



# Player Analysis Technology Approval report

## KITRIS KIT

**Test code:** PAT-13-001

**Serial no:** KP0003

**Software version(s):**

KIT device: v4

KITRIS Client: v1.3

KITRIS Server Application: v1.0

**Firmware version:** v5

**Issue date:** 21 October 2013



**Objective:** To test and evaluate KITRIS KIT Player Analysis Technology according to Rule 31 of the 2014 Rules of Tennis.

**Result:** Approved

### SUMMARY

A wrist-worn device (“KIT”) is used to capture data using a combination of voice recognition and wrist/arm gestures.

The user is able to record and access point information (i.e. the score) using the KIT device, which is not considered to constitute coaching information.

The user is able to record (potential) coaching information in the form of ‘complementary information’, e.g. forehand winner, and audio memos during the match, but this information cannot be accessed on the KIT device.

Access to complementary information requires connection of the KIT device to an auxiliary device, e.g. a personal computer (PC), and connection of the auxiliary device to the internet.

Restrictions on the access by a player to KITRIS components during periods when coaching is and is not allowed are as follows:

COMPONENT	NO COACHING	COACHING
KIT device	Permitted	Permitted
Auxiliary device (e.g. PC)	Not permitted	Permitted
KITRIS Server	Not permitted	Permitted

## MAIN COMPONENTS

The main components of the system are described in table 1 and depicted in figure 1.

COMPONENT	FUNCTION(S)
Wrist-worn ("KIT") device	Data capture and storage
Auxiliary device, e.g. personal computer (PC)	Data transmission, storage and communication
Data and application server ("KITRIS Server")	Data processing, communication and storage

Table 1. Description of the components of the KITRIS KIT system.



Figure 1. Components of the KITRIS system (from left to right): KIT device; auxiliary device (laptop); internet access to KITRIS Server (router).

## KIT DEVICE

The KIT device is used to capture point information (i.e. the score) and optional 'complementary information', e.g. forehand winner, and audio memos.

Point information is entered either by specific voice commands or wrist/arm gestures.

Even when the voice recognition method is selected to enter point information, wrist/arm motions can be used to activate the device (in preparation for a voice command).

The predefined gestures are illustrated in figure 2.

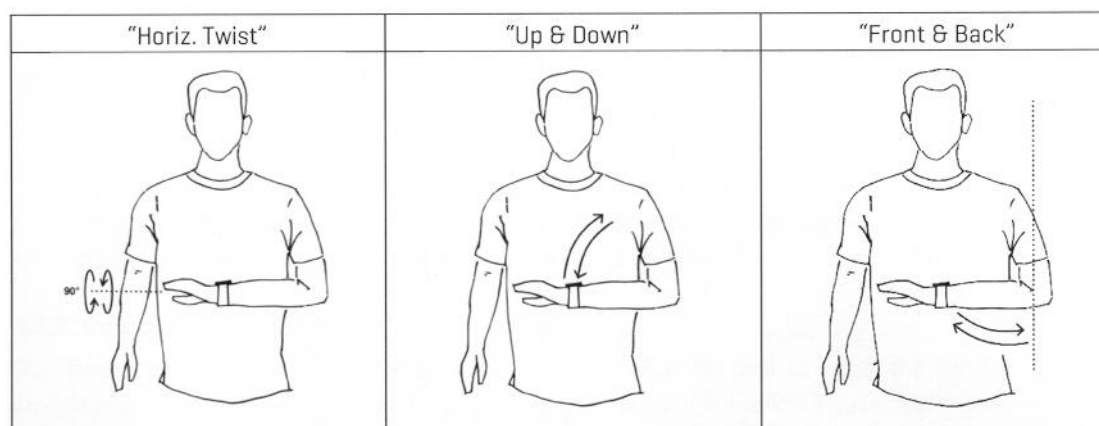


Figure 2. Point information input/activation gestures.

Alternatively, voice recognition can be activated by pressing the (yellow) button below the screen (see figure 1).

Confirmation of point information entry is given by:

1. A brief (approximately 1 second) indication of who won the point displayed on the screen of the device; and
2. Vibration of the device: two short pulses for a point won by the user; single long pulse for a point won by the opponent.

When point information is not being entered, the score is displayed on the device in the standard tennis format (in addition to the device time, as set by the user).

Complementary information can only be entered immediately after point information input. The list of voice commands and corresponding complementary information is given in table 2.

VOICE COMMAND	COMPLEMENTARY INFORMATION
“Serving ace”	Serving player won with an ace
“Serving win”	Serving player won with a service winner
“Serving double”	Serving player lost on a double fault
“Forehand winner”	Rally won or lost on a forehand winner
“Backhand winner”	Rally won or lost on a backhand winner
“Forehand forced”	Rally won or lost on a forced forehand error
“Backhand forced”	Rally won or lost on a forced backhand error
“Forehand why”	Rally won or lost on a unforced forehand error
“Backhand why”	Rally won or lost on a unforced backhand error

Table 2. Voice commands for complementary information entry.

The process of confirming complementary information is the same as for point information.

Audio memos can be recorded at any time, by selecting the function from the ‘MATCH MENU’ displayed on the device.

There are three options to edit point information in the ‘MATCH MENU’:

1. Undo point (delete the previous point entry).
2. Replay point (logs that the point was replayed).
3. Overrule (allows correction of the score – sets, games and points in the current game – using the navigation and selection buttons).

Repeated ‘undoing of the point’ effectively counts back the score. Complementary information and audio memos cannot be edited, or replayed, on the device.

The KIT device does not have wireless connectivity. It can only transmit data via USB connection or removal of its microSD memory card, which requires unscrewing the back panel and dismantling the device (see figure 3).

Previous (ended) matches cannot be viewed on the KIT device and are available on an auxiliary device only.



Figure 3. Back panel of the KIT device.

## COMMENTS

The user is able to record and access point information (i.e. the score) using the KIT device, which is not considered to constitute coaching information.

The user is able to record (potential) coaching information in the form of complementary information, e.g. forehand winner, and audio memos during the match, but this information cannot be accessed on the KIT device.

The fact that the KIT device does not have wireless connectivity is important because it has the capacity to provide visual and tactile (vibrational) feedback to the player. That is to say, even if data captured on the device was not considered coaching information, coaching information could potentially be communicated using the device if it had wireless connectivity.

## AUXILIARY DEVICE AND KITRIS SERVER

In order to gain access to complementary information (and audio memos), the user must upload the data to the KITRIS Server. This is done by:

1. Transferring the data file(s) from the KIT device to an auxiliary device, e.g. personal computer (PC), via a USB cable (see figure 4).
2. Uploading the data file(s) from the auxiliary device to the KITRIS Server via an internet connection.



Figure 4. USB connection of the KIT device (to an auxiliary device).

The auxiliary device must have KITRIS Client (proprietary software) installed to be able to receive the files.

Data transfer via USB requires several minutes for a straight-sets match (5 MB file). The contents of the data file saved on the auxiliary device are scrambled.

Audio memos can be played when importing data (using KITRIS Client) and additional match information, e.g. opponent name, appended to the imported data.

The time of recording the audio memo (in the match), duration of the memo and score at the time of recording can be accessed in the 'Manage Your Matches' area of the KITRIS Client software.

KITRIS Client can be used to review the match score, additional match information and audio memos. Complementary information, e.g. forehand winner, is only available via the KITRIS Server (Webclient) user-interface.

The user must set-up a personal account with login and password to upload (and access) the KITRIS Server. The transmission of data between the auxiliary device and KITRIS Server is performed via a secure internet channel (https).

KITRIS Webclient displays match statistics generated from point and complementary information. It also includes length of rally (i.e. the number of shots) for each point.

## COMMENTS

Transmission of data from the KIT device to the auxiliary device (e.g. PC) is via a wired connection, meaning that a potential hacker would need to obtain the KIT device or the auxiliary device to gain access to the data.

Access to complementary information requires connection of the KIT device to an auxiliary device and connection of the auxiliary device to the internet.

Transmission of data from the auxiliary device to the KITRIS Server, and subsequent access to the data on the KITRIS Server, is conducted using a secure internet channel and requires a password-protected user account.

## ADDITIONAL INFORMATION

**Client:**

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**Date received:** 23 September 2013

**Report prepared by:** Jamie Capel-Davies

**Report authorised by:** Stuart Miller

**Revision number:** 1