

SH 2/9-M

MIDI Interface for Roland SH-2 / SH-09

Model 8-437
ver. 1.0 and 2.0



INSTALLATION MANUAL





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This manual in PDF form is available on supplemental CD-ROM or on manufacturer's web-pages.

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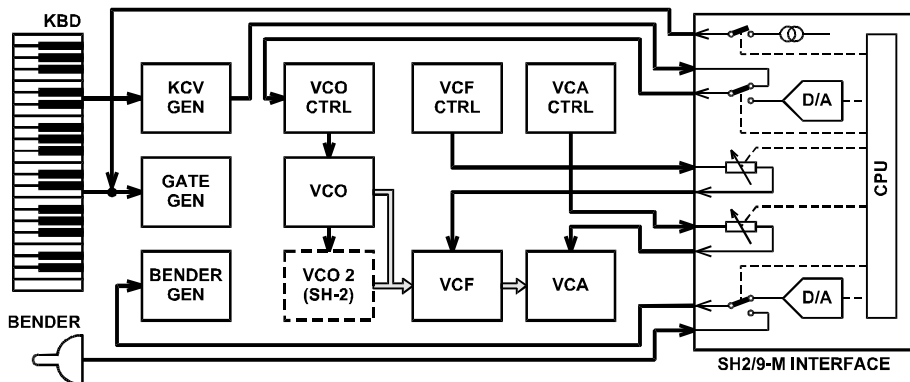
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1. GENERAL INFORMATION

SH2/9-M MIDI interface allows full integration of Roland SH-2 and SH-09 instruments to MIDI system. Interface affects some instrument's circuits (BENDER, VCO, VCF, VCA a ENV) which can be controlled via MIDI commands with help of the interface. However, all original features of SH-2 / SH-09 instrument stay unchanged after the interface installation and the instrument can be used by the same way. Simplified block functional schematic of the instrument after the interface installation shows pic. 1.1.

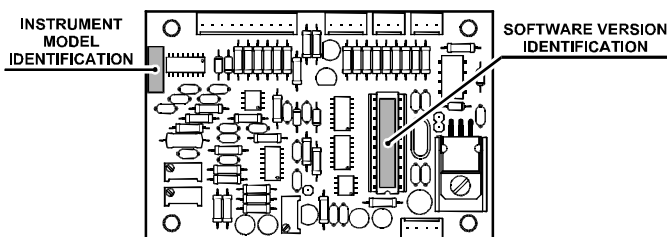
Pic. 1.1 – Connection to instrument



Construction of SH2/9-M MIDI interface is a little bit different for SH-2 and SH-09 instrument. Therefore check before the installation whether you have the right version of the interface. Version can be checked on identification label on interface board (see pic. 1.2).

In course of time, software of the interface can be revised. Actual version of software be to detect on identification label on interface's processor (see pic. 1.2).

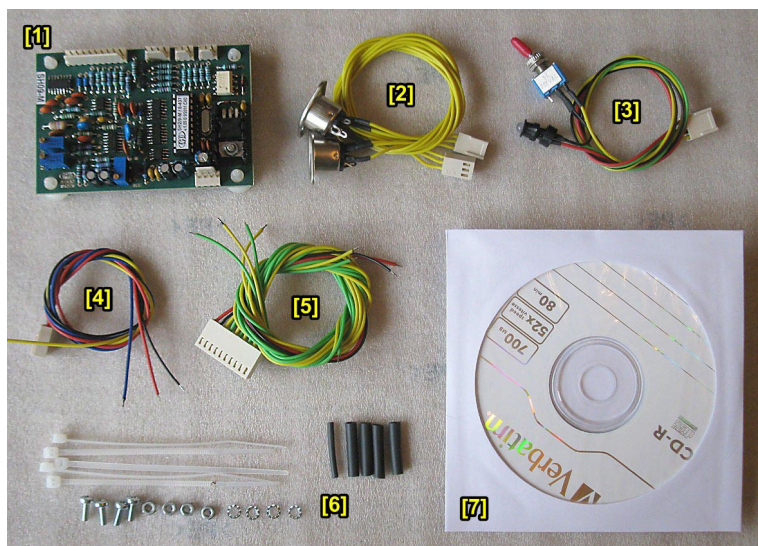
Pic. 1.2 – Identification of instrument model and SW version



1.1. PARTS OF MIDI INTERFACE KIT

Delivery of MIDI interface kit contents all parts necessary for installation inc. all support and coupling elements. Parts of delivery are also manuals for installation, handling and interface's SysEx communication and CD-ROM with support software. Please check if the delivery is complete before installation (see pic. 1.1.1).

Pic. 1.1.1 – Parts of interface kit



The SH2/9-M interface kit delivery contents :

1. MIDI Interface board
2. 2x DIN-5 socket with cable
3. Bunched cables with tumbler switch and LED
4. Power supply bunched cable (4-wire)
5. Signal bunched cables (10-wire)
6. Coupling elements (screws, nuts, washers, LED holder, tightening strips, insulation tubes ...)
7. CD-ROM with support software and manuals in PDF form
8. 3x manual in printed form

2. MIDI INTERFACE INSTALLATION

Mounting of the interface in the Roland SH-2 / SH-09 synthesizer is very easy. If you follow the instructions from this manual, there should be no major problems during the installation. The interface installation procedure is thoroughly described in the following chapters. Please follow these instructions accurately to avoid any damage of the instrument.



Attention! Disconnect the instrument from the mains prior to the installation. There is a risk of the electric shock!



Attention! Observe precautions for handling electrostatic discharge sensitive devices!



The producer is not responsible for any eventual mechanical or electrical damage of the SH-2 / SH-09 instrument caused by the infringement of the described installation procedure or by careless manipulation during the installation of the MIDI interface!



It is recommended to calibrate the SH-2 / SH-09 accordingly to the instructions in service manual of the instrument prior the interface installation. This ensures trouble-free operation of the interface.



Most of installation procedures is common for both SH-2 and SH-09 models of the instrument. Some differences are only in connection of signal bunched cables (chapter 2.5). Pass along instructions for given model of the instrument during installation of these bunched cables!

2.1. OPENING OF THE INSTRUMENT

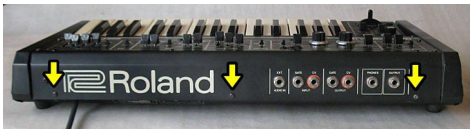
a) Unscrew six screws on top panel of the instrument (pic. 2.1.1) and three screws on rear panel of the instrument (pic. 2.1.2). Keep the screws. They will be used again after the MIDI kit installation.

b) Carefully open the instrument - lift off the instrument's panel. Now, all instrument's parts and boards needed for the interface installation are accessible see pic. 2.1.3.

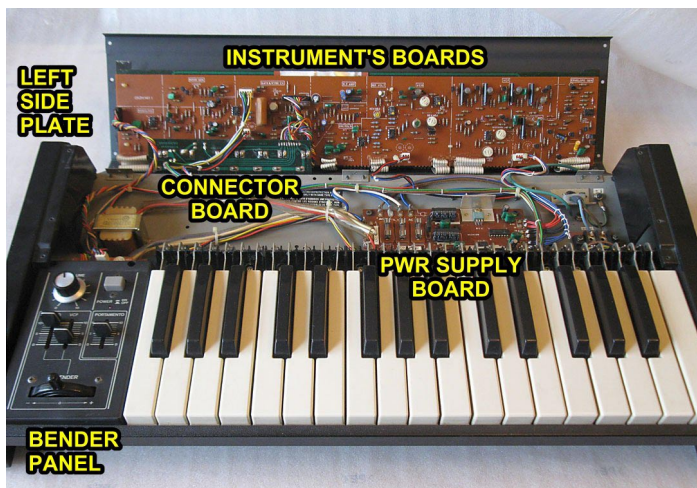
Pic. 2.1.1



Pic. 2.1.2



Pic. 2.1.3



2.2. DRILLING OF HOLES FOR MIDI SOCKETS, SWITCH AND INDICATION LED

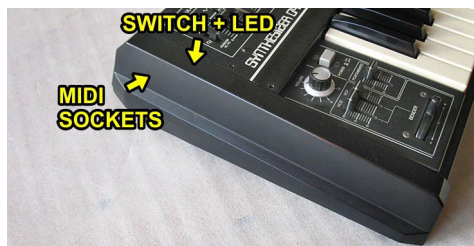
The interface has both MIDI input and output. Only MIDI input is implicitly necessary for the interface working. MIDI output need not to be installed – see chapter 5. Of course, usage of both MIDI input and output (MIDI-IN and MIDI-THRU/OUT sockets) is more convenient for easy interconnection of parts of whole MIDI system.

There are two elements for the interface control - tumbler switch and two-color LED. They are not necessary implicitly for the interface working. They need not to be installed – see chapter 5. Of course, usage of them is more convenient for easier device control.

Suitable place for MIDI sockets and control elements is on left side plate of the instrument (see pic. 2.2.1). It is necessary to drill holes for them to the side plate.

a) Left side plate is fixed to bottom of the instrument with five screws (pic. 2.2.2). These screws must be unscrewed and then it is possible remove the side plate.

Pic. 2.2.1



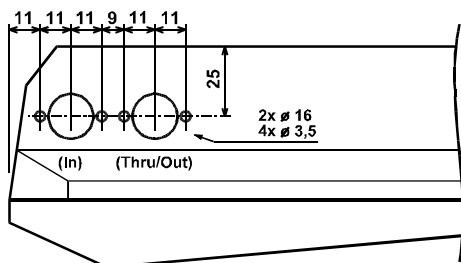
Pic. 2.2.2



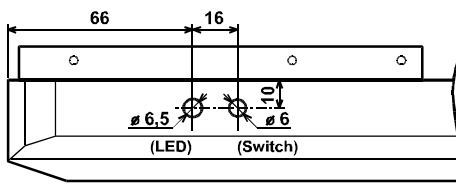
b) Drill two holes with diameter 16 mm and four holes with diameter 3,5 mm (from side wall) – see pic. 2.2.3. Use sharp drills and **work carefully** so that side plate was not damaged during drilling!

c) Drill one hole with diameter 6,5 mm and one hole with diameter 6 mm on top of the side plate – see pic. 2.2.4. **Work carefully** again so that side plate was not damaged!

Pic. 2.2.3



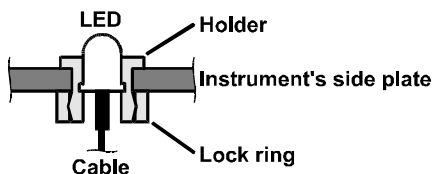
Pic. 2.2.4



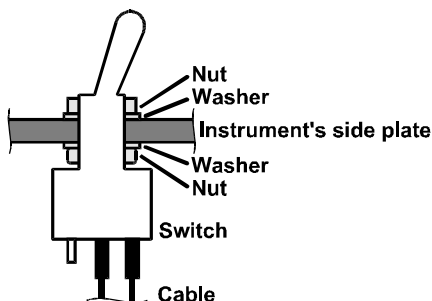
d) Clean the edge of all holes with small rasp or with point of bigger drill after drilling.

2.3. MONTAGE OF MIDI SOCKETS, SWITCH AND INDICATION LED

Pic. 2.3.1



Pic. 2.3.2



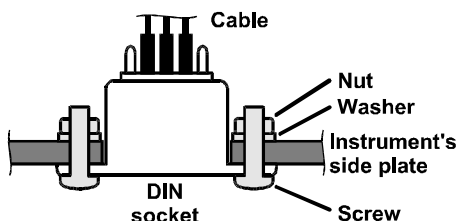


- Insert LED holder into 6,5 mm hole on top of the side plate. Plant lock ring of LED holder to two-color LED on power supply bunched cables. Then insert two-color LED into holder and fix it by overthrust of the ring on the holder (pic. 2.3.1).
- Insert tumbler switch into the other hole on top of the side plate so that its not connected lead was near to LED. Fix the switch to the side plate with help of nuts and washers (pic. 2.3.2).
- Get flat connectors of MIDI cables through the holes in side wall of the side plate and insert DIN sockets of the cables into the holes fully (pic. 2.3.3). Both cables are identical and they can be swapped.
- Fix DIN sockets to the side plate using screws, nuts and washers (pic. 2.3.4).

Pic. 2.3.3

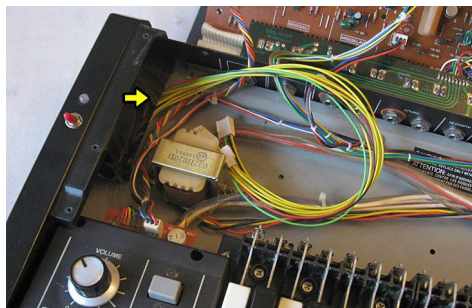


Pic. 2.3.4



- Insert side plate with installed MIDI sockets, switch and LED back to the instrument's bottom so that newly installed bunched cables are coming out at rear panel of the instrument (pic. 2.3.5).

Pic. 2.3.5

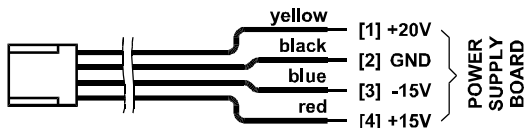


- Fix the side plate back to bottom of the instrument with help of five screws (see pic 2.2.2).
- It is suitable to label the DIN sockets ("MIDI IN", "MIDI THRU/OUT") – for example, with self-adhesive foil glued near to the sockets on side plate of the instrument.

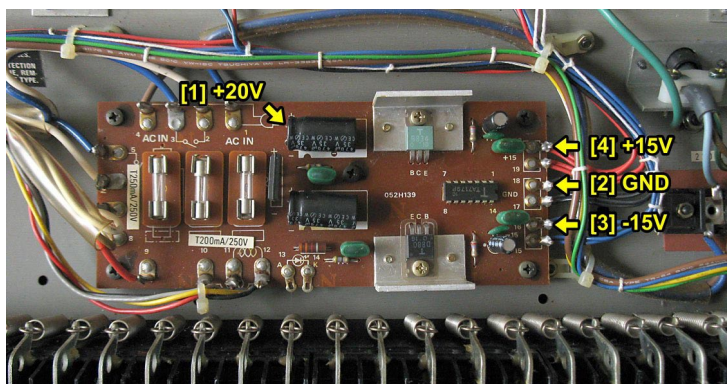
2.4. MONTAGE OF POWER SUPPLY BUNCHED CABLES

Power supply bunched cables are equipped with flat 4-pin connector on one end (pic. 2.4.1). All wires outgoing from this connector must be connected to instrument's power supply board as displayed on pic. 2.4.2.

Pic. 2.4.1



Pic. 2.4.2

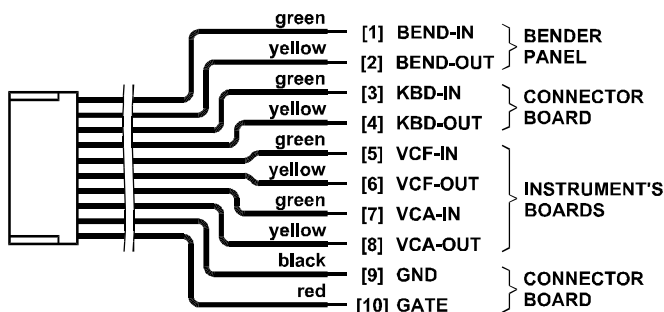


- Solder the yellow wire Nr. 1 (+20V) to supply voltage +20V. Most suitable point is positive pole terminal of electrolytic capacitor C45 on power supply board (pic. 2.4.2).
- Solder the black wire Nr. 2 (GND) to ground potential – to one of solder lugs marked with “GND” symbol, on the right on power supply board (pic. 2.4.2).
- Solder the blue wire Nr. 3 (-15V) to stabilized supply voltage -15V – to one of solder lugs marked with “-15” symbol, on the right on power supply board (pic. 2.4.2).
- Solder the red wire Nr. 4 (+15V) to stabilized supply voltage +15V – to one of solder lugs marked with “+15” symbol, on the right on power supply board (pic. 2.4.2).

2.5. MONTAGE OF SIGNAL BUNCHED CABLES

Signal bunched cables are equipped with flat 10-pin connector on one end. Wires outgoing from this connector must be connected to several places of the instrument (pic. 2.5).

Pic. 2.5



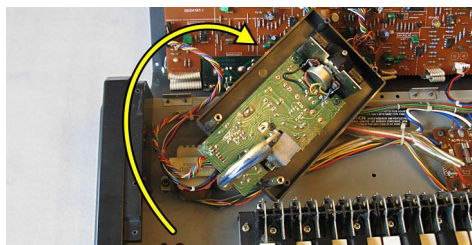
2.5.1. BENDER PANEL

- Wires Nr. 1 and 2 of signal bunched cables will be connected to bender board (on the left of the instrument's keyboard). It is necessary to disassemble this board. Block of bender is fixed to instrument's bottom with four screws – they must be unscrewed (pic. 2.5.1.1).
- After that, it is possible to lift off the bender panel (pic. 2.5.1.2).

Pic. 2.5.1.1



Pic. 2.5.1.2

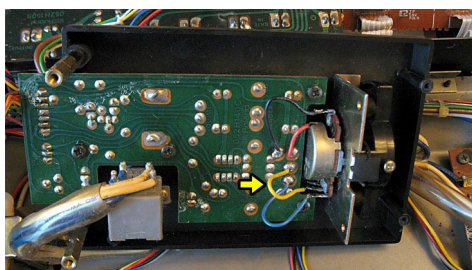


c) Unsolder yellow wire interconnecting sliding contact of bender potentiometer and solder pad "2" on bender board (pic. 2.5.1.3).

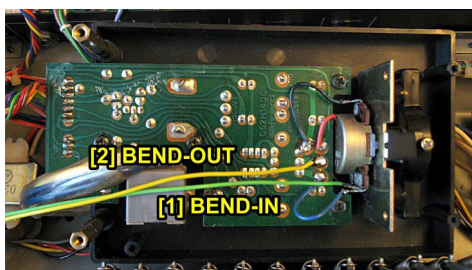
d) Solder the green wire Nr. 1 (BEND-IN) of signal bunched cables to sliding contact of bender potentiometer (pic. 2.5.1.4).

e) Solder the yellow wire Nr. 2 (BEND-OUT) of signal bunched cables to solder pad "2" on bender board (pic. 2.5.1.4).

Pic. 2.5.1.3



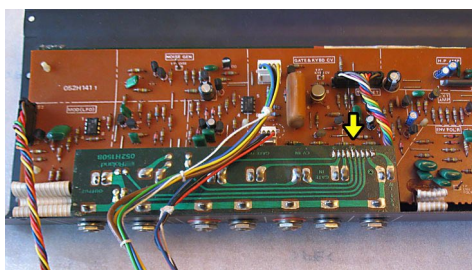
Pic. 2.5.1.4



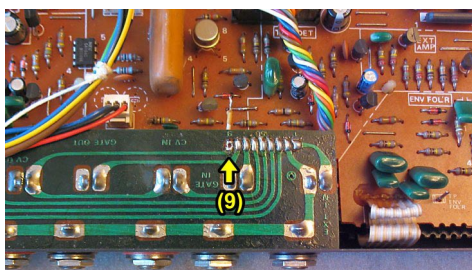
f) Place block of bender back to its original position and fix it to instrument's bottom with four screws (see pic. 2.5.1.1).

2.5.2. JACK CONNECTORS BOARD

Pic. 2.5.2.1



Pic. 2.5.2.2



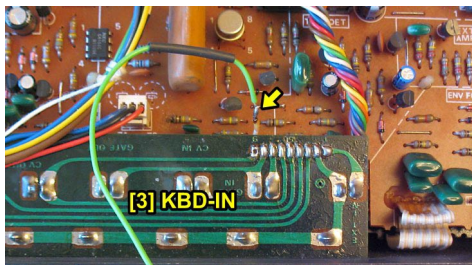
a) Wires Nr. 3, 4, 9 and 10 of signal bunched cables will be connected to Jack connectors board on rear panel of top part of the instrument (pic. 2.5.2.1).

b) Unsolder white wire marked with "9" symbol from board of Jack connectors (pic. 2.5.2.2). The wire is used to be glued on the board so it is necessary to unfasten it first.

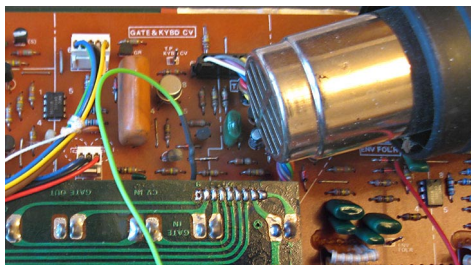
c) Place a heat-shrink insulation tube ϕ 2 mm on green cable Nr. 3 (KBD-IN) of signal bunched cables. Solder this wire to freed white wire coming originally to Jack connector board (pic. 2.5.2.3).

d) Isolate the connection with the insulation tube and heat it (with a hot-flue pistol for example) until it shrinks tightly to the cables (pic. 2.5.2.4).

Pic. 2.5.2.3



Pic. 2.5.2.4

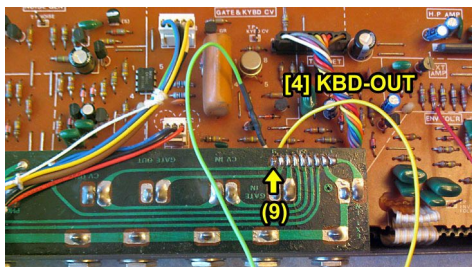


e) Solder the yellow wire Nr. 4 (KBD-OUT) of signal bunched cables to freed solder pad (9) on board of Jack connectors (pic. 2.5.2.5).

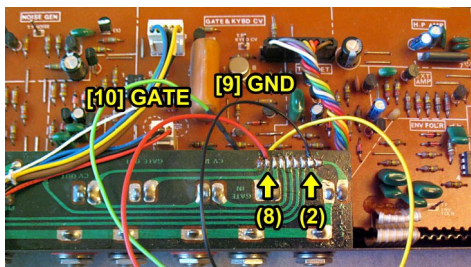
f) Solder the black wire Nr. 9 (GND) of signal bunched cables to ground potential – to solder pad (2) on board of Jack connectors (pic. 2.5.2.6).

g) Solder the red wire Nr. 10 (GATE) of signal bunched cables to solder pad (8) on board of Jack connectors (pic. 2.5.2.6).

Pic. 2.5.2.5



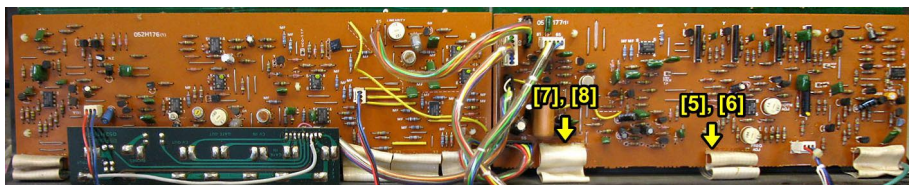
Pic. 2.5.2.6



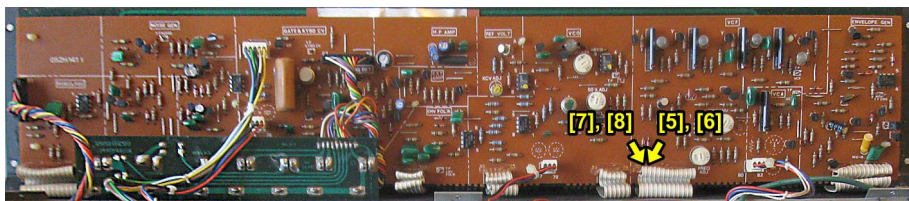
2.5.3. INSTRUMENT'S BOARDS

a) Wires Nr. 5 to 8 of signal bunched cables (they control VCF and VCA) will be connected to flat cables which interconnect boards of the instrument. **Attention – places of connection are different for SH-2 and SH-09 instruments!** In SH-2 instrument, used board has denotation 052H177A. It is upper right (visible) board of block of the instrument's panel (pic. 2.5.3.1). In SH-09 instrument, used board has denotation 052H141. It is only one upper (visible) board of block of the instrument's panel (pic. 2.5.3.2).

Pic. 2.5.3.1 - SH-2



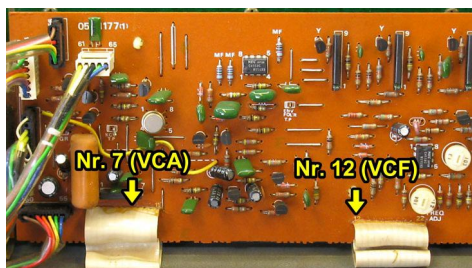
Pic. 2.5.3.2 - SH-09



b) Method of montage is the same for both models of the instrument but placing of flat cables with signals for VCF and VCA control is **different for SH-2 and SH-09 instruments!**

- in **SH-2** instrument, wires Nr. 7 for VCA and Nr. 12 for VCF of flat cables will be used (pic. 2.5.3.3),
 - in **SH-09** instrument, wires Nr. 30 for VCA and Nr. 31 for VCF of flat cables will be used (pic. 2.5.3.4).
- Wires of flat cables are numbered stepwise from the left from board margin.

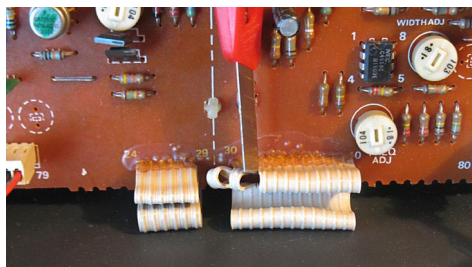
Pic. 2.5.3.3 - SH-2



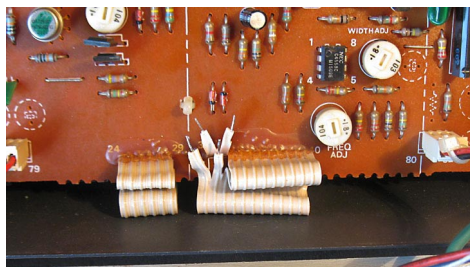
Pic. 2.5.3.4 - SH-09



Pic. 2.5.3.5



Pic. 2.5.3.6



c) Incise insulating material of flat cables with sharp knife and detach necessary wires see previous item (pic. 2.5.3.5).

d) Cut off (interrupt) these wires. Then carefully strip them for about ca 5 mm (insulating material is fairly relatively adamant) and tin plate ends of the wires (pic. 2.5.3.6).

e) Adapt length of wires Nr. 5 to 8 of interface's signal bunched cables as necessary and place heat-shrink insulation tubes ϕ 4 mm on these wires. Then the wires solder to freed ends of wires of instrument's flat cables (pic. 2.5.3.7):

In **SH-2** instrument:

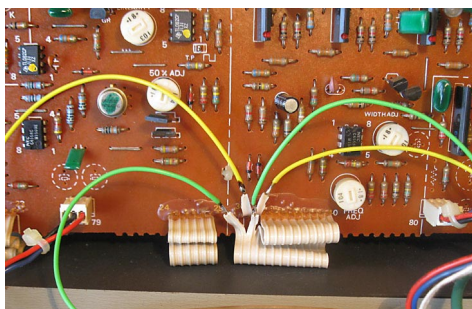
- solder the green wire Nr. 5 (VCF-IN) of signal bunched cables to end of wire Nr. 12 of flat cable outgoing from bottom instrument's board (i.e. the board near to instrument's panel),
- solder the yellow wire Nr. 6 (VCF-OUT) of signal bunched cables to end of wire Nr. 12 of flat cable outgoing from upper instrument's board (i.e. the visible board),
- solder the green wire Nr. 7 (VCA-IN) of signal bunched cables to end of wire Nr. 7 of flat cable outgoing from bottom instrument's board (i.e. the board near to instrument's panel),
- solder the yellow wire Nr. 8 (VCA-OUT) of signal bunched cables to end of wire Nr. 7 of flat cable outgoing from upper instrument's board (i.e. the visible board),

In **SH-09** instrument:

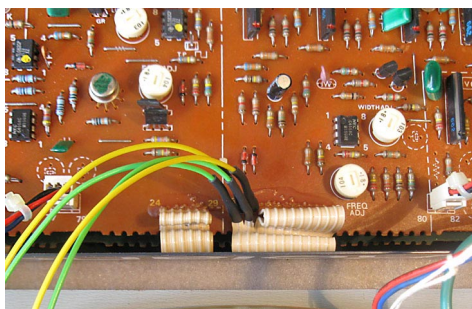
- solder the green wire Nr. 5 (VCF-IN) of signal bunched cables to end of wire Nr. 31 of flat cable outgoing from bottom instrument's board (i.e. the board near to instrument's panel),
- solder the yellow wire Nr. 6 (VCF-OUT) of signal bunched cables to end of wire Nr. 31 of flat cable outgoing from upper instrument's board (i.e. the visible board),
- solder the green wire Nr. 7 (VCA-IN) of signal bunched cables to end of wire Nr. 30 of flat cable outgoing from bottom instrument's board (i.e. the board near to instrument's panel),
- solder the yellow wire Nr. 8 (VCA-OUT) of signal bunched cables to end of wire Nr. 30 of flat cable outgoing from upper instrument's board (i.e. the visible board),

f) Isolate the connections with the insulation tubes and heat them (with a hot-flue pistol for example) until they shrink tightly to the cables (pic. 2.5.3.8).

Pic. 2.5.3.7



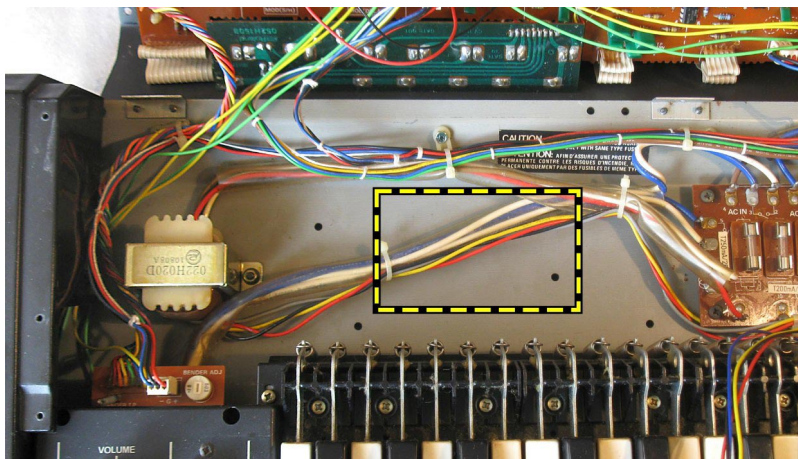
Pic. 2.5.3.8



2.6. MONTAGE OF INTERFACE'S BOARD

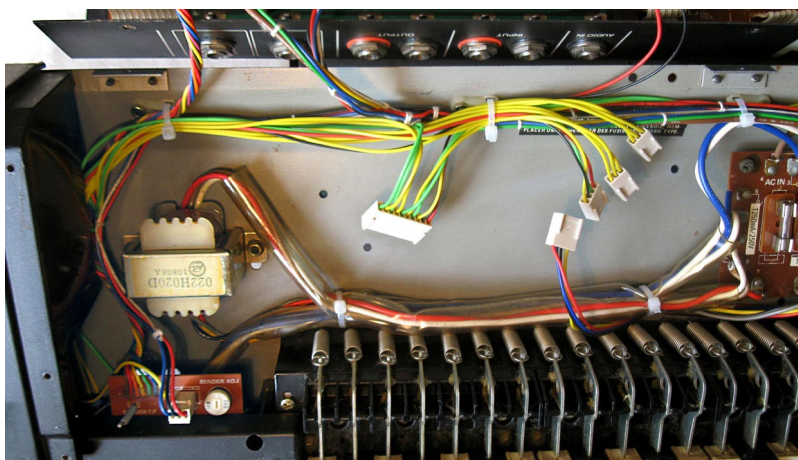
Interface board will be placed on bottom plate of the instrument between transformer and power supply board (pic. 2.6.1). So that there will be place for interface board, it is necessary to shift original bunched cables fixed to instrument's bottom plate.

Pic. 2.6.1



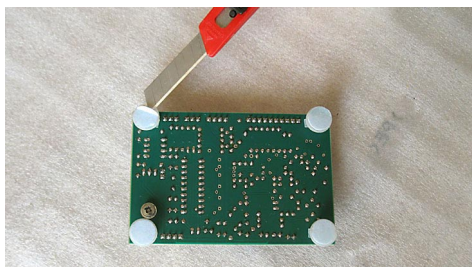
- Cut off tightening plastic strips and unfasten original bunched cables.
- Unscrew plastic fixing lugs from bottom of the instrument and relocate them to another opportune holes.
- Now fix all bunched cables (including newly installed) back to fixing lugs with help of new tightening plastic strips (pic. 2.6.2).

Pic. 2.6.2

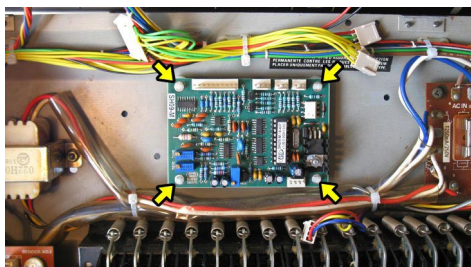


- Remove protective foil from the self-adhesive supports of interface's board (pic. 2.6.3).
- Put interface's board to bottom of the instrument so that connectors X1 to X4 are pointed at rear panel of the instrument (pic. 2.6.4) and then fix the self-adhesive supports by pressing down.

Pic. 2.6.3



Pic. 2.6.4



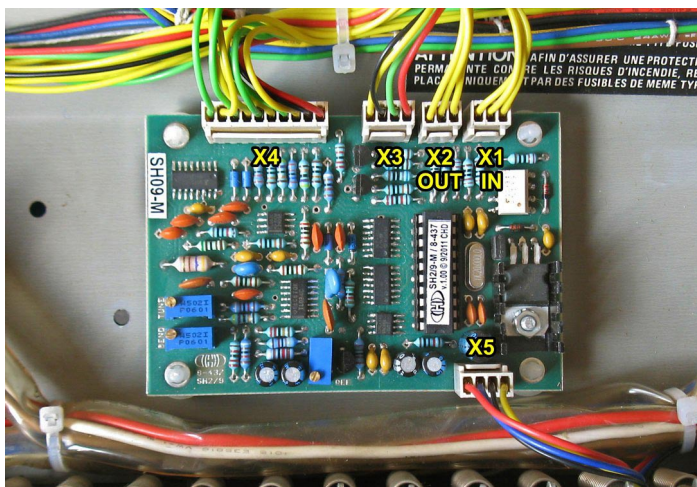
g) Plug the 10-pin connector of signal bunched cables to X4 head on the left on the interface's board. Orientation of the connector is unambiguously given by the connector lock and it can't be plugged to the contrary (pic. 2.6.5).

h) Plug the 4-pin connector of bunched cables with switch and LED to X3 on the interface's board. Orientation of the connector is unambiguously given by the connector lock again (pic. 2.6.5).

i) Plug two 3-pin connectors of MIDI cables to X1 a X2 heads on the right on the interface's board. Orientation of the connectors is given by the connector lock again but be sure that the connectors are not exchanged. MIDI input must be put to X1 head and MIDI output to X2 head (see pic. 2.6.5).

j) Plug the 4-pin connector of power supply bunched cables to X5 head on the right on bottom edge of the interface's board. Orientation of the connector is unambiguously given by the connector lock again (pic. 2.6.5).

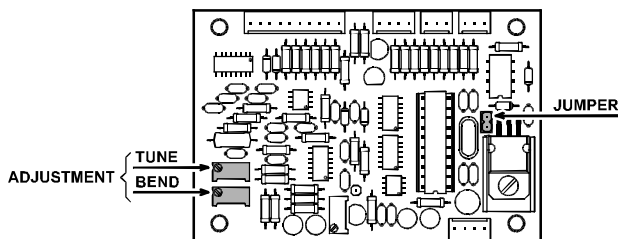
Pic. 2.6.5



2.7. ADJUSTMENT OF INTERFACE

It is necessary to adjust the interface after mechanical installation. It will be done with help of two trimmers (BEND and TUNE) and jumper on the interface's board (see pic. 2.7.1). Adjusting procedure is following:

Pic. 2.7.1



- Plug jumper to two-pin jumper head on interface's board (see pic. 2.7.1).
- Connect audio output of the instrument to amplifier or combo etc.
- Set some of controllers on instrument's panel to these positions:

For **SH-2** instrument:

- VCO (common) → MOD = 0, AUTO BEND = 0
- VCO-1 → RANGE = 8', WAVEFORM = Saw, BENDER = On
- AUDIO MIXER → VCO-1 SUB = 0, VCO-1 = 10, VCO-2 = 0
- VCF → CUTOFF FREQ = 10, RESONANCE = 0, ENV = UP/10, MOD = 0, KYBD = 0
- VCA → HOLD
- ENV → GATE, A = 0, D = 0, S = 10, R = 0
- PORTAMENTO = 0
- BENDER → VCO = 0, VCF = 0

For **SH-09** instrument:

- VCO → MOD = 0, RANGE = 8, WAVEFORM = Saw
- AUDIO MIXER → VCO = 10, SUB OSC = 0, EXT = 0
- VCF → CUTOFF FREQ = 10, RESONANCE = 0, ENV = UP/10, MOD = 0
- VCA → HOLD
- ENV → GATE, A = 0, D = 0, S = 10, R = 0
- PORTAMENTO = 0
- BENDER → VCO = 0, VCF = 0

Positions of other controllers on instrument's panel are not significant.

d) Plug instrument's power supply cable to mains socket and switch on the instrument by main switch POWER. **Attention – work very carefully during whole adjusting procedure - there is a risk of the electric shock!**

e) Turn interface's switch (newly installed on instrument's side plate) to OFF position – indication LED of the interface lights in red. Press key C2 on instrument's keyboard (pic. 2.7.2). Now tone with frequency ca 261,63 Hz is heard – this corresponds to VCO's control voltage +3V. Frequency and control voltage depend on setting of TOTAL TUNE on panel of SH-2 instrument or TUNE on SH-09 instrument respectively.

**Pic. 2.7.2**

f) Turn interface's tumbler switch to ON position (indication LED of the interface lights in green). By circumvolution of TUNE trimmer on the interface's board, find position where the same tone sounds as in previous item. It can be determined with help of tuner or by ear also.

g) Repeat items e) and f) as long as the same tone is heard in both positions of the switch. After final adjusting of TUNE trimmer, turn interface's tumbler switch to OFF position (indication LED of the interface lights in red) and press key C2 on instrument's keyboard again (see pic. 2.7.2).

h) Move BENDER-VCO slider on instrument's panel between terminal positions (from "0" position to "10" position and back) and, by circumvolution of BEND trimmer on the interface's board, find position where the same tone sounds in both "0" and "10" positions of the slider. It can be determined with help of tuner or by ear also. Attention - BENDER controller (lever) on instrument's panel must be in quiescent (middle) position during whole adjusting procedure!

i) After final adjusting of BEND trimmer, switch the instrument off by main switch POWER and disconnect power supply cable from mains socket.

j) Remove jumper from jumper head on interface's board.

2.8. FINISHING OF INSTALLATION

Turn over the top panel of the instrument (close the instrument) and fix it with six screws to side plates and with three screws to bottom part of the instrument. This is the reverse procedure of that described in the chapter 2.1.

Pic. 2.8.1**Pic. 2.8.2**

Installation of the MIDI interface kit is finished and the instrument is prepared for communication via MIDI bus (pic. 2.8.3).

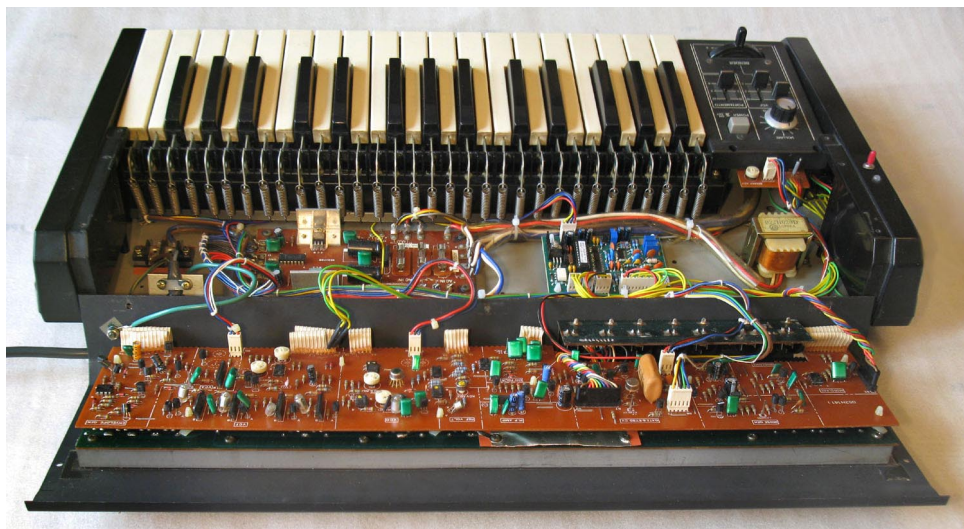
Please read carefully user manual of the interface before usage of modified instrument.



Pic. 2.8.3a – Installation in SH-2 instrument:



Pic. 2.8.3b – Installation in SH-09 instrument:





3. CHANGES AND NEW FUNCTIONS

If the interface is switched off and if it isn't connected to MIDI system, Roland SH-2 / SH-09 instruments works exactly the same way as before the interface installation.

After the interface activation, it controls BENDER, VCO, VCF, VCA and ENV circuits of the instrument via MIDI commands. More over, the interface includes internal software LFO which can be used as next source for modulation of VCO.

Enhanced function for control of the instrument via MIDI communication are described in detail in user manual of the interface.

4. LIMITATION DURING INSTRUMENT USAGE

When the interface is active, it is impossible to use own instrument's keyboard. If a key on instrument's keyboard is pressed, instrument's VCO will not be affected (detuned) but undesirable launching of envelope generator will occur.

Also portamento circuit (PORTAMENTO slider) of the instrument is totally functionless after the interface activation! Unfortunately, instrument's hardware design don't allow usage of portamento if instrument's VCO is controlled by external voltage.

Function of BENDER controller on instrument's panel depends on CONTROL - Bender Mode parameter setting (see user manual of the interface):

- In "Instrument" mode, manual controller BENDER on instrument's panel stay fully functional and it can be used by standard way.
- In "MIDI" mode, manual controller BENDER is disconnected and it is substituted by D/A converter of the interface. Then MIDI command Pitch Bend (Pitch Wheel) takes control over BENDER function.

All other control elements on SH-2 / SH-09 instrument's panel stay fully functional although the instrument is driven via MIDI bus with help of SH2/9-M interface. If the instrument is controlled via MIDI, we recommend to disuse GATE+TRIG position of selector for choice of envelope generator (ENV) launching. In this mode, unwanted triggering of envelope can occur. It is caused by influence of frequency jumping if VCO is modulated by interface's internal software LFO.

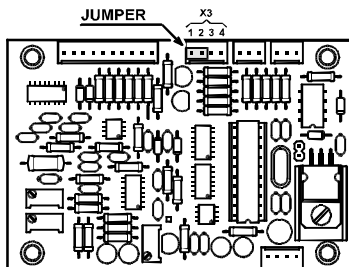
5. TIPS FOR INSTALLATION

a) Output MIDI – THRU/OUT

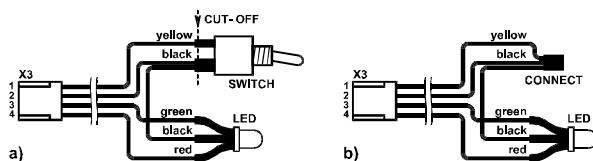
Interface SH2/9-M has both MIDI input and output. However, only MIDI input is unconditionally necessary for basic work of the interface (i.e driving the instrument via MIDI commands). MIDI THRU/OUT output connector need not to be installed at all if if you don't require transfer of MIDI data to another MIDI devices (THRU function) or reverse communication of the interface with host system (OUT function). In that case, connector X2 on interface board will stay unconnected (see pic. 2.6.5).

b) Switch and indication LED

Also installation of bunched cables of switch and indication LED isn't unconditional. You need not to install this bunched cables if you don't want to infringe excessively to instrument's panel by drilling. however, jumper must be plugged on pins Nr. 1 and 2 of X3 connector in that case (see pic. 5.1).

Pic. 5.1


Also it is possible to install only indication LED on instrument's panel. In that case, remove (cut-off) switch from bunched cables and connect (solder) together two black and one yellow wires lead to the switch originally and insulate connection of the wires (see pic. 5.2).

Pic. 5.2


Then the interface works this way: Immediately after its switching on, the interface is activated but it still doesn't affect the instrument – the instrument can be used like original one without installed interface. As lately as first MIDI command is coming to interface's MIDI input, the interface takes control over keyboard and other instrument's circuits. So that own instrument's keyboard can be used again, the interface must be reset. It can be done by turning of and on the instrument or with help of MIDI command "HW Reset" sent to the interface (see user manual of the interface).



