RS290

SAMPLER/DELAY

ECHO/DELAY

Echo was almost certainly the earliest 'effect' used on electronic sounds. It is also the easiest to produce: all you need is a tape recorder with a record head offset by a few centimetres from the playback head. If you then record a sound onto the tape, you can replay it as a single echo a few fractions of a second later, with the delay determined by the tape speed and the distance between the heads. Later innovations included machines with multiple heads that produced a series of echoes, and tape loop systems that - if you wished - extended the number of echoes to infinity, each sounding muddier and less like the original sound than the previous. If you listen to the electronic music of the 1950s, you'll find it awash with tape echo, sometimes used to excellent effect, more often not.

The problem with tape echo was that it was neither convenient nor cheap to produce. A lighter and more affordable alternative arrived in the 1970s with the development of the bucket brigade device, or BBD. Although totally analogue in nature, a BBD takes a series of samples of the incoming audio, and allows you to tap these at various stages as they pass down a series of discrete steps through the device. BBDs made cheap electronic delay lines a commercial reality and, although they never sounded as good as their tape-based counterparts, solid state "echo units" soon became a staple of electronic music.

Although the maximum delay times available from BBD echo units tended to be rather short - of the

order a few hundred milliseconds - they proved to be ideal for a wide range of electronic effects such as chorus, flanging and phasing, whereupon their often metallic sound could prove to be a benefit rather than a hindrance. The Analogue Systems RS310 Reverb / Chorus is one such device and, unlike the stand-alone units developed in the '70s, this offers significant benefits such as voltage control of the delay time and voltage control of the mix between the unaffected and affected signals.

Offering far higher fidelity, digital delay lines (DDLs) were also developed in the 1970s. Although clunky by today's standards, the earliest of these were unbelievably expensive, which is why they did not come to the attention of most musicians for another decade or so. To explain precisely how a digital delay line works would require a thorough treatise on sampling theory, and this manual is not the correct place for that. Nonetheless, it's not hard to grasp the basics…

A digital delay line is nothing more nor less than a specialised computer that samples an incoming signal and stores it in RAM. These samples are typically taken at a rate of 44,100 times per second, and stored with a resolution of 16- or 24- bits per sample. Once a sample is held, it can be read back at any time (or times) determined by the delay algorithm, until it is necessary to replace it with another incoming sample. The amount of time a sample can be stored is determined by the amount of RAM in the system.

If you can modulate the clock rate of a DDL and mix the affected signal with the original, you can create a much wider range of effects than just simple delays. As on their analogue counterparts, this is the method used to recreate sounds such as chorusing, flanging and phasing.

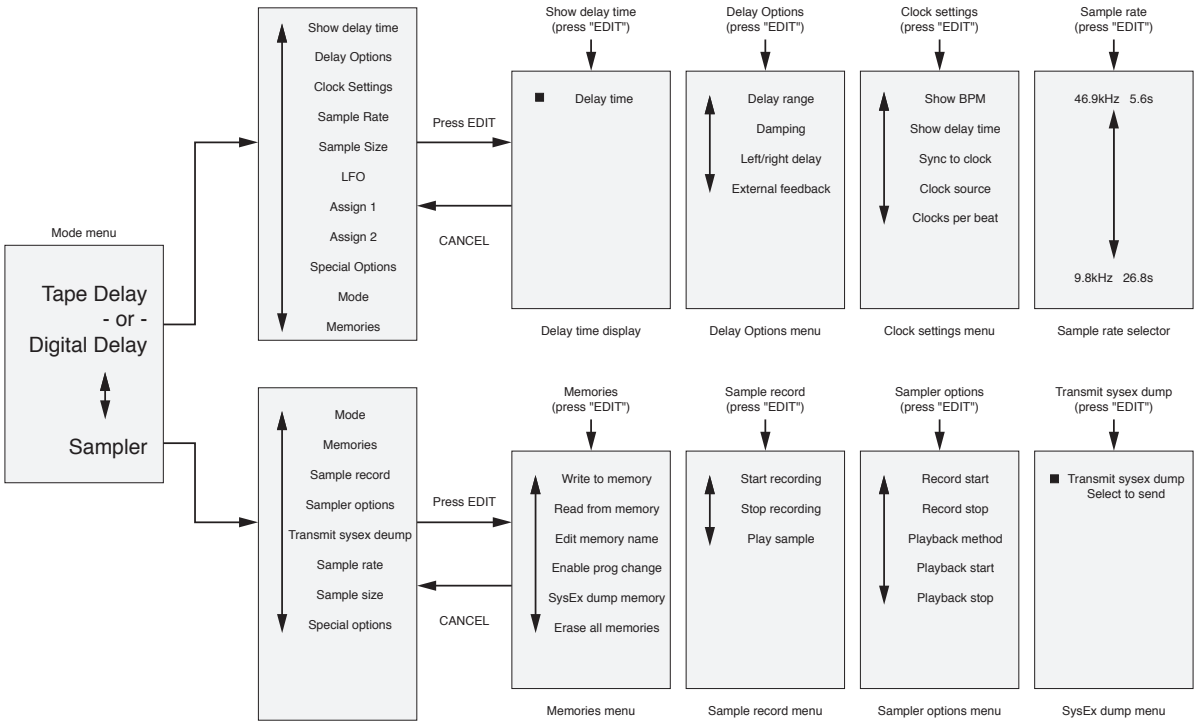
SAMPLER

Like the digital effects units mentioned above, digital samplers use computer memory to store clips of audio that have been converted into digital form by an analogue-to-digital converter. Playing back these clips is simply a matter of reversing the process, reading the information in the memory and converting this - as accurately as possible - back into the original audio.

It this were the limit to the capabilities of a digital sampler, it would not be a particularly useful tool. However, if we vary the rate at which the memory is read during the playback process, we can alter the pitch of the audio, transposing the sound up and down. So, for example, if an audio clip was sampled at a clock rate of 44,100 times per second, but played back at 22,050 samples per second, the resulting sound would have a pitch exactly one octave lower than the original. Clearly, if we could control the clock rate using a keyboard (or other controller of some sort) we could 'play' the audio clip just like the waveform produced by a conventional, analogue oscillator.

In the 1970s, early users of the newly developed sampling technology were carried away by this idea, and transposed many vocal and instrumental sounds inappropriately, producing an effect sometimes called 'munchkinisation'. This arises when the nature of the clip is altered too much by the transposition, making the tonal qualities unsuitable for the pitch that is being produced. The solution to this was to develop instruments capable of recording and storing multiple clips, and distributing these clips across the range of pitches required.

'Multi-sampling' required more powerful processors and a significant increase in memory, so early performance samplers such as the Fairlight CMI were extremely expensive. But the cost of hardware diminished rapidly throughout the 1980s and 1990s, and manufacturers can now design low-cost devices that offer a huge range of sampling, editing, and replay capabilities. The RS290 is one such device, and although it is a single-voice sampler, its unique combination of digital sampling, computer-based sample manipulation and control via analogue CVs makes it a unique product that allows you to experiment with sound in ways that are not possible elsewhere.



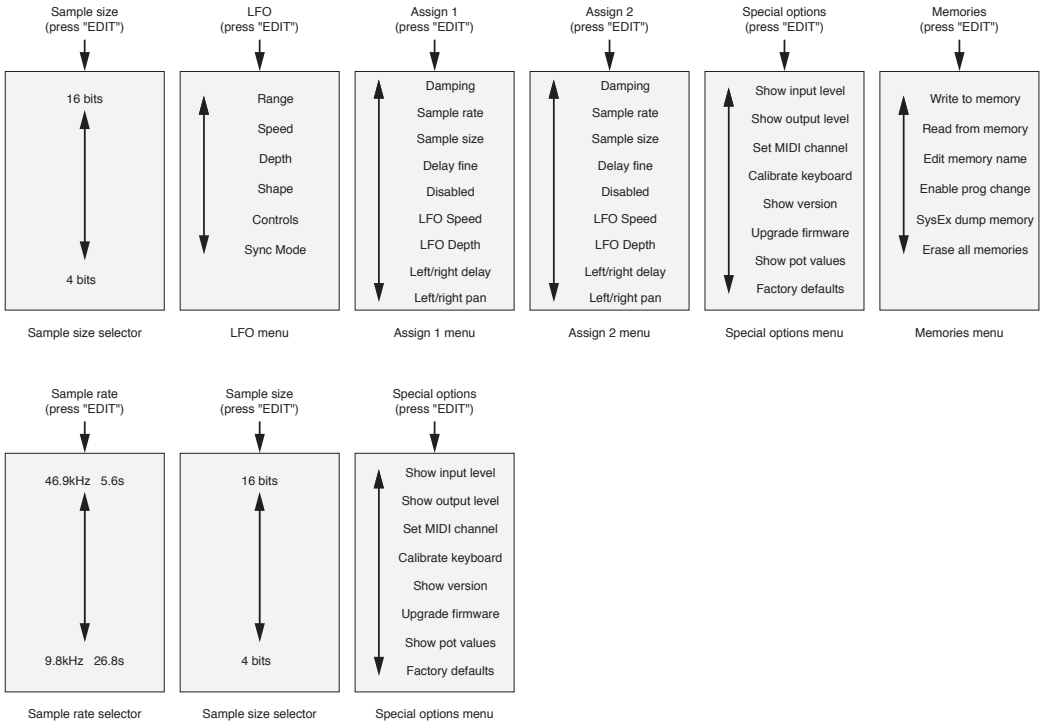
RS290 menu structure: v2.8, dated 9 April 2007

IN USE

The RS290 is in many ways two separate products. On one hand, it's a sophisticated Delay unit with six distinct modes of operation, and its inputs, controls and menus act in ways that are most appropriate for using it in this fashion. However, a quick change to Sampler mode alters the front panel operation and substitutes the eleven Delay menus and numerous sub-menus with eight Sampler menus and sub-menus that allow you to use it as a powerful, voltage controlled, single-voice sampler.

There is some overlap between the operation and menu structures in the two modes, so the rest of this chapter is divided into three sections:

- Common menus
- Menus and commands specific to the Delay modes
- Menus and commands specific to the Sampler mode



NAVIGATION

The RS290 is controlled primarily by the menus displayed on its 2 line x 20 character LCD. This display is backlit to aid its use in darkened conditions.

The two main menus (the top level of each menu hierarchy) offer access to the sub-menus, which in turn may offer additional sub-sub-menus. (The sub-sub-menus are not shown above.)

- Navigate through any menu by **rotating** the EDIT knob.
- Move "down" to select a sub-menu by **pressing** the EDIT knob.
- Enter a value and 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.

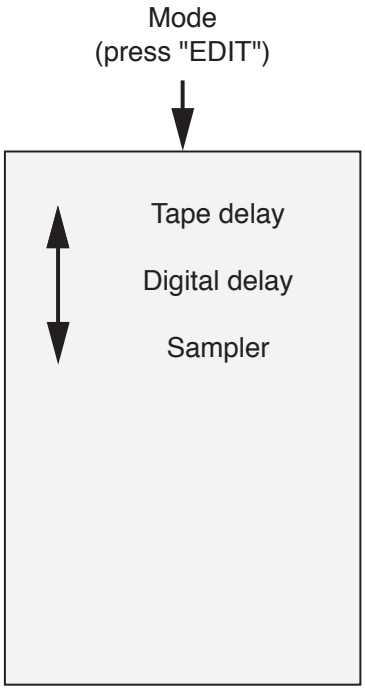
COMMON MENUS

(Refers to v2.8)

There are five sub-menus that are common to the Tape delay, Digital Delay and Sampler modes.

- Mode
- Sample rate
- Sample size
- Special options
- Memories

Of these, Mode, Sample rate and Sample size offer all their options within the sub-menu itself. In contrast, Special Options and Memories have extensive sub-sub-menus.

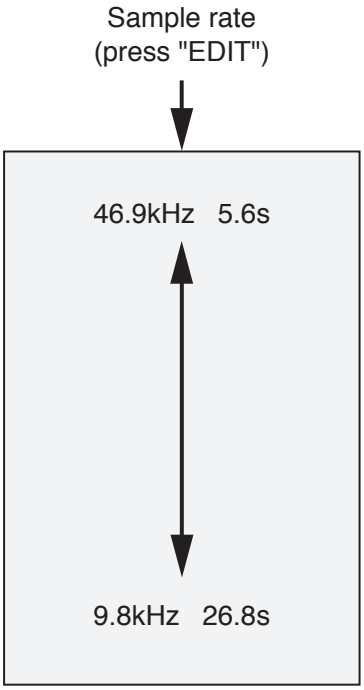


Mode menu

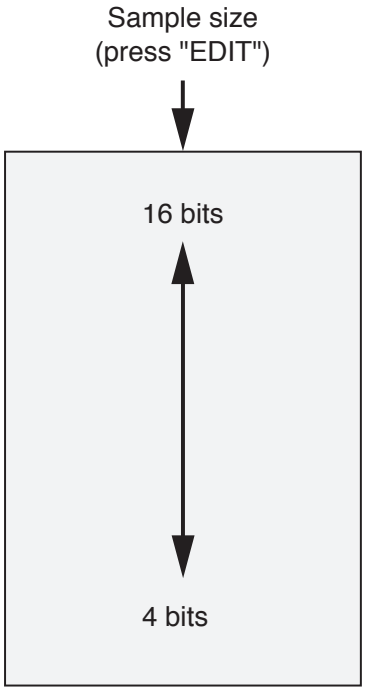
Mode

This menu allows you to switch between Tape delay, Digital delay and Sampler modes.

When you do so, all settings are remembered, so you can return to the previous mode and find that its dedicated menus and settings are in the same state as you left them.



Sample rate selector



Sample size selector

Sample rate

You may select the sample rate of the digital audio data stored and used within the RS290.

You can not set the sample rate independently for the Delay and Sampler modes, and the value set in this menu will be used by both.

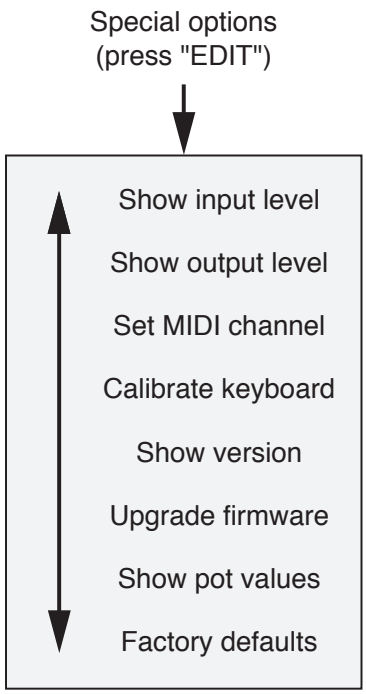
The time (in seconds) shown to the right of the sample rate is the amount of sample time available at the selected sample rate.

Sample size

You may select the sample size (or 'wordlength') used within the RS290.

You can not set the sample size independently for the Delay and Sampler modes, and the value set in this menu will be used by both.

Higher sample sizes increase fidelity, while lower sizes increase the 'grittiness' of the sound, and offer additional creative options.



Special options menu

Show input level
Show output level

These display the levels of the signals presented to the SIGNAL IN input and provided at the OUT L output, respectively.

For optimum results, the signals should lie in the "+" range. If either signal lies below this in the "-" range, you should check the input level and, if necessary, increase the INPUT GAIN or the level offered by the device providing the signal.

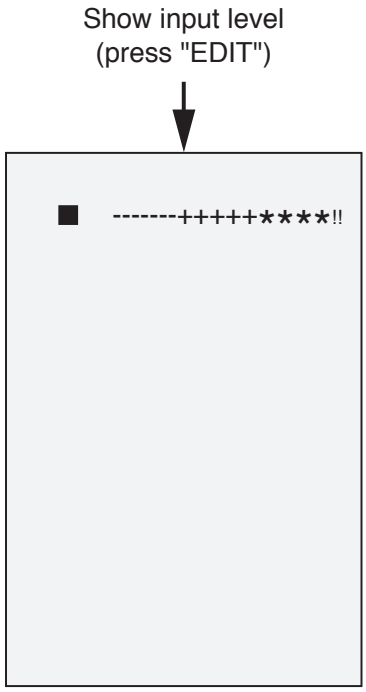
Peaking in the * range is acceptable, but if either display shows the "!" symbol, the signal will be clipping, and unpleasant distortion may result.

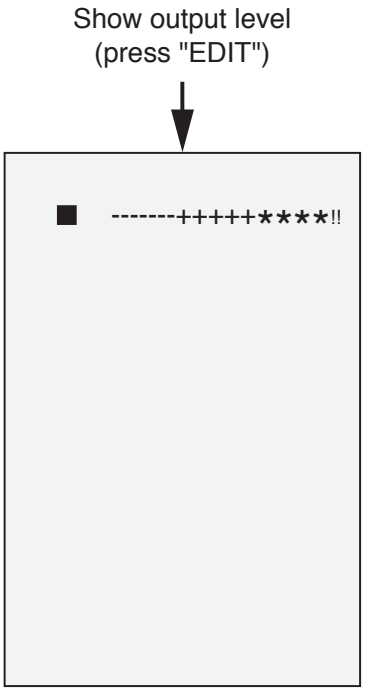
Set MIDI channel

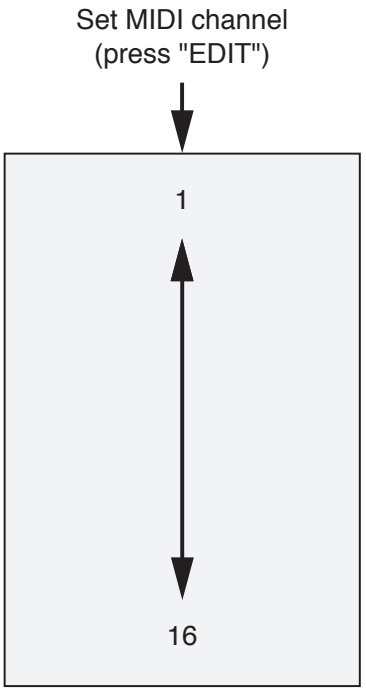
(Requires Analogue Systems RS295 Delay Expander module)

The channel set here is used throughout the RS290 and RS295. You cannot set it independently for the Delay and Sampler modes.

The selected MIDI channel is used for both SysEx dumps and program change commands.







Calibrate keyboard

This option allows you to calibrate the RS290 so that, in Sample mode, you can play the sample from an "x" V/Oct keyboard and have it track correctly across a wide range.

To calibrate:

Apply a CV of 0v to the ASSIGN/SAMPLE PITCH input, select "Apply 0V to Sample pitch input" and then press SELECT.

Next, apply a CV of 3V to the same input (on a 1V/Oct keyboard play a note three octaves higher than before), select "Apply 3V to Sample pitch input", and then press SELECT.

The RS290 is now calibrated.

Show version

Display the version of the operating system loaded.

Upgrade firmware

This option allows you to upgrade the firmware that lies at the heart of the RS290.

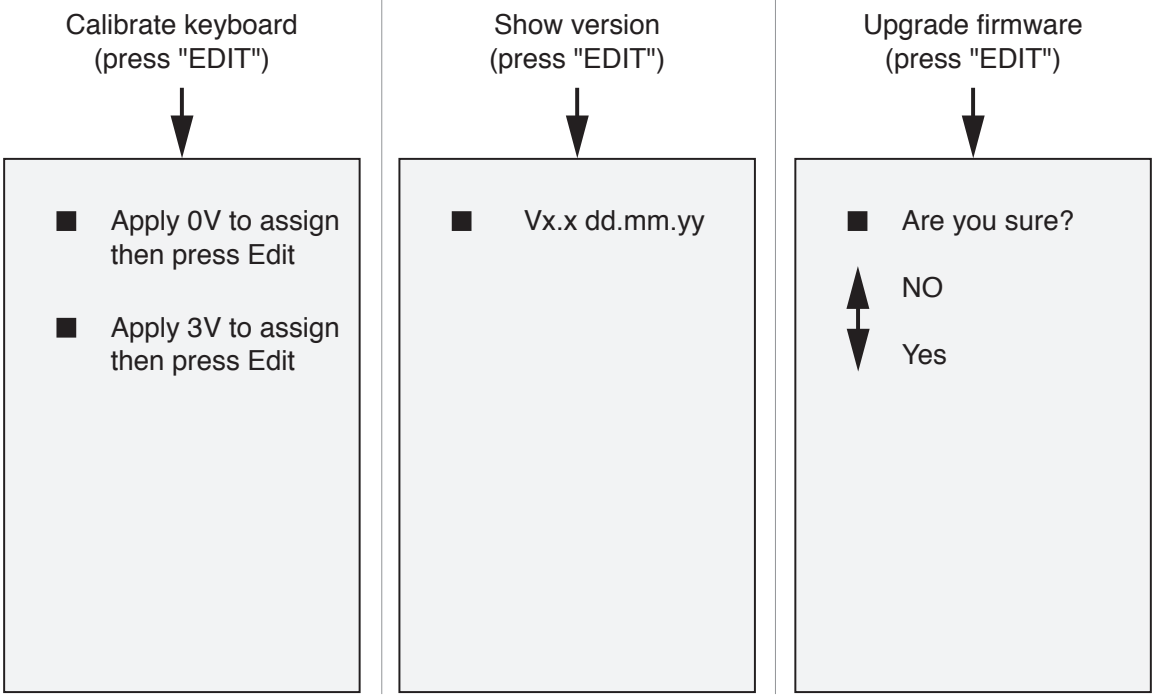
If you answer "Yes", the device will show:

FLASH PROGRAMMER
WAITING FOR DATA...

If you are unable to present the new software to the MIDI Input on the RS295 Delay Expander, the RS290 will lock up.

DO NOT WORRY.

Switch off the RS290, wait a few seconds, and switch on again. It will then function as before.



Show pot values

The screen displays the knob values as follows.

Upper row:

- Input gain
- Repeat speed / Sample start
- F/B gain / Sample end
- Wet/Dry mix

Lower row:

- Assign / Sample pitch
- RS295 Assign 2 (if connected)

Note: The Wet/Dry mix value is only shown when the Bypass on/off switch is set to On.

If CVs are received at the following inputs, the readouts show the values generated by the sum of the knob positions and the input voltages.

Upper row:

- -
- Repeat speed / Sample start
- F/B gain / Sample end
- -

Lower row:

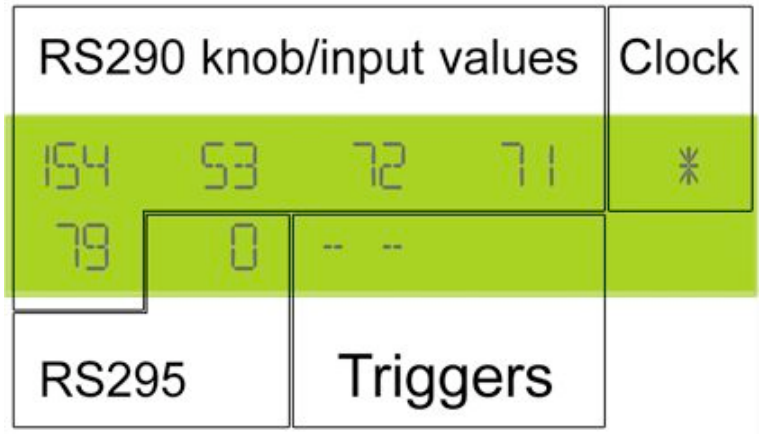
- Assign / Sample pitch
- RS295 Assign 2 (if connected)

Triggers:

The two dash "-" marks report when triggers are received at TRIG1 or TRIG2 by changing to hash "#" marks.

Clock:

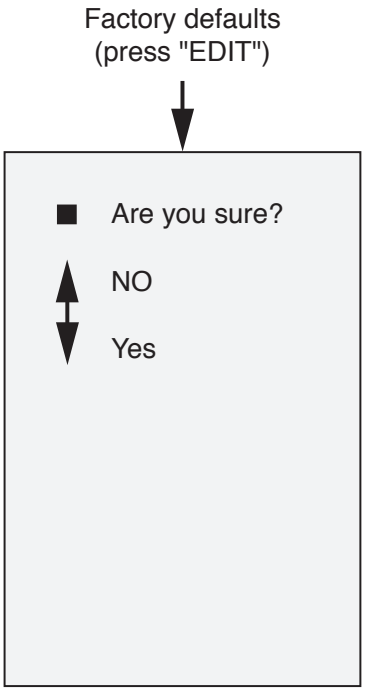
The asterix in the top righthand corner shows the clock, which is by default triggered by TRIG1.

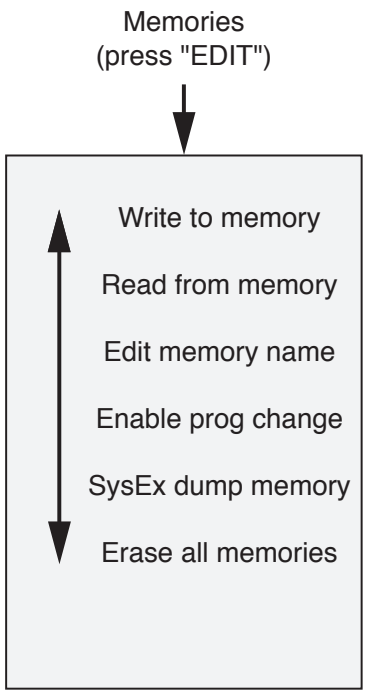


Factory defaults

This allows you to reset the operation of the RS290 to the factory defaults.

Be careful how you use this; the operation cannot be undone and, if you wish to re-use effects that you previously created, you will need to reprogram or (if appropriate) reload any of your own effects, sounds or settings.





Memories menu

Write to memory

You may write your current settings (but not sample data) to any one of the 50 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 unless saved elsewhere beforehand.

Read from memory

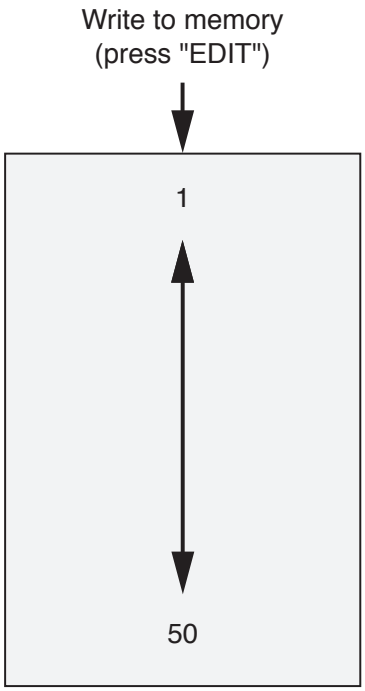
Rotate the EDIT knob to cycle through the memory locations, and press it to recall a saved setup.

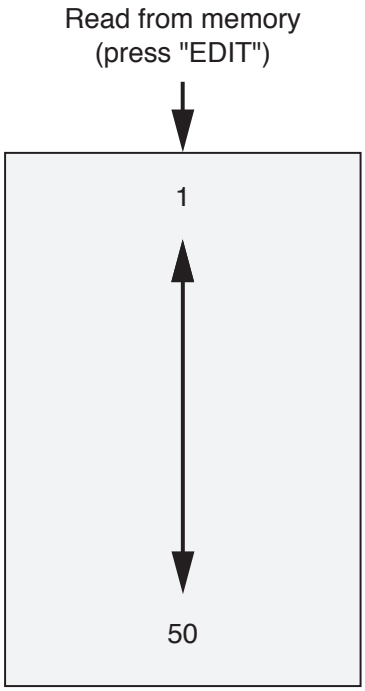
Edit memory name

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 anti-clockwise to scan through the alphanumeric table.

You may insert a character into the selected position by pressing EDIT again.





Enable prog change

(Requires Analogue Systems RS295 Delay Expander module)

• **Yes**

The RS290 will respond to MIDI program change messages in the range 1 to 50, selecting the memory of that number.

This operation overwrites any existing settings and parameter values, which will be permanently lost unless stored beforehand.

• **No**

The RS290 will not respond to MIDI program change messages.

Sysex dump memory

(Requires Analogue Systems RS295 Delay Expander module)

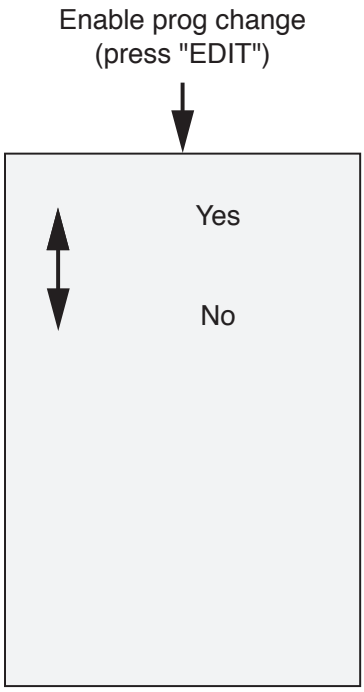
Press EDIT to dump the currently active memory via SysEx.

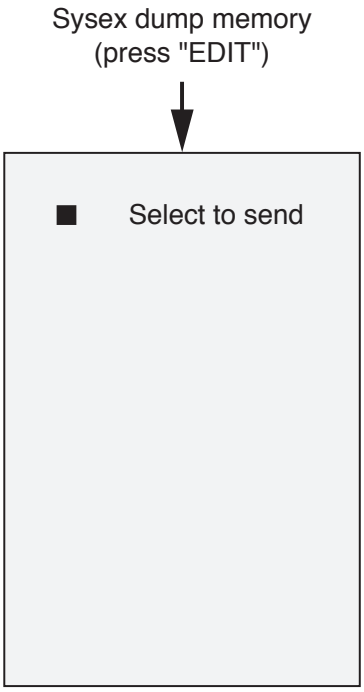
Note that the unit receiving the information must be ready to accept the SysEx dump, or it will not be stored.

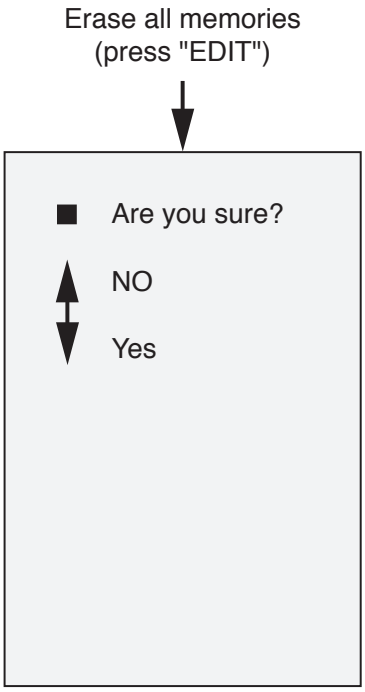
Erase all memories

Clears all fifty memory locations.

This operation cannot be undone, and all information stored within the RS290 will be lost unless it has been archived elsewhere using the RS295's SysEx capabilities.







THE DELAY MODES

The RS290 provides two delay modes; one which echoes the operation of a vintage tape delay, and the other of which is that of a modern digital delay unit.

Tape delay

In Tape delay mode, the operation is very similar to a true tape delay, on which the delay time is determined by the speed of the tape as it passes across the heads, and is controlled by speeding up the tape and slowing it down, as appropriate. This makes it possible to create unusual effects that are not as common today as they were thirty years ago. For example, if the tape is running slowly (you have a long delay time) and you then speed up the tape the delay time will decrease and the pitch of the delayed sound will increase. Once the whole loop of tape has run through the machine, the delay time will stay at its new, faster rate, but the pitch of the delayed sound will drop back to the input pitch. Extending this idea a bit further, imagine that you increase the tape speed and then quickly decrease it. The pitch will increase and then decrease. Then, as the loop is replayed on its next revolution a few seconds later, the opposite will happen; the pitch will decrease, then increase.

The Tape delay mode on the RS290 imitates this unusual behaviour, thus making it possible to create all manner of unusual effects. However, due to the nature and complexity of the algorithm needed, you may experience the generation of digital artefacts. You may wish to avoid these, or alternatively use them to create extreme sounds, as you choose.

Digital delay

If you think of the Digital delay mode in analogue terms it differs from the Tape delay in the following manner:

- In Tape delay mode, changes in delay time and pitch are caused by changing the tape speed, while the distance between the heads remains constant.

- In Digital delay mode the 'tape' runs at a fixed speed but the distance between the heads varies.

Digital delay mode is capable of creating larger pitch shifts, but the shift only occurs while the virtual 'tape head' (delay time) is being moved. As soon as you stop changing this, the pitch at the output returns to the input pitch.

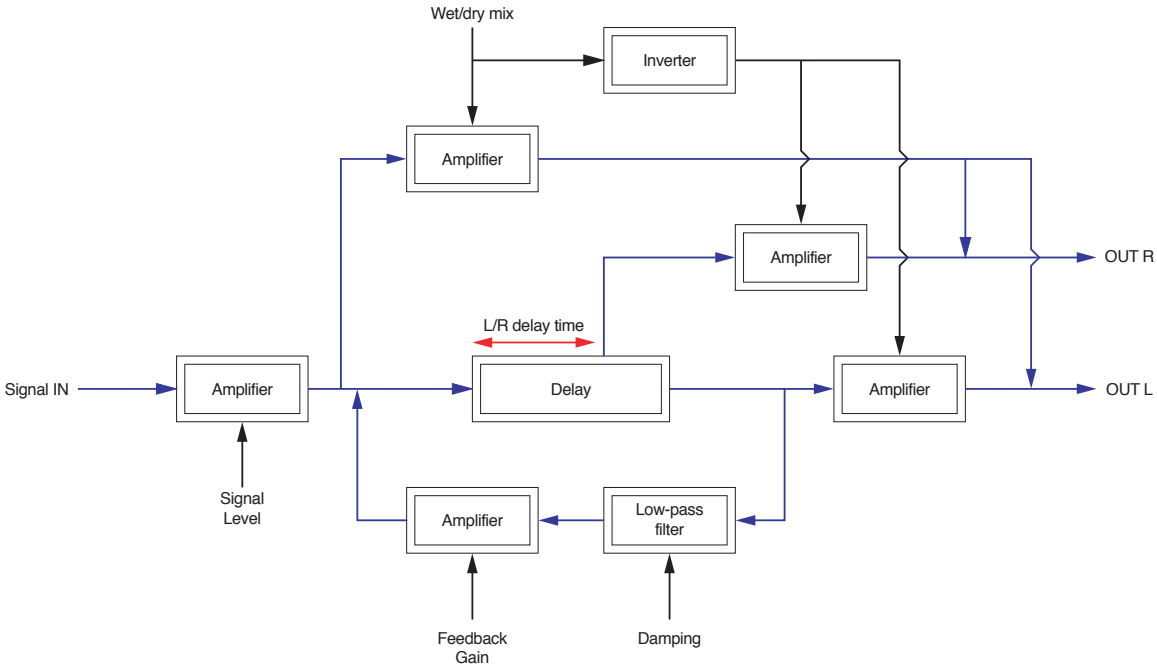
One novel consequence of this is that, if you increase the delay time quickly enough, you can make the RS290 play the sound backwards briefly. (To visualise this, imagine moving the head faster than the tape is moving).

The incidence of artefacts in much smaller in Digital delay mode than in Tape delay mode, but you may still experience some at extreme settings.

Delay Sub-Modes

Both types of delay offer three sub-modes of operation (for a total of six delay modes) as described in the following pages.

DELAY SUB-MODES



Stereo Delay

(Refers to v2.8)

The RS290 offers three delay sub-modes, selected using the Delay Options menu. There are myriad ways in which you will be able to use these to create new sounds and effects; far more than can be described here. To help you to understand these, the signal path diagrams show the three configurations:

- **Stereo delay (no external feedback loop)**

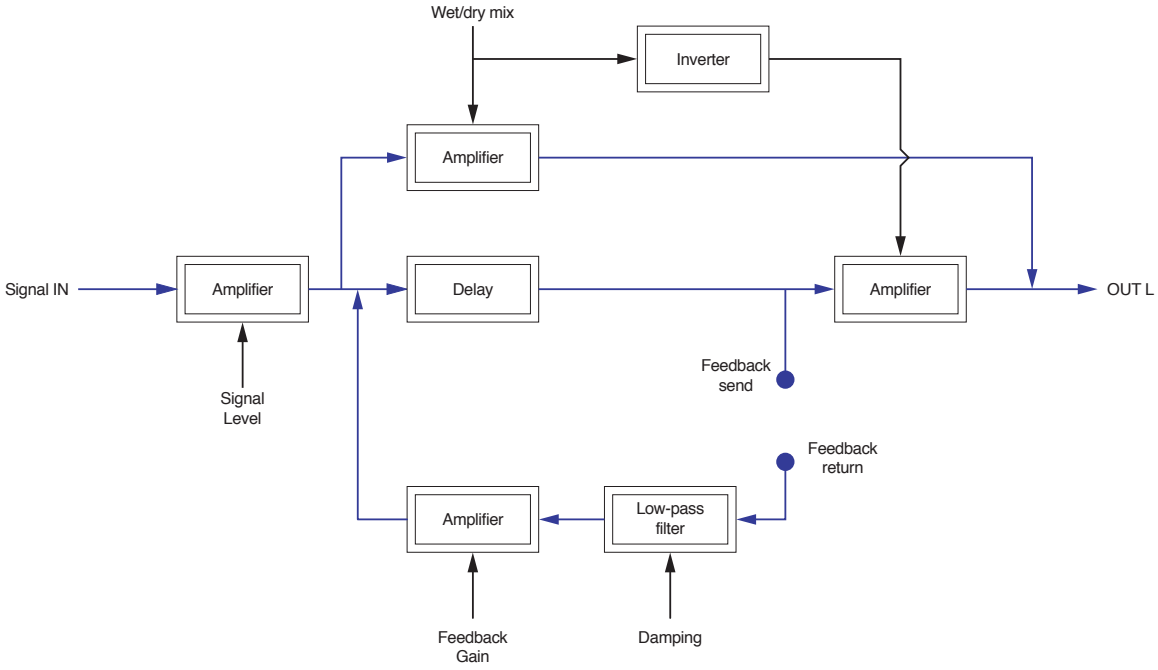
The RS290 acts as a stereo delay unit, with two taps presented to the Left and Right outputs.

- **Mono delay ('Pre' effect loop)**

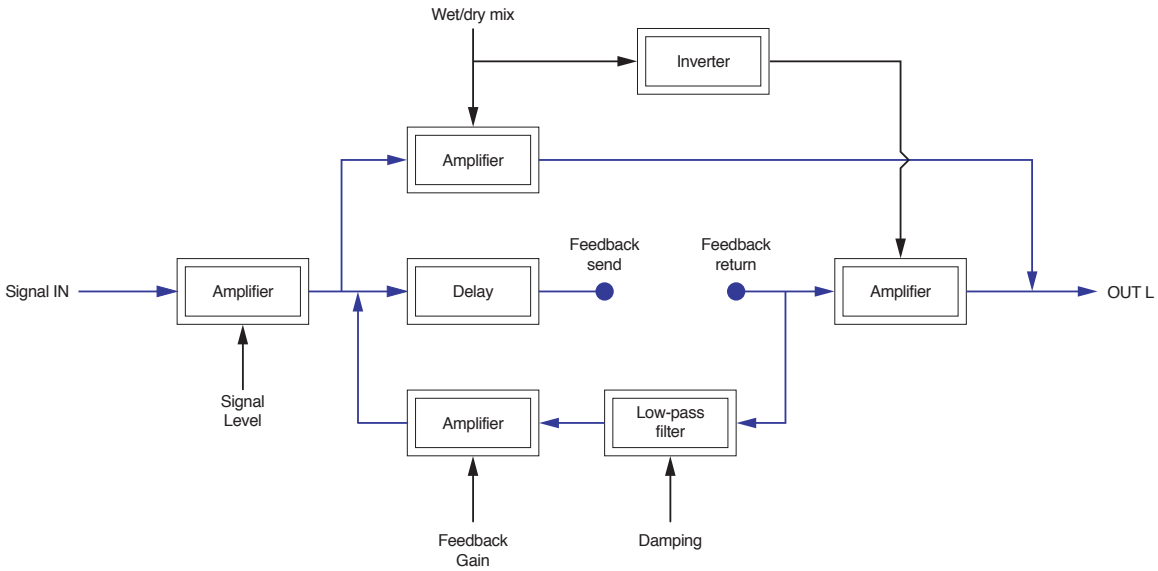
With this selected, you can patch external effects and treatments into the regeneration loop.

- **Mono delay ('Post' effect loop)**

With this selected, you can patch external effects and treatments into the signal path following the output from the delay itself. As in 'Pre' mode, these will affect the regeneration loop, but will also affect the output signal.



'Pre' effect



'Post' effect

THE FRONT PANEL

In the delay modes, the front panel controls, inputs and outputs operate as follows:

Controls

- INPUT GAIN
  Adjusts the input level in the range -80dB to +3dB

- REPEAT SPEED
  Adjusts the delay time. To keep quantisation noise to a minimum, use as short a delay range as possible for your desired delay

- F/B GAIN
  Controls the feedback gain.
  - With the knob turned fully anticlockwise, the Gain is zero.
  - With the knob turned fully clockwise, the Gain is unity.

- WET/DRY MIX
  Controls the amount of wet (affected) and dry (original) signal in the output mix.
  - With the knob turned fully anticlockwise, the output comprises input signal only.
  - With the knob turned fully clockwise, the output comprises delayed signal only.

- BYPASS
  When switched to Bypass, this determines that the output contains no affected signal. It is equivalent to rotating the WET/DRY MIX knob to its fully anticlockwise position.

- ASSIGN
  This input can be assigned various functions

Inputs

- SIGNAL IN
  Accepts audio signals in the range ±3V. Signals in excess of 6V p-p will cause clipping.

- F/B RETURN
  Accepts audio signals in the range ±3V. Signals in excess of 6V p-p will cause clipping.

  Note: The Feedback return is effective only when one of the external feedback modes are enabled in the menus.

- REPEAT SPEED CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the REPEAT SPEED knob immediately above it.

- F/B GAIN CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the F/B GAIN knob immediately above it.

- ASSIGN CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the ASSIGN knob immediately above it.

- TRIG1
  Apply pulses in the range +1.5V to 20V to this input for use as a clock or LFO 'sync' reset.

- TRIG2
  Apply pulses in the range +1.5V to 20V to this input for use as a clock or LFO 'sync' reset.

Outputs

- OUT L
  Outputs a signal in the range ±2.25V. Signals in excess of 4.5V p-p may be clipped.

- OUT R / F/B SEND
  Depending upon the Delay Mode, this acts as the output for the right audio channel (stereo delay sub-mode) or as the Send for an external feedback loop ('Pre' and 'Post' sub-modes).

Indicators

- LEVEL (Signal IN & Signal OUT)
  These offer visual feed back regarding the signal level at input and output.

- LED off	very low signal level
- LED green/amber	optimum signal level
- LED red	clipping is occurring

DELAY MENUS

The following pages outline the menu structure in the Delay modes, and detail all the options available.

The top level of the menu heirarchy is as shown here.

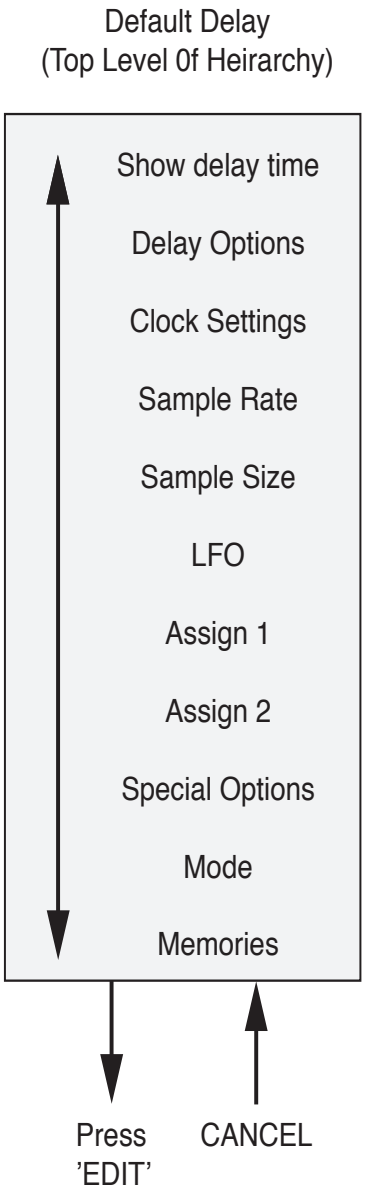
Five sub-menus are common to both the Delay and Sampler modes. These are:

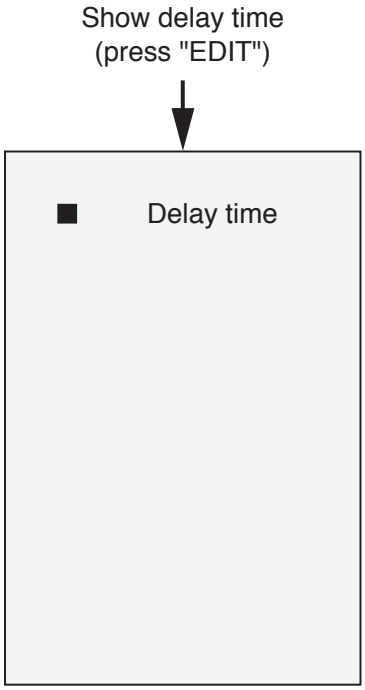
- Mode
- Sample rate
- Sample size
- Special options
- Memories

The following pages will, therefore, explain the functions of the remaining six sub-menus:

- Show delay time
- Delay Options
- Clock Settings
- LFO
- Assign 1
- Assign 2

Of these, Show delay time offers no sub-sub-menus. The other five sub-menus have extensive sub-sub-menus, with each offering additional sets of options.



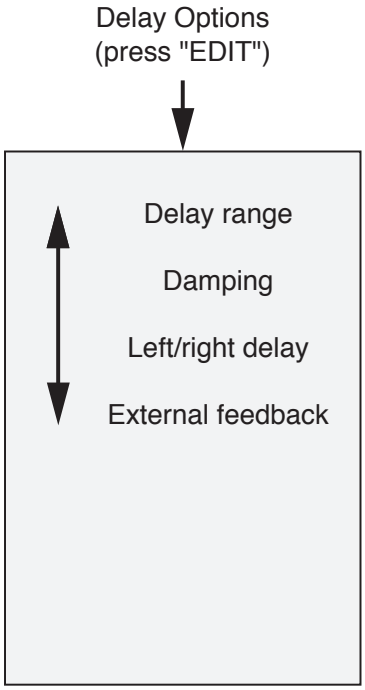


Delay time display

Show delay time

This sub-menu displays the delay time to four decimal places (i.e. to an accuracy of one ten thousandth of a second).

This menu has no sub-menus.



Delay Options menu

Delay Options

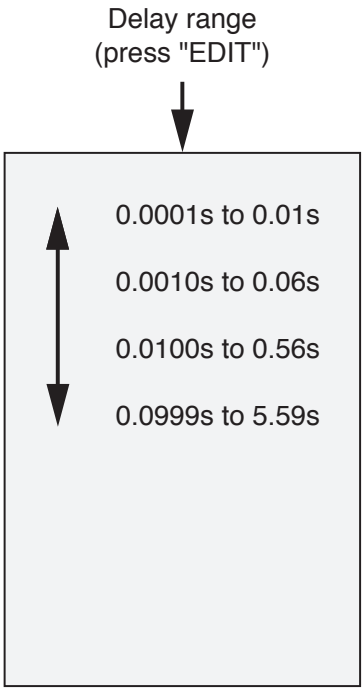
This sub-menu provides four sub-sub-menus that allow you to control the primary nature of the echo / delay effect.

Delay range

You may select from four ranges.

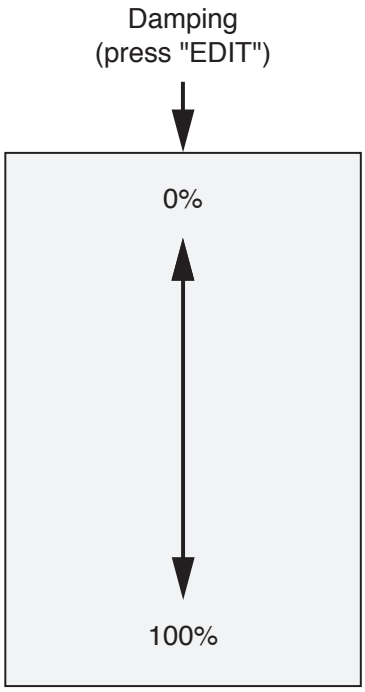
The exact nature of the ranges is dependent upon the sample rate selected in the Sample Rate sub-menu. At the maximum rate of 46.9kHz, the ranges offer delays lying between 0.0001s to 5.59s. At the minimum sample rate of 9.8kHz, the ranges lie between 0.005s and 26.85s.

The Repeat Speed front-panel control will work within the selected range, with the fastest repeats (i.e. the shortest delay) at the clockwise extreme, and the slowest repeats (i.e. the longest delay) at the anticlockwise extreme.



Damping

Select feedback damping from 0% to 100%



Left/right delay

The percentage of the overall delay time between the left and right outputs (50%=halfway)

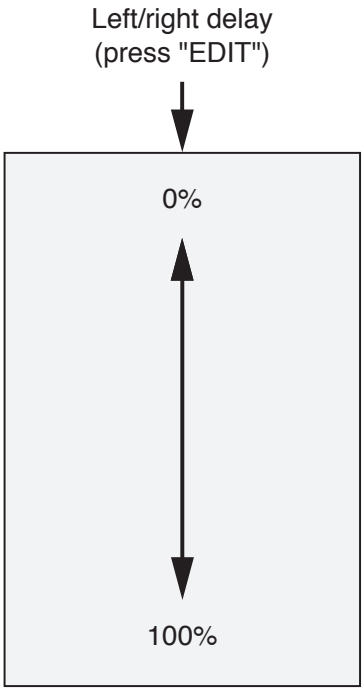
External feedback

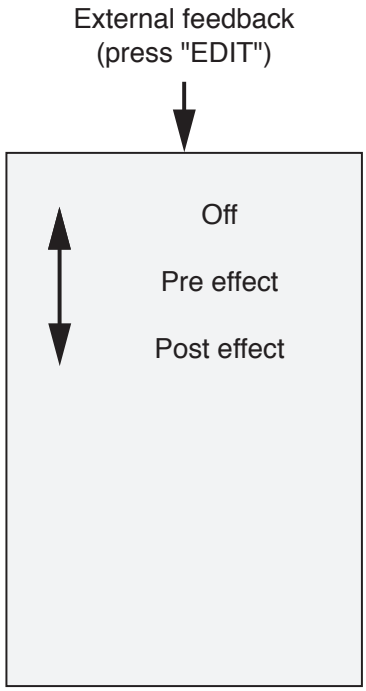
Allows you to use the external feedback loop (F/B SEND - F/B RETURN) in three ways:

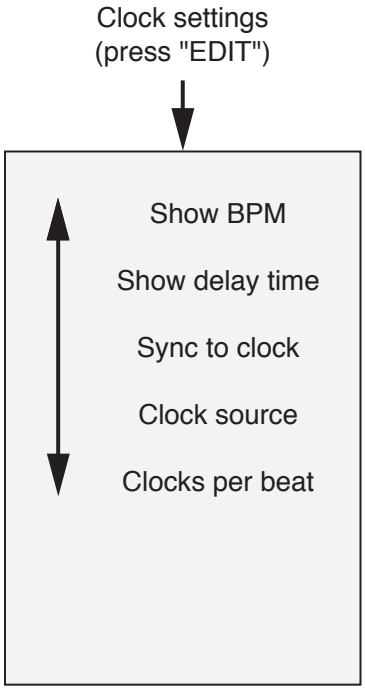
• **Off:**
There is no external feedback

• **Pre effect:**
The F/B SEND output lies before the effect in the signal path. For further information, refer to the diagrams earlier in this chapter.

• **Post effect:**
The F/B SEND output lies after the effect in the signal path. For further information, refer to the diagrams earlier in this chapter.







Clock settings menu

Clock settings

This sub-menu provides five sub-sub-menus that allow you to control other characteristics of the echo/delay effect.

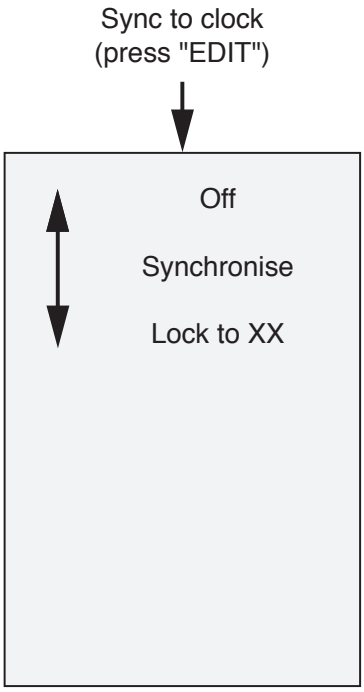
Sync to clock

Determines whether the delay effect is synchronised to an external clock and the input from which the clock is derived.

• **Off**
The delay is not synchronised to an external clock.

• **Synchronise**
The repeat speed is controlled by the REPEAT SPEED knob, but any increase or decrease in the speed of the external clock will cause a corresponding increase or decrease of the repeat speed.

• **Lock to XX**
The repeat speed is locked to a fraction of the external clock frequency. For example, if "lock to 3" is selected, the input will repeat once every three beats. The fraction "XX" is controlled by the REPEAT SPEED knob.



Clock source

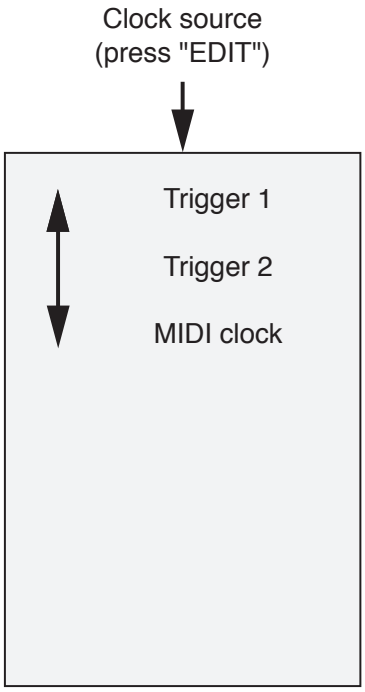
Determines the source for the clock signal used within the RS290. There are three options:

• **Trigger1**
A stable set of triggers received at the TRIG1 input will be used as the clock.

• **Trigger2**
A stable set of triggers received at the TRIG2 input will be used as the clock.

Midi clock *(requires RS295)*
A MIDI Clock signal received at the RS295 MIDI IN will be used as the clock.

Note: When receiving a clock signal a star in the top right hand corner of the display will flash at half the clock frequency .



Clocks per beat

Determines how many clocks there are per beat.

If the clock source is set to MIDI clock this should normally be set to "1".

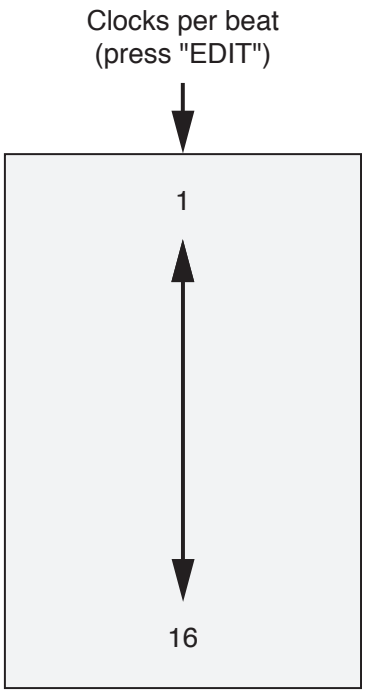
Show BPM

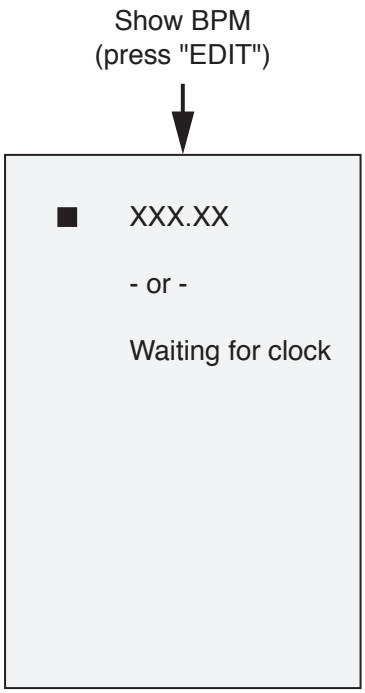
Displays the incoming clock in Beats Per Minute.

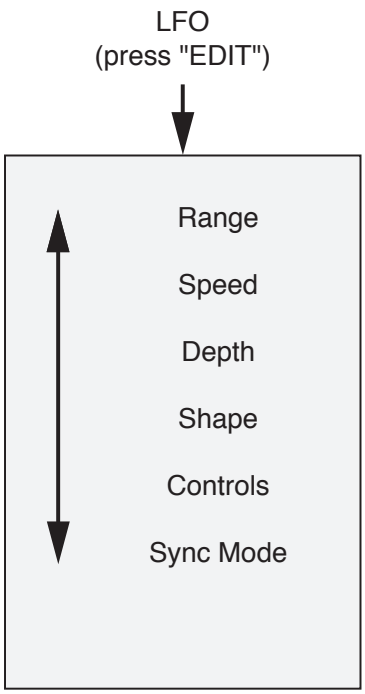
If no clock is detected, the message "Waiting for clock" is shown.

Show delay time

Displays the current delay time. You cannot adjust the delay time here.







LFO menu

LFO Range and Speed

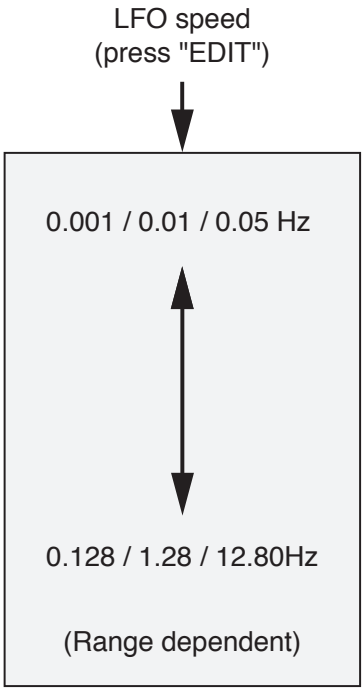
Three LFO ranges are provided:

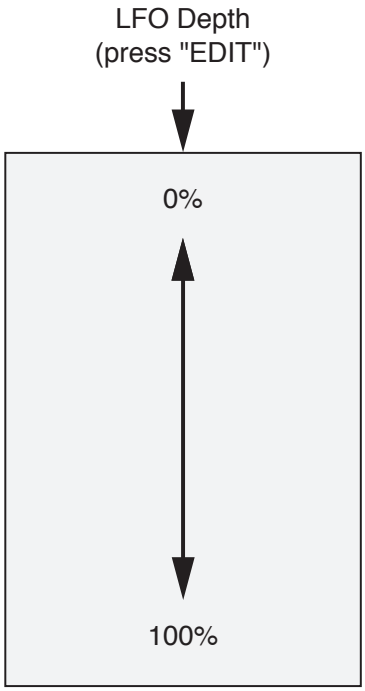
- 0.0005Hz - 0.128Hz
- 0.005Hz - 1.28Hz
- 0.05Hz - 12.8Hz

Within each of these ranges you can determine the speed of the internal LFO using the LFO speed menu.

LFO Depth

This menu determines the depth of the LFO effect applied to the selected destination in the 'LFO Controls' sub-sub-menu.





LFO Shape

Determines the waveform generated by the LFO. There are five options:

- Square wave
- Triangle wave
- Sawtooth wave
- Reverse sawtooth (ramp) wave
- Sine wave

LFO Controls

Use this to determine the parameter of the delay effect that is modulated by the LFO. There are four options:

- **Nothing**
No LFO is applied

- **Left/Right delay**
The LFO signal is added to the left/right delay ratio, altering the timing relationship between the channels

- **Delay time**
The LFO signal is added to the delay time. This generates a wide range of pitch shifting, phasing and flanging effects

- **Left/right pan**
The LFO signal controls panning between the left and right outputs

Sync mode

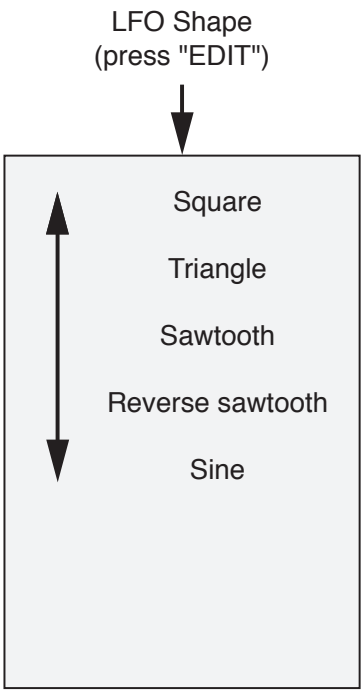
Determines whether the LFO is synchronised to an external source, and what that source is. There are four options:

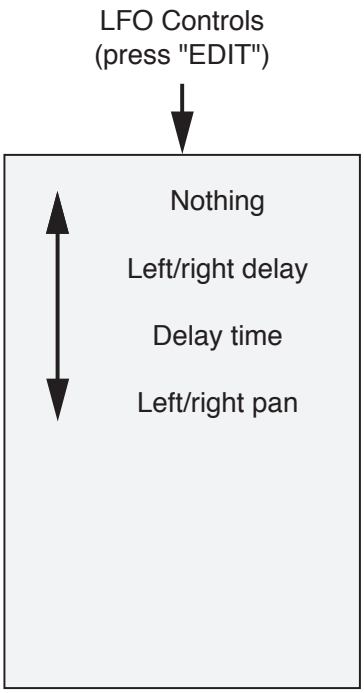
- **No sync**
The LFO 'free runs' and produces a continuous waveform

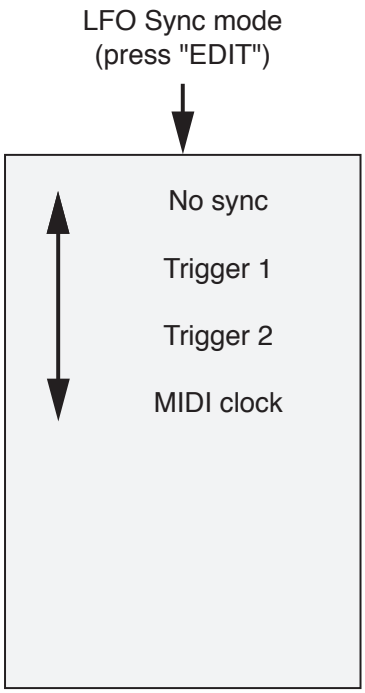
- **Trigger1**
The LFO is reset by a suitable signal applied to the TRIG1 input

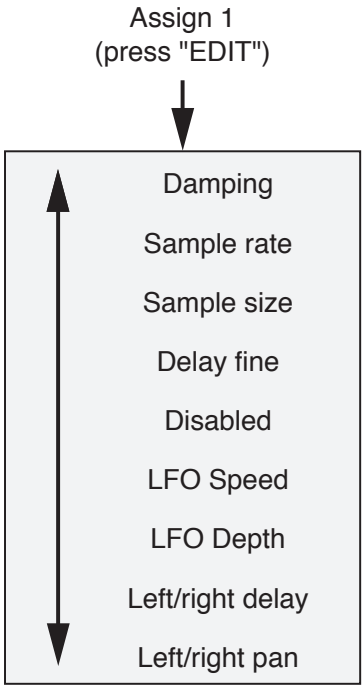
- **Trigger2**
The LFO is reset by a suitable signal applied to the TRIG2 input

- **MIDI clock** ***(RS295 required)***
The LFO is reset every 24 midi clocks







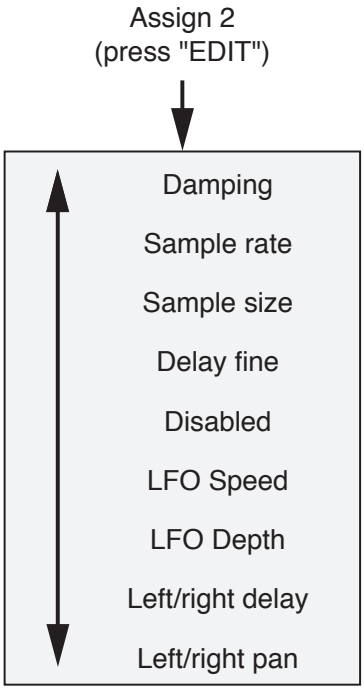


Assign 1 menu

Assign 1

This sub-menu offers eight destinations for the CV applied to the ASSIGN CV input.

This menu has no sub-menus.



Assign 2 menu

Assign 2

This sub-menu is identical to Assign 1, and offers eight destinations for the CV applied to the ASSIGN2 CV input found on the RS295 DELAY EXPANDER.

If the RS295 expander is not connected then the Assign 2 menu will not appear.

This menu has no sub-menus.

• **Damping**

Controls the amount of feedback damping.

• **Sample rate**

Steps through the available sample rates. This can cause extreme effects, and should be used with care.

• **Sample size**

Steps through the available wordlengths. This can cause extreme effects, and should be used with care.

• **Delay fine**

Allows you to modulate the delay time.

• **Disabled**

Disables the effect of the applied CV.

• **LFO speed**

Affects the speed of the internal LFO, allowing further CV control of the delay time, left/right delay ratio, and left/right pan.

• **LFO depth**

Affects the depth of the internal LFO, allowing further CV control of the delay time, left/right delay ratio, and left/right pan.

• **Left/right delay**

Directly affects the left/right delay ratio.

• **Left/Right pan**

Directly affects the left/right pan.

SAMPLER MODE

The RS290 is unlike any conventional digital sampler. Its combination of sampling with voltage control of record start/stop, playback start/stop, and playback/loop points is unique, and allows you to create sounds and effects not available elsewhere.

The RS290 will store a single clip of audio with a maximum length of 26.8 seconds. You can sample the clip manually, or use one of a selection of triggers to start and stop the sampling process. If you use electronic record and playback triggers, you can take samples dynamically, updating the stored data and replaying this in a variety of ways not possible using conventional samplers.

There are numerous playback modes, including the standard one-shot, looped and alternating modes. You can set the start and stop times (i.e. the range of the audio data) used for playback, and modify these settings dynamically using control voltages. This allows you to selected different snippets of the sampled audio.

THE FRONT PANEL

In Sample mode, the front panel controls, inputs and outputs operate as follows:

Controls

- INPUT GAIN
  Adjusts the input level in the range -80dB to +3dB

- SAMPLE START
  Adjusts the start point for the sample playback and/or loop

- SAMPLE END
  Adjusts the end point for the sample playback and/or loop

  Note: If the end point is less than the start point the sample will not play

- WET/DRY MIX (Affects OUT L only)
  Balances the audio signal being received at the SIGNAL IN input with the output of the existing sample (if being played back).
  - When fully anticlockwise (DRY) only input signal is heard
  - When fully clockwise (WET) only the sample is heard

  When no signal is being received at the SIGNAL IN input, this knob acts as an output level control for the sampler.

- BYPASS
  When switched to Bypass, this determines that the output contains only input signal. It is equivalent to rotating the WET/DRY MIX knob to its fully anticlockwise position.

- SAMPLE PITCH
  Allows you to play back the sample at various pitches. If you have calibrated the 0V - 3V keyboard scale correctly (see Common Menus / Special Options) you will be able to play the sample in conventional fashion. You may also input non-keyboard control voltages for special effects.

Inputs

- SIGNAL IN
  Accepts audio signals in the range ±3V. Signals in excess of 6V p-p will cause clipping.

- F/B RETURN
  Not used.

- SAMPLE START CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the SAMPLE START knob immediately above it.

- SAMPLE END CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the SAMPLE END knob immediately above it.

- SAMPLE PITCH CV
  Accepts control voltages in the range -5V to +5V. The incoming voltage is added to that determined by the SAMPLE PITCH knob immediately above it.

- TRIG1
  Apply pulses in the range +1.5V to 20V to this input for use as a clock or LFO 'sync' reset.

- TRIG2
  Apply pulses in the range +1.5V to 20V to this input for use as a clock or LFO 'sync' reset.

Outputs

- OUT L
  Outputs a signal in the range ±2.25V. Signals in excess of 4.5V p-p may be clipped.

- OUT R / F/B SEND
  Outputs a 50/50 mix of the existing sample (if played) and the signal presented to the SIGNAL IN input.

Indicators

- LEVEL (Signal IN & Signal OUT)
  These offer visual feed back regarding the signal level at input and output.

- LED off	very low signal level
- LED green/amber	optimum signal level
- LED red	clipping is occurring

SAMPLE MENUS

The following pages outline the menu structure in Sample mode, and detail all the options available.

The top level of the menu heirarchy is as shown here.

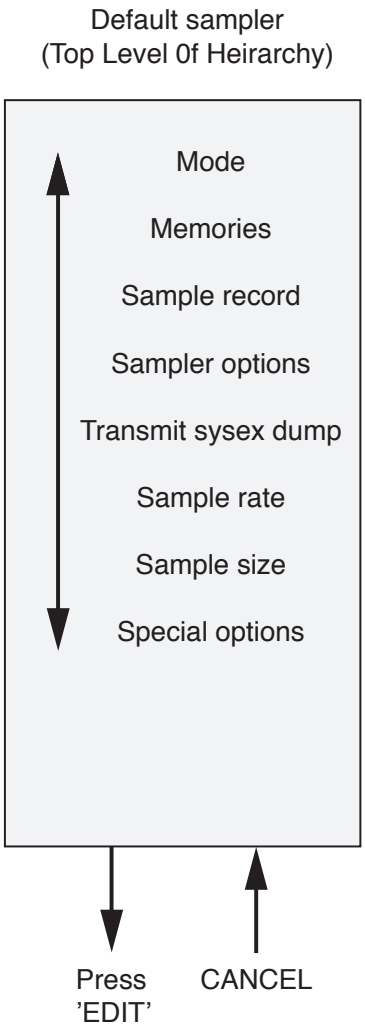
Five sub-menus are common to both the Delay and Sampler modes. These are:

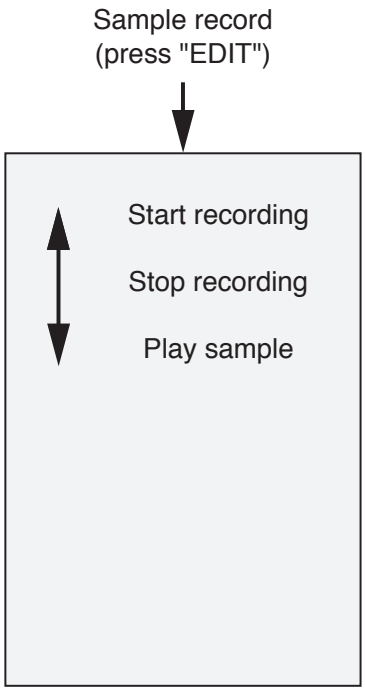
- Mode
- Sample rate
- Sample size
- Special options
- Memories

The following pages will, therefore, explain the functions of the remaining three sub-menus:

- Sample record
- Sampler Options
- Transmit Sysex dump

Of these, Transmit Sysex dump offers no sub-sub-menus. The other two sub-menus have sub-sub-menus, with each offering additional options.





Sample record menu

Sample record

This menu allows you to record and play back audio clips under manual control. For it to be active, you must set up the "Record start", "Record stop" and "Playback start" sub-sub-menus in the "Sampler options" sub-menu, as shown on the next page.

• **Start recording**

Press the EDIT knob to start recording an audio clip

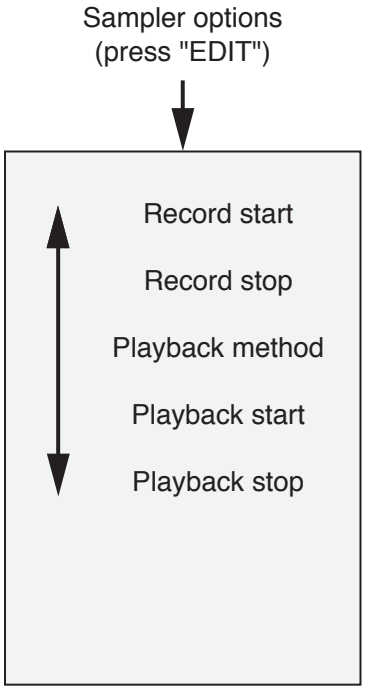
• **Stop recording**

Press the EDIT knob to stop recording an audio clip

• **Play sample**

Press the EDIT knob to replay the audio clip just recorded

Note:
While recording, the RS290 shows the progress of the recording by displaying the screen below. This means that you will not see the "Stop recording" option.



Sampler options menu

Sampler options

This menu allows you to determine how an audio clip will be sampled, and how and when it will be replayed.

You will need to set these options appropriately before you use the "Sample record" menu described on the previous page.

Note:

If you have "Record start" and "Record stop" set to the same value, the triggers become toggles. This means that triggering the input will start recording if the sampler is not already recording, otherwise it will stop recording. The "Playback start" and "Playback stop" commands work in the same way.

Record start

Determines when a recording is initiated. There are five options:

- **Trig1 high**
Recording starts when the signal presented to TRIG1 exceeds the trigger threshold

- **Trig1 low**
Recording starts when the signal at TRIG1 falls below the trigger threshold

- **Trig2 high**
Recording starts when the signal presented to TRIG2 exceeds the trigger threshold

- **Trig2 low**
Recording starts when the signal at TRIG2 falls below the trigger threshold

- **Manual**
Allows you to initiate a recording manually within the "Sample record" menu

Record stop

Determines when a recording is complete. There are five options:

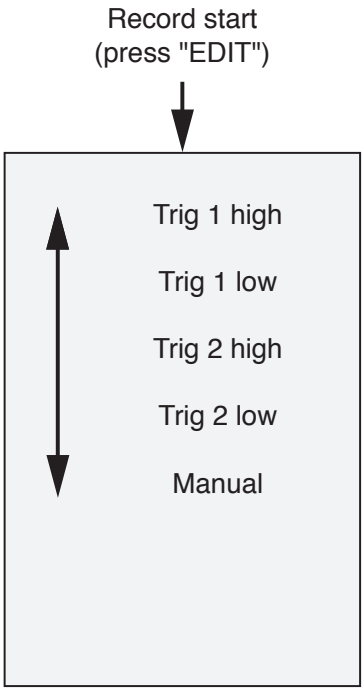
- **Trig1 high**
Recording stops when the signal presented to TRIG1 exceeds the trigger threshold

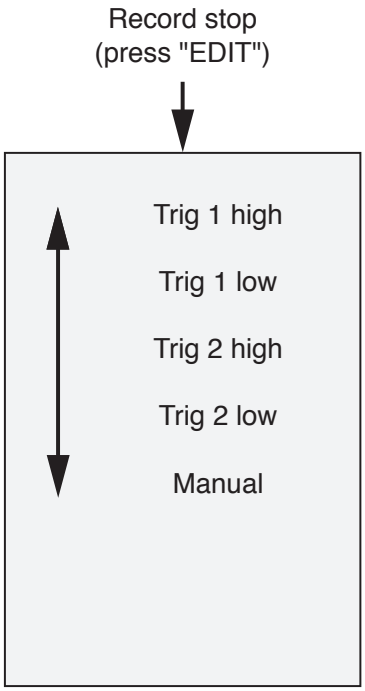
- **Trig1 low**
Recording stops when the signal at TRIG1 falls below the trigger threshold

- **Trig2 high**
Recording stops when the signal presented to TRIG2 exceeds the trigger threshold

- **Trig2 low**
Recording stops when the signal at TRIG2 falls below the trigger threshold

- **Manual**
Allows you to conclude a recording manually within the "Sample record" menu





Playback method

Determines the manner in which the audio clip is replayed. There are five options:

• **Once**
Once triggered, the clip is played once and then stops

• **Loop**
Once triggered, the sample loops continuously until stopped

• **Reverse once**
Once triggered, the clip is played backward once and then stops

• **Reverse loop**
Once triggered, the sample loops backward continuously until stopped

• **Alternate loop**
Once triggered, the sample loops continuously, first playing forwards and then backwards, until stopped

Playback start

Determines when a playback is initiated. There are five options:

• **Trig1 high**
Playback starts when the signal presented to TRIG1 exceeds the trigger threshold

• **Trig1 low**
Playback starts when the signal at TRIG1 falls below the trigger threshold

• **Trig2 high**
Playback starts when the signal presented to TRIG2 exceeds the trigger threshold

• **Trig2 low**
Playback starts when the signal at TRIG2 falls below the trigger threshold

•**Immediate**
Playback starts immediately a recording is completed

Playback stop

Determines when a playback is concluded. There are five options:

• **Trig1 high**
• **Trig1 low**
• **Trig2 high**
• **Trig2 low**

As "Playback start", but to stop the playback.

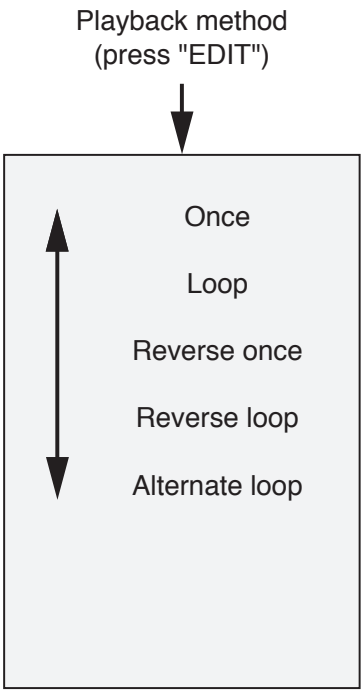
•**Auto**

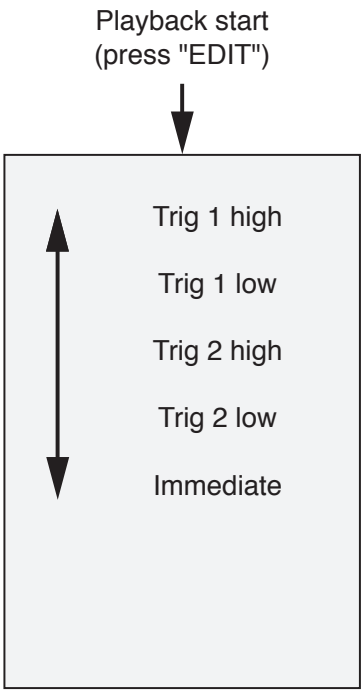
Playback method: once, reverse once:

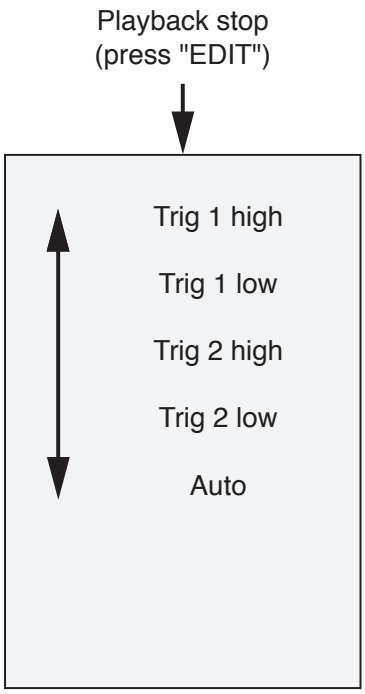
The sample will play once then stop

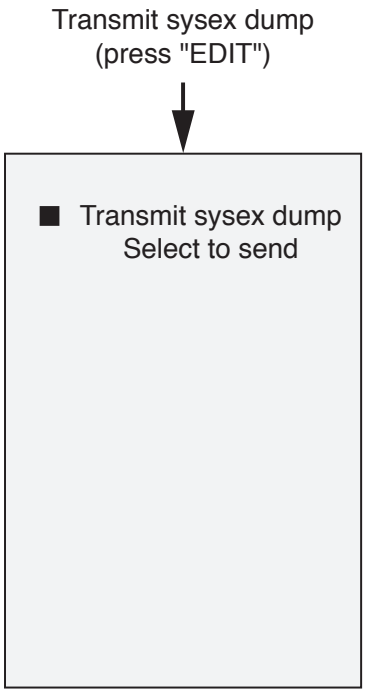
Playback method: any 'loop' mode:

The sample will keep playing until you start recording another sample, or until you trigger Playback start to restart playback from the beginning of the sample/loop.









SysEx dump menu

Transmit Sysex dump

You may dump the current sample to an external MIDI recorder using SysEx.

Press the EDIT knob to initiate transfer. The message "Sending Sample" will be displayed, together with the percentage of the total data transmitted. On completion, the screen will revert to the sub-menu.

To ensure safe receipt of the data from the RS295, and reliable reloading, please refer to the manual for the receiving device.

This menu has no sub-menus.

CONVERTING TEMPO (BPM) TO DELAY TIME (IN MILLISECONDS)

Tempo	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Crotchet	1333	1304	1277	1250	1224	1200	1176	1154	1132	1111	1091	1071	1053	1034	1017
Quaver	667	652	638	625	612	600	588	577	566	556	545	536	526	517	508
Semi-quaver	333	326	319	313	306	300	294	288	283	278	273	268	263	259	254
Dotted semi-quaver	444	435	426	417	408	400	392	385	377	370	364	357	351	345	339

Tempo	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Crotchet	1000	984	968	952	938	923	909	896	882	870	857	845	833	822	811
Quaver	500	492	484	476	469	462	455	448	441	435	429	423	417	411	405
Semi-quaver	250	246	242	238	234	231	227	224	221	217	214	211	208	205	203
Dotted semi-quaver	333	328	323	317	313	308	303	299	294	290	286	282	278	274	270

Tempo	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Crotchet	800	789	779	769	759	750	741	732	723	714	706	698	690	682	674
Quaver	400	395	390	385	380	375	370	366	361	357	353	349	345	341	337
Semi-quaver	200	197	195	192	190	188	185	183	181	179	176	174	172	170	169
Dotted semi-quaver	267	263	260	256	253	250	247	244	241	238	235	233	230	227	225

Tempo	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Crotchet	667	659	652	645	638	632	625	619	612	606	600	594	588	583	577
Quaver	333	330	326	323	319	316	313	309	306	303	300	297	294	291	288
Semi-quaver	167	165	163	161	160	158	156	155	153	152	150	149	147	146	144
Dotted semi-quaver	222	220	217	215	213	211	208	206	204	202	200	198	196	194	192

Tempo	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
Crotchet	571	566	561	556	550	545	541	536	531	526	522	517	513	508	504
Quaver	286	283	280	278	275	273	270	268	265	263	261	259	256	254	252
Semi-quaver	143	142	140	139	138	136	135	134	133	132	130	129	128	127	126
Dotted semi-quaver	190	189	187	185	183	182	180	179	177	175	174	172	171	169	168

Tempo	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134
Crotchet	500	496	492	488	484	480	476	472	469	465	462	458	455	451	448
Quaver	250	248	246	244	242	240	238	236	234	233	231	229	227	226	224
Semi-quaver	125	124	123	122	121	120	119	118	117	116	115	115	114	113	112
Dotted semi-quaver	167	165	164	163	161	160	159	157	156	155	154	153	152	150	149

Tempo	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149
Crotchet	444	441	438	435	432	429	426	423	420	417	414	411	408	405	403
Quaver	222	221	219	217	216	214	213	211	210	208	207	205	204	203	201
Semi-quaver	111	110	109	109	108	107	106	106	105	104	103	103	102	101	101
Dotted semi-quaver	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134

Tempo	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164
Crotchet	400	397	395	392	390	387	385	382	380	377	375	373	370	368	366
Quaver	200	199	197	196	195	194	192	191	190	189	188	186	185	184	183
Semi-quaver	100	99	99	98	97	97	96	96	95	94	94	93	93	92	91
Dotted semi-quaver	133	132	132	131	130	129	128	127	127	126	125	124	123	123	122

Tempo	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179
Crotchet	364	361	359	357	355	353	351	349	347	345	343	341	339	337	335
Quaver	182	181	180	179	178	176	175	174	173	172	171	170	169	169	168
Semi-quaver	91	90	90	89	89	88	88	87	87	86	86	85	85	84	84
Dotted semi-quaver	121	120	120	119	118	118	117	116	116	115	114	114	113	112	112

Tempo	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194
Crotchet	333	331	330	328	326	324	323	321	319	317	316	314	313	311	309
Quaver	167	166	165	164	163	162	161	160	160	159	158	157	156	155	155
Semi-quaver	83	83	82	82	82	81	81	80	80	79	79	79	78	78	77
Dotted semi-quaver	111	110	110	109	109	108	108	107	106	106	105	105	104	104	103

Tempo	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209
Crotchet	308	306	305	303	302	300	299	297	296	294	293	291	290	288	287
Quaver	154	153	152	152	151	150	149	149	148	147	146	146	145	144	144
Semi-quaver	77	77	76	76	75	75	75	74	74	74	73	73	72	72	72
Dotted semi-quaver	103	102	102	101	101	100	100	99	99	98	98	97	97	96	96

Tempo	210	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Crotchet	286	1304	1277	1250	1224	1200	1176	1154	1132	1111	1091	1071	1053	1034	1017
Quaver	143	652	638	625	612	600	588	577	566	556	545	536	526	517	508
Semi-quaver	71	326	319	313	306	300	294	288	283	278	273	268	263	259	254
Dotted semi-quaver	95	435	426	417	408	400	392	385	377	370	364	357	351	345	339

RS295

DELAY EXPANDER

The RS295 Delay Expander expands the facilities provides by the RS290 Sampler / Delay. It has no functionality in isolation.

All information relating to the RS295 is contained in the chapter on the RS290.