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About This Manual

Read this manual first. To get the most from this manual please read it from start to finish or you may miss important information! For questions regarding technical support please send us an email to **support@becosfx.com** or fill the contact form on product's website.

This manual is only available as a PDF download from product's website.

Last updated: **11-Jun-2020**

Safety Instructions

- Read the manual before starting to use the product.
- Keep this manual for further reference.
- Avoid using the product under extreme conditions (in confined space without heat ventilation, under direct sunlight, in the rain, on wet surfaces, near radiators or direct fire or other heat sources, etc.).
- Clean only with a soft dry cloth.
- Respect power voltage and battery polarity as indicated in the manual or on the product markings.
- Technical servicing must be carried by qualified service personnel only.

Warranty

The product is covered by 3 years direct manufacturer limited warranty for electronic circuits and 90 days for footswitch & potentiometers. Cosmetic issues arising from normal product usage are not covered. Warranty period starts from the date of initial purchase. Warranty is lost if product ownership is transferred from original buyer. Read product's specific Warranty Card and Product Page for detailed terms & conditions that may apply. If you think your product is defective and is within warranty period, send it to us for investigation. We will decide if the product can be repaired or if it is going to be replaced. Shipping costs both ways* must be prepaid by the buyer. A traceable shipping service must be used when sending the product for repair. We will ship it back to with a tracking number, as well. **Please contact us first, to give you the shipping & tracking instructions. Don't forget to register your product after purchase!**

* If warranty claim proves to be valid, we will support the cost for shipping back the serviced or replaced product.

TS8-MS Features

- Classic 808 sounding analog overdrive, made with highest quality components, in a compact, low profile design;
- 3-clipping options: Symmetrical, Asymmetrical (Silicon diodes), Custom (LED's or your choice);
- Responds to MIDI Program Change and Control Change messages for pedal Bypass/Effect switching and External Switching Relays switching, which function simultaneously;
- Footswitch performs multiple functions simultaneously: Effect/Bypass/Extended switching, External Switching Relays action and MIDI Program Change transmit;
- Bypass setting: chose between Buffered Bypass or Relay True Bypass;
- Switching mode for External Switching Relays: Latching or Momentary;
- Gold plated fully sealed relays used for pedal True Bypass and External Switching (2 relays linked to a stereo 1/4 TRS connector can be used to switch guitar amplifier's channels);
- Customization friendly: swap IC, clipping semiconductors and indicator LED's;

Technical Specifications

- Input impedance: 500KΩ
- Output impedance: 10KΩ
- Battery optimal working voltage: 8-10 VDC (9 V alkaline battery recommended)
- DC Power connector polarity: center negative [-]
- External DC power supply: 9 VDC
- Operation time on alkaline battery: 4 to 8 hours
- Current consumption: 28 mAh - 40 mAh
- Product size: Length: 120 mm, Width: 61 mm, Height: 31 mm
- Product weight: 276 gr. (including battery)
- Packed weight: 335 gr.
- RoHS Compliance: Partial. All components are RoHS but most solder joints are lead based.

Feedback

We appreciate feedback and suggestions regarding our products. If you wish to share them, send us an email at **support@becosfx.com**

BECOS TS8-MS Analog Overdrive with External Relay Switching and MIDI Functions

Thank you for using BECOS products!

TS8-MS is an analog overdrive guitar effect with classic 808 sounds, which combines MIDI functionalities and external switching relay capabilities that can be used to switch guitar amplifier channels or other available features (EQ, boost, reverb, etc.), making it a reliable, one-of-a-kind tool for guitarists. We call it the Swiss Army Knife of Tone.

It can be used concomitantly as classic tubescreamer guitar effect pedal and guitar amplifier channel switcher. It responds to MIDI Program Change and MIDI Control Change messages for all it's switching capabilities - Bypass and external switching -, which perform simultaneously in both MIDI Receive or MIDI Transmit mode. Yes, it can be used even as a very simple MIDI Controller! On footswitch action, TS8-MS transmits three MIDI Program Change numbers, one for each pedal state: Bypass, Effect and Extended.

With TS8-MS you have a quality tubescreamer guitar effect and a guitar amplifier channel switcher (with 2 independent relays), both functions being MIDI or Footswitch controlled. This pedal can sit not only under your foot, but also in a rack drawer.

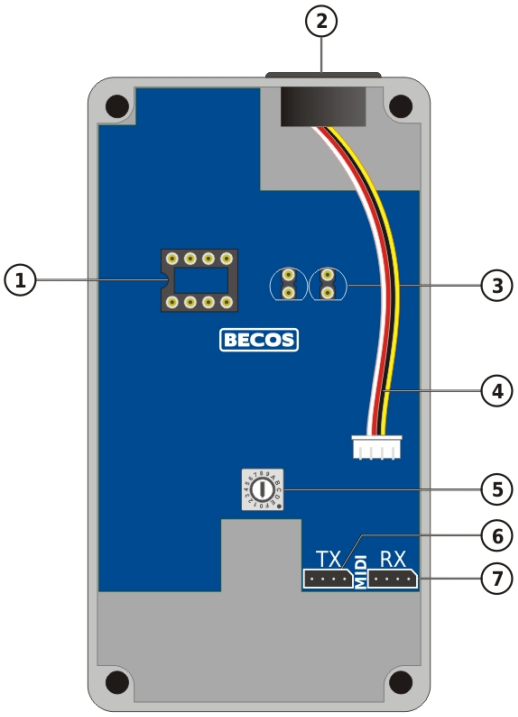
The analog overdrive sound can be adjusted through classic analog controls: gain, tone and output pots. A tri-option clipping switch sets the drive structure from smooth to near hi-gain drive, covering a large area of usability and distortion tone shaping.

Despite it's multiple functions, we designed the circuitry with power efficiency in mind. TS8-MS can run for hours on a regular 9V alkaline battery. When battery gets low, audio signal is automatically put in Bypass and LED's will flash to inform that battery must be changed.

TS8-MS has a socket to experiment with different Op-Amp IC's.

Settings

Several settings can be made from inside the pedal. Open the back lid and you will have easy access to hardware settings (and customization options such IC or clipping diodes replacement).



1. Audio Op-Amp IC socket
2. External MIDI connector - used for MIDI Receive or MIDI Transmit
3. Custom Clipping sockets - default with LED's
4. MIDI Jumper Cable - couples to MIDI RX or TX sockets, setting the MIDI Receive or Transmit function of the pedal
5. Multi Function switch, which is used to set:
   - MIDI Channel for Receive or Transmit functions
   - Switching Pattern for External Switching Relays
   - Setup
6. MIDI Transmit socket
7. MIDI Receive socket (default connected)

MIDI Receive and MIDI Transmit Sockets

Inside the pedal there are two small 4-pin sockets: one socket is for MIDI Receive function (factory default) and another for MIDI Transmit function. The external 5-pin MIDI connector is connected to the circuit board on one socket or the other, through a 4-wire jumper cable. Only one function can be used at a time. You may use a standard MIDI cable to connect to your other MIDI devices externally, for either function: transmit or receive.

Note: *Because TS8-MS is not configured with a second external MIDI connector for MIDI Through function, you will have to place it last in your chain of MIDI devices that needs to be MIDI controlled. Be sure the MIDI signal inside pedal goes from/to the appropriate socket on the circuit board.*

Multi Function Switch

This rotating switch has 16 positions and performs multiple functions:

1. It sets the Receive/Transmit MIDI Channel and maps a particular switching pattern to Effect/Bypass/Extended pedal states, for the two isolated relays performing external switching, when footswitch is pushed.

2. It is temporarily used in a setup procedure to configure:
   - Bypass type (Buffered or True Bypass),
   - External Switching type (Latching or Momentary)
   - Reset to factory defaults.

Note: *It is advisable to always set the Multi Function switch with power off. After power on, the last pedal state or last MIDI command is recalled. The new switching pattern will be activated after first push of the footswitch.*

Set MIDI Channel

Use a small screw driver to rotate the knob of the **Multi Function** switch inside the pedal and set the MIDI Channel, which will be the same set for both, Receive and Transmit functions. You cannot use both functions at the same time, since the pedal is fitted with only one external 5-pin MIDI connector. You may set the MIDI Receive Channel from 1 to 15 or OMNI (0 = OMNI; default set). For MIDI Transmit function, position 0 means MIDI Channel 16, the rest of positions being Channel 1 to 15. If you set the MIDI Channel for ***Transmit function*** be sure the short jumper cable inside the pedal is properly coupled with the corresponding MIDI socket for transmit (TX) on the circuit board; and likewise *for* ***Receive function*** (RX socket, default set).

Important! Please note that once you set a MIDI Channel, you also have chosen a certain pattern of switching for the relays performing external switching upon footswitch action.

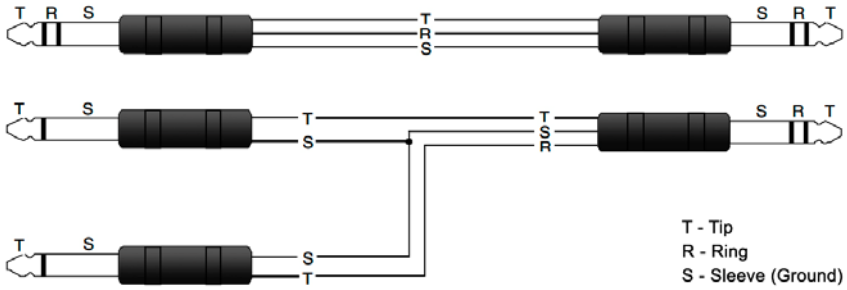
Usually, when controlling pedal with an external MIDI Controller, you won't care for what switching relays the footswitch would control. The same accounts for MIDI Receive or transmit: since you cannot use both functions at the same time, you only pick the MIDI Channel for whatever function (transmit or receive) you need to use with TS8-MS in your rig. If you want to control it with MIDI, then you will couple the MIDI jumper cable inside the pedal to the MIDI Receive socket (RX) on the circuit board; and most likely, you won't use pedal footswitch at all, although you can.

External Switching Relays

When using TS8-MS overdrive footswitch to cycle through Effect/Bypass/Extended you can simultaneously switch guitar amplifier channels through the use of two integrated and independent External Switching Relays. Also, Bypass/Effect pedal states and External Switching Relays can be fully controlled with MIDI commands. The switching type can be set to **Momentary** or **Latching** (factory default).

The External Switching Relays are connected to an 1/4 TRS connector usually used for this kind of task in almost any guitar gear. **Relay 1** is **Tip-To-Ground** and **Relay 2** is **Ring-To-Ground** in this connector. They both share connector's ground point, which in turn relates to amplifier's circuitry and not to our pedal's. These relays are controlled through pedal's footswitch or through MIDI commands, from an external MIDI Controller capable to send Program Change and/or Control Change messages.

To switch amplifier channels, you will need a dedicated cable from TS8-MS external switching connector to the amplifier's external switching connector. It may be a **stereo-to-stereo cable** or an **Y-cable** configured at one end with a stereo jack and at the other with two mono jacks.



So, if you need a particular amplifier Channel to be switched on when you put the pedal into Bypass state and another amplifier Channel when pedal is in Effect mode, you can do this by selecting a particular switching relay pattern through the same **Multi Function** switch that is used for setting the MIDI Channel for MIDI operation. Please consult Table 1 bellow for available options and chose your suitable switching pattern upon footswitch usage. Keep in mind that these two switching relays are independent and interchangeable, so you don't need to lock your mind on Relay 1 if you need to switch Channel 1 in an amplifier.

Very important! TS8-MS was primarily designed to have all it's switching features controlled with MIDI. With MIDI, you get full control over switching, using Program Change and/or Control Change MIDI commands. When using the Footswitch to pass from Bypass to Effect pedal state, there are 16 patterns of External Switching Relay switching combinations to chose from, settable through the 16-position Multi Function switch. All switching patterns are covered for these two pedal states and you can pass from any External Switching Relay combination to another External Switching Relay combination. For Extended Mode pedal state, however, only 16 complementary External Switching Relay combinations are possible in relation to Bypass/Effect states, and this is a limitation imposed by the number of positions on the Multi Function switch.

Several things can still be done to further accommodate external switching needs in the complementary Extended Mode pedal state:

- Modify the cable (Tip and Ring may be reversed in the other jack);
- If using a Y-cable, simply swap the mono cables in the amplifier's switching connectors;
- Swap switching patterns which end differently in Extended Mode (and swap relays too);

As a general rule: observe the switching pattern you would need for Extended, compare with what is available within the 16 options, and pick one that allows you to eliminate (not using) a switching relay, even though it is switched inside the pedal. **Use only what you need from what is available, when you cannot add.**

If you need to combine pedal's Effect/Bypass switching, amplifier's Channel switching, **and MIDI Transmit function**, you may also be limited in the options you have for choosing a particular transmitting MIDI Channel, because there is only one Multi Function hex switch. If that is the case, please set a different MIDI Channel in your other MIDI devices, which may be more configurable.

Setting External Switching Relays pattern on footswitch action

You need to choose the desired External Switching Relay combination when overdrive is **Off** (Bypass) or **On** (Effect), and set the **Multi Function** switch on the circuit board inside accordingly. The state of these relays will decide what amplifier Channel is switched. For example, if Multi Function hex switch is set to position 2 it means that, in Bypass pedal state, the External Switching Relays are Off, only Relay 2 is On in Effect state and both relays are On in Extended Mode. Concomitantly, the pedal responds to MIDI messages on MIDI Channel 2, or, if the pedal is used to transmit MIDI, it will transmit Program Change numbers PC#1, PC#2 and PC#3 on MIDI Channel 2, these numbers corresponding to pedal Bypass, Effect and Extended states.

The table bellow shows all available options for footswitch action depending on how the Multi Function hex switch is set inside the pedal.

MULTI FUNCTION SWITCH			BYPASS		EFFECT		EXTENDED	
			MIDI Transmit = PC# 1		MIDI Transmit = PC# 2		MIDI Transmit = PC# 3	
	MIDI Ch. Transmit	MIDI Ch. Receive	External Switching Relay 1	External Switching Relay 2	External Switching Relay 1	External Switching Relay 2	External Switching Relay 1	External Switching Relay 2
0	16	OMNI	Off	Off	Off	Off	On	On
1	1	1	Off	Off	On	Off	Off	On
2	2	2	Off	Off	Off	On	On	On
3	3	3	Off	Off	On	On	On	Off
4	4	4	On	Off	Off	Off	On	On
5	5	5	On	Off	On	Off	On	On
6	6	6	On	Off	Off	On	Off	Off
7	7	7	On	Off	On	On	Off	On
8	8	8	Off	On	Off	Off	On	Off
9	9	9	Off	On	On	Off	On	On
A	10	10	Off	On	Off	On	On	Off
B	11	11	Off	On	On	On	Off	Off
C	12	12	On	On	Off	Off	Off	On
D	13	13	On	On	On	Off	Off	Off
E	14	14	On	On	Off	On	On	Off
F	15	15	On	On	On	On	Off	On

Table 1 - Footswitch Action - External Switching Relays switching pattern and MIDI Channel select based on Multi Function switch position set (and MIDI Socket used on circuit board: TX or RX)

Note: *External Switching Relay 1 = Tip-To-Ground, External Switching Relay 2 = Ring-To-Ground*

Set Buffered Bypass

Buffered Bypass (factory default) uses the high input impedance of a buffer circuit and lowers the impedance of the signal at the output. That prevents signal loss, which is useful especially with long run cables following on the output. When the audio signal is bypassed, only the overdrive circuit is taken out, and the signal is silently switched through these buffers. To set Buffered Bypass mode of operation follow this procedure:

- power off pedal (battery or external power adapter),
- set the **Multi Function** switch to position "**A**",
- press down and hold the footswitch,
- power on the pedal (from battery or external power adapter),
- hold the footswitch for 3 more seconds, until the LED's are lit as indicated,
- release to footswitch to save this setting,
- power off pedal.

The pedal is now set to Buffered Bypass. With power off, set the Multi Function switch to another desired position/function then close the pedal, power it on and start using it.

Set Relay True Bypass

This switching mode is made with relays. In Bypass, audio signal is routed from the input connector straight to the output, even when pedal is not powered. To set True Bypass mode of operation follow this procedure:

- power off pedal (battery or external power adapter),
- set the **Multi Function** switch to position "**B**",
- press down and hold the footswitch,
- power up the pedal (from battery or external power adapter),
- hold the footswitch for 3 more seconds, until the LED's are lit as indicated,
- release the footswitch to save this setting,
- power off pedal.

The pedal is now set to True Bypass. With power off, set the Multi Function switch to another desired position/function then close the pedal, power it on again and start using it.

Set Latching Switching for External Switching Relays

To configure the External Switching Relays to act **with latching** (factory default), preserving closed contact in the relay for as long the relay is "On", follow this procedure:

- power off pedal (battery or external power adapter),
- set the **Multi Function** switch to position **"0"** - zero,
- press down and hold the footswitch,
- power up the pedal (from battery or external power adapter),
- hold the footswitch for 3 more seconds, until the LED's are lit as indicated,
- release the footswitch to save this setting,
- power off pedal.

The External Switching Relays will now act with Latching. With power off, set the Multi Function switch to the other desired function then close the pedal, power it on again and start using it.

Set Momentary Switching for External Switching Relays

To configure the External Switching Relays to act **Momentary ON** - which shorts the switching circuit for 100 milliseconds when the relay is pulse-commanded to be "On" or "Off", and automatically reverting to open circuit afterwards -, follow this procedure:

- power off pedal (battery or external power adapter),
- set the **Multi Function** switch to position **"1"**,
- press down and hold the footswitch,
- power up the pedal (from battery or external power adapter),
- hold the footswitch for 3 more seconds, until the LED's are lit as indicated,
- release to footswitch to save this setting
- power off pedal.

The External Switching Relays will now act Momentary. With power off, set the Multi Function switch to the other desired function then close the pedal and start using it.

Very Important! *Please note that for switching relays in the state "On" or "Off", the same 100 milliseconds of "momentary closed contact" will occur within the relay, which means you will have to sync visual indication on the pedal with the desired Channel on the amp. If switching relay's state is preserved when passing from one pedal state to another, i.e. Relay 1 was commanded "On" when pedal was in Bypass and must be "On" again when pedal passes to Effect, a new momentary command CANNOT be logically executed, NOR seen by the amp! This is because for either one of the "On" or "Off" switching relay state execution, the same "100ms momentary ON" command is issued in this mode of switching, so, inevitably, the relay logic state in TS8-MS is always alternating on the next execution. As a consequence, it is up to the amp to acknowledge, interpret and respond to these external momentary commands. It may be needed to go through a pedal power off before being able to sync relay's state with amp's channel, for those patterns where relays preserve their "On" or "Off" state when passing from Bypass to Effect.*

Reset to Factory Defaults

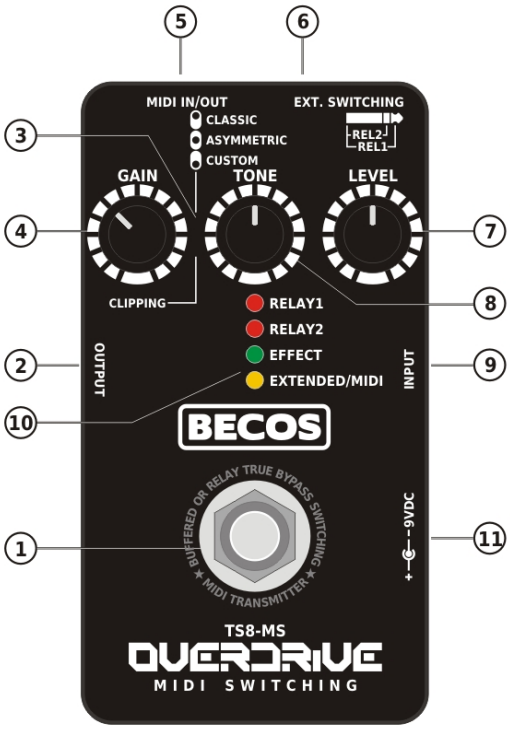
If for any reason you would like to revert the pedal to all factory settings, follow this procedure:

- power off pedal (battery or external power adapter),
- set the **Multi Function** switch to position **"F"**,
- press down and hold the footswitch,
- power up the pedal (from battery or external power adapter),
- hold the footswitch for at least 3 more seconds, until all LED's are blinking,
- release to footswitch to save this setting; power off pedal.

The pedal is now reset to Factory Default settings. With power off, set the Multi Function switch to the other desired function then close the pedal, power it on again and start using it.

In Operation

TS8-MS Controls



1. Momentary footswitch for Effect/Bypass/Extended switching, External Switching Relay action and MIDI transmit function
2. Audio Output Connector
3. Clipping Mode Selector
4. Gain Control (Logarithmic, Less/More Gain Mod)
5. MIDI Input/Output Connector
6. 1/4 TRS Connector for External Switching - 2 relays
7. Output Level Control
8. Tone Control
9. Audio Input Connector and Battery Power Switch (when jack is inserted)
10. Status LED Indicators
11. External 9VDC Power Connector (center minus)

Clipping Mode

Use the small tri-toggle switch to select clipping type:

- **Classic -** symmetric clipping with Silicon diodes used for classic tube screamer feel, where more saturated compression is needed;
- **Asymmetric -** also using Silicon diodes, provides a bit of air into the clipping and adds a little more gain; it really helps with higher gain amplifiers,
- **Custom -** it comes with our selection of LED's and this mode is better for (clean) boost or wilder distortion in higher gain setting, or when you want to drive hard a crunch Channel in an amplifier.

Gain Control

This knob controls the amount of gain added to the input signal. It's control is logarithmic, which means you will have to dial it further for higher gain, but provides a very fine control in the lower setting, where it exhibits a cleaner sound. Depending on the chosen clipping mode, a range of dynamic and smooth driven tones may be obtained. Higher settings reveal more clipping, compression and singing sustain, especially with Classic and Asymmetric clipping, while Custom

(LED's) behaves more like a distortion effect. Playing dynamics is gracefully complemented by tube-like musical distortion. Higher output humbucker guitar pickups attain faster clipping than lower power single coils, but they all recover softly and musically from each clipping mode. Lowering guitar volume and/or using guitar tone also contribute to playing dynamics. If you intend to use pedal as a (clean) booster or as a wilder overdrive, close to distortion, choose custom clipping mode (LED's) and dial the gain in and adjust output as needed. For a mix of harmonic distortion, select Asymmetric clipping mode - this setting is also best to push hard a crunch or high gain Channel in a guitar amplifier (preferably a tube amp). Settings with creamy overdrive sustain based on higher gain are best in front of clean or crunchy amplifier channels. Gain control should always be used in conjunction with the Output control, to compensate each other's influence.

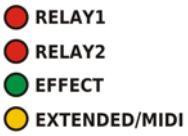
Tone Control

This knob controls the perceived tone of the audio signal. It is not intended to be used as a precision EQ shaping tool. It merely acts like a low/high cut filter, yet it has a strong impact on the distortion structure, especially on the higher frequency side, when dialed clockwise. Turned counterclockwise, it will cut the higher frequencies, revealing more lows. Around the middle, signal is untouched. The best corrections will compensate for different guitar pickup and amp characteristics **in between ten and two o'clock**.

Output Level Control

This knob controls signal level at the output. It should be used in conjunction with the other controls for better balancing between gains and clipping mode, as well as matching Bypassed audio signal level.

LED Indicators



- **RELAY 1** and **RELAY 2** LED's are lit Red when relays are set to "On" and shut down when relays are set to" Off".
- **EFFECT** LED is lit Green when signal passes through overdrive. No light means signal is Bypassed. In Extended mode (latter described) this LED can be either on or off.
- **EXTEDNDED/MIDI** LED is steadily lit Yellow to indicate entering Extended mode, or briefly pulsates indicating successfully received MIDI commands.

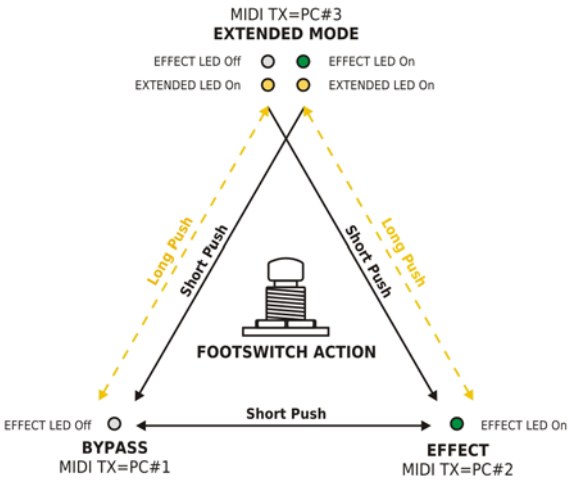
All LED's are used for visual indication while in Setup mode.

Footswitch Action

The footswitch used in TS8-MS is momentary (NO - normal open) type of switch, supporting both short and long pushes (during which time the switch contact is momentarily closed), each action type having different results. The feel of the push action is with a small mechanical detent. A certain push pressure is required to perform its switching action and a "click" is generated by the switch - this is

normal. We've chosen this type of switch to provide a firm tactile feedback, that can be "felt through the shoes" on successful push.

The footswitch on TS8-MS is used to perform more functions at once: **Bypass/Effect/Extended** switching, **External Switching Relay** action and **MIDI Transmit** function. See image on the right to better understand footswitch action.



Short Push the footswitch to alternately switch the audio signal through **Effect** or **Bypass** it from input to output. With any position of the Multi Function switch inside the pedal, a pattern of switching is activated for the External Switching Relays, which are switched simultaneously (see Table 1). Also, if pedal's MIDI jumper cable inside pedal is coupled to MIDI Transmit (TX) socket on the circuit board, a MIDI Program Change number is transmitted at once with all other relay switching.

Long Push the footswitch to enter **Extended Mode**. This mode is intended to provide even more flexibility in externally switching guitar amplifier channels and also to transmit one more MIDI Program Change preset number, which is useful if you want to control MIDI devices. For example, you may want a clean tone without overdrive in front of the amp's clean Channel, but then engage the overdrive and simultaneously switch amp channel to crunch; ultimately, you may switch to a third amp's Channel for a lead solo while either preserve the overdrive, or not, depending on what switching pattern you have selected through the Multi Function switch.

Previous pedal state is preserved in Extended mode! When switching to Extended mode, only the External Switching Relays are switched (and a MIDI message transmitted, if the MIDI cable inside the pedal is coupled to MIDI Transmit socket). Pedal state (Bypass or Effect) will be preserved in Extended mode. Visual indication will show Extended and Effect LED's on, which means you entered Extended mode from Effect state. If you enter Extended mode from Bypass state, the visual indication will show Extended LED on, and Effect LED off.

Exit from Extended mode either by long-push or short-push the footswitch, each having different results. Long-push gets you back to previous state (Effect or Bypass). Short-push takes you to the alternating state (see the drawing above to better understand the foot-switching).

If you only need to switch between two amp's channels and don't need the Extended mode at all, simply don't push the footswitch longer than one second.

Note: *If you power off pedal and then power it on again, TS8-MS will remember last command/state before power off.*

DC Power Supply

TS8-MS pedal can be powered using a **9 Volt alkaline battery or a 9 Volt DC Power Adapter with a barrel of 5.5 mm and a hole of 2.1 mm with minus polarity on the center** +—◎—-9VDC Instrument cable jack must be inserted into the input connector for the circuit to power on, if battery is the power source. When powered by the external DC adapter, the internal battery is switched off. The circuit is powered regardless if input jack cable is inserted or not.

Note: *When pedal is powered on, last pedal state or command is recalled. Last pedal state means what was last set on footswitch action or last received MIDI command, before powering off pedal. Be advised that MIDI commands may in fact contain a packet of commands, and because of the way MIDI serial protocol works, they will be executed fast, in series, as they come in; for example, a Program Change command may come along with several Control Change commands, and, if these commands are dedicated to more than one relay, TS8-MS will be able to recall only "that last command", for that one relay it was issued to. So, when power on guitar rig is best to send a check-up MIDI command from your MIDI Controller, to fully activate the pedal.*

Low Battery Indication and Battery Change

All switching circuits inside TS8-MS require a certain voltage to operate properly. If battery or DC power gets bellow 7V during pedal usage, a brown-out procedure is initiated, with the following actions and consequences:

- relay's Red LED's will start flashing to indicate relay switching is no longer possible because battery has low voltage and it needs to be changed;
- audio signal is switched and locked in Bypass until battery voltage is detected high again;
- if pedal is powered on with low battery, no LED's will be lit, but audio signal will pass through only as Bypassed (Buffered or True Bypass - depending on pedal settings);
- no MIDI commands received will be executed;
- no switching commands will be initiated with the footswitch;
- no MIDI commands will be transmitted.

Alcaline batteries are recommended for longer operation time. To change battery, open the back lid of the pedal and replace it. To avoid battery depletion, remove plug from the input connector when pedal is not used. Remove battery if the pedal is not going to be used a long time. Do not set batteries of fire for risk of injuries. Please do not throw very batteries into garbage - dispose them in a convenience store or other dedicated facility for recycling.

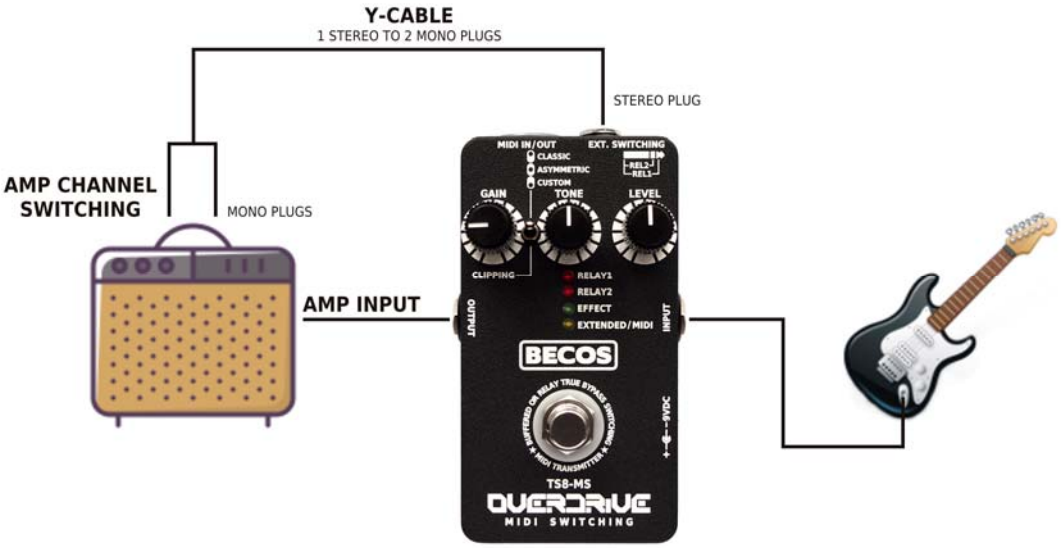
Ways to Use TS8-MS MIDI Overdrive Effect Pedal

Out of the box, you can use the pedal just like any other guitar effect pedal. Simply place it in your desired audio signal chain, power it up and use the footswitch to alternately switch between Effect and Bypass. However, if you want to use its extended features, you can:

- concomitantly use it as analog overdrive pedal and amplifier channel switcher through the integrated and isolated External Switching Relays,
- use it as an overdrive pedal, switch amplifier's channels and transmit a MIDI Program Change preset number to other MIDI devices, all at once (three pre-programmed PC numbers can be transmitted, each associated to pedal's states: Effect, Bypass, Extended)
- externally control TS8-MS overdrive effect through MIDI Program Change and Control Change messages, so you can integrate an analog overdrive in your MIDI rig,
- on top of MIDI controlling the overdrive effect, you may also use two integrated External Switching Relays to switch amplifier channels with MIDI Program Change and Control Change, which means you can add MIDI Channel Switching to any guitar amplifier that supports external channel switching.

Using TS8-MS as analog overdrive and amplifier channel switcher on footswitch action

The **Multi Function** switch inside the pedal sets the External Switching Relays pattern when overdrive effect is enabled or Bypassed using the main footswitch. Of course, if other features can be switched externally in an amplifier, you can use the relays for switching these features (ex. reverb, EQ stage, solo, boost, etc). In the picture bellow, TS8-MS Overdrive pedal is used to also switch amp's channels but you can use the switching relays in the pedal to switch an amp feature.



Footswitch Action - use TS8-MS as analog overdrive and amp channel switcher

To use the switching feature of the pedal, a stereo cable or a "Y" split cable is needed, as described earlier in the manual. A TRS stereo plug will be inserted into the AMP SWITCH connector in our pedal, while the other mono plugs (or corresponding stereo plug, if you're using a single cable with two stereo plugs) will be inserted into your amp's switching connectors.

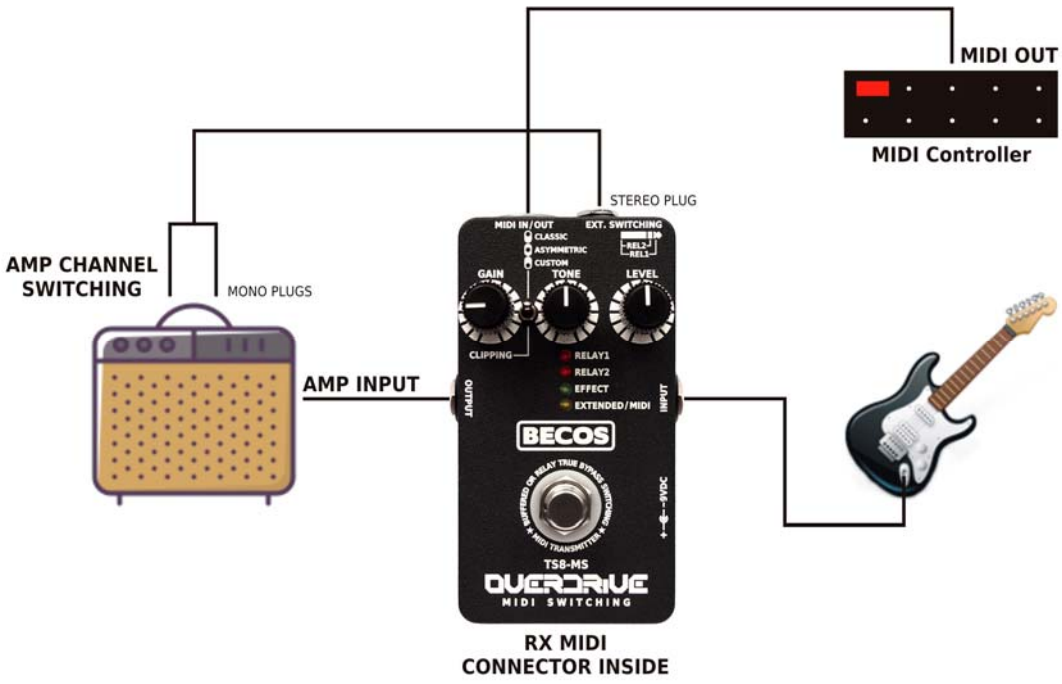
Why would you need this? Let's analyze a practical situation. Say you want to play a guitar part on a clean amp channel, where you don't need the overdrive push. During the song, you want to engage

the overdrive for a guitar solo, but you would also want it in front of a different amp channel. So, you need to switch amp's Channel and engage the overdrive at the same time. TS8-MS does just that and you can do this with only one footswitch push!

The External Switching Relays are completely isolated from pedal audio circuit. When the relays are ON, the Tip and/or Ring in the connector are shorted to connector's Ground. While in OFF state, the short is lifted. When we say Ground, we refer to the "ground" or sleeve of the stereo plug inserted into the switching connector, which is actually part of the amp's switching circuit. When relays are in ON setting, the corresponding LED's will lit to indicate relay state.

Using an external MIDI Controller to control TS8-MS analog overdrive and switch amplifier's channels

Program Change (PC) and Control Change (CC) messages are supported by TS8-MS. An external MIDI Controller like Rocktron Midi Mate or Voodoo Lab Ground Control Pro or any other programmable MIDI Controller can control the TS8-MS Overdrive Effect/Bypass, along with its External Switching Relays.



External MIDI Control - switch TS8-MS analog overdrive and amp channels with an external MIDI Controller

With TS8-MS pedal you can not only add an overdrive in front of a guitar amplifier and switch it remotely, but you can also switch amplifier's channels (or other switch able feature - i.e. boost, eq, reverb, etc. -, if available) with MIDI commands.

Each MIDI command accepted and executed by TS8-MS will be visually signaled with a short blink on the EXTENDED/MIDI Yellow LED. Commands that cannot be executed will not be signaled in any way - they will be ignored.

Note: *TS8-MS does NOT store presets, where each relay state is recorded/recalled. It simply executes fast all MIDI commands received, be these simple and solitary MIDI commands, or a group of MIDI commands in series - as is the case when a preset change occurs.*

Receiving Program Change MIDI messages

Program Change (PC) MIDI messages may be sent from an external MIDI Controller programmed by the user to transmit a preset number corresponding to pedal's features that you want enabled or disabled.

When you use Program Change to control TS8-MS it is advisable to use PC messages alone, without accompanying with conflicting Control Change (CC) messages. However, you may use both type of commands, at once, to control everything in your MIDI rig - they just need to be programmed correctly.

Each of the Program Change numbers TS8-MS can respond to has multiple action results, meaning all relays are switched on and/or off with each command received. All commands are executed fast, one by one, in series, in order they came in.

TS8-MS pedal is pre-programmed to respond to the following Program Change numbers:

Program Change Number	Bypass / Effect Relay	Switching Relay 1 Tip-To-Gnd	Switching Relay 2 Ring-To-Gnd
#50	Bypass	Off	Off
#51	Bypass	On	On
#52	Bypass	Off	On
#53	Bypass	On	Off
#54	Effect	Off	Off
#55	Effect	On	On
#56	Effect	Off	On
#57	Effect	On	Off

Table 2 - MIDI Program Change switching options in TS8-MS

If you have multiple MIDI devices you need to control using Program Change messages, dedicate each one a separate MIDI Channel and then you may transmit the same Program Change number on different channels, each device then executing what it is supposed to.

For instance, if you want to transmit PC#55 to load a reverb effect in a processor for a clean sound, this one Program Change number, if transmitted on the same MIDI Channel for all MIDI devices including TS8-MS, would turn overdrive effect on and may switch an amp channel when executed, which may not be what you desire for your clean sound reverb preset. Likewise, if you transmit PC#55 along with a CC number that can be executed - like CC 81 -, the results might conflict with each other and the switching could seem erratic.

Note: *The MIDI protocol has a total of 128 Program Change numbers, from 0 to 127. Most MIDI Controllers transmit Program Change number 0 while displaying PC#1 or "Preset 1" as transmitted. Other advanced MIDI Controllers allow the user to set if MIDI Controller will send Program Change 0 or Program Change 1 for "Preset 1". TS8-MS is programmed to respond like this: when receiving Program Change number 49 it will respond as PC#50 in the table above.*

Receiving Control Change MIDI messages

TS8-MS can respond to Continuous Controllers or Control Change (CC) MIDI messages that may be sent along with Program Change messages by an external MIDI Controller, programmed by the user to transmit a particular value for the CC number transmitted, corresponding to TS8-MS relays/features that you want enabled or disabled. This way of controlling MIDI devices, including TS8-MS, allow for complete control over your switching needs.

Some MIDI Controllers have a physical button alocated for switching a feature on/off within a MIDI Program Change preset, using a general purpose Control Change command. When that button is pressed repeatedly, the alocated CC number is sent accompanied by an on/off value (usually alternately switched). However, other simpler MIDI Controllers do not have assignable momentary on/off physical buttons, yet they can be programmed to send MIDI Control Change messages along with Program Change messages.

In our case, when TS8-MS receives a certain CC number with a value between 0-63, it switches one or more relays OFF; the same CC number with a value between 64-127 will switch one or more relays ON.

TS8-MS pedal is pre-programmed to respond to the following MIDI Control Change numbers:

Control Change Number	Relays Controlled	Relay/LED OFF	Relay/LED ON
		CC Value	CC Value
80	Bypass	0-63	64-127
81	R1		
82	R2		
83	Bypass, R1, R2		
84	Bypass, R1		
85	R1, R2		
86	Bypass, R2		

Table 3 - MIDI Control Change switching options in TS8-MS

Note: ***Bypass*** *= Effect/Bypass Relay.* ***R1*** *= External Switching Relay 1 (Tip-to-Ground).* ***R2*** *= External Switching Relay 2 (Ring-to-Ground).*

When working with Control Change commands CC 83, CC 84, CC 85 and CC 86 - which control more relays at once in TS8-MS -, you must program your MIDI Controller in such a way that when a preset (Program Change command) is transmitted, only one of these CC numbers will be transmitted. Otherwise, if more of these numbers are transmitted at once, moreover, if sent along with a Program Change number that does the same thing, they will be all executed in cascade and result in an erratic behavior of TS8-MS and the controlling amp's channels.

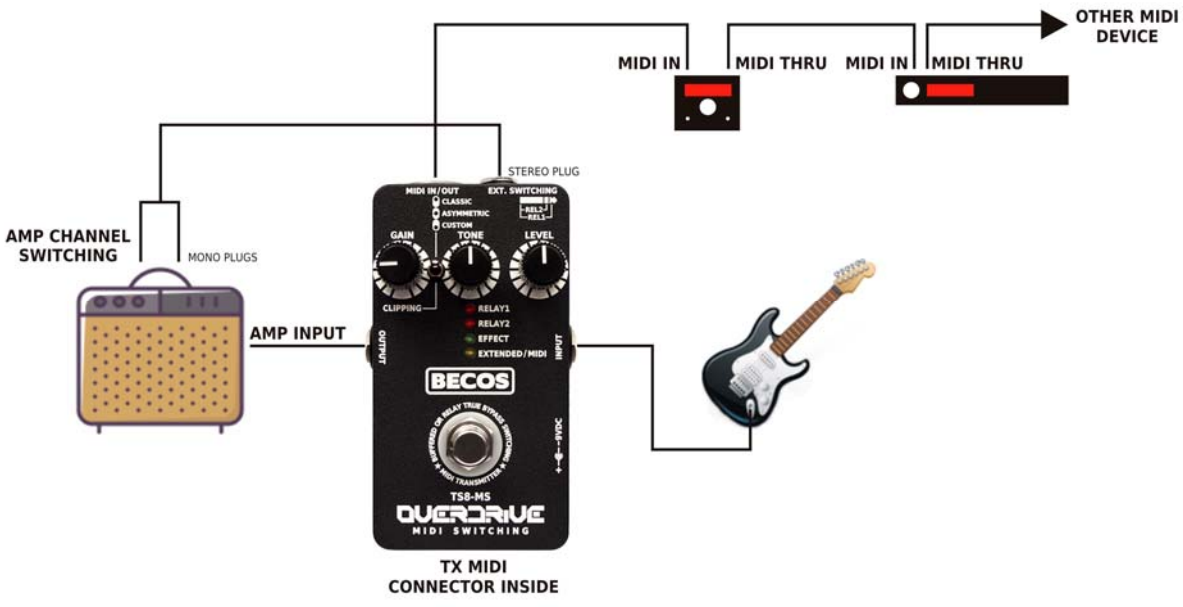
If you have a simple MIDI Controller with little options for transmitting Control Change on/off commands, these multiple action CC numbers may come in handy. You can program one CC number per PC preset which may controls some other device, and this CC number could switch all relays in TS8-MS, in any available configuration.

However, if you have an advanced MIDI Controller, is best to program it to transmit Program Change message with all of the following CC numbers allocated, each controlling only one relay in TS8-MS: CC 80 - Bypass Relay, CC 81 - External Switching Relay 1, CC 82 - External Switching Relay 2. This way you can control these relays within one Program Change preset, even after the preset is transmitted to your other MIDI devices, using dedicated on/off physical buttons.

Note: *TS8-MS does NOT store presets where each relay state is recorded/recalled. It simply executes fast all MIDI commands received, be these simple and solitary MIDI commands, or a group of MIDI commands in series - as is the case when a preset change occurs. When multiple CC commands are transmitted (as a series of MIDI commands) within a preset change, which puts the TS8-MS in a certain state, where each relay has a position (on or off), please note that if you power off pedal and then on again, only the very last MIDI command will be recalled - of the many commands received in series for that preset change. This means that it may be necessary to re-transmit the preset command from your MIDI Controller, in order to put TS8-MS relays in the position they need to be.*

Using TS8-MS as analog overdrive, amplifier channel switcher and simple MIDI Controller (transmitter) on footswitch action

TS8-MS can also function as a very simple MIDI Transmitter. You need to set the MIDI jumper cable inside the pedal to the **Transmit (TX)** socket and set the **Multi Function** switch to a desired transmitting Channel (which simultaneusly sets External Relays switching pattern; see Table 1).



Footswitch Action - use TS8-MS as analog overdrive, switch amplifier channels and transmit MIDI Program Change messages, all at once

For example, if Multi Function hex switch is set to 2, it means that in pedal Bypass the External Switching Relays are Off, in effect only Relay 2 is On and in extended mode, both relays are On (see Table 1 above). Concomitantly, the pedal sends MIDI messages on MIDI Channel 2:

- **PC# 1** when pedal is in Bypass,
- **PC# 2** when pedal is in Effect,
- **PC# 3** when pedal is in Extended mode.

With TS8-MS as "MIDI Controller", you can cycle through three MIDI presets on your other MIDI devices and switch amplifier channels at the same time. Of course, to do so, you also need to connect the External Switching Relays to the amp's external switching connector using either a stereo or an "Y" stereo to 2-mono cable, as previously explained.

TS8-MS Customizations

Swapping IC's

There is a whole debate around the "sound & feel" of IC's used in overdrive circuits! The differences are more **felt in the "playing hand" than heard by the ear**. Sometime they have an influence in conjunction with guitar pickups and amplifier's channel/setting used, for a cumulative, more obvious effect.

You can swap IC's with ease, without taking apart anything but the back cover of the pedal, so we encourage you to experiment. Here are some IC's to try:

- RC4558D/P - warm saturation, classic tubescreamer sound, used by most manufacturers
- TLC2272 - low noise, gentle musical clipping, good for hi-gain crunch
- OP275 - very "clean", low noise with nice recovery from clipping
- OPA2604 - low distortion, quiet, gentle clipping, a bit darker sounding
- Other: TL072, NE5532, LM833, OPA2134PA, LT1214

Clipping Semiconductors

In TS8-MS overdrive, Symmetric and Asymmetric settings are hardwired with Silicon diodes which clip around 0.55V each, while Custom is configured with our selection of Red LED's - clipping around 1.6V, for a wilder distortion in higher gain setting or an Almost Clean boost in lower gain setting.

Troubleshooting

No LED lights at power up and no sound - Change battery.

Not working when powered with a DC adapter - Verify polarity (center minus). Verify voltage (9V). If you powered pedal with reverse voltage, the protection diode might be blown and needs to be replaced (this issue is not covered by warranty). If over voltage was used, the electronics inside could be damaged (this issue is not covered by warranty).

Not switching amp channels - Verify custom made switching cables and signal compatibility with you amp. Review Table 1 in the manual for External Switching Relays pattern used.

Not responding to MIDI commands - Set MIDI Channel to the same one used by transmitting controller. Restart pedal. Restore to factory defaults.

Not sending MIDI commands - Verify pedal MIDI Channel to be the same as the one used by the receiving device.

MIDI commands are conflicting - Verify if you use MIDI PC and CC commands, that are conflicting. Be sure to not send more than one CC number from the supported ones (review Table 3 in the manual). Try to set a dedicated MIDI Channel for each MIDI device (do not use 0=OMNI because commands intended to other devices might be interpreted by the pedal).

MIDI response has some latency - Set a dedicated receiving MIDI Channel for pedal. Try to program transmitted presets with less MIDI messages. For example, if you only intend to use three CC commands within a preset, be sure your controller does not transmit more of them; deactivate the ones not used.

MIDI commands are bursting - If you send commands from controller too fast, this is possible. Try to leave at least one second between the commands sent.

Last state (issued with MIDI) is not recalled on power up - MIDI commands may contain in fact a packet of commands and the pedal only recalls the very last MIDI command from that series. Re-send the MIDI command (preset) from the controller to put the pedal in the desired state.