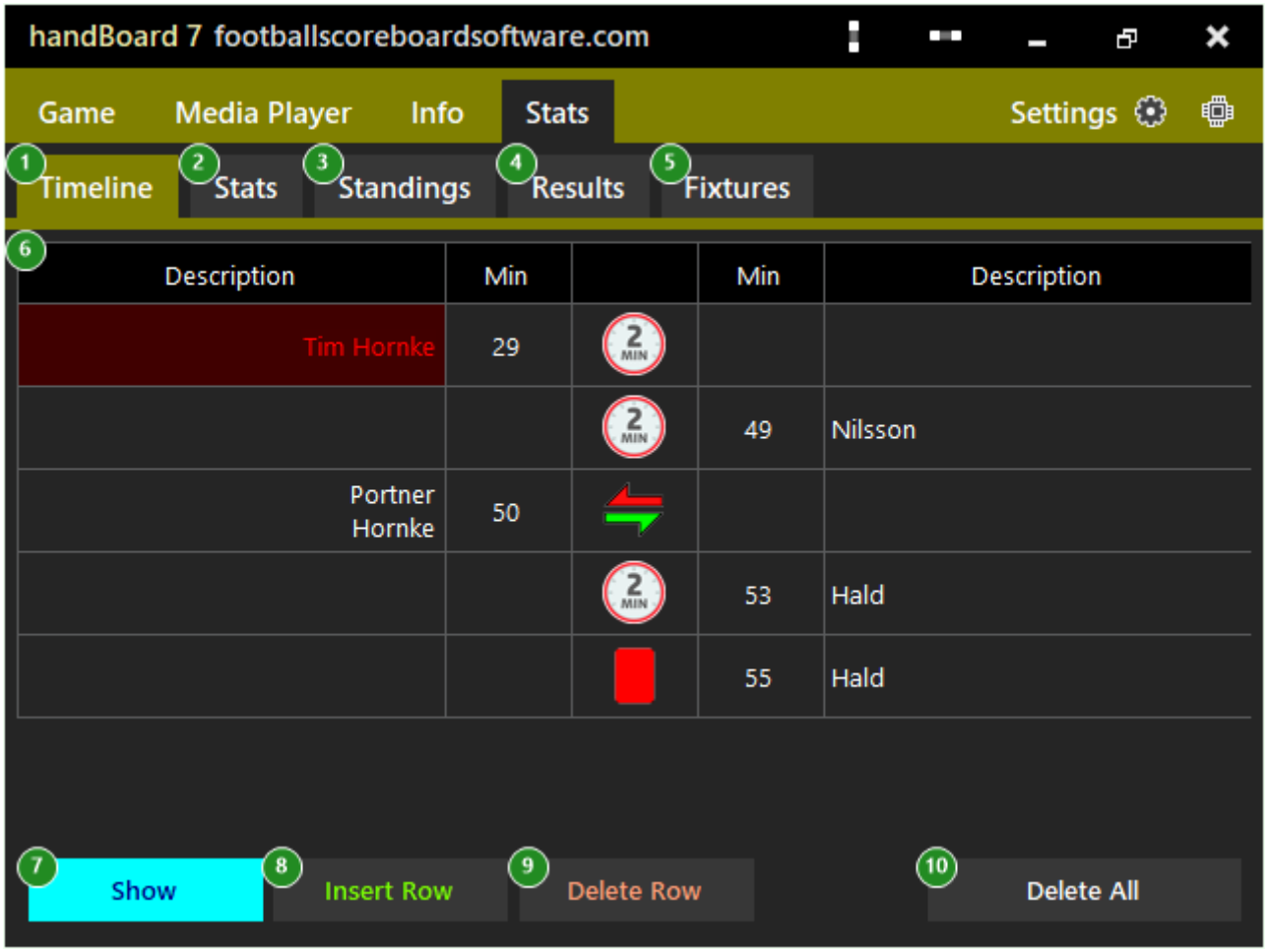


Figure 70. The Timeline tab with the events of the demo match.

No.	Control	Name	What It Does
1	Timeline	**Timeline**	Opens the match timeline (section 10.1).
2	Stats	**Stats**	Opens the match statistics table (section 10.2).
3	Standings	**Standings**	Opens the league table (section 10.3).
4	Results	**Results**	Opens the results (section 10.4).
5	Fixtures	**Fixtures**	Opens the fixtures (section 10.4).
6		**Timeline**	Home events left, guest events right of the icon column: description and minute. Click an icon cell, then its small button, to choose the icon. Saved at once.
7	Show	**Show**	Puts the timeline on the board with logos, names and score. Only rows with an icon are shown.
8	Insert Row	**Insert Row**	Adds an empty row above the selected row.
9	Delete Row	**Delete Row**	Removes the selected row.

No.	Control	Name	What It Does
10	Delete All	**Delete All**	Empties the timeline: the first click turns it red, the second deletes.

Column	What It Holds
Description (left), Min	The home event: the player (for a substitution the player coming in and the player going out on two lines) and the minute.
Icon	The kind of event.
Min, Description (right)	The guest event.

How rows get into the timeline:

- The info screens add a row with every Show while Add to Match Timeline is on (chapter 9.2): Goal, the cards, Substitution and Multiple, on the Info tab and on the CK page. The same row is never added twice.
- Insert Row adds an empty row above the selected row (or at the end). Type the description and the minute; Shift + Enter starts a second line.
- To choose the icon, click the icon cell of the row and then the small button that appears in it: a row of icons opens. Click one; the red mark closes the row without a change.

Icon	Event	Added by
Ball	Goal	Goal (Goal)
2 MIN	2-minute suspension	Goal (Own Goal), see the note
Ball with tick	7-metre goal	Goal (7-Metre Goal)
Ball with cross	Missed 7-metre throw	Only by hand
Arrows	Substitution	Substitution, Multiple
Yellow card	Warning	Yellow Card; 2 Min on the Info tab
Blue card	Disqualification with report	Blue Card
Red card	Disqualification	Red Card; 2 Min on the CK page

> **Note:** The icons do not match every event yet: an own goal is entered with the 2 MIN icon, a 2-minute suspension with the yellow card icon (Info tab) or the red card icon (CK page). Correct the icon of such a row with the icon row.

- Delete Row removes the selected row. Delete All empties the timeline: the first click turns it red, the second click deletes. Clicking a row in between cancels.
- Every change is saved at once (common\data\dataEvents.xml).
- Show puts the timeline on the board with the logos, the names and the score of the two teams. Only rows with an icon are shown.

- On the CK page the timeline is a lower third (chapter 9.16).

10.2 Stats

A table of match statistics, typed by hand. The values are not taken from the match.

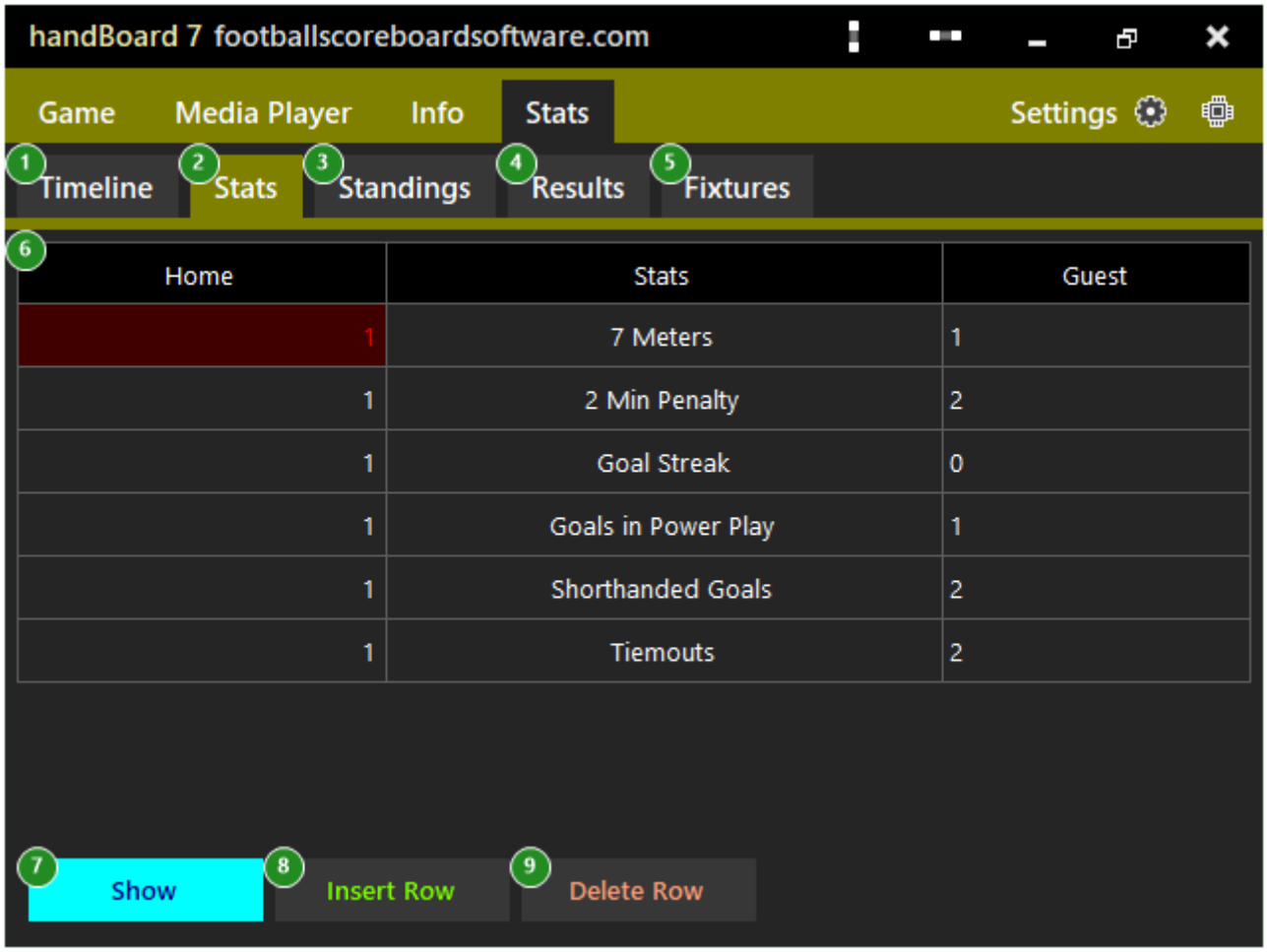
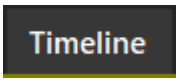
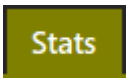
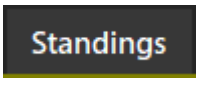
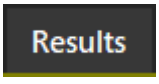
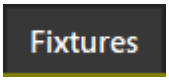
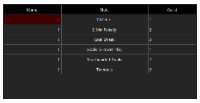
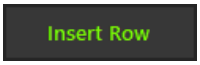
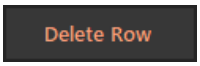


Figure 71. The Stats tab with the demo statistics.

No.	Control	Name	What It Does
1		**Timeline**	Opens the match timeline (section 10.1).
2		**Stats**	Opens the match statistics table (section 10.2).
3		**Standings**	Opens the league table (section 10.3).
4		**Results**	Opens the results (section 10.4).
5		**Fixtures**	Opens the fixtures (section 10.4).
6		**Stats**	Home value, label and guest value per row. Saved at once.

No.	Control	Name	What It Does
7		**Show**	Puts the statistics on the board with logos, names and score.
8		**Insert Row**	Adds an empty row above the selected row.
9		**Delete Row**	Removes the selected row.

Column	What It Holds
Home	The value of the home team.
Stats	The label, for example 7-Metre Goals, 2-Minute Suspensions, Timeouts.
Guest	The value of the guest team.

- Insert Row adds an empty row above the selected row; Delete Row removes the selected row. Every change is saved at once (common\data\dataStats.xml).
- Show puts the table on the board with the logos, the names and the score of the two teams.

10.3 Standings

The league table.

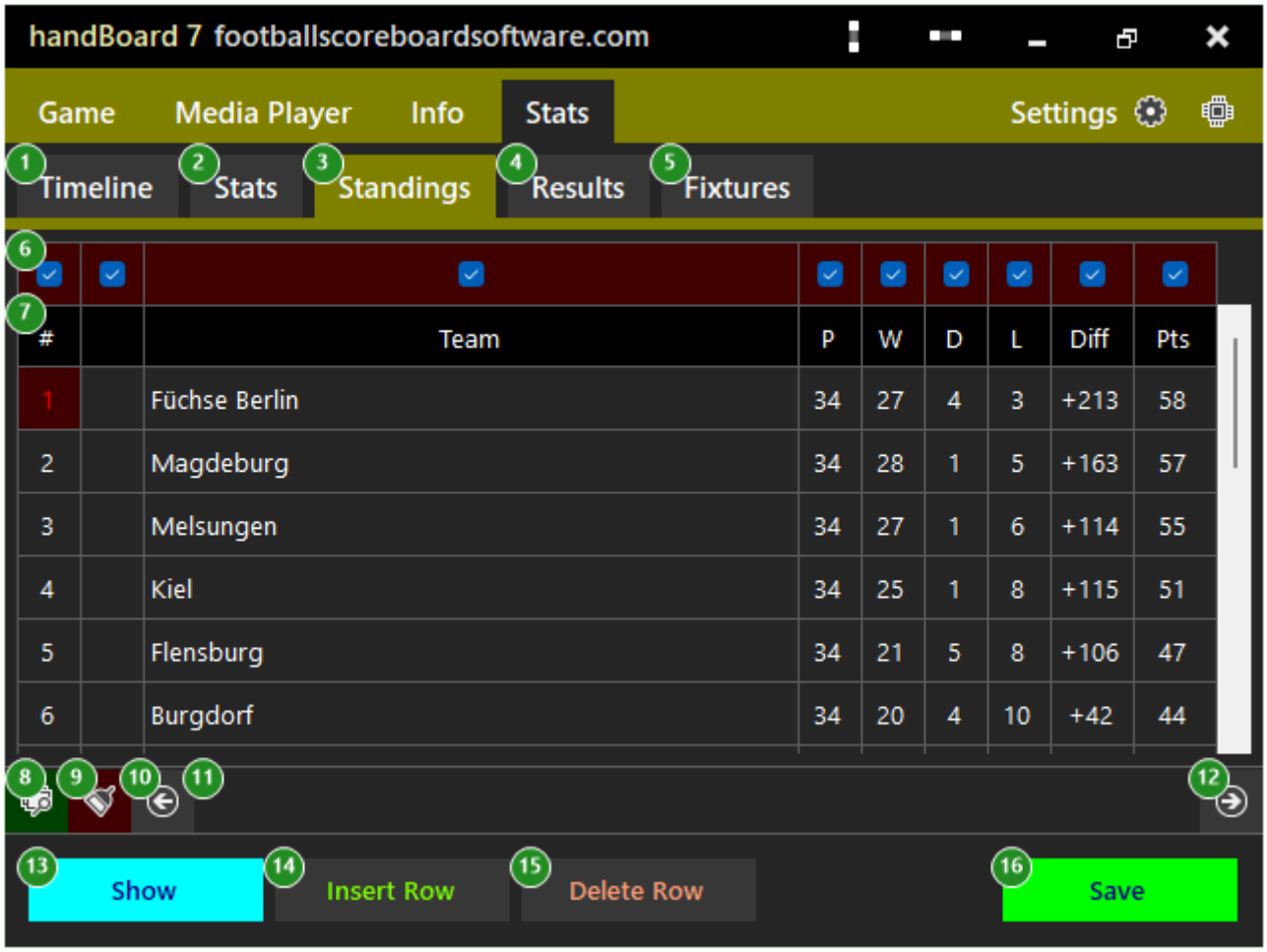
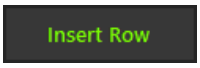
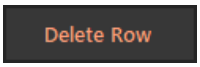


Figure 72. The Standings tab with the demo table.

No.	Control	Name	What It Does
1	Timeline	**Timeline**	Opens the match timeline (section 10.1).
2	Stats	**Stats**	Opens the match statistics table (section 10.2).
3	Standings	**Standings**	Opens the league table (section 10.3).
4	Results	**Results**	Opens the results (section 10.4).
5	Fixtures	**Fixtures**	Opens the fixtures (section 10.4).
6		**Column check boxes**	Tick the columns that go to the board; the first check box switches all. Saved at once.
7		**Standings**	#, logo, Team, P, W, D, L, Diff, Pts. Type the values; drag a row to move it.
8		**Select Picture**	Adds one or more logo pictures to the logo strip.
9		**Clear**	Empties the logo strip.

No.	Control	Name	What It Does
10		**Scroll left**	Scrolls the logo strip to the left.
11		**Logo strip**	Click a logo, then the row of the team (Esc cancels), or drag the logo onto the row. Delete removes the selected logo.
12		**Scroll right**	Scrolls the logo strip to the right.
13		**Show**	Puts the table with the ticked columns on the board, as it is in the grid.
14		**Insert Row**	Adds an empty row above the selected row.
15		**Delete Row**	Removes the selected row.
16		**Save**	Saves the table. Green when the tab opens, grey after saving.

Column	What It Holds
#	The position. The program numbers the rows from top to bottom.
Logo	The team logo (below).
Team	The team name.
P, W, D, L	Played, won, drawn, lost.
Diff	The goal difference.
Pts	The points.

- Type the values into the cells. The program does not calculate the table: handball gives two points for a win and one for a draw.
- Drag a row to move it; the positions are numbered again.
- Insert Row adds an empty row above the selected row; Delete Row removes the selected row.
- Save saves the table (common\data\dataStandings.xml). It is green when the tab opens and grey after saving, until the tab is opened again: click Save after every change.
- The check boxes above the columns choose the columns that go to the board. The first check box switches all of them. The choice is saved at once.
- Show puts the table on the board as it is in the grid (also before Save), with the ticked columns.

Logos: the strip below the grid holds the logo pictures.

1. Click Select Picture (the button at the left of the strip) and choose one or more picture files. They are added to the strip.
2. Click a logo in the strip: the mouse pointer becomes the logo.
3. Click the row of the team. The logo goes into the Logo column. Esc cancels.

- A logo can also be dragged from the strip onto a row.

- Delete removes the selected logo from the strip; Clear (the brush) empties the strip. The arrows scroll it.
- The strip is shared by Standings, Results and Fixtures.

10.4 Results and Fixtures

Two tables with the same layout: the played matches with their scores, and the coming matches.

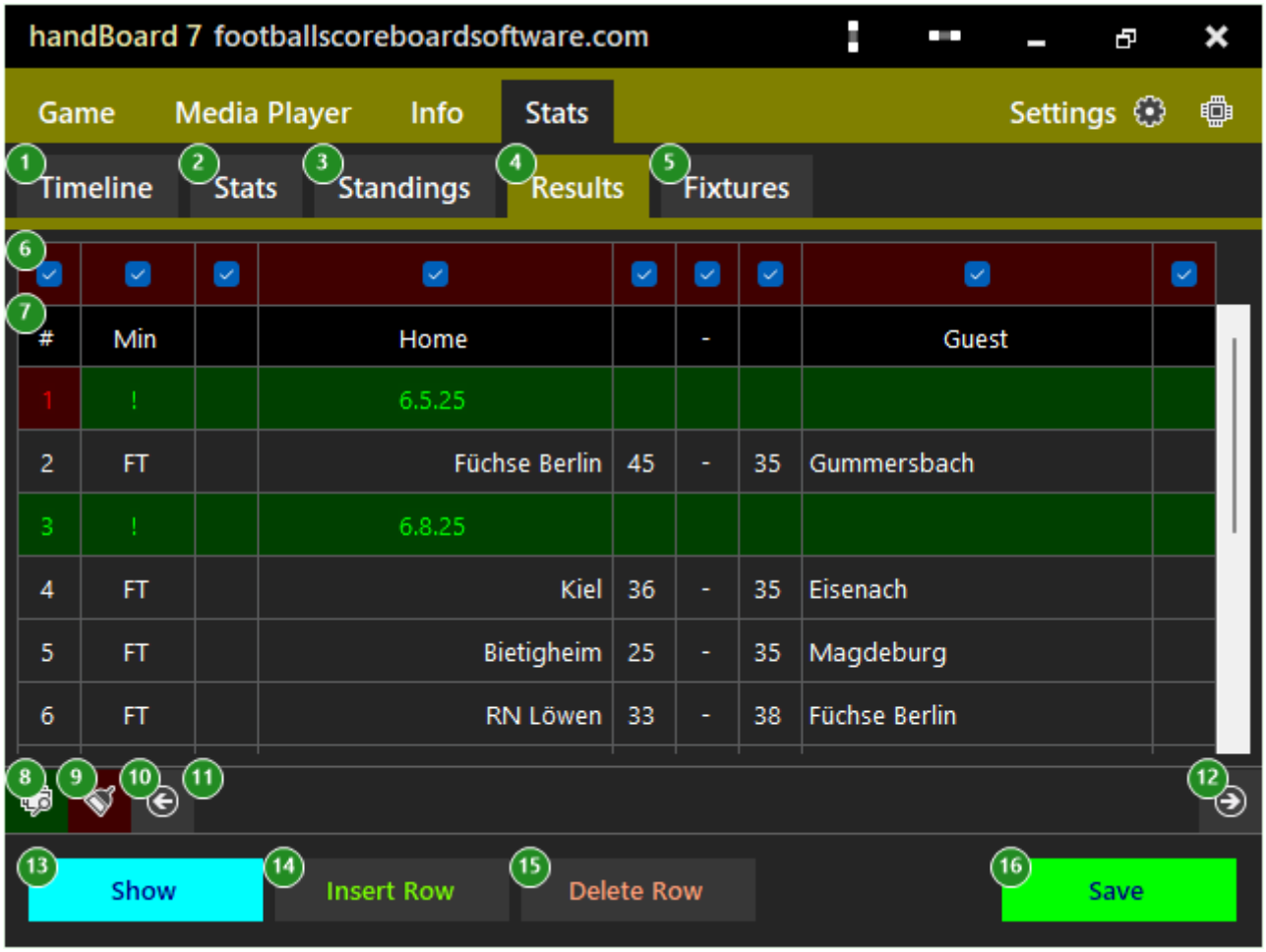
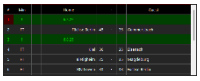
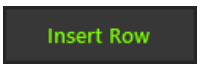
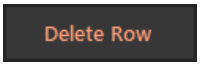


Figure 73. The Results tab with the demo results.

No.	Control	Name	What It Does
1	Timeline	**Timeline**	Opens the match timeline (section 10.1).
2	Stats	**Stats**	Opens the match statistics table (section 10.2).
3	Standings	**Standings**	Opens the league table (section 10.3).
4	Results	**Results**	Opens the results (section 10.4).
5	Fixtures	**Fixtures**	Opens the fixtures (section 10.4).
6		**Column check boxes**	Tick the columns that go to the board; the first check box switches all. Saved at once.

No.	Control	Name	What It Does
7		**Matches**	#, row kind (! = heading row), logo, Home, scores, Guest, logo. Type the values; drag a row to move it.
8		**Select Picture**	Adds one or more logo pictures to the logo strip.
9		**Clear**	Empties the logo strip.
10		**Scroll left**	Scrolls the logo strip to the left.
11		**Logo strip**	Click a logo, then the row of the team (Esc cancels), or drag the logo onto the row. Delete removes the selected logo.
12		**Scroll right**	Scrolls the logo strip to the right.
13		**Show**	Puts the list with the ticked columns on the board, as it is in the grid.
14		**Insert Row**	Adds an empty row above the selected row.
15		**Delete Row**	Removes the selected row.
16		**Save**	Saves the results or the fixtures. Green when the tab opens, grey after saving.

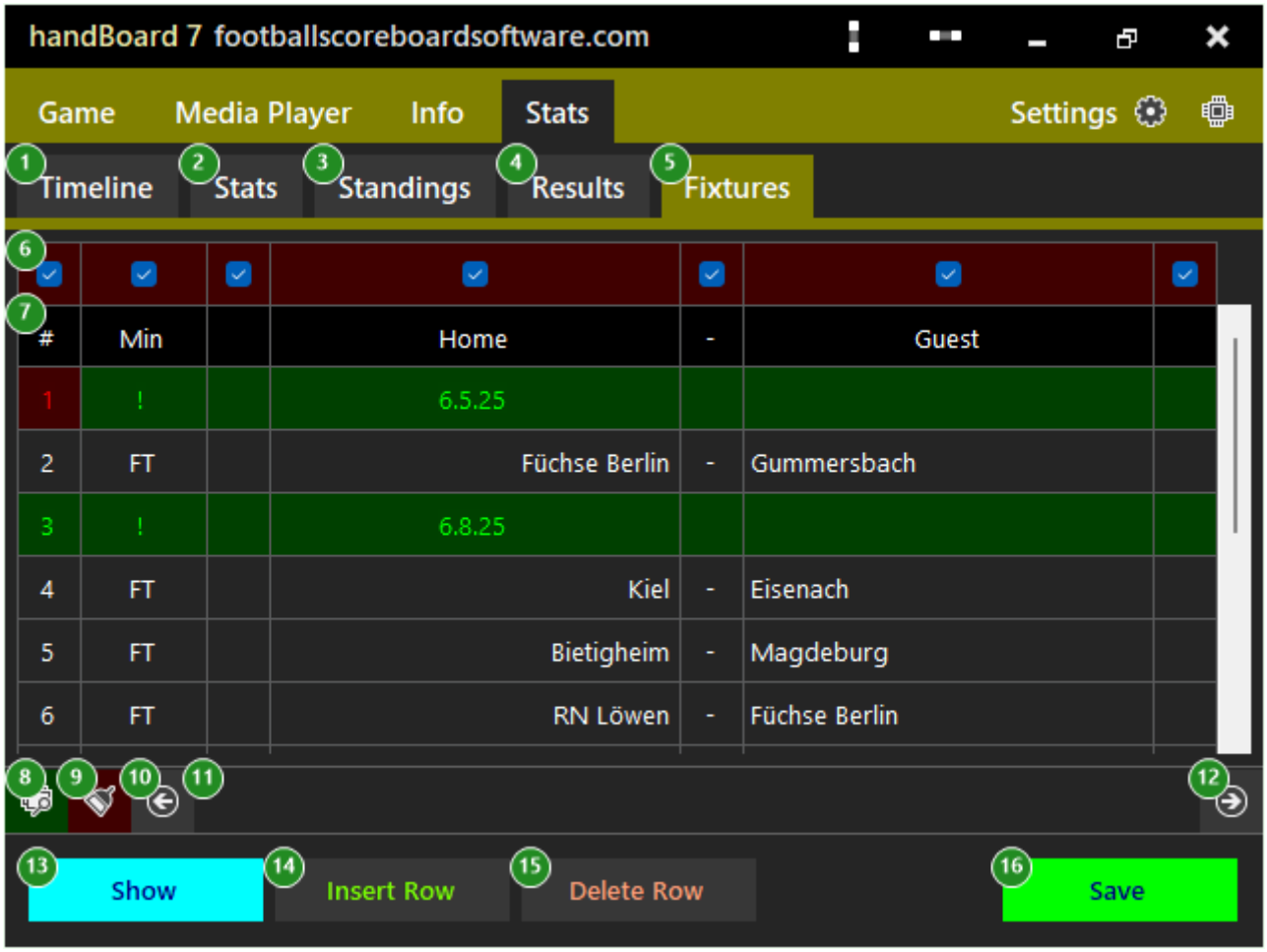


Figure 74. The Fixtures tab. It has no score columns.

Column	What It Holds
#	The row number.
Min	The kind of the row. ! (or #, D) makes the row a heading, for example a date: type the text into the Home cell; the row is green and has no teams or scores. Any other text, for example FT, is shown in front of the match.
Logo, Home	The home team and its logo.
Score, -, Score	The goals of the home and the guest team (Results only).
Guest, Logo	The guest team and its logo.

- Insert Row, Delete Row, the check boxes, the logo strip, Save and Show work as in Standings (section 10.3).
- Save writes common\data\dataResults.xml or common\data\dataFixtures.xml.

11. Teams, Players, Photos and Logos

This chapter collects what handBoard 7 knows about the two teams: the names, the colours, the logos, the player lists with their photos, and the team database that keeps player lists for later matches.

11.1 Team Names

The team names are typed on the Game tab (chapter 5.8). The X next to a name box empties it.

- The boards show the names as typed, for example in capitals.
- The info screens use the same names: the team line of Goal, the cards and Substitution, the title of the team list, the score bar of the Stats tables and of the CK timeline.
- The remote control and the HTTP API can set the names (set_home_team, set_guest_team; chapter 14, Appendix B).
- A new match keeps the names.

11.2 Team Colours

Each team has two colours. They are set on the Info tab, in the two small boxes next to Home Team and Guest Team (chapter 9.12): the upper box is the band colour, the lower box the text colour on the band.

1. Click a colour box. The colour picker opens.
2. Choose the colour and confirm. The colour is saved at once.

- The team list (Home Team > Show) uses the colours for the number boxes, the group titles and the coach band.
- The boards whose design has team colour bars use the first colour of each team, for example the bars next to the team names of the CK scorebug.
- Factory colours: home green and white, guest red and white.

11.3 Logos

The Game tab has three logo slots: the home logo (left), the board logo (middle) and the guest logo (right).

Slot	How	Where It Appears
Home logo, guest logo	Click the logo and choose a picture file. Move the mouse over the logo: an X appears that removes it.	Next to the team on the scoreboards, on the info screens (Banner, Announce, Goal, the cards, Substitution, the large faded logo of the team list), in the CK lower thirds and in the score bar of the Stats tables.
Board logo	The same.	The logo of the competition or the venue, where the design has a place for it (for example the EHF Champions League logo of the demo).

- Picture files: bmp, gif, jpg, jpeg, png and the other picture types of the dialog. The dialog starts in C:\handBoard7\media\downloads\images.
- The factory logos (SC Magdeburg, Aalborg, the Champions League) are in C:\handBoard7\common\images.
- The logos of the Standings, Results and Fixtures tables are separate: they are set in the logo strip of the Stats tab (chapter 10.3).

- In the DEMO mode the home logo cannot be changed or removed ("License Required"); chapter 3.
- Remove a logo with the X; there is no right-click menu.

11.4 Player Lists

Each team has a player list: Info > Home Team and Info > Guest Team. The title bar shows Home Team or Guest Team.

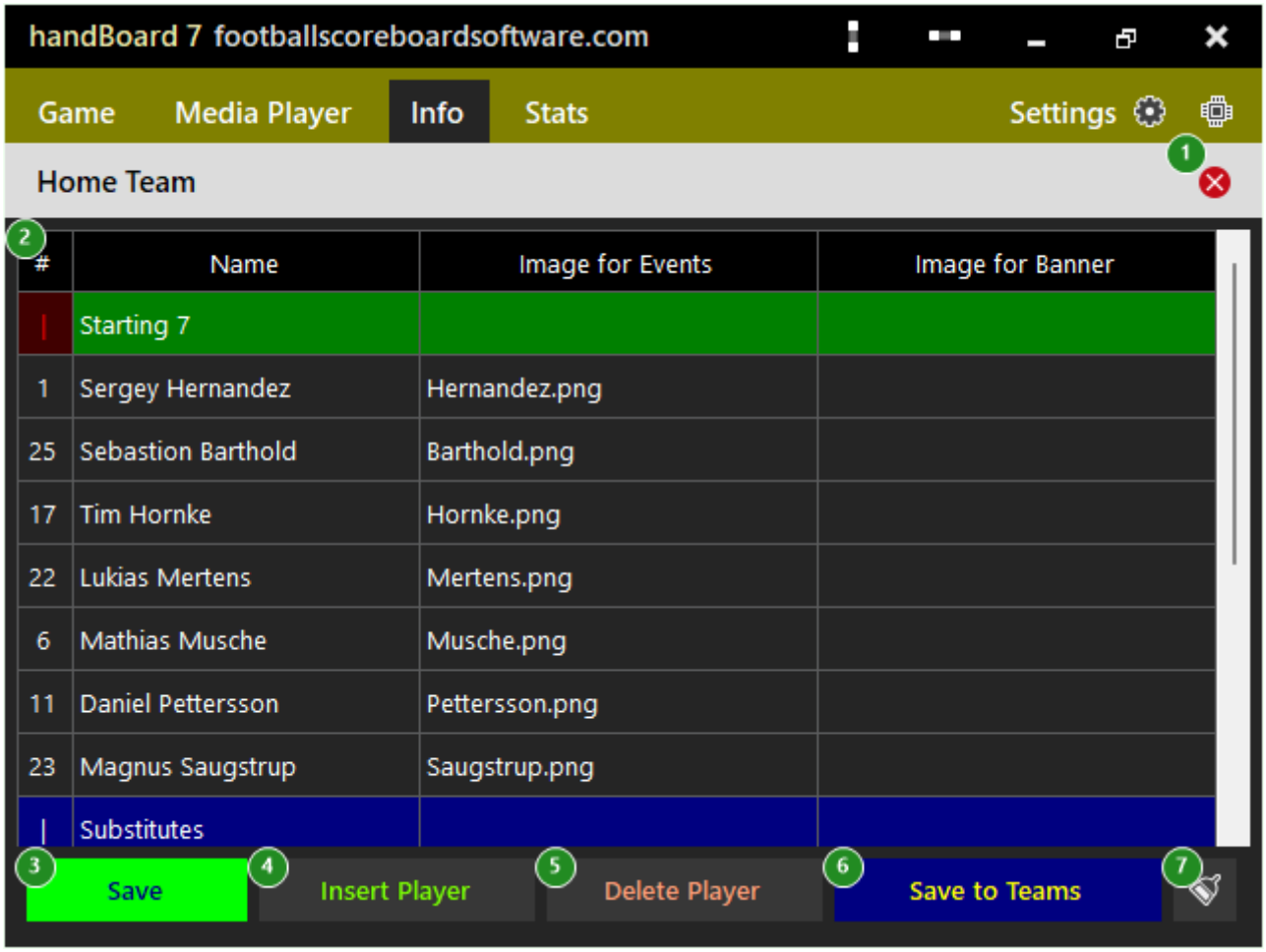
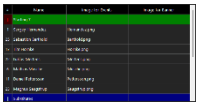
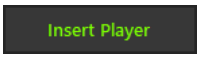
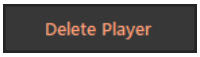


Figure 75. The player list of the home team (SC Magdeburg).

No.	Control	Name	What It Does
1		**Close**	Closes the player list. Unsaved changes are lost.
2		**Player list**	The groups Starting 7, Substitutes, Other Players and Trainer with #, Name, Image for Events and Image for Banner. Drag a player to move him.
3		**Save**	Saves the list; green while there are unsaved changes. Empty rows are dropped.
4		**Insert Player**	Adds an empty row at the end of the group of the selected row. Trainer takes one person only.
5		**Delete Player**	Removes the selected player.
6		**Save to Teams**	Asks for a name and saves the list in the team database.

No.	Control	Name	What It Does
7		**Clear All**	Empties the list down to the four group rows; Save keeps the empty list.

The list has four groups, each with a coloured header row:

Group	What It Holds
Starting 7	The starting seven: the goalkeeper and the six court players.
Substitutes	The other players of the match squad.
Other Players	Further players, for example injured players. They are in the player lists of the info screens but not on the team list.
Trainer	One person: the coach. The team list shows the coach in the band under the team name.

Column	What It Holds
#	The shirt number. The info screens show it in front of the name; the penalty boxes of the Game tab offer the numbers of the list (section 11.8).
Name	The name as it appears on the board.
Image for Events	The photo for Show With Picture of Goal, the cards and Substitution, and for the Slide of the team (chapter 9).
Image for Banner	The picture or video clip of the player picture player (Show Pictures, chapter 9.12).

Button	What It Does
Insert Player	Adds an empty row at the end of the group of the selected row. The Trainer group takes one person only.
Delete Player	Removes the selected player. The group rows cannot be deleted.
Save	Saves the list (common\data\playersHome.xml or playersGuest.xml). It is green while there are unsaved changes; empty rows are dropped.
Save to Teams	Asks for a name and saves the list in the team database (section 11.7).
Clear All (brush)	Empties the list down to the four group rows. Click Save to keep the empty list.

- Click a cell and type; F2 edits the cell.
- Drag a player to move him to another place or another group. A player cannot be moved into or out of the Trainer group.

- Photos: click a cell of Image for Events or Image for Banner. A small button in the cell chooses the file. When the file exists, a preview of the picture opens under the row; its folder button opens the folder of the file in Windows Explorer. Image for Events takes pictures; Image for Banner also takes video clips.
- A file name in red means that the file is missing.
- Esc or the X closes the list. Close it after Save: changes that are not saved are lost when the list is opened again.

11.5 Where the Player Lists Are Used

Where	Which Entries
Goal, Yellow / Red / Blue Card, 2-Minute Suspension, Substitution, Multiple (Info tab and CK page)	The Player lists: Starting 7, Substitutes and Other Players, sorted by number, as "number-name".
Team list (Home Team > Show)	Starting 7 and Substitutes in two columns, the coach in the band.
Slide	Starting 7, Substitutes and Trainer, one slide per person with the Image for Events.
Show Pictures	The group you choose, with the Image for Banner files.
Penalty boxes of the Game tab	The shirt numbers of the whole list (section 11.8).
HTTP API (info_goal, info_card, info_subst)	An empty name is looked up by the shirt number.

The group titles on the board (Starting Seven, Substitutes, Coach) are titles of Settings > Language > Titles (chapter 16), not the names of the group rows.

11.6 Photos and Photo Folders

- Keep the photos of a team in one folder, for example C:\handBoard7\media\images\players\<team>. The demo photos of SC Magdeburg are in C:\handBoard7\media\images\players\magdeburd.
- The lists save the full path of each file. If you move the folder, the names turn red: choose the files again.
- PNG with a transparent background looks best on the info screens (see the demo photos).
- A second photo for a screen: next to the Image for Events file, a file with _Goal or _Card added to its name (Hornke_Goal.png, Hornke_Card.png) is used instead by Show With Picture of Goal or of the cards. Substitution always uses the Image for Events file.

11.7 Team Database

The team database keeps player lists for later matches, for example the squads of all clubs of the league.

1. Fill in the player list of a team and click Save to Teams. Type a name, for example the club name, and confirm.
2. Before the next match against that club, open Info > Team Database, select the team and click Set Home or Set Guest. After a confirmation the saved list replaces the home or the guest player list.

- Set Home and Set Guest load only the players: set the team name and the logo on the Game tab.

- Save to Teams always adds a new entry. To update a saved team, open it with the Show button of the team database, change it and click Save there.
- The details of the Team Database page are in chapter 9.15. The saved lists are common\data\team_<id>.xml; the names are in common\data\dataTeams.xml.

11.8 The Penalty Player Lists on the Game Tab

The penalty box of each team on the Game tab has a small list button (Select Player) next to the number box (chapter 5.6). It opens the shirt numbers of the team's player list, sorted; a click puts the number into the box.

- The numbers come from all groups of the list, the coach included when he has a number.
- The lists are read when the program starts. After a change of a player list or Set Home / Set Guest, restart the program to see the new numbers; you can always type a number into the box.

> **Note:** The number lists of the Game tab are read when the program starts: restart the program after you change a player list. Give every player a number only (no letters such as A for a team official); a shirt "number" with letters leaves the list empty.

12. Media Player, Playlists, Camera, Screen Capture and NDI

handBoard 7 plays videos and pictures, shows live camera pictures and parts of the PC screen, and sends its board as an NDI video stream into the network.

Where	What It Plays	Output
Media Player tab of the main window	Six playlists (and 14 more) of videos, audio and pictures; web pages	Full screen over the board, in every display mode
Ad page > Media Player, Camera, Screen Capture	Six playlists, a camera, a part of the screen	The multimedia area of the Ad board (chapter 7.4)
Ad page > Banner > Multimedia	Six playlists for each banner	Inside banner 1 or banner 2
CK page > Media Player, Camera, Screen Capture	Six playlists, a camera, a part of the screen	Behind the graphics of the CK board (chapter 7.5)
NDI button on the Game tab	The board itself	An NDI stream in the network

Each place has its own playlists: a clip added on the Ad page is not in the playlists of the Media Player tab.

12.1 Media Player and Playlists

The Media Player tab of the main window plays videos and pictures full screen on the board output, for example an advert in a timeout or a highlight at half-time. The clip plays in its own window, Multimedia, in the position and size of the board.

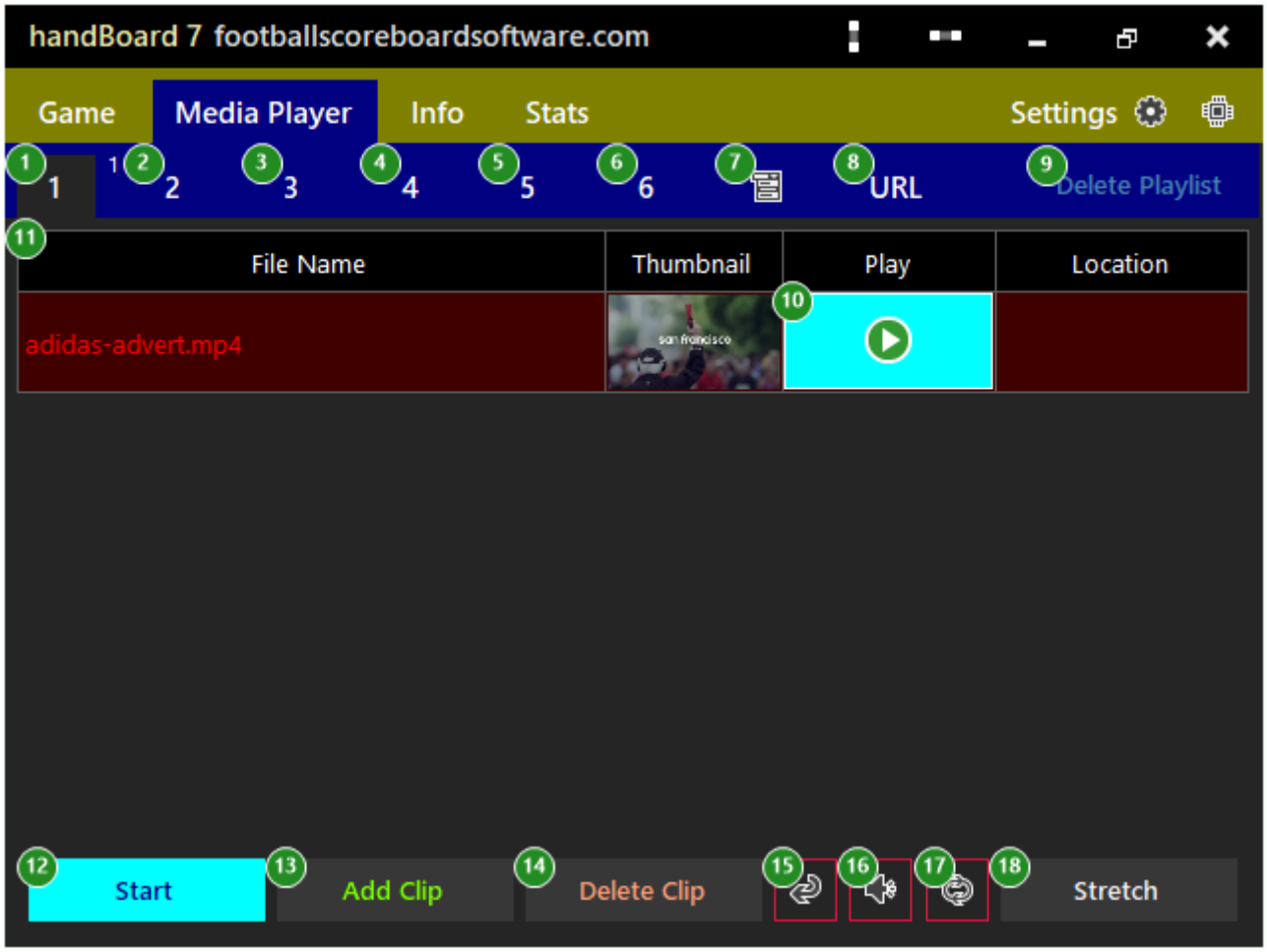
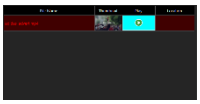
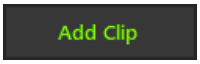
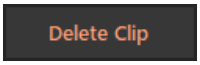


Figure 76. The Media Player tab with playlist 1 and the sample clip selected.

No.	Control	Name	What It Does
1	1	1	Opens playlist 1. The small number above the button shows how many clips it holds. Not available while a clip plays.
2	2	2	Opens playlist 2. Not available while a clip plays.
3	3	3	Opens playlist 3. Not available while a clip plays.
4	4	4	Opens playlist 4. Not available while a clip plays.
5	5	5	Opens playlist 5. Not available while a clip plays.
6	6	6	Opens playlist 6. Not available while a clip plays.
7		**More Playlists (List Icon)**	Opens a list of the playlists 7 to 20; choose one to open it.
8	URL	**URL**	Opens the Web URL list: web pages to show full screen on the board output.
9	Delete Playlist	**Delete Playlist**	Empties the current playlist at once, without a question. Hidden while a clip plays.

No.	Control	Name	What It Does
10		**Play**	Plays only the clip of this row full screen on the board. While it plays, the cell shows Stop (ends the clip) and Pause (holds and continues it).
11		**Playlist**	The clips of the playlist: File Name, Thumbnail, Play and Location (time left of the playing clip). Pictures are grey. Click a row to select it; drag a row to change the order (not while playing).
12		**Start / Finish**	Plays the list on the board from the selected clip; the button then reads Finish, click it to stop.
13		**Add Clip**	Adds video, audio or picture files to the playlist. Hidden while a clip plays.
14		**Delete Clip**	Removes the selected clip from the playlist. Hidden while a clip plays.
15		**Return to Scoreboard Screen When Playlist Ends**	On (green frame): the scoreboard comes back after the last clip. Off (red frame): the list starts again from the top. Off after each program start.
16		**Sound**	Switches the sound of the clips on (green frame) or off (red frame).
17		**Auto Repeat**	Repeats the current clip until you stop it: on = green frame, off = red frame. Start switches it off.
18		**Display Mode (Stretch)**	Opens the list of display modes: how the picture fits the board (Center, CoverCenter, Original, SizeToFit, SizeToFitCenter, Stretch, ZoomCenter).

How to play a playlist:

1. Click a playlist, 1 to 6.
2. Click Add Clip and choose one or more files. Video, audio and picture files are accepted (mp4, mov, mkv, avi, wmv, webm, mp3, wav, jpg, png, gif, bmp and more).
3. Select the clip to start with.
4. Click Start. The list plays from the selected clip on the board; the button then reads Finish. Click Finish to stop.

To play one clip only, select its row and click the play button in its Play cell. While the clip plays, the cell shows a stop button and a pause button: stop ends the clip, pause holds it and continues it. While a clip plays, another row gets its own play button, which switches to that clip at once.

- Pictures stay on screen for Image Play Duration seconds (Settings > Screen Properties, default 5, chapter 7.1).
- Picture files are listed in grey. A file that no longer exists cannot be played (its row has no play button) and Start skips it.
- Drag a row to change the order (not while a clip plays). The playlists are saved at once, in common\data\playList_<n>.xml.
- While a clip plays, Add Clip, Delete Clip and Delete Playlist are hidden, the playlists cannot be switched, and the Settings tab of the menu bar shows the time left of the clip (for example ▶ 0:20).
- Click the Game tab to stop the media and bring back the scoreboard.

The buttons at the bottom right:

Button	Off	On
Return to Scoreboard Screen When Playlist Ends	The list starts again from the top after the last clip.	The scoreboard comes back after the last clip.
Sound	The clips play without sound.	The clips play with sound.
Auto Repeat	–	The current clip repeats until you stop it. Start switches Auto Repeat off.
Stretch (display mode)	How the picture fits the board: Center, CoverCenter, Original, SizeToFit, SizeToFitCenter, Stretch (the factory setting) or ZoomCenter.	

A green frame means on, a red frame off. Return to Scoreboard is off after each start of the program; Sound and the display mode are kept.

More playlists and web pages:

- The list button next to 6 opens a list of the playlists 7 to 20. Choose one to open it; it works like 1 to 6.
- URL opens Web URL, a list of web pages. Insert Row adds a row for an address, Delete Row removes the selected row, and Load in a row shows that page full screen on the board output. Click the Game tab to go back to the scoreboard.

From the remote control (chapter 13) and the HTTP API (chapter 14) you can start a playlist: start_playlist with the value 1 to 6 plays that playlist of the Media Player tab, start_playlist_ad_screen switches to the Ad mode and plays that playlist of the Ad page. A second start while the list plays stops it.

The playlists of the Ad and CK pages work in the same way, with six playlists each and these differences (chapter 7.4): there is no Return to Scoreboard and no Auto Repeat button, Start repeats the list until you click Finish, and the picture goes into the multimedia area (Ad) or behind the graphics (CK) instead of over the whole board.

12.2 Cameras

The Camera tabs of the Ad and CK pages show a live picture from a camera connected to the PC: a webcam, a USB camera or a capture card (for example a Decklink card), as listed by Windows.

The Camera tabs are shown in chapter 7.4 (Ad page) and 7.5 (CK page).

1. Choose the camera in the Camera list. The Format list then shows its picture formats; choose one, for example 1920x1080 @ 30fps.
2. Click Start: the picture appears in the Preview.
3. Click Show: the picture goes on the board, into the multimedia area (Ad) or behind the graphics (CK). Show stops a playlist or a screen capture running on the same board.
4. Click Stop to end the camera picture.

- Without a camera or a format the program shows "Please select a camera and format.".

- After Start the buttons disappear for a moment while the camera opens.
- The FPS button shows the frame rate the camera delivers.
- How the picture fits the area follows displayMode (Ad page > Settings > Multimedia, chapter 7.4) or the display mode button of the CK Media Player.

12.3 Screen Capture

The Screen Capture tabs of the Ad and CK pages show a part of the PC screen live on the board, for example a statistics program, a browser window or a second video source shown on the desktop.

The Screen Capture tabs are shown in chapter 7.4 (Ad page) and 7.5 (CK page).

1. Set the Source Bounds: Left, Top, Width and Height of the area in pixels of the Windows desktop. Or click Select Rectangle (the button under the boxes) and drag a frame around the area on the screen.
2. Click Start. The area appears on the board; Stop ends it.

- Target Rectangle shows the size of the area on the board in pixels (read only). The captured area is fitted into it.
- The FPS button shows the frame rate of the capture.
- The source bounds are saved with Start and come back next time.
- To capture another area, click Stop, change the bounds and click Start again: Start does nothing while a capture runs.
- Do not capture the area of the board window itself: the board would show itself again and again.

While a camera or a screen capture runs, its tab and the Ad or CK tab of the menu bar blink. A display-mode change stops it (chapter 7).

12.4 NDI

The NDI button on the Game tab, at the right under the language flag and the remote control symbol (tooltip "Start/Stop NDI Camera Stream"), sends the board into the network as an NDI video stream. Receivers such as vMix, OBS (with the NDI plug-in), a vision mixer or the NDI Studio Monitor list it as <PC name> (Hb7_NDI).

1. Place the board window as usual (Settings > Screen Properties, chapter 7.1).
2. Click NDI. The button blinks red while the stream is sent.
3. Click NDI again to stop the stream.

How the stream is made:

- The program copies the screen area of the board (L, T, W, H of Screen Properties) about 60 times a second and sends it. The stream has the size of the board.
- Everything that is visible in that area goes into the stream. Keep the board window visible and on top: a window or a dialog over the board area, or a minimised board, appears in the stream.
- A display-mode change needs no new start: the board of the new mode appears in the same area.
- After a change of the board position or size, stop and start NDI again.
- The stream has no transparency. For an overlay, use the CK mode with green, blue or magenta and key the colour out in the receiver (chapter 7.5). With the transparent key colour, the desktop behind the board would be sent.

The sender name Hb7_NDI is set in C:\handBoard7\start.xml, SETTINGS > NDI > SenderName. There is no setting for it in the program; to give a second PC another name, close handBoard 7, change the name in the file and start the program again. The NDI runtime is part of the installation.

13. Remote Control

The remote control is a web page that a phone or tablet opens in its browser. You do not need an app. The page talks to handBoard 7 over the network on port 1907 and sends the same commands as the HTTP API (chapter 14). One operator can stand at the table with a phone while the PC drives the LED wall, or a second operator can show goals, cards and substitutions while the first one keeps the clock.

13.1 Network and Firewall

Before a phone can connect, check these four points:

- The phone or tablet is on the same network as the PC (Wi-Fi or LAN).
- The remote control is switched on. It is off on a new installation (section 13.2).
- Port 1907 is open in the Windows firewall. The setup runs C:\handBoard7\open_firewall_1907.bat, which adds the rules "handBoard 1907 TCP IN", "handBoard 1907 UDP IN", "handBoard 1907 TCP OUT" and "handBoard 1907 UDP OUT". If a phone cannot connect, right-click the file and run it as administrator. Rules that already exist are left as they are.
- No other program uses port 1907 on this PC. All Board7 programs (soccerBoard 7, volleyBoard 7 and the others) use the same port, so only one of them can have its remote switched on at a time. Close the other program, or switch its remote off, before you switch on the remote of handBoard 7.

13.2 Switching the Remote On

Open Settings > Remote Control, or click the Remote Control icon at the right of the Game tab.

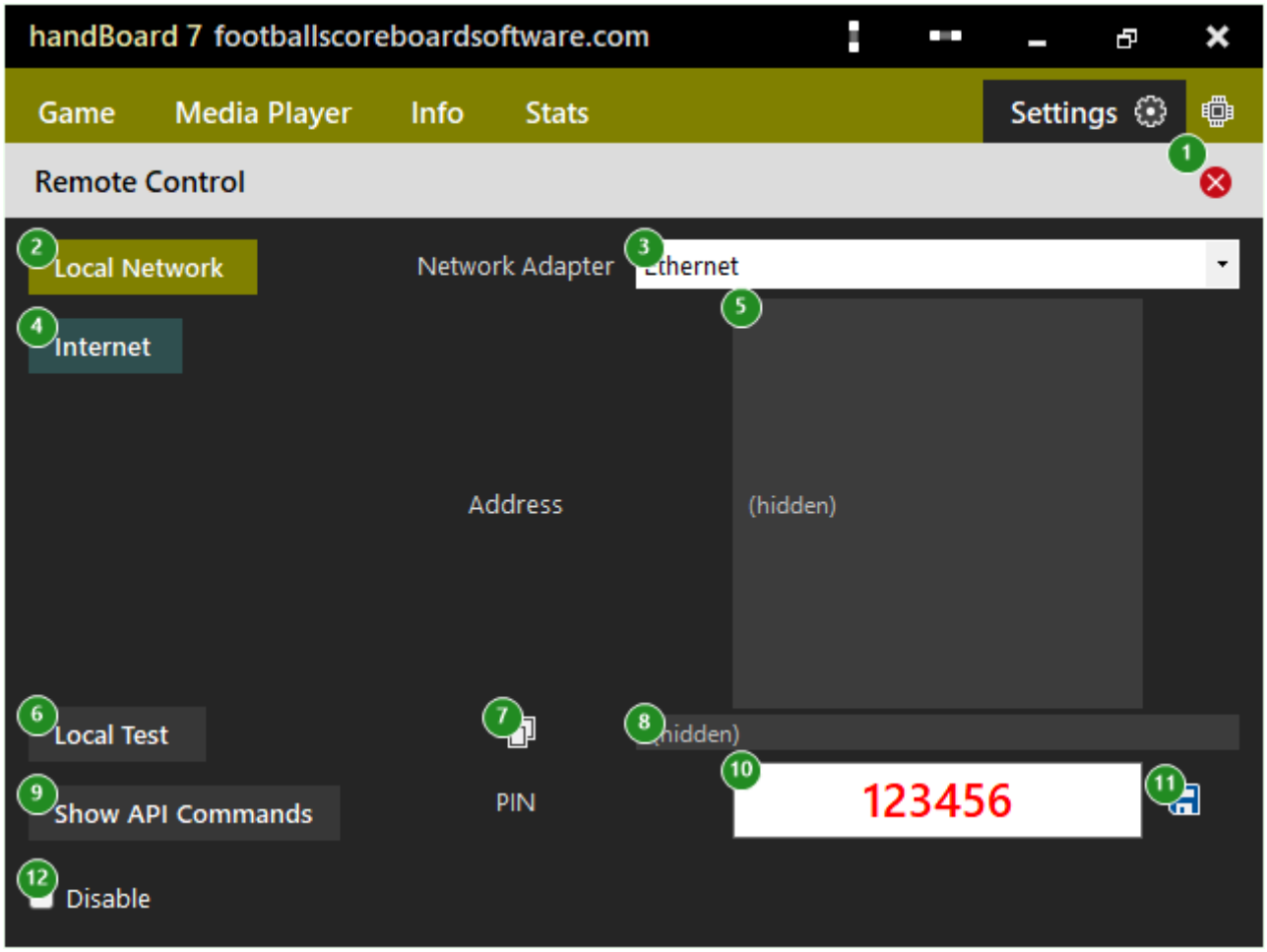
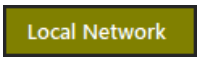
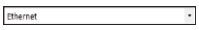
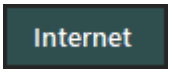
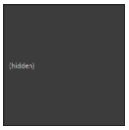
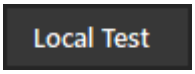


Figure 77. The Remote Control page. The address and the QR code are hidden in this picture; your page shows the address of your PC.

No.	Control	Name	What It Does
1		**Close (X)**	Closes the Remote Control page. Esc does the same. The remote keeps its on / off state.
2		**Local Network**	Shows the address of the remote page in the local network, for the network adapter chosen on the right (default).
3		**Network Adapter**	Chooses the connected Ethernet or Wi-Fi card whose address and QR code are shown.
4		**Internet**	Shows the public address of the internet connection; it works only when the router forwards TCP port 1907 to this PC. Without a connection the address reads No Internet Connection.
5		**QR Code**	Scan it with the phone camera to open the logon page of the remote (hidden in this picture).
6		**Local Test**	Opens the address in the web browser of this PC, to test the logon page.
7		**Copy**	Copies the address to the clipboard.

No.	Control	Name	What It Does
8	(hidden)	**Address**	The address to open in the phone or tablet browser: http://<PC address>:1907/logon.html (hidden in this picture).
9	Show API Commands	**Show API Commands**	Opens API_Commands.txt, the short list of HTTP commands, in Notepad. Appendix B is the full reference for this version.
10	123456	**PIN**	The code the phone enters on the logon page: digits only, 123456 by default.
11		**Save PIN (Disk)**	Appears when you change the PIN; click it to save the new PIN and use it at once.
12	Disable	**Disable**	Not ticked = the remote server runs and phones can log on. Ticked (red) = the server is off. The setting is kept for the next start.

To switch the remote on, untick Disable at the bottom of the page. The box loses its red colour and the server starts at once. The setting is kept: when Disable is not ticked, the remote starts with the program.

To switch it off, tick Disable. The box turns red and phones can no longer connect.

> **Note:** The Internet button shows the public address of your internet connection. It only works when your router forwards TCP port 1907 to this PC. The page is protected by the PIN only and the connection is not encrypted. Use the local network address unless you know what opening the port means for your network.

13.3 PIN

- The PIN contains digits only. The default is 123456.
- Type the new PIN in the PIN box. The disk icon appears next to it; click it to save the PIN. The new PIN is used at once.
- After a PIN change, log out on every phone and log on again with the new PIN.

> **Note:** Change the PIN from 123456 before you use the remote at an event. Do not save an empty PIN: while the PIN is empty, any request without a PIN is accepted. At the next start the program goes back to 123456.

13.4 Logging On

1. Open the address shown on the Remote Control page in the phone browser, for example http://192.168.1.20:1907/logon.html, or scan the QR code with the phone camera. The address must end with /logon.html.
2. The logon page (handBoard7, REMOTE CONTROL) shows a keypad. Enter the PIN; each digit appears as a dot. The ⌫ key deletes the last digit.
3. Tap ✓. The remote panel opens on the HOME tab.

If the PIN is wrong, the empty logon page comes back without a message. Enter the PIN again.

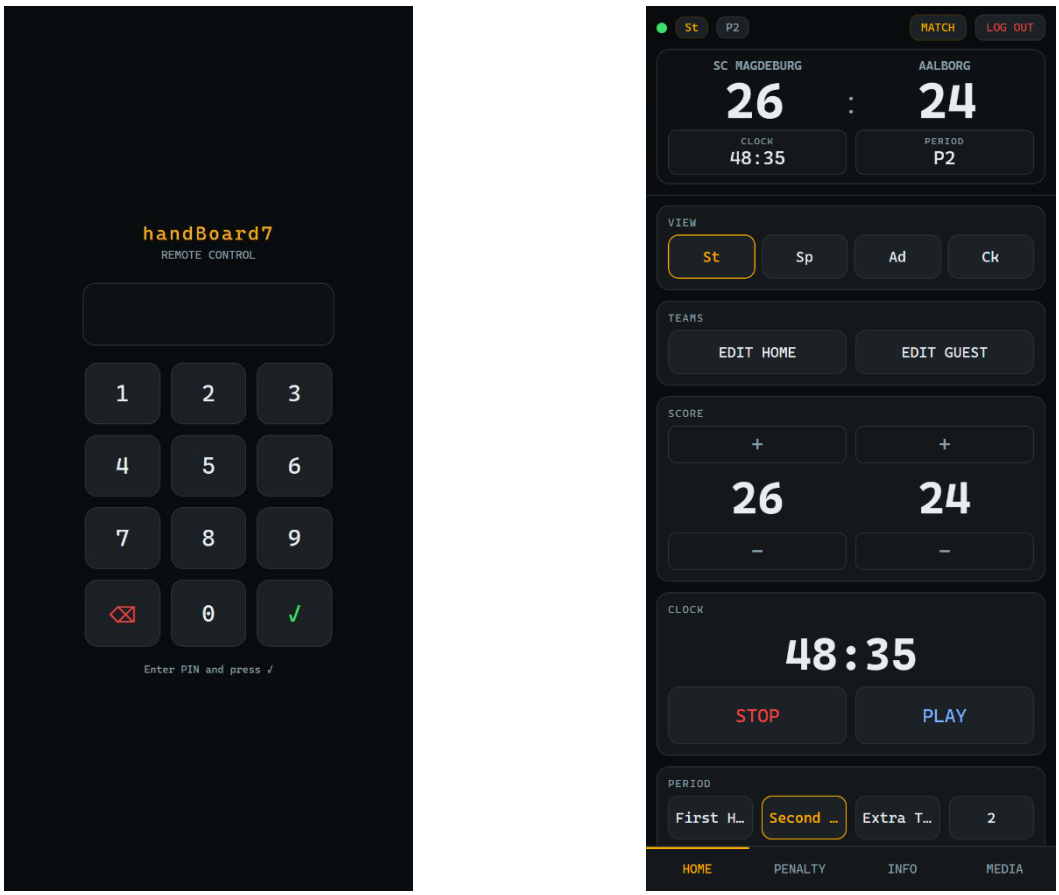


Figure 78. The logon page (left) and the HOME tab of the remote panel (right) on a phone.

> **Note:** Logging on works like the MATCH button: the PC selects the current display mode again and draws the scoreboard. If the board is in the Advertisement mode (Ad), it switches to the Standard mode (St). Log on before the match, not while a video or an advertisement is on air.

13.5 The Remote Panel

The top of the page stays in place while you scroll. It always shows:

- the connection dot: green = connected, red = the PC cannot be reached;
- the display mode (St, Sp, Ad or CK) and the period (P1, P2, P3, P4, or PS for the 7-metre shootout);
- MATCH: brings the scoreboard back on the board (section 13.6);
- LOG OUT: back to the logon page;
- the team names, the score, the match CLOCK (it pulses in amber while it runs) and the PERIOD.

The page asks the PC for the state about every 0.6 seconds, so it also shows the changes made on the PC, with the keyboard or from another phone. The four tabs at the bottom are HOME, PENALTY, INFO and MEDIA.

> **Note:** The texts of the remote page are in English. They do not follow the language of the program (chapter 16).

HOME Tab

Card	Element	What It Does
VIEW	St, Sp, Ad, Ck	Switches the display mode of the board (chapter 7). The mode on the board is highlighted.

Card	Element	What It Does
TEAMS	EDIT HOME, EDIT GUEST	Opens a text box with the team name. Type the new name and tap SET; CLOSE cancels. A new line in the text box becomes the second line of the name on the board.
SCORE	+ and − (per team)	One goal more or one goal less. The score does not go below 0.
SCORE	The score number	Tap it to type the exact score of the team, then SET.
CLOCK	The time	Tap it to type a new time as mm:ss, for example 28:30, then SET. A running clock is paused first. A text without a colon is ignored.
CLOCK	PLAY / PAUSE	Starts or pauses the match clock, like the Start button of the Game tab. It does nothing while a team timeout runs.
CLOCK	STOP	Works like the Stop button of the Game tab: a running clock is paused; a paused clock is reset to the start time of the period and all running suspensions are cleared.
PERIOD	One button per period, then PEN	Selects the period, as the period buttons of the Game tab: First Half, Second Half, Extra Time - 1 (first half of the overtime) and 2 (second half of the overtime). PEN selects the 7-metre shootout. The clock is set to the start time of the period. A period cannot be changed while the clock or a timeout runs. Tapping Extra Time - 1 again while you are in the overtime switches to the second overtime (the button then reads Extra Time - 2) and back.
TIMEOUTS	The three dots (per team)	The team timeouts taken in the match, at most 3.
TIMEOUTS	− and + (per team)	Corrects the number of timeouts taken (0 to 3).
TIMEOUTS	TO (per team)	Starts the team timeout with its countdown on the board. Tap TO again to end the timeout early. If the timeout breaks an IHF rule, the page asks first (section 13.7).
LOWER LINES	LINE 1, LINE 2	Opens a text box with the first or the second text line of the board (for example the competition and the venue).

The whole TIMEOUTS card is greyed out and shows CLOCK RUNNING while the match clock runs. Stop the clock first, then start the timeout, as on the Game tab.

PENALTY Tab

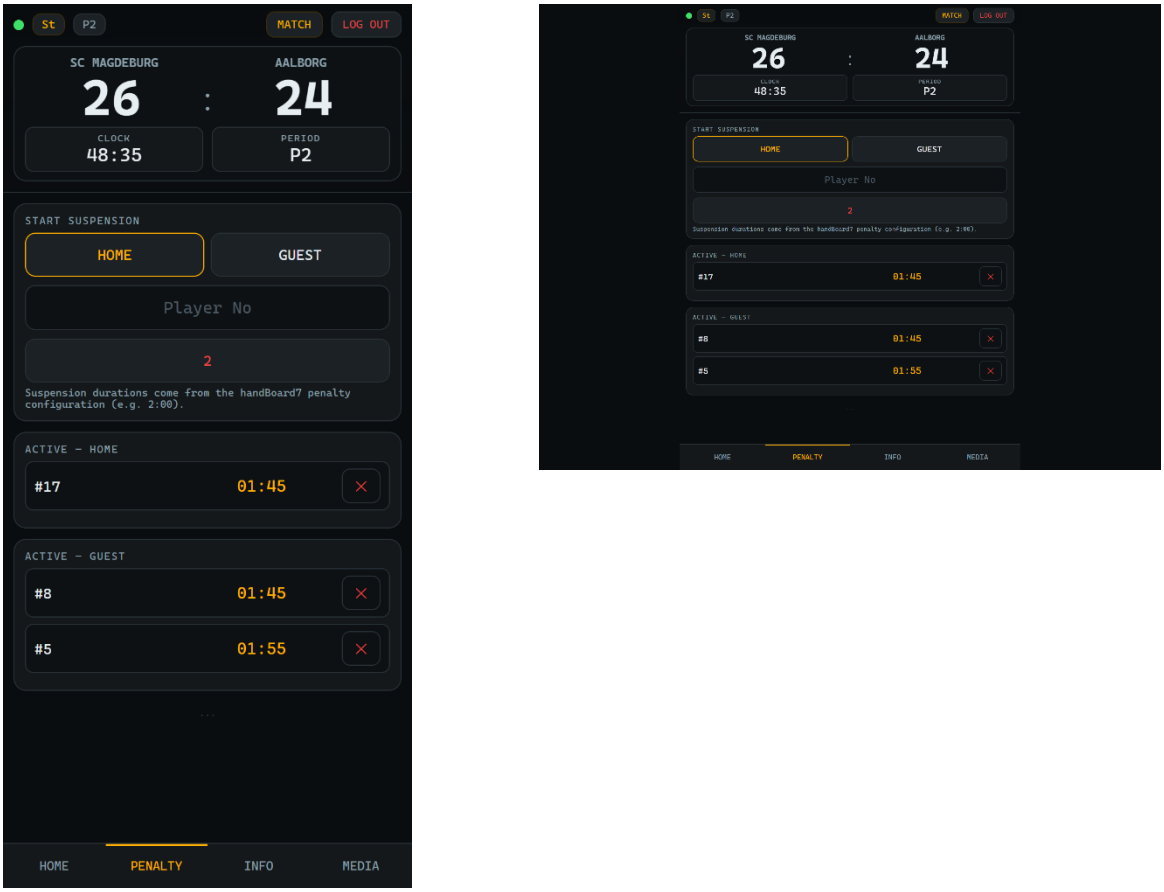


Figure 79. The PENALTY tab on a phone (left) and on a tablet (right).

Card	Element	What It Does
START SUSPENSION	HOME, GUEST	Chooses the team of the suspended player.
START SUSPENSION	Player No	The shirt number of the player.
START SUSPENSION	The duration buttons	One button per suspension duration of the Period & Penalty Settings (chapter 6); with the factory settings there is one button, 2 (two minutes). Tap it to add the suspension. It counts down with the match clock: if the clock is stopped, it starts when the clock starts.
ACTIVE — HOME, ACTIVE — GUEST	The list	The running suspensions of each team: #number and remaining time.
ACTIVE — HOME, ACTIVE — GUEST	×	Cancels that suspension, for example after a wrong entry.
7-METRE SHOOTOUT	SCORE, MISS (per team)	Shown only when the period is the 7-metre shootout (PEN). Records one throw: [O] = goal, [X] = miss. The card title shows the total, for example 4 - 3.
7-METRE SHOOTOUT	CLEAR (per team)	Deletes all throws of the team.

> **Note:** The remote does not check the number of players on suspension or the duration. Enter the suspension the referee gave, once.

INFO Tab

The INFO tab shows info screens on the board: a goal, a card or a 2-minute suspension, and a substitution. They are the same screens as on the Info tab of the program (chapter 9).

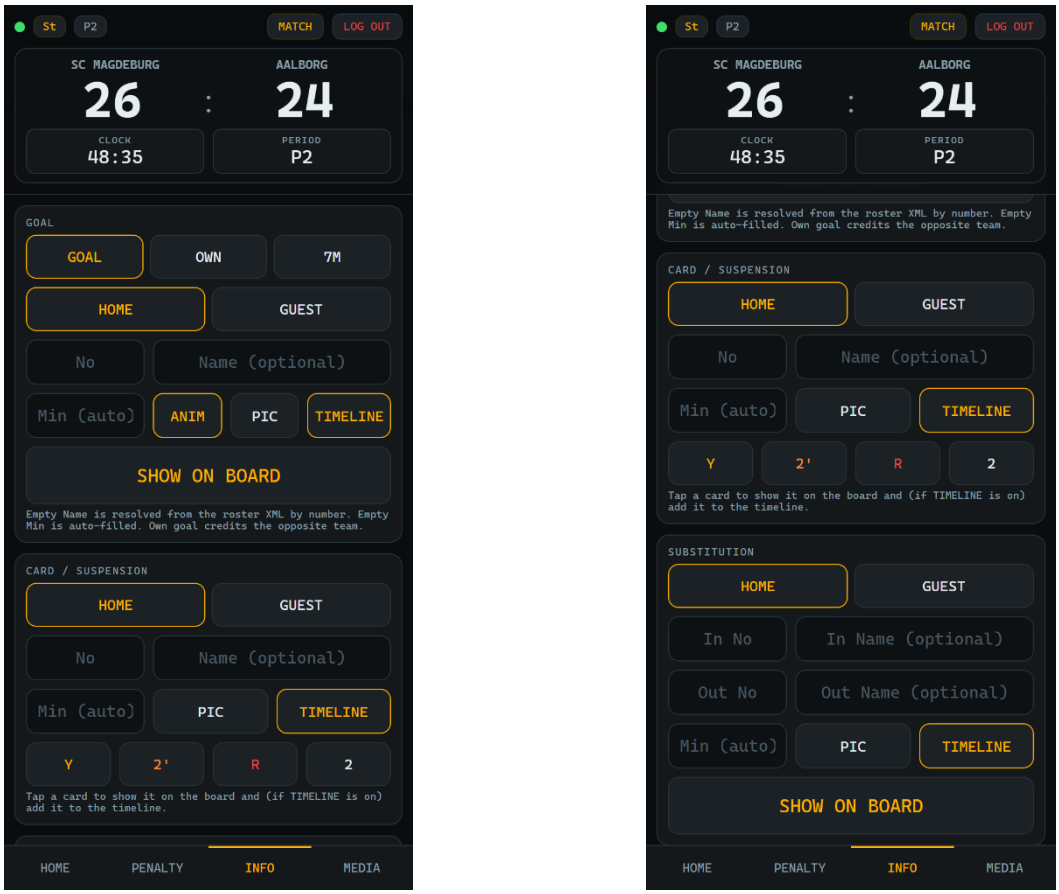


Figure 80. The INFO tab: the top with GOAL and CARD / SUSPENSION (left), and the bottom with SUBSTITUTION (right).

GOAL:

Element	What It Does
GOAL, OWN, 7M	The kind of goal: a goal, an own goal, or a 7-metre goal. The board shows the title of that kind (chapter 16.3).
HOME, GUEST	The team of the scorer. An own goal is shown on the side of the other team.
No, Name (optional)	The shirt number, and the name. Leave Name empty: the program takes the name from the player list of the team (chapter 11).
Min (auto)	The minute. Leave it empty: the program takes the minute from the match clock.
ANIM	Plays the goal animation (on by default).
PIC	Shows the photo of the player, if one is set (off by default).

Element	What It Does
TIMELINE	Adds the goal to the match timeline (on by default; chapter 10).
SHOW ON BOARD	Shows the goal screen on the board.

CARD / SUSPENSION has the same team, number, name, minute, PIC and TIMELINE fields, and one button per card. A tap on a card button shows the screen at once:

Button	Screen on the Board
Y (yellow)	Yellow Card
2' (orange)	The title of the second card slot, Blue Card with the factory titles
R (red)	Red Card
2 (white)	2-Minute Suspension

> **Note:** The CARD / SUSPENSION buttons only show the info screen. They do not start the suspension clock. To start the two minutes, use the PENALTY tab as well.

SUBSTITUTION: choose HOME or GUEST, enter In No and Out No (the names are optional, as above), the minute if wanted, PIC and TIMELINE, then tap SHOW ON BOARD.

The info screen stays on the board until you tap MATCH or a VIEW button. The numbers and names stay in the fields, so you can show the same player again.

MEDIA Tab

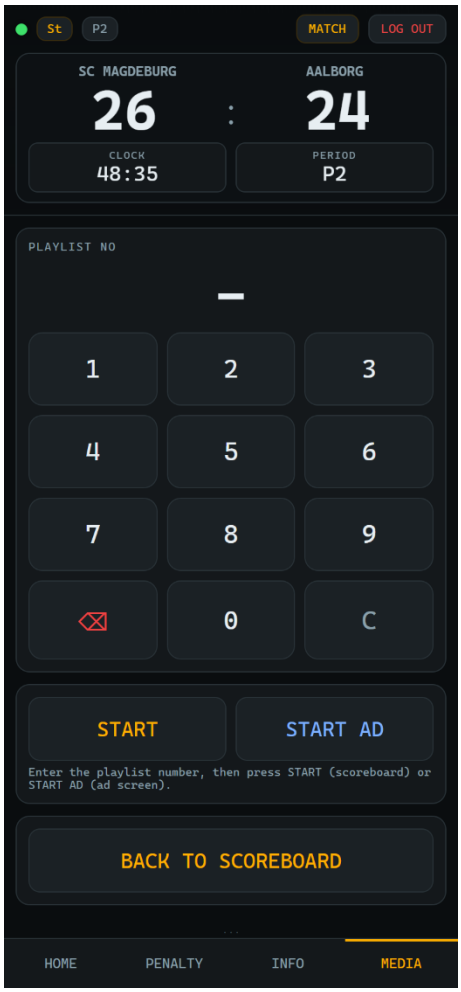


Figure 81. The MEDIA tab on a phone.

1. Type the number of a playlist on the keypad (⌫ deletes the last digit, C clears).
2. Tap START to open the Media Player on the PC and play that playlist, or START AD to switch the board to the Advertisement mode and play that playlist of the Ad page. If a playlist already plays there, the same button stops it.
3. Tap BACK TO SCOREBOARD to bring the scoreboard back.

The Media Player and the Ad page have numbered playlists (chapter 12). Use the numbers 1 to 6: any other number plays playlist 1.

13.6 The MATCH Button

MATCH (at the top of every tab) and BACK TO SCOREBOARD (MEDIA tab) select the current display mode again and draw the scoreboard: an info screen or a video on the board is replaced by the scoreboard. In the Advertisement mode (Ad), MATCH switches to the Standard mode (St).

13.7 The Timeout Question

The program knows the IHF rules for team timeouts (chapter 6 and Appendix A). When TO would break one of them, the phone shows a question before the timeout starts, for example:

```
Max. 2 Timeouts per Half of Regular Time.

Start Timeout Anyway?
```

The possible warnings are:

- No Team Timeout in Overtime or 7-Metre Throws.
- A Team May Take Max. 3 Timeouts per Match.
- Max. 2 Timeouts per Half of Regular Time.
- Only 1 Timeout in the Last 5 Minutes of Regular Time.

Tap OK to start the timeout anyway (the referees decide), or Cancel to leave it. The text is in the language of the program. It is the same question that the Game tab asks on the PC.

13.8 Phone and Tablet

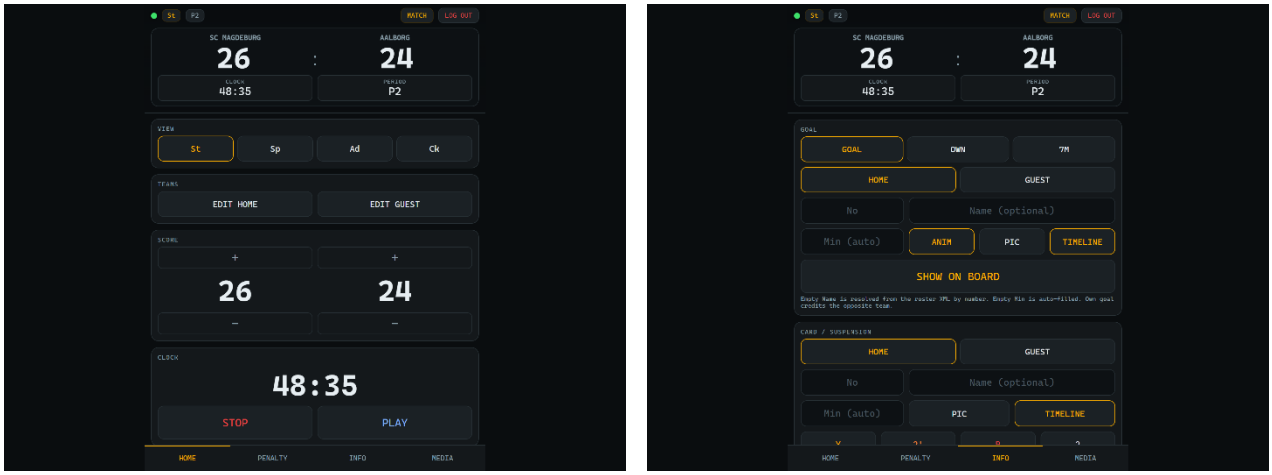


Figure 82. The HOME and the INFO tab on a tablet.

- The page is one column. On a tablet or a wide screen the column is centred and at most 560 pixels wide.
- Add the page to the home screen of the phone for a full-screen look.
- Only one person should give goals at a time: the PC does not stop two phones (or a phone and the keyboard) from giving the same goal twice.
- If the connection dot turns red, check the Wi-Fi of the phone, and that handBoard 7 still runs on the PC with the remote switched on.
- After a restart of the program the phone keeps working; after a PIN change, log on again.

13.9 What the Remote Cannot Do

The remote covers the work during a match. These tasks need the PC:

- the match rules, the mode (Handball, U19, U16) and the Period & Penalty Settings (chapter 6);
- the team logos, the player lists and photos, and the team database (chapter 11);
- the designs and the board size and position (chapters 7 and 8);
- the info screens other than goal, card and substitution, for example team lists, referees, sponsors, standings and statistics (chapters 9 and 10);
- the media files and the content of the playlists (chapter 12);
- the timeline and statistics corrections (chapter 10);
- the licence, the language and the settings (chapters 3, 16 and 17).

14. HTTP API

handBoard 7 can be controlled by other programs and devices with plain web requests: a vision-mixer macro, a stream deck, a scoring system or a small script. The remote page of chapter 13 uses the same commands.

14.1 Request Format

```
http://<PC address>:1907/api.html?_=<number>&pin=<PIN>&cmd=<command>&value=<value>$
```

- Port 1907 is fixed. The remote control must be switched on (chapter 13.2). From the PC itself, use 127.0.0.1 as the address.
- The request method is GET and the path is /api.html, written exactly like this.
- Every request ends with a dollar sign $. Text after the $ is ignored.
- The parameters come in this order: _ (optional), pin, cmd, value. Nothing may follow the value except the $. A parameter after cmd or value (for example a cache-buster at the end) makes the request invalid.
- _=<number> is the cache-buster: any changing number, for example the time in milliseconds. It stops browsers and proxies from answering from their cache. The program ignores it. Put it first.
- pin is the PIN of Settings > Remote Control (default 123456), digits only.
- Leave out &value= when the command has no value. An empty value (&value=$) makes the request invalid.
- Command names are not case-sensitive, except GET, which must be written in capitals. The values home and guest, and the clock values play, pause and stop, are written in small letters.

Encoding the value:

- Encode the value as a browser does (encodeURIComponent): a space as %20, | as %7C, ~ as %7E.
- The program decodes the request before it reads the parameters. Because of this, the value cannot contain & or $, not even encoded as %26 or %24: & makes the request invalid, and $ ends the value.
- A plain + in the request is read as a space. Write a plus sign as %2B.
- In team names and in the two text lines, an underscore _ is a new line.
- A request must not be larger than 8 KB.

14.2 Replies

Reply	Meaning
<html>!<command></html>	Accepted. The program also gives this reply to an unknown command and to a command it cannot carry out (for example a timeout while the clock runs). Read the state with GET to see what changed.
XML	The reply to cmd=GET (section 14.3).
<html>#Invalid PIN</html>	Wrong or missing PIN.
<html>#Invalid API Request</html>	The request is not a GET to /api.html, the $ is missing, the parameters are in the wrong order, or the value is empty or contains &.
<html>#Invalid API Command</html>	The request has no command (for example cmd before pin).
<html>#<message></html>	The command failed inside the program; the message tells why.

Examples:

```
http://127.0.0.1:1907/api.html?_=1&pin=123456&cmd=set_home_score_up$
http://127.0.0.1:1907/api.html?_=2&pin=123456&cmd=click&value=playpause$
http://127.0.0.1:1907/api.html?_=3&pin=123456&cmd=penalty_add&value=home%7C17%7C120$
http://127.0.0.1:1907/api.html?_=4&pin=123456&cmd=set_guest_team&value=AALBORG_HANDBOLD$
http://127.0.0.1:1907/api.html?_=5&pin=123456&cmd=info_goal&value=home%7Cgoal%7C17%7C%7C%7C1%7C
0%7C1$
```

> **Note:** The API never asks a question. timeout_start starts a timeout even when it breaks an IHF rule, and set_chronometer stop on a paused clock resets the clock and clears all suspensions. Build a question into your own panel or macro, as the remote page does with TimeoutWarnHome and TimeoutWarnGuest (section 14.3).

14.3 Reading the State

cmd=GET returns the state of the scoreboard as XML:

```
http://127.0.0.1:1907/api.html?_=6&pin=123456&cmd=GET$
```

The reply has one <Item> inside <Response>. A shortened example from the sample match of this guide:

```
<Response>
  <Item>
    <BoardType>St</BoardType>
    <Mode>0</Mode>
    <Home>SC MAGDEBURG</Home>
    <HomeScore>26</HomeScore>
    <Guest>AALBORG</Guest>
    <GuestScore>24</GuestScore>
    <Chronometer>48:35</Chronometer>
    <StatusChronometer>false</StatusChronometer>
    <Period>2</Period>
    <PenaltyHome>17~01:42</PenaltyHome>
    <PenaltyGuest>8~00:55|5~02:00</PenaltyGuest>
    <ShootoutTotal></ShootoutTotal>
    <TimeoutHome>1</TimeoutHome>
    <TimeoutGuest>2</TimeoutGuest>
    <TimeoutRunning>false</TimeoutRunning>
    <TimeoutWarnHome></TimeoutWarnHome>
    <TimeoutWarnGuest></TimeoutWarnGuest>
    ...
  </Item>
</Response>
```

- Booleans are written true or false, in small letters.
- A team name or text line with two lines has a line break between them (the factory home name is SC and MAGDEBURG on two lines).
- Lists use | between the entries and ~ between the fields of an entry.
- The index of an entry in PenaltyHome or PenaltyGuest (0 for the first) is the index that penalty_cancel expects.
- TimeoutWarnHome and TimeoutWarnGuest are empty when a timeout of the team breaks no IHF rule. Otherwise they hold the warning and the question "Start Timeout Anyway?", in the language of the program.
- ShootoutTotal is empty until the first 7-metre throw of the shootout; then it holds the goals, for example 4 - 3.

Appendix B.3 lists every field. A panel can poll GET about twice a second; the remote page polls every 0.6 seconds.

14.4 Command Groups

Group	Commands
Display	click St / Sp / Ad / Ck, match
Score	set_home_score_up, set_home_score_down, set_home_score, and the same for guest
Teams and text lines	set_home_team, set_guest_team, line_text_1, line_text_2
Match clock	set_chronometer (play, pause, stop, mm:ss), click playpause, click stop
Periods	click period_1 ... period_4, click penalty
Suspensions	penalty_add, penalty_cancel
7-metre shootout	shootout, shootout_clear
Team timeouts	timeout_set, timeout_start
Info screens	info_goal, info_card, info_subst
Media	start_playlist, start_playlist_ad_screen
Hidden counters	set_home_fault_up, set_home_fault_down, set_guest_fault_up, set_guest_fault_down
State	GET

Appendix B describes every command, its values and an example. The file API_Commands.txt in C:\handBoard7 (Settings > Remote Control > Show API Commands) has a short reference; where it differs from Appendix B, Appendix B is correct for this version.

14.5 Compatibility with Other Board7 Programs

handBoard 7 uses the Board7 remote protocol of soccerBoard 7 and the other Board7 programs: the same port, request format, PIN, replies and GET reply with <Response> and <Item>. The common commands (click, match, set_home_team, set_guest_team, line_text_1, line_text_2, the score commands, set_chronometer, start_playlist, start_playlist_ad_screen) work as in those programs. The commands of other sports (cards with a different meaning, sets, rallies and others) are not known to handBoard 7: they reply ! and do nothing.

15. Keyboard Shortcuts

15.1 Keyboard Hook Manager

handBoard 7 can start and stop the match clock and give goals with three keys. The shortcuts are global: they also work while another program, for example the vision-mixer software, has the focus.

Open the Keyboard Hook Manager with the keyboard icon at the right of the Game tab (tooltip Keyboard Active).

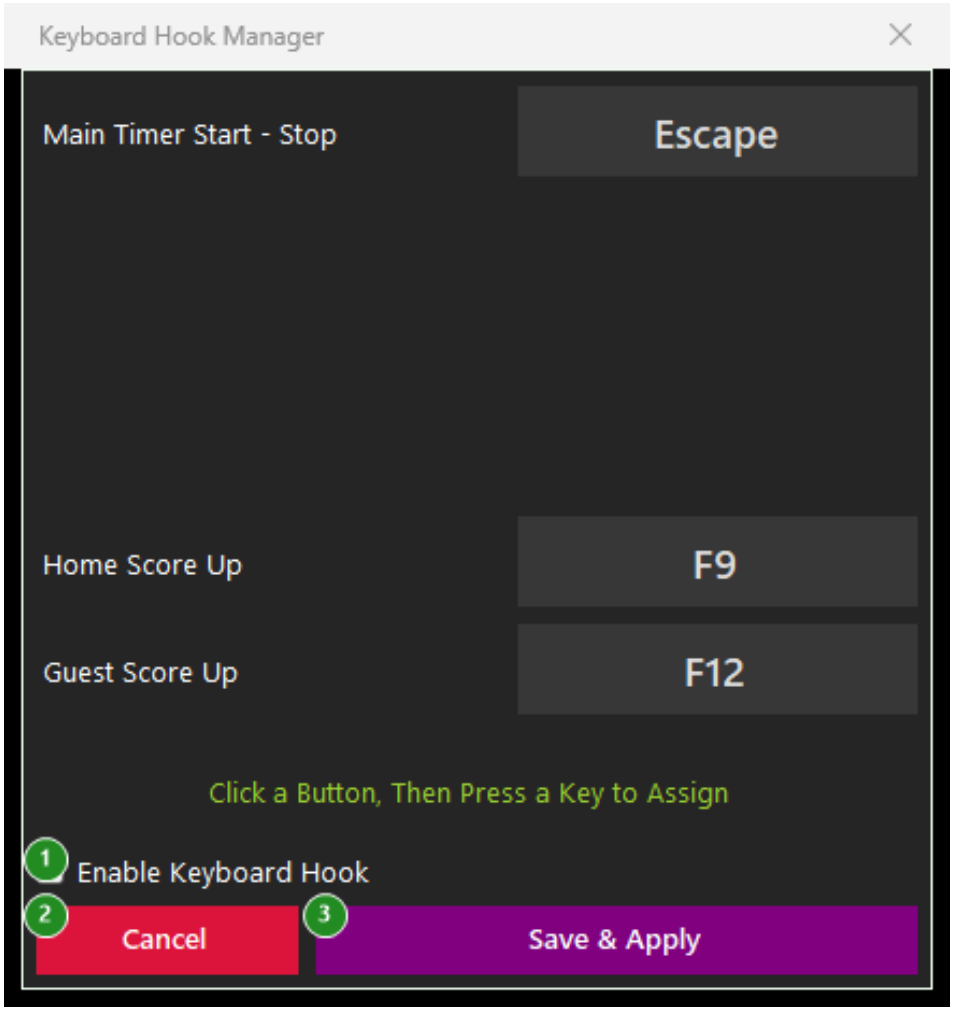


Figure 83. The Keyboard Hook Manager with the default keys.

No.	Control	Name	What It Does
1	Enable Keyboard Hook	**Enable Keyboard Hook**	Switches the three global shortcuts on or off. Takes effect with Save & Apply.
2	Cancel	**Cancel**	Closes the Keyboard Hook Manager without saving.
3	Save & Apply	**Save & Apply**	Saves the keys and the on / off switch, and arms or releases the shortcuts at once.

The window lists three actions, each with its key in the box on the right:

Action	Default Key	Same As
Main Timer Start - Stop	Escape (Esc)	The Start button of the Game tab: starts the match clock, or pauses it while it runs. Does nothing while a team timeout runs.
Home Score Up	F9	The + button of the home score: one goal for the home team.
Guest Score Up	F12	The + button of the guest score: one goal for the guest team.

To change the shortcuts:

1. Tick Enable Keyboard Hook. The shortcuts are off on a new installation.
2. To change a key, click its box (it turns blue), then press the new key. The box shows the Windows name of the key, for example F5, NumPad7, Space or Pause.
3. Click Save & Apply. The shortcuts are armed (or released) at once. Cancel closes the window without saving.

The keyboard icon on the Game tab is green while Enable Keyboard Hook is saved as on, and red while it is off.

> **Note:** In this version the shortcuts are armed only when you click Save & Apply. After every start of the program, open the Keyboard Hook Manager and click Save & Apply once, even if the keyboard icon is already green.

15.2 Good to Know

- Choose keys that you do not use for other work. Escape, the default for the clock, is also the key that closes windows and menus in Windows and in handBoard 7: every Esc you press anywhere starts or stops the match clock. A key such as Pause, Scroll Lock or a key of the numeric keypad is a safer choice.
- A key pressed together with Ctrl, Shift or Alt does nothing.
- Holding a key down repeats the action: tap the keys, do not hold them.
- The key also reaches the program that has the focus. Keep the cursor out of text fields while you score, or the key is typed there too.
- Do not give the same key to two actions: both actions would run.
- With NumLock off, the digit keys of the numeric keypad send other keys (arrows, Home, End). If you use NumPad keys, keep NumLock on.
- The goal keys add one goal only. To take a goal back, use − on the Game tab or on the remote (chapter 13).
- The timeout, the suspensions, the period and the info screens have no keyboard shortcut. Use the Game tab, the remote or the HTTP API (chapter 14).
- While the shortcuts are on, pressing an assigned key in the Keyboard Hook Manager also performs its action. Untick Enable Keyboard Hook and click Save & Apply before you reassign keys, or correct the score and the clock afterwards.

16. Languages and Titles

Settings > Language has two pages: Language, with the texts of the program, and Titles, with the titles that the info screens show on the board.

16.1 Choosing the Language

The program speaks 46 languages: English, Turkish, Albanian, Azerbaijani, Bosnian, Bulgarian, Chinese, Czech, German, Danish, Spanish, Finnish, French, Georgian, Greek, Croatian, Hungarian, Indonesian, Hindi, Persian, Icelandic, Italian, Japanese, Kyrgyz, Khmer, Korean, Kazakh, Macedonian, Mongolian, Malay, Dutch, Norwegian, Polish, Portuguese, Romanian, Serbian, Russian, Arabic, Swedish, Slovenian, Thai, Tajik, Turkmen, Swahili, Uzbek and Vietnamese.

1. Open Settings > Language, or click the flag icon at the right of the Game tab (tooltip Language Settings).
2. Choose the language in Select Language. The list shows each language in its own name, with its flag.
3. Click the disk icon next to the list. The program shows "New Language Selected ! Please Restart Application."
4. Close and restart handBoard 7.

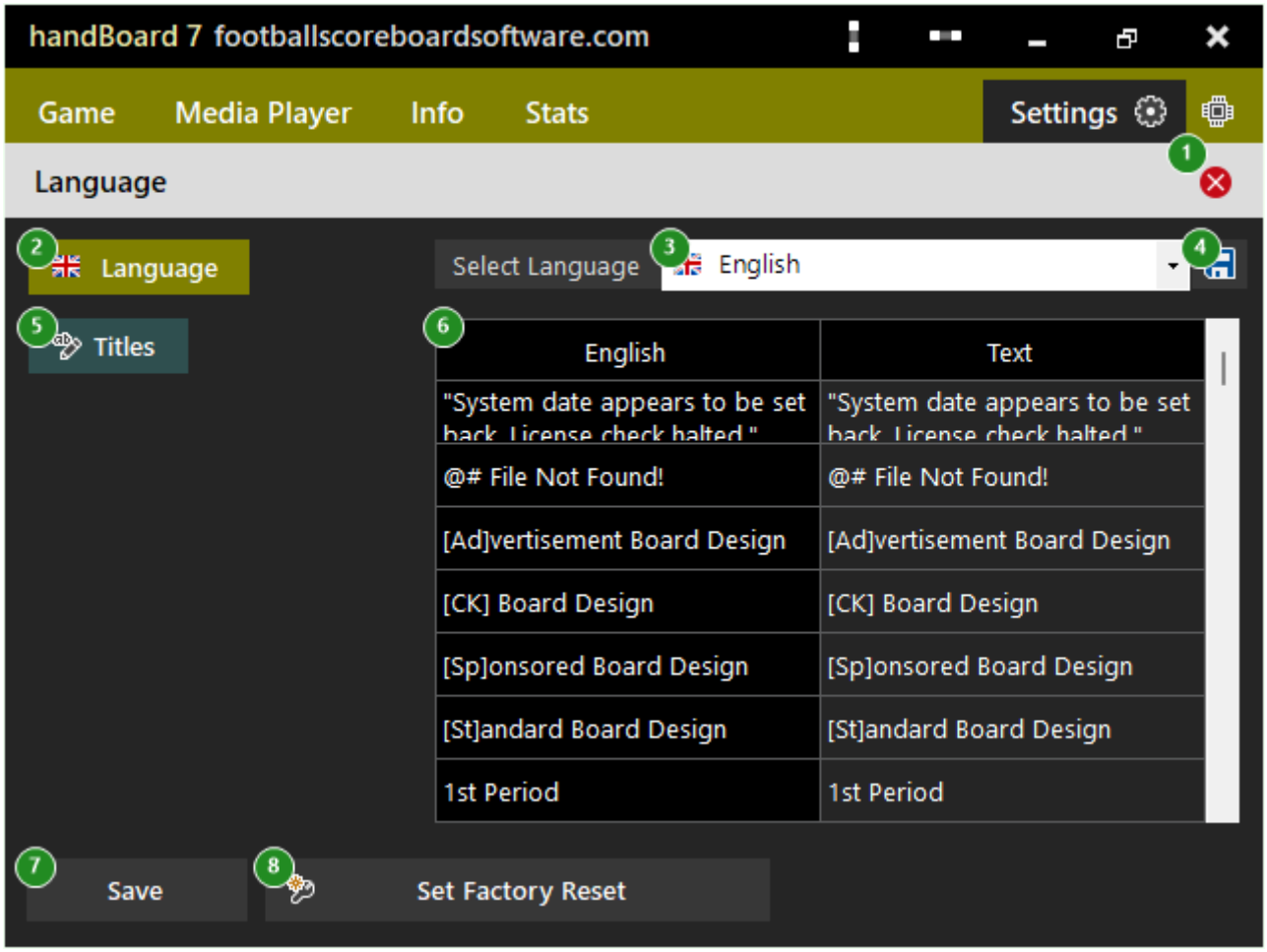
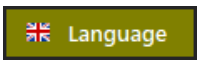
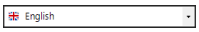
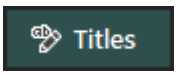
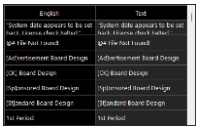
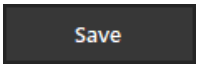
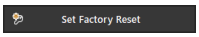


Figure 84. The Language page of Settings > Language.

No.	Control	Name	What It Does
1		**Close (X)**	Closes the Language page. Esc does the same.
2		**Language**	Shows the texts of the program: English on the left, the selected language on the right.
3		**Select Language**	Chooses the language: the language to edit in the list, and the language to use when you click the disk icon.
4		**Save Language (Disk)**	Makes the selected language the program language and writes its titles into the Titles page. Restart the program afterwards.
5		**Titles**	Shows the titles of the info screens on the board (Goal, 2-Minute Suspension, Red Card, Blue Card ...).
6		**Text List**	The texts or titles. Click a text on the right, press F2, type the new text and press Enter; then click Save.
7		**Save**	Saves the changed texts or titles. It turns lime when there are unsaved changes.
8		**Set Factory Reset**	Language page: copies the factory texts of all languages back (langFactory.xml). Titles page: copies the titles of the program language back. No question is asked.

The language applies to the program, to the texts on the boards and to the IHF timeout warnings of the remote (chapter 13.7). The rest of the remote page stays in English.

At the first start the program takes the language of the Windows regional format, or English if that language is not in the list.

> **Note:** Saving a language with the disk icon also writes the titles of that language into the Titles page (section 16.3). Your own titles are replaced. Choose the language first, then change the titles.

16.2 Editing Translations

Every text of the program can be changed:

1. On the Language page, choose the language in Select Language. The list shows English on the left and the selected language on the right, sorted by the text on the right.
2. Click the text on the right and press F2, type the new text, press Enter. The Save button turns lime.
3. Click Save. The changes are written into that language; most of them show after the next start.

- Names in braces, for example {0}, are filled in by the program; keep them.
- Keep the length of a text close to the English one: buttons and labels have a fixed size.
- The English column cannot be changed.

16.3 Titles

The Titles page holds the titles of the info screens on the board, for example "Goal" above the scorer of a goal screen. Click Titles, change the text on the right (click it, F2, type, Enter), then click Save. The next info screen uses the new title.

Left Column	Title (Factory English Text)	Used On
Goal	Goal	The goal screen (GOAL)
GoalOwn	Goal OG	The own goal screen (OWN)
Goal	Penalty Goal	The 7-metre goal screen (7M)
2-Minute Suspension	2-Minute Suspension	The 2-minute suspension screen
Yellow Card	Yellow Card	The yellow card screen
Red Card	Red Card	The red card (disqualification) screen
Second Yellow Red Card	Blue Card	The blue card screen (the second card slot)
Substitution	Substitution	The substitution screens
Referees	Referees	The referees screen
Standings	Standings	The standings table
Results	Results	The results table
Fixtures	Fixtures	The fixtures table
Starting XI	Starting 7	The team list: the players on court
Substitutes	Substitutes	The team list: the substitutes
Trainer	Trainer	The team list: the coach

The pictures of this guide use some handball wording of their own: Own Goal, 7-Metre Goal, Starting Seven and Coach. Type the wording of your competition, for example "Disqualification" instead of "Red Card".

> **Note:** On the Titles page, do not change Select Language. The list then shows the translations instead of the titles, and Save would write them into the titles. Click Titles again to get the titles back.

16.4 Factory Texts

Set Factory Reset copies the factory texts back:

- On the Language page: all texts of all languages, at once and without a question. Your own translations are lost. The factory texts are in C:\handBoard7\common\xml\langFactory.xml; your texts are in common\xml\lang.xml.
- On the Titles page: the titles of the program language (from lang.xml), also without a question. Your own titles are lost.

Copy lang.xml and title.xml (both in C:\handBoard7\common\xml) to a safe place before a factory reset if you want to keep your changes.

17. Settings Reference

17.1 The Settings Tab

Button	Opens	Section
License (and ? for License Info)	The licence page	17.2, 3
Screen Properties	The board position and size and the other settings below	17.3
[St]andard / [Sp]onsored / [Ad]vertisement / [CK] Board Design	The design editor. Only the button of the current display mode is enabled.	17.4, 8
Remote Control	The remote control page	17.5, 13
Language	Language, translations and titles	17.6, 16
Youtube Tutorials	Opens the video tutorials in the web browser	17.7

17.2 License

The License page shows the Computer ID and the licence key, saves a new key and creates a USB licence. The page and the License Info box are described in chapter 3.

17.3 Screen Properties

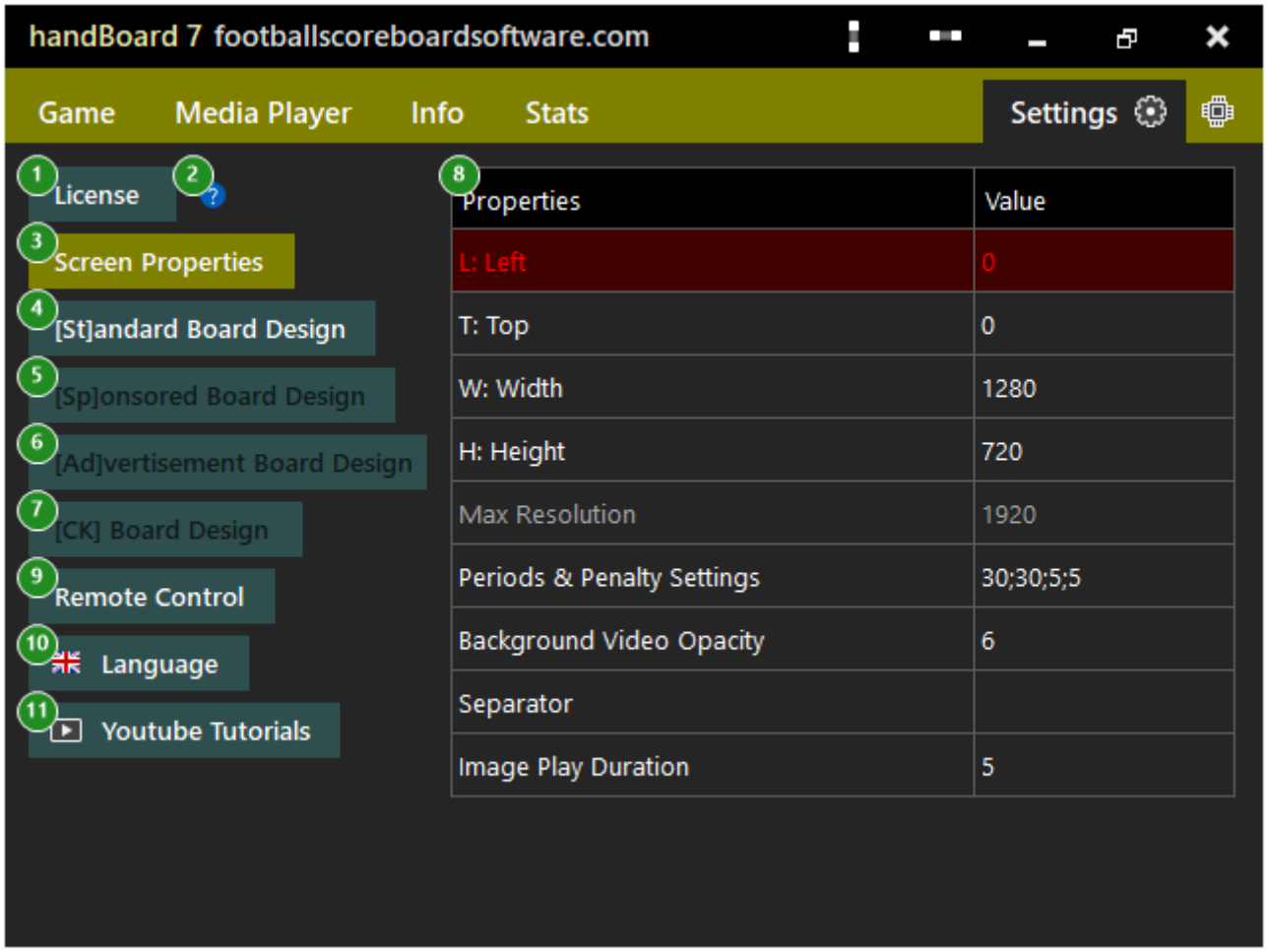
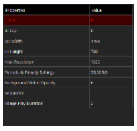
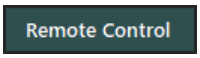
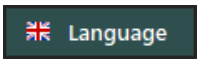
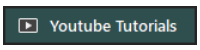


Figure 85. Settings > Screen Properties.

No.	Control	Name	What It Does
1	License	**License**	Opens the License page: Computer ID, licence key, Save and Create USB License (chapter 3).
2	?	**License Info (?)**	Opens the License Info box: Validation, Max Resolution, Expire Date, Model, GPU Enabled, Extra Player, Record & Replay and the result of the date check.
3	Screen Properties	**Screen Properties**	Opens the Screen Properties table: board position and size, Max Resolution, Periods & Penalty Settings, background video opacity, separator and image play duration.
4	[St]andard Board Design	**[St]andard Board Design**	Opens the design editor of the Standard board (chapter 8). Enabled only in the St display mode.
5	[Sp]onsored Board Design	**[Sp]onsored Board Design**	Opens the design editor of the Sponsored board (chapter 8). Enabled only in the Sp display mode.
6	[Ad]vertisement Board Design	**[Ad]vertisement Board Design**	Opens the design editor of the Advertisement board (chapter 8). Enabled only in the Ad display mode.
7	[CK] Board Design	**[CK] Board Design**	Opens the design editor of the Chroma Key board (chapter 8). Enabled only in the CK display mode.

No.	Control	Name	What It Does
8		**Properties / Value**	The Screen Properties table. Select a value, type the new value (or press F2) and leave the cell: it is saved and applied at once. Periods & Penalty Settings opens with the "..." button in its value cell.
9		**Remote Control**	Opens the Remote Control page: server on or off, address and QR code, PIN (chapter 13).
10		**Language**	Opens the Language page: program language, translations and titles (chapter 16).
11		**Youtube Tutorials**	Opens the handBoard 7 video tutorials on YouTube in the web browser.

The page is a table with two columns, Properties and Value. Select a value, type the new value (or press F2 to edit it) and leave the cell: the change is checked, saved in start.xml and applied to the boards at once; there is no Save button. An empty value is not accepted (except for Separator); the old value comes back.

Row	Default	Values	What It Does
L: Left	0	Pixels	X position of the board windows on the Windows desktop. A value below 0 is used as 0.
T: Top	0	Pixels	Y position of the board windows. A value below 0 is used as 0.
W: Width	960	Pixels, up to Max Resolution	Width of the board windows. A larger value is cut to Max Resolution.
H: Height	540	Pixels, up to Max Resolution	Height of the board windows. A larger value is cut to Max Resolution.
Max Resolution	From the licence (38400 in DEMO)	Read only (grey)	The largest width and the largest height of the board
Periods & Penalty Settings	30;30;5;5	"..." button	The lengths in minutes of the first half, the second half and the two overtime periods. The value cannot be typed: select the row and click the "..." button at the right of its value cell to open the Period & Penalty Settings window (chapter 6).
Background Video Opacity	6	0-10	Strength of the background video behind the boards and info screens: 0 hides it, 10 shows it fully. An invalid value is set back to 6.
Separator	Empty	Text	When set, the board shows the scores of both teams in one field with this text between them (for example 26:24). Empty = two separate score fields.

Row	Default	Values	What It Does
Image Play Duration	5	1-120 seconds	How long a picture stays on the screen in a Media Player playlist. An invalid value is set back to 5.

> **Note:** The board size and position apply to all board windows of all display modes. Set W and H to the pixel size of the screen or LED output that shows the board (chapter 7). The NDI output takes the board area at the moment you switch NDI on; after a change of L, T, W or H switch NDI off and on again (section 18.6).

17.4 Board Design Buttons

[St]andard Board Design, [Sp]onsored Board Design, [Ad]vertisement Board Design and [CK] Board Design open the design editor for the board of that display mode. Only the button of the display mode that is on now can be clicked; the others are grey. Switch the display mode on the Game tab first. The design editor is described in chapter 8.

17.5 Remote Control

The Remote Control page switches the remote server on port 1907 on or off (Disable), shows the address and a QR code for phones and tablets (for example http://<PC address>:1907/logon.html), and holds the PIN. The PIN is 123456 until you change it. On a new installation the remote control is off. The page is described in chapter 13.

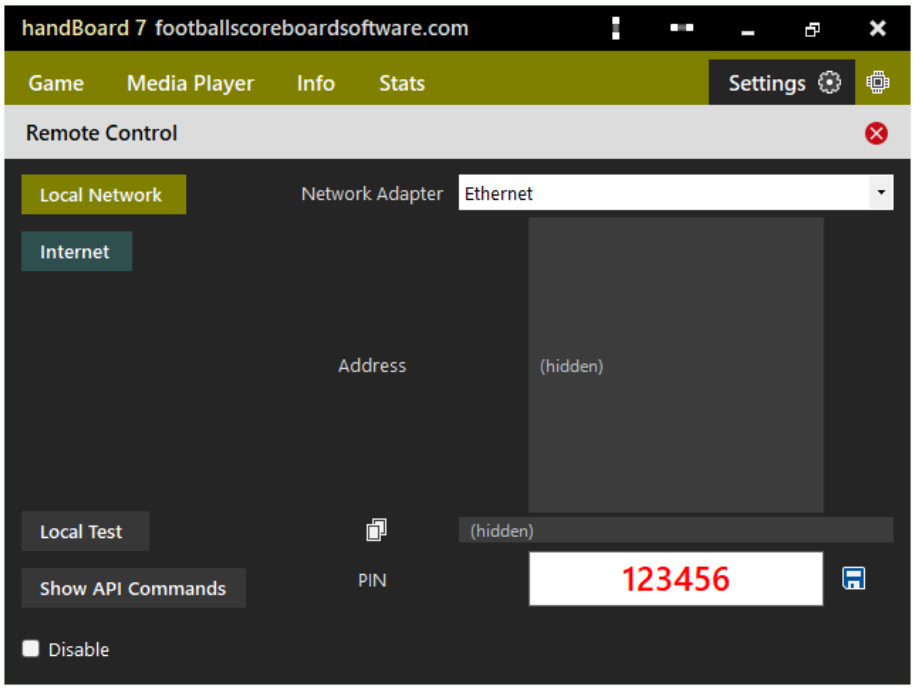


Figure 86. Settings > Remote Control. The network address is hidden in this picture.

17.6 Language

The Language page chooses the program language, edits the translations and, on its Titles tab, the titles of the player lists (chapter 16).

17.7 Youtube Tutorials

Youtube Tutorials opens the playlist of the handBoard 7 video tutorials on YouTube in the default web browser. The PC needs an internet connection.

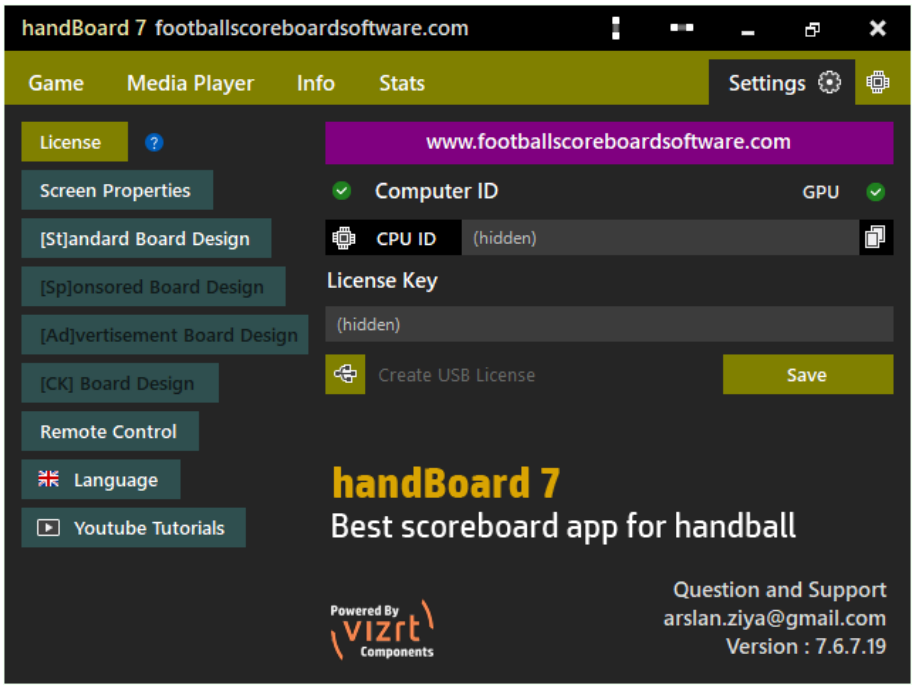


Figure 87. The Settings tab: Youtube Tutorials is the last button on the left. The licence key and the Computer ID are hidden in this picture.

17.8 Where Other Settings Are

Setting	Where
Display mode	Game tab: St, Sp, Ad, CK (chapter 7)
Match format (Handball, U19, U16), period lengths, timeouts, suspensions, Cumulative Time	Settings > Screen Properties > Periods & Penalty Settings (chapter 6)
Design	Settings > Board Design buttons and the design gallery (chapter 8)
Sponsor band (place, height, content)	Sp page (chapter 7)
Ad layout, media and banners	Ad page (chapters 7 and 12)
Chroma key colour	CK page (chapter 7)
Keyboard shortcuts	Game tab: keyboard icon (chapter 15)
Media Player display mode and volume	Media Player tab (chapter 12)
NDI sender name	start.xml, value SenderName in the NDI section (default Hb7_NDI; edit only while the program is closed)

All settings are stored in C:\handBoard7\start.xml (and config*.xml). The program saves a change at once.

18. Troubleshooting and FAQ

18.1 The Board Is Black or Empty (WebView2)

The boards are drawn by the Microsoft Edge WebView2 Runtime. The setup does not install handBoard 7 without it. If the runtime was removed or damaged later, the board windows stay empty and the program shows no message. Install the runtime again from Microsoft (https://go.microsoft.com/fwlink/p/?LinkId=2124703) and restart handBoard 7.

The browser profile of the boards is kept in C:\handBoard7\handBoard7.exe.WebView2. The program empties it at every start, so an old or damaged profile does not stay.

18.2 The Board Is on the Wrong Monitor or Has the Wrong Size

The board windows take their place from Settings > Screen Properties: L: Left, T: Top, W: Width, H: Height (section 17.3).

1. Open the Windows display settings (Settings > System > Display) and note the arrangement of the monitors and the resolution of the board monitor.
2. Set Left to the x position of the board monitor, for example 1920 when it is to the right of a full-HD main screen, and Top to its y position, usually 0.
3. Set W and H to the resolution of the board monitor or LED output, for example 1920 and 1080.

- The boards cannot go to negative positions: a Left or Top below 0 is used as 0. If the board monitor is to the left of or above the main screen in Windows, drag it to the right of or below the main screen in the Windows display settings, or make the board monitor the main display.
- W and H cannot be larger than Max Resolution of the licence; a larger value is cut.
- After you change the Windows display arrangement, check L and T again.

18.3 Display Scaling

Set the Windows display scaling of the board monitor to 100 % (Windows Settings > System > Display > Scale). handBoard 7 is made for 100 %: at 125 % or 150 % Windows enlarges it, the picture can become slightly blurred and the board position and size can be counted in scaled pixels.

18.4 Fonts

The setup installs the fonts of the boards in Windows, and the program also loads them from C:\handBoard7\common\font at every start (and releases them when it closes). If a board shows a wrong font, run the font installation again in a command prompt opened as administrator:

```
powershell -ExecutionPolicy Bypass -File C:\handBoard7\install_fonts.ps1
```

Then restart the program.

18.5 Network, Firewall and Port 1907

The remote control and the HTTP API use TCP port 1907.

Problem	Fix
The phone cannot open the remote page	Remote control switched on (Settings > Remote Control, Disable not ticked)? Phone and PC in the same network? Address and port correct (http://<PC address>:1907/logon.html)?

Problem	Fix
Still no connection	Run C:\handBoard7\open_firewall_1907.bat as administrator (right click > Run as administrator). It adds the four "handBoard 1907" firewall rules if they are missing and waits for a key at the end. Check other firewall or security software.
Another program uses port 1907	Only one program can use the port: another Board7 program (for example soccerBoard 7 or volleyBoard 7) or a second copy of handBoard 7. When you switch the remote control on while the port is taken, an error message appears and the remote control does not start, although Disable is not ticked. Close the other program, then tick and untick Disable.
handBoard 7 stops at start with a Windows error	The remote control is on and port 1907 is taken by another program. Close the other program and start handBoard 7 again. If you cannot find it, close handBoard 7, open C:\handBoard7\start.xml in a text editor, change Open in the REMOTE section from True to False, save, and start handBoard 7 without the remote control.

18.6 NDI

- The NDI button on the Game tab starts and stops the NDI output. While NDI sends, the button blinks red.
- NDI sends a picture of the screen area of the board (L, T, W, H of Screen Properties) at the moment you switch it on. Everything that covers that area, for example the main window or another program, is in the stream too. Keep the board area free and do not minimise the board.
- After a change of the board position or size switch NDI off and on again.
- The source does not appear in the receiver: PC and receiver must be in the same network, and NDI must not be blocked by the firewall. The sender is called Hb7_NDI on new installations (section 17.8).

18.7 The Match Clock Does Not Start

What You See	Reason and Fix
Play and Stop are grey	A team timeout runs. Play and Stop come back when the timeout ends, or when you stop the timeout with its button.
The timeout buttons are missing	They are shown only while the match clock is stopped. Stop the clock first, then start the timeout.
The clock shows DEMO	No licence: after 5 minutes of play in a period the clock shows DEMO instead of the time (chapter 3).

18.8 The Suspension Timers Stop

The 2-minute suspensions run only while the match clock runs. When you stop the clock, the suspension timers stop at their remaining time; when you start the clock, they continue. This follows the rules: a suspension is counted in playing time.

> **Note:** Stop has two steps. The first click stops the clock. A second click on Stop while the clock is stopped resets the clock to the start of the period and removes all running suspensions of both teams. Use Play (pause) to stop the clock for an interruption.

18.9 FAQ

The boards show DEMO every 10 seconds. No valid licence was found at start. Check Settings > License; after entering a key, restart. With a USB licence, plug the stick in before you start the program.

"License Required ! This action is not allowed in the DEMO version." In DEMO the home team score and the home team logo cannot be changed (chapter 3.2).

"License Key Not Valid!" The key belongs to another PC or stick. After a hardware change send the new Computer ID to support.

The licence worked before and now the program runs in DEMO. The licence expired, or the Windows date is earlier than the last start of the program. Check License Info (? next to License, chapter 3.5) and the Windows date and time.

The board is in the wrong place or has the wrong size. Set L, T, W and H in Settings > Screen Properties (section 18.2). Use 100 % display scaling.

The score and the clock are back to 0 after a restart. handBoard 7 keeps the team names, logos and text lines, but not the score, the clock, the period, the timeouts and the suspensions. Do not close the program during a match (chapter 4.4).

The program does not start, starts with factory settings or does not find its pictures. It was probably started from another folder: it looks for start.xml, the language file and the pictures in the folder it was started in. Use the desktop shortcut, or set the Start in folder of your own shortcut to C:\handBoard7 (chapter 2.4).

My players, translations or designs are gone after an update. The setup overwrites the delivered files with the same names. Copy them back from your backup of C:\handBoard7 (chapter 2.5).

A team timeout asks "Start Timeout Anyway?". The timeout breaks an IHF limit shown in the message (no timeout in overtime or 7-metre throws, max. 3 per match, max. 2 per half, only 1 in the last 5 minutes). Click No, or Yes to start it anyway (chapter 5).

A shortcut key does nothing. Switch the keyboard shortcuts on (chapter 15). Keys pressed with Ctrl, Shift or Alt are ignored.

The Design button I need is grey in Settings. Only the design editor of the current display mode can be opened. Switch the display mode on the Game tab first (chapter 17.4).

My NDI receiver shows a green picture. That is the Chroma Key display mode with the key colour. Key it in the receiver or vision mixer, or switch to the Standard mode (chapter 7).

I started the program twice. Close one copy with its Close button. Only one copy should run.

How do I close the program safely? With the X in the title bar of handBoard 7 and Yes.

Appendix A: Handball Rules Reference

This appendix summarises the rules of the IHF Rules of the Game (Indoor Handball) that the scoreboard deals with: the playing time, the overtime, the 7-metre throws that decide a match, the team timeout and the 2-minute suspension. For each rule it says what handBoard 7 does:

- **Automatic:** the program does it by itself.
- **Warning:** the program asks before it does something the rule does not allow; the operator decides.
- **Operator:** the program leaves it to the operator, as the timekeeper and the referees decide.

The summaries are checked against the IHF Rules of the Game, Indoor Handball, edition 1 July 2025 (rules 2:1, 2:2, 2:10, 16:3-16:9 and Clarification No. 3). They are not the rule text. Check the current edition and the regulations of your competition before an event; national federations and competitions can have their own playing times, numbers of team timeouts and tie-break rules.

A.1 Playing Time (Rule 2:1 and Following)

Rule	What handBoard 7 Does
Teams with players of 16 years and above play 2 halves of 30 minutes.	Automatic: presets Handball and U19, 2 × 30 minutes (chapter 6.2).
Youth teams of 12 to 16 years play 2 halves of 25 minutes.	Automatic: preset U16, 2 × 25 minutes.
Youth teams of 8 to 12 years play 2 halves of 20 minutes.	Operator: type 20 and 20 into First Half and Second Half; there is no preset.
The half-time break is normally 10 minutes; federations may set another break of at most 15 minutes.	Operator: the program has no break countdown.
The playing time ends with the automatic final signal of the public clock (or, without one, the whistle of the timekeeper).	Automatic: the clock stops by itself at the end of every period and plays the horn (02.wav) when the sound is on.
The playing time is stopped for a time-out (by the referees) or a team timeout.	Operator: pause the clock. The suspensions pause with it.

A.2 Overtime and 7-Metre Throws (Rule 2:2)

Rule	What handBoard 7 Does
If a match that must have a winner is tied at the end of the regular playing time, an overtime is played after a 5-minute break: 2 halves of 5 minutes with a 1-minute break.	Automatic: Extra Time - 1 and 2, 5 minutes each (chapter 5.4). Operator: the breaks, and whether an overtime is played.

Rule	What handBoard 7 Does
If the match is still tied, a second overtime is played after a 5-minute break, again 2 halves of 5 minutes with a 1-minute break.	Automatic: click Extra Time - 1 again during the overtime for Extra Time - 2; the period texts become E3 and E4, and with Cumulative Time on the clock runs 70:00-75:00 and 75:00-80:00.
If the match is still tied, the winner is determined by the rules of the competition. Where 7-metre throws are used, each team nominates 5 players who throw alternately with the players of the other team.	Automatic: P records every throw with O / X and shows the last 5 throws of each team and the shootout total (chapter 5.7). Operator: which team throws first, the throwers, and the end of the shootout.
If the score is still tied after 5 throws each, the throwing continues in pairs until one team leads after both have had the same number of throws.	Automatic: all throws are kept, also the sudden-death throws; the board shows the last 5 of each team. Operator: the winner.
Players who are suspended or disqualified at the end of the playing time may not take part in the 7-metre throws.	Operator: the program does not check the throwers.
No team timeout in an overtime (rule 2:10) and no team timeout during the 7-metre throws.	Warning: "No Team Timeout in Overtime or 7-Metre Throws."

The comment to rule 2:2 gives the procedure: the referees choose the goal and make a coin toss; the winning team chooses to throw first or last. Each team nominates 5 players, who throw alternately with the players of the other team; goalkeepers can be chosen freely among the eligible players. A round ends early when one team can no longer catch up. If the score is still tied after five throws each, each team nominates five players again (all or some may be the same), the team that started changes, and the winner is decided as soon as there is a goal difference after both teams have had the same number of throws. The program does not depend on these details; it records the throws the operator enters.

A.3 Team Timeout (Rule 2:10)

Rule	What handBoard 7 Does
A team timeout lasts 1 minute.	Automatic: the Timeout field, 60 seconds (chapter 6.3). The countdown ends with a sound (03.wav).
A team may request a team timeout only when it is in possession of the ball; the timekeeper stops the game and the playing time.	Operator: pause the clock, then start the timeout with the play button of the team. The timeout can be started only while the clock is stopped.
Rule 2:10: each team has one team timeout in each half of the regular playing time.	The 3-timeout variant below is what the program follows (three pips per team). With one timeout per half, the operator watches the count.

Rule	What handBoard 7 Does
Note to rule 2:10 and Clarification No. 3, used by the IHF, the continental confederations and many federations: each team has at most 3 team timeouts in the regular playing time.	Warning: "A Team May Take Max. 3 Timeouts per Match."
In this variant, at most 2 team timeouts per team in each half of the regular playing time.	Warning: "Max. 2 Timeouts per Half of Regular Time."
In this variant, only 1 team timeout per team in the last 5 minutes of the regular playing time.	Warning: "Only 1 Timeout in the Last 5 Minutes of Regular Time." The last 5 minutes are read from the clock of the second half.
In this variant, the opponents must have had the ball at least once between two team timeouts of a team.	Operator: the program does not know who has the ball.
No team timeout in an overtime.	Warning: "No Team Timeout in Overtime or 7-Metre Throws."
The playing time restarts with the whistle of the referees after the timeout.	Operator: start the clock. The program does not start it after the timeout.

The warnings ask "Start Timeout Anyway?"; the program never refuses a timeout. The remote control page asks the same question in the browser.

After 50 seconds of a team timeout the timekeeper gives an acoustic signal that the game continues in 10 seconds (Clarification No. 3). The program shows the countdown of the timeout and plays its sound only at the end of the minute; the timekeeper gives the 50-second signal.

A.4 2-Minute Suspension and Disqualification (Rules 16:3-16:8)

Rule	What handBoard 7 Does
A suspension is always for 2 minutes of playing time.	Automatic: the suspension button gives 120 seconds (chapter 5.6).
The suspension time begins when play is restarted with the whistle, and counts only playing time.	Automatic: a suspension counts down only while the match clock runs and pauses with it. Added while the clock is stopped, it starts with the clock.
The suspended player may not take part, and the team may not replace him or her on the court during the suspension. Several suspensions of a team run at the same time, each for its own 2 minutes; there is no limit to the number of suspended players.	Automatic: all suspensions of a team run at the same time, without a maximum.

Rule	What handBoard 7 Does
A suspension ends after its 2 minutes; a goal does not end it.	Automatic: the row disappears at 00:00 with a sound (04.wav). A goal does not change the suspensions (End Penalty On Goal is off, chapter 6.6).
A suspension that has not expired at the end of a half continues in the next half or overtime.	Automatic: the period buttons keep the suspensions. Operator: do not reset the clock with Stop between the halves, which deletes them.
The third suspension of the same player is always a disqualification.	Operator: the program does not count the suspensions of a player.
A disqualification of a player or a team official during the playing time is combined with a reduction of the team on the court for 2 minutes.	Operator: add a 2-minute suspension (for the shirt number of the disqualified player).
A suspension of a team official reduces the team on the court for 2 minutes, served by a player.	Operator: add a 2-minute suspension; type the letter of the official (for example A) or the number of the player into the number box.

Rule 16:5 also says that a suspension that has not expired at the end of the overtime excludes the player from the 7-metre throws that follow; the program keeps the rows in the P period, so the operator can see who is still suspended. Rule 16:8 gives the 2-minute reduction after a disqualification, and rule 16:9 the cases in which the team plays with one player less for 4 minutes (for example unsportsmanlike conduct right after a suspension, before the game is restarted). For a 4-minute reduction, add two suspensions for the same number.

A.5 7-Metre Throws During the Match (Rule 14)

A 7-metre throw awarded during the match does not change the clock or the counters, and the scoreboard needs nothing for it: give the goal with the up arrow if it is scored. The P button is only for the 7-metre throws that decide a tied match (A.2).

A.6 What the Program Does Not Follow

The scoreboard keeps the time, the score and the counters an operator puts on the board. It does not enforce the following rules; the referees and the timekeeper decide and the operator records:

- the breaks (half-time, before an overtime, between the overtime halves);
- whether an overtime or 7-metre throws are played, and who wins them;
- the stopping of the playing time by the referees;
- the number of suspensions of a player and the disqualification after the third one;
- the 2-minute reduction after a disqualification;
- warnings (yellow cards), disqualifications and blue cards; the Info screens can show them (chapter 9);
- passive play, the substitutions and the players on the court.

Appendix B: HTTP API Command Reference

B.1 Request and Replies

Request (chapter 14):

```
http://<PC address>:1907/api.html?_=<number>&pin=<PIN>&cmd=<command>&value=<value>$
```

- The parameters come in the order _, pin, cmd, value, and the request ends with $. Leave out &value= when the command has no value.
- Command names are not case-sensitive, except GET.
- Team values: home means the home team. Every other value (guest, but also Home or HOME) means the guest team. Write home and guest in small letters.
- Multi-field values: the fields are separated by | (encoded %7C). Fields at the end can be left out; empty fields in the middle stay as || (%7C%7C).
- Flags: 1 = on, 0 = off.
- Text values: _ is a new line. The value cannot contain & or $ (chapter 14.1).
- In the tables, "!" is the reply <html>!<command></html>. A command that cannot act (for example a timeout while the clock runs) also replies "!" and changes nothing. The error replies are listed in chapter 14.2.

B.2 Commands

Display

Command	Value	What It Does	Reply
click	St, Sp, Ad, Ck (any case)	Switches the display mode (chapter 7), like the St, Sp, Ad and CK buttons of the Game tab.	!
match	–	Selects the current display mode again and draws the scoreboard; an info screen or a video on the board is replaced. In the Ad mode it switches to St.	!

Example:

```
http://127.0.0.1:1907/api.html?_=1&pin=123456&cmd=click&value=Ck$
```

Score

Command	Value	What It Does	Reply
set_home_score_up, set_guest_score_up	–	One goal more for the team, like the + button of the Game tab.	!
set_home_score_down, set_guest_score_down	–	One goal less (not below 0).	!
set_home_score, set_guest_score	A number	Sets the score of the team, for example 26. The program does not check the value: send digits only.	!

Example:

```
http://127.0.0.1:1907/api.html?_=2&pin=123456&cmd=set_guest_score&value=24$
```

Teams and Text Lines

Command	Value	What It Does	Reply
set_home_team, set_guest_team	Text	The team name on the board. _ starts the second line, for example SC_MAGDEBURG.	!
line_text_1	Text	The first text line of the board (Line 1 on the remote).	!
line_text_2	Text	The second text line of the board (Line 2 on the remote).	!

Example:

```
http://127.0.0.1:1907/api.html?_=3&pin=123456&cmd=line_text_1&value=EHF%20Champions%20League$
```

Match Clock

Command	Value	What It Does	Reply
set_chronometer	play	Starts the match clock, like the Start button. Nothing when the clock runs or a timeout runs. Running suspensions start with it.	!
set_chronometer	pause	Pauses the match clock and the suspensions. Nothing when the clock is stopped.	!
set_chronometer	stop	Like the Stop button: a running clock is paused; a paused clock is reset to the start time of the period and all suspensions of both teams are cleared.	!
set_chronometer	mm:ss	Sets the time, for example 28:30. A running clock is paused first. The value must contain a colon; the program does not check it further.	!
click	playpause	Starts or pauses the match clock (Start button). Nothing while a timeout runs.	!
click	stop	The same as set_chronometer stop.	!

The values play, pause and stop of set_chronometer are written in small letters; click accepts any case.

Example:

```
http://127.0.0.1:1907/api.html?_=4&pin=123456&cmd=set_chronometer&value=30:00$
```

Periods

Command	Value	What It Does	Reply
click	period_1	First Half.	!

Command	Value	What It Does	Reply
click	period_2	Second Half.	!
click	period_3	Overtime, first half (Extra Time - 1). Sent again while the overtime is played, it switches between the first and the second overtime.	!
click	period_4	Overtime, second half (button 2).	!
click	penalty	The 7-metre shootout (Period = 5 in GET). The clock shows 00:00.	!

A period change sets the clock to the start time of the period. It is ignored while the match clock or a timeout runs.

Suspensions

Command	Value	What It Does	Reply
penalty_add	team|number|seconds	Adds a suspension to the list of the team: number = shirt number of the player; seconds = duration, for example 120 for two minutes. The suspension counts down while the match clock runs.	!
penalty_cancel	team|index	Removes the suspension at that position of the list (0 = the first, as in PenaltyHome / PenaltyGuest of GET).	!

The program does not check the duration or the number of suspended players. Use the durations of the Period & Penalty Settings (PenaltyLevels in GET).

Examples:

```
http://127.0.0.1:1907/api.html?_=5&pin=123456&cmd=penalty_add&value=guest%7C8%7C120$
http://127.0.0.1:1907/api.html?_=6&pin=123456&cmd=penalty_cancel&value=guest%7C0$
```

7-Metre Shootout

Command	Value	What It Does	Reply
shootout	team|O, team|X	Records one throw of the team: O = goal ([O]), X = miss ([X]). Every value other than X (any case) counts as a goal.	!
shootout_clear	team	Deletes all throws of the team.	!

Select the shootout period first (click penalty). The commands also work in the other periods, but the board shows the throws only in the shootout.

Example:

```
http://127.0.0.1:1907/api.html?_=7&pin=123456&cmd=shootout&value=home%7C0$
```

Team Timeouts

Command	Value	What It Does	Reply
timeout_set	team|up, team|down	Correction: one timeout more or less for the team (0 to 3). Ignored while the match clock runs.	!
timeout_start	team	Starts the team timeout with its countdown (the timeout duration of the Period & Penalty Settings) and counts it. If a timeout already runs, it ends that timeout. Ignored while the match clock runs. It does not check the IHF rules: read TimeoutWarnHome / TimeoutWarnGuest first.	!

Example:

```
http://127.0.0.1:1907/api.html?_=8&pin=123456&cmd=timeout_start&value=home$
```

Info Screens

The info screens are shown on the board of the current display mode and stay there until match or click St / Sp / Ad / Ck. A video playing on the board stops.

Command	Value	What It Does	Reply
info_goal	team|type|number|name|minute|animate|picture|timeline	Shows a goal. type = goal (default), own (own goal) or penalty (7-metre goal). An own goal is shown for the other team. animate: goal animation (default 1). picture: player photo (default 0). timeline: add to the match timeline (default 1).	!
info_card	team|card|number|name|minute|picture|timeline	Shows a card or suspension screen. card = yellow (Yellow Card, default), yellowred (the second card slot, Blue Card with the factory titles), red (Red Card) or 2min (2-Minute Suspension). picture default 0, timeline default 1. It does not start a suspension: send penalty_add as well.	!
info_subst	team|in number|in name|out number|out name|minute|picture|timeline	Shows a substitution. picture default 0, timeline default 1.	!

- An empty name is taken from the player list of the team by the shirt number (chapter 11).
- An empty minute is taken from the match clock and rounded up: 48:35 gives 49.
- The titles of the screens come from Settings > Language > Titles (chapter 16.3).

Examples:

```
http://127.0.0.1:1907/api.html?_=9&pin=123456&cmd=info_goal&value=home%7Cpenalty%7C17%7C%7C%7C1
%7C0%7C1$
http://127.0.0.1:1907/api.html?_=10&pin=123456&cmd=info_card&value=guest%7C2min%7C8$
http://127.0.0.1:1907/api.html?_=11&pin=123456&cmd=info_subst&value=home%7C23%7C%7C17$
```

Media

Command	Value	What It Does	Reply
start_playlist	1-6	Opens the Media Player and plays that playlist. Sent while a playlist plays, it stops it.	!
start_playlist_ad_screen	1-6	Switches the display to Ad and plays that playlist of the Ad page. Sent while a playlist plays there, it stops it.	!

The values 2 to 6 select playlists 2 to 6; every other value plays playlist 1. A file path is not accepted.

Hidden Counters

Command	Value	What It Does	Reply
set_home_fault_up, set_guest_fault_up	–	One more on the foul counter of the team (FaultHome / FaultGuest in GET). A running clock is paused.	!
set_home_fault_down, set_guest_fault_down	–	One less on the foul counter.	!

The foul counter is a leftover of the common Board7 panel: it is hidden on the Game tab and not shown on the handball boards. Do not use these commands, because the up commands stop the clock.

State

Command	Value	What It Does	Reply
GET	–	The state as XML (B.3). Written in capitals.	XML

B.3 The GET Reply

The reply is <Response><Item>...</Item></Response> with these fields, in this order:

Field	Meaning
BoardType	Display mode: St, Sp, Ad, CK
Mode	The match rules: 0 = Handball, 1 = U19, 2 = U16 (chapter 6)
Home, Guest	Team names; a two-line name has a line break between the lines
HomeScore, GuestScore	Goals

Field	Meaning
Chronometer	The match clock, mm:ss
StatusChronometer	true while the match clock runs
Period	1 = First Half, 2 = Second Half, 3 and 4 = the halves of the overtime, 5 = 7-metre shootout
Extra01, Extra02	The two text lines of the board
FaultHome, FaultGuest	The hidden foul counters (B.2)
PeriodLabels	The texts of the four period buttons: First Half|Second Half|Extra Time - 1|2
PenaltyLevels	The suspension buttons: seconds~text~red, for example 120~2~red. Empty when none is set.
CardSlots	The card buttons of the remote: yellow~Y~yellow|yellowred~2'~yellowred|red~R~red|2min~2~white (slot~button text~colour)
PenaltyHome, PenaltyGuest	The running suspensions: number~remaining time, for example 17~01:42|23~02:00
ShootoutHome, ShootoutGuest	The 7-metre throws, separated by spaces: [O] [O] [X]
ShootoutTotal	The shootout goals, home - guest (4 - 3); empty before the first throw
TimeoutHome, TimeoutGuest	Team timeouts taken (0-3)
TimeoutRunning	true while a team timeout runs
TimeoutWarnHome, TimeoutWarnGuest	Empty, or the IHF warning for a new timeout of the team followed by a blank line and "Start Timeout Anyway?"

The warnings are No Team Timeout in Overtime or 7-Metre Throws; A Team May Take Max. 3 Timeouts per Match; Max. 2 Timeouts per Half of Regular Time; Only 1 Timeout in the Last 5 Minutes of Regular Time. They are written in the language of the program.

B.4 Differences from API_Commands.txt

API_Commands.txt (Settings > Remote Control > Show API Commands) was written for an earlier version. This appendix follows the program; where they differ:

- The GET reply is <Response><Item>, not <ArrayOfDictionary><Dictionary>, and booleans are true / false in small letters.
- PenaltyHome and PenaltyGuest are number~time entries (17~01:42), not "7 NAME 1:48". The second field of penalty_add is the shirt number shown on the board.
- ShootoutHome and ShootoutGuest have a space between the throws.
- Mode can also be 2 (U16).
- The examples with an empty value (&value=$, for example cmd=GET&value=$ and cmd=match&value=$) are refused with #Invalid API Request: leave out &value= instead.
- A wrong PIN is not ignored silently: the reply is #Invalid PIN.
- The playlist commands take a number from 1 to 6, not a file path.
- The card slot yellowred shows the title of CardYellowRed, which is Blue Card in the factory titles.

Appendix C: Glossary

Term	Meaning
2-minute suspension	The player must leave the court for two minutes of playing time; the team plays with one player less. The program counts the suspension down with the match clock (chapter 5).
7-metre shootout	Throws from the 7-metre line that decide a match that must have a winner when the score is level after the overtime. Five throws per team, then one each until there is a winner. Period 5, PEN on the remote.
7-metre throw	A penalty throw from the 7-metre line. A goal from it is a 7-metre goal (7M on the remote).
API	The HTTP command interface on port 1907 (chapter 14, Appendix B).
Blue card	Shown by the referees after a red card when the disqualification is reported to the disciplinary body. The second card slot of the program shows it.
Board	The output window with the graphics: Standard, Sponsored, Advertisement or Chroma Key.
Chroma key (CK)	Graphics on a solid key colour that a vision mixer replaces with the camera picture.
Cumulative time	The clock counts on over the halves: the second half starts at 30:00 instead of 00:00 (chapter 6).
DEMO	The program without a valid licence.
Display mode	St, Sp, Ad or CK (chapter 7).
Disqualification	The player must leave the court and the bench for the rest of the match, shown with a red card; the team is reduced for two minutes.
Extra time / overtime	Two halves of 5 minutes each when a match that needs a winner is level after the regular time. A second overtime follows if it is still level (Extra Time - 2).
Half	One of the two periods of the regular playing time: 2 × 30 minutes for adults and U19, 2 × 25 minutes for U16.
IHF	International Handball Federation, which writes the rules of the game.
Info screen	A graphic with match information shown on the board instead of the scoreboard, or as a lower third in CK (chapter 9).
Lower third	A graphic in the lower part of a TV picture.
Lower lines	The two text lines of the board, for example the competition and the venue (Line 1 and Line 2).
Mode	The match rules: Handball, U19 or U16 (chapter 6).
NDI	A standard for video over the network; handBoard 7 can send and receive NDI.
On air	Shown on the output now.
Own goal	A goal into the own team's goal; it counts for the other team.

Term	Meaning
Period	A section of the match: First Half, Second Half, the two halves of the overtime, and the 7-metre shootout.
PIN	The code that protects the remote control and the HTTP API (chapter 13.3).
Playlist	A numbered list of videos and pictures of the Media Player or the Ad page (chapter 12).
Remote control	The web page for phones and tablets on port 1907 (chapter 13).
Scorebug	The small score graphic of the CK mode.
Substitution	A player change. In handball players can change at any time through the substitution area; the program shows it as an info screen.
Team timeout	A one-minute break requested by a team: at most 3 per match, at most 2 per half of the regular time, and only 1 in the last 5 minutes of the regular time. None in the overtime.
Timeline	The list of the events of the match (goals, cards, substitutions) with their minute (chapter 10).
U16, U19	The youth modes of the program: U19 with 2 × 30 minutes, U16 with 2 × 25 minutes.
WebView2	The Microsoft Edge component that draws the boards.
Yellow card	A warning for a player or an official.

Appendix D: Match-Day Checklist

Before the event:

1. Licence: the licence icon at the right of the menu bar reports a licence (its tooltip reads, for example, CPU License Found) and the boards do not show DEMO (chapter 3). With a USB licence, the stick is plugged in before the program starts.
2. Board output: Settings > Screen Properties L, T, W, H match the LED wall or the second monitor; the Windows display scaling of that monitor is 100 % (chapters 7, 17 and 18).
3. Design: the right design is applied in every display mode you will use (chapter 8).
4. Rules: the Mode button on the Game tab shows the right mode (Handball, U19 or U16); the Period & Penalty Settings have the right half length, overtime, suspension duration, timeout length and cumulative time setting (chapter 6).
5. Data: team names, logos, player lists with shirt numbers and photos, referees, standings, results and fixtures are filled in and saved (chapters 9 and 11). The remote and the API take the player names from the player lists.
6. Titles: Settings > Language > Titles has the wording of your competition (chapter 16.3).
7. Sponsors and media: sponsor logos, playlists and the background video are in place (chapter 12).
8. Remote: switched on, PIN changed from 123456, the phone logged on, a test goal given and taken back (chapter 13).
9. Keyboard shortcuts: if used, keys chosen that nobody presses by mistake, and Save & Apply clicked after the program start (chapter 15).
10. NDI or video output: the receiver or the vision mixer shows the board; for keying use CK with a key colour (chapter 7).

Before each match:

1. The team names, logos and the two text lines for this match.
2. The score at 0 - 0, the timeouts at 0, no suspensions in the lists, no 7-metre throws left from an earlier match.
3. First Half selected and the clock at its start time.
4. The display mode for the moment (St, Sp, Ad or CK) and the scoreboard on the output.
5. The team list screens, if you show them before the throw-off (chapter 9).

During the match:

- One person gives the goals. Correct a wrong goal at once with − (Game tab or remote).
- Start the clock with the referee's whistle and stop it when the referees give a time-out.
- Team timeout: stop the clock, then start the timeout (Game tab or TO on the remote). If the program warns about an IHF rule, follow the decision of the timekeeper and the referees.
- Suspensions: enter the shirt number and start the 2 minutes at once; they run with the match clock.
- Goal, card and substitution screens from the Info tab or the INFO tab of the remote, then back to the scoreboard (MATCH).
- Half-time: select Second Half before the restart.
- Level score in a match that needs a winner: Extra Time - 1, then 2; then the 7-metre shootout (PEN).

After the match:

- Show the result, the statistics and the standings if wanted (chapters 9 and 10).
- Close handBoard 7 with its Close button at the end of the day; the settings and the data are saved.