

**MIDI-Interface for Fully Polyphonic Instruments (MVS-FP)**

# **Operation Manual for the MIDI-for-Vintage-Synths-Interface in the Roland RS-505 Paraphonic String Ensemble**

*Version incl. bass-section-control with two MVS-FP-controllers*



The MIDI-for-Vintage-Synths-FP-interface in the Roland RS-505

## 1. Overview

The MIDI-for-Vintage-Synths-Interface is used to retrofit a MIDI interface for remote control of synthesizers. The **MVS-FP-interface** processes via the MIDI input (MIDI-In) the MIDI commands *Note-On* and *Note-Off* and can by means of rotary encoder can be set to one of the 16 available MIDI channels. For special cases, the MIDI Omni-Mode (ie all MIDI channels are processed simultaneously) can also be activated.

With this MVS-FP version, the Roland RS-505 Paraphonic String Ensemble (hereinafter referred to as Roland RS-505) existing bass section separately via MIDI are controlled. In addition to the necessary key-control-boards for each 12 keys (called MVS-FP-Octaver) additionally an own The MVS-FP-controller incorporates the MIDI data on its own MIDI channel processed.

The electronics of the MVS-FP-interface are distributed over several different printed circuit boards (PCBs). In addition to the six MVS-FP-octaver responsible for the key contact boards there are two MVS-FP-controller boards. These contain the actual MIDI interface and control the octaver connected via a ribbon cable on boards.

For assembly reasons, the Roland RS-505 is the otherwise 8 necessary single boards summarized on 4 boards and on a carrier sheet under the keyboard-contacts mounted. In addition, there is a small additional PCB which contains the switches to select the MIDI-channels without disassembling the keyboard.

Since the MVS-FP version does not have digital-to-analog converters, analogue functions (pitch-bend, filter-control etc.) are not supported in principle. All-recently, that allows at least a "digital-pitchbend" in real time (see chapter 2.2 and chapter 3.1).

For normal operation the MVS-FP-interface has no controls. On the PCBs of the MVS-FP-controller some special options are selectable by jumpers, which are described in the appendix (chapter 3.1).

The rear panel of the Roland RS-505 has a DIN-5-pin input socket labeled MIDI-In, a loop-through output (MIDI-Thru) or a MIDI Output (MIDI Out) are not available.

The MIDI control of the Roland RS-505 is basically fully polyphonic. With consideration of the load of the power supply through the 49 + 24 low-power-optocoupler-switches there is a safety limit: it will be for the string-section 12 simultaneously pressed keys at any time, for the (monophonic) bass-section only 4. For more activated optocouplers, the MVS FP controller calculates the thermal stress and switches - depending on the number of keys and the time of duration - forcibly press down from the middle. The algorithm works in this way inconspicuous that 13 keys could be permanently pressed for about 6 minutes, at 49 simultaneously activated keys, a partial shutdown takes place after approx. 10 seconds.

## 1.1 The Pitch Shift Control Option

With the Roland RS-505, the pitch-shift function is responsible for - when activated - the pitch of the struck notes lowered by a certain amount and then - when disabled - the pitch more or less fast back to normal. Both the lowering level and the speed resumption speed can be set via the left-hand panel of the instrument.

The pitch-shift function can be activated via MIDI, and this is exactly how it works. as it is directly triggered via the control-pitch jack of the instrument (which of course, remains possible).

Even if the pitch shift function (internal) is controlled over the MVS-FP-controller responsible for the bass-section, it also affects the string-section of the Roland RS-505, because the common tone generation of the instrument is affected.

Further details on the pitch-shift-control-option as well as how to deal with it are given in the section Operation (chapter 2.3).

## 1.2 The Sustain Damping Control Option

According to the owner's manual of the Roland RS-505, operation with the plugged in footswitch on the socket „Control-Sustain“ the normal case is: the release phases of the individual notes of the string-section and the synth-section remain very short when the footswitch is not pressed. Only when the foot switch is pressed the sustain-function work the way you do it expects without footswitch: the sliders on the controlpanel allow release phases for several seconds.

An "infinitely" long holding of the sound (as is the case with some other instruments known) is not provided on the Roland RS-505. In addition, the “Control-Sustain” has impact on the string- and the synth-section, but not on all of the bass-section associated parts of the Roland RS-505 (ie all those registers that can be switched on or off over the dark red switch of the panel).

For a string-synthesizer, the behavior described above is a bit "strange", one would normally like to spend a long time in release-phase (as one does in the Roland RS-505 without connected footswitch is also used). For this reason in this manual is not the term sustain-function but uses sustain-damping-function, because the Roland behavior of the instrument is practically reversed.

The sustain-damping-function of the Roland RS-505 can be activated via MIDI, wherein - according to the above statements - the function (standard <sup>1</sup>) inverted to this is how it is triggered directly via the control-sustain-jack of the instrument (which of course remains possible).

More details about the sustain-damping-control option and how to handle it is described in section Operation (chapter 2.4).

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<sup>1</sup> One of the option-jumpers (see chapter 3.1) can be used for a (further) inversion: on via MIDI received "footswitch command" then acts exactly like a directly connected to the instrument footswitch.

## 2. Operation

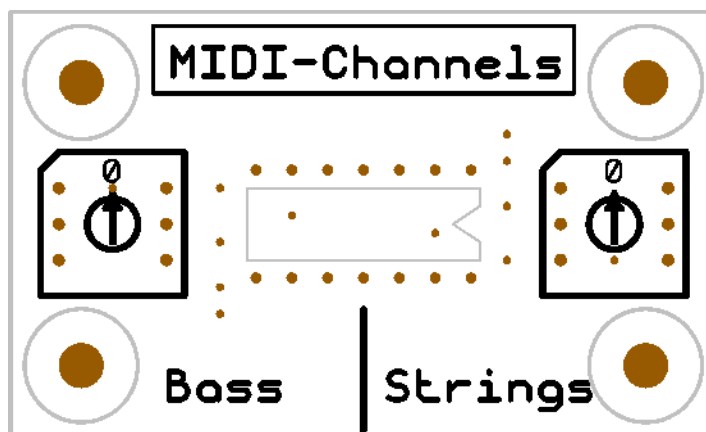
### 2.1 The Setting of the MIDI-Channel or Omni-Mode

The PCBs of the two MVS-FP-controllers for the bass- or the string-section are mounted below the keyboard. So that the keyboard does not need to be disassembled only to change a MIDI channel, the 16-stage-rotary-switch, with which the MIDI-channels can be switched to one of the 16 possible channels, a small additional PCB is mounted. This 3 x 5 cm board is connected to the two MVS-FP-controllers over of a ribbon cable and can be achieved - after opening the control panel of the Roland RS-505 - relatively easily.

The following HEX-switch called 16-step rotary switches have for display the respective switch position an imprint in hexadecimal notation. The lowest position is the 0 (and not the 1) and the levels above the 9 are characterized as A-F. At first glance, this may sound a bit strange, but thus, the shift position marking takes up only minimal space.

The position of the HEX-switches is only after switching on the instrument only is read out once and then remains stored until it is switched off. In practice, this circumstance is not significant, since the instrument should not be played when opened...

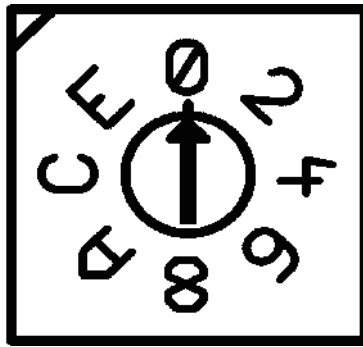
The adjustment is made with a small screwdriver with suitable blade width, the selected switch position indicates a small arrow.



The overview of the additional board with the location of the HEX switches

The left HEX-switch is for the MIDI-channel of the bass-section-controller and the right HEX-switch is responsible for the MIDI-channel of the string-section-controller.

In principle, both channel-settings can be selected completely independently of each other. So, of course, the same MIDI-channel for both MVS-FP-controllers could be used. However, this will result in receiving the MIDI-command *Damper-On/Off*, the pitch-shift-function as well as the sustain-damper-function is triggered. By suitable re-configuration (see chapters 3.1 and 3.3) but this "collision" can also be avoided.



The HEX-switch with 16 positions 0-9 and A-F

HEX-Switch-Position	MIDI-Channel(dezimal)
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	10
A	11
B	12
C	13
D	14
E	15
F	16

The assignment of the HEX-switch position to the selected MIDI-channel

When shipped, the bass-section's MVS-FP-controller has preset the lowest MIDI-channel 1 (HEX switch position 0), the MVS-FP-controller of the string-section has the MIDI channel 2 (HEX switch position 1) preset.

In the rare case that the MVS-FP-interface is not limited to a special MIDI-channel but should react to all MIDI-channels at the same time, the MIDI-Omni-mode can be activated. This can be done via one of the jumpers and will be described in the appendix (chapter 3.1). If the MIDI-Omni-mode is activated, the HEX-Switch-position, of course, no longer has any meaning.

## 2.2 The Pitch-Bend-Function

The "Pitchbend-Wheel" of a master-keyboard can generate a "keyboard-shift" with a scope of +/- 2 semitones in real time. Because the MVS-FP-version has no digital-to-analog converter, this pitchbend of course not be stepless, but is done by digitally shifting the keyboard location.

The switching stages are chosen so that they correspond to the semitone steps of a synthesizers are symmetrical with a stepless pitchbend. This gives a good compromise between the resulting effects with slow pitch bend (little deflection) and the musical expression possibilities at fast Pitchbend (large or full deflection)

At the upper and lower keyboard boundaries, a note can not be moved to a nonexistent key, the note it is therefore „cut". Furthermore, it should be noted that at each semitone jump (internally) also a new attack is generated.

If necessary, the pitch-bend-function can be deactivated by jumpering the MVS-FP-controllers in the intended way (see chapter 3.1).

## 2.3 The Pitch-Shift-Function

The MVS-FP-controller for the bass-section with its optional add-on-control-output is connected with the pitch-shift-function of the Roland RS-505 so that it can be activated and deactivated via the MIDI command *Damper-On/Off*.

Through the switch located on the left control panel of the Roland RS-505 "Auto"-„Off/ (Ext Cont)"-„Manual" the operating mode of the pitch-shift function is selected. To control the pitch-shift-function via MIDI, the switch has to be set to the position "Off/ (Ext Cont)".

If the MVS-FP-controller of the bass-section receives the MIDI-command *Damper-On/Off*, the pitch-shift-function is processed exactly as it is when directly connecting a corresponding footswitch to the Roland RS-505 would be the case.



The pitch-shift-function has a design-related effect on all sound register of the Roland RS-505 at the same time, even if the corresponding MIDI-command via the MVS-FP-controller of the bass-section is processed.

The polarity of the MIDI-damper-signal (also called sustain or hold) can be switched with the damper-invert-function (see chapter 3.1) on the MVS-FP-controller for the bass-section. Although normally (depending on the damper-pedals) the polarity should be set on the MIDI-transmitter, it can be necessary to additionally invert the signal at the MIDI-receiver. To avoid incorrect functionality, the inversion is only effective after the initial reception of a MIDI-message *Damper-On/Off*.

When shipped, the damper-invert-function for the pitch-shift-function is disabled.

## 2.4 The Sustain-Damping-Function

The MVS-FP-controller for the string-section is with its additional control-output connected to the sustain-function of the Roland RS-505. Via the MIDI-command *Damper-On/Off* the sustain-function can be activated and deactivated.

If the MVS-FP-controller of the string-section receives the MIDI-command *Damper-On/Off*, the sustain-damping-function is activated. This happens in reverse to the behavior, as it when directly connecting a corresponding footswitch to the Roland RS-505 would be the case. However, this inverse behavior is also so only by pressing a MIDI-damper-pedal should the corresponding sustain-envelopes are abbreviated<sup>2</sup>.



Due to the design, the sustain-damping-function has no effect to the sustain envelopes of white and green sound-registers (synth- and string-section), the sustain-envelopes of the dark-red sound-registers of the Roland RS-505 are not influenced.

The polarity of the MIDI-damper-signal (also called sustain or hold) can be changed by the damper-invert-function (see chapter 3.1) on the MVS FP controller for the string-section. Although normally (depending on the damper-pedals) the polarity should be set on the MIDI-transmitter, it can be necessary to additionally invert the signal at the MIDI-receiver. To avoid incorrect functionality, the inversion is only effective after the initial reception of a MIDI-message *Damper-On/Off*.

When shipped, the damper-invert-function for the sustain-damping-function is disabled.

## 2.5 The Auto-Local-Function

In usage of pitchbend or other continuous-controllers (damper or sustain or hold pedal), it belongs to the sequencer program, whether at the end or at the stop of the sequence, sending commands to zero the values or not. In the worst case, the signals get stuck on the last used values, and there is no way to set this manually to zero (except turning the synthesizer off).

The auto-local-function sets all control functions influenced by the MVS-FP-interface signals back to the starting position when over the 30 second period "no-key-pressed" is detected.

In addition, the function can be influenced by the corresponding MIDI-commands *Local-On/Off*. When the MIDI-command *Local-Off* is sent, the MVS-FP-controller completely deactivate the auto-local-function. If the MIDI-command *Local-On* is sends, the MVS-FP-controller activates the auto-local-function and sets the previously received values for pitch-bend to the neutral default-values.

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<sup>2</sup> This is the same as the primary name of the MIDI-command *Damper-On/Off*, which is more incidental.

## 2.6 The Active-Sensing-Function

The adaptive active-sensing-feature constantly monitors the MIDI-connection and triggers a internal MIDI-reset (including All-Notes-Off) when disconnecting MIDI (eg turning off the master keyboard). Also when "crashing" the sequencer, "hanging/stuck MIDI-notes" can be avoided.

Assuming that the MIDI-transmitter repeatedly sends the MIDI-command *Active-Sensing* for a certain amount of time (about 10 seconds), the active-sensing-feature automatically switched on. If sometime later no MIDI-data will be received, an internal MIDI-reset will be executed after approx. 2 seconds and the MIDI-active-sensing-feature is disabled. Through this algorithm the MVS-FP-controller adapts to the existing MIDI-setup, depending on the whether MIDI-command *Active-Sensing* is used or not.

If absolutely necessary, the active-sensing-function can be deactivated by a jumper on the MVS-FP-controller (see chapter 3.1).



## 3. Annex

### 3.1 The Jumpers

On the circuit board of the MVS-FP-controller, there is a jumper field, via that some options can be set. Normally, no changes should be necessary, except in accordance with prior agreement with the manufacturer or at your own risk.



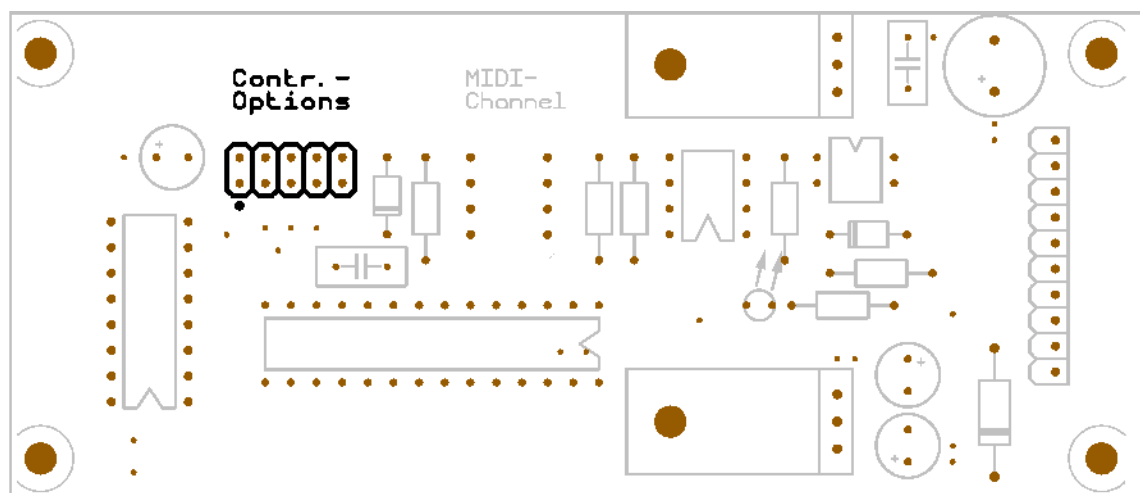
To set the special options, the opening of the device is necessary, which is why the skilled technician reserved remains.



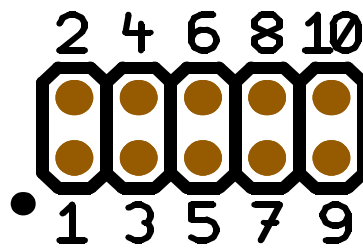
Because there are components with not-covered main-voltage in the device, there is a **risk of a fatal electric shock!**

The 10-pin jumper field for the controller-options is actually the ISP-Plug for the programming phase of the microprocessor with a special programmer. In normal operation, some of the pins are used as additional inputs are used to query the jumper-settings.

The jumpers are read out only once after switching on the device and then stored until switched off. In practice, this circumstance is not significant, since the instrument should not be played when opened...



Overview of the MVS-FP-controller with the location of the controller option jumper field



The ISP plug, which also serves as a jumper field

Allowed are only the three jumpers described below, otherwise a short circuit could damage the MVS-FP-interface or even the synthesizer.

1. A jumper set to **position 9-10** activates the MIDI-Omni-Mode. The position of the HEX-switch then no longer has any significance.
2. A set jumper at **position 7-8** inverts the polarity of the received MIDI-command *Damper-On/Off*.
3. A jumper set at **position 3-4** deactivates all the following special-features:
  - Halftone shift function via MIDI-pitch-bend
  - Reset after missing MIDI-active-sensing

So far, there is no need to deactivate this special-functions known, but you never know...

### 3.2 The MIDI-Activity-LED

The circuit board of the MVS-FP-controller has a yellow LED, which normally indicates the processing of MIDI-commands (MIDI-activity). When switching on the synthesizers (system check) and for certain errors others States are signaled also.

### 3.3 The MIDI-Implementation-Chart

MIDI-command	processing		remarks
Basic-Channel	1-16		The setting is made via a HEX-switch-rotary encoder (0..9, A..F).
Program-Change	No		Program-change-commands are ignored.
Note-Number	Bass-section: 48 – 72 String-section: 48 – 97		Other note numbers are ignored, MIDI Activity LED lights up only when notes are processed.
Velocity	Note On	Yes	Velocity 1-127 hits the key, velocity 0 (or note-off) releases key.
	Note Off	No	

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<b>MIDI-command</b>	<b>processing</b>		<b>remarks</b>
Pitch-Bender	Yes		The Pitch Bender command causes a shift of the keyboard position in real time +/- 2 semi-tones.
Continuous-Controller	Modulation Breath-Controller Foot-Pedal Data Entry Volume	No No No No No	The MVS FP controller ignores this commands
Switches	Damper / Sustain Portamento Sostenuto Soft-Pedal	Yes No * No * No *	The MVS-FP-controller uses the commands to deactivate or activate the pitch-shift- or sustain-damper-function. The polarity of the MIDI-switches can be changed.
Channel-Mode	Reset-All-Contr. Local On/Off All Notes Off Omni Off Omni On Mono On Poly On	Yes Yes Yes Yes Yes No Yes	The local-on-command can be used to reset the pitch-bend-wheel values. The command local-off can be used to disable the auto-local-function of the MVS-FP-controller. In Omni-Mode all MIDI-channels (1..16) are processed simultaneously.
System-Real-Time	Timing-Clock System-Reset Start Stop Continue Active-Sensing	No Yes No No No Yes	After receiving active-sensing-commands for approx. 2 seconds, a subsequent interruption of the MIDI-data-stream causes a MIDI-system-reset (All-Notes-Off etc.).
System-Common	Song Position Song Select Tune Request	No No No	

\* On request, the setting of one of these "switch controllers" is possible instead of the MIDI-damper/sustain-pedal

### 3.4 Technical Data and Design

<b>Power supply:</b>	Due to the low power consumption, the supply takes place directly from the synthesizer (+ 25V).
<b>Connections:</b>	2 x controller-boards contains 1 x MIDI-In (common), 1 x optocoupler-output (each) for pitch-shift-function and sustain-damper-function, 16-pin-Plug (each) for up to 8 octaver-boards.
<b>MIDI-Modes:</b>	Omni-Mode, Poly-Mode (MIDI-channel adjustable via HEX-switch).
<b>MIDI-Commands:</b>	Note-On/Off, Pitch-Wheel, Damper (or Sustain, Hold), Local-On/Off, All-Notes-Off, Omni-On/Off, Active-Sensing, Reset.
<b>Execution delay:</b>	Less than 1 millisecond (practically real time).
<b>Special functions:</b>	Inversion for damper- / sustain- / hold-polarity, auto-local-function for pitchbend reset, LED for MIDI-activity, MIDI-Error/Overflow, HW-Failure etc.
<b>Design:</b>	Open circuit boards: 2 x controller plus 6 x octaver combined mounted on 2 x 2 carrier boards (built into the synthesizer).
<b>Dimensions:</b>	The electronics will be built-in on special mounting plate below the Keyboard: 680 x 115 x 20 mm (LxWxH)
<b>Mass:</b>	< 1500 g

## 4. Own Notes

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