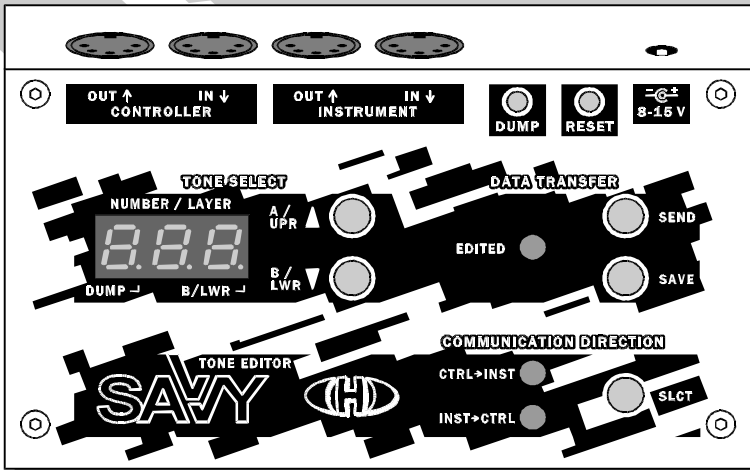# SAVY

# Tone Parameters Editor & Controller

## Version 1.0



## Service Manual
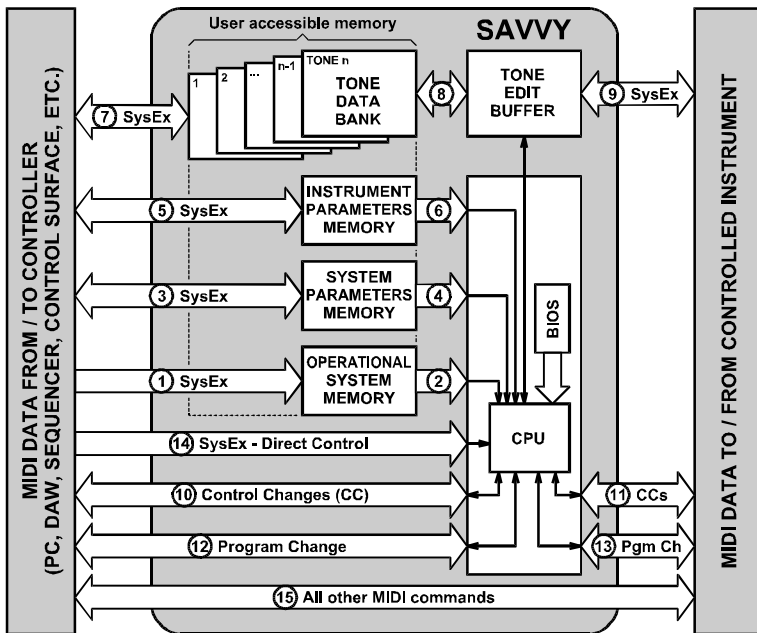
# 1    PRINCIPLE OF THE SAVVY FUNCTION

Internal structure of the SAVVY editor memory areas and data processing shows Figure 1:

## Figure 1 – Internal structure of the SAVVY editor



Since the editor can control more instruments (but **not** more instruments **simultaneously!**) with different communication protocols, it has part of internal memory reserved for information about chosen instrument - **Operational System Memory**. Operational system is downloadable by user via MIDI SyEx ①. CPU of SAVVY then works in dependence on loaded operational system ②.

For parameters which control basic functions of the editor, part of internal memory named **System Parameters Memory** is reserved. This memory bank can be loaded with user data or stored data can be read via MIDI SyEx ③. CPU of the editor then reads stored parameters ④ and works in accordance with them. Note that the general parameters are different for each of instruments!

For assignment of CCs numbers used actually for the instrument control, part of internal memory named **Instrument Parameters Memory** is reserved. Again, this memory bank can be loaded with user data or stored data can be read via MIDI SyEx ⑤. CPU of the editor then works in accordance with assigned CCs ⑥. Note that the instrument parameters are different for each of instruments!

The editor has its own memory (**Tone Data Bank**) of individual tone parameters for controlled instrument. This bank (stored tones) is independent on the controlled instrument memories. Each part of the memory bank (tone) can be loaded with own user data or content of a part of memory bank (tone) can be transmitted from the editor the (the tone data can be archived) as Bulk Dump MIDI SysEx ⑦.

**2**

The active tone can be selected manually from the device panel anytime (by ↑ or ↓ buttons) or via Program Change / Bank Select MIDI commands in dependence on system parameters setting. When a tone is set as active from the controller, data from corresponding part of tone bank are copied to tone edit buffer ⑧ and then transferred to controlled instrument as SysEx messages ⑨. When a tone is set as active from controlled instrument, data from corresponding part of tone bank are copied to tone edit buffer ⑧ and they can be simultaneously sent to the controller as stream of CCs ⑩.

Control Changes (CCs) MIDI commands received from the controller ⑩ are divided to assigned (by an instrument parameter) and unassigned to a tone parameter. Assigned CCs are converted to control SysEx data and then sent to the instrument ⑨. Unassigned CCs are only transferred through the device ⑪. In opposite direction, all CCs received from the controller ⑪ are only transferred through the device ⑩.

Program Change MIDI commands received from the controller ⑫ can change actual part of tone bank ⑧ and / or they are transferred to controlled instrument [13] in dependence on setting of system parameters. The same goes for the opposite communication direction – Program Change commands received from controlled instrument ⑬ can change actual tone bank ⑧ and / or they are transferred to the controller ⑫ in dependence on setting of system parameters.

SysEx messages incoming from the controlled instrument ⑨ can be converted and sent to the controller as CCs ⑩ in dependence on setting of system parameters.

Direct Control MIDI SysEx commands (i.e. Bulk Dump Request and Initialize) ⑭ are processed by CPU of the SAVVY immediately after their receiving. Please see description of SysEx communication.

All other MIDI commands (i.e. unused channel commands, all common system commands and unacceptable SysEx) are only transferred through the editor without any change ⑮ (in both communication directions).

## Figure 2 – Block schematics diagram
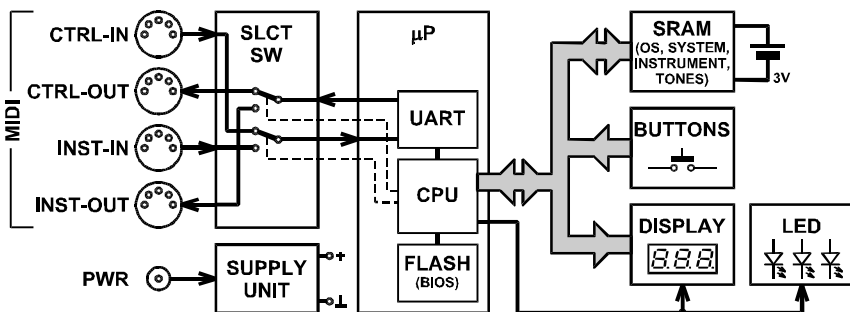
## 2  BACKUP BATTERY REPLACEMENT

The SAVVY device's internal memory is powered from battery cell when the device is disconnected from power supply adapter. The battery has a life of about five years. The battery should be replaced after this time or when its voltage falls under 2,7 V . For replacement, use standard lithium battery cell **CR2032** type (lithium).

The battery is placed on PCB inside the device. So it necessary to open the device.

### 2.1. Opening the device

Turn the device upside down. Unscrew four self-tapping screws on the bottom cover (Fig. 3) and remove the bottom cover.
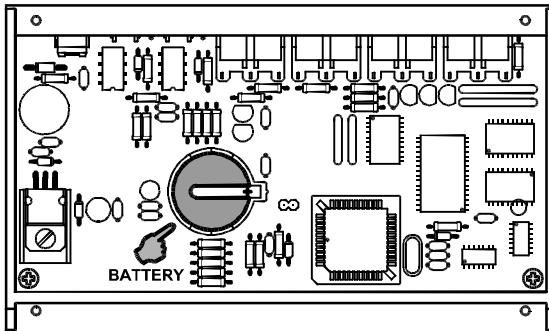
**Figure 3. – Bottom cover removing**



### 2.2. Battery cell replacement

Remove old battery from holder on PCB (Fig. 4) and replace it with new one. Use **CR2032** type lithium battery cell only!

**Figure 4. – Battery replacement**



BATTERY

### 2.3. Refitting the device

Put the bottom cover back on the device and fix it with four original self-tapping screws.

**Notice:** The old battery should not be disposed as general household waste! You should look for appropriate recycling facilities and systems for the disposal of this product.

## 3    HARDWARE TESTS

The SAVVY device's basic software (BIOS) contains routines for checking of functionality of its own hardware. Testing procedures can be executed if display of the device doesn't show correctly for example or if the device does not work properly with MIDI system, etc.;

### 3.1. Enter to testing mode

For enter into the testing mode, press ↑ and ↓ buttons and hold both them pressed ①. Then turn the device on – connect power supply adapter to the device ②. After that, all decimal points of display and all LEDs (EDITED, CTRL→INST and INST→CTRL) light ③. Now, ↑ and ↓ buttons ① can be released – the device is incoming to testing mode.

PWR
Supply
Adapter
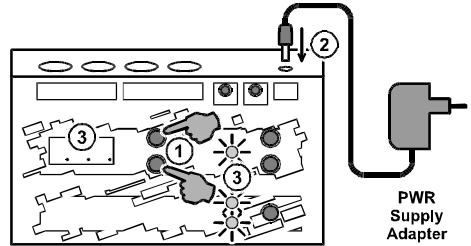
### 3.2. Test of display and LEDs

Test of the display and LEDs is launched automatically after entering into testing mode. All LEDs and segments of display light in this cycle:

1. **CTRL→INST** LED and sequentially all segments (see Fig. 5.) on left position of the display
2. **INST→CTRL** LED and sequentially all segments (see Fig. 5.) on middle position of the display
3. **EDITED** LED and sequentially all segments (see Fig. 5.) on right position of the display

**Figure 5. – Sequence of display segments lighting**

Continue to next test occurs after any of buttons is pressed.

### 3.3. Test of buttons

The display shows "**b. --**" symbols where "**b.**" means "buttons". Now you have to press sequentially all buttons. It doesn't matter in what order the buttons are pressed.

Pressing of each of buttons is indicated on the display – by corresponding lighting segment (see table 1). The segment remains light after the button is depressed.

| Table 1 – INDICATION OF PRESSED BUTTONS | | | | | |
|---|---|---|---|---|---|
| **Button** | **Display** | **Button** | **Display** | **Button** | **Display** |
| ↑, A/UPR | | SAVE | | DUMP | |
| ↓, B/LWR | | SELECT | | RESET | |
| SEND | | After all buttons are pressed : | | | |

After all buttons are pressed, the display shows "**b. ok**" symbols for approx. one second. This indicates proper function of all buttons. Then the device goes to next test automatically.

### 3.4. Test of display brightness control

The display shows "**d. nn**" symbols where "**d.**" means "display" and "**nn**" is value (from 0 to 15) of actual brightness of the display. The brightness can be changed by ↑ and ↓ buttons. ↑ button increments the

brightness, ↓ button decrements the brightness. Anytime the buttons are pressed, the brightness goes up or down respectively in one step in range from 0 to 15.

For continue to next test, RESET button need to be pressed.

### 3.5. Test of internal RAM memory

The test runs automatically. The display shows "**r. nn**" symbols. where "**r.**" means "RAM" and "**nn**" is number of block of RAM cells under testing procedure. During the test, block numbers 1 to 32 are displayed sequentially. Each of these 32 blocks of RAM cells has size 4096 byte. After whole area of RAM cells are checked successfully, the display shows "**r.ok**" symbols for approx. one second and then the device continues to next test automatically.

If any defective memory cell is detected during the RAM test, display shows "**r. E. n**" symbols (RAM Error) where "**n**" is number of the error (see table 2). In this case, continue to next test occurs after RESET button is pressed.

| Table 2 – POSSIBLE ERRORS DURING RAM TESTING PROCEDURE | |
|---|---|
| **Error number** | **Error description** |
| E.1, E.2 | Wrong reaction to Read / Write instruction in lower part of RAM. |
| E.3 | Content of cell in lower part of RAM can't be refreshed. |
| E.4, E.5 | Wrong reaction to Read / Write instruction in upper part of RAM. |
| E.6 | Content of cell in upper part of RAM can't be refreshed. |

### 3.6. Test of MIDI inputs and outputs

Standard MIDI cable (with DIN 41524 connectors on both ends) is necessary for execution of this testing routine. Individual MIDI inputs and outputs of the device will be interconnected with help of this cable.

The test is indicated by symbol "**M.**" on the display – it means "MIDI".

Until no MIDI input is connected with no MIDI output, symbols "**--**" is shown on the display. Connection of arbitrary MIDI input with arbitrary MIDI output is indicated by symbols of two characters. First of them indicates used MIDI output ("**i**" = INSTRUMENT-OUT, "**c**" = CONTROLLER-OUT) and the second indicates used MIDI input ("**i**" = INSTRUMENT-IN, "**c**" = CONTROLLER-IN).

If symbol "**--**" is still displayed or if symbol "**-?**" is displayed after a MIDI input is interconnected with a MIDI output, used MIDI input or MIDI output respectively is not working correctly.

For continue to next test, RESET button need to be pressed.

### 3.7. Displaying of basic software version

The test is indicated by symbol "**v.**" on the display – it means "version".

Then moving text "**bioS vEr. n.nn**" is shown on the display. The "**n.nn**" in the text is number of version of basic software (BIOS) installed in the device (e.g. 1.00).

For continue, RESET button need to be pressed.

### 3.8. End of tests

After all testing procedures are finished, display shows "**End**" symbols and the device stops all operations. Now, you can disconnect power supply adapter from the device.

If no error occurs during testing procedures, the device is fully functional and it should to work with MIDI system correctly.

If any hardware malfunction was detected during testing procedures, the device must be repaired in specialized workshop.

⬭ SAVY

Tone Parameters Editor & Controller
Model TPE-1 Nr. 8-361 / Bios v. 1.00
Document: 8361100_service

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Tone Parameters Editor & Controller