GARBAGE COLLECTOR
## User Manual

The **Oscillator Devices Garbage Collector** is both a MIDI controllable expression pedal and footswitch combined in one device. Effects devices with expression pedal inputs or inputs for external foot switches (e.g. tap tempo on guitar pedals) can be controlled automatically by the **Garbage Collector** via MIDI. It can emulate either a foot switch with *tip* and *ring* or an expression pedal on both outputs. The **Garbage Collector** can be synced to MIDI clock, allowing time-based effects to sync to either tap tempo or LFO waveforms. The MIDI channel is selectable and complex switching functions can be combined in presets.
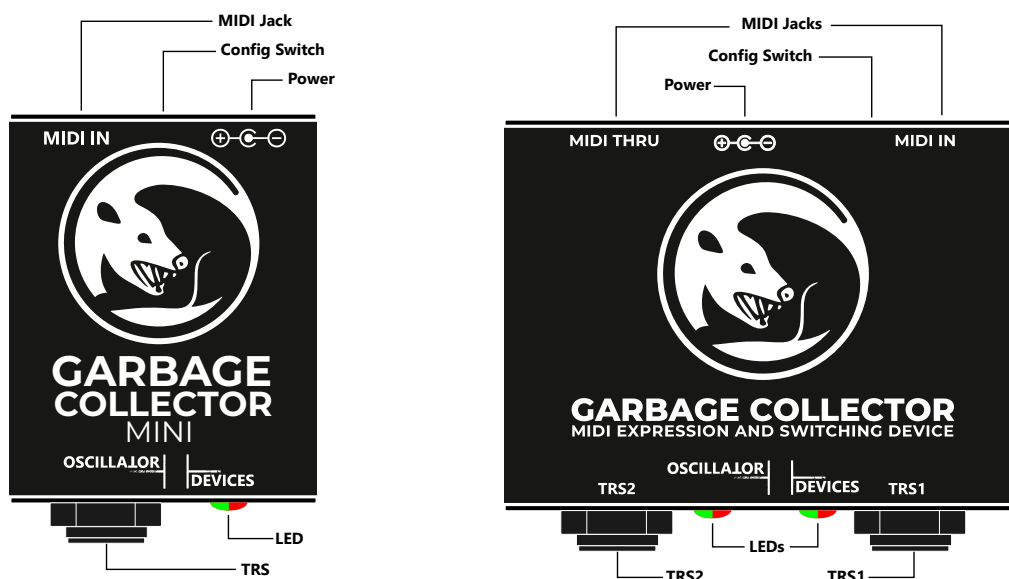
- **TRS:** 1/4 '' stereo jack sockets. When used as switch, the *tip* and *ring* are open and close individually to the *sleeve*. As an expression out, the wiper is on the *tip* and connected to the *sleeve* and *ring* via the potentiometer. If the expression function is activated via MIDI command, the switch is automatically deactivated. If the switch is used, the expression function is automatically deactivated.

- **LED**: Associated LEDs. With the switch function, the LEDs light up whenever the contact is closed. The green LED lights up whenever the *tip* is connected to the *sleeve*, the red LED lights up whenever the *ring* is connected to the *sleeve*. When using the expression function, the LED on the *heel* position lights up green, becomes darker towards the middle position and begins to light up red towards the *toe* position.

- **Power:** Power supply 9-18V. 2.1mm barrel connector, center negative. This corresponds to the standard "Boss-Style" power supply. Current consumption maximum 70mA.

- **Config Switch**: A switch recessed in the housing for setting the MIDI channel (see MIDI Channel section) or for testing the functions without a MIDI controller. If the switch is pressed shortly while the device is switched on, *tip*, *ring* and *tip+ring* are closed in sequence. If the switch is held, the expression function is activated and it is slowly moved from heel to toe and back again.

- **MIDI In/Thru**: 1/8" stereo jack sockets according to MIDI standard for MIDI TRS (**MIDI TRS-Type A**).

MIDI TRS Type-A
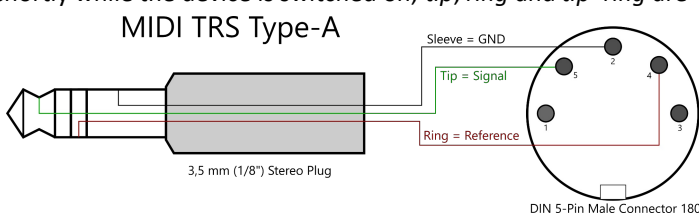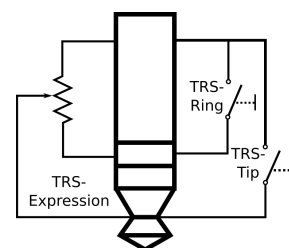
Please disconnect all devices from the power supply, before making any connections.

Differences Between the Models

|	TRS	Potentiometers	Switches	MIDI Thru	Switching of more than 5V and AC	Dimensions
v3	2	2	4	Yes	Yes (see chapter below)	69 x 50 x 24 mm
Mini	1	1	2	No	Yes (v1.1.0 only, see chapter below)	41 x 50 x 24 mm

Using the Switches

Caution: **In the delivery state**, under no circumstances should there be more than +5V or negative voltages be applied to the TRS sockets. Otherwise the digital potentiometer would be destroyed (which wouldn't be a big deal because it's not that expensive and easily replaceable).
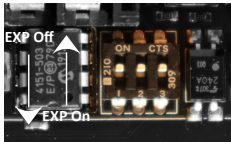
Garbage Collector Mini

In order to switch AC voltages **up to +-60V**, the dip switch on the inside must be switched to the **off** position for the corresponding TRS. This isolates the digital potentiometer from the circuit. In addition, the *sleeve* of the socket is separated from GND. In this way the switches of the *Garbage Collector* are completely isolated and can be used as an amp switcher, for example. To access the dip switch, remove the two Phillips head screws on the side where the TRS sockets are and carefully slide the PCB out.
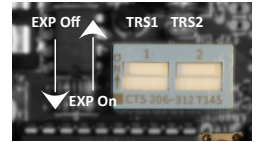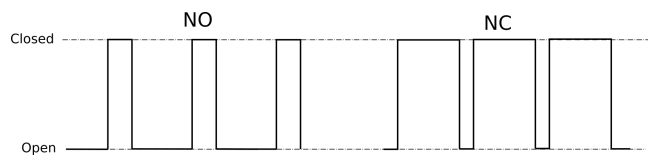

Garbage Collector v3

Switch Behaviour

Most effects devices expect a switch that is open when idle and activated by a connection to the *sleeve*. But there are also manufacturers who, conversely, expect a closed switch for the idle state (e.g. Boss). In the case of commands that generate pulses, each command is therefore laid out twice: *NO* (Normally Open) and *NC* (Normally Closed).

- **NO**: The impulse always ends openly. If the switch is closed at the beginning, it is only opened

- **NC**: The impulse always ends closed. If the switch is open at the beginning, it only closes.

MIDI Channel

The *Garbage Collector* ships in omni mode (i.e. it responds to every channel).

The *Garbage Collector's* MIDI channel can be set in two ways. With the Config-Switch, or with a MIDI command.

To change the MIDI channel using the Config-Switch, follow the steps below

1. Disconnect the device from the power supply

2. Carefully press the Config-Switch with a pointed object (pen, pencil or small screwdriver) and restore the power supply while the button is pressed.

3. After the boot process is complete, the device starts to flash (TRS1 green LED). Press the button according to the number of the desired channel (e.g. twice for channel 2). The *Garbage Collector* acknowledges this by emitting short flashing pulses corresponding to the number of the channel.

4. Once the desired channel is set, press the button and hold it down until both green LEDs are lit.

5. Disconnect the supply voltage. The next time the *Garbage Collector* is started, it reacts to the selected MIDI channel.

To put the *Garbage Collector* in omni mode skip step 3.

To change the MIDI channel via MIDI, the following commands are sent directly one after the other.

	CC	Function
119	0-16	Set MIDI channel 1-16, 0 for Omni
119	127	Saving the MIDI channel. The Device restarts.

Presets

It is possible to save 16 configurations and call them up with Program Change (PC) commands. The last command that was called is saved for each TRS (switch and expression function). The exception is the pulse length, which is always saved.

With the command CC 113, TRS1 and TRS2 are saved together; with the commands CC 114 and CC 115, TRS1 and TRS2 can be saved separately. The TRS that has not been saved in each case remains unchanged when the preset is called up. A preset can be deleted with CC 116.

For these commands to take effect, the value 127 must be sent after each of these commands, without another CC command being sent in between (e.g. CC 113 00 + CC 113 127 to save preset 0). This prevents accidentally overwriting of the presets.

CC		Function
113	0-15 + 127	Save the last command from TRS1 and TRS2 to preset 0-15
114	0-15 + 127	Save the last command from TRS1 to preset 0-15
115	0-15 + 127	Save the last command from TRS2 to preset 0-15
116	0-15 + 127	Deleting preset 0-15

To recall the saved presets, the corresponding number is sent as a Program Change (PC).

ATTENTION: Preset 0 is the startup state that is called when the device is switched on.

MIDI Commands (Switch)

CC 102 to CC 104 are commands that act on multiple switches at the same time. CC 102 act on all switches, CC 103 only on TRS1, CC 104 only on TRS2.

CC	#	TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring
102	00	Open	Open	Open	Open
	01	**Closed**	Open	Open	Open
	02	Open	**Closed**	Open	Open
	03	**Closed**	**Closed**	Open	Open
	04	Open	Open	**Closed**	Open
	05	**Closed**	Open	**Closed**	Open
	06	Open	**Closed**	**Closed**	Open
	07	**Closed**	**Closed**	**Closed**	Open
	08	Open	Open	Open	**Closed**
	09	**Closed**	Open	Open	**Closed**
	10	Open	**Closed**	Open	**Closed**
	11	**Closed**	**Closed**	Open	**Closed**
	12	Open	Open	**Closed**	**Closed**
	13	**Closed**	Open	**Closed**	**Closed**
	14	Open	**Closed**	**Closed**	**Closed**
	15	**Closed**	**Closed**	**Closed**	**Closed**

CC	#	TRS1-Tip	TRS1-Ring
103	00	Open	Open
	01	**Closed**	Open
	02	Open	**Closed**
	03	**Closed**	**Closed**
	04	**Pulse NO**	**Pulse NO**
	05	**Pulse NC**	**Pulse NC**

CC	#	TRS2-Tip	TRS2-Ring
104	00	Open	Open
	01	**Closed**	Open
	02	Open	**Closed**
	03	**Closed**	**Closed**
	04	**Pulse NO**	**Pulse NO**
	05	**Pulse NC**	**Pulse NC**

CC 10 (TRS1-Tip), CC 20 (TRS1-Ring), CC30 (TRS2-Tip), CC 40 (TRS2-Ring) only act on one switch at a time.

CC					Function				
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	Basic functions and NO	#	NC	#	Toggle
10	20	30	40	00	Set „Open"				
				01	Set „Closed"				
				02	Single Pulse NO				
				03	Single Pulse NC				
				04	Toggle (Open → Close/Close -> Open)				
				10	Pulse NO MIDI clock 1/4	30	Pulse NC MIDI clock 1/4	50	Toggle MIDI clock 1/4
				11	Pulse NO MIDI clock 1/8	31	Pulse NC MIDI clock 1/8	51	Toggle MIDI clock 1/8
				12	Pulse NO MIDI clock triplets	32	Pulse NC MIDI clock triplets	52	Toggle MIDI clock triplets
				13	Pulse NO MIDI clock 1/16	33	Pulse NC MIDI clock 1/16	53	Toggle MIDI clock 1/16
				14	Pulse NO MIDI clock dotted 1/8	34	Pulse NC MIDI clock dotted 1/8	54	Toggle MIDI clock dotted 1/8
				15	Pulse NO MIDI clock 1/32	35	Pulse NC MIDI clock 1/32	55	Toggle MIDI clock 1/32
				16	Pulse NO MIDI clock 1/2	36	Pulse NC MIDI clock 1/2	56	Toggle MIDI clock 1/2
				17	Pulse NO MIDI clk every whole note	37	Pulse NC MIDI clk every whole note	57	Toggle MIDI clock every whole note
				18	Pulse NO MIDI clk every 2nd whole note	38	Pulse NC MIDI clk every 2nd whole note	58	Toggle MIDI clock every 2nd note
				19	Pulse NO MIDI clk every 3rd whole note	39	Pulse NC MIDI clk every 3rd whole note	59	Toggle MIDI clock every 3rd note
				20	Pulse NO MIDI clk every 4th whole note	40	Pulse NC MIDI clk every 4th whole note	60	Toggle MIDI clock every 4th note
				21	Pulse NO MIDI clk every 5th whole note	41	Pulse NC MIDI clk every 5th whole note	61	Toggle MIDI clock every 5th note
				22	Pulse NO MIDI clk every 6th whole note	42	Pulse NC MIDI clk every 6th whole note	62	Toggle MIDI clock every 6th note
				23	Pulse NO MIDI clk every 7th whole note	43	Pulse NC MIDI clk every 7th whole note	63	Toggle MIDI clock every 7th note
				24	Pulse NO MIDI clk every 8th whole note	44	Pulse NC MIDI clk every 8th whole note	64	Toggle MIDI clock every 8th note

Pulses (Switch)

It is also possible to send a certain number of pulses, e.g. to select a preset on a pedal. This is also possible as *NO* and *NC*.

CC					Function
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	
11	21	31	41	00	1 pulse NO
				01	2 pulses NO
				02	3 pulses NO
				n	n+1 pulses NO
				126	127 pulses NO
				127	128 pulses NO

CC					Function
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	
12	22	32	42	00	1 pulse NC
				01	2 pulses NC
				02	3 pulses NC
				n	n+1 pulses NC
				126	127 pulses NC
				127	128 pulses NC

MIDI Clock Pulse (Switch)

Some effects with Tap Tempo are sensitive to the Tap Tempo Pulse being sent continuously. Therefore it is possible to send the clock only for a limited number of pulses until the effects device has recognized the tempo. This is also possible as *NO* and *NC*.

With these commands, an automatic MIDI clock detection is carried out. If the MIDI clock changes by more than approx. 1%, the pulses are sent again.

CC					Function
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	
13	23	33	43	0-19	1-20 pulses NO MIDI clock 1/4
				20-39	1-20 pulses NO MIDI clock 1/8
				40-59	1-20 pulse NO MIDI clock triplets
				60-79	1-20 pulses NO MIDI clock 1/16
				80-99	1-20 pulses NO MIDI clock dot. 1/8
				100-119	1-20 pulses NO MIDI clock 1/32

CC					Function
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	
14	24	34	44	0-19	1-20 pulses NC MIDI clock 1/4
				20-39	1-20 pulses NC MIDI clock 1/8
				40-59	1-20 pulse NC MIDI clock triplets
				60-79	1-20 pulses NC MIDI clock 1/16
				80-99	1-20 pulses NC MIDI clock dot. 1/8
				100-119	1-20 pulses NC MIDI clock 1/32

For systems with high MIDI clock jitter, the detection sensitivity can be set in 16 steps, or the function can be deactivated entirely. The following two commands must be sent immediately one after the other.

CC		Function
118	0-16	Sensitivity (default = 12) 0 = Deactivated 1 = Very low sensitivity 16 = Very High sensitivity
118	127	Save sensitivity

Pulse Length (Switch)

The standard length of a pulse is approx. 80 ms. This can be too short for some devices, or too long for fast switching applications. Therefore the pulse length can be set in 10ms steps.

CC					Function
TRS1-Tip	TRS1-Ring	TRS2-Tip	TRS2-Ring	#	
15	25	35	45	n	Pulse length in 10ms steps

This command persist over new pulse or MIDI clk pulse commands. It can be saved together with the switch command in a preset.
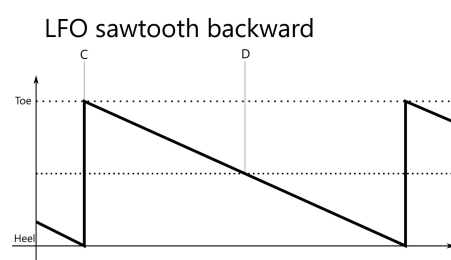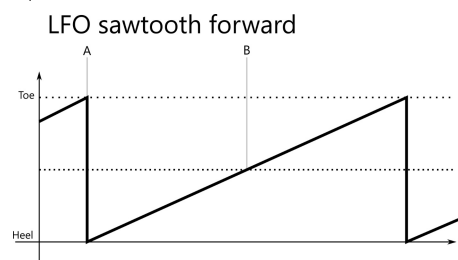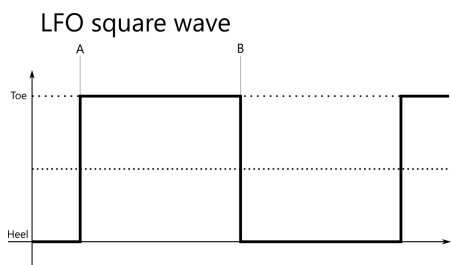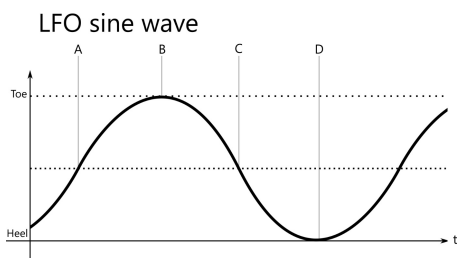
MIDI Commands (Expression)

The following commands apply to the use of TRS1/2 as expression out. The change from switch to expression and back is done automatically. The expression out has 256 steps. Command 16/17 or 36/37 distributes the entire range over 128 steps. The high-resolution commands 18/38 and 19/39 can be used to set a precise value.

CC			Function
TRS1 (EXP1)	TRS2 (EXP2)	#	
16	36	0-127	Expression out from heel (0) to toe (127)
17	37	0-127	Expression out from toe (0) to heel (127)
18	38	0-127	Expression out from heel (0) to middle position (127)
19	39	0-127	Expression out from middle position (0) to toe (127)

LFO Waveforms (Expression)

The *Garbage Collector* has an internal, MIDI clock synchronous, LFO engine with 3 waveforms to drive the Expression. These are the basic commands for selecting the waveform and starting point. Refer to the following chapters how to alter these commands to change speed and range.

CC			Function		#	Function
TRS1 (EXP1)	TRS2 (EXP2)	#				
26	46	0	Stop LFO		50	LFO square wave with starting point A
		1	Restart LFO		60	LFO square wave with starting point B
		10	LFO sine wave with starting point A		90	LFO sawtooth forward with starting point A
		20	LFO sine wave with starting point B		100	LFO sawtooth forward with starting point B
		30	LFO sine wave with starting point C		110	LFO sawtooth backward with starting point C
		40	LFO sine wave with starting point D		120	LFO sawtooth backward with starting point D

LFO sine wave

LFO square wave

LFO sawtooth forward

LFO sawtooth backward

The LFO starts immediately at the specified starting point. Resending the commands will reset the engine to start over from the starting point.

LFO Speed (Expression)

The speed of the LFO, relative to MIDI clock, can be increased or decreased. The commands above (CC26 and CC46) perform one pass of the waveform per 1/4 note. The commands to change the speed are determined by adding to the basic command (CC 26 10, CC 26 20 etc.).

- • Basic Command: Normal speed
- • Basic Command+1: Half speed
- • Basic Command+2: Double speed
- • Basic Command+3: Quarter speed
- • Basic Command+4: Quadruple speed

For example:

CC			Function
TRS1 (EXP1)	TRS2 (EXP2)	#	
26	46	10	LFO sine wave with starting point A, speed normal (1/4 Note)
		11	LFO sine wave with starting point A, half speed (1/2 Note)
		12	LFO sine wave with starting point A, double speed (1/8 Note)
		13	LFO sine wave with starting point A, quarter speed (Whole Note)
		14	LFO sine wave with starting point A, quadruple speed (1/16 Note)

This procedure can be applied to all waveforms. E.g. rectangle with starting point B in 1/8 notes: CC 26 62 or CC 46 62

LFO Parameter (Expression)

The waveforms set this way always runs through the entire range, from heel to toe. The range can be reduced and the center point moved. The waveforms are shifted in 13 steps, with step 6 being the waveform in the middle. This corresponds to the *Offset* in the graphic.

CC			Function
TRS1 (EXP1)	TRS2 (EXP2)	#	
27	47	00	Offset 0. The middle of the waveform is at Heel
		60	Offset middle: The middle of the waveform is right between the heel and toe (default)
		120	Offset Max: The middle of the waveform is at Toe

All values in increments of 10 are valid.

In addition to the shift, the height of the waveforms can also be restricted. This corresponds to *Height* in the graphic. As with command CC 26/46, this parameter is calculated by addition to the basic command.

- • Basic Command: Normal Height
- • Base Command+1: Half Height
- • Base Command+2: Quarter Height
- • Base Command+7: Height 1/128
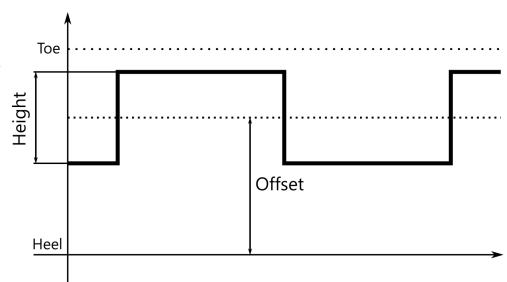
For example:

CC			Function
TRS1 (EXP1)	TRS1 (EXP1)	#	
27	47	60	No constraint on height, waveform sweeps full range (default)
		61	Waveform height halved
		62	Waveform height 1/4
		63	Waveform height 1/8
		...	
		67	Waveform height 1/128

The *Offset* and *Height* settings persist across a new waveform. Reset with CC 27 60 or CC 47 60.

Examples

DigiTech FS 3X: To emulate a DigiTech FS 3X switch, the following commands are sent (for TRS1)

Function FS 3X	Function TRS	CC commands	Description
Mode	Tip to GND	CC 10 02	A single pulse on the tip emulates a non-latching button press on Mode
Down	Ring to GND	CC 20 02	A single pulse on the ring emulates a non-latching button press on Down
Up	Tip and ring to GND	CC 10 02 + CC 20 02	Individual pulses at the tip and ring emulate non-latching button presses on Up

Strymon El Capistan: The EXP socket can either be used to call up the favorite setting or to set the tempo. (Requires different configuration of the El Capistan)

Function El Capistan	Function TRS	CC commands	Description
Call up favorite	Tip closed	CC 10 01	A closed line on the tip calls up the favorites setting
Call up live mode	Tip open	CC 10 00	An open line at the tip changes back to live mode
Control tempo	Expression out	CC 16 00…CC 16 127	Expression out controls the tempo. The El Capistan must be configured for this

Controlling a filter pedal with LFO expression: This is for controlling a simple low pass filter pedal with a LFO over an expression out.

Function LFO	Function TRS	CC commands	Description
1/4 notes sinus sweep	Expression LFO on TRS1	CC 26 10	Expression out of TRS1 controls the filter and sweeps in 1/4 notes sinus in sync to MIDI clock.
1/8 notes sawtooth forward sweep	Expression LFO on TRS1	CC 26 92	Expression out of TRS1 controls the filter and sweeps in 1/8 notes sawtooth forward in sync to MIDI clock
1/2 notes sinus sweep w/ reduced range	Expression LFO on TRS2	CC 46 11 + CC 47 61	Expression out of TRS2 controls the filter and sweeps in 1/2 notes sinus in sync with MIDI clock with half the full range.

Use an expression pedal connected to a Morningstar MC3/MC6/MC8: Sometimes it can be useful to connect an expression pedal to your MIDI controller, let it convert the expression signal to MIDI and send these MIDI signals back to the *Garbage Collector* to change it back to an expression signal. That way the *Garbage Collector* can be used as an Expression Pedal Multiplexer. Here's how you set up your MCx in the Morningstar editor for use with TRS1: