DESIGN FOR A SCORING MACHINE
Using off the shelf components

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Background

A scoring machine was previously designed using individual components and requiring hand-made construction. Two versions were described. One allowing for up to eight judges, and one allowing for three judges.

That original design has now been realised using standard off the shelf components, therefore requiring no hardware construction. The total cost of materials (Nov-23) is about £65.

Principle

The principle for the off-the-shelf design remains the same as for the hand-made design. A standard keyboard can be regarded as split into sections, where each section becomes a handset for a judge and the maximum realistic capacity is 8 judges scoring 1-5. Each score from each judge provides a unique keyboard character, which can be decoded in software, and any complexity of facilities is concentrated in that software.

The hand-made design used passive wiring in the handsets with a central keyboard controller. This off-the-shelf design uses individually programmable keyboards. In that respect it is similar to the Dorchester system which placed a keyboard encoder in every handset. It also has some similarities with the use of off-the-shelf numeric keyboards, but is a considerable improvement in that multiple numeric keyboards required either (a) interface software to identify each handset via its hardware, or (b) use of special keys to signal which keyboard was about to send its score.

The Keyboards

The keyboards are LICHIFIT 5-key programmable keyboards via Amazon.

Each keyboard comes with a 1.5m micro-USB to USB2-A cable.

- The micro-USB plug can be fitted to the end of the keyboard, or adjacent at the side. End fit is recommended.
- The cable length is considered sufficient when 3 judges are seated side by side.

The keyboards display no indication of which key has been pressed.

As delivered, each keyboard is programmed to deliver numbers 1-5, with 5 being the cable end.

Other Hardware Required

The keyboards for the 3 judges will be connected to a USB hub under the chair of the middle judge. The hub should be a 4 to 1 device, with the onward cable terminated in USB-A. A USB-2 hub (or even USB-1) should be used.

Permitted cable lengths for USB-3 are not sufficient for the required layout. To reach the likely distance from the judges to the scoring computer, requires an A-female to A-male USB-2 extension lead. 3 metres may be suitable.

This layout leaves one socket spare on the hub. The system is therefore expandable to 6 judges by adding a 2 metre extension to a second hub which itself has handsets for judges 4-6. Note, this layout has not been tested. It relies on the hubs acting as powered repeaters to overcome the maximum permitted USB cable length.

Programming the Keyboards

The keyboards will be reprogrammed from their delivered state to provide the characters required to identify each judge and the score pressed. The table shows the coding for eight judges.

As delivered	1	2	3	4	5 (cable end)
Score required	5	4	3	2	1
Judge 1	&7	$4	£3	"2	!1
Judge 2	Uu	Rr	Ee	Ww	Qq
Judge 3	Jj	Ff	Dd	Ss	Aa
Judge 4	Mm	Vv	Cc	Xx	Zz
Judge 5	6^	5%	0)	9(	8*
Judge 6	Yy	Tt	Pp	Oo	Ii
Judge 7	Hh	Gg	:;	Ll	Kk
Judge 8	,<	.>	?/	Bb	Nn

The keyboards come with no instructions, but there are sources of advice on the internet. Look up about Sayo Device and Sayobot.

Standalone Utility

A standalone utility is available for download at https://osu.sayobot.cn/download/

No installation is required as the program 'sayodevice' is executed directly.

Plug in one (only) keyboard to any USB port. The computer will install device software.

Run the utility. Select the device – only one should be available.

The keyboard is displayed with its current character settings as if the cable end is on the right. As delivered, the keys will be 1,2,3,4,5 (see table above).

Select a key. Use the General option to show a virtual keyboard. Select the required key as shown in the table above. Confirm. The new value will be shown in the display.

Repeat for each key.

In the top bar, click to edit the device name and rename according the keyboard being programmed eg, 'Judge 1'. This value is not used in the scoring program but will be seen if the keyboard is programmed again.

Click 'Save'. The keyboard will be programmed with the new values and the program exits.

Repeat use of the program for each keyboard.

Sayo Website Utility

The utility runs in your browser, from https://sayodevice.com

Select English language (unless you know Chinese).

Plug in one (only) keyboard to any USB port. The computer will install device software.

Select the device in the utility. The utility may update the keyboard firmware in which case it will be necessary to select the device again as the name may have changed. [Updating firmware is not available in the standalone utility program.]

The keyboard is displayed with its current character settings as if the cable end is on the right. As delivered, the keys will be 1,2,3,4,5 (see table above).

Select a key. Use the General option to show a virtual keyboard. Select the required key as shown in the table above. Click 'OK'; the edit window closes. Click 'Submit'. The new value will be shown in the display.

Repeat for each key.

In the top bar, click to edit the device name and rename according the keyboard being programmed eg, 'Judge 1'. This value is not used in the scoring program but will be seen if the keyboard is programmed again.

Click 'Save to Device'. The keyboard will be programmed with the new values.

The keyboard can be disconnected and another keyboard attached to repeat reprogramming for each keyboard.

Exit the utility.

Labelling

The keys on each keyboard should be labelled with the score values. Score 1 is nearest the cable entry.

Optionally, each keyboard may be labelled with the judge number.

Testing

An individual keyboard can be connected to any USB port. Use a simple text program (Notepad, Wordpad, Word) to display the character for each key.

An individual keyboard can be connected to any USB port. Use the scoring software and the Handset Test function to display the character, judge and score for each key.

Connect multiple keyboards via a USB hub (or separate USB ports on the computer). Use the scoring software to test all the connected handsets.

Software

This specification does not deal with the software required to use the handset system.

Current software uses MS-Excel with VBA code, including:
- Compatibility with versions of Excel from 2000 and later.
- Configuration setup (number of judges, the score range, scores visibility).
- Handset testing.
- Manual scoring machine.
- Optional integration with the running order for the event, with saving of scores against the entries.
- Optional saving of all individual judges' scores.
- Optional reporting.

Refer to the current software version for more detail.

The general principle remains that the scoring machine hardware requires no modifications to work with any variety of software solutions which may be devised.