RS300

CV/MIDI CONVERTER

Not long after the introduction of MIDI in 1983, players demanded the ability to control their analogue CV+Gate synthesisers using MIDI keyboards and the new breed of MIDI hardware and software sequencers. Many manufacturers responded, and there was soon a plethora of MIDI-to-CV converters available, some monophonic, some polyphonic, but all capable of playing appropriately equipped CV+Gate synthesisers. Some of these converters also incorporated dedicated LFOs that added pitch modulation, and many also interpreted MIDI controllers such as Modulation, Breath Controller, Volume, and so on.

Nonetheless, all MIDI/CV converters are unidirectional. In other words, they convert MIDI data into analogue voltages, but do not convert analogue control voltages into MIDI. In fact, other than the RS300, we are unaware of any CV/MIDI converter designed specifically to accept analogue voltages and output MIDI messages that allow you to control your digital keyboards and modules using analogue synthesisers, sequencers and controllers.

The possibilities of this are enormous. Analogue synthesis offers modulation possibilities that are far beyond those of most digital instruments, so an RS Integrator fitted with the RS300 extends the capabilities of modern workstations and synthesisers. In addition, you can use analogue controllers such as the Analogue Systems French Connection to control MIDI instruments in ways that are not possible using conventional keyboards.
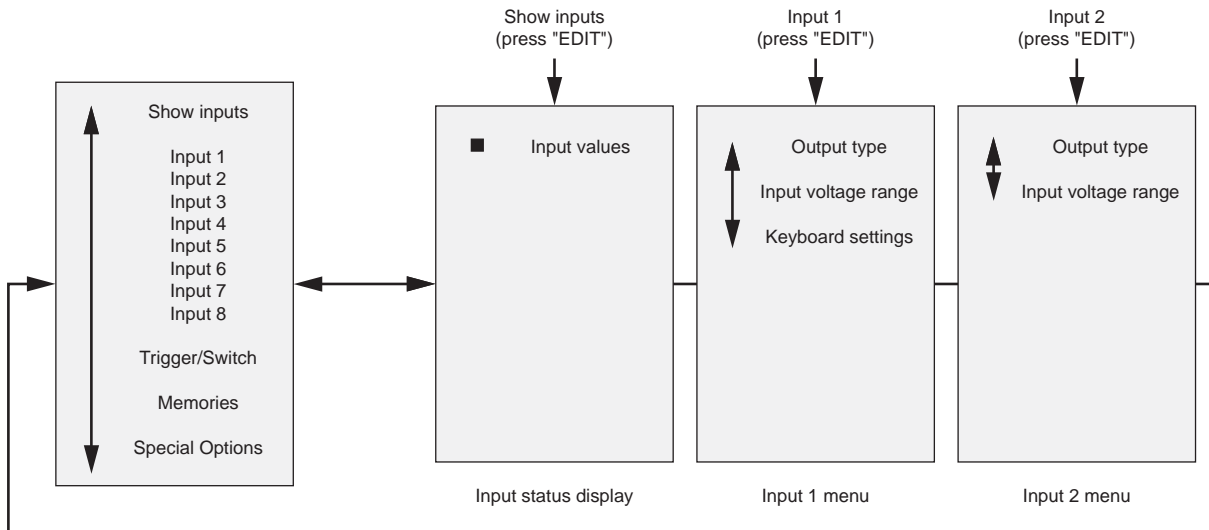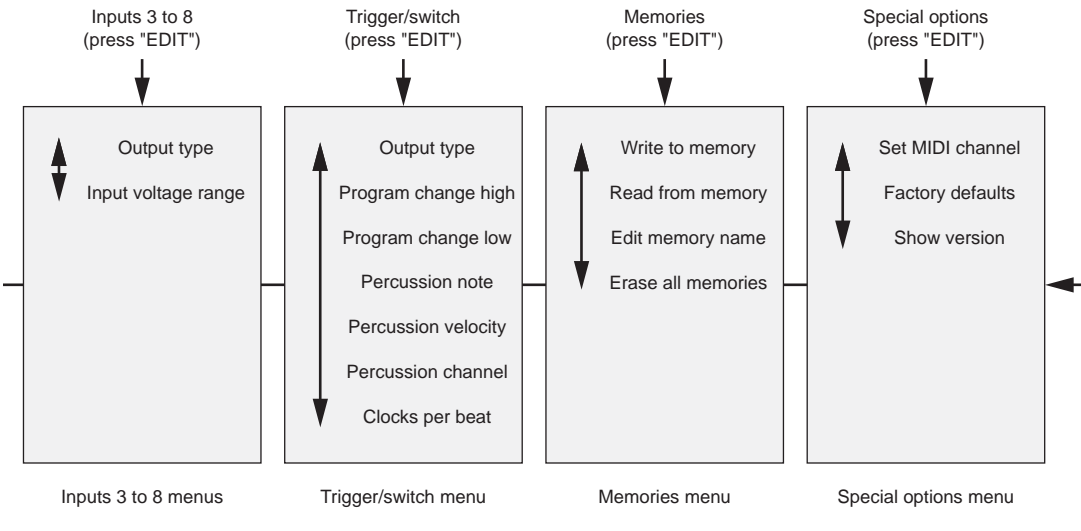
Show inputs
(press "EDIT")

Input 1
(press "EDIT")

Input 2
(press "EDIT")

Show inputs

Input 1
Input 2
Input 3
Input 4
Input 5
Input 6
Input 7
Input 8

Trigger/Switch

Memories

Special Options

■   Input values

Output type

Input voltage range

Keyboard settings

Output type

Input voltage range

Input status display

Input 1 menu

Input 2 menu
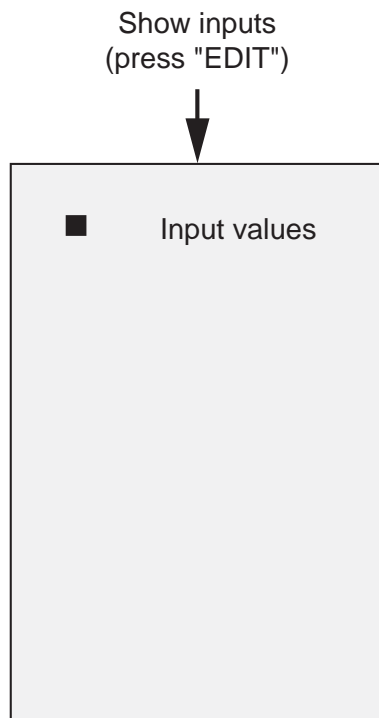
Figure refers to v1.0, 12 August 2003

NAVIGATION

The RS300 is controlled by the menus displayed on its 2 line x 20 character LCD. This display is backlit to aid its use in darkened conditions.

There are twelve menus (those for inputs 3 to 8 are identical, so are grouped in the diagram above) and these offer access to the sub-menus (not shown).

- Navigate through the menu structure by **rotating** the EDIT knob.
- Select a menu by **pressing** the EDIT knob.
- Navigate through any menu by **rotating** the EDIT knob.
- Move "down" to select a sub-menu or list of options by **pressing** the EDIT knob.
- Alter a value by **rotating** the EDIT knob.
- Return to the previous menu by **pressing** the EDIT knob.
- Jump "up" a level from a sub-menu to a main menu by pressing CANCEL.
- Leave an option or parameter unchanged and return to the menu containing it by pressing CANCEL.

Output type	Output type	Write to memory	Set MIDI channel
Input voltage range	Program change high	Read from memory	Factory defaults
	Program change low	Edit memory name	Show version
	Percussion note	Erase all memories	
	Percussion velocity		
	Percussion channel		
	Clocks per beat		

Inputs 3 to 8 menus   Trigger/switch menu   Memories menu   Special options menu

THE MENUS
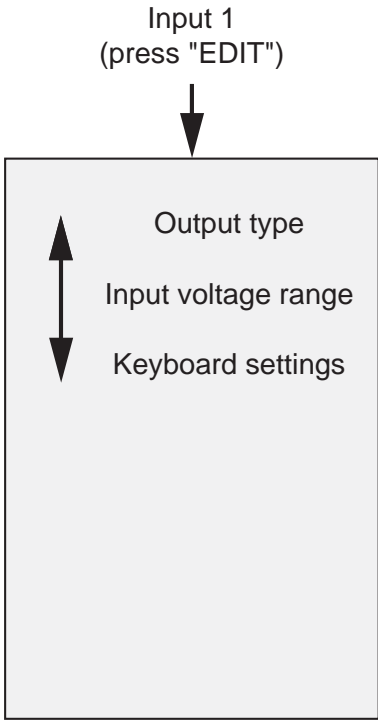
Show inputs
(press "EDIT")

■ Input values

Input status display

Show inputs

Displays the MIDI note (if any) and controller values generated by the CVs and trigger/switch voltages presented to the ten analogue inputs. As an example, the nine figures in the figure below are (from top left to bottom right):

The MIDI note number
Input 2: MIDI controller value
Input 3: MIDI controller value
Input 4: MIDI controller value
Input 5: MIDI controller value
Input 6: MIDI controller value
Input 7: MIDI controller value
Input 8: MIDI controller value
A trigger "on"

```
C4    0    63    63
63   63   63    63   T
```

**Input 1
(press "EDIT")**

Output type

Input voltage range

Keyboard settings

Input 1 menu

Input 1

This menu provides three sub-menus that allow you to control the nature of the MIDI data generated by the analogue voltage presented to the CV1 input.

Output type

• **Note on/off**

The MIDI data sent is a note ON of the pitch shown in the input display. A new note will be sent whenever there is a transition, and will be marked by an asterisk "*" in the top right of the display.

• **Pitch wheel**

The MIDI data sent is a pitch-bend message.

• **Aftertouch**

The MIDI data sent is an aftertouch message.

• **CC#0 - CC#127**

The MIDI data sent is a continuous controller message on the selected CC number.

**Output type
(press "EDIT")**

Note on/off

Pitch wheel

Aftertouch

CC:0

CC:127

Input voltage range

Four voltage ranges are provided:

- -10V to +10V
- -5V to +5V
- 0V to +10V
- 0V to +5V

Set the range to the most appropriate for the signal being presented to the CV1 input.

**Input voltage range
(press "EDIT")**

-10V to +10V

-5V to +5V

0V to +10V

0V to +5V
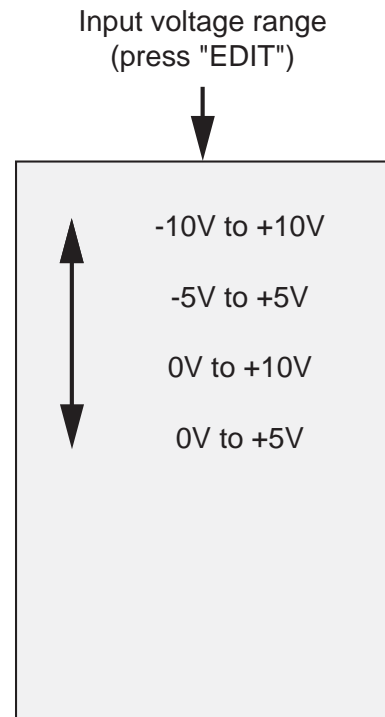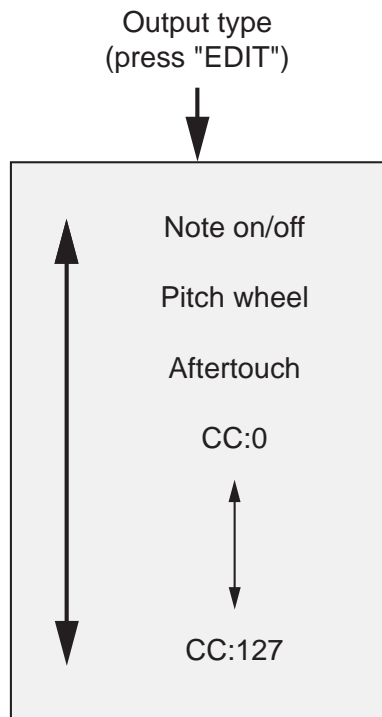
Keyboard settings

This menu allows you to determine the nature of the MIDI notes output by the RS300.

• Note Velocity

Sets the MIDI velocity for every note. The range of possible values is 0 to 127.

Use this setting when you are not generating a dynamic MIDI velocity using input CV2. Note, however, that you will have no control over dynamics if all MIDI notes have the same velocity value.

• Transpose

Shift the output pitch by up to ±36 semitones.

Keyboard settings
(press "EDIT")

Note velocity

Transpose

Note sequencing

Note delay

Calibrate keyboard

Show keyboard input

• Note sequencing

This menu only has an effect while in free-run mode or if you are connected to an analogue synth with no trigger output, or one that has retriggering turned off.

There are two options:

Note 1 off, note 2 on

As the CV1 input crosses a note boundary, the previous note is turned off then the new note is turned on. (This is equivalent to taking your finger off one note then playing the next one.) The output is a new MIDI note ON every time that a new note is detected.

Note 2 on, note 1 off

As the CV1 input crosses a note boundary, a new note is turned on before the previous note is turned off. (This is equivalent to playing the new note before releasing the old.) If you are generating the CV1 input from a continuous controller such as ribbon controller or an Analogue Systems French Connection you should obtain a smooth transition between notes.

• Note delay

You may extend the delay between the RS300 receiving an analogue trigger and outputting a MIDI note. This allows any incoming CV to settle before the RS300 interprets it, and reduces the chance of misidentification.

To use this correctly, you should select the shortest time that provides accurate CV to MIDI conversion.

The range of values is 3ms to 50ms.

• Calibrate keyboard

This option allows you to calibrate the RS300 so that MIDI notes are generated correctly when you control the module using a 1v/octave CV+Gate keyboard.

To calibrate:

Apply a CV of 0v (often the bottom 'C' on an analogue keyboard) to the CV1 input, select "Apply 0v to input1" and then press EDIT.
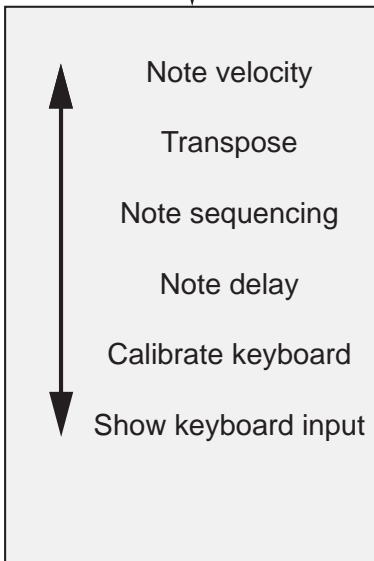
Next, apply a CV of 3v to the same input (i.e. play a note three octaves higher than before), select "Apply 3v to input1", and then press EDIT.

The RS300 is now calibrated.
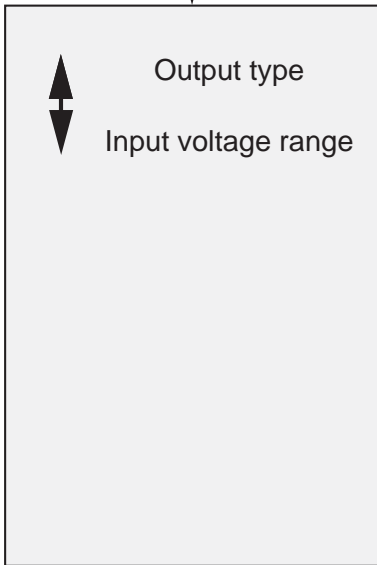
• Show keyboard input

For any CV applied to Input 1, this shows the closest MIDI note, and gives an indication of the amount of deviation from the ideal note voltage.

Input 2
(press "EDIT")

↓

```
┌─────────────────────────┐
│                         │
│  ↕   Output type        │
│                         │
│      Input voltage range│
│                         │
│                         │
│                         │
│                         │
│                         │
│                         │
│                         │
└─────────────────────────┘
```

Input 2 menu

Input 2

This menu provides two sub-menus that allow you to control the nature of the MIDI data generated by the analogue voltage presented to the CV2 input.

Output type

• Note Velocity

Use a CV to determine the MIDI velocity for each note. The range of possible values is 0 to 127.

Use this setting when your analogue keyboard has a VCA CV output, or when you wish to use another CV to control the MIDI note velocities.

Note: A MIDI velocity is only sent when a new note is output.

• **Pitch wheel**

The MIDI data sent is a pitch-bend message.

• **Aftertouch**

The MIDI data sent is an aftertouch message.

Output type
(press "EDIT")

↓

```
┌─────────────────────────┐
│  ↑     Note velocity    │
│  │                      │
│  │     Pitch wheel      │
│  │                      │
│  │     Aftertouch       │
│  │                      │
│  │     CC:0             │
│  │            ↑         │
│  │            │         │
│  │            │         │
│  ↓     CC:127           │
│                         │
└─────────────────────────┘
```

• **CC#0 - CC#127**

The MIDI data sent is a continuous controller message on the selected CC number.
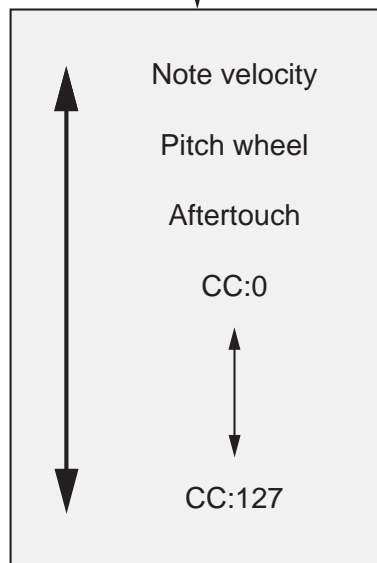
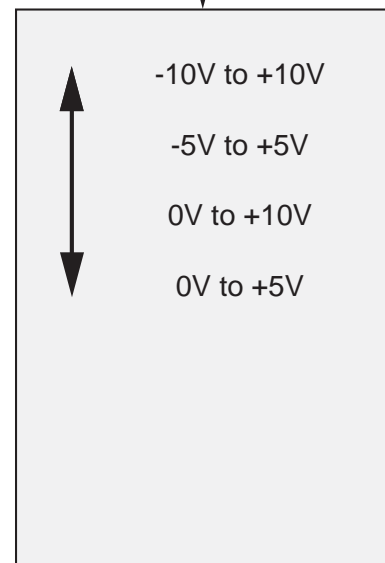### Input voltage range

Four voltage ranges are provided:

• -10v   to   +10v
• -5v   to   +5v
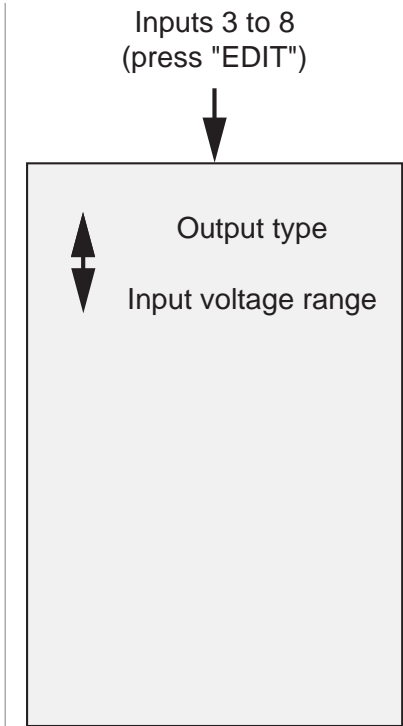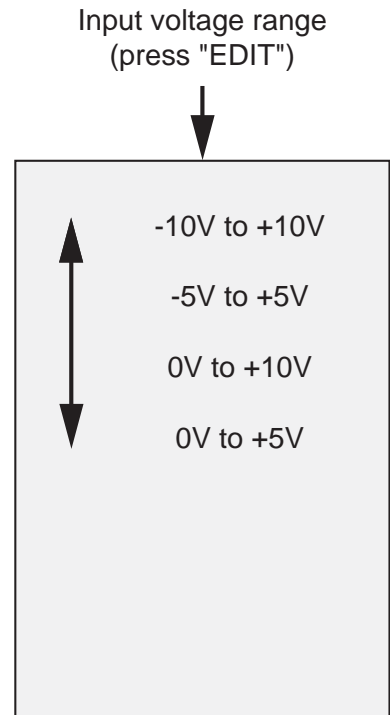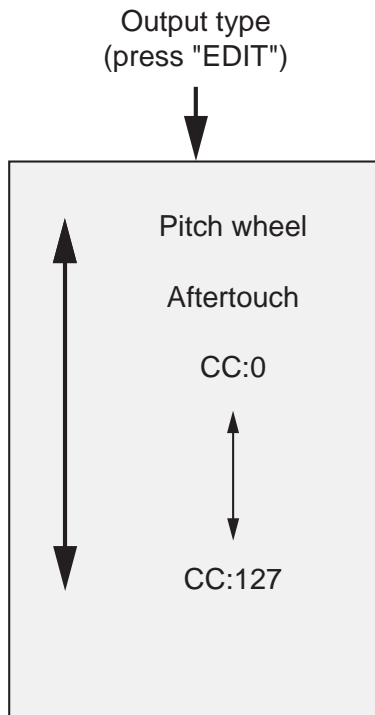• 0v   to   +10v
• 0v   to   +5v

Set the range to the most appropriate for the signal being presented to the CV2 input.

Input voltage range
(press "EDIT")

↓

```
┌─────────────────────────┐
│  ↑     -10V to +10V     │
│  │                      │
│  │     -5V to +5V       │
│  │                      │
│  │     0V to +10V       │
│  │                      │
│  ↓     0V to +5V        │
│                         │
│                         │
│                         │
└─────────────────────────┘
```

Inputs 3 to 8
(press "EDIT")

↓

```
  ↕      Output type

         Input voltage range
```

Inputs 3 to 8 menus

Inputs 3 to 8

These menus each provide two
sub-menus that allow you to
control the nature of the MIDI
data generated by the analogue
voltage presented to the CV3,
CV4, CV5, CV6, CV7 and CV8
inputs.

Output type

• **Pitch wheel**

The MIDI data sent is a pitch-
bend message.

• **Aftertouch**

The MIDI data sent is an
aftertouch message.

• **CC#0 - CC#127**

The MIDI data sent is a
continuous controller message
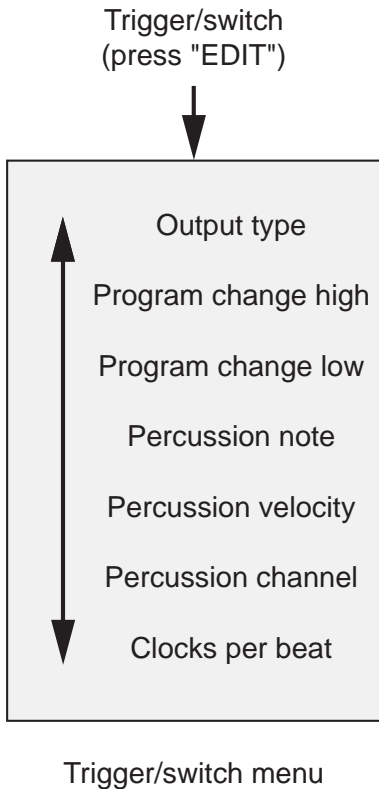on the selected CC number.

Input voltage range

Four voltage ranges are
provided:

* -10V to +10V
* -5V to +5V
* 0V to +10V
* 0V to +5V

Set the range to the most
appropriate for the signal being
presented to the CV2 input.

Output type
(press "EDIT")

↓

```
  ↕    Pitch wheel

       Aftertouch

       CC:0

  ↕

       CC:127
```

Input voltage range
(press "EDIT")

↓

```
  ↕   -10V to +10V

      -5V to +5V

      0V to +10V

      0V to +5V
```

Trigger/switch
(press "EDIT")

↓

```
┌─────────────────────────────┐
│  ↑                          │
│       Output type           │
│                             │
│   Program change high       │
│                             │
│   Program change low        │
│                             │
│     Percussion note         │
│                             │
│    Percussion velocity      │
│                             │
│    Percussion channel       │
│                             │
│      Clocks per beat        │
│  ↓                          │
└─────────────────────────────┘
```

Trigger/switch menu

Trigger/switch

This menu provides six sub-menus that allow you to control the nature of the MIDI data generated by the analogue voltage presented to the TRIGGER/SWITCH input.

You should always present a trigger or switch CV (i.e. one with a well-defined and sharp transition) to this input, or unpredictable results may ensue.

Output type

• Percussion

Send a note on the channel set in the Percussion channel menu. By default, this is set to MIDI channel 10, which is the channel used for drums and percussion in all GS and GM protocols.

Use this option in conjunction with the Percussion Note and Percussion Velocity menus that follow.

• Program Change

Send a MIDI Program Change message when there is a transition in the voltage presented to the input.

Use this option in conjunction with the Program Change High and Program Change Low menus that follow.

Output type
(press "EDIT")

↓

```
┌─────────────────────────────┐
│  ↑                          │
│       Percussion            │
│                             │
│     Program change          │
│                             │
│     Sustain pedal           │
│                             │
│      Portamento             │
│                             │
│       Sostenuto             │
│                             │
│       Soft pedal            │
│                             │
│    Legato footswitch        │
│                             │
│        Hold 2               │
│                             │
│       MIDI clock            │
│  ↓                          │
└─────────────────────────────┘
```

• Sustain pedal

Send a MIDI Sustain Pedal ON when the input goes high, and a Sustain Pedal OFF when it goes low.

• Portamento

Send a MIDI Portamento ON when the input goes high, and a Portamento OFF when it goes low.

• Sostenuto

Send a MIDI Sostenuto ON when the input goes high, and a Sostenuto OFF when it goes low.

• Soft pedal

Send a MIDI Soft Pedal ON when the input goes high, and a Soft Pedal OFF when it goes low.

• Legato footswitch

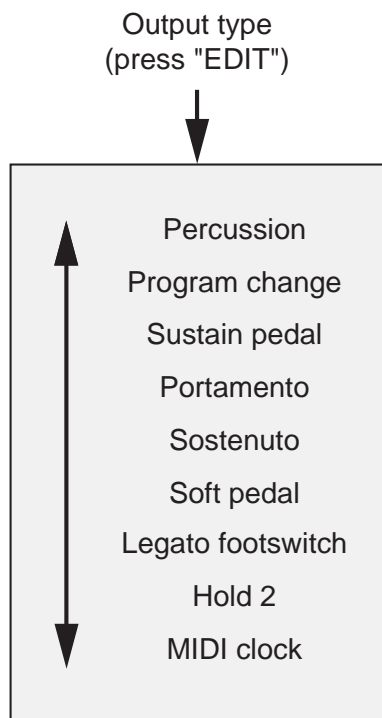Send a MIDI Legato ON when the input goes high, and a Legato OFF when it goes low.

• Hold 2

Send a MIDI Hold 2 ON when the input goes high, and a Hold 2 OFF when it goes low.

• MIDI Clock

A regular stream of pulses received at the input is converted into MIDI Clock.

Use this option in conjunction with the Clocks per Beat menu that follows.
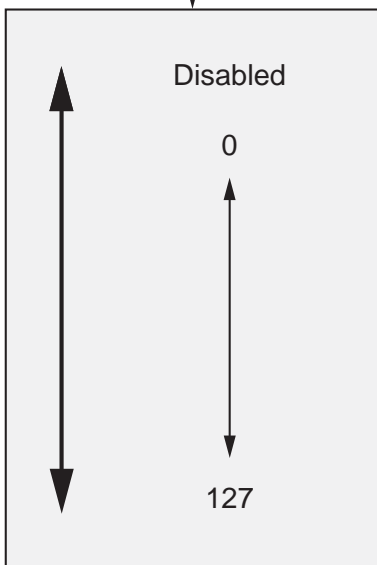
Program change high

Set the Program Change number that is sent when the input presented to the input goes high.

The Program Change is only output if the appropriate option is set in the Output Type menu.

Program change high
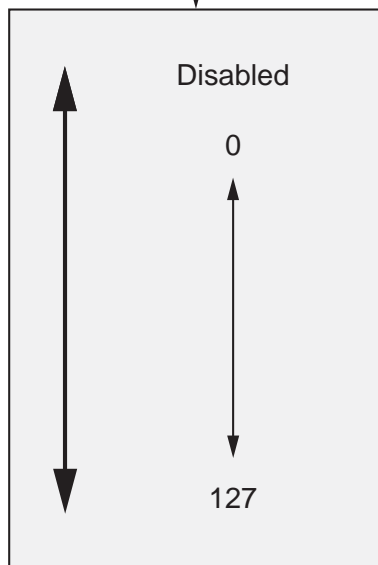(press "EDIT")

Disabled

0

127

Program change low

Set the Program Change number that is sent when the input presented to the input goes low.

The Program Change is only output if the appropriate option is set in the Output Type menu.

Program change low
(press "EDIT")

Disabled

0

127

Percussion note

Set the note number that is sent when a trigger is received at the input.

The Percussion note is only output if the appropriate option is set in the Output Type menu.

Percussion note
(press "EDIT")

0   -3C

127   7G
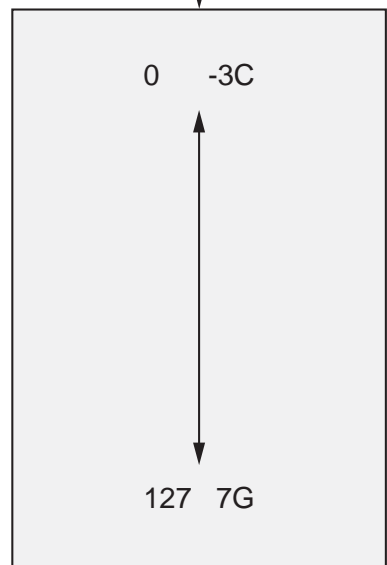
Percussion velocity

Set the velocity of the percussion note that is sent when a trigger is received at the input.

• Use velocity input:

The velocity is determined by the CV2 input, provided that the Note Velocity option is selected.

• 1 - 127

The velocity is constant at the value selected here.

The Percussion note is only output if the appropriate option is set in the Output Type menu.

Percussion channel

Set the MIDI channel on which the percussion note is sent.

The Percussion note is only output if the appropriate option is set in the Output Type menu.

Clocks per beat

Set the number of analogue clock pulses required per MIDI beat.

The MIDI beats per minute (BPM) are displayed while you are adjusting this menu. The range of tempo values is approximately 0 to 900 BPM.

The MIDI Clock is only output if the appropriate option is set in the Output Type menu.
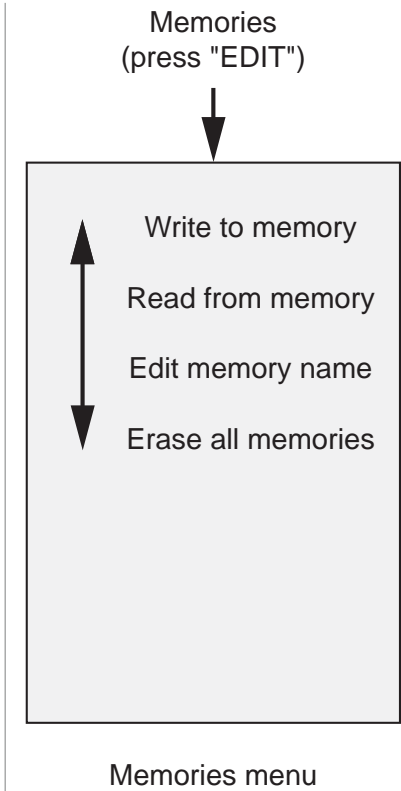
Percussion velocity
(press "EDIT")

Use velocity input

1

127
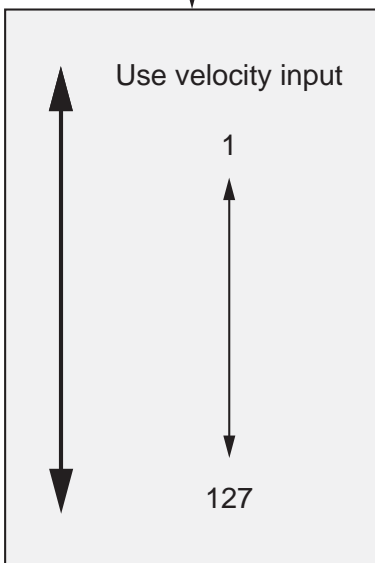
Percussion channel
(press "EDIT")

1

16
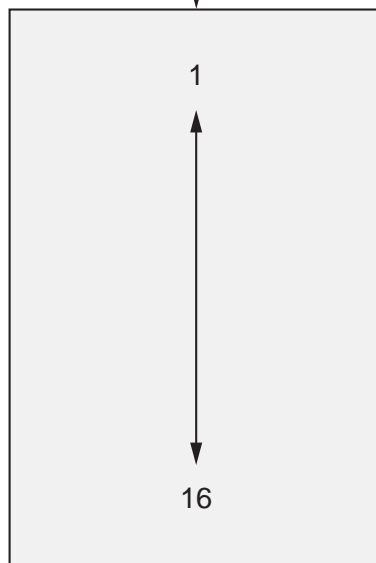
Clocks per beat
(press "EDIT")

1

24

Memories
(press "EDIT")

Write to memory

Read from memory

Edit memory name

Erase all memories

Memories menu
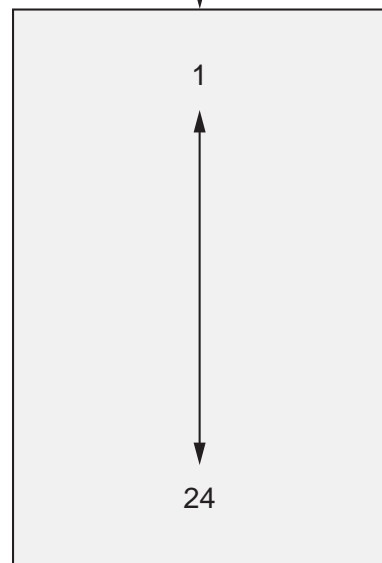
Memories

Allows you to store and recall complete RS300 setups.

Write to memory

You may write your current settings to any one of the 40 internal memories.

Rotate the EDIT knob to cycle through the memory locations, and press it to store your current setup.

Warning… this operation overwrites any existing settings and parameter values, which will be permanently lost.

Write to memory
(press "EDIT")

1

40

Read from memory

Rotate the EDIT knob to cycle through the memory locations, and press it to recall a saved setup.

Read from memory
(press "EDIT")

1

40
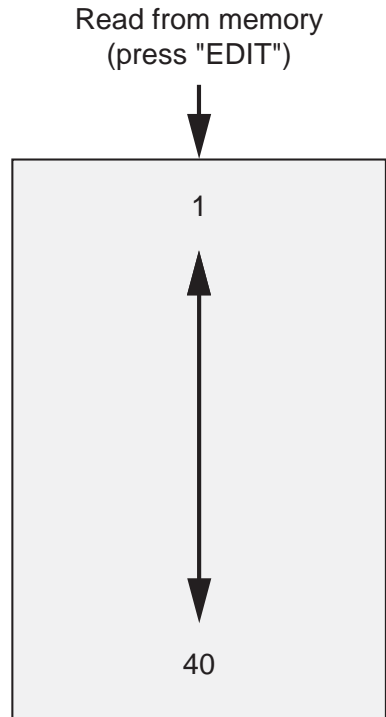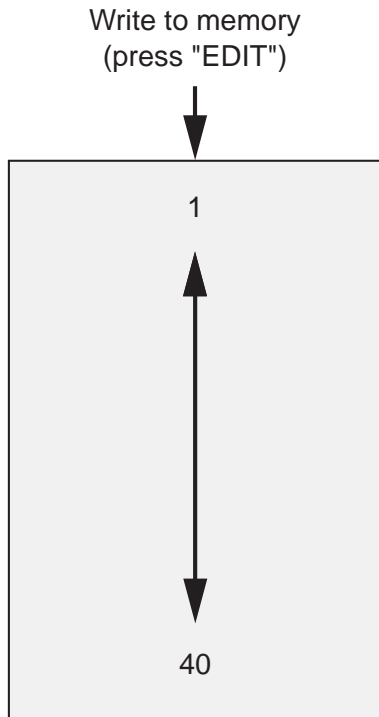
Edit memory name

With this menu selected you can rotate the EDIT knob to move left and right across the memory name.

Press the EDIT knob to select the character you wish to edit, then rotate it clockwise or anticlockwise to scan through the alphanumeric table.

You may insert a character into the selected position by pressing EDIT again.
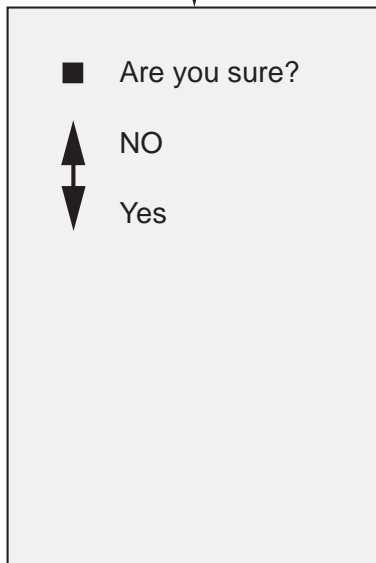
Edit memory name
(press "EDIT")

■ Edit memory name

xxxxxxxxxxxxxxxxx
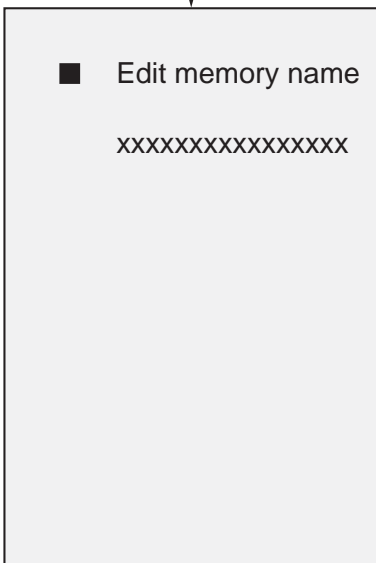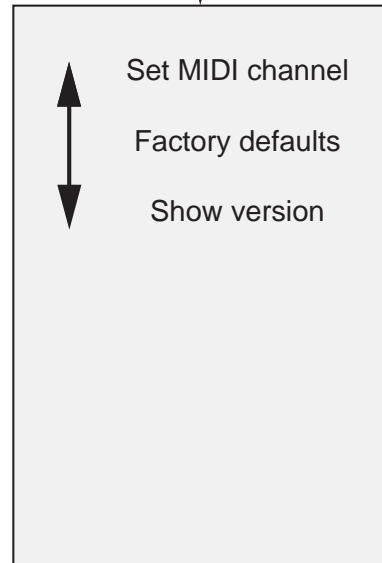
Erase all memories

Clears all memory locations.

Warning: this operation cannot be undone, and all information stored within the RS300 will be lost.

Erase all memories
(press "EDIT")

■ Are you sure?

NO

Yes

Special options
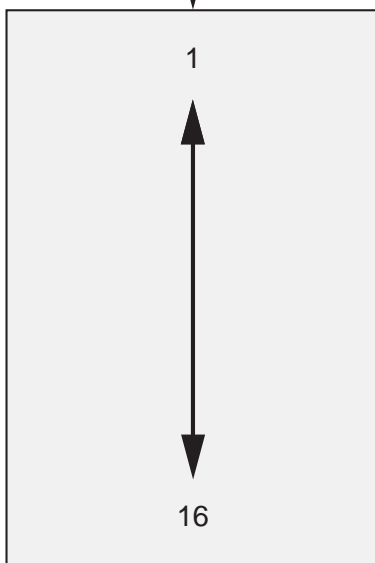(press "EDIT")

Set MIDI channel

Factory defaults

Show version

Special options menu

Set MIDI channel

Determine the channel on which the MIDI data are transmitted.

Set MIDI channel
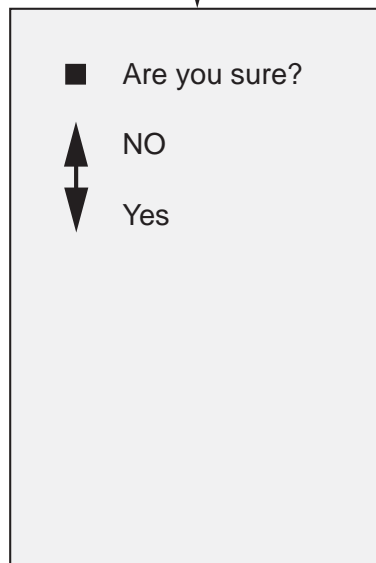(press "EDIT")

↓

1
↕
16

Factory defaults

This option allows you to reset the operation of the RS300 to the factory defaults.

Be careful how you use this; the operation cannot be undone and, if you wish to re-use settings that you previously created, you will need to reprogram them.
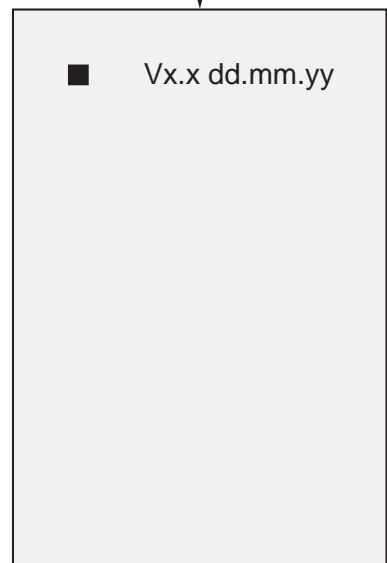
Factory defaults
(press "EDIT")

↓

■ Are you sure?
↑ NO
↓ Yes

Show version

Display the version of the operating system loaded.

Show version
(press "EDIT")

↓

■ Vx.x dd.mm.yy

THE FRONT PANEL

The front panel controls, inputs and output operate as follows:

Controls

- TRIGGER MODE

This determines when the RS300 will output note data. There are two options:

Trigger:

A note is generated every time that a suitable pulse is received at the NOTE TRIGGER input. The pulse is treated as a Gate, and the duration of the note is therefore equal to the duration of the pulse.

Free-run

A new MIDI note is generated every time that the voltage presented to the CV1 input crosses a note boundary.

Inputs

- CV1, CV2, CV3, CV4, CV5, CV6, CV7, CV8
  Accept analogue signals in the range ±10v.

- NOTE TRIGGER
  Accepts pulses in the range 0v to +10v.

  Low to High transition:
  The trigger goes "high" when the input voltage passes a low voltage to greater than 3.4v

  High to Low transition:
  The trigger goes "low" when the input voltage passes from a high voltage to less than 1.0v

- TRIGGER/SWITCH
  Accepts pulses in the range 0v to +10v.

Outputs

- MIDI OUT
  Transmits MIDI note, clock and controller data, as defined in the menus.

Indicators

- DATA
  Indicates the transmission of MIDI data.

GETTING YOU STARTED

Here's a simple exercise in the use of the RS300. Once you have understood this, you should be able to extend the principles to create a huge range of sounds and effects.

- Connect the TRI OUT of an RS80 voltage controlled LFO to the RS300 CV1 input
- Set the LFO frequency to, say, 0.25Hz, and the TRI OUT LEVEL to about '3'
- Connect the SQR OUT of a second RS80 LFO to the RS300 NOTE TRIGGER input
- Set this LFO frequency to, say, 5Hz, and the SQR OUT LEVEL to MAX
- Set the RS300 TRIGGER MODE to TRIGGER
- Connect the RS300 MIDI OUT to the MIDI IN of the module or keyboard you wish to control.
- Ensure that the RS300 MIDI channel is the same as the 'receive' channel of the module/keyboard
- Access the Input 1/Keyboard settings/Transpose menu and set this to +36
- Access the Input 1 menu and ensure that the Output Type is set to Note on/off

If you have set everything correctly, you should now hear a rising and falling series of quantised notes. This is because the voltage generated by the first LFO is being treated as a keyboard CV, and is generating a chromatic scale as it sweeps up and down. (The Transpose = +36 setting moves the sweep into the standard MIDI note range.) At the same time, the second LFO is generating a series of pulses - the Gates - that tell the RS300 which notes to play.

You can, of course, substitute different modules, and create far more complex patches to take advantage of the RS300's ability to generate MIDI controllers, velocity, and so on. You can also use genuine keyboard CVs to determine the pitches played, substitute unconventional controllers such as the Analogue Systems French Connection, or even create drum patterns using - for example - the RS200 Sequencer tuned to specific note values.

Above all… experiment.